



CENTRAL HUDSON GAS & ELECTRIC 2024-2028 CORPORATE CAPITAL FORECAST July 1st , 2023



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EXECUTIVE SUMMARY

This document presents the comprehensive Capital Expenditure Plan (Capital Plan) for the Electric, Gas and Common program areas of Central Hudson Gas & Electric Corporation (Central Hudson or the Company) for the forecast period 2024 through 2028. This Capital Plan positions Central Hudson to continue to provide safe and reliable service to customers over the long term. This Capital Plan is consistent with the purpose statement of the Company as shown below:

“Together we power endless possibilities.”

This Capital Plan outlines forecasted addition expenditures of \$772 million in the electric delivery system (including \$17 million related to FERC-regulated projects), \$410 million in the gas delivery system and \$435 million in Common Program areas over the five-year period. The projects and programs proposed in this Capital Plan are what the Company has determined as the highest priority over the forecast period to respond to the day-to-day non-discretionary needs of the systems, maintain those system’s standards, and implement system enhancements to meet future performance and energy policy goals. The Company is continually re-evaluating and reprioritizing projects, and the latter years of this Capital Plan will change because of these reevaluations and assessments. The Capital Plan is developed annually in accordance with the Company’s Capital Prioritization Process Guidelines.

The five-year Capital Plan contains projects that are aligned with Central Hudson’s strategy of providing exceptional value to our Stakeholders by focusing on four themes listed below:

- **Business Modernization:** Modernizing and transforming our business through electric and natural gas system investments and process improvements.
- **Operational Excellence:** Continuously improving our performance while maintaining cost effective, efficient, and secure operations.
- **Energy Leadership:** Advocating on behalf of customers and other stakeholders.
- **Organizational Development:** Investing in programs and employee development to position the organization for continued success in the future.

Capital Forecast – Additions (\$000)

| | <u>2024</u> | <u>2025</u> | <u>2026</u> | <u>2027</u> | <u>2028</u> | <u>TOTAL</u> |
|-----------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------|
| ELECTRIC | \$ 148,833 | \$ 146,035 | \$ 148,938 | \$ 155,194 | \$ 155,191 | \$ 754,192 |
| FERC | 254 | 271 | 347 | 593 | 15,952 | \$ 17,417 |
| GAS | 72,005 | 80,014 | 81,971 | 83,874 | 91,845 | 409,710 |
| COMMON | <u>80,668</u> | <u>84,847</u> | <u>94,453</u> | <u>73,549</u> | <u>101,886</u> | <u>435,402</u> |
| CORPORATE TOTAL | <u>\$ 301,760</u> | <u>\$ 311,167</u> | <u>\$ 325,709</u> | <u>\$ 313,210</u> | <u>\$ 364,874</u> | <u>\$ 1,616,720</u> |

Capital Forecast – Removal (\$000)

| | <u>2024</u> | <u>2025</u> | <u>2026</u> | <u>2027</u> | <u>2028</u> | <u>TOTAL</u> |
|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|
| ELECTRIC | \$ 15,283 | \$ 15,340 | \$ 13,797 | \$ 13,566 | \$ 12,504 | \$ 70,489 |
| GAS | 1,996 | 2,054 | 2,104 | 2,151 | 2,221 | 10,527 |
| COMMON | <u>95</u> | <u>249</u> | <u>530</u> | <u>250</u> | <u>284</u> | <u>1,408</u> |
| CORPORATE TOTAL | <u>\$ 17,374</u> | <u>\$ 17,643</u> | <u>\$ 16,431</u> | <u>\$ 15,967</u> | <u>\$ 15,009</u> | <u>\$ 82,424</u> |

Capital Forecast – Additions & Removal Totals (\$000)

| | <u>2024</u> | <u>2025</u> | <u>2026</u> | <u>2027</u> | <u>2028</u> | <u>TOTAL</u> |
|-----------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------|
| ELECTRIC | \$ 164,370 | \$ 161,646 | \$ 163,082 | \$ 169,353 | \$ 183,647 | \$ 842,098 |
| GAS | 74,001 | 82,068 | 84,075 | 86,025 | 94,067 | 420,236 |
| COMMON | <u>80,763</u> | <u>85,096</u> | <u>94,984</u> | <u>73,799</u> | <u>102,169</u> | <u>436,811</u> |
| CORPORATE TOTAL | <u>\$ 319,134</u> | <u>\$ 328,810</u> | <u>\$ 342,141</u> | <u>\$ 329,177</u> | <u>\$ 379,883</u> | <u>\$ 1,699,145</u> |

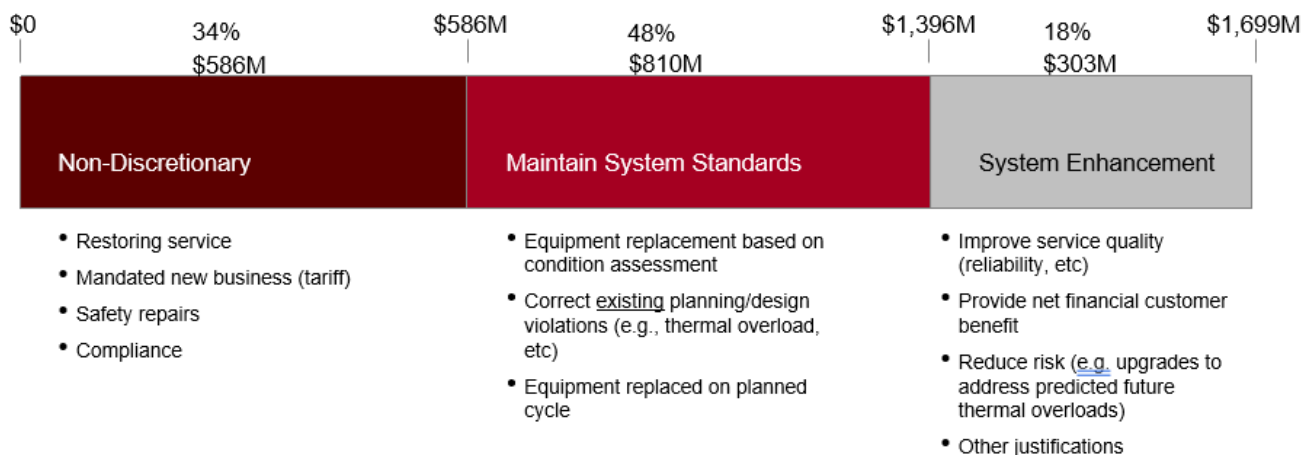
Introduction

Central Hudson’s Corporate Capital Forecast shows elevated levels of investment in 2024 through 2028 that are driven by continued electric capital investments, major facilities initiatives, and information technology upgrades. The capital plan includes a number of projects that advance sustainability initiatives in support of the State’s climate goals as outlined in the Climate Leadership and Community Protection Act (“CLCPA”). The capital plan totals \$1,699 million in capital expenditures (Additions + Retirements) over the five-year period 2024-2028. The prior year’s 5-year forecast from 2023-2027 was \$1,441 million. Significant variations between forecasts are driven

primarily by new projects that will require regulatory support to proceed, increased costs/inflation, and updated project estimates.

5-Year Corporate Capital Forecast Summary

A breakdown of the Capital Forecast is shown below indicating the level of spending as prioritized by summary categories. Non-discretionary is the level of spending that is necessary to meet the minimum standards of service or compliance with Public Service Law. Maintain System Standards is the level of spending required to continue our current level of service reliability and safety or to meet obligations set through the rate proceedings. System Enhancement is capital spending aimed at improving our quality of service, reducing risk, lowering operating costs, or implementing design and technology changes that are responsive to energy policy objectives.



The System Enhancement Capital Spending has been further segregated into the following categories:

- **Projects with a Net Financial Customer Benefit**
 - o Projects revenue requirement of the capital investment is lower than the net benefit (e.g., cost savings) for customers
 - o Reduces customer bills in the long term (after next rate case)
 - o Increases earnings both short term and long term

- **Projects that Reduce Risk**
 - o Investment reduces the risk of a system failure that would:
 - Reduce potential public safety at risk
 - Result in widespread incident, impacting system integrity
 - Spur significant punitive regulatory action

- **Projects that Improve Reliability**
 - o Investment improves reliability at a cost that (we believe) customers are willing to pay
 - o Demonstrate that increased cost is warranted by the improvement in service quality (benchmark and compare cost per customer outage avoided).

- **Other Projects**

- Projects that do not clearly fit in the other categories, but can be justified for other reasons
- Requires detailed individual business case
- Demonstrate a clear strategic rationale
- Show financial projections (customer bill impact and earnings impact)
- Assess risks (regulatory disallowance, etc.)

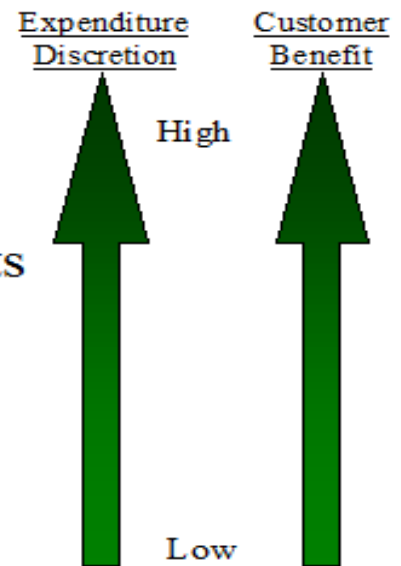
Each year through its planning and forecasting processes, Central Hudson develops a recommended Capital Expenditures Budget for the upcoming fiscal year, as well as a forecast for upcoming five-year period.

The Corporate Capital Forecast is developed through a bottom-up process where planning studies, infrastructure issues, compliance requirements, and other corporate initiatives identify specific capital needs. Following the Company's Capital Prioritization Process Guidelines, these needs are prioritized based on whether the need is non-discretionary (mandated or otherwise not optional), required to maintain the existing level of service or reliability, or a system or service enhancement. In addition to the costs of the projects, the timing of the projects is also analyzed to determine the most appropriate time for the capital investment to be made either due to load growth, risk of failure, or business need.

In addition to the summary categories, the needs are prioritized based on the investment categories shown below. It should be noted that those projects with the least amount of discretion also have the least amount of benefit for customers in terms of improving their level of service quality or reducing operating costs. It is important that we continue to develop sound justifications for the system enhancement projects since they do provide the most benefit to customers.

Categories of System Capital Investments

- System Expansion/Enhancement
- Study Based Load Growth
- Infrastructure/Planned Replacements
- New Business/Customer Additions
- Compliance
- Daily Operations/Repairs and Unplanned Replacements



The key driver of the expenditures included within the five-year Electric Capital Plan remains condition-based infrastructure replacements necessary to maintain current levels of reliability. 75% of the Company’s planned expenditures in the Electric Capital five-year forecast are related to infrastructure replacements versus installing new infrastructure. This percentage increases to 93% across the electric operation budget categories (“Production,” “Transmission,” “Substation,” and “Distribution” categories). While the Company’s replacement strategies are condition-based versus time-based programs, as equipment reaches the end of its useful life, the condition assessment is more likely to identify issues that warrant replacement. In 2023, the Company performed an asset lifecycle assessment for three of the categories listed above (“Transmission,” “Substation” and “Distribution”). The analysis determined that, apart from three out of twelve asset classes in the study, 20% or more of assets in each asset class are beyond their expected life with certain asset classes at 45% or more. Without a structured infrastructure replacement program, the number of assets remaining in-service past their useful life will continue to grow and may negatively impact system reliability. In 10 years, the total amount of system assets beyond the expected life would be approximately 40% across all asset classes. The Company’s 2022 Long Range System Plan describes a number of these asset replacement programs.

In addition, the five-year electric plan includes a number of projects that will help meet the State’s climate goals as outlined in the CLCPA. The Company’s Electric Capital Plan includes projects classified as CLCPA Phase 1 projects. These represent projects that satisfy Reliability, Safety, and Compliance purposes but that can also address bottlenecks or constraints that limit renewable energy delivery within a utility’s system or include the added benefit of increasing the capacity to host additional DERs. Approximately 30% of the electric 5-year capital plan is for projects that also will increase headroom and will do so by up to 547 MW by the end of the 5-year period. Two projects with

the potential to increase headroom by an additional 117 MW will be started within the 5-year period but will be completed outside of this timeframe. This MW level of headroom increase (up to 547 MW) represents approximately two times Central Hudson's total currently interconnected renewable generation nameplate capacity.

The single largest component of the Gas Capital Program is the Leak Prone Pipe (“LPP”) elimination program. Central Hudson operates 1,318 miles of distribution main with 66,186 services (as of 2022), which currently includes 82 miles of LPP main. From 2016 through 2021, an average of 20 miles of LPP main was eliminated. In 2022, 15 miles of LPP was eliminated, and the Company plans to continue eliminating leak prone pipe at a rate of 15 miles per year which would result in the total elimination of distribution pipe currently classified as leak prone in six years. The main replacement projects are identified and prioritized using the GL Main Replacement Prioritization Program (“MRP”) which develops a risk ‘score’ based on pipe and operating characteristics such as material, operating pressure, age, diameter, leak history, location (proximity to buildings, business district, flood prone areas) and cathodic protection status. This risk score measures the relative likelihood and the consequences of a leak associated with each pipeline segment. In addition, Subject Matter Expert (“SME”) input review and planned highway rebuilds are taken into consideration when developing the proposed main replacement project listing.

The Gas New Business plan reflects a significant reduction from the prior five-year forecasts due to two contributing factors: 1) The forecast is in alignment with the most recent rate agreement, recognizing the fact that the Company has reduced its gas expansion program to tariff based customer requested service connections consistent with state energy policy; and 2) Expenditures associated with service replacements completed as part of LPP gas main replacement projects going forward will be transferred from the “New Business” program to the “Distribution Improvements” category. The 3-year average expenditures for these LPP service replacements are approximately \$2.5M per year.

The Common Capital Forecast consists of the following categories: Land & Buildings; Information and Operational Technology (“IT and OT”); Tools & Equipment; Security; Communication; and Transportation. The Land & Buildings capital forecast comprises of several significant projects including the Training Academy & Indoor Operations Training Area, a Primary Control Center for transmission and distribution operations, and infrastructure replacement projects due to age or equipment failures. The Tools forecast consists of replacements driven by the modernization of the vehicles they are utilized on, obsolescence and incompatibility, decreased reliability, discontinued manufacturer support, and conformance to changing OSHA or other regulations. Security’s capital forecast consists of upgrades to our security infrastructure across the service territory. The transportation capital forecast is built primarily on the replacement of vehicles and equipment based on industry standard replacement criteria. Electrifying our transportation fleet is currently underway to fulfill New York State’s clean energy emissions goal. Lastly, the IT and OT Capital Budget consists of investments for business-driven software implementations, upgrades to existing software solutions, and infrastructure or hardware lifecycle upgrades and ongoing extensions resulting from corresponding software updates or implementations. Significant detail regarding our IT expenditures plan is included in the Common Program section.

Resource Needs of Future Program

Central Hudson will face the following opportunities and challenges as we implement this Capital Plan:

Recently, the high inflationary economic environment is requiring careful management to navigate supply constraints and price increases. The underlying forecast in the Capital Plan were developed with assumptions of lower inflation levels than those that have emerged as of the time of this writing. Executing the Capital Plan from 2024 to 2028 with these challenges will require additional prioritization as well as higher levels of investment.

On the electric side, the Company will need to continue to develop enhanced competencies in both asset management as well as centralized distribution system operations. Improvements are being made to the System Planning Process with a transition in forecasting methodologies and application of a more probabilistic approach to integrate distributed energy resources (“DERs”) into the risk and growth profiles. This process will encompass both how we determine asset replacements and the methods used to optimize the portfolio of projects and programs. In addition, in recognition of the State’s aggressive renewable goals as identified in the CLCPA and the Accelerated Renewable Energy Growth and Community Benefit Act (Accelerated Renewables Act), the Company is modifying its planning process to better align with these goals. As noted, our electric capital plan is comprised of condition-based infrastructure type projects. A number of these existing projects provide incremental hosting capacity benefits. As new project needs are studied, renewable penetration levels and potential hosting capacity improvements are included in analysis to determine the recommended solution. Preliminary study work has been completed to help identify additional potential projects that would facilitate the attainment of these goals based on system constraints and forecasted renewable penetration levels. To ensure that the Plan proceeds in the most optimal fashion, the Company will need to reassess the timing and reprioritize projects using both these improved asset management approaches and the understanding of system needs. Planning shall remain as a core competency for the Company.

On the gas side of the business, the elimination of leak prone distribution piping, integrity driven modifications to the transmission system, and regulator station modernization requires detailed project prioritization and system planning. Additionally, engineering design, permitting, estimating and field construction management and oversight resources will need to remain at current levels to maintain the high degree of safety, and ensure quality installations continue to occur.

In relation to executing our construction plans, the Company will continue to utilize contract resources to perform the incremental electric and gas transmission and distribution construction. It is anticipated that sufficient contract resources are available to complete the planned work.

ELECTRIC PROGRAM SUMMARY

Electric System Overview

The Central Hudson electric system serves approximately 309,000 electric customers in New York State’s Mid-Hudson River Valley. Central Hudson’s electric service territory extends from the suburbs of metropolitan New York City north to the Capital District at Albany.

The Central Hudson system is comprised of substations having an aggregate transformer capacity of approximately 5.2 million kilovolt amps, a transmission system that consists of 566 circuit miles and a distribution system that consists of 7,158 pole miles of overhead lines and 1,656 trench miles of underground lines, as well as customer service lines and meters.

The transmission system operates at nominal voltages of 69 kilovolts, 115 kilovolts and 345 kilovolts. The table below provides a more detailed breakdown of the transmission system.

| Operating Voltage | Design Voltage | Overhead Circuit Miles | Pipe-Type Cable Circuit Miles | Total Circuit Miles |
|--------------------------|--|-------------------------------|--------------------------------------|----------------------------|
| 345 kV | 345 kV | 76 | 0 | 76 |
| 115 kV | 115 kV | 199.3 | 4.1 | 203.4 |
| 69 kV | 69 kV | 248 | 0 | 305 |
| | 115 kV construction operating at 69 kV | 39 | | |
| Total | | 562.3 | 4.1 | 566.4 ¹ |

The distribution system operates at nominal voltages of 4.16 kilovolts, 4.8 kilovolts, 13.8 kilovolts, and 34.5 kilovolts. It also encompasses sub-transmission systems that operate at 13.8 kilovolts in three urban areas of our service territory, feeding into secondary networks. The table below provides a more detailed breakdown of the overhead portion of the distribution system, based upon the voltage at which a feeder exits the substation.

| Conductor | Pole Miles of Line at Substation Exit |
|----------------------|--|
| 34.5 kV Overhead | 209 |
| 13.8 kV Single Phase | 4,536 |
| 13.8 kV Three Phase | 2,379 |
| 5 kV or under | 34 |
| Total | 7,158 |

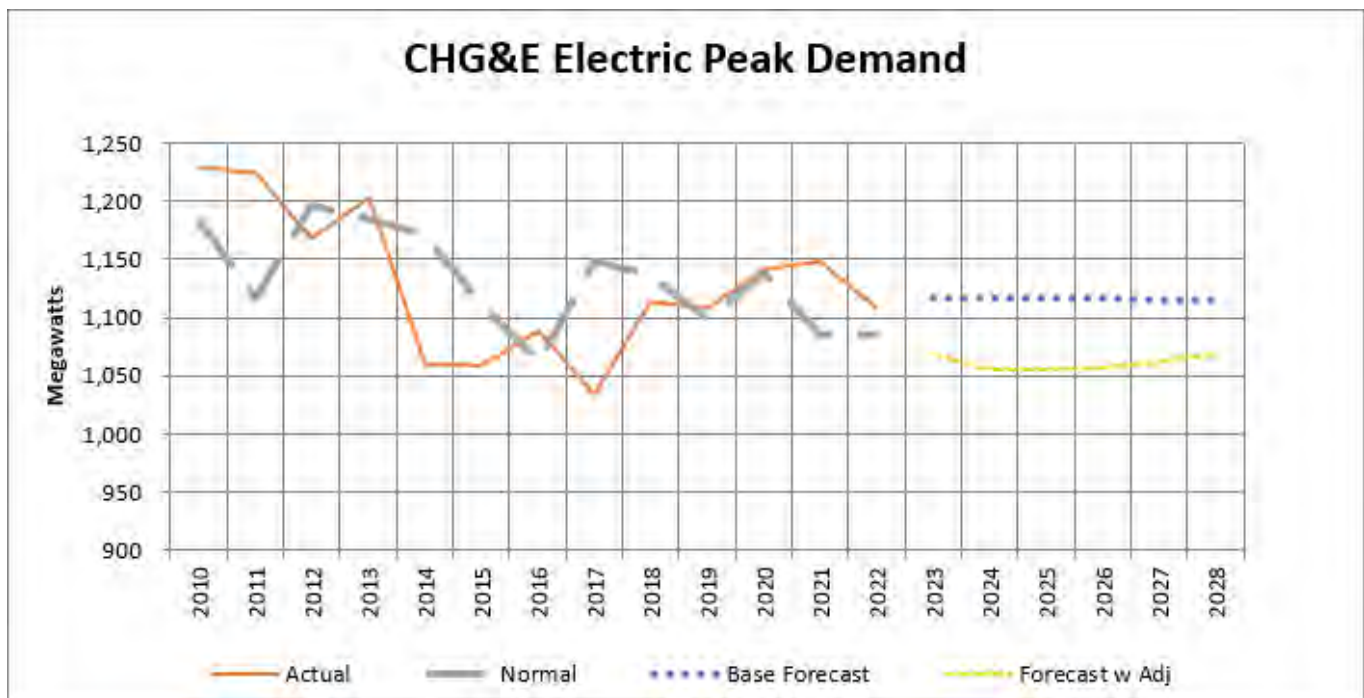
¹ Accounts for the sale of the SL Line in 2022

Central Hudson’s roughly 77 electric substations contain the power transformers that change the voltage from one level to another.

Electric Forecast Overview

Central Hudson’s electric capital forecast for the next five-year period is developed each year using the most recent planning studies, customer and sales forecasts, corporate load forecasts, and other corporate trends.

The current system peak forecast is shown on the graph below. On the graph, Central Hudson’s peak demand has shown a modest decline based primarily on the regional economy, and the effects of the Company’s energy efficiency and demand management programs. Forecast demand is also showing a modest decline and then flat for the next five-year period.



In addition, Central Hudson utilizes distribution planning areas to aid in the identification of needs, their timing, and the quantification of the risks, as well as assess the alternatives available to meet those needs. These distribution planning areas are based on where the ability exists to transfer load among area substations. The graphic on the next page shows the distribution planning area load groups.

CHGE Franchise Territory by Electric Load Group



Electric Program Detail

The Electric Capital Forecast is developed utilizing guidelines, planning standards and engineering judgment. The forecast is completed for each budget category and integrated into a comprehensive plan. The summaries below provide the annual forecasts for each of the Electric Program categories.

Electric Capital Forecast – Additions (\$000)

| | <u>2024</u> | <u>2025</u> | <u>2026</u> | <u>2027</u> | <u>2028</u> | <u>TOTAL</u> |
|---------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Production | \$ 4,367 | \$ 6,417 | \$ 5,178 | \$ 3,533 | \$ 5,560 | \$ 25,055 |
| Transmission | 31,010 | 28,794 | 29,063 | 36,312 | 32,835 | 158,013 |
| Transmission FERC | 254 | 271 | 347 | 593 | 15,952 | 17,417 |
| Substation | 26,230 | 20,219 | 22,589 | 22,874 | 22,731 | 114,644 |
| New Business | 12,688 | 13,301 | 13,766 | 14,426 | 15,156 | 69,338 |
| Distribution Improvements | 52,447 | 56,322 | 57,449 | 56,759 | 57,213 | 280,191 |
| Transformers | 17,640 | 16,443 | 16,255 | 16,564 | 16,879 | 83,782 |
| Meters | 2,768 | 2,827 | 2,886 | 2,941 | 2,997 | 14,418 |
| Storm | 1,682 | 1,712 | 1,751 | 1,785 | 1,820 | 8,750 |
| Total | \$ 149,087 | \$ 146,306 | \$ 149,285 | \$ 155,787 | \$ 171,143 | \$ 771,609 |

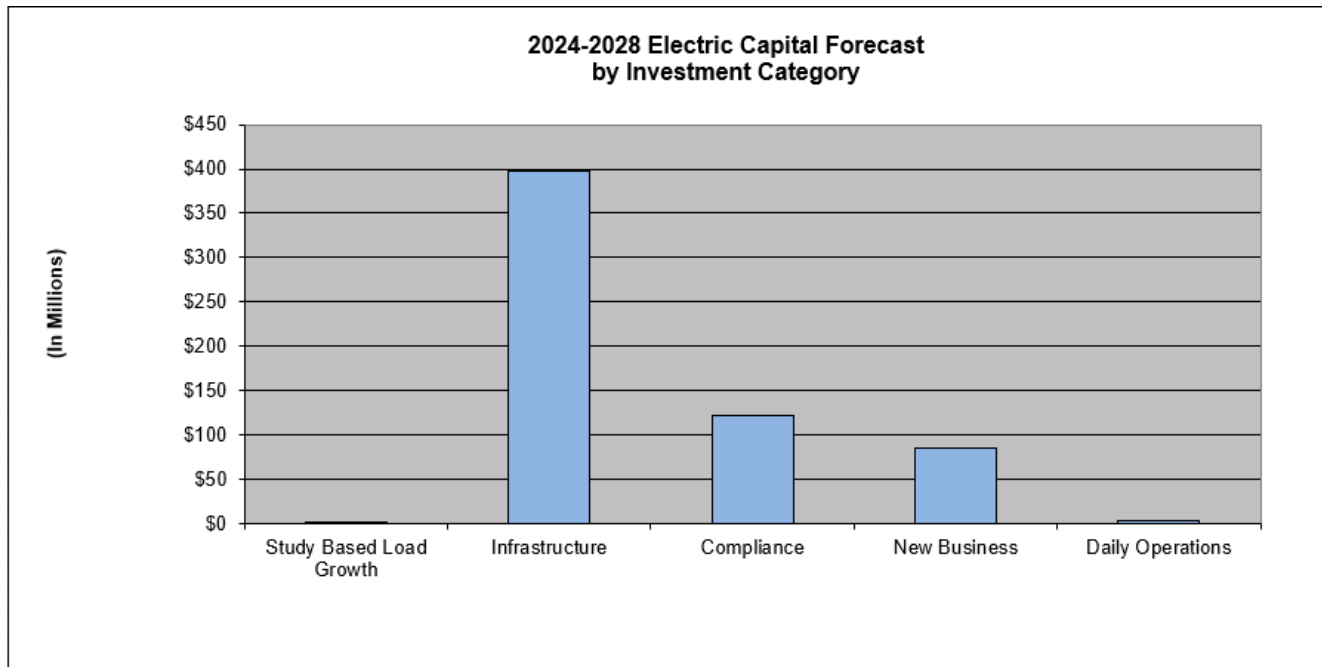
Electric Capital Forecast – Removal (\$000)

| | <u>2024</u> | <u>2025</u> | <u>2026</u> | <u>2027</u> | <u>2028</u> | <u>TOTAL</u> |
|---------------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Production | \$ 5 | \$ 1,258 | \$ 94 | \$ 54 | \$ 33 | \$ 1,445 |
| Transmission | 6,266 | 5,658 | 4,676 | 4,945 | 3,800 | 25,344 |
| Substation | 2,604 | 2,108 | 2,586 | 2,174 | 2,216 | 11,688 |
| New Business | 256 | 269 | 283 | 297 | 312 | 1,417 |
| Distribution Improvements | 5,738 | 5,619 | 5,720 | 5,649 | 5,689 | 28,415 |
| Transformers | 409 | 418 | 427 | 435 | 443 | 2,132 |
| Meters | 5 | 10 | 11 | 11 | 11 | 48 |
| Total | \$ 15,283 | \$ 15,340 | \$ 13,797 | \$ 13,566 | \$ 12,504 | \$ 70,489 |

A breakdown of the Electric Capital Forecast is shown below indicating the level of spending the Company has prioritized. Non-discretionary is the level of spending that is necessary to meet the minimum standards of service or compliance with public service law. Maintaining System Standards is the level of spending required to maintain our current level of service reliability and to meet obligations set through the rate proceedings. System Enhancement is capital spending aimed at improving our level of service, reducing risk, or reducing operating costs.



In addition, the projects within the Electric Program are categorized by the following Investment Category: growth (study-based load growth); new business; compliance; day-to-day business management; and infrastructure replacement. The bar graph below shows the breakdown of the projects in our current five-year forecast by these Investment Categories.



State Policy and Regulatory Items Impacting Electric Program

In 2020, Central Hudson participated as a member of the Department of Public Service (“DPS”) led Utility T&D Investment Working Group in response to the CLCPA and the Accelerated Renewables Act. The primary goal of the working group, in response to the May 2020 Public Service Commission (“Commission” or “PSC”) Order, was to identify policy changes necessary to facilitate the interconnection of large-scale renewables necessary to meet the CLCPA targets, identify new transmission and distribution development needed to meet these goals, and identify and prioritize technologies to research to improve existing and future grid function. The technical analysis to identify projects required to unbundle forecasted renewable generation to help address the State’s goals concluded in the fall of 2020. As part of this technical analysis, engineering identified projects that advance the State’s energy targets as identified in the Acts, split into two phases. Phase 1 projects are immediately actionable projects that satisfy Reliability, Safety, and Compliance purposes but can also address bottlenecks or constraints that limit renewable energy deliverability within a utility’s system and are in the utility’s current capital pipeline. Phase 2 projects increase capacity on the local transmission and distribution system to specifically allow for interconnection and delivery of new renewable generation resources within the utility’s system. In response to the Utility T&D Investment Working Group November 2020 filing, the Commission approved the proposed Phase 1 projects in February 2021 and ordered NY Utilities in September 2021 to modify headroom calculations based on Staff’s proposal, file a revised Benefit Cost Analysis (“BCA”), and establish a Coordinated Grid Planning Proposal (“CGPP”). The NY Utilities filed their initial framework for the CGPP and revised BCA in December 2021. The NY Utilities also filed their revised headroom calculations starting in February 2022 and on a bi-annual basis thereafter. The revised BCA was approved by the Commission in June 2022. Additionally, as indicated within the initial CGPP framework, the NY Utilities filed a more comprehensive CGPP proposal in December 2022 which is awaiting Commission approval. The new CGPP will have longer term implications in developing T&D projects to meet the CLCPA and the development of a new planning process aimed at reducing the curtailment of renewable resources. In addition, the Commission ordered the upstate utilities (Central Hudson, National Grid and Avangrid) to propose solutions to “Areas of Concern” where the New York Independent System Operator (“NYISO”) predicted greater future interconnections. This analysis proposed solutions for projects that are well along in the NYISO Interconnection Process.

The Company is actively working to complete Phase 1 projects and has identified additional Phase 1 projects included within the current five-year forecast. The Phase 1 projects are identified within the sections below and additional documentation based on the February 11, 2021, Order on Phase 1 Local Transmission and Distribution Project Proposals is included in Appendix A for each new Phase 1 project. In addition, two Phase 2 projects (rebuild Q Line at 115 kV and 10 and T-7 Station Connections) were identified in the follow-up DPS report (Initial Report on the New York Power Grid Study) as Priority Phase 2 Local Transmission Projects. The replacement of the 10 and T-7 Station Connectors has been incorporated into the current five-year plan. The Q Line rebuild at 115 kV, operate at 69 kV is included within the five-year plan as a Phase 1 project.

In February 2023, the Public Service Commission approved Phase 2 Areas of Concern Transmission Upgrades. The Phase 2 Areas of Concern were identified as locations within Central Hudson, NYSEG/RGE, and National Grid territory where strong developer interest in siting renewable generation exceeded the capability of the local transmission system. Within Central Hudson’s territory, the approval of the Phase 2 Area of Concern proposal includes rebuilding the Company’s NC

Line for 115 kV and operating at 69 kV. Additionally, the Order approved cost recovery for this project under the FERC load ratio share methodology.

In April 2022, the PSC issued an Order amending cost sharing rules within the NY Standardized Interconnection Requirements. The purpose of this Order is intended to reduce the capital burden on developers/applicants that trigger upgrades by providing upgrade costs to multiple developers/applicants that benefit from such upgrades. Part of this Order requires NY Utilities to share their Capital Investment Plan (“CIP”) and identify substations included in the CIP that are eligible for cost sharing as well as have multi-value components (i.e., address a substation transformer asset condition which also results in an increase to DER hosting capacity). As part of this, developers may have the opportunity to impact initial capital plans to accommodate additional DERs.

Electric Production

Most of the expenditures for the hydroelectric generating facilities are for condition-based infrastructure replacement projects with a smaller number of projects to improve operations and address security concerns brought about with remote starting capability.

The Company projects expenditures in 2024 of \$1.9 million for the replacement of the rubber gate and headgates at the Dashville facility. This is followed by major overhauls and runner replacements for Dashville Unit #1 in the 2024/2025 timeframe and Dashville Unit #2 in the 2025/2026 timeframe. The overhauls are budgeted for \$5.1 million (Unit #1) and \$5.3 million (Unit #2). The Dashville rubber gate is a replacement in kind project for the existing system that has reached the end of its useful life. Three additional smaller infrastructure projects are included for the Dashville facility (Concrete Reinforcement on the Spillway, Staircase to the Bottom Door, and Walkway over the Tailrace) to address issues with the 1920s vintage infrastructure. There are two projects included to address infrastructure issues at the Sturgeon Pool facility – Retaining Wall Penstock and Relay Protection and Breaker replacements. These projects address condition-based/aging infrastructure issues. The remaining infrastructure project is an upgrade of the High Falls Trash Rake scheduled for 2024. This project is a replacement in kind component for the current system.

The projects to improve operations include the addition of remote start capabilities at the Sturgeon Pool and Dashville plants and an upgrade of the plant excitation systems at all sites in the 2027/2028 timeframe; and for pond control at the Dashville Plant in the 2024/2025 timeframe. The security projects include the addition of camera systems at both our Sturgeon Pool and Dashville facilities. The camera systems are a requirement in automation to ensure safe conditions on site before starting the hydro production facilities remotely.

There are minimal capital expenditures for the Company’s combustion turbine facilities in the five-year plan. The Company will be retiring these units in the 2024/2025 timeframe due to substantial capital expenditures required to meet new and more stringent emissions requirements, aligned with State energy goals, which make these units uneconomical going forward.

Electric Transmission

For the Electric Transmission System, the purpose is to serve the expected load by developing a rational program to maintain reliability, avoid unacceptable risks, strive for the most economical reinforcements, and allow for equipment maintenance.

The facilities need to be planned, designed, operated, and maintained according to “Good Utility Practice.” These are any of the practices, methods or actions required by FERC, NERC, NPCC, NYSRC, NYISO, PSC, applicable law, regulations, or policies and standards, or engaged in or approved by a significant portion of the electric utility industry. Electric Planning and Interconnections analyses are based on planning criteria where the transmission system is designed and operated to conform to applicable reliability rules: no electric transmission facility should be loaded beyond its normal rating prior to any contingency; no facility to be loaded beyond its applicable emergency rating following any contingency; and fault levels are to be within equipment ratings.

The thermal, voltage, and system stability performance is analyzed under the various customer/load scenarios to assess the load serving capability, identify alternatives to increase load serving capability where needed, and evaluate alternatives. 100% of the expenditures in the Electric Transmission category are associated with the condition-based replacement of older/aging infrastructure.

The significant Electric Transmission projects in the five-year forecast are the rebuild of several transmission lines, including: the Knapps Corners – Myers Corners 69 kV KM line; the Hurley Ave – Saugerties SB line for 115 kV; the Saugerties – North Catskill H line for 115 kV; the Honk Falls - Neversink 69 kV HG line; the Pleasant Valley – Rhinebeck Q Line for 115 kV; Central Hudson’s portion of the North Catskill – National Grid 115 kV 5 Line; and the Knapps Corners – Spackenkill 115 kV SK Line. All these projects are driven by infrastructure conditions. These major rebuilds account for 70% of the planned Electric Transmission category expenditures.

A project that appeared in previous five-year forecasts, the Northwest Reinforcement Project (which adds a 345 kV interconnection to the Catskill District 115kV system)², has been deferred due to the Targeted Demand Response (DR) Program; this DR program is expected to delay the Northwest Reinforcement in service date until at least 2029.

The rebuild of the 69 kV KM line is intended to address significant infrastructure issues on the line identified through our inspection program. Inspections have identified 58% of the line’s wood pole structures as needing replacement. The line was originally constructed in the 1930’s. In addition to addressing known infrastructure issues, potential benefits of the KM line rebuild include an increase of the transmission supply to the Myers Corners Substation. The main concern impacting the rebuild is its proximity to the Dutchess County Airport. The project will be constructed in late 2023 / early 2024 with an anticipated cost of approximately \$2.88 million within the 5-year forecast period. This project is one of Central Hudson’s Phase 1 projects consistent with the State’s CLCPA goals.

² The Northwest reinforcement was identified in the November 2, 2020 “Utility Transmission and Distribution Investment Working Group Report” as a potential Phase 2 project.

| KM Line Condition | | | | |
|--------------------------|--------------|----------------------|---------------|--|
| <u>Section</u> | <u>Miles</u> | <u>Structures to</u> | | <u>Probable Replacement Percentage</u> |
| | | <u>Replace</u> | <u>Repair</u> | |
| Knapps Corners – P33581 | 1.0 | 10 | 5 | 65.2% |
| P33581 – P33591 | 0.5 | 9 | 5 | 60.8% |
| P33591 – P140218 | 0.35 | 0 | 0 | 0 |
| P140218 - Myers Corners | 1.0 | 9 | 2 | 64.7% |
| Totals | 2.85 | 28 | 12 | 58.0% |

Rebuilding the 69 kV H&SB lines are identified in the five-year forecast. This transmission path is another of Central Hudson’s oldest (c. 1919); its towers are mostly steel lattice construction. Inspections have shown 32% of structures needing replacement with another 36% in need of significant repair. These findings initiated a review of the line to develop the most economical alternative to rebuild the line, improve reliability, and (if possible) improve load-serving capability for the Northwest Area. Each line will be rebuilt to 115 kV but will continue to be operated at 69 kV for the foreseeable future. This project is expected to be constructed from 2022 through 2026 with an anticipated total cost of approximately \$33.82 million within the 5-year forecast period. The rebuild project is one of Central Hudson’s Phase 1 projects consistent with the State’s CLCPA goals, while the conversion to 115 kV operation is a potential Phase 2 project.

| H & SB Line Condition | | | | | | |
|----------------------------------|--------------------------|---------------|------------------------|----------------------------------|---------------|--|
| <u>Line</u> | <u>Section</u> | <u>Miles</u> | <u># of Structures</u> | <u>Structures to</u> | | <u>% of structures that require work</u> |
| | | | | <u>Replace/Add mid-span pole</u> | <u>Repair</u> | |
| H | Saugerties – N. Catskill | 12.061 | 138 | 41 | 66 | 78% |
| SB | Hurley Ave. - Saugerties | 11.11 | 118 | 41 | 25 | 56% |
| | Total | 23.171 | 256 | 82 | 91 | 68% |

Rebuild of the Honk Falls - Neversink 69 kV HG line is identified in the five-year forecast. This transmission path is another of Central Hudson’s oldest (the oldest section was built in 1937); it is wood pole construction with 43 structures replaced in 2017 due to their poor condition. Of the 239 not replaced in 2017, 54% of structures have severity level 3, 4, or 5 deficiencies. These findings initiated a review of the line to develop the most economical alternative to rebuild the line, improve reliability, and (if possible) improve hosting capability for the Neversink Area. The rebuild will eliminate the existing sag limits and allow full hydro generation with certain portions of the WH line out of service. This project is expected to be constructed from 2025 through 2028 with an anticipated total cost of

approximately \$36.38 million within the 5-year forecast period. This project is one of Central Hudson’s Phase 1 projects consistent with the State’s CLCPA goals.

| HG Line Condition | | | | | | |
|--------------------------|---|----|----|----|----|------------------|
| CH Severity Level | 1 | 2 | 3 | 4 | 5 | Total Structures |
| Structures with Defects | 0 | 27 | 82 | 35 | 11 | 155 |

Rebuild of the Knapps Corners – Spackenkill 115 kV SK Line is identified in the five-year forecast. This line was built in 1965 with wood poles. Out of the 37 structures that make up the SK Line, 28 are exhibiting conditions that would warrant repair or replacement and/or are in poor overall condition. This represents over 75% of the line’s structures with an additional 5% containing significant defects. In addition to the infrastructure assessment, a recent survey conducted as part of Central Hudson’s Right-of-Way Deficiency Program has indicated several deficiencies from centerline to edge of right-of-way along the length of the line that would support the need to acquire new easements. Based on a preliminary Engineering review, the existing corridor is sufficient in width such that these deficiencies could primarily be mitigated through the “centering” of the line within the currently established corridor. This would reduce the need to acquire new easement. A rebuild of the line is being proposed to both address the existing infrastructure conditions as well as the easement deficiencies. \$0.56 million is included in the 5-year forecast for this project with additional anticipated costs of approximately \$4.96 million in future years. Construction work for the project is planned for 2029. This project is one of Central Hudson’s Phase 1 projects consistent with the State’s CLCPA goals.

Rebuild of Central Hudson’s portion of the North Catskill – National Grid Line Segment 115 kV 5 Line is identified in the five-year forecast. The line was originally built in the 1910’s on lattice tower structures. Of the 30 structures that make up Central Hudson’s section of the line before connecting to the National Grid section, 17 of the structures (56%) are carrying major conditions found during Central Hudson’s comprehensive inspection program and need replacement. There are 11 additional structures (37%) which have defects that require some level of minor repair. In total, 28 structures (93% of the line) need some level of corrective work. The line conductors were installed in the 1950’s making them more than 60 years old. The conductor is of a non-standard design and has been put into a dead-end configuration on a large number of structures when the line was re-conditioned in the 1950’s. This makes one-for-one replacement a difficult and inefficient means to correct outstanding tower conditions. Due to the high percentage of structures requiring work as well as the age of the conductor, the line is being proposed as a rebuild project to correct all the identified infrastructure conditions. The project will be constructed in 2027 at a total 5-year cost of approximately \$8.73 million. This project is one of Central Hudson’s Phase 1 projects consistent with the State’s CLCPA goals.

Rebuild of the Pleasant Valley – Rhinebeck 69 kV Q Line is identified in the five-year forecast as a complete rebuild of the line at 115 kV. The Q Line provides a link between the Northern Dutchess area and Pleasant Valley. The line was constructed in the late 1950s and is comprised of a 4-mile section of 40 lattice towers and a 16.5-mile section of 211 wood pole structures. The 40 lattice towers

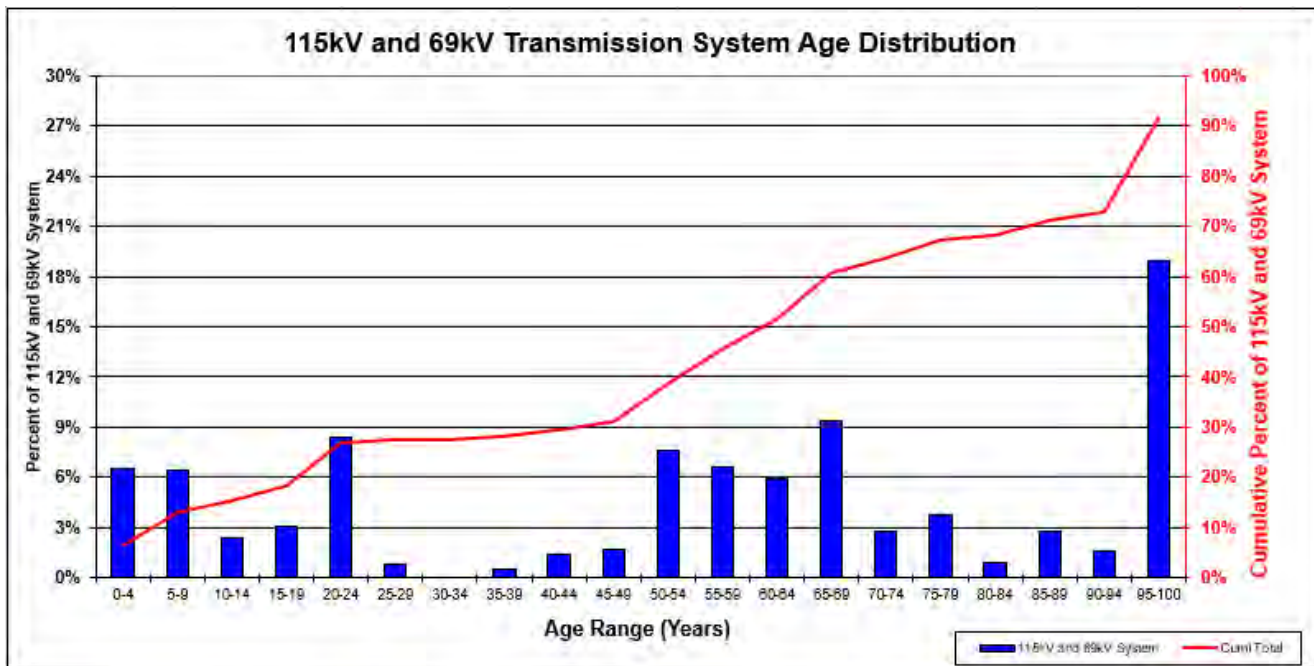
are double circuit towers shared with the 115 kV “X” Line from Pleasant Valley to Inwood Avenue. Despite conducting numerous maintenance projects on the line, inspection findings indicate that approximately 65% of the wood pole line section is still in need of replacement or repair because of aging infrastructure and poor overall condition. The vast majority of both the static wire and phase conductor is of the original line vintage. The project will be constructed from 2028 to 2030 with an anticipated total cost of approximately \$28.50 million within the 5-year forecast period. There are also additional anticipated costs of approximately \$25.2 million in future years. In the NYTO’s November 2, 2020, report to the Commission³ this project was listed as one of Central Hudson’s potential Phase 2 projects consistent with the State’s CLCPA goals with rebuild for 69 kV operation a Phase 1 project. With the incorporation of the 115 kV rebuild in the 5-year capital projects, the rebuild becomes a Phase 1 project.

| 69 kV Q Line Structure Summary | | | | | | | |
|---|--------------|-------------------------|--|------------|---|-------------|--|
| Section | Miles | Total Structures | Actionable Repairs / Replacements | | Probable Future Repairs / Replacements | | % of structures that require work |
| | | | Structures | % | Structures | % | |
| Pleasant Valley to East Park Tap (common tower with X line) | 4 | 40 | 0 | 0% | 3 | 8% | 8% |
| East Park Tap to East Park | 4.5 | 54 | 29 | 54% | 6 | 11% | 65% |
| East Park to Staatsburg | 4.25 | 56 | 29 | 52% | 4 | 7% | 59% |
| Staatsburg to Rhinebeck | 7.75 | 101 | 70 | 69% | 6 | 6% | 75% |
| Total | 20.5 | 251 | 128 | 51% | 19 | 7.6% | 59% |

Work to rebuild the Company’s NC Line for 115 kV and operating at 69kV is included within the forecast as a Phase 2 Area of Concern project. Cost recovery for this project is through the FERC load ratio share methodology as approved by the PSC.

In addition to the above capital expenditures, there are several programs in Electric Transmission designed to reduce risk and improve infrastructure. The High Priority Replacements (“HPR”) Program under the Electric Transmission Budget provides funding to respond to results of the inspections completed each year. HPR projects address infrastructure issues that will reduce the risk of system failure, contact incidents, or loss of reliability. The replacement work is prioritized based upon whether it is part of the 345 kV or underlying system and whether the feed is radial or networked. When an inspection severity of 4 or 5 has been indicated, structures, insulators, and other capital items are replaced according to a specified timeline. The graph directly below indicates the approximate Transmission System Age Distribution.

³ “Utility Transmission and Distribution Investment Working Group Report.” Case 20-E-0197.



Electric Substation & Distribution

Central Hudson Electric Substation and Distribution capital programs are developed based on our current planning criteria and address load serving capability, infrastructure, compliance, and reliability/operating issues. For infrastructure-based issues, Central Hudson utilizes its asset management process, including field inspections, condition monitoring, periodic testing and more in-depth analysis and studies to identify trends, equipment issues and recommend replacement programs. Infrastructure based replacements also will be reviewed to determine whether to replace equipment in-kind or pursue an alternative solution. Load serving capability projects related to substation equipment or distribution circuits are identified through our planning process. For each area and substation, the capacity and operability of the system under the various load forecast scenarios is analyzed. This analysis includes a review of the Substation and Distribution facilities, requiring a full understanding of the limiting components. For any areas or substations where load serving capability has been identified as a potential problem, plans and alternatives by area are evaluated to develop the best solution considering all costs, benefits, and long-range growth potential. The solution sets for these projects include both traditional utility projects and the use of Non-Wires Alternative solutions to replace or defer the potential capital upgrades.

The planning criteria are based on a combination of economic factors, current industry practice, design and practical considerations, reliability, and judgment. Influencing factors are:

- Infrastructure Condition – If infrastructure must be replaced because it has reached the end of its life, consider the most effective means to replace it.
- Thermal limits - related to the ability of the facility to withstand load related heating without damage.
- Protection– minimum fault current levels need to be maintained to ensure safe operation.

- Power Quality - provide adequate voltage to customer premise ANSI C84.1, +/- 5.0% range during normal conditions (lower voltage in Conservation Voltage Reduction), +5.8% to -8.3% under emergency conditions; eliminate stray voltage.
- Reliability/Operational Flexibility – proximity of solutions to load, \$/Customer Outage Avoided, \$/Customer Minute Interrupted, and integration of Distribution Automation.
- Regulatory Requirements - NESC, NYPSC
- Renewable penetration levels and forecast
- Hosting capacity limitations/system congestion

From this process, substation upgrades, equipment replacement programs and projects establishing new substations or the addition of circuits and transformers in existing substations are identified. Due to the projected declining or flat load forecast in many of our planning areas, there are an extremely limited number of growth-driven major substation and distribution projects that have been identified through the planning process in this five-year forecast. Based on the age and the continuing condition assessment of our major substation and distribution infrastructure, there are several projects and programs to proactively replace equipment prior to the development of age/condition related operating issues. The need for upgrades in the Northwest Area of our service territory due to load growth and transmission/substation upgrades to reinforce and increase the load serving capability of those areas have been deferred outside of our five-year forecast due to Non-Wires Alternative solutions.

77% of the expenditures planned in the Substation category are associated with the condition-based replacement of older/aging infrastructure and 98% of the expenditures planned in the Distribution category are associated with the condition-based replacement of predominately older/aging infrastructure.

Electric Substation

\$114.6 million is allocated to infrastructure-related substation programs and projects within the five-year forecast. Major substation rebuilds or partial rebuilds due to infrastructure considerations include work/upgrades at the following substations: Bethlehem Road; Kerhonkson; Modena; Greenfield Road (CLCPA Phase 1 project); Myers Corners; Cocksackie (CLCPA Phase 1 project); South Cairo (CLCPA Phase 1 project); Shenandoah; Pleasant Valley ; Maybrook (CLCPA Phase 1 Project - required for Commercial/Industrial spot load near the Maybrook/Montgomery areas) and Woodstock . Additional major substation projects include: the addition of a second transformer for reliability and operational flexibility at the New Baltimore Substation (CLCPA Phase 1 project) in addition to avoiding otherwise required distribution system infrastructure work; and the installation of a new tapped 115/69 kV substation at the Tilcon site to continue to provide service to this larger industrial customer while allowing for the retirement of approximately 2.5 miles of a poor condition transmission line that runs through a residential neighborhood.

\$11.25 million is included for upgrades at the New Baltimore, Cocksackie, and South Cairo Substations due to the retirement of combustion turbines (“CTs”) at Cocksackie and South Cairo Substations. Central Hudson submitted a compliance filing to the New York State Department of Environmental Conservation in March 2020 in response to its recently promulgated 6 NYCRR Subpart 227-3 “Ozone Season Oxides of Nitrogen (NOx) Emission Limit for Simple Cycle and Regenerative Combustion Turbines” which imposes more stringent emission standards for these units which makes

the CTs at these locations uneconomic. As these units are currently required for local transmission and distribution reliability needs, capital projects are necessary to address these needs prior to the retirement of the CTs. New transformers will be installed at both the Cocksackie and South Cairo substations (CLCPA Phase 1 projects) to provide reserve capability and statcom units/capacitor banks will be installed at New Baltimore and South Cairo to provide voltage support to the local transmission loop. These upgrades have an in-service date of 2024, allowing for the planned retirement of the CTs by December 2024.

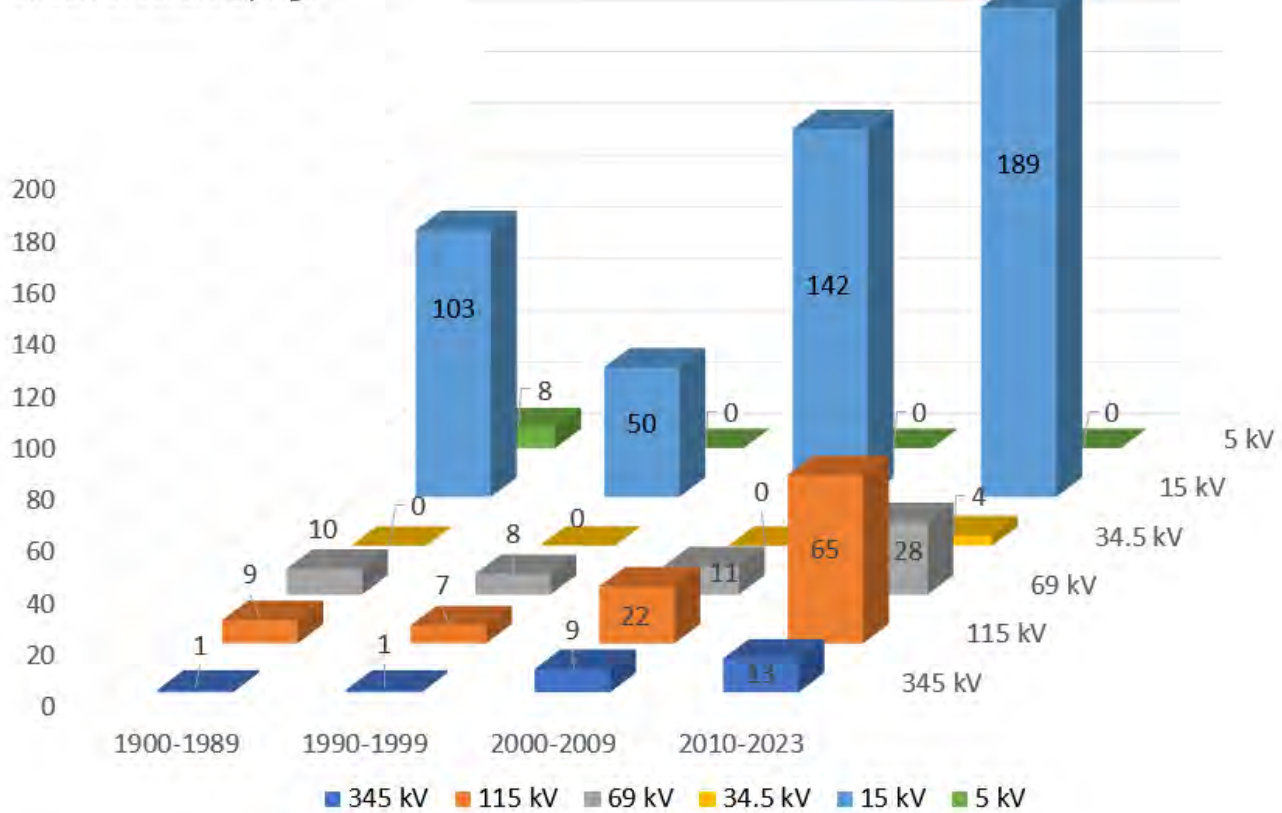
A major substation infrastructure program included in the five-year forecast is the continuation of our Breaker Replacement Program that has been broken out into individual projects due to nearing the conclusion of the Program. This program was initiated to improve infrastructure and maintain system reliability through a planned prioritized equipment replacement program. The assessment process for the selection and prioritization of the breakers included in the replacement program is as follows:

- Breaker Duty: All power circuit breakers with breaker duties greater than 85% with highest priority given for breakers with duties greater than 100%.
- Condition: All the power circuit breakers identified based upon the recommendations from our Substation Engineering and Operations Division. These recommendations are based upon reports of failures or reports of poor testing results.
- Obsolescence: Several of the circuit breakers on our system still employ outdated technology, specifically relating to interrupter design. Others suffer from extended service lives and parts are no longer available for many others.
- Other Factors: Other power circuit breakers on our system meet the above breaker duty or condition selection criteria, but they have not been selected for this replacement program because they will be replaced with new breakers as part of new substation construction projects.

The Breaker Replacement Program has been in place since 2009; all the originally identified 196 breakers have been replaced. As a continuation of this program, 120 breakers have been identified for planned replacement in the five-year forecast horizon, with a cost of \$5.1 million. Many of these breakers targeted for replacement will be combined with other identified work at stations to create larger projects, as was the case with the 3 breakers identified for replacement in 2020. The chart below indicates the planned replacement plan from 2023-2028 and the following graph indicates the approximate Breaker Age Distribution.

| Circuit Breaker Replacements by Year | | | | | | |
|--------------------------------------|------|------|------|------|------|------|
| | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
| 345 kV | 1 | 0 | 0 | 0 | 0 | 0 |
| 115 kV | 7 | 3 | 0 | 2 | 0 | 0 |
| 69 kV | 5 | 0 | 1 | 1 | 0 | 0 |
| 15 kV | 18 | 1 | 31 | 14 | 19 | 15 |
| 5 kV | 0 | 0 | 2 | 0 | 0 | 0 |
| Total | 31 | 4 | 34 | 17 | 19 | 15 |

Circuit Breakers By Age

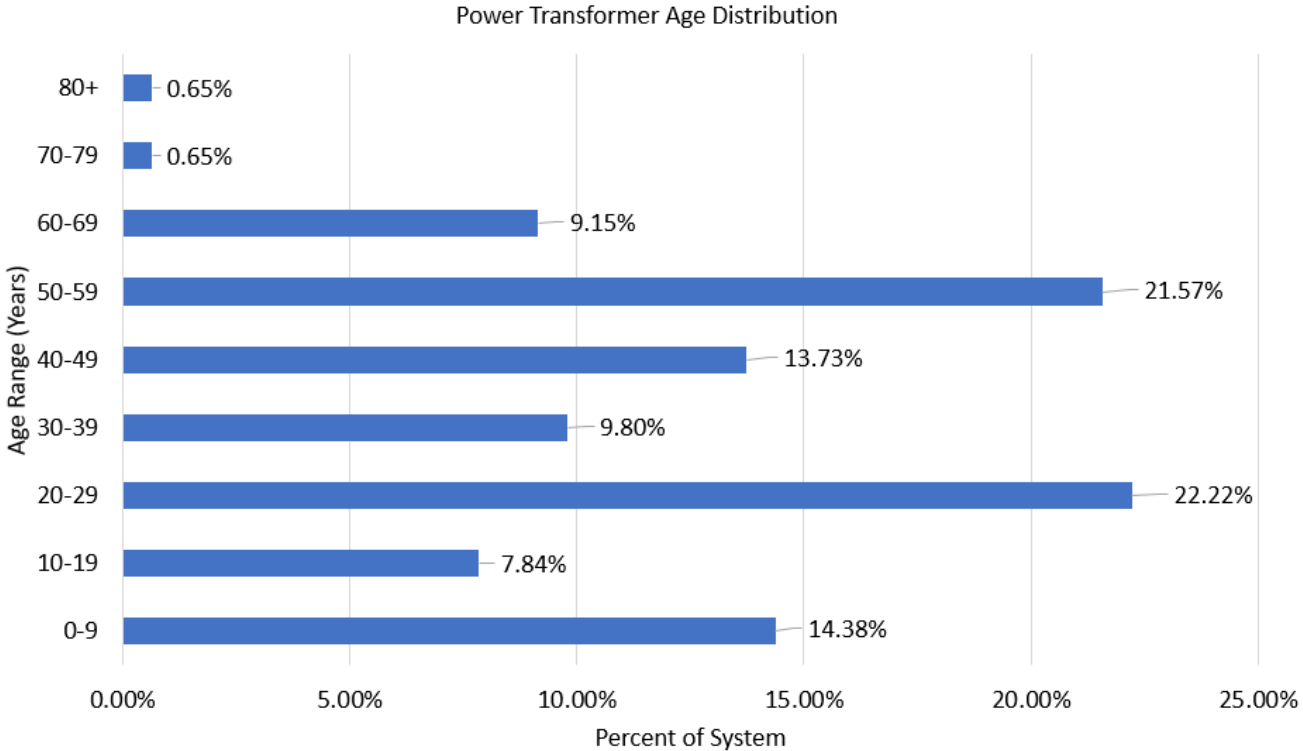


Additional major infrastructure replacement programs associated with substation equipment include the continued condition assessment and replacement of protective relaying equipment and substation power transformers. Targeted replacement programs for circuit switchers, disconnect switches, and motor-operated switches (“MOS”), have commenced based on feedback and maintenance trends from Substation Operations.

The comprehensive relay and metering modernization program included in the five-year forecast identifies outdated meters, relays, and communications infrastructure. This program has been integrated into comprehensive substation rebuilds or major upgrades to take advantage of construction efficiencies. There is \$11.2 million in the five-year forecast to complete these projects.

Regarding the substation power transformers, the condition of the power transformers varies and the ability to maintain them is tied closely to their age. Recent focused replacement of poor performing transformers has reduced the average age of our substation transformer fleet to approximately 35 years old; however, some transformers remain that are up to 80 years old and are in deteriorating condition. The transformers are monitored using dissolved gas analysis, oil screen/testing, and Doble power factor testing at an interval based on voltage level and equipment criticality. Transformers are replaced based on this testing and overall condition assessment. There are three substation transformer projects in the five-year forecast associated with the condition-based replacement of aging transformers totaling \$6.8 million. These projects include transformer

replacements at the following substations: Ancram (CLCPA Phase 1 Project); Pulvers Corners (CLPCA Phase 1 Project) and Converse Street. The replacement of the Ancram and Pulvers Corners transformers (CLCPA Phase 1 Projects) are being replaced due to their age and condition and will be sized to support local operational and hosting capacity needs. An overall Area study has been completed for the Pulvers/Ancram Area which incorporated recommendations for the Ancram substation. Additionally, there is the planned installation of two 115/69 kV transformers at the Kerhonkson Substation coordinated with the retirement of the Modena 115/69 kV transformer and the upgrade of the P and MK Lines to 115 kV operation (CLCPA Phase 1 project) and the planned installation of transformers at the Cocksackie and South Cairo Substations due to the retirement of the CTs at these locations. The graph below provides an overview of the age of the Company’s Power Transformers.



A condition-based program has been created to identify and replace switchgear units that are in poor or deteriorating condition. This program has been separated out into individual projects to incorporate design and construction efficiencies with other work that needs to be completed at each substation. There is \$9.8 million in the five-year forecast allotted to start these replacements. The following substations have been included in the switchgear replacement projects in the five-year forecast: Cocksackie; Woodstock; Myers Corners; Montgomery Street; Tioronda; Converse Street; Shenandoah; and the purchase of a mobile switchgear.

Like the breaker replacement program, programs have been created to address concerns with the remaining life of substation circuit switchers, disconnect switches, and motor operated switches. Replacement programs have been created to proactively replace these devices subject to potential failure. Recent problems have been identified with certain style switches, and there are limited to no

replacement parts available. There is \$6.1 million in the five-year forecast allotted to these replacements.

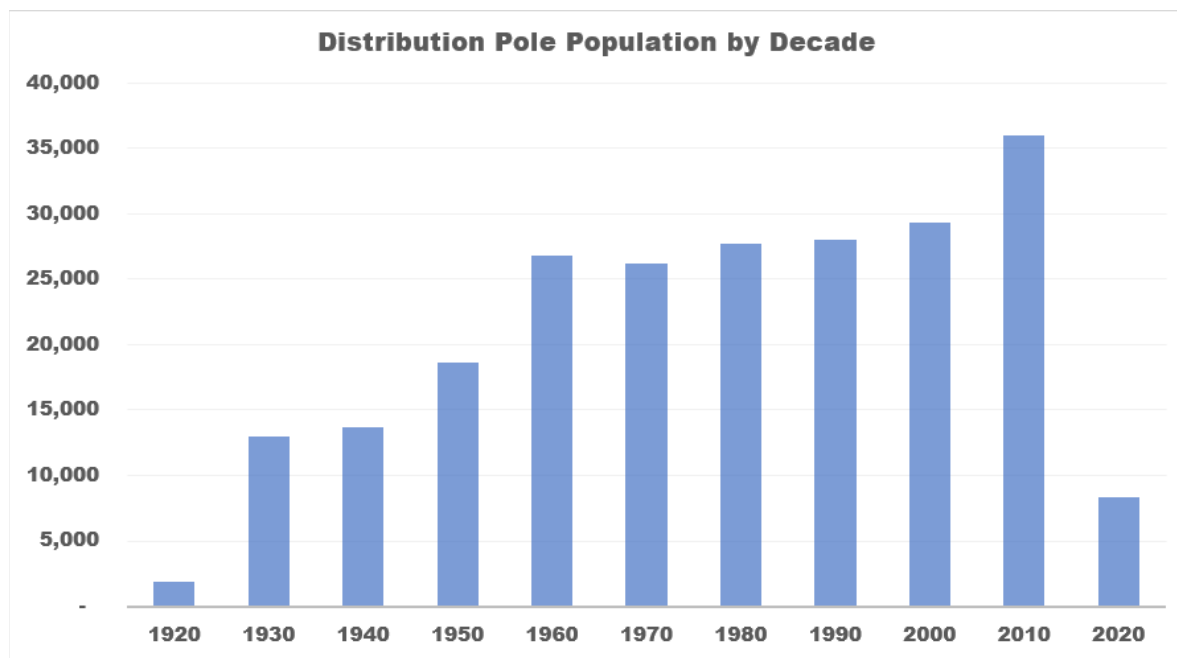
Distribution

\$280.19M is included in the electric capital forecast for distribution improvements. The expenditures in this category are focused on addressing condition-based infrastructure replacements, expenditures related to the day-to-day capital requirements for distribution facilities, and projects necessary to maintain current levels of reliability performance by addressing local thermal/voltage, reliability, and operating issues.

The forecasted level of expenditures for the day-to-day items over the five-year forecast period is \$151.7 million. The expenditure levels for these projects are based on historical trend levels adjusted for known changes. These are projects that necessary are for the daily operations of the distribution system which include the following:

- Distribution Improvement Blankets/Minors - Work orders developed for newly emerging operational work and are classified as blankets or minors/locals according to Central Hudson accounting rules
- Road/Bridge Rebuild Relocation Projects/Relocation Blankets – Relocations of electric distribution facilities required based on State and local road rebuilds.
- Distribution Improvement Conversions – Conversion from 4 kV to 13.2 kV operation due to customers experiencing low or errant voltage or an overloaded step-down transformer.
- CATV Make-ready – Work orders developed to address emergent CATV work, as the communication companies continue to expand their infrastructure, the proper NESC clearances between communication and electric facilities must be maintained and the poles must have sufficient capability to carry the additional facilities, where if the infrastructure is aged, the utility is responsible for the cost of the upgrades.
- Distribution Pole Replacements – Replacements based on the facility inspections program. All poles are inspected on a rotating five-year basis and are replaced if deemed to be compromised due to breaks, severe lean, rot, washout, evidence of flash over and woodpecker holes. The replacement of weak and failing poles is a key driver to maintaining customer reliability.

The number of distribution inspection driven pole replacements has shown an increasing trend in recent years. Based on the age demographic of the pole plant and this increasing trend, additional funding was included within the five-year forecast to address pole replacements (\$105.8M). The graph below provides an overview of the age of the company’s distribution pole plant.



\$58.1M has been included for various condition-based infrastructure improvement programs targeting the replacement of older assets required to maintain service reliability for electric customers. These infrastructure improvement programs include the following:

- Overhead Secondary Replacement – replacement of legacy open wire secondary wire with triplex or quadplex.
- Primary Network Cable and Equipment Replacement – Replacing 14.4 kV Paper-Insulated Lead-Covered (PILC) cables, oil switches, and the legacy CE Mesh network monitoring system on the network primary feeders.
- Secondary Network Upgrades – replacement of aged secondary network infrastructure, including failed cable, collapsed duct banks, and pull boxes and manholes that are in poor condition.
- Underground Residential Distribution (URD) Cable Replacements – Central Hudson's URD cables are aging and are experiencing failures. Although the impact to reliability so far has been small, the utility industry recognizes the larger impact these aging cables will have on reliability in the future. Proactive measures are needed to curb these failures by eliminating legacy infrastructure and rebuild the aging circuitry to modern-day construction, reliability, and operational flexibility standards.
- 5 kV Aerial Cable Replacement (CLCPA Phase 1) – A program developed to mitigate all the reliability, loading, environmental, and safety concerns associated with the 90-year-old 5 kV aerial cable. The cable is aged and prone to failure and has also been the cause of many voltage

issues on the system. Additionally, when this cable is replaced, the typical practice is to convert the customers over to the 13.2 kV voltage class.

- Copper wire replacement program (CLCPA Phase 1) – There is a proliferation of primary copper wire on Central Hudson's distribution system. These conductors are not only antiquated and prone to failure; they are frequently undersized for modern operational needs. They are also susceptible to burndown during reclose operations.
- 4800 V conversion (CLCPA Phase 1) – This program focuses on upgrading 4800 V mainline circuitry to 13.2kV operational voltage. The remaining pockets of 4800 V circuitry limit operational flexibility, load serving capability and hosting capacity for DERs. Much of the 4800 V circuitry is over 70 years old and has exceeded its useful life.

An additional \$4.2M is included for the construction of distribution facilities associated with substation and transmission reinforcements/retirements. 98% of the expenditures planned in this category are associated with the condition-based replacement of older/aging infrastructure.

Central Hudson has included \$28.3M in the five-year forecast to maintain the current levels of performance for the distribution system. This includes the following:

- Thermal/voltage – load or voltage relief projects are often recommended to mitigate any loading, thermal, and voltage concerns. Polyphasing, reconductoring, and voltage conversions, building new lines, or leveraging modern technologies are examples of projects that could fall under this line item.
- Reliability - Projects that are developed and prioritized according to a 5-year historical average \$/COA (customer outage avoided), but ancillary benefits to customer satisfaction and resiliency also are considered. Examples of improvement projects include relocating circuitry from off-road to on-road, closing gaps (i.e., new circuit ties), installing electronic reclosers, and replacing failure prone equipment.
- CEMI/Worst Circuits – Projects that focus on areas of the system that experience multiple outages per year that are not always captured under larger scale capital improvement programs. This program is used to help the Company identify those areas which may require more specific attention to correct issues impacting reliability. The program originally targeted customers experiencing ten or greater outages in a 12-month period. The Company has recently expanded the program to include CEMI at levels lower than ten interruptions per year to be more proactive to meet customer reliability expectations and to expand the pool of projects. The Company maintains the use of a “cost per customer outages avoided” metric as a screening criterion to ensure the projects remain cost effective.
- Operating/Infrastructure (CLCPA Phase 1) – Projects address operational limitations in the distribution circuitry. Customer outage duration reduction is a primary driver of projects in this category. In addition, aged infrastructure in poor condition may create operational limitations and/or future risk of an increase in outages. Projects to address operating issues are developed

with the primary goal of reducing the duration of outages. Typical projects involve developing a tie between feeders, or reconductoring the lines to make the tie stronger so more load can be reenergized through switching. Many of these projects also address failing infrastructure that does not fall under a specific program.

The Distribution Automation (“DA”) Program (CLCPA Phase 1) is a major initiative that commenced in 2015 and continues to be included in the five-year forecast. By the end of 2024, most of the installation of DA devices in our five districts will have been completed and planned expenditures for DA are significantly reduced in the 2025-2027 timeframe. Central Hudson will continue with the Automatic Load Transfer (“ALT”) switch and recloser replacement programs. As part of the Company’s Grid Modernization initiative, these programs will be integrated with its Advanced Distribution Management System (“ADMS”) to improve reliability, system safety, and system efficiency, enhancing the capability of ALTs to include more complex Fault Location, Isolation and Service Restoration (“FLISR”), scenarios while providing for Volt-VAr Optimization.

Storm Hardening

While the five-year capital plan includes numerous items to improve system reliability that also have resiliency benefits, the areas impacted by storms may not always be prioritized based upon the Company’s benefit/cost analysis metrics. The areas hardest hit by major storms are often located in the remote areas and/or on the edges of our service territory with low population density. The storm hardening program in the five-year capital plan is a continuation of the Company’s plan included within our previous rate filing. The storm hardening program includes \$27.9 million for circuit hardening projects and an additional \$1.68 million for a strategic undergrounding project. The circuit hardening projects focus on rebuilding the mainline zones of protection that impact 500 customers or more on those circuits that have shown poor reliability performance including Code 1 (Major storms) reliability data. The five-year forecast included funding to address nine circuits, with projects developed to bring the circuit mainlines up to current design and construction standards and complete any danger tree removal that is required. The circuit hardening projects are CLCPA Phase 1 projects.

As part of the storm hardening program, a strategic undergrounding project is included in the forecast. This project will complete the undergrounding of approximately 1.3 miles of mainline that is currently off-road, cross lot circuitry prone to outages where traditional options such as overhead line relocation are not viable solutions.

In addition to this program for resiliency, Central Hudson is currently in the process of completing a Climate Change Vulnerability Study and Climate Change Resilience Plan pursuant to New York Public Service Law §66(29) and Public Service Commission Case 22-E-0222. The Vulnerability Study is designed to evaluate infrastructure, design specifications and procedures to better understand vulnerability to climate-driven risks. Following completion of the Climate Change Vulnerability Study, Central Hudson will prepare a resilience plan detailing mitigating actions to address those risks.

New Business, Transformer, Meters, and Storm

The remainder of the Electric Capital Budget, the New Business, Transformers, Meters, and Storm capital forecasts are based on the projected customer growth from the corporate forecast and/or were trended based on historical experiences and adjusted for known changes.

Forecasted expenditures for the New Business category are based on expected residential and commercial customer additions as specified in the Company's sales forecast multiplied by an average cost of service installation. Service installation costs were calculated by taking the (3) year average across the entire New Business category and applying inflation and overheads. All project installation costs were included in the average from simple residential services to large industrial services, as recent meter additions achieved are expected to trend similarly based on known commercial/industrial projects and 12-month forward looking visibility into upcoming underground residential developments ("URD"). The overall forecast for the New Business category is an increase from the Company's prior Rate Agreement since actual expenditures measurably exceeded the prior budget.

Material cost increases associated with global supply chain constraints have resulted in firm pricing increases for the Transformers category. This has had a significant impact on our Transformers category expenditures identified in the five-year plan. Forecasted Meter expenditures have remained flat, and the five-year forecast is based on and aligned with historic trends.

Forecasted capital expenditures for storm restoration efforts (Storm) were included as a new line item identified within the five-year capital plan. These expenditures are non-discretionary in nature and the Company has historically monitored capital expenditures associated with addressing damage sustained during storm conditions to quantify and manage these incremental expenditures across other electric capital budget categories. Forecasted expenditures for this category were trended based on historical experience over the prior three years.

GAS PROGRAM SUMMARY

The Central Hudson gas system contains well over 2,000 miles of transmission and distribution pipeline facilities ranging in age from new to over 100 years. It supplies gas service to approximately 84,000 customers in communities along the Mid-Hudson River Valley from Woodbury in the south to Cossackie in the north and ranges from Carmel in the east to as far west as Montgomery.

The Company's gas transmission system consists of 162 miles of steel piping ranging from 6-16" in diameter, four transmission pipeline supplier gate stations and three flow control stations with a Maximum Allowable Operating Pressure (MAOP) of between 512-750 PSIG. The majority (81%) of the transmission system was installed during the 1950's and 1960's. The MPI and MPR transmission lines were the last to be installed (1990's) and account for 12.8% of the total transmission pipeline inventory. Three of the four gate stations date to the 1950's and early 1960's. The last gate station, Pleasant Valley, was constructed in the early 1990's to take gas from the then-new Iroquois gas transmission line. Additional details on the Company's gas transmission system are in our annual Transmission Integrity Management Plan ("TIMP").

A total of 142 gas regulator stations are utilized to supply the distribution system. The stations either reduce transmission pressure to distribution pressure, or further reduce distribution pressure to a lower pressure.

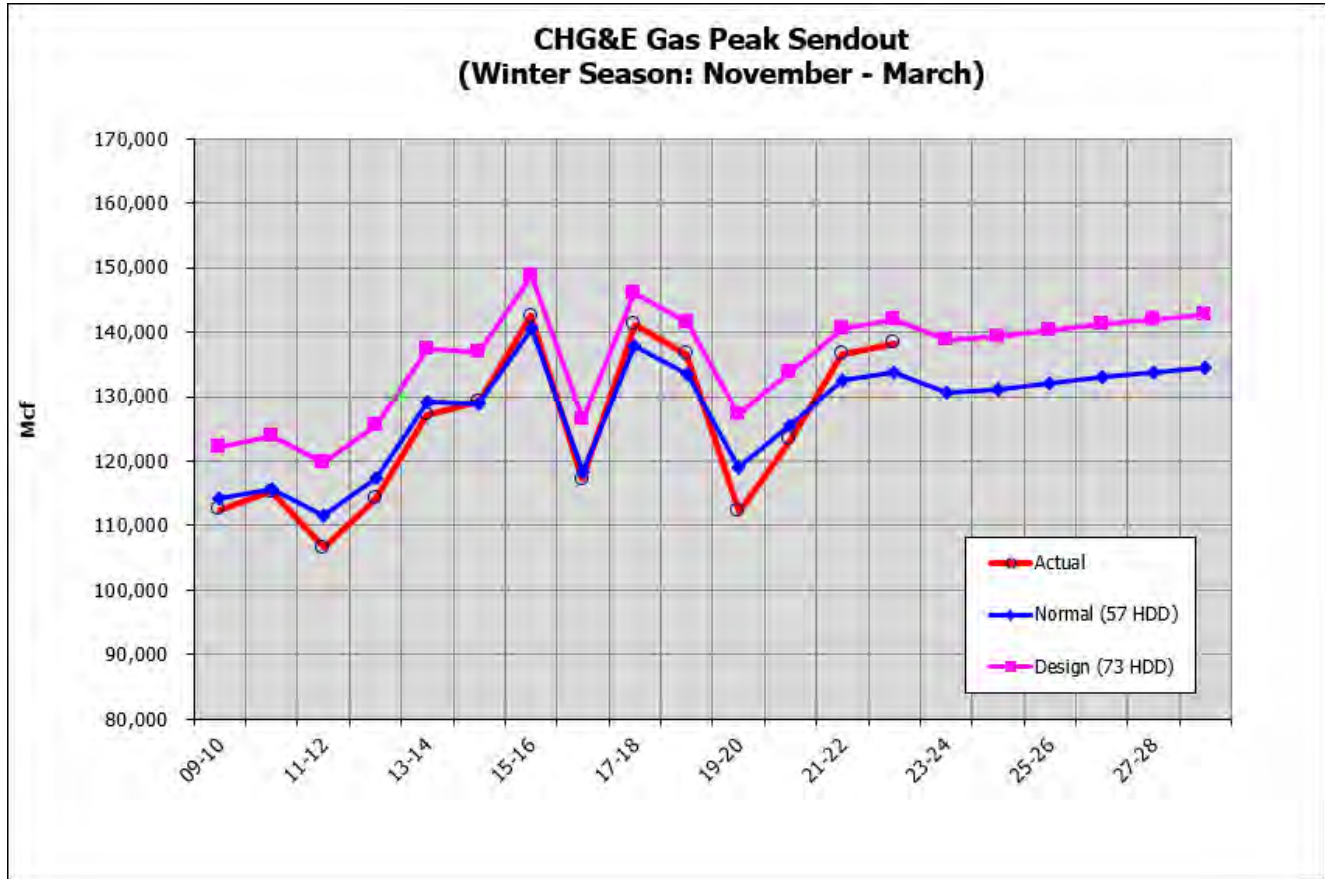
The gas distribution system is comprised of 1,318 miles of distribution main that operates at pressures from utilization (inches of water column) to 120 PSIG. Also included in this total is a short (2.8 mile) section of pipeline which operates at 325 PSIG which in compliance with current code requirements is classified as high-pressure distribution piping. Nominal pipe diameters range from ½" to 16 inch in size and are comprised of plastic, steel, wrought iron, and cast iron. The predominant material is plastic, which makes up 870 miles of the total inventory, and cathodically protected steel, which accounts for an additional 367 miles. Currently Central Hudson defines leak prone pipe (LPP) as cast iron, wrought iron and unprotected steel. This represents a total of 82 miles or 6.2% of the total distribution main inventory. The Company's gas service inventory totals 66,186 services, of which 52,474 are plastic, 9,066 are protected steel, and 35 are copper. The remainder are considered leak prone.

Low pressure systems exist in each of the larger Cities of Beacon, Newburgh, Poughkeepsie, and Kingston, and Villages of Saugerties and Catskill. Construction on these systems started in the early 1900s and piping have been added and replaced regularly since that time. These systems contain significant lengths of cast iron, bare steel, and wrought iron piping. Portions of the piping must be replaced to maintain a manageable leak inventory. These older communities have transformed from residential/commercial and industrial centers into primarily residential, light commercial and governmental centers and gas loads have stabilized or slightly declined over the years.

Gas Forecast Overview

Central Hudson's gas capital forecast for the next five-year period is developed using a number of inputs such as planning studies, econometric forecasts, corporate load forecasts, facility inspection results, integrity recommendations, field operations feedback as well as others.

Central Hudson’s gas peak load forecast is allocated into planning areas to identify system capacity needs and the timing of those needs, quantify the risks of the load growth outpacing our ability to serve that load, and assess the alternatives, historical pipe solution or non-pipes alternative, available to meet that load. As a result of these efforts, capital needs are identified, timing determined, and alternatives developed from planning studies.



The New Business and Meters capital forecast is based on the projected customer growth from the corporate forecast.

For the Gas System, the primary evaluation criteria for area studies are load serving capability, based on system configuration, capacity, and the resulting pressures during design day. The planning criteria are based on AGA Engineering Practices. The minimum operating pressures which are allowed under these planning criteria are 50% of the local system set pressure.

The planning criterion is based on single contingency failure. The planning process evaluates the risk associated with load growth uncertainties, the risk of pressure falling below required minimums, the number of customers impacted, and the time associated with restoration of service.

Gas Program Detail

The Gas Capital forecast is developed utilizing guidelines, planning standards, and engineering judgment. The forecast is completed for each budget category and integrated into a comprehensive plan. The following is a summary of the five-year capital forecast for each of the categories.

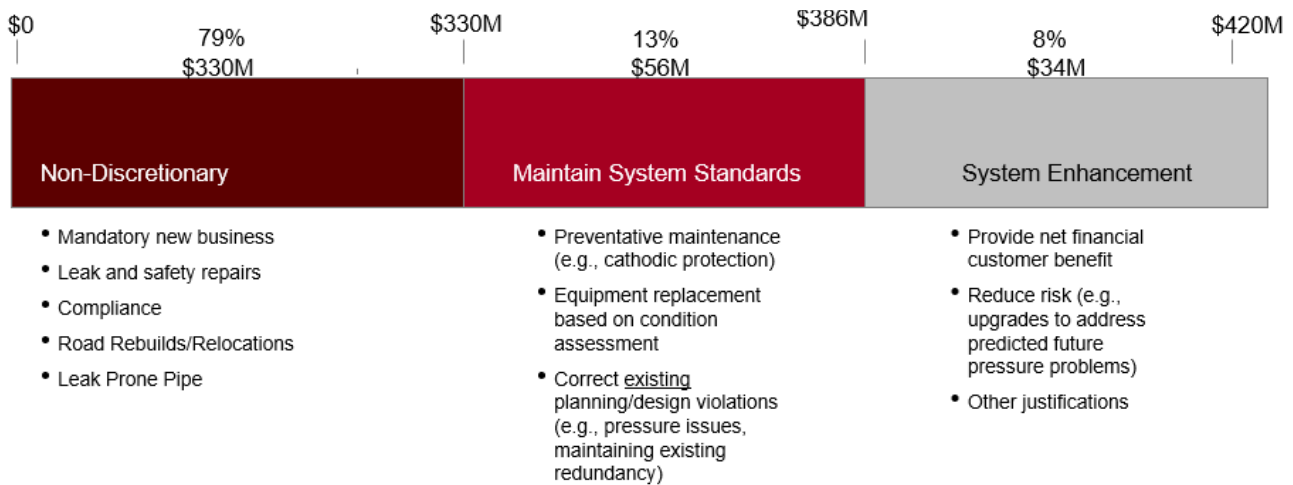
Gas Capital Forecast – Additions

| | <u>2024</u> | <u>2025</u> | <u>2026</u> | <u>2027</u> | <u>2028</u> | <u>TOTAL</u> |
|---------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|
| Production | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| Transmission | 4,240 | 6,647 | 6,818 | 4,493 | 5,672 | 27,870 |
| Regulating Stations | 3,304 | 3,592 | 3,820 | 4,376 | 4,337 | 19,429 |
| New Business | 9,955 | 10,373 | 7,738 | 7,908 | 8,313 | 44,288 |
| Distribution Improvements | 51,581 | 56,374 | 60,382 | 63,691 | 69,912 | 301,940 |
| Meters | 2,926 | 3,028 | 3,213 | 3,405 | 3,611 | 16,183 |
| Total | <u>\$ 72,005</u> | <u>\$ 80,014</u> | <u>\$ 81,971</u> | <u>\$ 83,874</u> | <u>\$ 91,845</u> | <u>\$ 409,710</u> |

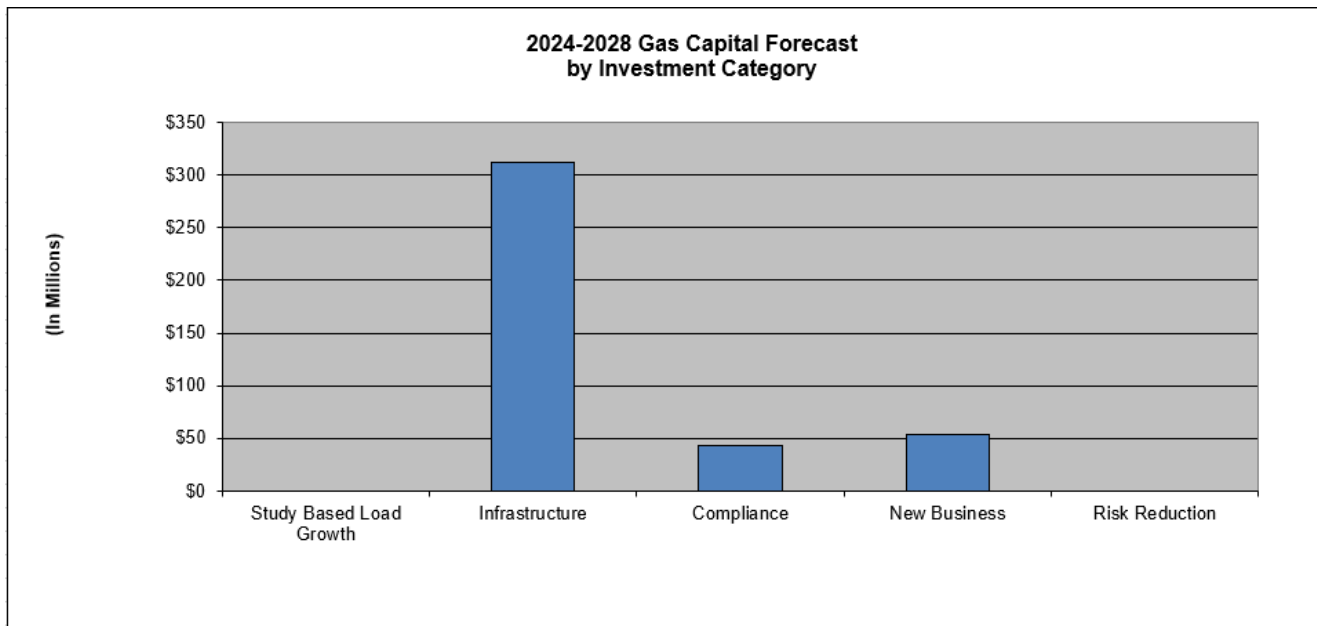
Gas Capital Forecast – Removal

| | <u>2024</u> | <u>2025</u> | <u>2026</u> | <u>2027</u> | <u>2028</u> | <u>TOTAL</u> |
|---------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|
| Production | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| Transmission | 102 | 146 | 149 | 152 | 155 | 705 |
| Regulating Stations | 256 | 230 | 235 | 239 | 266 | 1,226 |
| New Business | 205 | 215 | 226 | 238 | 249 | 1,133 |
| Distribution Improvements | 1,433 | 1,463 | 1,494 | 1,522 | 1,551 | 7,463 |
| Meters | - | - | - | - | - | - |
| Total | <u>\$ 1,996</u> | <u>\$ 2,054</u> | <u>\$ 2,104</u> | <u>\$ 2,151</u> | <u>\$ 2,221</u> | <u>\$ 10,527</u> |

A breakdown of the Gas Capital Forecast indicating the level of spending as prioritized is shown below. Non-discretionary is the level of spending that is necessary to meet the minimum standards of service or compliance with public service law. Maintaining System Standards is the level of spending required to maintain our current level of service regarding safety and reliability and to meet obligations set through the rate proceedings. System Enhancement is capital spending aimed at improving our level of service, reducing risk, or reducing operating costs.



In addition, the projects within the Gas Program are categorized by the following Investment Categories: growth (study-based load growth), new business, compliance, risk reduction, and infrastructure replacement. The bar graph below shows the breakdown of the projects in our current five-year forecast by these Investment Categories.



Gas Transmission

The Gas Transmission category consists of gate station and transmission capital projects. Sample projects may include transmission line replacement/relocations, transmission valve replacements, modernization of gate station flow control equipment, etc. The development of the Gas Transmission five-year Capital Forecast is derived from the following inputs:

- Transmission Integrity Management Program (TIMP)
- Mega Rule 49 CFR 192.624

- Regulatory requirements
- Equipment obsolescence/performance
- Inspection results
- Municipal projects
- Load growth

The Gas Transmission projects are designed to provide necessary capacity, reduce risk, and improve infrastructure. Gas Transmission Capital Projects are primarily a mix of compliance, risk reduction and infrastructure. They may stem from System Load Studies or studies performed as part of the Pipeline Integrity Program. These studies result in selected pipeline projects such as casing removals or the installation of remotely operated valves (ROVs). The transmission flow control equipment such as remote terminal units (RTUs) is evaluated to determine useful remaining life. The Gas Transmission five-year Capital forecast addresses several infrastructure and integrity issues. The remainder of the capital forecast focuses on the following areas for system improvement: TIMP related projects, flow control system upgrades, and remote operated valves.

The Mega Rule or “Safety of Transmission Pipes Final Rule” became effective July 1, 2020, and broadly affects onshore gas transmission line operators, such as Central Hudson, by expanding federal regulation and reporting requirements. The most significant impact for the Company relates to reconfirmation of maximum allowable operating pressure (“MAOP”). This must be accomplished by replacing existing segments of the transmission line that are in high consequence areas or class 3 or 4 locations where we do not have traceable, verifiable, or complete records that pressure tests were conducted at install.

Our initial engineering assessment of Mega Rule affected transmission pipelines is complete, and an implementation plan was filed with the Department of Public Service on June 30, 2021. The requirement is that 50% of identified actions must be completed by July 3, 2028, and 100% by July 2, 2035.

Gas Regulator Stations

The Gas Regulator Station category consists of regulator station capital projects. The projects range from the installation of new stations to the replacement/upgrade of station equipment. The development of the Gas Regulator Station five-year Capital Forecast is driven by the following inputs:

- Regulatory requirements
- Equipment obsolescence/performance
- Inspection results
- Load growth

The Gas Regulator Station projects consist primarily of a mix of compliance and infrastructure projects. The main replacements associated with the LPP Elimination Program result in changes in the low and medium pressure system flows. As a result, modifications will be made to existing stations as needed to account for increased flow due to the modification of distribution system piping. In some cases, stations will be eliminated due to these elimination projects. The remainder of the Gas Regulator Station capital forecast is related to regulatory requirements, equipment obsolescence, maintenance issues, improved/remote pressure control, retirements, and relocations.

Gas Distribution Improvements

The Gas Distribution Improvement category consists primarily of main and service replacements. Projects in this category include LPP main replacements, additional valve installations, etc. The development of the Gas Distribution five-year Capital Forecast is derived from the following inputs:

- Distribution Integrity Management Program (DIMP)
- Risk assessment (including leak history, material type, location, etc.)
- Regulatory updates/mandates
- Inspection results
- Municipal projects
- Load growth

The Gas Distribution five-year Capital Forecast is driven primarily by the mandated elimination of LPP. At this time, the Company defines leak prone pipe as cast iron, wrought iron and unprotected steel pipe. As detailed in its current rate order 20-G-0429, the Company must eliminate a minimum of 15 miles of leak prone pipe a year during the three-year rate order. Elimination of less than 15 miles will result in a negative revenue adjustment of 15 basis points. It is the Company's intent to achieve 15 miles of LPP elimination annually.

The LPP replacement projects are identified and prioritized using the GL Main Replacement Prioritization Program (MRP) which develops a risk 'score' based on pipe and operating characteristics such as material, operating pressure, age, diameter, leak history, location (proximity to buildings, business district, flood prone areas) and cathodic protection. This risk score measures the relative likelihood and the consequences of a leak associated with each pipeline segment. In addition, SME review is taken into consideration when developing the proposed main replacement project listing. Based on industry best practice, LPP projects consist of 1- 2 mile 'neighborhood' projects which result in limited disruption to customers and more economical replacement of LPP. While this methodology does result in the replacement of existing short sections (< 100 feet) of plastic and protected steel previously replaced due to undermines or leak repairs, the overall efficiencies gained through bypassing and elimination of prolonged customer interruption are significantly more cost effective. As part of the LPP elimination program the Company is identifying locations where beneficial electrification of customers' natural gas appliances and equipment may be converted to electric. This will eliminate the need to replace a portion of LPP main that serves limited customers and is not detrimental to maintaining current levels of service to other customers on the system. Based on an LPP elimination rate of 15 miles per year, all identified LPP will be eliminated by 2029.

Included in the Gas Distribution capital budget is funding for main replacements or relocations associated with municipal projects such as road rebuilds. The actual project cost is included when the actual project is known, otherwise the budgeted amounts are trended from past year expenditures.

New Business & Meters

The New Business section of the Gas Capital Budget is based primarily on the projected customer driven growth from the corporate forecast and the Category 24 budget established in 20-G-0429. The forecasted expenditure level was significantly reduced from the prior 5-year forecasts based

on the impacts of climate legislation and reduced focus on gas expansion unless required under tariff or where revenues support the investment. The Gas New Business program has budget support for \$49 million over the five-year period for residential and commercial customer driven additions.

The Gas Meters capital forecast is based on the projected customer growth from the corporate forecast. The meter forecast is based on the annual needs for non-load related meter installations (Meter Testing Program or ERT meter requests), approximately 1,000 meters during the forecast period, and the forecast level based on the customer growth, peak, and sales forecast.

COMMON PROGRAM SUMMARY

The Common Capital Forecast consists of the following categories: Land and Buildings; Information and Operational Technology; Tools & Equipment; Communication; and Transportation. The following is a summary of the five-year capital forecast for each of these categories:

Common Capital Forecast – Additions

| | <u>2024</u> | <u>2025</u> | <u>2026</u> | <u>2027</u> | <u>2028</u> | <u>TOTAL</u> |
|--------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|
| LAND AND BUILDINGS | \$ 17,479 | \$ 21,996 | \$ 30,628 | \$ 18,293 | \$ 25,802 | \$ 114,199 |
| OFFICE EQUIPMENT* | 38,199 | 38,435 | 37,582 | 34,023 | 54,828 | 203,067 |
| TOOLS | 1,605 | 1,639 | 1,781 | 2,144 | 1,849 | 9,018 |
| COMMUNICATION | 9,559 | 8,662 | 10,051 | 4,404 | 4,442 | 37,119 |
| TRANSPORTATION | 13,824 | 14,115 | 14,411 | 14,685 | 14,964 | 71,999 |
| TOTAL | <u>\$ 80,668</u> | <u>\$ 84,847</u> | <u>\$ 94,453</u> | <u>\$ 73,549</u> | <u>\$ 101,886</u> | <u>\$ 435,402</u> |

*Information Technology (I.T.) & Operational Technology (O.T.) included in Office Equipment

Common Capital Forecast – Removal

| | <u>2024</u> | <u>2025</u> | <u>2026</u> | <u>2027</u> | <u>2028</u> | <u>TOTAL</u> |
|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|------------------------|
| Lands and Buildings | \$ 544 | \$ 698 | \$ 979 | \$ 699 | \$ 733 | \$ 3,653 |
| Office Equipment | - | - | - | - | - | - |
| Tools | - | - | - | - | - | - |
| Communication | 1 | 1 | 1 | 1 | 1 | 5 |
| Transportation | <u>(450)</u> | <u>(450)</u> | <u>(450)</u> | <u>(450)</u> | <u>(450)</u> | <u>(2,250)</u> |
| Total | <u>\$ 95</u> | <u>\$ 249</u> | <u>\$ 530</u> | <u>\$ 250</u> | <u>\$ 284</u> | <u>\$ 1,408</u> |

Land and Buildings

There are several larger facility projects planned during the five-year forecast period. The first project is the completion of an integrated transmission and distribution system operations center (“PCC”). This project is planned to be in service and all expenditures received in 2024. The construction of this project began in 2022 and the total estimated Facility costs is \$44.5 million; of that \$4.6 million is estimated to be incurred during this 5-year budget period.

The second project consists of the completion of the buildout of the Training Academy. This project was previously proposed and approved in recent rate filings but was not included in the current (2022-2024) filing, therefore the construction of the Training Academy and Annex has been deferred. Funding for this project is including in the current 5-year budget. Currently \$20.2 million is planned to complete the Training Academy- Annex and \$25 million is planned to complete the Training Academy-Academy. However, if current material cost increases continue, there is a likelihood that additional funding for the project would be needed.

The third project is the construction of a new Tannersville building. Currently the employees assigned to Tannersville work out of a rented bay at the local fire department. The equipment and vehicles have outgrown this space and the fire department has indicated they are not willing to sign another lease. Procurement of land is expected to occur in 2023. The estimated cost of this project is \$4.2 million and is planned to occur within this five-year forecast.

Next are two projects that replace/rebuild existing buildings at operational headquarters. Rebuilding of the Butler Building in Fishkill will upgrade an existing structure at the end of its useful life and provide enhancements to support operations departments. The estimated cost of the project is \$4.7 million and is planned to occur primarily in 2026. Construction of a new automotive repair shop at the Eltings Corners location will provide a more appropriately sized building for this work, while allowing the existing garage to be used to store large and expensive equipment indoors. The estimated cost of this project is \$4.7 million and is planned to occur primarily in 2026.

The last project is the relocation of the Newburgh District Operating Headquarters. Several alternatives have been evaluated to increase the functionality of the headquarters and mitigate risk associated with its general low-lying location and proximity to the Lake Washington Dam. The proposed project will address safety and congestion issues at the current site while also relocating critical operational activities to a more geographically secure location. The current estimated cost of this project during the five-year forecast period is approximately \$2.5 million, which would allow for property procurement, design, permitting and other pre-construction needs, but most of the construction expenditures and project completion is anticipated to be in 2029-2030.

Information & Operational Technology / Communications / Security

Central Hudson is continuing to make strategic investments in Information Technology (“IT”), Operational Technology (“OT”), Communications, and Security to meet rapidly increasing demands of our customers, industry, regulators, workforce, and technological changes.

The Technology organization currently supports and maintains more than 350 business service offerings, 3,600 desktop software applications, nearly 600 servers, nearly 1,000 databases, Operations Technology (including but not limited to Control Centers and Supervisory Control and Data Acquisition (“SCADA”)) and the underlying network infrastructure to enable the needs of the business and Central Hudson’s external stakeholders. The technology investments directly support the Company’s strategic initiatives to:

- 1) Provide a seamless customer experience,
- 2) Modernize/transform business operations to continue to provide safe, efficient, and reliable service to Central Hudson customers,
- 3) Transform safety culture and,

4) Develop, attract, and retain an inclusive and diverse workforce.

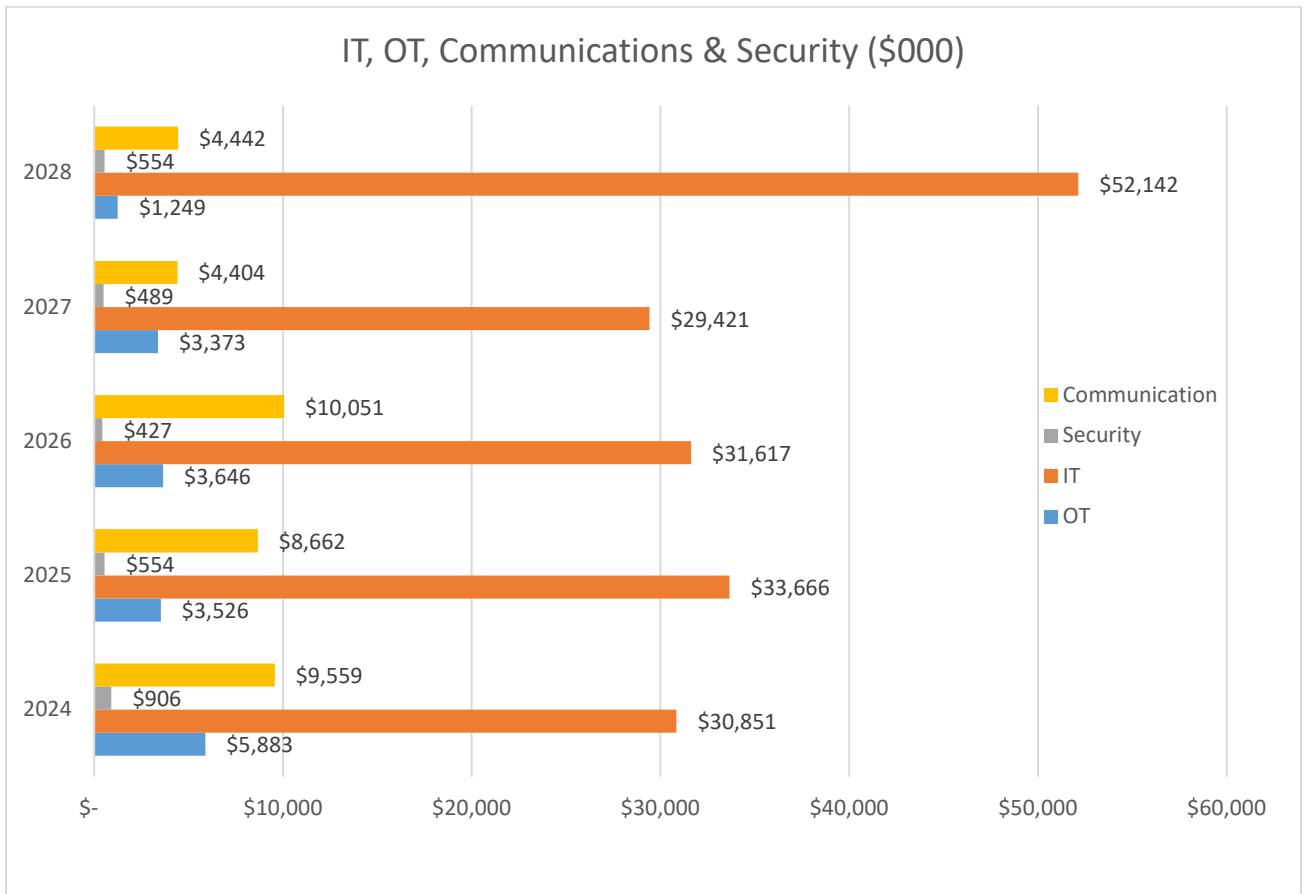
The average annual investment requirement for 2024-2027 is \$47 million, driven by investments required to fulfill the strategic initiatives mentioned above as well as increased investments in Customer Experience Optimization, Cybersecurity, infrastructure hardening & resiliency, and investments that were deferred from prior years due to the Company’s focus on Customer Information System (“CIS”) Modernization.

OT’s Five-Year Capital Plan, \$17.7 million, reflects continued investment in the enhancement of the Distribution Management System (“DMS”) to expand to the inclusion of Outage Management System (“OMS”) capabilities. Additionally, \$5 million of OT’s Capital Expenditures are allocated for the technological build-out of the Primary Control Center.

IT’s Five-Year Capital Plan, \$177 million, reflects continued investment in the reoccurring license renewals, infrastructure and application upgrades, enhancements, and replacements.

Security’s Five-Year Capital Plan, \$3 million, reflects continued investment in the upgrading of security hardware to provide our workforce the ability to support critical infrastructure that supports safe and reliable service to our customers.

The graph below outlines the Five-Year IT, OT & Communications & Security Capital Plan for 2024-2028:



Outlined below are the key technology investments that support each strategic business initiative during the 2024-2028 timeframe:

- **Digital Customer Experience** – Ongoing investment in Digital (Web/Chat/Mobile/Social) customer enablement via extending self service capabilities, growing adoption of existing self-service offerings, and aligning customer experience across all channels.
 - SAP Optimizations and Upgrade
 - Dunning - (collections) automation within SAP and implementing enhancements that will reduce the manual workload that currently exists within the Business.
 - Monthly Meter Reading - to enable the organization to transition to Monthly Meter Reading.
 - Major SAP Upgrade - to ensure the software continues to receive vendor support and maintenance by remaining at a current software version.
 - IVR Modernization - improve customer contact center experience with the replacement of the current Interactive Voice Response (“IVR”) system.
 - Billing Re-Design - creating and providing bills, forms, and letters in Spanish for customers in which Spanish is their preferred language.
 - MyAccount Site Updates - MyAccount page will reflect a more modern appearance with easy-to-understand information.
- **Modernize/transform Business Operations:** Ongoing investments to enhance and upgrade our business operations.
 - **Grid Modernization:**
 - ADMS Modeling & Enhancements West of River - development of the ADMS model for the West of River.
 - Field Area Network investments - discontinue aging network communications equipment and improve the speed and reliability of the Central Hudson distribution network communications.
 - OMS implementation, utilizing the GE DMS & EMS solution.
 - Primary Control Center (PCC) - Build out of the Network Strategy NOC and Operational Technology Supporting Systems and Applications at the new PCC.
 - **Communications** - Expanded use of a Network Integrity program (Cisco's Suite of Products) that will improve the security of the corporate network.
 - Land Mobile Radio (“LMR”) Replacement with Digital Mobile Radio (“DMR”) – replace the existing LMR system with a new DMR system.
 - Backhaul Optical Fiber - locations have been identified where optic fiber is needed to reinforce this communication network and provide redundant communication paths to increase system reliability or expand the communication network to reach new Electric Substations, Gas Regulator Stations, or gateway locations.

- Substation Upgrades – Replace aged phone circuits for communications for services including voice circuits (POTs Lines), SCADA circuits, and Protective Relay circuits.
 - **Technology Infrastructure Optimization & Lifecycle Initiatives** – Ongoing life cycle and enhancement management of hardware across the enterprise to ensure minimal impacts to productivity and to ensure effective delivery of business applications.
 - Replacement of Mobile Workforce Management - replace the Oracle solution with one that ensures continued vendor support for vulnerabilities and product development.
 - Upgrade(s) to Cascade - migrate the software from an old Power Builder platform to a modern Web Base User Interface.
 - Upgrade(s) to DNV Inspection Manager – Upgrade of DNV Inspection Manager, a compliance-based inspection software used to schedule and inspect gas system assets.
 - **Enterprise Analytics Platform & IEDR Phase 1 &2** – Deliver enterprise-wide analytics solutions to support the business in aligning to data driven business operations. This program is inclusive of the Integration Energy Data Resource (“IEDR”) program as well.
 - **GIS Modernization:**
 - Utility Network Migration – Upgrade and enhance ArcGIS to ArcGIS PRO.
 - Underground Network Management Solution - convert paper maps of manholes, underground pull boxes, cables, and duct banks in Poughkeepsie, Newburgh, and Kingston districts into detailed electronic models within Central Hudson’s existing GIS Solution.
- **Workforce Development, Attraction & Retention:**
 - Learning Management System (“LMS”) Consolidation - initiative seeks to consolidate the multiple learning management platforms leveraged throughout Central Hudson’s operational areas onto an enterprise LMS.
- **Transform Safety Culture:**
 - Cyber Security Program - Ongoing investment in security layers to aid in prevention of customer and company data/information system breaches. Constant rigor required to ensure customer and company Cyber Security.
 - Identity and Access Management (IDAM) Phase 2 - expanding the functionality of its IDAM tool to integrate with ServiceNow to provide seamless access provisioning to systems, SAP’s GRC tool to ensure all core authentication/authorization platforms are configured for automated provisioning, and Azure AD/Exchange Online to streamline SharePoint and Teams access management.
 - ServiceNow GRC – This solution will aid Central Hudson’s Cybersecurity Team in ensuring increasing maturity of processes, alignment to modern and current NIST standards, allow for risk measurement and reduction, and decreasing inefficiencies in manually tracking regulatory and compliance requirements.

- Aviat Router Replacement – phase out the Aviat equipment and replace with Cisco equipment.

Also included in the 5-year capital plan are investments to support ERP Phase III preparation.

- ERP Assessment – to analyze current and scope out the future state solution
- Warehouse Barcoding – implementing barcode scanning and inventorying.
- Document Information System (“DIS”) Replacement – move off its legacy DIS system to better leverage industry standards in managing and maintaining physical corporate records
- Integrated Energy Accounting (“IEA”) modernization - Transitioning to a replacement solution.

The Central Hudson Technology group partners and collaborates with the 12 major areas responsible for Central Hudson operations to create the prioritized portfolio of technology projects in the 5-Year Capital Plan. In 2022, the Technology group implemented an objective prioritization framework to support the prioritization and selection of all capital technology investments. This framework, created in partnership with the Technology Steering Committee and the Capital Asset Review and Evaluation Committee (“CARE”), consists of six attributes derived from qualifying questions that are used to evaluate and classify project requests. These questions receive equal weighting when determining the priority of a request and are as follows:

- Does the project satisfy or fulfill a regulatory requirement?
- Does the project result in cost savings, cost avoidance, and/or revenue for Central Hudson or its stakeholders?
- Does the project enhance Central Hudson’s customer experience?
- Does the project reduce risk, debt, or vulnerabilities (i.e., legal, cybersecurity, technology, infrastructure)?
- Does the project improve or enhance safety and wellness for Central Hudson employees, contractors, or the public?
- Is the project included in the current rate case authorization?

Projects are evaluated on a scale of 0 to 6 based on the number of attributes the investment satisfies, creating a priority score. Each project is then evaluated for relative urgency and classified as an ‘immediate,’ ‘moderate,’ or ‘low’ urgency initiative. The priority and urgency ratings combined with Central Hudson’s classifications of ‘maintaining standards,’ ‘system enhancements,’ and ‘non-discretionary’ support the global ranking and sequencing of projects within the portfolio. Project ranking is leveraged to determine which projects receive capital funding.

Additionally, project requests are evaluated to ensure overall alignment with Technology strategic drivers. These drivers are designed to ensure that Central Hudson’s Technology investments align with industry best practices, Central Hudson’s operational support capabilities, and alignment with other factors such as risk and cost optimization:

- Cloud – this strategy supports the adoption of cloud technologies for platforms whenever appropriate. This approach aligns with industry trends in that it minimizes software development and infrastructure overhead, enables rapid scalability, enables frequent and periodic software upgrades to provide additional functionality and address security vulnerabilities.

- Mobility – this strategy focuses on equipping Central Hudson and its customers with the ability to access data, applications, and services anytime, anywhere, and from any device with the proper credentials. The strategy supports mobile computing and communication, while ensuring security, data privacy, and compliance controls are in place.
- Sustainability, Reliability, & Rationalization – this strategy supports efforts that enhance Central Hudson’s ability to sustain business operations or improve the reliability of key technologies. In alignment with industry best practices, Central Hudson has an obligation to continuously ensure technology assets are at current vendor-supported versions (N or N-1) to prevent functionality and cybersecurity risks. This strategy also focuses on consolidating (minimizing) redundant legacy applications whenever possible to centralized enterprise-wide solutions.
- Cyber & Information Security – this strategy focuses on reducing technical risk and vulnerabilities, supporting data privacy and Central Hudson’s overall cybersecurity posture.
- Process Automation – this strategy aims to automate, streamline, and optimize business processes wherever possible to reduce errors, delays, and inefficiencies while increasing overall productivity and potentially reduce cost.

Leaders from each of the 12 operational areas meet regularly as a collective Technology Steering Committee to review and approve the investments in the Technology portfolio in alignment with the strategic plan. The Technology Steering Committee, chaired by the Chief Technology Officer, is also responsible for approving any changes to the plan. This prioritization process will continue to mature as incremental improvements are made in the upcoming years. The capital plan has been created and reviewed in accordance with this process.

Transportation and Tools

The Tools Capital Forecast provides for both the normal replacement of tools and instruments as well as the addition of any new and/or incremental tooling needs throughout the Company to allow our employees to complete their daily work. Typical items included within the tool budget include welders, gas tapping equipment, line voltage and fault testing equipment, automobile jacks and lifts, etc. The Company utilizes the historical spend for tools to develop the portion of the budget required for typical “tool replacement” and then develops a forward-looking plan for any incremental needs associated with any new initiatives or workforce expansion. The annual “tool replacement” spend has been set at an average of the 3-year historical spend while the incremental portion of the budget has been developed based on a needs inventory taking into consideration those tools required for the Indoor Operations Training Area.

The Transportation Capital Forecast includes all vehicles, including light and heavy-duty vehicles, trailers, forklifts, track/earthmoving equipment, and cranes. The Company uses the following industry appropriate criteria for determining the replacement cycle: Light duty vehicles are included on the replacement listing when they are seven years old or have 120,000 miles; Heavy duty vehicles are included on the replacement listing when they are 10 years old or have 10,000 machine hours; and other specialty equipment is specifically included within the Five-Year Capital Plan based on individual assessment. Within the Greenhouse Gas Emissions Reduction Plan, the Company has also committed to dedicating at least 10% of the annual vehicle capital budget to the procurement of

battery electric vehicles (“BEV”) and/or plug-in hybrid electric vehicles (“PHEV’s) through 2025. Additionally, the Company’s goal is to have 10% of the fleet electrified by 2025 and 50% by 2030, dependent upon the pace of technological advances in charging infrastructure and heavy-duty vehicle electrification. As such, the plan included herein includes expenditures to replace gas powered vehicles with an electric vehicle or a plug-in electric vehicle where feasible. These replacements will be completed in conjunction with the normal replacement cycle of the vehicle. The Company is planning to replace vehicles at the end of their useful life in-order to meet these goals. These goals are in alignment with the Greenhouse Gas Emissions Reduction Plan and support New York’s overall transportation electrification objectives. The Company has performed an analysis on its current fleet comparing its current state against that of its future state over each of the next five years (utilizing average annual mileage or hours to project the future state of each vehicle or piece of equipment). This analysis was the basis to determine which vehicles/equipment would warrant replacement based on the established replacement criteria. Findings from this analysis have shown that we are currently significantly behind on our scheduled replacement cycles (driven by extended delivery times associated with supply chain constraints) and that a very sizeable expenditure in year one of this five-year replacement plan would be required to “catch up.” To appropriately develop an executable replacement plan, considering extended order times for vehicles, a levelized budgeting approach utilizing a consistent spend over the Five-Year Common Capital Plan was developed. This levelized plan allows the Company to get back in alignment with our replacement schedule by the end of the Five-Year Common Capital Plan as it provides the most manageable procurement plan (taking into consideration supply chain challenges) for the Company while also consistently spreading the cost equitably throughout the five-year period. Prior to the onset of the COVID-19 pandemic, lead times for vehicles/trucks built to the Company’s specifications were approximately a year. As the effects of the COVID-19 pandemic are being experienced in various supply chains, the lead times on these same trucks are a minimum of three years, and up to five years. Finally, based on the current and anticipated future requirements from the New York State Department of Transportation (with respect to Highway Work Permits and the required use of protective vehicles with truck/trailer mounted impact attenuators), it is estimated that a total of nine attenuators will be required to meet Company needs. Attenuators are safety vehicles with an attenuating crash cushion intended to reduce the risks of injuries and fatalities resulting from crashes in construction work zones. Therefore, expenditures for a total of nine attenuators have been included within the first 3 years of the Transportation Forecast (3 per year for the first 3 years).

SUMMARY SCHEDULES 2024-2028 FORECAST

2024-2028 Construction Forecast (\$000's)
INSTALLATION W/ AFUDC
(with inflation & OH adjustment)

3/23/2023

| | | Expenditures with AFUDC | | | | | |
|-----------------------------|------|-------------------------|----------------------|----------------------|----------------------|----------------------|---------------------------------|
| | | 2024 Proposed Budget | 2025 Proposed Budget | 2026 Proposed Budget | 2027 Proposed Budget | 2028 Proposed Budget | 2024-2028 Proposed Budget Total |
| ELECTRIC PROGRAM | | | | | | | |
| Hydro & Gas Turbines | 11 | 4,367 | 6,417 | 5,178 | 3,533 | 5,560 | 25,055 |
| Transmission | 12A | 31,010 | 28,794 | 29,063 | 36,312 | 32,835 | 158,013 |
| Transmission FERC | 12B | 254 | 271 | 347 | 593 | 15,952 | 17,417 |
| Substations | 13 | 26,230 | 20,219 | 22,589 | 22,874 | 22,731 | 114,644 |
| New Business | 14 | 12,688 | 13,301 | 13,766 | 14,426 | 15,156 | 69,338 |
| Dist. Improvements | 15 | 52,447 | 56,322 | 57,449 | 56,759 | 57,213 | 280,191 |
| Transformers | 16 | 17,640 | 16,443 | 16,255 | 16,564 | 16,879 | 83,782 |
| Meters | 17 | 2,768 | 2,827 | 2,886 | 2,941 | 2,997 | 14,418 |
| Storm | 19 | 1,682 | 1,712 | 1,751 | 1,785 | 1,820 | 8,750 |
| Total Electric Program | | 148,833 | 146,035 | 148,938 | 155,194 | 155,191 | 754,192 |
| GAS PROGRAM | | | | | | | |
| Production | 21 | - | - | - | - | - | - |
| Transmission | 22 | 4,240 | 6,647 | 6,818 | 4,493 | 5,672 | 27,870 |
| Regulator Stations | 23 | 3,304 | 3,592 | 3,820 | 4,376 | 4,337 | 19,429 |
| New Business | 24 | 9,955 | 10,373 | 7,738 | 7,908 | 8,313 | 44,288 |
| Dist. Improvements | 25 | 51,581 | 56,374 | 60,382 | 63,691 | 69,912 | 301,940 |
| Meters | 27 | 2,926 | 3,028 | 3,213 | 3,405 | 3,611 | 16,183 |
| Total Gas Program | | 72,005 | 80,014 | 81,971 | 83,874 | 91,845 | 409,710 |
| COMMON PROGRAM | | | | | | | |
| Buildings | 41 | 17,479 | 21,996 | 30,628 | 18,293 | 25,802 | 114,199 |
| Buildings Minors | | 9,959 | 8,794 | 10,554 | 8,337 | 7,276 | 44,920 |
| Major Expansion | | 7,521 | 13,202 | 20,074 | 9,956 | 18,526 | 69,279 |
| Office Equipment | 42 | 38,199 | 38,435 | 37,582 | 34,023 | 54,828 | 203,067 |
| General | 4210 | 560 | 689 | 1,893 | 740 | 884 | 4,765 |
| EMS | 4230 | 5,883 | 3,526 | 3,646 | 3,373 | 1,249 | 17,676 |
| EDP | 4222 | 5,706 | 3,392 | 6,144 | 3,328 | 3,489 | 22,058 |
| Software | 4220 | 25,144 | 30,274 | 25,473 | 26,093 | 48,653 | 155,638 |
| Security | 4240 | 906 | 554 | 427 | 489 | 554 | 2,930 |
| Tools | 43 | 1,605 | 1,639 | 1,781 | 2,144 | 1,849 | 9,018 |
| Communication | 44 | 9,559 | 8,662 | 10,051 | 4,404 | 4,442 | 37,119 |
| Transportation | 45 | 13,824 | 14,115 | 14,411 | 14,685 | 14,964 | 71,999 |
| Total Common Program | | 80,668 | 84,847 | 94,453 | 73,549 | 101,886 | 435,402 |
| PSC ADDITIONS TOTAL | | 301,506 | 310,896 | 325,362 | 312,617 | 348,922 | 1,599,303 |
| PSC REMOVALS TOTAL | | 17,374 | 17,643 | 16,431 | 15,967 | 15,009 | 82,424 |
| SUBTOTAL PSC CAPITAL | | 318,880 | 328,539 | 341,794 | 328,584 | 363,931 | 1,681,728 |
| FERC TOTAL | | 254 | 271 | 347 | 593 | 15,952 | 17,417 |
| CORPORATE TOTAL | | 319,134 | 328,810 | 342,141 | 329,177 | 379,883 | 1,699,145 |

2024-2028 Construction Forecast (\$000's)

REMOVAL
(with inflation)

| | | Expenditures | | | | | |
|-------------------------|------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------------------|
| | | 2024 Proposed Budget | 2025 Proposed Budget | 2026 Proposed Budget | 2027 Proposed Budget | 2028 Proposed Budget | 2024-2028 Proposed Budget Total |
| ELECTRIC PROGRAM | | | | | | | |
| Hydro & Gas Turbines | 11 | 5 | 1,258 | 94 | 54 | 33 | 1,445 |
| Transmission | 12 | 6,266 | 5,658 | 4,676 | 4,945 | 3,800 | 25,344 |
| Substations | 13 | 2,604 | 2,108 | 2,586 | 2,174 | 2,216 | 11,688 |
| New Business | 14 | 256 | 269 | 283 | 297 | 312 | 1,417 |
| Dist. Improvements | 15 | 5,738 | 5,619 | 5,720 | 5,649 | 5,689 | 28,415 |
| Transformers | 16 | 409 | 418 | 427 | 435 | 443 | 2,132 |
| Meters | 17 | 5 | 10 | 11 | 11 | 11 | 48 |
| Storm | 19 | - | - | - | - | - | - |
| Total Electric Program | | 15,283 | 15,340 | 13,797 | 13,566 | 12,504 | 70,489 |
| GAS PROGRAM | | | | | | | |
| Production | 21 | - | - | - | - | - | - |
| Transmission | 22 | 102 | 146 | 149 | 152 | 155 | 705 |
| Regulator Stations | 23 | 256 | 230 | 235 | 239 | 266 | 1,226 |
| New Business | 24 | 205 | 215 | 226 | 238 | 249 | 1,133 |
| Dist. Improvements | 25 | 1,433 | 1,463 | 1,494 | 1,522 | 1,551 | 7,463 |
| Meters | 27 | - | - | - | - | - | - |
| Total Gas Program | | 1,996 | 2,054 | 2,104 | 2,151 | 2,221 | 10,527 |
| COMMON PROGRAM | | | | | | | |
| Buildings | 41 | 544 | 698 | 979 | 699 | 733 | 3,653 |
| Buildings Minors | | 544 | 698 | 899 | 699 | 733 | 3,573 |
| Major Expansion | | - | - | 80 | - | - | 80 |
| Office Equipment | 42 | - | - | - | - | - | - |
| General | 421 | - | - | - | - | - | - |
| EMS | 423 | - | - | - | - | - | - |
| EDP | 4222 | - | - | - | - | - | - |
| Software | 4220 | - | - | - | - | - | - |
| Security | 424 | - | - | - | - | - | - |
| Tools | 43 | - | - | - | - | - | - |
| Communication | 44 | 1 | 1 | 1 | 1 | 1 | 5 |
| Transportation | 45 | (450) | (450) | (450) | (450) | (450) | (2,250) |
| Total Common Program | | 95 | 249 | 530 | 250 | 284 | 1,408 |
| CORPORATE TOTAL | | 17,374 | 17,643 | 16,431 | 15,967 | 15,009 | 82,424 |

ELECTRIC PROGRAM INDIVIDUAL PROJECT SUBMITTAL

Submission Date: May 12, 2023
Submitted By: B Yager

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 3 Pre-Construction

A. GENERAL

Project/Program Name: Dashville Rubber Gate Replacement & Headwork Modification **Work Order #:** -

Budget Group: Electric **Budget Category:** 11 **Funding Project Number:** 1-1122-00-18

Is this a Specific Project, Program or Blanket? Specific **Target Schedule - Start:** 4/1/2022 **In-Service:** 12/31/2024

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
 None

Describe the project objective and scope of work:

1. The objective is to replace, in kind, the Rubber Crest Gate system, due to it reaching the end of its life, to continue maximizing plant output for our customers.
2. Since the area will need to be dewatered, the headwork wall will also be modified to eliminate the safety issue of water entering the building and eventually compromising the structural integrity of the building.

Describe specific scope exclusions, assumptions and constraints:

The assumption is that the headwork wall will be able to be modified at a reasonable cost and the material costs for a new rubber gate will not have changed significantly due to supply chain delays created by COVID-19. The Rubber Gate estimate was based on discussions with a vendor in early 2021.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

1. "Do Nothing" option
2. Going back to the wooden flashboards

Why was the proposed project scope chosen over other alternatives?

"Do Nothing" option would cost the customers \$256K per year. This is a least cost solution and has a net benefit of \$60k per year. Going back to the wooden flashboards would require a more extensive regulatory review and not likely to be accepted since the Rubber Gate system is safer for employees and is less likely to cause a dam failure.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

System has reached the end of life.

What are the risks and consequences of not completing this project?

System failure and possible damage to the dam structure.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|------------------|--|-------------|-------------|-------------|--------------|
| \$2,448,005 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 2,391,881 | 538,881 | 1,853,000 | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 56,000 | 6,000 | 50,000 | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,447,881 | 544,881 | 1,903,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 124 | | 0 | 124 | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 124 | 0 | 0 | 124 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | |
|---|------------------|------------------|
| Current Approved Rate Case Funding (\$): | 2,189,000 | 2,189,000 |
|---|------------------|------------------|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Material availability could impact both cost and schedule. The other risk is regulatory review of project could significantly delay project. This project cannot be done at the same time as the budgeted Major overhauls at Dashville in 2024 and 2025. This would be a blackout period to implement this project.

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

The Rubber Gate estimate was based on discussions with an engineering design firm and one possible vendor in early 2021.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 12, 2023
Submitted By: B yager

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Dashville #1 Major Overhaul

Work Order #: -

Budget Group: Electric

Budget Category: 11

Funding Project Number: 1-1122-00-18

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2025

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

None

Describe the project objective and scope of work:

The objective is to bring the unit that has reached the end of its life back to near OEM specification. Complete overhaul of wet section (including new runner) and minor generator work of the hydroelectric generating unit.

Describe specific scope exclusions, assumptions and constraints:

This project scope excludes a major overhaul of the generator. The full scope of the work cannot be determined until the unit is disassembled and a detailed investigation is performed.

See attached Dashville Planning Study (EP2021-013)

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

See attached Sturgeon Pool Planning Study (EP2021-002)

Why was the proposed project scope chosen over other alternatives?

See attached Sturgeon Pool Planning Study (EP2021-002)

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

See attached Dashville Planning Study (EP2021-013)

What are the risks and consequences of not completing this project?

See attached Dashville Planning Study (EP2021-013)

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|---|----------------------------------|--|---|----------------|--|----------------|----------------|----------------|--------------|
| \$5,193,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 347,440 | | 25,870 | 321,570 | | | | |
| | Labor (Monthly Payroll) | 63,190 | | 6,910 | 56,280 | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 4,205,045 | | 437,480 | 3,767,565 | | | | |
| | Overheads | 490,150 | | 52,740 | 437,410 | | | | |
| | AFUDC* | 175 | | | 175 | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 5,106,000 | 0 | 523,000 | 4,583,000 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 38,700 | | | 38,700 | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 27,300 | | | 27,300 | | | | |
| | Overheads | 21,000 | | | 21,000 | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 87,000 | 0 | 0 | 87,000 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|------------------|------------------|------------------|
| Current Approved Rate Case Funding (\$): | 5,032,000 | 535,000 | 4,497,000 |
| | | 2021-2023 | 2024 |

Prior years funding;
not actuals.

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Cost estimate developed based on anticipated work scope. Actual work scope cannot be determined until the unit is completely disassembled.

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

See attached Dashville Planning Study (EP2021-013)

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 12, 2023
Submitted By: B Yager

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Dashville #2 Major Overhaul

Work Order #:

Budget Group: Electric

Budget Category: 11

Funding Project Number: 1-1122-00-18

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 7/1/2024

In-Service: 12/31/2026

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

None

Describe the project objective and scope of work:

The objective is to bring the unit that has reached the end of its life back to near OEM specification. Complete overhaul of wet section (including new runner) and minor generator work of the hydroelectric generating unit.

Describe specific scope exclusions, assumptions and constraints:

This project scope excludes a major overhaul of the generator. The full scope of the work cannot be determined until the unit is disassembled and a detailed investigation is performed.

See attached Dashville Planning Study (EP2021-013)

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

See attached Sturgeon Pool Planning Study (EP2021-002)

Why was the proposed project scope chosen over other alternatives?

See attached Sturgeon Pool Planning Study (EP2021-002)

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

See attached Dashville Planning Study (EP2021-013)

What are the risks and consequences of not completing this project?

See attached Dashville Planning Study (EP2021-013)

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|------------------------|--|------------------------|------------------------|------------------------|---------------------|
| \$5,365,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 328,440 | | | 65,870 | 262,570 | | | |
| | Labor (Monthly Payroll) | 69,190 | | 5,000 | 6,910 | 57,280 | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 4,228,056 | | 20,000 | 394,350 | 3,813,706 | | | |
| | Overheads | 490,084 | | | 52,740 | 437,344 | | | |
| | AFUDC* | 160,230 | | 1,000 | 17,130 | 142,100 | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 5,276,000 | 0 | 26,000 | 537,000 | 4,713,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 18,700 | | | | 18,700 | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 49,300 | | | | 49,300 | | | |
| | Overheads | 21,000 | | | | 21,000 | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 89,000 | 0 | 0 | 0 | 89,000 | 0 | 0 | 0 |
| * AFUDC may require adjustment after Finance Department review. | | | | | | | | | |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 4,972,000 | 535,000 | 4,437,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Cost estimate developed based on anticipated work scope. Actual work scope cannot be determined until the unit is completely disassembled.

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

See attached Dashville Planning Study (EP2021-013)

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

See attached Sturgeon Pool Planning Study (EP2021-002)

Why was the proposed project scope chosen over other alternatives?

See attached Sturgeon Pool Planning Study (EP2021-002)

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

See attached Sturgeon Pool Planning Study (EP2021-002)

What are the risks and consequences of not completing this project?

See attached Sturgeon Pool Planning Study (EP2021-002)

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$1,215,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,174,998 | | | 38,998 | 21,000 | 1,115,000 | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 40,002 | | | 2 | 10,000 | 30,000 | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,215,000 | 0 | 0 | 39,000 | 31,000 | 1,145,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------------|------------------|----------------|
| Current Approved Rate Case Funding (\$): | 131,000 | | 131,000 |
| | | 2021-2023 | 2024 |

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

It is not known what controls equipment will be still supported at the start of the project. Still defining scope.

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

See attached Sturgeon Pool Planning Study (EP2021-002)

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 12, 2023
Submitted By: B Yager

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Sturgeon Pool Southern Wall Foundation Reinforcement

Work Order #: -

Budget Group: Electric

Budget Category: 11

Funding Project Number: 1-1122-00-18

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 2/1/2027

In-Service: 12/1/2027

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

None

Describe the project objective and scope of work:

Replacement of floor section at sturgeon pool. Voids were created below during a historical equipment failure (historic issue resolved/ floor still to be fixed).

Describe specific scope exclusions, assumptions and constraints:

Assumed that damage is isolated to one area and that there has been no damage due to the void.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do Nothing

Why was the proposed project scope chosen over other alternatives?

The cost to fully verify that the void is an isolated occurrence would be very similar to resolving the issue.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To confirm the void is isolated and will not cause settling issues.

What are the risks and consequences of not completing this project?

Settling of the plant foundation putting the units out of alignment.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

This project should be completed in addition to previously planned projects.

What other factor were considered during the prioritization process?

Foundation settling can affect the alignment of the units in the plant.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$1,105,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 100,000 | | | | | 100,000 | | |
| | Labor (Monthly Payroll) | 17,000 | | | | | 17,000 | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 967,000 | | | | | 967,000 | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 21,000 | | | | | 21,000 | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,105,000 | 0 | 0 | 0 | 0 | 1,105,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | 0 | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Full scope is not determinable until areas are exposed.

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Budgetary estimate by industry personnel

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 12, 2023
Submitted By: B Yager

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Sturgeon Pool Replace Toe of Dam

Work Order #: -

Budget Group: Electric **Budget Category:** 11

Funding Project Number: 1-1122-00-18

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 3/1/2028

In-Service: 12/1/2029

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

None

Describe the project objective and scope of work:

Fill in erosion downstream of the dam before it works its way under the toe.

Describe specific scope exclusions, assumptions and constraints:

Rifton bank is structurally sound. During the summer the toe fully dries up. Minimal rock removal is necessary.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do Nothing

Why was the proposed project scope chosen over other alternatives?

Will become a regulatory issue if not tended to

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

An engineering study will be completed to determine current condition and project timeline requirements.

What are the risks and consequences of not completing this project?

Regulatory action, Compromised dam

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

This project should be completed in addition to previously planned projects. This project was not previously included as it is planned for 2028-29.

What other factor were considered during the prioritization process?

The toe of the dam deteriorates slowly however the more it deteriorates the more expensive the costs for replacement gets.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$1,150,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 50,000 | | | | | | 50,000 | |
| | Labor (Monthly Payroll) | 19,000 | | | | | | 19,000 | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 300,000 | | | | | | 300,000 | |
| | Contractors (A/P tax exempt) | 674,000 | | | | | | 674,000 | |
| | Overheads | 84,000 | | | | | | 84,000 | |
| | AFUDC* | 23,000 | | | | | | 23,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,150,000 | 0 | 0 | 0 | 0 | 0 | 1,150,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Volume has to be fully calculated.

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Estimated off industry estimate calculation using yards of concrete.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 12, 2023
Submitted By: B Yager

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Sturgeon Pool Relay Protection / Breakers

Work Order #: -

Budget Group: Electric Budget Category: 11

Funding Project Number: 1-1122-00-18

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2027

In-Service: 12/1/2028

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

None

Describe the project objective and scope of work:

Upgrade Breakers and protective devices to protect the major electrical components in the plant.

Describe specific scope exclusions, assumptions and constraints:

Conductor can be reutilized, and all components can be spec'd as a replacement in kind.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure

Growth/Sustaining/Retirement: Growth Sustaining

Discretion Level: System Enhancements

Investment Type: Infrastructure

Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44)

Is there an Innovation Component? No

Needs Assessment: Infrastructure

If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:

The plant still utilizes the protection system put in place during initial installation in the 20's and has oil filled breakers. Upgrading these components will help to protect our investments put into the generators.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

Non-toxic and non-flammable

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document:

[CLICK HERE](#)

Which Strategic Theme does project most align with? Operational Excellence

Which Strategic Objective does project most align with? Improve system performance and resilience

Which Strategic Initiative does project most align with? Business & Operations Modernization

Which Team Goal does project most align with? Earnings (Net Income)

Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44,

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimate? Yes

** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: Yes **Environmental Component:** Yes

Social Component: No

Governance Component: No

Is complete Sustainability status achieved by this project?* No

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

The only alternative explored was to not move forward with this investment.

Why was the proposed project scope chosen over other alternatives?

Due to the potential hazards of oil breakers and increased protection provided to the generators.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Risk reduction

What are the risks and consequences of not completing this project?

Generator damage, fire/ explosion, PCB Hazards

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

This project should be completed in addition to previously planned projects. Recent unit rebuilds created insight to upgrades needed in protection before other system components can be upgraded.

What other factor were considered during the prioritization process?

Increasing protection systems for plant infrastructure and removal of hazardous materials from site.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$1,724,300 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 117,000 | | | | | 64,000 | 53,000 | |
| | Labor (Monthly Payroll) | 33,000 | | | | | 18,000 | 15,000 | |
| | Stock Materials | 44,000 | | | | | 22,000 | 22,000 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,390,300 | | | | | 857,700 | 532,600 | |
| | Overheads | 32,000 | | | | | 5,000 | 27,000 | |
| | AFUDC* | 54,000 | | | | | 14,000 | 40,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,670,300 | 0 | 0 | 0 | 0 | 980,700 | 689,600 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 54,000 | | | | | 54,000 | 0 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 54,000 | 0 | 0 | 0 | 0 | 54,000 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Equipment pricing has not been quoted

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Budgetary estimate from industry contractors.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 12, 2023
Submitted By: B Yager

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Sturgeon Pool Retaining Wall Penstock

Work Order #: -

Budget Group: Electric **Budget Category:** 11

Funding Project Number: 1-1122-00-18

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2028

In-Service: 11/1/2028

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
None

Describe the project objective and scope of work:

Secure the rock face adjacent to the penstocks to avoid rock debris hitting the pipes

Describe specific scope exclusions, assumptions and constraints:

Engineering required due to proximity to dam. Assumed that some rock material can be removed.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do Nothing

Why was the proposed project scope chosen over other alternatives?

It is important to protect the infrastructure that we have in place.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Hillside is eroding more with each freeze cycle.

What are the risks and consequences of not completing this project?

Damage to infrastructure.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

This project should be completed in addition to previously planned projects. This project was not previously included as it is planned for 2028.

What other factor were considered during the prioritization process?

Location of loose rock on hillside.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|-------------|-------------|------------------|--------------|
| \$1,691,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 32,000 | | | | | | 32,000 | |
| | Labor (Monthly Payroll) | 15,000 | | | | | | 15,000 | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 16,000 | | | | | | 16,000 | |
| | Contractors (A/P tax exempt) | 1,547,000 | | | | | | 1,547,000 | |
| | Overheads | 47,000 | | | | | | 47,000 | |
| | AFUDC* | 34,000 | | | | | | 34,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,691,000 | 0 | 0 | 0 | 0 | 0 | 1,691,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|---|---|---|---|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Amount of loose rock during removal will greatly affect price.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Budgetary estimate for intended scope.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: March 31, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|--|--|--------------------------------|-------------------------------|
| Project/Program Name: High Priority Replacement Program | | Work Order #: | <input type="text" value=""/> |
| Budget Group: Electric | Budget Category: 12 | Funding Project Number: | 1-1221-90-18 |
| Is this a Specific Project, Program or Blanket? Program | Target Schedule - Start: 1/1/2024 | In-Service: | 12/31/2028 |

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

There are no other specific work orders associate with the HPR Program. On occasion, in order to take advantage of mobilization and construction synergies, other projects will be done in conjunction with HPR projects.

Describe the project objective and scope of work:

Transmission lines are inspected on a cyclical basis with varying methods ranging from aerial patrols to comprehensive ground patrols. Inspection results are stored in a searchable database, currently CASCADE. This database contains data recorded from all types of inspection methods including aerial patrol, comprehensive aerial inspection, comprehensive ground inspection, ground line testing and treatment, climbing inspection, corona camera inspection, infrared inspection, etc... Inspection data is recorded for all transmission assets including poles, insulators, guy wires and anchors, structure hardware, foundations, grounding, conductors, static wires, suspect clearances, and right of ways (including encroachments, vegetation, access, etc). After the completion of each inspection cycle, results are analyzed and condition assessments are assigned to the appropriate component of each structure. These conditions are rated on a scale from "1" to "6" with "6" being in the most need of repair. Components with ratings of either "6", "5" or "4" must be repaired or replaced within 2 weeks, 1 year and 3 years, respectively, after the date of the condition assessment. There is a need to provide funding to respond to the results of the inspection process described above. In some instances components can simply be replaced while in other instances an entire structure might need to be replaced. The design work is then completed and materials ordered. Aside from emergency replacements, HPR driven replacements are typically grouped in packages by line and location to efficiently utilize field resources.

Describe specific scope exclusions, assumptions and constraints:

Program scopes are based on a majority of identified findings being mitigated through the replacement of structures. If other alternate mitigation methods are utilized it will affect the programs's project mix by allowing additional projects to be completed. It does not take into account emergent work that can be discovered through the scoping and design processes and/or unforeseen environmental and access improvements, land agreements or permits.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Various condition mitigation options are considered through the project scoping process such as repair or replacement of individual structure components as opposed to the replacement of an entire structure.

Why was the proposed project scope chosen over other alternatives?

Project Engineers evaluate various mitigation methods for each individual project and identified condition based on a variety of factors such as access difficulty, proximity to environmentally sensitive areas, overall condition of the structure / component, etc. In conjunction with the other internal CHG&E stakeholders, they then develop the project scope based on the best balance of the inputs and concerns.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Conditions identified in the comprehensive inspection cycle have the potential to represent risk to the safety and reliability of the electric transmission system and need to be addressed consistent with the timeframes specified by both the PSC and our internal severity rating criteria.

What are the risks and consequences of not completing this project?

There is a heightened possibility of failure if identified conditions are not repaired in-timeframe leading to the need for unplanned emergency repair and/or replacement work at elevated cost.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

Conditions are grouped by the transmission line they are on and by the timeframes in which they are due. Priority is given to conditions and lines with the greater number of outstanding conditions and their severity. Critical bulk electric system lines are prioritized over others.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|------------------------|--|------------------------|------------------------|------------------------|---------------------|
| \$54,083,315 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 4,404,277 | 1,761,077 | 530,000 | 528,300 | 528,300 | 528,300 | 528,300 | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 11,010,694 | 4,402,694 | 1,325,000 | 1,320,750 | 1,320,750 | 1,320,750 | 1,320,750 | |
| | Contractors (A/P tax exempt) | 28,627,803 | 11,447,003 | 3,445,000 | 3,433,950 | 3,433,950 | 3,433,950 | 3,433,950 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 2,059,000 | | 2,000 | 210,000 | 465,000 | 553,000 | 829,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 46,101,774 | 17,610,774 | 5,302,000 | 5,493,000 | 5,748,000 | 5,836,000 | 6,112,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 7,646,541 | 2,459,541 | 1,187,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | |
| | Overheads | 335,000 | | 28,000 | 45,000 | 67,000 | 87,000 | 108,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 7,981,541 | 2,459,541 | 1,215,000 | 1,045,000 | 1,067,000 | 1,087,000 | 1,108,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|

| | | | |
|---|-------------------|-------------------|------------------|
| Current Approved Rate Case Funding (\$): | 23,592,000 | 17,489,000 | 6,103,000 |
| | | 2021-2023 | 2024 |

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

The following could affect final annual HPR Program costs: Inflationary costs related to materials and labor, size of final project scopes, environmental conditions requiring costly permitting and/or access improvements, use of alternative and more costly structure types in final project designs, permitting restrictions, etc...

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

The HPR Cost estimate was derived using an estimate of the number of structures anticipated to be completed in a given year based on inspection results and assuming a pro-forma based cost per structure of approximately \$83K "A" and \$18K "R". Modifications are assumed to have an estimate cost of \$17K "A" per occurrence. Pro-Forma costs were derived from Historical 3-year averages (2021-2023).

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Cost Estimate breakdown is based on a conceptual pro-forma per single pole structure. The cost breakdown provided is estimated based on an averaged historical percentage split per project of Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively. Prior-year estimate column represents 2023 budget + total actual spending from 2021-2022 with historical percentage split applied.

| Analysis | Actual | Estimated (Avg. of 2023-2025) | | | | |
|------------------------------------|------------------|-------------------------------|------------------|------------------|------------------|------------------|
| | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
| Overdue Defects Due | 106 | 93 | 118 | 105 | 105 | 105 |
| Assumed # of Replacements | 53 | 47 | 59 | 53 | 53 | 53 |
| "A" Costs | 4,399,000 | 3,901,000 | 4,897,000 | 4,399,000 | 4,399,000 | 4,399,000 |
| "R" Costs | 954,000 | 846,000 | 1,062,000 | 954,000 | 954,000 | 954,000 |
| Assumed # of Capital Modifications | 53 | 46 | 59 | 52 | 52 | 52 |
| "A" Costs | 901,000 | 782,000 | 1,003,000 | 884,000 | 884,000 | 884,000 |
| TOTAL "A" | 5,300,000 | 4,683,000 | 5,900,000 | 5,283,000 | 5,283,000 | 5,283,000 |
| TOTAL "R" | 954,000 | 846,000 | 1,062,000 | 954,000 | 954,000 | 954,000 |

| | "A" | "R" |
|--|--------|--------|
| Average Cost Per Structure Replacement Rate | 83,000 | 18,000 |
| | 50% | |
| Average Cost Mod. | 17,000 | |
| Capital Reinforcement Rate | 50% | |

Requested Funding

| | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
|------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Overdue Defects Due * | 106 | 106 | 105 | 105 | 105 | 105 |
| Assumed # of Replacements | 53 | 53 | 53 | 53 | 53 | 53 |
| "A" Costs | 4,399,000 | 4,399,000 | 4,399,000 | 4,399,000 | 4,399,000 | 4,399,000 |
| "R" Costs | 954,000 | 954,000 | 954,000 | 954,000 | 954,000 | 954,000 |
| Assumed # of Capital Modifications | 53 | 53 | 52 | 52 | 52 | 52 |
| "A" Costs | 901,000 | 901,000 | 884,000 | 884,000 | 884,000 | 884,000 |
| TOTAL "A" | 5,300,000 | 5,300,000 | 5,283,000 | 5,283,000 | 5,283,000 | 5,283,000 |
| TOTAL "R" | 954,000 | 954,000 | 954,000 | 954,000 | 954,000 | 954,000 |

| | | |
|--|--------|--------|
| Average Cost Per Structure Replacement Rate | 83,000 | 18,000 |
| | 50% | |
| Average Cost Mod. | 17,000 | |
| Capital Reinforcement Rate | 50% | |

Notes * Replacements based on assumed replacement Rate of 50% - Remaining Structure to be addressed via Capital Reinforcements



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: 69kV FV Line Indian Lake Crossing

Work Order #: 2 4 8 2 - K

Budget Group: Electric **Budget Category:** 12

Funding Project Number: 1-1221-90-18

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2023

In-Service: 6/1/2025

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The 69kV FV Line runs 4.6 miles from the Smithfield Substation to the N.Y.S. line with C.T. where changes ownership with Eversource. This change in ownership occurs within a 2050ft span over Indian Lake. CHG&E has outstanding conditions in the span that would require the replacement of the conductor. Eversource has also approached CHG&E about replacing the span consistent with their rebuild of the C.T. portion which was completed in 2022. This project represents CHG&E's portion of the project to replace the crossing over the lake, to be done in

Describe specific scope exclusions, assumptions and constraints:

Detailed design and permitting work has not been completed. Estimates to-date do not account for specific conditions related to matting, access, permitting, outage constraints, etc...

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

The replacement of the conductor in the span was considered to address the CHG&E inspection findings. Given the age of the towers, the inter-dependence of the connected Eversource assets, and the in-progress replacement work being done on the C.T. side of the line, it was decided to work with Eversource to replace the crossing.

Why was the proposed project scope chosen over other alternatives?

Replacing the crossing will allow it to be brought up to current-day strength and clearance criteria. It will also provide for the installation of larger conductor to match the rebuild Eversource portion of the line.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Given the conditions identified as part of the inspection process, it is important to complete the project to reduce the risk of an in-service failure. The work must also be done in conjunction with the replacement of the corresponding Eversource assets consistent with their timeframes.

What are the risks and consequences of not completing this project?

Delaying the project would increase the risk of an unplanned outage and subsequent repair.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

This is an emergent project that got added based on inspection findings as well as the timing of the inter-dependent Eversource project.

What other factor were considered during the prioritization process?

This line is an interconnection to another utility.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$2,817,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 262,500 | 7,500 | 10,000 | 245,000 | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 656,250 | 18,750 | 25,000 | 612,500 | | | | |
| | Contractors (A/P tax exempt) | 1,706,250 | 48,750 | 65,000 | 1,592,500 | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 97,000 | | | 97,000 | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,722,000 | 75,000 | 100,000 | 2,547,000 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 9,500 | | | 9,500 | | | | |
| | Contractors (A/P tax exempt) | 85,500 | | | 85,500 | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 95,000 | 0 | 0 | 95,000 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,971,900 Maximum (\$): 3,662,100

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

No explanation on confidence level required.

Permitting, material and construction costs may vary causing a potential variance in the pro-forma estimate. A more accurate estimate will be created upon completion of preliminary design work.

Basis for estimate: Historical Proforma Pricing; Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Please see provided estimate for details on assumptions. Cost figures were based on historical costs for projects of similar construction and permitting requirements.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

The cost breakdown provided is estimated based on an averaged historical percentage split per project of Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively. Removals were split based on a 90%/10% split of Contractor (AP) and Monthly Labor respectively.



Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

Project Name: FV/690 Line Indian Lake Crossing Project Date: 11/4/2022 WO #: 2482
 Prepared By: Kyle Bragg Revision(s): 0
 Cost Estimate Level: Conceptual Estimate +/-30% Accuracy... There is a general scope but few details available. Little or no design work completed yet.

Part 1: Additions

* All unit and total cost figures should be "raw costs", without any overhead markups. Markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | | |
|---|---|----------|--------|-------------------------|--------------------|-----|---------|--------|--------------------|----|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------------|---------|-----------------------|--|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | | |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | | | |
| A.1 | Transmission Design | 600 | Hours | | 1.0 | 600 | 65.00 | 39,000 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| A.2 | Drafting | 80 | Hours | | 1.0 | 80 | 65.00 | 5,200 | | 0 | | 0 | | 0 | | 0 | | 0 | | Support / Closeouts | |
| A.3 | LiDAR | 1 | PC | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 25,000.00 | 25,000 | | |
| A.4 | Geotechnical Analysis / Foundation Design | 2 | PC | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 10,000.00 | 20,000 | | |
| A.5 | Contract Engineering | 1 | LOT | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 41,000.00 | 41,000 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | | | |
| B.1 | Project Management Support | 100 | Hours | | 1.0 | 100 | 65.00 | 6,500 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| B.2 | Environmental Affairs | 40 | Hours | | 1.0 | 40 | 65.00 | 2,600 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| B.3 | Real Property Services | 40 | Hours | | 1.0 | 40 | 65.00 | 2,600 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| B.4 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| B.5 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| B.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| B.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| B.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| B.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| B.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | | | |
| C.1 | Construction Staking | 1 | LOT | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 25,000.00 | 25,000 | Staking + Sagging | |
| C.2 | Laydown Rental | 4 | Months | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 5,000.00 | 20,000 | | |
| C.3 | Crane | 1 | Months | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 100,000.00 | 100,000 | Large Specialty Crane | |
| C.4 | SWPP Inspections | 2 | Months | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 10,000.00 | 20,000 | | |
| C.5 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | |
| C.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | |
| C.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | |
| C.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | |
| C.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | |
| C.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|--|---|----------|-------|-------------------------|------------------|--------------------------|-------|---------|-----------------|-------------------------|----|---------|------------------|-----------|------------------------------------|-----------|--------------------------------------|-----------|---|------|
| | | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | | Cost |
| D MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | | |
| D.1 | Engineered Pole 1654 | 1 | PC | | | 0 | | 0 | | 0 | | 0 | | 0 | 200,000.00 | 200,000 | | 0 | Based on SB Rebuild Pole Order | |
| D.2 | Engineered Pole 1653 | 1 | PC | | | 0 | | 0 | | 0 | | 0 | | 0 | 38,000.00 | 38,000 | | 0 | Based on SB Rebuild Pole Order | |
| D.3 | 1654 Caisson Foundation | 1 | PC | | | 0 | | 0 | | 0 | | 0 | | 0 | 350,000.00 | 350,000 | | 0 | Based on 2022 301 Foundation Pricing | |
| D.4 | 1653 Caisson Foundation | 1 | PC | | | 0 | | 0 | | 0 | | 0 | | 0 | 250,000.00 | 250,000 | | 0 | Based on 2022 301 Foundation Pricing | |
| D.5 | Deadend Hardware | 1 | LOT | | | 0 | | 0 | | 0 | | 0 | | 0 | 8,000.00 | 8,000 | | 0 | | |
| D.6 | Tangent Hardware | 1 | LOT | | | 0 | | 0 | | 0 | | 0 | | 0 | 3,000.00 | 3,000 | | 0 | | |
| D.7 | Conductor "Dove" 556 ACSS | 7,500 | FT | | | 0 | | 0 | | 0 | | 0 | | 0 | 3.00 | 22,500 | | 0 | 3-phase @ 2000ft + 500ft setup @ 3\$/ft | |
| D.8 | OPGW (144 Fiber) 0.669 | 2,500 | FT | | | 0 | | 0 | | 0 | | 0 | | 0 | 3.50 | 8,750 | | 0 | Single Static Line | |
| D.9 | FAA Lights (1 System) | 1 | AS | | | 0 | | 0 | | 0 | | 0 | | 0 | 6,000.00 | 6,000 | | 0 | (1) Solar-Powered System | |
| D.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E CONSTRUCTION | | | | | | | | | | | | | | | | | | | | |
| E.1 | Environmental/Restoration | 1 | LOT | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 21,000.00 | 21,000 | 10% of Line Labor Costs | |
| E.2 | Install R.O.W. Improvements/Access Controls (Gates, etc...) | 1 | LOT | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 100,000.00 | 100,000 | | |
| E.3 | R.O.W. Improvements - Matting | 1 | LOT | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 100,000.00 | 100,000 | | |
| E.4 | Line Contractor | 6 | Weeks | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 35,000.00 | 210,000 | 70% of Line Cost | |
| E.5 | Line Supervision | 8 | Weeks | | 60.0 | 480 | 65.00 | 31,200 | | 16.0 | 32 | 60.00 | 1,920 | | 0 | | 0 | 0 | | |
| E.6 | Switching | 2 | Days | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 0 | 0 | | |
| E.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 0 | 0 | | |
| E.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 0 | 0 | | |
| E.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 0 | 0 | | |
| E.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 0 | 0 | | |
| | | | | 0 | | | | 87,100 | | | | | | 0 | | | 886,250 | | 682,000 | |
| | | | | | | 1,340 | | | | 32 | | | | | | | | | | |
| | | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | |

Part 2: Removals

* All unit and total cost figures should be "raw costs", without any overhead markups. All markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|-----|--------------------------------|----------|-------|-------------------------|------------------|--------------------|----|---------|-----------------|--------------------|----|---------|------------------|-----------|------------------------------------|-----------|--------------------------------------|-----------|------------------|------|
| | | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | | Cost |
| R.1 | Line Contractor | 5 | Weeks | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 5,000.00 | 25,000 | 15% of Line cost | |
| R.2 | Disposal | 1 | LOT | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 40,000.00 | 40,000 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 0 | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 0 | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 0 | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 0 | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 0 | 0 | | |
| | | | | 0 | | | | 0 | | | | | | 0 | | | | 65,000 | | |
| | | | | | | 0 | | | | 0 | | | | | | | | | | |

| | | | | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|--------------------------------|----------|-------|-------------------------|--------------------------|----|---------|------|-------------------------|----|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|
| # | Work Breakdown Structure (WBS) | Quantity | Units | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |
| | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|--------------------------------|----------|-------|-------------------------|--------------------|----|---------|------|--------------------|----|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |

Part 3: Cost Estimate Summary

ADDITIONS SUMMARY:

Incurred To-Date:

| | | |
|----------------------------------|--------------------|---|
| Raw Costs Incurred To-Date: | \$0 | |
| Overhead Costs Incurred To-Date: | | <i>This figure must be manually entered if applicable</i> |
| AFUDC Costs Incurred To-Date: | | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$0 | |
| Estimated Future Raw Costs: | \$1,657,270 | |
| Estimated Future Overheads: | \$339,915 | |
| Estimated Future AFUDC: | \$21,721 | |
| Subtotal Future Costs: | \$2,018,906 | |
| Contingency Applied: | \$605,672 | 30.0% <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL ADDITIONS: | \$2,624,578 | |

REMOVALS SUMMARY:

Incurred To-Date:

| | | |
|----------------------------------|-----------------|---|
| Raw Costs Incurred To-Date: | \$0 | |
| Overhead Costs Incurred To-Date: | \$0 | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$0 | |
| Estimated Future Raw Costs: | \$65,000 | |
| Estimated Future Overheads: | \$8,303 | |
| Subtotal Future Costs: | \$73,303 | |
| Contingency Applied: | \$21,991 | 30.0% <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL REMOVALS: | \$95,294 | |

GRAND TOTAL ADDITIONS + REMOVALS:

\$2,719,872

Assumptions, Notes, Clarifications, etc.:

Estimate assumes the installation of (2) new structures on the NY-side of Indian Lake on the 69kV "FV" Line and associated conductor / static wire. Materials and labor assumed in estimate represent only what is needed for the CHG&E-Owned portion of the project. Estimate assumes no modification to FV Tower 1652. Tower 1653 is anticipated to be an 80ft self-supported mono-pole with caisson foundation and Tower 1654 is anticipated to be a 240ft self-supported mono-pole also with caisson foundation. No part 102C report is anticipated due to the length of the project. No costs are included related to municipal approvals. Outages are assumed to be continuous with good availability.

B. JUSTIFICATION

| | |
|---|--|
| Load Based/Infrastructure: Infrastructure | Growth/Sustaining/Retirement: Transmission Sustaining |
| Discretion Level: Non-Discretionary | Investment Type: Infrastructure |
| Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44) | Is there an Innovation Component? No |
| Needs Assessment: Infrastructure; Reliability; Risk Reduction | |
| If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? | No |

Describe the justification for this project. Include attachments or links to planning studies if applicable:

Existing towers are vintage and require replacement to support the new distribution circuit installations.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

Replacement of the lines will reduce the risk of an in-service failure and resulting unplanned emergency repair work at a premium cost. This will also preclude the need to find an alternate route for the proposed distribution circuit replacements.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

| | |
|--|---|
| Which <u>Strategic Theme</u> does project most align with? | Operational Excellence |
| Which <u>Strategic Objective</u> does project most align with? | Improve system performance and resilience |
| Which <u>Strategic Initiative</u> does project most align with? | Business & Operations Modernization |
| Which <u>Team Goal</u> does project most align with? | PSC SAIFI Outage Frequency |

Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44)

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates? Yes

** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

Miscellaneous (wetlands; highway; SWPPP)

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

| | | | |
|---------------------------------------|---|--|--|
| Checklist Fully Completed: Yes | Environmental Component: Yes | | |
| | Social Component: Yes | | |
| | Governance Component: Maybe - Requires further scope development | | |

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

Is complete Sustainability status achieved by this project?* Maybe - Requires further scope development

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Reconductoring the distribution circuits on the existing towers was considered as well as moving/rebuilding the distribution circuits onto the adjacent roadway and off of the towers.

Why was the proposed project scope chosen over other alternatives?

Rebuilding the (5) DW Line structures as well as the underbuilt distribution in the same configuration will provide more resilient and reliable structures that are designed to current-day standards and current working distances for effective maintenance of the circuits underneath the active transmission line. There is no space on the adjacent roadway due to the presence of several other distribution circuits making the on-road option not feasible.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

It is important to complete the project in the proposed timeframe to help reduce the risk of an in-service failure on the distribution. The work must also be done in conjunction with the replacement of the (2) underbuilt circuits.

What are the risks and consequences of not completing this project?

Delaying the project would increase the risk of an unplanned outage and subsequent repair and potentially affect the distribution replacement schedule and/or reliability.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

This is an emergent project that got added based on the emergent distribution capital project.

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$1,891,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 166,200 | | | 6,200 | 160,000 | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 415,500 | | | 15,500 | 400,000 | | | |
| | Contractors (A/P tax exempt) | 1,080,300 | | | 40,300 | 1,040,000 | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 143,000 | | | 2,000 | 141,000 | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,805,000 | 0 | 0 | 64,000 | 1,741,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 8,100 | | | | 8,100 | | | |
| | Contractors (A/P tax exempt) | 72,900 | | | | 72,900 | | | |
| | Overheads | 5,000 | | | | 5,000 | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 86,000 | 0 | 0 | 0 | 86,000 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,323,700 Maximum (\$): 2,458,300

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

No explanation on confidence level required.

Permitting, material and construction costs may vary causing a potential variance in the pro-forma estimate. A more accurate estimate will be created upon completion of preliminary design work.

Basis for estimate: Historical Proforma Pricing; Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Please see provided estimate for details on assumptions. Cost figures were based on historical costs for projects of similar construction and permitting requirements.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

The cost breakdown provided is estimated based on an averaged historical percentage split per project of Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively. Removals were split based on a 90%/10% split of Contractor (AP) and Monthly Labor respectively.



Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

Project Name: DW Line - West Balmville Tower Replacements with [Date: XXX
 Prepared By: Evan Gally Revision(s): XXX
 Cost Estimate Level: WO #: XXX

Part 1: Additions

* All unit and total cost figures should be "raw costs", without any overhead markups. Markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|--|----------|-------|-------------------------|------------------|--------------------|-------|---------|-----------------|--------------------|-------|---------|------------------|-----------|------------------------------------|-----------|--------------------------------------|-----------|-------|
| | | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit |  | Cost |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | |
| A.1 | Engineering Design | 100 | Hours | | 1.0 | 100 | 71.00 | 7,100 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| A.2 | Engineering Supervision; Project Sponsor | 25 | Hours | | 1.0 | 25 | 71.00 | 1,775 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| A.3 | Engineering Drafting | 25 | Hours | | | 0 | | 0 | 1.0 | 25 | 65.00 | 1,625 | | 0 | | 0 | | 0 | |
| A.4 | Surveyors / Structure Stakeout | 1 | Units | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 5,000.00 | 5,000 | |
| A.5 | Consultant Engineering | 1 | Units | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 20,000.00 | 20,000 | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | |
| B.1 | Environmental Services | 25 | Hours | | 1.0 | 25 | 71.00 | 1,775 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| B.2 | Real Properties | 25 | Hours | | 1.0 | 25 | 71.00 | 1,775 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| B.3 | T&D Supervision | 100 | Hours | | 1.0 | 100 | 71.00 | 7,100 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| B.4 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| B.5 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| B.6 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| B.7 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| B.8 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| B.9 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| B.10 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | |
| C.1 | Matting | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | 75,000.00 | 0 | |
| C.2 | Environmental Controls/ Restoration | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | 25,000.00 | 0 | |
| C.3 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| C.4 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| C.5 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| C.6 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| C.7 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| C.8 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| C.9 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| C.10 | | | | | | 0 | | 0 | | | 0 | 0 | | 0 | | 0 | | 0 | |
| D MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through xx/xx/xx | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|-----------------------|---------------------------------------|----------|-------|---|--------------------|--------------------------|---------|--------|--------------------|-------------------------|---------|------|------------------|------|------------------------------------|---------|--------------------------------------|---------|-------------------------|--|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| D.1 | Engineered Pole / Hardware | 5 | Units | | | 0 | | 0 | | 0 | | 0 | | 0 | 40,000.00 | 200,000 | | 0 | SB Line Rebuild Phase 1 | |
| D.2 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D.3 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D.4 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D.5 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E CONSTRUCTION | | | | | | | | | | | | | | | | | | | | |
| E.1 | Line Construction | 15 | Days | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 10,800.00 | 162,000 | | |
| E.2 | Foundation | 5 | Units | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 125,000.00 | 625,000 | | |
| E.3 | ROW Improvements / Gates | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.4 | Showup / Dumpsters | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 1,600.00 | 1,600 | | |
| E.5 | Construction Moves | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 2,250.00 | 2,250 | | |
| E.6 | Foreman / Field Supervision | 150 | Hours | | 1.0 | 150 | 71.00 | 10,650 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.7 | Field Clerks / Electricians / Riggers | 50 | Hours | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | 0 | | | | 30,175 | | | | | 1,625 | | 0 | | 200,000 | | 815,850 | |
| | | | | | | 425 | | | | | 25 | | | | | | | | | |
| | | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | |

Part 2: Removals * All unit and total cost figures should be "raw costs", without any overhead markups. All markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through xx/xx/xx | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|-----|--------------------------------|----------|-------|---|--------------------|--------------------------|---------|-------|--------------------|-------------------------|---------|------|------------------|------|------------------------------------|------|--------------------------------------|--------|--------|--|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| F.1 | Line Construction | 15 | Days | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 2,700.00 | 40,500 | | |
| F.2 | Showup / Dumpsters | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 6,000.00 | 6,000 | | |
| F.3 | ROW Improvements / Gates | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| F.4 | Foreman | 50 | Hours | | 1.0 | 50 | 71.00 | 3,550 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | 0 | | | | 3,550 | | | | | 0 | | 0 | | 0 | | 46,500 | |
| | | | | | | 50 | | | | | 0 | | | | | | | | | |
| | | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through xx/xx/xx | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|--------------------------------|----------|-------|---|--------------------|----|---------|------|--------------------|----|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |

Part 3: Cost Estimate Summary

| ADDITIONS SUMMARY: | | | |
|----------------------------------|--------------------|-------|---|
| Incurring To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | | | <i>This figure must be manually entered if applicable</i> |
| AFUDC Costs Incurred To-Date: | | | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$1,047,650 | | |
| Estimated Future Overheads: | \$230,546 | | |
| Estimated Future AFUDC: | \$0 | | |
| Subtotal Future Costs: | \$1,278,196 | | |
| Contingency Applied: | \$383,459 | 30.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL ADDITIONS: | \$1,661,655 | | |

| REMOVALS SUMMARY: | | | |
|----------------------------------|-----------------|-------|---|
| Incurring To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | \$0 | | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$50,050 | | |
| Estimated Future Overheads: | \$12,232 | | |
| Subtotal Future Costs: | \$62,282 | | |
| Contingency Applied: | \$18,685 | 30.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL REMOVALS: | \$80,967 | | |

| | |
|--|--------------------|
| GRAND TOTAL ADDITIONS + REMOVALS: | \$1,742,622 |
|--|--------------------|

Assumptions, Notes, Clarifications, etc.:

Replacement of (5) existing 115kV DW Line Structures with Engineered mono-poles with concrete caisson foundations. Poles to be sized appropriately to carry up to (3) underbuilt distribution circuits.



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Transmission Minors Project

Work Order #: -

Budget Group: Electric **Budget Category:** 12

Funding Project Number: 1-1211-00-18

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

There are no specific Work Orders associated with this project overall. If possible, the work identified in Transmission Minors may be constructed in conjunction with other projects (HPR, etc...) to take advantage of potential synergies with regards to access, mobilizations, etc...

Describe the project objective and scope of work:

The Minor Transmission Projects Program is intended to cover small emergent projects that arise during the course of the year due to the discovery of priority inspection findings or are prompted by the failure of a transmission line component (Insulator, Conductor, pole, structure component, etc...). Projects covered under this funding project include the repair and/or replacement of existing equipment not specifically tied to a major project.

Describe specific scope exclusions, assumptions and constraints:

Specific project constraints related to access, matting, drilling and environmental controls would be unknown until the jobs are identified which could represent a significant portion of the project costs. These projects are typically of an emergency nature and may be subject to additional costs related to the unplanned nature of the work.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Repairs to damaged assets are always considered against replacement of the asset or structure on a project-by-project basis.

Why was the proposed project scope chosen over other alternatives?

Scopes will be dictated on a project-by-project basis related to the specific nature of the failed component and/or the critical condition that is identified.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Any critical finding or failed component must be addressed promptly to ensure system integrity and reliability.

What are the risks and consequences of not completing this project?

If projects are not completed in a timely manner there is an enhanced risk for a decrease in the reliability of the electric transmission system.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$1,942,694 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 141,887 | 43,887 | 19,600 | 19,600 | 19,600 | 19,600 | 19,600 | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 354,718 | 109,718 | 49,000 | 49,000 | 49,000 | 49,000 | 49,000 | |
| | Contractors (A/P tax exempt) | 922,266 | 285,266 | 127,400 | 127,400 | 127,400 | 127,400 | 127,400 | |
| | Overheads | 77,000 | | | 8,000 | 17,000 | 21,000 | 31,000 | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,495,871 | 438,871 | 196,000 | 204,000 | 213,000 | 217,000 | 227,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 32,500 | | 6,500 | 6,500 | 6,500 | 6,500 | 6,500 | |
| | Contractors (A/P tax exempt) | 392,323 | 99,823 | 58,500 | 58,500 | 58,500 | 58,500 | 58,500 | |
| | Overheads | 22,000 | | 2,000 | 3,000 | 4,000 | 6,000 | 7,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 446,823 | 99,823 | 67,000 | 68,000 | 69,000 | 71,000 | 72,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|------------------|----------------|----------------|
| Current Approved Rate Case Funding (\$): | 1,113,000 | 742,000 | 371,000 |
| | 2021-2023 | | 2024 |

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Costs can vary significantly from Project to Project depending on the nature of the repair or replacement that is needed as well as other factors such as access, environmental controls, etc...

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Cost estimate for years 2024-2028 are based on the potential replacement of (5) structures per year at an approx. cost of \$40K per structure "A" and \$13K per structure "R".

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Cost Estimate breakdown is based on a conceptual pro-forma per single pole structure. The cost breakdown provided is estimated based on an averaged historical percentage split per project of Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively. Prior Year spending is a combination of 2021-2022 actuals and 2023 projections, applicable cost split has been applied to this as well. Removals are split 90/10 by Contractors(AP) / Internal Labor respectively.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Replacement of the structures was considered as an alternative to coating.

Why was the proposed project scope chosen over other alternatives?

Coating the structures provides the ability to address any corrosion-based defects while both extending the useful life of the structures and deferring the need for a significantly higher-cost capital project.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Completing the program in the proposed timeline is important to ensure that structures with more advanced coating or corrosion conditions will be mitigated in order to realize the greatest life-extension possible from application of the new coatings.

What are the risks and consequences of not completing this project?

If the project is not completed, coatings and corrosion on existing structures will continue to advance to a point when applications of new coatings will no longer be able to meaningfully extend the life of the asset and a more substantial and costly capital replacement project will be needed.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Project is being requested as part of the upcoming 2024-2028 capex forecast and is not being substituted into the capex plan for any other project.

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$11,080,900 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 1,049,400 | | 150,200 | 150,100 | 150,300 | 192,300 | 123,800 | 282,700 |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 2,623,500 | | 375,500 | 375,250 | 375,750 | 480,750 | 309,500 | 706,750 |
| | Contractors (A/P tax exempt) | 6,821,000 | | 976,200 | 975,650 | 976,950 | 1,249,950 | 804,700 | 1,837,550 |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 587,000 | | | 60,000 | 132,000 | 201,000 | 194,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 11,080,900 | 0 | 1,501,900 | 1,561,000 | 1,635,000 | 2,124,000 | 1,432,000 | 2,827,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Estimate is based on single per-structure replacement estimates. Definitive costs could vary based on actual scope, access, erosion and sediment controls, matting, contractor selection, permitting requirements, etc...

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Please see attached cost benefit analysis

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

The cost breakdown provided is estimated based on an averaged historical percentage split per project of Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively.

| <u>Line</u> | <u># of Structure Type</u> | <u>Structure Type</u> | <u>Tangent Structures</u> | <u>Deadend Structures</u> | <u>Total Coating Estimate</u> | <u>Total Replacement Estimate</u> |
|-------------|----------------------------|-----------------------|---------------------------|---------------------------|-------------------------------|-----------------------------------|
| 303 | 22 | Pole | 13 | 9 | \$1,252,360.00 | \$24,080,000.00 |
| 303 | 6 | Tower | 5 | 1 | \$249,240.00 | \$5,520,000.00 |
| 301 | 18 | Pole | 12 | 6 | \$1,042,840.00 | \$18,720,000.00 |
| 301 | 1 | Tower | 0 | 1 | \$41,540.00 | \$1,520,000.00 |
| 311 | 7 | Pole | 5 | 2 | \$416,660.00 | \$7,040,000.00 |
| PX | 61 | Tower | 21 | 40 | \$833,860.00 | \$11,728,000.00 |
| EM | 46 | Tower | 11 | 35 | \$628,760.00 | \$9,199,500.00 |
| M | 2 | Tower | 0 | 2 | \$27,320.00 | \$410,000.00 |
| C | 1 | Tower | 0 | 1 | \$13,660.00 | \$205,000.00 |
| E | 118 | Tower | 68 | 50 | \$1,612,980.00 | \$21,674,000.00 |
| E | 2 | Pole | 0 | 2 | \$63,820.00 | \$740,000.00 |
| E/G | 18 | Towers | 10 | 8 | \$245,980.00 | \$3,409,000.00 |
| D/J/CW | 53 | Tower | 18 | 35 | \$724,480.00 | \$10,421,000.00 |
| I | 24 | Tower | 7 | 17 | \$328,040.00 | \$8,567,700.00 |
| I | 1 | Pole | 1 | 0 | \$35,160.00 | \$275,000.00 |
| X | 11 | Tower | 8 | 3 | \$150,360.00 | \$2,020,000.00 |
| DW | 71 | Tower | 47 | 24 | \$970,560.00 | \$12,816,000.00 |
| N/O | 52 | Tower | 31 | 21 | \$710,820.00 | \$9,777,500.00 |
| DB | 1 | Tower | 0 | 1 | \$13,660.00 | \$205,000.00 |
| DR | 1 | Tower | 0 | 1 | \$13,660.00 | \$205,000.00 |
| DR/DB | 15 | Tower | 7 | 8 | \$205,000.00 | \$4,715,000.00 |
| FT/WF | 5 | Poles | 4 | 1 | \$153,300.00 | \$1,470,000.00 |
| OR | 33 | Tower | 26 | 7 | \$451,080.00 | \$5,803,000.00 |
| 2 | 16 | Tower | 12 | 4 | \$218,660.00 | \$2,836,000.00 |
| P | 1 | Pole | 1 | 0 | \$35,160.00 | \$275,000.00 |
| | | | | Totals | \$10,438,960.00 | \$163,631,700.00 |

| <u>Line</u> | <u># of Structure Type</u> | <u>Structure Type</u> | <u>Contractor Coating Cost</u> | <u>Bucket Truck Rental</u> ¹ | <u>Coating Material Cost</u> ² | <u>Environmental Testing</u> ³ | <u>Environmental Disposal</u> ⁴ | <u>Access Cost</u> ⁵ | <u>Total Coating Estimate</u> | <u>Induron Repaint Priority</u> | <u>Coating Year</u> |
|-------------|----------------------------|-----------------------|--------------------------------|---|---|---|--|---------------------------------|-------------------------------|---------------------------------|---------------------|
| 303 | 22 | Pole | \$25,000.00 | \$100,000.00 | \$36,960.00 | \$2,200.00 | \$13,200.00 | \$25,000.00 | \$1,252,360.00 | 1 | 2024 |
| 303 | 6 | Tower | \$15,000.00 | \$0.00 | \$5,040.00 | \$600.00 | \$3,600.00 | \$25,000.00 | \$249,240.00 | 4 | 2024 |
| 301 | 18 | Pole | \$25,000.00 | \$100,000.00 | \$30,240.00 | \$1,800.00 | \$10,800.00 | \$25,000.00 | \$1,042,840.00 | 1 | 2025 |
| 301 | 1 | Tower | \$15,000.00 | \$0.00 | \$840.00 | \$100.00 | \$600.00 | \$25,000.00 | \$41,540.00 | 4 | 2025 |
| 311 | 7 | Pole | \$25,000.00 | \$50,000.00 | \$11,760.00 | \$700.00 | \$4,200.00 | \$25,000.00 | \$416,660.00 | 1 | 2025 |
| PX | 61 | Tower | \$10,000.00 | \$0.00 | \$34,160.00 | \$600.00 | \$36,600.00 | \$2,500.00 | \$833,860.00 | 2 | 2026 |
| EM | 46 | Tower | \$10,000.00 | \$0.00 | \$25,760.00 | \$400.00 | \$27,600.00 | \$2,500.00 | \$628,760.00 | 3 | 2026 |
| M | 2 | Tower | \$10,000.00 | \$0.00 | \$1,120.00 | \$0.00 | \$1,200.00 | \$2,500.00 | \$27,320.00 | 2 | 2026 |
| C | 1 | Tower | \$10,000.00 | \$0.00 | \$560.00 | \$0.00 | \$600.00 | \$2,500.00 | \$13,660.00 | 3 | 2026 |
| E | 118 | Tower | \$10,000.00 | \$0.00 | \$66,080.00 | \$1,100.00 | \$70,800.00 | \$2,500.00 | \$1,612,980.00 | 2 | 2027 |
| E | 2 | Pole | \$25,000.00 | \$6,500.00 | \$1,120.00 | \$0.00 | \$1,200.00 | \$2,500.00 | \$63,820.00 | 2 | 2027 |
| E/G | 18 | Towers | \$10,000.00 | \$0.00 | \$10,080.00 | \$100.00 | \$10,800.00 | \$2,500.00 | \$245,980.00 | 2 | 2027 |
| D/I/CW | 53 | Tower | \$10,000.00 | \$0.00 | \$29,680.00 | \$500.00 | \$31,800.00 | \$2,500.00 | \$724,480.00 | 2 | 2028 |
| I | 24 | Tower | \$10,000.00 | \$0.00 | \$13,440.00 | \$200.00 | \$14,400.00 | \$2,500.00 | \$328,040.00 | 2 | 2028 |
| I | 1 | Pole | \$25,000.00 | \$6,500.00 | \$560.00 | \$0.00 | \$600.00 | \$2,500.00 | \$35,160.00 | 2 | 2028 |
| X | 11 | Tower | \$10,000.00 | \$0.00 | \$6,160.00 | \$100.00 | \$6,600.00 | \$2,500.00 | \$150,360.00 | 2 | 2028 |
| DW | 71 | Tower | \$10,000.00 | \$0.00 | \$39,760.00 | \$700.00 | \$42,600.00 | \$2,500.00 | \$970,560.00 | 2 | 2029 |
| N/O Line | 52 | Tower | \$10,000.00 | \$0.00 | \$29,120.00 | \$500.00 | \$31,200.00 | \$2,500.00 | \$710,820.00 | 2 | 2029 |
| DB | 1 | Tower | \$10,000.00 | \$0.00 | \$560.00 | \$0.00 | \$600.00 | \$2,500.00 | \$13,660.00 | 3 | 2030 |
| DR | 1 | Tower | \$10,000.00 | \$0.00 | \$560.00 | \$0.00 | \$600.00 | \$2,500.00 | \$13,660.00 | 3 | 2030 |
| DR/DB | 15 | Tower | \$10,000.00 | \$0.00 | \$8,400.00 | \$100.00 | \$9,000.00 | \$2,500.00 | \$205,000.00 | 3 | 2030 |
| FT/WF | 5 | Poles | \$25,000.00 | \$10,000.00 | \$2,800.00 | \$0.00 | \$3,000.00 | \$2,500.00 | \$153,300.00 | 3 | 2030 |
| OR | 33 | Tower | \$10,000.00 | \$0.00 | \$18,480.00 | \$300.00 | \$19,800.00 | \$2,500.00 | \$451,080.00 | 3 | 2030 |
| 2 | 16 | Tower | \$10,000.00 | \$0.00 | \$8,960.00 | \$100.00 | \$9,600.00 | \$2,500.00 | \$218,660.00 | 3 | 2030 |
| P | 1 | Pole | \$25,000.00 | \$6,500.00 | \$560.00 | \$0.00 | \$600.00 | \$2,500.00 | \$35,160.00 | 3 | 2030 |

| Yearly Cost Breakdown | |
|-----------------------|----------------|
| 2024 | \$1,501,600.00 |
| 2025 | \$1,501,040.00 |
| 2026 | \$1,503,600.00 |
| 2027 | \$1,922,780.00 |
| 2028 | \$1,238,040.00 |
| 2029 | \$1,681,380.00 |
| 2030 | \$1,090,520.00 |

| Assumptions/Notes | |
|---|--|
| Assumes structures can be coated at a rate of 3 per week ¹ | |
| ~\$25K / month for 125' tracked bucket ¹ | |
| Paint Cost ~ \$70 / gallon ² | |
| ~12 Gallon per 345 kV structure ² | |
| ~8 Gallons per 115/69 kV structure ² | |
| \$100 per pole paint test ³ | |
| \$200 per drum for paint chip disposal ⁴ | |
| Assumed all 69/ 115 kV lattice towers can be climbed ⁵ | |
| Assumed - 500 ft of matting per 345 kV Structure @ \$50/ft ⁵ | |
| Assumed no matting for 69 / 115 kV structures ⁵ | |

| Repaint Priority | |
|------------------|---|
| 1 | Immediate protective painting 0-2 years |
| 2 | Preventative maintenance 3-5 years |
| 3 | Preventative maintenance 6-8 years |
| 4 | Preventative maintenance 8-10 years |

| Line | # of Structure | Type | Structure Type | Number of Circuits | Tangent Structures | Deadend Structures | Access Cost | Structure Replacement Cost |
|----------|----------------|--------|----------------|--------------------|--------------------|--------------------|-------------|----------------------------|
| 303 | 22 | Pole | Single Circuit | 13 | 9 | 9 | \$50,000.00 | \$24,080,000.00 |
| 303 | 6 | Tower | Double Circuit | 5 | 1 | 1 | \$50,000.00 | \$5,520,000.00 |
| 301 | 18 | Pole | Single Circuit | 12 | 6 | 6 | \$50,000.00 | \$18,720,000.00 |
| 301 | 1 | Tower | Single Circuit | 0 | 1 | 1 | \$50,000.00 | \$1,520,000.00 |
| 311 | 7 | Pole | Single Circuit | 5 | 2 | 2 | \$50,000.00 | \$7,040,000.00 |
| PX | 61 | Tower | Single Circuit | 21 | 40 | 40 | \$5,000.00 | \$11,728,000.00 |
| EM | 46 | Tower | Double Circuit | 11 | 35 | 35 | \$5,000.00 | \$9,199,500.00 |
| M | 2 | Tower | Single Circuit | 0 | 2 | 2 | \$5,000.00 | \$410,000.00 |
| C | 1 | Tower | Single Circuit | 0 | 1 | 1 | \$5,000.00 | \$205,000.00 |
| E | 118 | Tower | Single Circuit | 68 | 50 | 50 | \$5,000.00 | \$21,674,000.00 |
| E | 2 | Pole | Single Circuit | 0 | 2 | 2 | \$5,000.00 | \$740,000.00 |
| E/G | 18 | Towers | Double Circuit | 10 | 8 | 8 | \$5,000.00 | \$3,409,000.00 |
| D/J/CW | 53 | Tower | Double Circuit | 18 | 35 | 35 | \$5,000.00 | \$10,421,000.00 |
| I | 24 | Tower | Double Circuit | 7 | 17 | 17 | \$5,000.00 | \$8,567,700.00 |
| I | 1 | Pole | Single Circuit | 1 | 0 | 0 | \$5,000.00 | \$275,000.00 |
| X | 11 | Tower | Double Circuit | 8 | 3 | 3 | \$5,000.00 | \$2,020,000.00 |
| DW | 71 | Tower | Single Circuit | 47 | 24 | 24 | \$5,000.00 | \$12,816,000.00 |
| N/O Line | 52 | Tower | Double Circuit | 31 | 21 | 21 | \$5,000.00 | \$9,777,500.00 |
| DB | 1 | Tower | Single Circuit | 0 | 1 | 1 | \$5,000.00 | \$205,000.00 |
| DR | 1 | Tower | Single Circuit | 0 | 1 | 1 | \$5,000.00 | \$205,000.00 |
| DR/DB | 15 | Tower | Double Circuit | 7 | 8 | 8 | \$5,000.00 | \$4,715,000.00 |
| FT/WF | 5 | Poles | Double Circuit | 4 | 1 | 1 | \$5,000.00 | \$1,470,000.00 |
| OR | 33 | Tower | Single Circuit | 26 | 7 | 7 | \$5,000.00 | \$5,803,000.00 |
| 2 | 16 | Tower | Single Circuit | 12 | 4 | 4 | \$5,000.00 | \$2,836,000.00 |
| P | 1 | Pole | Single Circuit | 1 | 0 | 0 | \$5,000.00 | \$275,000.00 |

| Per Structure Replacement Cost | |
|---|---|
| 345 kV | |
| <i>Engineered Deadend</i> | <i>Engineered Tangent</i> |
| \$1,470,000.00 | \$750,000.00 |
| 69 kV / 115 kV | |
| <i>Engineered Deadend</i> | <i>Engineered Tangent</i> |
| \$365,000.00 | \$270,000.00 |
| 69 kV / 115 kV Single Circuit | |
| <i>Direct Embed Tangent Lattice Replacement</i> | <i>Direct Embed Deadend Lattice Replacement</i> |
| \$168,000.00 | \$205,000.00 |
| 69 kV / 115 kV Double Circuit | |
| <i>Direct Embed Tangent Lattice Replacement</i> | <i>Direct Embed Deadend Lattice Replacement</i> |
| \$174,500.00 | \$208,000.00 |

Notes

Access Cost are assumed to be double the cost for coating due to the need of additional equipment for replacing a structure

Replace costs have been estimated as a one for one spot replacment not as a whole line rebuild.

See attached spreadsheets for breakdown of replacment costs



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 2 Design

A. GENERAL

| | | | | | |
|---|--|--------------------------------|-------------------------------|--------------------------------|-------------------------------|
| Project/Program Name: MG and GK Line 115kV Upgrade (Modena - Kerhonkson) | | Work Order #: | <input type="text" value=""/> | <input type="text" value="-"/> | <input type="text" value=""/> |
| Budget Group: Electric | Budget Category: 12 | Funding Project Number: | 10480 | | |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 1/1/2023 | In-Service: 2/28/2024 | | | |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
 This Project is being completed in conjunction with the FK Line and P Line 115kV Upgrade projects in Cat#12 as well as various other Cat#13 projects with the goal of completing the objective of the original P, MK, HK Article VII project scope and energizing the related lines and substations up to 115kV operation.

Describe the project objective and scope of work:
 Central Hudson's "P", "FK", "MG", "GK", "MK" and "HK" lines were constructed in the mid-90s as part of a PSC Article VII project and are currently operated at a voltage of 69kV. As part of the open Article VII permit, these lines are intended to be energized to 115kV pending the completion of several related substation improvement projects. Given the age of the lines, any outstanding infrastructure concerns that may exist as a result will need to be completed to ensure that these lines meet the appropriate clearance and strength criteria to support the upgrade. There are also several substation exits that will need to be re-routed as well and are included on the appropriate line scope. The "MG" and "GK" Lines between Modena and Kerhonkson will need to be reviewed and any potential infrastructure-related issues or clearance issues addressed in advance of the upgrade. A small re-route will also need to be done at the Modena Substation to connect the line to the 115kV dead end structure.

Describe specific scope exclusions, assumptions and constraints:
 Scope may not take into account specific requirements for access, drilling, erosion & sediment control, etc... based on actual site conditions and final project scope.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Please refer to the planning memo for information on the 115kV Upgrade. Repair and replacement options will both be considered when designing the upcoming project to ready the line for 115kV operation in the most efficient and cost effective manner possible.

Why was the proposed project scope chosen over other alternatives?

Preliminary line analysis indicates some conductor clearance issues at both structures and spans that will need to be addressed to allow for 115kV operation. It is assumed based on the age and condition of the line that synergies with inspection condition mitigation and these potential issues can be addressed together via structure replacements.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

In order to support the timeline of the Cat#13 projects and 115kV cut-over date, this and other Cat#12 projects need to be completed in advance.

What are the risks and consequences of not completing this project?

If the Cat#12 projects supporting the 115kV upgrade are not completed consistent with the Cat#13 project timelines there will be a risk of delaying the upgrade or putting new Substation equipment in an abnormal operating condition.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

The Project also includes work that would typically be done under the High Priority Replacement Program. Prioritizing the 115kV project allows us to apply synergies between the two project objectives and help reduce the risk of in-service failures while also readying the line for 115kV Operation.

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|---|----------------------------------|--|---|----------------|--|----------------|----------------|----------------|--------------|
| \$1,971,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 151,100 | 109,100 | 42,000 | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 377,750 | 272,750 | 105,000 | | | | | |
| | Contractors (A/P tax exempt) | 982,150 | 709,150 | 273,000 | | | | | |
| | Overheads | 1,000 | | 1,000 | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,512,000 | 1,091,000 | 421,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 46,000 | 44,000 | 2,000 | | | | | |
| | Contractors (A/P tax exempt) | 413,000 | 395,000 | 18,000 | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 459,000 | 439,000 | 20,000 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|

| | | | |
|---|----------------|----------------|----------|
| Current Approved Rate Case Funding (\$): | 622,000 | 622,000 | 0 |
|---|----------------|----------------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Scope assumes replacement of structures and some minor line modification work, if those assumptions change based on the detailed design and scoping process then the project costs will need to be adjusted.

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Cost Estimates are based on a tentative scope and included as "MG" Line 115kV Upgrade and "GK Line 115kV Upgrade.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Cost Estimate breakdown is based on a conceptual estimates provided. The cost breakdown provided for estimates and actuals is based on an averaged historical percentage split per project of Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively. Removal costs are split 90/10 by Contractor AP and Internal Labor respectively. This applies to both prior year actuals / projections as well as 2024-2028.

Copy to: Mr. P. E. Haering Mr. E. A. Loeven
Mr. P. Harpolis Mr. K. D. Bragg
Mr. H. W. Turner Mr. W. J. Mancroni
Mr. B. Arteta Mr. T. P. Burns
Mr. G. H. Yozzo E.P.# 2017-014

September 11, 2017

Mr. C. Rottkamp

Re: **Remaining Work for P/FK/HK/MK/GK/MG Upgrade to 115 kV Operation**

Reference

- Chan, Ruby. "P & MK Area Study," E.P.# 2010-008. May 2, 2011.
- Genesee, Stephanie. "Spare 10/12 MVA Transformer Relocations," E.P. #2016-012. August 18, 2016.

Article VII Conditions and Requirements

As the rebuild of the P/FK/HK/MK/GK/MG lines (at the time of the rebuild known as the P&MK Project) was accomplished under the provisions of Article VII of Public Service Law of the State of New York; a series of agreed to conditions and requirements emanated when receiving Public Service Commission (PSC) approval prior to the onset of reconstruction. These included:

- An approved Environmental Management & Construction Plan (EM&CP) - General procedures included within the EM & CP describe project administration, consultations, construction, restoration and environmental mitigation.
- Series of Ordering Clauses detailing both construction related practices and requirements for post construction activities.
- PSC notification (review and involvement including possible PSC approval) before conducting many future tasks associated with both the transmission lines and various electric substations.
- Specific agreements emanating from the Article VII approval process such as the Minnewaska Access Agreement.

Remaining Work

The remaining work to upgrade the P/FK/HK/MK/GK/MG area to 115 kV operation is listed below:

Must be completed prior to 115 kV Operation

In order

1. Install OPGW for the P/FK/HK/MK/MG area in 2019/2020 as included in the Network Strategy plans (Note that the plan doesn't include installing OPGW for the GK line because of the difficult access through Minnewaska State Park).
2. Connect the OPGW to the primary relays for 115 kV primary line protection and possibly direct transfer trip. Reset the relays in the area. Primary and backup distance relays are installed at High Falls Substation, Galeville Substation, Sturgeon Pool Substation and Kerhonkson Substation. For the GK line, determine whether to use wireless Tier 1 or power line carrier for communication.

E.P.# 2017-014; September 11, 2017

No particular order required

- Remove the FK-186, FK-187 and FK-188 switches and the associated connections at Accord Substation.
- Install two 115/69 kV transformers and associated equipment at Kerhonkson Substation.
- Specify the 115 kV transformer fixed tap setting (NLTC) at High Falls (115-13.8 kV), Galeville (115-13.8 kV) and Kerhonkson (115-13.8 kV and 115/69 kV).

Must be completed immediately prior to 115 kV Operation

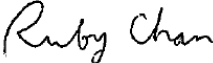
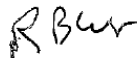
- Check each pole and connections prior to operating at 115 kV to ensure no 69 kV equipment remains.
- Develop a timeline and coordinated plan among System Operations, Electric Transmission Design, Substation Design, Operations Services, Electric Transmission Planning and Electric T&D for the 115 kV Operation conversion which includes steps to do the following:
 - Relocate the P line at Sturgeon Pool Substation from the 69 kV bus to the 115 kV bus.
 - Relocate the MG line at Modena Substation from the 69 kV bus to the 115 kV bus.
 - Replace all the 69 kV CCVTs with 115 kV CCVTs at High Falls and Galeville.
 - Replace all the necessary 69 kV CCVTs with 115 kV CCVTs at Kerhonkson.
 - Change the transformer connections from 69-13.8 kV to 115-13.8 kV for the following transformers:
 - ❖ High Falls Transformer #1
 - ❖ High Falls Transformer #2
 - ❖ Kerhonkson Transformer #1
 - ❖ Kerhonkson Transformer #2
 - ❖ Galeville Transformer #1
 - ❖ Galeville Transformer #2

Can be completed any time (before or after conversion to 115 kV Operation) - no particular order required

- Install third breaker at Modena Substation to form a ring bus.
- Rebuild the three spans adjacent to the existing Honk Falls Substation. Those three spans currently share structures (HK and MK lines) and have 1/0 Cu conductors.
- Split another six pairs of HK & MK structures guyed together. A failure of a structure guyed to another could result in loss of load to the Ellenville area.
- Install a 69 kV bus tie breaker at the retired WH-962 breaker position in Honk Falls Substation to preclude loss of both 69 kV Kerhonkson inputs for a bus fault and install Honk Falls Bus 1 and 2 differential relays.

To be completed after conversion to 115 kV Operation

- Retire existing 115/69 kV Modena transformer and Modena 69 kV yard.
- The available 69-13.8 kV transformer (T-10000-18) at Modena to be installed at Greenfield Road Substation.


Ruby Chan




Project Name: GK Line 115kV Upgrade
 Prepared By: Patrick Robinson
 Cost Estimate Level: Conceptual Estimate

Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

Date: 4/8/2022
 Revision(s): 00
 WO #: PEND

+/-30% Accuracy... There is a general scope but few details available. Little or no design work completed yet.

Part 1: Additions

* All unit and total cost figures should be "raw costs", without any overhead markups. Markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|---|--|----------|-------|-------------------------|------------------|--------------------|-------|---------|-----------------|--------------------|-------|---------|------------------|-----------|------------------------------------|-----------|--------------------------------------|------------|---------|----------------------------|
| | | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | | Cost |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | | |
| A.1 | Engineering Design | 150 | Hours | | 1.0 | 150 | 60.00 | 9,000 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.2 | Engineering Supervision; Project Sponsor | 150 | Hours | | 1.0 | 150 | 60.00 | 9,000 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.3 | Engineering Drafting | 75 | Hours | | | 0 | | 0 | 1.0 | 75 | 65.00 | 4,875 | | 0 | | 0 | | 0 | | |
| A.4 | Surveyors / Structure Stakeout | 1 | Units | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 5,000.00 | 5,000 | |
| A.5 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.11 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | | |
| B.1 | Environmental Services | 21 | Hours | | 1.0 | 21 | 60.00 | 1,260 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.2 | Real Properties | 21 | Hours | | 1.0 | 21 | 60.00 | 1,260 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.3 | T&D Supervision | 150 | Hours | | 1.0 | 150 | 60.00 | 9,000 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.4 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.5 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | | |
| C.1 | Environmental Controls / Restoration | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 100,000.00 | 100,000 | Matting Likely Near Modena |
| C.2 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.3 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.4 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.5 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through xx/xx/xx | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | | |
|-----------------------|---------------------------------------|----------|-------|---|--------------------|--------------------------|---------|--------|--------------------|-------------------------|---------|--------|------------------|---------|------------------------------------|------|--------------------------------------|---------|-------------------|--|--|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | | |
| D.1 | Standard Stock Poles | 20 | Units | | | 0 | | 0 | | 0 | | 0 | 12,000.00 | 240,000 | | 0 | | 0 | 90' Poles Typical | | |
| D.2 | Standard Stock Hardware | 10 | Units | | | 0 | | 0 | | 0 | | 0 | 4,000.00 | 40,000 | | 0 | | 0 | | | |
| D.3 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| D.4 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| D.5 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| D.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| D.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| D.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| D.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| D.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| E CONSTRUCTION | | | | | | | | | | | | | | | | | | | | | |
| E.1 | Line Construction | 28 | Days | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 7,000.00 | 196,000 | | | |
| E.2 | Pole Holes / Anchors | 20 | Units | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 3,000.00 | 60,000 | | | |
| E.3 | ROW Improvements / Gates | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 15,000.00 | 15,000 | | | |
| E.4 | Showup / Dumpsters | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 2,000.00 | 2,000 | | | |
| E.5 | Construction Moves | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 10,000.00 | 10,000 | | | |
| E.6 | Foreman / Field Supervision | 400 | Hours | | 1.0 | 400 | 60.00 | 24,000 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| E.7 | Field Clerks / Electricians / Riggers | 200 | Hours | | | 0 | | 0 | 1.0 | 200 | 65.00 | 13,000 | | 0 | | 0 | | 0 | | | |
| E.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| E.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| E.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| | | | | 0 | | | | 53,520 | | | | | 17,875 | | 280,000 | | 0 | | 388,000 | | |
| | | | | | | 892 | | | | | 275 | | | | | | | | | | |
| | | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | | |

Part 2: Removals

* All unit and total cost figures should be "raw costs", without any overhead markups. All markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through xx/xx/xx | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | | |
|-----|--------------------------------|----------|-------|---|--------------------|--------------------------|---------|-------|--------------------|-------------------------|---------|------|------------------|------|------------------------------------|------|--------------------------------------|--------|---------|--|--|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | | |
| F.1 | Line Construction | 28 | Days | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 3,000.00 | 84,000 | | | |
| F.2 | Showup / Dumpsters | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 7,500.00 | 7,500 | | | |
| F.3 | ROW/ Gates | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 3,000.00 | 3,000 | | | |
| F.4 | Restoration | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 50,000.00 | 50,000 | | | |
| F.5 | Foreman | 150 | Hours | | 1.0 | 150 | 60.00 | 9,000 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| F.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| F.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| | | | | 0 | | | | 9,000 | | | | | 0 | | 0 | | 0 | | 144,500 | | |
| | | | | | | 150 | | | | | 0 | | | | | | | | | | |
| | | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|--------------------------------|----------|-------|-------------------------|--------------------|----|---------|------|--------------------|----|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |

Part 3: Cost Estimate Summary

| ADDITIONS SUMMARY: | | | |
|----------------------------------|--------------------|------|---|
| Incurring To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | | | <i>This figure must be manually entered if applicable</i> |
| AFUDC Costs Incurred To-Date: | | | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$739,395 | | |
| Estimated Future Overheads: | \$290,569 | | |
| Estimated Future AFUDC: | \$10,150 | | |
| Subtotal Future Costs: | \$1,040,114 | | |
| Contingency Applied: | \$0 | 0.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL ADDITIONS: | \$1,040,114 | | |

| REMOVALS SUMMARY: | | | |
|----------------------------------|------------------|------|---|
| Incurring To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | \$0 | | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$153,500 | | |
| Estimated Future Overheads: | \$32,427 | | |
| Subtotal Future Costs: | \$185,927 | | |
| Contingency Applied: | \$0 | 0.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL REMOVALS: | \$185,927 | | |

| | |
|--|--------------------|
| GRAND TOTAL ADDITIONS + REMOVALS: | \$1,226,041 |
|--|--------------------|

Assumptions, Notes, Clarifications, etc.:



Project Name: MG Line 115kV Upgrade
 Prepared By: John Dittmann
 Cost Estimate Level: Conceptual Estimate

Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

Date: 4/8/2022
 Revision(s): 2
 WO #: 8652

+/-30% Accuracy... There is a general scope but few details available. Little or no design work completed yet.

Part 1: Additions

* All unit and total cost figures should be "raw costs", without any overhead markups. Markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|---|--|----------|-------|-------------------------|------------------|--------------------|-------|---------|-----------------|--------------------|-------|---------|------------------|-----------|------------------------------------|-----------|--------------------------------------|-----------|--------|----------------------------|
| | | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | | Cost |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | | |
| A.1 | Engineering Design | 50 | Hours | | 1.0 | 50 | 60.00 | 3,000 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.2 | Engineering Supervision; Project Sponsor | 50 | Hours | | 1.0 | 50 | 60.00 | 3,000 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.3 | Engineering Drafting | 24 | Hours | | | 0 | | 0 | 1.0 | 24 | 65.00 | 1,560 | | 0 | | 0 | | 0 | | |
| A.4 | Surveyors / Structure Stakeout | 1 | Units | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 5,000.00 | 5,000 | |
| A.5 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.11 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | | |
| B.1 | Environmental Services | 8 | Hours | | 1.0 | 8 | 60.00 | 480 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.2 | Real Properties | 8 | Hours | | 1.0 | 8 | 60.00 | 480 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.3 | T&D Supervision | 60 | Hours | | 1.0 | 60 | 60.00 | 3,600 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.4 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.5 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | | |
| C.1 | Environmental Controls / Restoration | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 50,000.00 | 50,000 | Matting Likely Near Modena |
| C.2 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.3 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.4 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.5 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through xx/xx/xx | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|-----------------------|---------------------------------------|----------|-------|---|--------------------|--------------------------|---------|--------|--------------------|-------------------------|---------|-------|------------------|--------|------------------------------------|------|--------------------------------------|--------|-------------------|---------|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| D.1 | Standard Stock Poles | 8 | Units | | | 0 | | 0 | | 0 | | 0 | 12,000.00 | 96,000 | | 0 | | 0 | 90' Poles Typical | |
| D.2 | Standard Stock Hardware | 8 | Units | | | 0 | | 0 | | 0 | | 0 | 4,000.00 | 32,000 | | 0 | | 0 | | |
| D.3 | Conductor | 2,000 | Feet | | | 0 | | 0 | | 0 | | 0 | 2.00 | 4,000 | | 0 | | 0 | Drake ACSR | |
| D.4 | Static Wire | 1,000 | Feet | | | 0 | | 0 | | 0 | | 0 | 1.50 | 1,500 | | 0 | | 0 | Petrel ACSR | |
| D.5 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E CONSTRUCTION | | | | | | | | | | | | | | | | | | | | |
| E.1 | Line Construction | 10 | Days | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 7,000.00 | 70,000 | | |
| E.2 | Pole Holes / Anchors | 8 | Units | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 3,000.00 | 24,000 | | |
| E.3 | ROW Improvements / Gates | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 7,500.00 | 7,500 | | |
| E.4 | Showup / Dumpsters | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 2,000.00 | 2,000 | | |
| E.5 | Construction Moves | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 10,000.00 | 10,000 | | |
| E.6 | Foreman / Field Supervision | 150 | Hours | | 1.0 | 150 | 60.00 | 9,000 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.7 | Field Clerks / Electricians / Riggers | 75 | Hours | | | 0 | | 0 | 1.0 | 75 | 65.00 | 4,875 | | 0 | | 0 | | 0 | | |
| E.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | 0 | | | | 19,560 | | | | | 6,435 | | | | 0 | | | 168,500 |
| | | | | | | 326 | | | | | 99 | | | | | | | | | |
| | | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | |

Part 2: Removals * All unit and total cost figures should be "raw costs", without any overhead markups. All markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through xx/xx/xx | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|-----|--------------------------------|----------|-------|---|--------------------|--------------------------|---------|-------|--------------------|-------------------------|---------|------|------------------|------|------------------------------------|------|--------------------------------------|--------|-------|--------|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| F.1 | Line Construction | 10 | Days | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 3,000.00 | 30,000 | | |
| F.2 | Showup / Dumpsters | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 7,500.00 | 7,500 | | |
| F.3 | ROW/ Gates | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 3,000.00 | 3,000 | | |
| F.4 | Restoration | 1 | Unit | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 25,000.00 | 25,000 | | |
| F.5 | Foreman | 50 | Hours | | 1.0 | 50 | 60.00 | 3,000 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| F.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| F.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | 0 | | | | 3,000 | | | | | 0 | | | 0 | | | | 65,500 |
| | | | | | | 50 | | | | | 0 | | | | | | | | | |
| | | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through xx/xx/xx | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|--------------------------------|----------|-------|---|--------------------|----|---------|------|--------------------|----|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |

Part 3: Cost Estimate Summary

| ADDITIONS SUMMARY: | | | |
|----------------------------------|------------------|------|---|
| Incurring To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | | | <i>This figure must be manually entered if applicable</i> |
| AFUDC Costs Incurred To-Date: | | | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$327,995 | | |
| Estimated Future Overheads: | \$128,836 | | |
| Estimated Future AFUDC: | \$4,502 | | |
| Subtotal Future Costs: | \$461,333 | | |
| Contingency Applied: | \$0 | 0.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL ADDITIONS: | \$461,333 | | |

| REMOVALS SUMMARY: | | | |
|----------------------------------|-----------------|------|---|
| Incurring To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | \$0 | | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$68,500 | | |
| Estimated Future Overheads: | \$13,929 | | |
| Subtotal Future Costs: | \$82,429 | | |
| Contingency Applied: | \$0 | 0.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL REMOVALS: | \$82,429 | | |

| | |
|--|------------------|
| GRAND TOTAL ADDITIONS + REMOVALS: | \$543,762 |
|--|------------------|

Assumptions, Notes, Clarifications, etc.:



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: FK Line 115kV Upgrade (Kerhonkson - High Falls)

Work Order #:

Budget Group: Electric **Budget Category:** 12

Funding Project Number: 10401

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2024

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

This Project is being completed in conjunction with the MG Line, GK Line and P Line 115kV Upgrade projects in Cat#12 as well as various other Cat#13 projects with the goal of completing the objective of the original P, MK, HK Article VII project scope and energizing the related lines and substations up to 115kV operation.

Describe the project objective and scope of work:

Central Hudson's "P", "FK", "MG", "GK", "MK" and "HK" lines are were constructed in the mid-90s as part of a PSC Article VII project and are currently operated at a voltage of 69kV. As part of the open Article VII permit, these lines are intended to be energized to 115kV pending the completion of several related substation improvement projects. Given the age of the lines, any outstanding infrastructure concerns that may exist as a result will need to be completed to ensure that these lines meet the appropriate clearance and strength criteria to support the upgrade. There are also several substation exits that will need to be re-routed as well and are included on the appropriate line scope. The "FK" Line between Kerhonkson and High Falls will need to be reviewed and any potential infrastructure-related issues or clearance issues addressed in advance of the upgrade.

Describe specific scope exclusions, assumptions and constraints:

The conceptual scope does not account for any specific construction, matting, access and/or environmental control provisions in excess of the pro-forma pricing.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Please refer to the planning memo for information on the 115kV Upgrade. Repair and replacement options will both be considered when designing the upcoming project to ensure the line is ready for 115kV operation in the most efficient and cost effective manner possible.

Why was the proposed project scope chosen over other alternatives?

Preliminary line analysis indicates some conductor clearance issues at both structures and spans that will need to be addressed to allow for 115kV operation. It is assumed based on the age and condition of the line that synergies with inspection condition mitigation and these potential issues can be addressed together via structure replacements.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

In order to support the timeline of the Cat#13 projects and 115kV cut-over date, this and other Cat#12 projects need to be completed in advance.

What are the risks and consequences of not completing this project?

If the Cat#12 projects supporting the 115kV upgrade are not completed consistent with the Cat#13 project timelines there will be a risk of delaying the upgrade or putting new Substation equipment in an abnormal operating condition.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

The Project also includes work that would typically be done under the High Priority Replacement Program. Prioritizing the 115kV project allows us to apply synergies between the two project objectives and help reduce the risk of in-service failures while also readying the line for 115kV Operation.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|---|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| \$1,096,000 | | | | | | | | | |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 95,400 | | 95,400 | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 241,000 | | 241,000 | | | | | |
| | Contractors (A/P tax exempt) | 626,600 | | 626,600 | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 963,000 | 0 | 963,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 13,000 | | 13,000 | | | | | |
| | Contractors (A/P tax exempt) | 117,000 | | 117,000 | | | | | |
| | Overheads | 3,000 | | 3,000 | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 133,000 | 0 | 133,000 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|------------------|------------------|----------|
| Current Approved Rate Case Funding (\$): | 1,327,000 | 1,327,000 | 0 |
|---|------------------|------------------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Scope assumes replacement of structures and some minor line modification work, if those assumptions change based on the detailed design and scoping process then the project costs will need to be adjusted.

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Cost Estimate is based on a tentative scope of 11 Structure Replacements at a rate of \$90K per Structure (\$80K "A" & \$10K "R").

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Cost Estimate breakdown is based on a conceptual base pro-forma per single pole structure. The cost breakdown provided is estimated based on an averaged historical percentage split per project of Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively. Removal costs are split 90/10 by Contractor AP and Internal Labor respectively. Splits are applied to estimates as well as prior year / projections column as well.



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: P Line 115kV Upgrade (High Falls - Sturgeon Pool)

Work Order #:

Budget Group: Electric **Budget Category:** 12

Funding Project Number: 10402

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2022

In-Service: 12/31/2024

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

This Project is being completed in conjunction with the MG Line, GK Line and FK Line 115kV Upgrade projects in Cat#12 as well as various other Cat#13 projects with the goal of completing the objective of the original P, MK, HK Article VII project scope and energizing the related lines and substations up to 115kV operation.

Describe the project objective and scope of work:

Central Hudson's "P", "FK", "MG", "GK", "MK" and "HK" lines are were constructed in the mid-90s as part of a PSC Article VII project and are currently operated at a voltage of 69kV. As part of the open Article VII permit, these lines are intended to be energized to 115kV pending the completion of several related substation improvement projects. Given the age of the lines any outstanding infrastructure concerns that may exist as a result will need to be completed to ensure that these lines meet the appropriate clearance and strength criteria to support the upgrade. There are also several substation exits that will need to be re-routed as well and are included on the appropriate line scope. The "P" Line from Sturgeon Pool to High Falls will need to be reviewed and any potential infrastructure-related issues or clearance issues addressed in advance of the upgrade. A small re-route will also need to be done at the Sturgeon Pool Substation to connect the line to the 115kV Dead end structure.

Describe specific scope exclusions, assumptions and constraints:

Actual project scope may vary from the assumed in the estimate based on the detailed design and permitting.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Please refer to the planning memo for information on the 115kV Upgrade. Repair and replacement options will both be considered when designing the upcoming project to ready the line for 115kV operation in the most efficient and cost effective manner possible.

Why was the proposed project scope chosen over other alternatives?

Preliminary line analysis indicates some conductor clearance issues at both structures and spans that will need to be addressed to allow for 115kV operation. It is assumed based on the age and condition of the line that synergies with inspection condition mitigation and these potential issues can be addressed together via structure replacements.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

In order to support the timeline of the Cat#13 projects and 115kV cut-over date, this and other Cat#12 projects need to be completed in advance.

What are the risks and consequences of not completing this project?

If the Cat#12 projects supporting the 115kV upgrade are not completed consistent with the Cat#13 project timelines there will be a risk of delaying the upgrade or putting new Substation equipment in an abnormal operating condition.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

The Project also includes work that would typically be done under the High Priority Replacement Program. Prioritizing the 115kV project allows us to apply synergies between the two project objectives and help reduce the risk of in-service failures while also readying the line for 115kV Operation.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|---|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| \$991,000 | | | | | | | | | |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 90,000 | 51,000 | 39,000 | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 225,000 | 127,500 | 97,500 | | | | | |
| | Contractors (A/P tax exempt) | 585,000 | 331,500 | 253,500 | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 900,000 | 510,000 | 390,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 81,000 | 49,500 | 31,500 | | | | | |
| | Contractors (A/P tax exempt) | 9,000 | 5,500 | 3,500 | | | | | |
| | Overheads | 1,000 | | 1,000 | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 91,000 | 55,000 | 36,000 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------------|----------------|----------|
| Current Approved Rate Case Funding (\$): | 622,000 | 622,000 | 0 |
|---|----------------|----------------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 693,700 Maximum (\$): 1,288,300

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

No explanation on confidence level required.

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Cost Estimate is based on a tentative scope of 11 Structure Replacements at a rate of \$90K per Structure assuming above average difficulty in each replacement to account for other actions that may be needed with regards to the the 115kV upgrade.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Cost Estimate breakdown is based on a conceptual pro-forma per single pole structure. The cost breakdown provided is estimated based on an averaged historical percentage split per project of Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively. Removals are split 90/10 but Contractor AP and Internal Labor respectively. Splits apply to estimates as well as prior year / projected costs.



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|--|--|--------------------------------|-------------------------------|
| Project/Program Name: ROW Repair Project (Deficiencies) | | Work Order #: | <input type="text" value=""/> |
| Budget Group: Electric | Budget Category: 12 | Funding Project Number: | 1-1232-00-18 |
| Is this a Specific Project, Program or Blanket? Program | Target Schedule - Start: 1/1/2024 | In-Service: | 12/31/2028 |

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

This program is comprised of various work orders identified and opened annually based on the upcoming capital project schedule.

Describe the project objective and scope of work:

Central Hudson had committed voluntarily to obtain additional right of way as follow up to the Northeast Blackout of 2003. The report to the PSC stated that we would identify easements that were deficient in width from the standard of 100 foot on 69kV and 115kV lines and 150 foot on 345kV lines. Central Hudson is identifying easement deficiencies along its 69kV, 115kV and 345kV transmission line corridors. The adjacent property owners are being identified and, if not already, will be contacted in an attempt to acquire the additional ROW as needed to mitigate the deficiencies. A vendor will be chosen to provide all of the required work and services to document and obtain additional easement agreements throughout the service territory.

Describe specific scope exclusions, assumptions and constraints:

Individual line deficiency scopes will vary depending on the number of R.O.W. deficiencies identified as well as the rate of acquisition.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

In some cases, line relocation can serve as an alternative to acquiring additional Easement to mitigate deficiencies. This can be an effective option for small stretches of line where property owner negotiation does not prove successful or on a complete project rebuilds where there is more design flexibility.

Why was the proposed project scope chosen over other alternatives?

In most cases where the line in question does not require rebuild, and the deficiency is isolated to a single or small location, the most cost effective option is to pursue the additional easement rights. Depending on the extent of the deficiency, acquiring a complete corridor in either case is preferred.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

The lines being surveyed and analyzed for deficiency acquisition opportunities are one that have upcoming capital projects that will benefit from the additional rights. It is important to continue to pursue the additional rights in advance of project construction.

What are the risks and consequences of not completing this project?

If additional rights are not acquired, it could inhibit our ability to access and maintain our lines as well as affect reliability by not affording us the ability to completely trim our corridors to the greatest extent possible or respond to emergencies.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$2,801,257 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 200,000 | | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 2,445,257 | 645,257 | 360,000 | 360,000 | 360,000 | 360,000 | 360,000 | |
| | Overheads | 156,000 | | | 16,000 | 35,000 | 42,000 | 63,000 | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,801,257 | 645,257 | 400,000 | 416,000 | 435,000 | 442,000 | 463,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|

| | | | |
|---|------------------|------------------|----------------|
| Current Approved Rate Case Funding (\$): | 2,307,000 | 1,550,000 | 757,000 |
| | | 2021-2023 | 2024 |

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Cost estimate is based on a placeholder for the ROW Deficiency Program of \$400K. Actual expenditures may vary depending on the length of the lines surveyed, number and extent of deficiencies found and response of landowners to offer requests.

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Cost Estimate is based on the company pursuing the survey 2 to 3 Lines per year at an estimated cost of \$100K per year with associated supporting internal / contracted supporting services and potential acquisitions.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Estimates are split 90/10 Contractor AP and Internal Labor respectively.



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|----------------------|
| Project/Program Name: Trap Rock Substation Tie-In and Retirement of 69kV TR Line | | Work Order #: | <input type="text"/> |
| Budget Group: Electric | Budget Category: 12 | Funding Project Number: | 1-1212-05-17 |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 1/1/2024 | In-Service: 6/1/2027 | |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
 There will potentially be other Cat#13 Work Orders required to support the installation of a new Substation on Tilcon's property and the retirement / removal of the existing Knapp's Corners Substation.

Describe the project objective and scope of work:
 The TR Line is a 69 kV line approximately 2.4 miles long, connecting the Knapps Corners Substation to the Tilcon Quarry. The majority of the line has 1/0 Copper conductor from 1929 and older wood structures that have reached the end of their useful life. Given the existing right-of-way constraints of the "TR" Line corridor, Central Hudson is currently investigating the feasibility of installing a small substation and 115/69kV transformer at the existing intersection of the 69kV "TR" Line and 115kV "SC" Line to allow for the retirement of all but 0.4 Miles of the existing "TR" Line and its removal through a densely populated residential area.

Describe specific scope exclusions, assumptions and constraints:
 Conceptual Project assumptions do not assume special provisions for access, matting, environmental controls or permitting.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

A complete rebuild of the existing 69kV TR Line was considered as an alternative to the "SC" Line Substation option.

Why was the proposed project scope chosen over other alternatives?

The installation of the proposed "SC" Line substation on the Tilcon Quarry property would shorten the length of the TR Line, remove a portion of the line that traverses several heavy residential areas and confine it to Tilcon's property while providing the ability to retire the existing line assets in all residential and commercial areas near Route 9. It would also allow for the retirement and removal of the existing Knapp's Corners Substation 69kV structures on Spring Road.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Completing the project in the requested timeframe will reduce the risk of an aged asset failing unexpectedly and causing damage to private property and requiring a costly unplanned repair.

What are the risks and consequences of not completing this project?

The longer the old assets remain in place, there is an elevated risk of failure.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|--|----------------------------------|--|---|----------------|--|----------------|----------------|----------------|--------------|
| \$1,932,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 137,800 | 51,000 | | | | 86,800 | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 247,000 | 30,000 | | | | 217,000 | | |
| | Contractors (A/P tax exempt) | 642,200 | 78,000 | | | | 564,200 | | |
| | Overheads | 91,000 | | | | | 91,000 | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,118,000 | 159,000 | 0 | 0 | 0 | 959,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 74,000 | | | | | 74,000 | | |
| | Contractors (A/P tax exempt) | 676,000 | 16,000 | | | | 660,000 | | |
| | Overheads | 64,000 | | | | | 64,000 | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 814,000 | 16,000 | 0 | 0 | 0 | 798,000 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|

| | | | |
|---|------------------|------------------|----------|
| Current Approved Rate Case Funding (\$): | 1,404,000 | 1,404,000 | 0 |
|---|------------------|------------------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Specific project details relevant to the removal of the structures is still unknown such as environmental and access constraints and local permitting. Plans for the new SC Line Substation also need to be finalized pending negotiations with Tilcon.

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Conceptual Transmission cost estimates to support the substation option were based on the removal of (40) single pole wood structures and associated conductor at \$18k per structure (includes wire removal) and the installation of (10) new single pole steel structures at approx. \$90k per structure to account for permitting and potential ROW acquisition costs.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Estimates assumes a 90/10 split for AP and internal labor charges related to the removal of the line. For the installation of the new structure, an averaged historical percentage split per project of Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively was used. These splits were generally applied to 2021-2023 Actuals / Projections.



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 3 Pre-Construction

A. GENERAL

Project/Program Name: 69kV KM Line Rebuild - Knapps to Myers

Work Order #: 5 7 7 2 - F

Budget Group: Electric

Budget Category: 12

Funding Project Number: 1-1212-15-16

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 2/1/2017

In-Service: 6/1/2024

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

There will be other work orders in Cat#13 related to any required substation modification work as a result of the new line.

Describe the project objective and scope of work:

Replacement of the 2.9-mile long 69 kV electric transmission line between Knapps Corners Substation (Town of Poughkeepsie) and Myers Corners Substation (Town of Wappinger) due to an aging and deteriorating condition. Inspections indicate that approximately 58% of the structures on the line are in need of replacement. Additionally, portions of the static wire are 5/16" steel, which has been identified as problematic and is in need of replacement/upgrade. All structures, conductor and static wire will be replaced.

Describe specific scope exclusions, assumptions and constraints:

Three of the replacement poles (KM 50, KM 51 and KM 52) are located on the Knapps Corners Substation property and are permitted for replacement via the New Knapps Corners Substation project. However, they will be replaced under work order 5772 A/R. Consequently, from a permitting perspective the Site Plan Application for the KM Line Replacement project covers replacement poles KM 1 through KM 49.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

The KM Line is critical electric infrastructure that must be maintained safely, reliably and cost effectively. The decision to replace the facility in-kind on its existing ROW was evaluated as the most cost-effective option.

Why was the proposed project scope chosen over other alternatives?

Please see response above as well as the referenced planning memos.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Prior inspections of the KM Line in concert with its ongoing deterioration status have resulted in the need to replace the KM Line at this time, in order to maintain system reliability and integrity.

What are the risks and consequences of not completing this project?

Loss of system reliability and integrity.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

Inspections and reviews of other electric transmission lines in terms of condition, reliability and integrity.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|---|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| \$8,888,000 | | | | | | | | | |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 772,100 | 510,800 | 261,300 | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 1,930,250 | 1,277,000 | 653,250 | | | | | |
| | Contractors (A/P tax exempt) | 5,018,650 | 3,320,200 | 1,698,450 | | | | | |
| | Overheads | 266,000 | | 266,000 | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 7,987,000 | 5,108,000 | 2,879,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 89,400 | 59,300 | 30,100 | | | | | |
| | Contractors (A/P tax exempt) | 804,600 | 533,700 | 270,900 | | | | | |
| | Overheads | 7,000 | | 7,000 | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 901,000 | 593,000 | 308,000 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|------------------|------------------|----------|
| Current Approved Rate Case Funding (\$): | 3,618,000 | 3,618,000 | 0 |
|---|------------------|------------------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 7,110,400 Maximum (\$): 10,665,600

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

No explanation on confidence level required.

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

The Cost Estimate Range provided above is based on the current proforma, with some understanding that (unplanned) weather-related issues could impact the final project cost (+ or -).

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Cost Estimate breakdown is based on the total conceptual project cost provided and detailed in the provided estimate. The cost breakdown provided above is displayed based on an averaged historical percentage split of project Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively. This historical split has also been applied to the prior year actuals / projections column as well.



Project Name: **KM Line Rebuild**
 Prepared By: **Sam Pozorski**
 Cost Estimate Level:

Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

Date: **12/30/2022** WO #: **5772**
 Revision(s): **1**

Miles
3.16

Part 1: Additions

* All unit and total cost figures should be "raw costs", without any overhead markups. Markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|---------------------------------------|----------|-------|-------------------------|--------------------|-----|---------|--------|--------------------|-----|---------|--------|------------------|------|------------------------------------|------|--------------------------------------|-----------|--------|
| | | | | through 12/31/22 | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | |
| A.1 | Elec Trans Design - Engr (121)-MP WP | 52 | weeks | 75,466 | 16.0 | 832 | 71.00 | 59,072 | 0.1 | 5 | 71.00 | 369 | | 0 | | 0 | | 0 | |
| A.2 | Elec Trans Desn-Supv&Supt (121)-MP | 52 | weeks | 14,308 | 4.0 | 208 | 71.00 | 14,768 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| A.3 | Elec System Protection (125) - MP | 26 | weeks | 48 | 1.0 | 26 | 71.00 | 1,846 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| A.4 | Elec System Planning (126) - MP | 26 | weeks | 3,132 | 1.0 | 26 | 71.00 | 1,846 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| A.5 | Engr Drafting (132) - MP WP | 20 | days | 8,495 | 0.5 | 10 | 71.00 | 710 | 8.0 | 160 | 71.00 | 11,360 | | 0 | | 0 | | 0 | |
| A.6 | Op. Svcs. - General (211) - MP | 3 | days | 0 | 1.0 | 3 | 71.00 | 213 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| A.7 | Engineering - Admin. (310) - MP | 5 | days | 81 | 4.0 | 20 | 71.00 | 1,420 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| A.8 | System Ops (330) - MP WP | 3 | days | 0 | | 0 | | 0 | 3.0 | 9 | 71.00 | 639 | | 0 | | 0 | | 0 | |
| A.9 | Network Strategy (331) - MP | 3 | days | 0 | 5.0 | 15 | 71.00 | 1,065 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| A.10 | EMS / SCADA (730) - MP | 3 | days | 0 | 5.0 | 15 | 71.00 | 1,065 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & OTHER SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | |
| B.1 | Project Mgmt (110) - MP | 52 | weeks | 35,202 | 8.0 | 416 | 71.00 | 29,536 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.2 | Real Property Svcs (124) - MP | 52 | weeks | 10,674 | 1.0 | 52 | 71.00 | 3,692 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.3 | Environmental Affairs (726) - MP | 52 | weeks | 3,166 | 1.0 | 52 | 71.00 | 3,692 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.4 | Network Mapping - AP | 1 | lot | 3,879 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 3,786.42 | 3,786 |
| B.5 | Survey Staking (Maser/Colliers) - AP | 1 | lot | 7,891 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 40,000.00 | 40,000 |
| B.6 | Orion Magnetics - AP | | | 2,400 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 |
| B.7 | Williams Aviation - AP | 1 | lot | 25,250 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 5,000.00 | 5,000 |
| B.8 | Environ. Design & Research (EDR) - AP | 1 | lot | 118,559 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 40,000.00 | 40,000 |
| B.9 | Cuddy & Feder - AP | 1 | lot | 199,976 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 10,000.00 | 10,000 |
| B.10 | SEDC Engineering - AP | | | 43,461 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 1,853.00 | 0 |
| B.11 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 |

2023/2024
Projection

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|--|---|----------|--------|-------------------------|--------------------|----|---------|------|--------------------|----|---------|------------|------------------|------------|------------------------------------|---------|--------------------------------------|-----------|--|
| | | | | through 12/31/22 | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | |
| C.1 | LaBelle Prop (Equip Laydn&Office)-AP | 18 | months | 12,000 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,000.00 | 54,000 | |
| C.2 | Sean Thompson - AP | 18 | months | 29,000 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,000.00 | 18,000 | |
| C.3 | JPF Dev. - AP | | | 106,400 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | |
| C.4 | Cross Court - AP | | | 28,000 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | |
| C.5 | Todd Fowler - AP | | | 17,085 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | |
| C.6 | Purchasing Card (Citizen Bank) - AP | 1 | lot | 1,614 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,000.00 | 5,000 | | 0 | |
| C.7 | Canon/Pitney Bowes - AP | 1 | lot | 1,309 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 500.00 | 500 | | 0 | |
| C.8 | Town of Wappinger - AP | 1 | lot | 13,175 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10,000.00 | 10,000 | |
| C.9 | Town of Poughkeepsie - AP | 1 | lot | 4,525 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6,000.00 | 6,000 | |
| C.10 | JRL VCHR + WOADJ: (JV+WOA) | | | 297,121 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | Reduced by 12/22 Riggs Estimate of \$224361 for Drilling and KM51 Fr |
| D MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | |
| D.1 | Steel Poles (45) | 1 | lot | | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 327,381.00 | 327,381 | | 0 | PO#93688 |
| D.2 | Hybrid Poles (11) | 1 | lot | | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 201,379.00 | 201,379 | | 0 | PO#93649 |
| D.3 | Conductor | 45,735 | LB | | | 0 | | 0 | 0 | 0 | 0 | 3.92 | 179,085 | | 0 | 0 | | 0 | 30-50-140 |
| D.4 | OPGW | 20,000 | FT | | | 0 | | 0 | 0 | 0 | 0 | 3.34 | 66,850 | | 0 | 0 | | 0 | 30-50-205 |
| D.5 | Standard Stock | 1 | lot | | | 0 | | 0 | 0 | 0 | 0 | 117,929.80 | 117,930 | | 0 | 0 | | 0 | Estimated Tan, Swing, DE, 2P Tan Strs |
| D.6 | Braced Post Insulator Assemblies | 1 | lot | | | 0 | | 0 | 0 | 0 | 0 | | 0 | 101,105.46 | 101,105 | | 0 | PO#93165 | |
| D.7 | Post Insulators | 1 | lot | | | 0 | | 0 | 0 | 0 | 0 | | 0 | 16,547.76 | 16,548 | | 0 | PO#93147 | |
| D.8 | OPGW Suspension Clamps | 45 | pc | | | 0 | | 0 | 0 | 0 | 0 | | 0 | 103.92 | 4,676 | | 0 | | |
| D.9 | FAA Lights | 2 | as | | | 0 | | 0 | 0 | 0 | 0 | | 0 | 5,846.40 | 11,693 | | 0 | | |
| D.10 | Misc Rebuild Material | 1 | lot | | | 0 | | 0 | 0 | 0 | 0 | 10,000.00 | 10,000 | 20,000.00 | 20,000 | | 0 | | |
| D.11 | KM Knps Crnr Poles - Sabre (KM50 to KM 52) | 1 | lot | 70,298 | | 0 | | 0 | 0 | 0 | 0 | | 0 | 0.00 | 0 | | 0 | PO#92276 | |
| D.12 | KM Knapps Corners Braced Post Ass | 1 | lot | | | 0 | | 0 | 0 | 0 | 0 | | 0 | 2,660.67 | 2,661 | | 0 | PO#92436 | |
| D.13 | KM Knapps Corners High Angle Suspension Clamps | 1 | lot | | | 0 | | 0 | 0 | 0 | 0 | | 0 | 1,844.58 | 1,845 | | 0 | PO#92376 | |
| D.14 | KM Knapps Corners Station Tie Poles | 1 | lot | | | 0 | | 0 | 0 | 0 | 0 | 14,541.00 | 14,541 | | 0 | | 0 | | |
| D.15 | KM Knapps Corners Station Tie Clamps | 1 | lot | | | 0 | | 0 | 0 | 0 | 0 | | 0 | 1,535.90 | 1,536 | | 0 | PO#92246 | |
| D.16 | KM Knapps Corners Station Tie Cond | 1,092 | LB | | | 0 | | 0 | 0 | 0 | 0 | 2.21 | 2,417 | | 0 | | 0 | 30-50-134 | |
| D.17 | KM Knapps Corners Station Tie Static | 152 | LB | | | 0 | | 0 | 0 | 0 | 0 | 1.44 | 219 | | 0 | | 0 | 30-50-133 | |
| D.18 | Standard Stock - Knapps Corners and Station Tie | 1 | lot | | | 0 | | 0 | 0 | 0 | 0 | 21,307.61 | 21,308 | | 0 | | 0 | | |
| D.19 | KM Knapps Corners Tie Connectors | 10 | pc | 211 | | 0 | | 0 | 0 | 0 | 0 | | 0 | 0.00 | 0 | | 0 | PO#94356 | |
| D.20 | Misc | 1 | lot | | | 0 | | 0 | 0 | 0 | 0 | 500.00 | 500 | 1,000.00 | 1,000 | | 0 | | |

2023/2024
Projection

April 2023
April 2023
Late 2023 or early 2024 (de
Late 2023 or early 2024 (de
Late 2023 or early 2024 (de
February 2023
February 2023
June 2023
June 2023
2024
2022
February 2023
January 2023
February 2023
January 2023
February 2023
February 2023
February 2023
2022
February 2023

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | | | | |
|-----------------------|---------------------------------------|----------|--------|-------------------------|--------------------------|-----|---------|--------|--------------------|-------------------------|---------|--------|------------------|---------|------------------------------------|------|--------------------------------------|---------|--|---------|--|--|-----------|
| | | | | through 12/31/22 | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | | | | |
| E CONSTRUCTION | | | | | | | | | | | | | | | | | | | | | | | |
| E.1 | Line Construction | 1.0 | lot | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 897,030.75 | 897,031 | TV Bid \$/str unit pricing for KM scope | | | | |
| E.2 | Drilling | 1.0 | lot | 134,648 | | 0 | | 0 | | 0 | | 0 | | 0 | | | 584,049.57 | 584,050 | ((TV Bid)*51/103)*1.3. 54 Total KM strud | | | | |
| E.3 | KM51 Foundation | 1 | lot | 89,713 | | 0 | | 0 | | 0 | | 0 | | 0 | | | 26,111.65 | 26,112 | January 2023 | | | | |
| E.4 | Matting | 0.8 | lot | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 404,835.89 | 323,869 | ((TV Bid)*54/107)*1.3) | | | | |
| E.5 | Matting (2022) Out On A Limb-AP | | | 316,800 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | | | | | |
| E.6 | Matting (2022) KW Reese- AP | 1 | lot | 388,864 | | 0 | | 0 | | 0 | | 0 | | 0.00 | | | | | TBD | | | | |
| E.7 | Civil / Envir / Rest | 6.0 | months | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 92,400.00 | 554,400 | TV Est/2*1.3 (80/20) | | | | |
| E.8 | ROW/Gates | 0.8 | | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 50,000.00 | 40,000 | | | | | |
| E.9 | Project Construction (215) - MP WP | 26 | weeks | 7,283 | 14.0 | 364 | 71.00 | 25,844 | 48.0 | 1,248 | 71.00 | 88,608 | | 0 | | | | | | | | | |
| E.10 | Clerical (216) - WP | 26 | weeks | 26 | | 0 | | 0 | 0.2 | 5 | 71.00 | 369 | | 0 | | | | | | | | | |
| E.11 | Op Svc-Gen (221,223,224,225,226)-WP | 26 | weeks | 0 | | 0 | | 0 | 12.0 | 312 | 71.00 | 22,152 | | 0 | | | | | | | | | |
| E.12 | Op. Svcs. - General (592) - WP | 26 | weeks | 0 | | 0 | | 0 | 4.0 | 104 | 71.00 | 7,384 | | 0 | | | | | | | | | |
| E.13 | NY Drilling Svcs & Riggs Distler - AP | | | 18,639 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | | | | | |
| E.14 | Independent Helicopter - AP | | | 1,270 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | TBD | | | | |
| E.15 | Out On A Limb-AP | | | 34,961 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | TBD | | | | |
| E.16 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | | | | | |
| E.17 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | | | | | |
| | | | | 2,124,930 | | | | | 144,769 | | | | | 130,881 | | | 412,849 | | | 695,324 | | | 2,612,247 |
| | | | | | | | | | 2,039 | | | | | 1,843 | | | | | | | | | |
| | | | | | Manhours Monthly Payroll | | | | | Manhours Weekly Payroll | | | | | | | | | | | | | |

2023/2024 Projection
Remainder in 2024 except: \$92k in February 2023, rem Knapps Corners Drilling is c January 2023 Use January Estimate

Part 2: Removals

* All unit and total cost figures should be "raw costs", without any overhead markups. All markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | | | | |
|-----|--|----------|--------|-------------------------|--------------------|-----|---------|-------|--------------------|-----|---------|--------|------------------|--------|------------------------------------|------|--------------------------------------|---------|---|---|--|--|---------|
| | | | | through 12/31/22 | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | | | | |
| R.1 | Project Mgmt (110) - MP | 52 | weeks | 35,240 | 2.0 | 104 | 71.00 | 7,384 | | 0 | | 0 | | 0 | | | | 0 | | | | | |
| | Line Construction | 1.0 | lot | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 188,677.50 | 188,678 | TV Bid \$/str unit pricing for KM scope | | | | |
| | G Line Removal | 1.0 | lot | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 72,751.80 | 72,752 | TV Bid \$/str unit pricing for G scope | | | | |
| | Matting | 0.2 | | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 404,835.89 | 80,967 | 1/4 of TV (80/20) | | | | |
| | Civil / Envir / Rest | 6.0 | months | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 28,600.00 | 171,600 | TV Est/2*1.3 (80/20) | | | | |
| | ROW/Gates | 0.2 | | | | 0 | | 0 | | 0 | | 0 | | 0 | | | 50,000.00 | 10,000 | | | | | |
| R.2 | Project Construction (215) - MP WP | 26 | weeks | 0 | | 0 | | 0 | 12.0 | 312 | 71.00 | 22,152 | | 0 | | | | | | | | | |
| R.3 | Op. Svcs. - Genl (224) - WP | 52 | weeks | 0 | | 0 | | 0 | 0.1 | 5 | 71.00 | 369 | | 0 | | | | | | | | | |
| R.4 | Out On A Limb - AP | | | 697 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | TBD | | | | |
| | Out On A Limb-Matting Purch. (2022) - AP | | | 79,200 | | 0 | | 0 | | 0 | | 0 | | 0.00 | | | | | TBD | | | | |
| R.5 | KW Reese-Matting Purch. (2022) - AP | 1 | lot | 97,216 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | TBD | | | | |
| R.6 | Riggs Distler - AP | | | 181 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | TBD | | | | |
| R.7 | Journal Voucher - JV | | | 9,016 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | | | | | |
| | | | | 221,550 | | | | | 7,384 | | | | | 22,521 | | | 0 | | | 0 | | | 523,996 |
| | | | | | | | | | 104 | | | | | 317 | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|--------------------------------|----------|-------|-------------------------|------------------|--------------------|----|---------|-----------------|--------------------|----|---------|------------------|-----------|------------------------------------|-----------|--------------------------------------|-----------|-------|
| | | | | | through 12/31/22 | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit |  | Cost |

Manhours Monthly Payroll Manhours Weekly Payroll

2023/2024
Projection

Part 3: Cost Estimate Summary

| ADDITIONS SUMMARY: | | |
|----------------------------------|--------------------|--|
| Incurred To-Date: | | |
| Raw Costs Incurred To-Date: | \$2,124,930 | |
| Overhead Costs Incurred To-Date: | \$284,293 | <i>This figure must be manually entered if applicable</i> |
| AFUDC Costs Incurred To-Date: | \$241,954 | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$2,651,177 | |
| Estimated Future Raw Costs: | \$3,996,070 | |
| Estimated Future Overheads: | \$499,577 | |
| Estimated Future AFUDC: | \$332,643 | |
| Subtotal Future Costs: | \$4,828,290 | |
| Contingency Applied: | \$241,415 | 5.0% <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL ADDITIONS: | \$7,720,881 | |

| REMOVALS SUMMARY: | | |
|----------------------------------|------------------|--|
| Incurred To-Date: | | |
| Raw Costs Incurred To-Date: | \$221,550 | |
| Overhead Costs Incurred To-Date: | \$58,768 | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$280,318 | |
| Estimated Future Raw Costs: | \$553,902 | |
| Estimated Future Overheads: | \$30,477 | |
| Subtotal Future Costs: | \$584,379 | |
| Contingency Applied: | \$29,219 | 5.0% <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL REMOVALS: | \$893,916 | |

| | |
|--|--------------------|
| GRAND TOTAL ADDITIONS + REMOVALS: | \$8,614,798 |
|--|--------------------|

Assumptions, Notes, Clarifications, etc.:

June 3, 2016

TO: Hal Turner, Manager – Electric Engineering Services

CC: Chris Rottkamp Chris DeRoberts Ruby Chan
 Eric Loeven Brett Arteta Luke Mangels
 Rich Wright Cliff Hay Pat Harder
 Kyle Bragg

FROM: Brian Dimisko, Project Manager

RE: **69 kV G-Line South Reinforcement / Rebuild Project (3406 A/R)**
Assessment of Alternatives Analysis: RECOMMENDATION

Hal,

The 69 kV G-Line South Reinforcement / Rebuild project is being pursued to address an aging infrastructure of the G, KM and TV electric transmission lines. At the same time, the ability to provide incremental area load via the Myers Corners substation also is a consideration, although not a requirement based on load studies. Transmission Planning staff indicate that current load (and projected future load) can be adequately maintained by either a 69 kV or 115 kV solution.

The analysis included a review of the following substation endpoint configurations: (a) Knapps Corners - Myers Corners - Fishkill Plains; and (b) Knapps Corners - Myers Corners - North Chelsea. The analysis included a review of existing ROWs for both configurations, and an alternate ROW corridor that traverses Rt. 9, between Knapps Corners substation and the Nine Mall Plaza (or Kohl's Plaza). It is noted that a traverse of the Rt.9 corridor also would require a new ROW to connect from behind the Nine Mall Plaza to the existing ROW for the TV line corridor.

Since either line voltage provides a solution, a Line Alternatives Analysis was performed to identify the best option. Input was received from Transmission Design, Substation Design, Real Property and Environmental/Permitting. Attributes were identified and scored by the team (using a weighted formula method), which were collectively used to develop a project recommendation.

The following Alternatives were reviewed by the team:

1. Upgrade to 115 kV on existing ROW (Knapps Corners - Myers Corners - Fishkill Plains)
2. Upgrade to 115 kV w/ portion on Rt. 9 (Knapps Corners - Myers Corners - Fishkill Plains)
- 3A. Upgrade to 115 kV on existing ROW (Knapps Corners - Myers Corners - North Chelsea)
- 3B. Rebuild the 69 kV on existing ROW (Knapps Corners - Myers Corners - North Chelsea)
- 4A. Upgrade to 115 kV w/ portion on Rt. 9 (Knapps Corners - Myers Corners - North Chelsea)
- 4B. Rebuild the 69 kV w/ portion on Rt. 9 (Knapps Corners - Myers Corners - North Chelsea)
- *5. Upgrade to 115 kV on existing ROW (Knapps Corners - Myers Corners - North Chelsea):
 UNDERGROUND transmission (1.5 miles) between Knapps Corners and New Hackensack Rd.;
 OVERHEAD transmission for remainder (7.4 miles) to Myers Corners and North Chelsea.

** This Alternative was not scored in the Alternatives Analysis spreadsheet (Attribute table).*

Based on the Line Alternatives Analysis performed by the project team, the highest (best) score of 511 points was achieved on Alternative 3B: Rebuild the 69 kV line on the existing ROW (Knapps Corners - Myers Corners - No. Chelsea). Scores in descending order were tallied as follows:

- Alternative 3A: 448 points
- Alternative 1: 424 points
- Alternative 4A: 342 points
- Alternative 2: 325 points
- Alternative 4B: 317 points

Based on the cost estimate analysis performed by the project team, Alternative 3B experienced the lowest (best) cost estimate at \$14.5 million. Ascending cost estimates were tallied as follows:

- Alternative 3A: \$14.6 million
- Alternative 1: \$17.6 million
- Alternative 4B: \$27.8 million
- Alternative 4A: \$33.5 million
- Alternative 5: \$37.2 million
- Alternative 2: \$44.2 million

Alternative 5 (Underground): Based on a 115 kV system traversing the existing ROW for Knapps Corners – Myers Corners – N. Chelsea end points, construction of the underground segment from Knapps Corners substation to New Hackensack Road (at 1.5 miles) is estimated to cost \$25.52 million. Construction of the overhead section for the remainder of the system (at 7.4 miles) is estimated to cost \$7.4 million. The total estimated cost for the entire transmission line is approximately \$37.2 million, which includes estimated costs for the required substation modifications, environmental/permitting needs and ROW acquisitions (for overhead line only; easements currently do not exist for an underground line length of 5,500' between Knapps Corners substation and Wappingers Creek).

The project team is recommending that Alternative 3B be selected as the rebuild project herein. This Option provides for current and future load requirements, and has been vetted by a comprehensive analysis. Upon approval of this option by senior management, the project can move forward to the permitting and design stage.

Submitted By:

Brian Dimisko
Project Manager

Attachment: Line Alternatives Analysis Spreadsheet

G-Line South Rebuild Project

Route Alternatives Analysis

SCORING KEY:

A higher score is more favorable than a lower score.

Attribute Weighting: Level of Importance (1 = low; 2 = somewhat low; 3 = moderate; 4 = somewhat high; 5 = high)

Raw Scoring: Degree of Difficulty (1=worst case; 2=very challenging; 3=moderately challenging; 4=less challenging; 5=least challenging)

Weighted Score: = Raw Score x Attribute Weighting

| Attribute | Attribute Weighting | OPTION 1 115 kV ONLY: Existing ROW Overhead Route (KC-MC-FP) | | | | | OPTION 2 115 kV ONLY: Alternate ROW Overhead Route - via Rt. 9 (KC-MC-FP) | | | | | OPTION 3A 115 kV ONLY: Existing ROW Overhead Route (KC-MC-NC) | | | | | OPTION 3B 69 kV ONLY: Existing ROW Overhead Route (KC-MC-NC) | | | | | OPTION 4A 115 kV ONLY: Alternate ROW Overhead Route - via Rt. 9 (KC-MC-NC) | | | | | OPTION 4B 69 kV ONLY: Alternate ROW Overhead Route - via Rt. 9 (KC-MC-NC) | | | | | | | | |
|--|---------------------|---|---|---|------------|---------------------------------------|---|---|--|-----------|----------------|---|------|------|-----------|----------------|---|--|--|-----------|----------------|---|---|--|-----------|---|---|---|--|---|---|---|---|----|------------|
| | | Quantity or Desc. | Pros | Cons | Raw Score | Weighted Score | Quantity | Pros | Cons | Raw Score | Weighted Score | Quantity | Pros | Cons | Raw Score | Weighted Score | Quantity | Pros | Cons | Raw Score | Weighted Score | Quantity | Pros | Cons | Raw Score | Weighted Score | Quantity | Pros | Cons | Raw Score | Weighted Score | | | | |
| Total Line Length | 3 | 8.5 miles | | | 4 | 12 | 9.7 miles | | | 3 | 9 | 8.9 miles | | | 4 | 12 | 8.9 miles | | | 4 | 12 | 10.3 miles | | | 2 | 6 | 10.3 miles | | | 3 | 9 | | | | |
| Use of Engineered Structures | 4 | 0 | | | 5 | 20 | 12 | More robust Structure, no need for supporting guy wires | More costly and complex to Engineer, Procure and install | 2 | 8 | 0 | | | 5 | 20 | 0 | | | 5 | 20 | 12 | More robust Structure, no need for supporting guy wires | More costly and complex to Engineer, Procure and install | 2 | 8 | 12 | More robust Structure, no need for supporting guy wires | More costly and complex to Engineer, Procure and install | 2 | 8 | | | | |
| Gen'l Design Complexity | 3 | | Existing Overhead lines in those corridors currently | Expansion of ROW in an existing corridor (Clearing) with both Gas and Electric Facilities | 3 | 9 | | | Distribution underbuild and roadway design could be very complex | 2 | 6 | | | 4 | 12 | | | | 4 | 12 | | | | Distribution underbuild and roadway design could be very complex | 2 | 6 | | | 2 | 6 | | | | | |
| Distribution Underbuild | 4 | | | | 3 | 12 | | | | 2 | 8 | | | 4 | 16 | | | | 4 | 16 | | | | | 2 | 8 | | | 2 | 8 | | | | | |
| DOT Issues | 4 | | | | 2 | 8 | | | | 1 | 4 | | | 3 | 12 | | | | 3 | 12 | | | | | 1 | 4 | | | 1 | 4 | | | | | |
| FAA/Airport Issues | 5 | | | | 2 | 10 | | | | 4 | 20 | | | 2 | 10 | | | | 2 | 10 | | | | | 4 | 20 | | | 4 | 20 | | | | | |
| Meet In-service Date of Dec. 2020 | 5 | | | | 4 | 20 | | | | 3 | 15 | | | 4 | 20 | | | | 5 | 25 | | | | | 3 | 15 | | | 3 | 15 | | | | | |
| Total Cost of Transm Line Work | 5 | \$10,747,000 | | | 3 | 15 | \$15,115,000 | | | 2 | 10 | \$10,377,000 | | | 4 | 20 | \$10,046,000 | | | 4 | 20 | \$14,526,000 | | | 2 | 10 | \$13,628,000 | | | 2 | 10 | | | | |
| Gen'l Design Complexity | 3 | Original design | | | 5 | 15 | Original design | | | 5 | 15 | Original design | | | 5 | 15 | Need a larger foot print to make room for the Auto-transformer on the southeast side. | | Additional equipment and site work needed. | 3 | 9 | Original Design | | | 5 | 15 | Need a larger foot print to make room for the Auto-transformer on the southeast side. | | Additional equipment and site work needed. | 3 | 9 | | | | |
| Equipment Maintenance | 1 | | | | 5 | 5 | | | | 5 | 5 | | | 5 | 5 | | Second Auto-transformer, second 69kV breaker, two additional sets of M.O. switches. | | | 2 | 2 | | | 5 | 5 | | | 5 | 5 | Second Auto-transformer, second 69kV breaker, two additional sets of M.O. switches. | 2 | 2 | | | |
| Total Cost of Substation Work | 5 | | FOR 115 kV: KC: New sub. meets req.; FP: two 115 kV bkr w/ relay panel; three CCVTs; four Disc. Sw. w/ Motor; fiber optic MC: repl 69 kV bkr w/ 115 kV bkr; repl 600A disc; reset xfmr taps for 115 kV; repl/add CCVTs & pilot prot.; concrete; grounding | | 4 | 20 | FOR 115 kV: KC: New sub. meets req.; FP: two 115 kV bkr w/ relay panel; three CCVTs; four Disc. Sw. w/ Motor; fiber optic MC: repl 69 kV bkr w/ 115 kV bkr; repl 600A disc; reset xfmr taps for 115 kV; repl/add CCVTs & pilot prot.; concrete; grounding | | | 4 | 20 | FOR 115 kV: KC: New sub. meets req.; MC: 115 kV bkr already being repl in '16 (?); relay panel w/ fiber optic comm. (?); CCVTs (3); Disc. Sw. w/ motor op.; grounding MC: repl 69 kV bkr w/ 115 kV bkr; repl 600A disc; reset xfmr taps for 115 kV; repl/add CCVTs & pilot prot.; concrete; grounding | | | 5 | 25 | FOR 69 kV: KC: 115/69 kV xfmr.; 115 kV Brkr.; 69 kV Brkr.; Package subst. (?); site dev. (?) MC: 115/69 kV xfmr.; 115 kV Vert. Brk. Disc.; Steel str.; concrete; MC: Assess cond. of existing 69 kV brkr; Repl. 600 A Disc. Switches (?); | | Revise Cat 13 budget | 2 | 10 | FOR 115 kV: KC: New sub. meets req.; MC: 115 kV bkr already being repl in '16 (?); relay panel w/ fiber optic comm. (?); CCVTs (3); Disc. Sw. w/ motor op.; grounding MC: repl 69 kV bkr w/ 115 kV bkr; repl 600A disc; reset xfmr taps for 115 kV; repl/add CCVTs & pilot prot.; concrete; grounding | | 5 | 25 | FOR 69 kV: KC: 115/69 kV xfmr.; 115 kV Brkr.; 69 kV Brkr.; Package subst. (?); site dev. (?) MC: 115/69 kV xfmr.; 115 kV Vert. Brk. Disc.; Steel str.; concrete; MC: Assess cond. of existing 69 kV brkr; Repl. 600 A Disc. Switches (?); | | Revise Cat 13 budget | 2 | 10 | FOR 69 kV: KC: 115/69 kV xfmr.; 115 kV Brkr.; 69 kV Brkr.; Package subst. (?); site dev. (?) MC: 115/69 kV xfmr.; 115 kV Vert. Brk. Disc.; Steel str.; concrete; MC: Assess cond. of existing 69 kV brkr; Repl. 600 A Disc. Switches (?); | | 2 | 10 | |
| Meet In-service Date of Dec. 2020 | 5 | | | | 5 | 25 | | | | 5 | 25 | | | 5 | 25 | | | | 5 | 25 | | | | | 5 | 25 | | | 5 | 25 | | | | | |
| Impact to Property Owners | 5 | | | | 1 | 5 | | | | 1 | 5 | | | 1 | 5 | | | | 5 | 25 | | | | | 2 | 10 | | | 2 | 10 | | | | | |
| Difficulty in Obtaining Easements | 5 | | | | 1 | 5 | | | | 1 | 5 | | | 2 | 10 | | | | 5 | 25 | | | | | 1 | 5 | | | 1 | 5 | | | | | |
| Total Cost of Real Property Work | 5 | | | | 3 | 15 | | | | 1 | 5 | | | 3 | 15 | | | | 5 | 25 | | | | | 2 | 10 | | | 2 | 10 | | | | | |
| Meet In-service Date of Dec. 2020 | 5 | | | | 3 | 15 | | | | 1 | 5 | | | 3 | 15 | | | | 5 | 25 | | | | | 2 | 10 | | | 1 | 5 | | | | | |
| Visual Impacts: New ROW; Structure types, hts, Access/Work areas | 5 | | | | 2 | 10 | | | | 3 | 15 | | | 2 | 10 | | | | 4 | 20 | | | | | 3 | 15 | | | 3 | 15 | | | | | |
| ROW Clearing (restrictions) | 5 | | | | 2 | 10 | | | | 1 | 5 | | | 2 | 10 | | | | 5 | 25 | | | | | 1 | 5 | | | 1 | 5 | | | | | |
| Total Cost of Environmental Work | 1 | | | | 5 | 5 | | | | 3 | 3 | | | 4 | 4 | | | | 5 | 5 | | | | | 3 | 3 | | | 4 | 4 | | | | | |
| ARTICLE VII (Option 4A only) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Wetlands & Wildlife: NYSDEC | 5 | | | | 3 | 15 | | | | 2 | 10 | | | 3 | 15 | | | | 3 | 15 | | | | | 2 | 10 | | | 2 | 10 | | | | | |
| Wetlands: USACE | 5 | | | | 3 | 15 | | | | 2 | 10 | | | 3 | 15 | | | | 3 | 15 | | | | | 2 | 10 | | | 2 | 10 | | | | | |
| Total Cost of Permitting Work | 1 | | | | 5 | 5 | | | | 3 | 3 | | | 4 | 4 | | | | 5 | 5 | | | | | 3 | 3 | | | 3 | 3 | | | | | |
| Meet In-service Date of Dec. 2020 | 5 | | | | 5 | 25 | | | | 4 | 20 | | | 5 | 25 | | | | 5 | 25 | | | | | 4 | 20 | | | 4 | 20 | | | | | |
| Conflicts w/ Other Utilities | 5 | | | | 3 | 15 | | | | 1 | 5 | | | 3 | 15 | | | | 3 | 15 | | | | | 1 | 5 | | | 1 | 5 | | | | | |
| Amount of Angles Required | 1 | | | | 5 | 5 | | | | 5 | 5 | | | 5 | 5 | | | | 5 | 5 | | | | | 5 | 5 | | | 5 | 5 | | | | | |
| Access and Work Areas | 4 | | | | 2 | 8 | | | | 1 | 4 | | | 2 | 8 | | | | 2 | 8 | | | | | 1 | 4 | | | 1 | 4 | | | | | |
| Traffic Control | 5 | | | | 4 | 20 | | | | 1 | 5 | | | 4 | 20 | | | | 4 | 20 | | | | | 1 | 5 | | | 1 | 5 | | | | | |
| Shut Downs, Delays | 4 | | | | 3 | 12 | | | | 3 | 12 | | | 3 | 12 | | | | 3 | 12 | | | | | 3 | 12 | | | 3 | 12 | | | | | |
| Restoration Issues | 4 | | | | 3 | 12 | | | | 1 | 4 | | | 3 | 12 | | | | 3 | 12 | | | | | 1 | 4 | | | 1 | 4 | | | | | |
| Meet In-service Date of Dec. 2020 | 5 | | | | 5 | 25 | | | | 5 | 25 | | | 5 | 25 | | | | 5 | 25 | | | | | 5 | 25 | | | 5 | 25 | | | | | |
| Access for Maintenance | 5 | | | | 2 | 10 | | | | 3 | 15 | | | 2 | 10 | | | | 2 | 10 | | | | | 3 | 15 | | | 3 | 15 | | | | | |
| Vegetation Management | 3 | | | | 2 | 6 | | | | 3 | 9 | | | 2 | 6 | | | | 2 | 6 | | | | | 3 | 9 | | | 3 | 9 | | | | | |
| Damage Pot'l (tree hits, vehicle hits) | 5 | | | | 3 | 15 | | | | 2 | 10 | | | 3 | 15 | | | | 3 | 15 | | | | | 2 | 10 | | | 2 | 10 | | | | | |
| TOTAL WEIGHTED SCORE OPTION 1: | | | | | 424 | TOTAL WEIGHTED SCORE OPTION 2: | | | | | 325 | TOTAL WEIGHTED SCORE OPTION 3A: | | | | | 448 | TOTAL WEIGHTED SCORE OPTION 3B: | | | | | 511 | TOTAL WEIGHTED SCORE OPTION 4A: | | | | | 342 | TOTAL WEIGHTED SCORE OPTION 4B: | | | | | 317 |

| Element of Project | Estimated Cost for Each Line Option(\$,000) | | | | | | UNDERGROUND |
|---------------------------------------|---|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | 1 (115 kV only) | 2 (115 kV only) | 3A (115 kV) | 3B (69 kV) | 4A (115kV) | 4B (69 kV) | 5 (115 kV only) |
| Transmission Design ¹ | \$10,747 | \$15,115 | \$10,377 | \$10,046 | \$14,526 | \$13,628 | \$32,920 |
| Substation Design ² | \$2,785 | \$2,785 | \$2,259 | \$4,100 | \$2,259 | \$4,100 | \$2,259 |
| Real Property (ROW) ^{3,4} | \$3,755 | \$25,818 | \$1,604 | \$38 | \$16,267 | \$9,637 | \$1,604 |
| Environmental/Permitting ⁵ | \$350 | \$450 | \$350 | \$300 | \$450 | \$400 | \$450 |
| TOTAL | \$17,637 | \$44,168 | \$14,590 | \$14,484 | \$33,502 | \$27,765 | \$37,233 |

NOTES:

¹ The increased costs associated with the Alternate (Rt. 9) ROW are based mainly on the need for Engineered Steel Poles and Engineered Foundations, coupled with a longer construction timeline (i.e., Engineering Construction Support and related equipment). Light Duty Steel Poles would be used on existing ROWs.

² The Substation Design costs are based on approved 2019 (in-service) new substation construction for Knapps Corners, and future modifications to Fishkill Plains & Myers Corners substations (tentatively planned for 2020). A cost of \$0 is identified for Knapps Corners substation in Options 1, 2, 3A and 4A, and \$1.68 million in Options 3B & 4B. A cost of \$1.345 million is identified for Myers Corners substation in Options 1, 2, 3A and 4A, and \$93K in Options 3B and 4B. A cost of \$1.44 million is identified for Fishkill Plains substation in Options 1 & 2. North Chelsea substation requires a cost of \$2.327 million for Options 3B & 4B, and \$914K for Options 3A & 4A.

³ The dollar amounts identified represent only estimated payout costs to property owners. NOT included are additional administrative fees pertaining to condemnation proceedings, permitting, internal and/or contracted administrative labor, or additional surveying requirements. The TV Line corridor will need to be surveyed in order to provide more indepth analysis (and possible change to the estimated costs, as applicable).

⁴ For 115 kV ROW: Used 100' for single structure corridors & 150' for dual structure corridor;
For 69 kV ROW: Used 60' for single structure corridors & 90' for dual structure corridor.

⁵ Cost estimates initially based on the average of five vendor bids provided for the G-Line North project, since this project has some similarities to the G-Line South project in terms of line length, line rating (69 kV) and number of municipalities involved (for existing ROW conditions). The cost estimates provided herein have been recalibrated to account for the alternate ROW (Rt. 9), and 115 kV and 69 kV ROW variations.

OPTION 1
115 kV ONLY: Existing ROW Overhead Route
(KC-MC-FP)

OPTION 2
115 kV ONLY: Alternate ROW Overhead Route - via Rt. 9
(KC-MC-FP)

OPTION 3 (A & B)
115 kV or 69 kV: Existing ROW Overhead Route
(KC-MC-NC)

OPTION 4 (A & B)
115 kV OR 69 kV: Alternate ROW Overhead Route - via Rt. 9
(KC-MC-NC)

OPTION 5
115 kV ONLY: Existing ROW Underground & Overhead Route
(KC-MC-NC)



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 4 Construction

A. GENERAL

| | | | |
|---|--|--------------------------------|--------------------|
| Project/Program Name: H Line Rebuild (69kV to 115kV) Article VII | | Work Order #: | 0 8 5 3 - D |
| Budget Group: Electric | Budget Category: 12 | Funding Project Number: | 1-1232-67-05 |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 9/1/2005 | In-Service: | 6/1/2026 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
 H-Line Rebuild #0853-D; H-Line Re-Route Easement #2553-I; Land Purchase on SB-Line 40.5-acres Town of Ulster, #5036-H; future work order for gas line AC induction mitigation system; SB-Line / I-Line rebuild Rail Trail Section, #s 8799-J / 8946-J Respectively; distribution underbuild w/ I-Line for approx. 0.7-miles outside Hurley Ave. Sub.

Describe the project objective and scope of work:
 Rebuild the electric transmission H-Line, which is a subset of the overall H&SB-Lines Rebuild project. The H-Line runs from Saugerties Substation to the Catskill Substation, with an approximate length of 12.0-miles. The rebuild includes an upgrade from 69kV to 115kV, and requires Article VII submission and respective Certificate of Need from the Public Service Commission. The scope also includes access improvements including the procurement of permanent off-ROW rights, and an approximate 0.7-mile reroute around the Great Vly Wildlife Management Area.

Describe specific scope exclusions, assumptions and constraints:
 The project is constrained by all the Conditions specifically setforth in the Certificate of Need issued by The Public Service Commission (PSC), effective August 14, 2020. The project will also be bound by the Environmental Management and Construction Plan (EM&CP), approved by PSC on August 11th, 2022. It is assumed that the Lines will remain operating at 69-kV for the foreseeable future, so substation upgrades for 115kV operation are not being considered at this time.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Reference Article VII Exhibit 3 "Alternatives", revised version dated 5/25/2018.

ECM link to Exhibit 3 "Alternatives": <https://contentcentral.cenhud.com/otcs/cs.exe/link/23027326>

Why was the proposed project scope chosen over other alternatives?

Reference Article VII Exhibit 3 "Alternatives", revised version dated 5/25/2018.

ECM link to Exhibit 3 "Alternatives": <https://contentcentral.cenhud.com/otcs/cs.exe/link/23027326>

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

The H Line was constructed in the early 1900's and the majority of the structures and conductors have reached the end of their useful life. The existing infrastructure is need of replacement to mitigate the increased risk of failure due to advanced age.

What are the risks and consequences of not completing this project?

Due to the age and condition of existing structures and conductor, the most significant risk of not completing the project are increased outages due to component failures. The consequences include negative impacts to both SAIFI and CAIDI metrics.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

The project has also been submitted by Central Hudson as a Phase I project that supports NYS CLCPA and renewable energy goals.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$35,867,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 2,991,900 | 612,200 | 850,000 | 1,200,000 | 329,700 | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 7,479,750 | 1,530,500 | 2,125,000 | 3,000,000 | 824,250 | | | |
| | Contractors (A/P tax exempt) | 19,444,350 | 3,979,300 | 5,522,000 | 7,800,000 | 2,143,050 | | | |
| | Overheads | 767,000 | | | 477,000 | 290,000 | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 30,683,000 | 6,122,000 | 8,497,000 | 12,477,000 | 3,587,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 496,600 | 28,200 | 139,700 | 158,700 | 170,000 | | | |
| | Contractors (A/P tax exempt) | 4,469,400 | 253,800 | 1,257,300 | 1,428,300 | 1,530,000 | | | |
| | Overheads | 218,000 | | 33,000 | 71,000 | 114,000 | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 5,184,000 | 282,000 | 1,430,000 | 1,658,000 | 1,814,000 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|-------------------|-------------------|------------------|
| Current Approved Rate Case Funding (\$): | 26,810,000 | 17,449,000 | 9,361,000 |
| | | 2021-2023 | 2024 |

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 28,693,600 Maximum (\$): 43,040,400

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

No explanation on confidence level required.

A detailed quantity takeoff has not yet occurred; we have noticed a significant increase in both materials and contractor pricing over last several years (COVID pandemic years) which has cast some uncertainty in the unit-cost historical pricing we are using to help derive the preliminary cost

Basis for estimate: Historical Data + Job Specific Adjustments; Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

3 major components: 1) Article VII Application Exhibit 9 "Cost of Proposed Facility" rev. 5/25/2018 (<https://contentcentral.cenhud.com/otcs/cs.exe/link/23183378>); 2) 1/2020 Updates to Preliminary Cost Estimate (<https://contentcentral.cenhud.com/otcs/cs.exe/link/29557587>); 3) 1/2022 increases per Chris R. & Kyle B. to accomodate recent materials & labor

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Reference Certificate of Need "Order Adopting Joint Proposal" effective August 14, 2020 (<https://contentcentral.cenhud.com/otcs/cs.exe/link/31379817>) and Environmental Management & Construction Plan (EM&CP) approved by the Public Service Commission (PSC) on August 11, 2022 (multiple files, all on record in ECM and on NYS DPS public DMM system). The cost breakdown provided above is displayed based on an averaged historical percentage split of project Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively. This historical split has also been applied to the prior year actuals / projections column as well.



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 4 Construction

A. GENERAL

| | | |
|--|--|---|
| Project/Program Name: SB Line Rebuild (69kV to 115kV) Article VII | | Work Order #: 0 8 5 4 - D |
| Budget Group: Electric | Budget Category: 12 | Funding Project Number: 1-1232-67-05 |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 9/1/2005 | In-Service: 6/1/2024 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
 H-Line Rebuild #0853-D; H-Line Re-Route Easement #2553-I; Land Purchase on SB-Line 40.5-acres Town of Ulster, #5036-H; future work order for gas line AC induction mitigation system; SB-Line / I-Line rebuild Rail Trail Section, #s 8799-J / 8946-J Respectively; distribution underbuild w/ I-Line for approx. 0.7-miles outside Hurley Ave. Sub.

Describe the project objective and scope of work:
 Rebuild the electric transmission SB-Line, which is a subset of the overall H&SB-Lines Rebuild project. The SB-Line runs from Hurley Avenue Substation to the Saugerties Substation, with an approximate length of 11.5-miles. The rebuild includes an upgrade in line construction from 69kV to 115kV, and requires Article VII submission and respective Certificate of Need from the Public Service Commission. The scope also includes access improvements including the procurement of permanent off-ROW rights.

Describe specific scope exclusions, assumptions and constraints:
 The project is constrained by all the Conditions specifically setforth in the Certificate of Need issued by The Public Service Commission (PSC), effective August 14, 2020. The project will also be bound by the Environmental Management and Construction Plan (EM&CP), approved by PSC on August 11th, 2022. It is assumed that the Lines will remain operating at 69-kV for the foreseeable future, so substation upgrades for 115kV operation are not being considered at this time.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Reference Article VII Exhibit 3 "Alternatives", revised version dated 5/25/2018.

ECM link to Exhibit 3 "Alternatives": <https://contentcentral.cenhud.com/otcs/cs.exe/link/23027326>

Why was the proposed project scope chosen over other alternatives?

Reference Article VII Exhibit 3 "Alternatives", revised version dated 5/25/2018.

ECM link to Exhibit 3 "Alternatives": <https://contentcentral.cenhud.com/otcs/cs.exe/link/23027326>

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

The SB Line was constructed in the early 1900's and the majority of the structures and conductors have reached the end of their useful life. The existing infrastructure is in need of replacement to mitigate the increased risk of failure due to advanced age.

What are the risks and consequences of not completing this project?

Due to the age and condition of existing structures and conductor, the most significant risk of not completing the project are increased outages due to component failures. The consequences include negative impacts to both SAIFI and CAIDI metrics.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

The project has also been submitted by Central Hudson as a Phase I project that supports NYS CLCPA and renewable energy goals.

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|--|----------------------------------|--|---|------------------|--|----------------|----------------|----------------|--------------|
| \$31,408,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 2,797,900 | 1,872,700 | 925,200 | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 6,994,750 | 4,681,750 | 2,313,000 | | | | | |
| | Contractors (A/P tax exempt) | 18,186,350 | 12,172,550 | 6,013,800 | | | | | |
| | Overheads | 8,000 | | 8,000 | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 27,987,000 | 18,727,000 | 9,260,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 338,900 | 202,100 | 136,800 | | | | | |
| | Contractors (A/P tax exempt) | 3,050,100 | 1,818,900 | 1,231,200 | | | | | |
| | Overheads | 32,000 | | 32,000 | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 3,421,000 | 2,021,000 | 1,400,000 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|

| | | | |
|---|-------------------|-------------------|----------|
| Current Approved Rate Case Funding (\$): | 26,527,000 | 26,527,000 | 0 |
| | 2021-2023 | 2024 | |

Prior years funding;
not actuals.



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 25,126,400 Maximum (\$): 37,689,600

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

No explanation on confidence level required.

A detailed quantity takeoff for the majority of the SB Line Rebuild has not yet occurred; There remains a level of uncertainty in both materials and contractor pricing due to ongoing supply and labor difficulties which has resulted in departures from the historical unit-cost pricing we are using to help derive the preliminary cost estimate.

Basis for estimate: Historical Data + Job Specific Adjustments; Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

3 major components: 1) Article VII Application Exhibit 9 "Cost of Proposed Facility" rev. 5/25/2018 (<https://contentcentral.cenhud.com/otcs/cs.exe/link/23183378>); 2) 1/2020 Updates to Preliminary Cost Estimate (<https://contentcentral.cenhud.com/otcs/cs.exe/link/29557587>); 3) 1/2022 increases per Chris R. & Kyle B. to accomodate recent materials & labor increases and extended schedule. 2021-2023 actuals + Projections split based on 65% / 25% / 10% split for AP Charges, Materials, and Labor respectively.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Reference Certificate of Need "Order Adopting Joint Proposal" effective August 14, 2020 (<https://contentcentral.cenhud.com/otcs/cs.exe/link/31379817>) and Environmental Management & Construction Plan (EM&CP) approved by the Public Service Commission (PSC) on August 11, 2022 (multiple files, all on record in ECM and on NYS DPS public DMM system). The cost breakdown provided above is displayed based on an averaged historical percentage split of project Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively. This historical split has also been applied to the prior year actuals / projections column as well.

H & SB Electric Transmission Lines Rebuild

January 2020 Updates to Preliminary Cost Estimate

| Description | H-Line (52%) | SB-Line (48%) |
|---|---------------------|---------------------|
| 11-2017 Preliminary Estimate with Application \$41,045,731 | \$21,343,780 | \$19,701,951 |
| <u>2019 Adjustments:</u> | | |
| Change 7 guyed structures to engineered | \$1,250,000 | - |
| Change 13 guyed structures to engineered, excl. Rail Trail | - | \$2,650,000 |
| Replace added 5 lattice structures in Catskill | \$3,500,000 | - |
| Rail Trail redesign | - | \$1,500,000 |
| Bluestone Forest area redesign | - | \$750,000 |
| <u>January 2020 Adjustments:</u> | | |
| Cost increase adjustment for quarry reroute | \$619,987 | - |
| Heavy earthwork grading increase adjustment for access & workpads | \$2,340,000 | \$2,160,000 |
| Increase contingency from 5% to 10% | \$1,404,306 | \$1,296,283 |
| | | |
| Subtotals: | \$30,458,073 | \$28,058,234 |
| Grand Total: | \$58,516,307 | |
| Per-Mile Estimate: | \$2,479,505 | |

**BEFORE THE
NEW YORK STATE
PUBLIC SERVICE COMMISSION**

In the Matter of the Application of Central Hudson Gas & Electric Corporation For a Certificate of Environmental Compatibility and Public Need Pursuant to Article VII of the Public Service Law to Rebuild the H and SB Lines of Approximately 23.6 miles from 69 kilovolts to 115 kilovolt standards in the City of Kingston and Towns of Ulster and Saugerties in Ulster County, and the Town of Catskill and Village of Catskill in Greene County.

Case No.: 17-T-_____

**CENTRAL HUDSON GAS & ELECTRIC CORPORATION
H AND SB ELECTRIC TRANSMISSION LINES REBUILD PROJECT**

**EXHIBIT E-4
ENGINEERING JUSTIFICATION**

EXHIBIT E-4 – ENGINEERING JUSTIFICATION

This section addresses the requirements of 16 NYCRR §88.4.

E-4.0 Introduction

Central Hudson Gas & Electric Corporation (CHG&E or the Applicant) is proposing to rebuild the existing 69 kilovolt (kV) H and SB transmission lines (H and SB Lines) to 115 kV requirements located between Kingston in Ulster County and Catskill in Greene County, New York (the Project). Approximately 1.2 miles of the H Line route is proposed to be relocated to avoid a sensitive environmental resource area designated by the New York State Department of Environmental Conservation (NYSDEC) as the Great Vly Wildlife Management Area (WMA). The proposed reroute conditions are detailed in Alternatives (Exhibit 3).

E-4.1 Need for the Proposed Project

While the lines will be designed and constructed for 115 kV operation, they will continue to be operated at 69 kV in the near term. Future operation at 115 kV would be needed for any of the following: sudden load growth that cannot be mitigated with non-wires alternative projects; increased UPNY-SENY flow resulting in overload conditions on the 115 kV Feura Bush (National Grid) to North Catskill line; and a need to increase hosting capacity for photovoltaic and storage projects. Given what the Applicant considers to be reasonably likely scenarios, rebuilding for just 69 kV use would be short sighted and not cost efficient. Future modifications at the three substations and one tap station would be required prior to 115kV operation as detailed in Exhibit E-2 Other Facilities.

Moreover, in addition to being the sole transmission supply for the 35-40 MWs of peak distribution load currently served from the Saugerties and Woodstock Substations, the H and SB Lines provide an important input to the system in the northwest portion of Central Hudson's franchise area (Northwest Area). The H Line also is the sole supply for the Lehigh Cement Co. in the Towns of Saugerties and Catskill. Historic and forecast area loads are provided below in Table E-4.1.

Table E-4.1 Historic and Forecast Area Loads

| | Year | Coincident Peak (MW) | | | Weather Normalized (MW) ¹ | | |
|----------|------|----------------------|-------------|------------|--------------------------------------|------------|-----------|
| | | Date | System Peak | Saugerties | Woodstock | Saugerties | Woodstock |
| Historic | 2006 | August 2 | 1295 | 24.7 | 19.4 | | |
| | 2007 | August 8 | 1185 | 23.8 | 17.1 | | |
| | 2008 | June 10 | 1187 | 22.4 | 17.9 | | |
| | 2009 | August 17 | 1107 | 24.7 | 16.9 | | |
| | 2010 | July 6 | 1229 | 19.8 | 18.7 | | |
| | 2011 | July 22 | 1225 | 22.9 | 19.6 | | 15.9 |
| | 2012 | July 17 | 1168 | 21.7 | 17.6 | | 18.2 |
| | 2013 | July 18 | 1202 | 22.5 | 18.6 | | 23.6 |
| | 2014 | July 23 | 1060 | 20.8 | 15.9 | | 23.7 |
| | 2015 | July 29 | 1059 | 20.5 | 16.3 | | 23.4 |
| | 2016 | August 13 | 1088 | 21.2 | 18.0 | | |
| Forecast | 2017 | July 20 | 1034 | 20.4 | 16.1 | | |
| | 2018 | | | | | 23.0 | 19.0 |
| | 2019 | | | | | 22.9 | 19.2 |
| | 2020 | | | | | 22.7 | 19.5 |
| | 2021 | | | | | 22.6 | 19.8 |

The existing 69 kV H and SB Lines originally were installed in 1928 as double circuit steel lattice structures using 1/0 Cu conductor for each of the circuits; the double circuits subsequently were converted to single circuits with two 1/0 Cu conductors per phase. Some of the steel lattice structures have been replaced with wood poles through the years. An assessment of the condition of the structures was conducted in 2015 and revealed that 32.0% of the lines' structures were in need of replacement or the addition of mid-span poles to correct sag issues; an additional 35.5% of structures are in need of maintenance repairs. Issues found include: damage to numerous tower legs; many insulators in need of replacement; tower foundation issues; woodpecker damage to wood poles; and need for mid-span structures to correct sag issues. In addition, the installation of mid-span structures most likely would result in the need to replace adjacent tangent structures. Some identified issues found were severe enough to prompt replacements of eight (8) structures in 2017-2018.

E-4.2 Project Benefits

The proposed rebuild will have both reliability and economy benefits for CHG&E and its interconnected network.

Reliability benefits are twofold: increased reliability to the Saugerties and Woodstock substations; and a more reliable source to CHG&E's Northwest Area. This increased reliability would be in the form of fewer line trips associated with

¹ Central Hudson Gas & Electric Corporation, "Central Hudson Initial Distributed System Implementation Plan," June 30, 2017. Table VI-7.

new construction and the increased clearances for 115 kV design. For example, for the period 2013-October 2017 the H and SB Lines experienced 27 line trips (1.16 / mile) as compared to 37 line trips for all of CHG&E's approximately 230 miles of 115 kV lines (0.16 / mile).

Economy benefits would result from the increase in conductor size (i.e., from two 1/0 Cu to 795 ACSR) which will lower the circuit resistance by approximately 55% with an associated reduction in electrical (I^2R) losses. Based on 2016 hourly flows and NYISO Zone G LBMPs², we estimate an annual reduction in losses of approximately 4,100 MWhr for an annual energy cost reduction of approximately \$130,000.

This project will not increase the load serving capabilities of the Saugerties or Woodstock stations. Those load serving capabilities are approximately 50 MVA and 20 MVA, respectively.

E-4.3 Proposed Completion Date and Impact of Schedule Delays

The proposed completion of work (in-service) is by December 2022. If work is not completed by this date, the higher risk of a system failure due to the aging infrastructure will remain or even be exacerbated. Extended delays will result in the continued deterioration of existing facilities that could result in either reduced reliability or a need to repair or replace individual structures and conductor sections; these new structures or spans may require subsequent replacement when the lines are rebuilt. Should the lines deteriorate to a state where they are unusable, the Applicant would need to find an alternate source for the load currently supplied from Saugerties and Woodstock substations.

E-4.4 System Studies

CHG&E's load flow analyses indicated that this project would increase the UPNY-SENY transfer limit by less than 25 MW. Based on that analysis, on October 31, 2015, NYISO Staff indicated that since this project is not expected to impact interface transfer limits by more than 25 MW, no System Impact Study would be required. As a result, the Applicant will include in its Motion for Waivers, the requirement that it comply with 16 NYCRR § 88.4(a)(4).

² LBMP: Locational Based Marginal Price



Project Cost Estimate

Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

Project Name: H Line 69kV Rebuild - Single Circuit
 Prepared By: Kyle Bragg
 Cost Estimate Level: Conceptual Estimate

Date: 5/06/2015
 Revision(s): 1
 WO #: 0853 A/R

+/-30% Accuracy... There is a general scope but few details available. Little or no design work completed yet.

Part 1: Additions

* All unit and total cost figures should be future "raw costs", without any overhead markups. All markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|---|---|----------|-----------|------------------------|--------------------|-----|---------|--------|--------------------|-----|---------|--------|------------------|------|------------------------------------|------|--------------------------------------|---------|-------|------------------------------------|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | | |
| A.1 | Planning Labor | 100 | Hours | | 1.0 | 100 | 55.00 | 5,500 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.2 | Base Survey (Contract) | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 180,000.00 | 180,000 | | Based off of WH 1&2 Bids |
| A.3 | Geotechnical Borings | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 40,000.00 | 40,000 | | Approx. 25 Borings for Engr. Str.s |
| A.4 | Visual Renderings | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 30,000.00 | 30,000 | | |
| A.5 | Lightening / Grounding Study | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 25,000.00 | 25,000 | | |
| A.6 | Engineering Construction Administration | 250 | Hours | | 1.0 | 250 | 55.00 | 13,750 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.7 | Transmission Line Design | 550 | Hours | | 1.0 | 550 | 55.00 | 30,250 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| A.8 | Lidar - Asbuilts (Contract) | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 1,300.00 | 16,900 | | \$1.3K Per Mile |
| A.9 | Foundation Designs (Contract) | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 35,000.00 | 35,000 | | |
| A.10 | E.M.F. Study | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 30,000.00 | 30,000 | | |
| A.11 | E.S.D. Supervision / Construction Support | 12 | Per Month | | 40.0 | 480 | 55.00 | 26,400 | | 0 | | 0 | | 0 | | 0 | | 0 | | Assumed 4-5 Field Visits Per Month |
| A.12 | Drafting - Design Prints | 200 | Hours | | | 0 | | 0 | 1.0 | 200 | 55.00 | 11,000 | | 0 | | 0 | | 0 | | 1/C Drafter |
| A.13 | Drafting - Closeout Prints | 50 | Hours | | | 0 | | 0 | 1.0 | 50 | 55.00 | 2,750 | | 0 | | 0 | | 0 | | 1/C Drafter |
| A.14 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | | |
| B.1 | Real Property Services | 220 | Hours | | 1.0 | 220 | 55.00 | 12,100 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.2 | Environmental Services | 220 | Hours | | 1.0 | 220 | 55.00 | 12,100 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.3 | Environmental / Permitting Consultant | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 200,000.00 | 200,000 | | 1/3 of \$600K Bid Estimate |
| B.4 | Legal Consultation (Contract) | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 60,000.00 | 60,000 | | |
| B.5 | Project Management | 550 | Hours | | 1.0 | 550 | 55.00 | 30,250 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.7 | Project Sponsors | 175 | Hours | | 1.0 | 175 | 65.00 | 11,375 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.8 | Easements | 1 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.9 | Purchase Additional R.O.W. | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 20,000.00 | 250,000 | | |
| B.10 | Off R.O.W. Access Agreements | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 10,000.00 | 125,000 | | |
| B.6 | | | | | | | | | | | | | | | | | | 0 | | |
| B.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | | |
| C.1 | Construction Trailers | 12 | months | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 1,000.00 | 12,000 | | |
| C.2 | Temporary Toilet Facilities | 12 | months | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 500.00 | 6,000 | | |
| C.3 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|----------|--|----------|-----------|--------------------------------------|--------------------|----|---------|------|--------------------|-------|---------|---------|------------------|--------|------------------------------------|-----------|--------------------------------------|-----------|-------|---|
| | | | | Incurred To-Date through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| C.4 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.5 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D | MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | |
| D.1 | Light Duty Steel Poles w/ Vangs & Arms | 105 | Each | | | 0 | | 0 | | 0 | | 0 | | 0 | 8,500.00 | 892,500 | | 0 | | |
| D.2 | Engineered Steel Poles | 25 | Each | | | 0 | | 0 | | 0 | | 0 | | 0 | 30,000.00 | 750,000 | | 0 | | |
| D.3 | Engineered Foundations | 25 | Each | | | 0 | | 0 | | 0 | | 0 | | 0 | 75,000.00 | 1,875,000 | | 0 | | |
| D.4 | Conductor (795 TERN) | 220,000 | Feet | | | 0 | | 0 | | 0 | | 0 | | 0 | 2.00 | 440,000 | | 0 | | |
| D.5 | Static (OPGW) | 75,000 | Feet | | | 0 | | 0 | | 0 | | 0 | | 0 | 3.50 | 262,500 | | 0 | | |
| D.6 | OPGW Hardware (Nonstock) | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | 5,000.00 | 65,000 | | 0 | | Clamps, Splice Boxes, Misc Hardware (Fr |
| D.7 | Standard Stock Materials - Tangent | 100 | Each | | | 0 | | 0 | | 0 | | 0 | 300.00 | 30,000 | | 0 | | 0 | | |
| D.8 | Standard Stock Materials - Dead End | 30 | Each | | | 0 | | 0 | | 0 | | 0 | 1,500.00 | 45,000 | | 0 | | 0 | | |
| D.9 | Bucket / Digger Rental | 12 | Month | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 60,000.00 | 720,000 | | |
| D.10 | Crane Service | 25 | Location | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 2,000.00 | 50,000 | | |
| D.11 | Equipment Moves | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 12,000.00 | 150,000 | | Assumed 3 Moves per Mile @ \$4K Per Mo |
| D.12 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E | CONSTRUCTION | | | | | | | | | | | | | | | | | | | |
| E.1 | Construction Staking (Contract) | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 60,000.00 | 60,000 | | Based off of WH 1&2 Bids |
| E.2 | Erosion / Sediment Control Installation | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 5,000.00 | 62,500 | | |
| E.3 | Install R.O.W. Access Controls (Gates, etc...) | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 8,000.00 | 100,000 | | \$2K per Gate Assumed 4 Gates Per Mile |
| E.4 | R.O.W. Improvements - Access (Bulding / Upgrading Roads, Culverts, etc...) | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 15,000.00 | 187,500 | | |
| E.5 | R.O.W. Improvements - Matting | 2 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 650,000.00 | 1,300,000 | | Assumed 2 Miles of Matting Needed |
| E.6 | R.O.W. Improvements - Trimming | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 30,000.00 | 375,000 | | |
| E.7 | Drill Pole Holes - Soil (Contract) | 90 | Per Hole | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 800.00 | 72,000 | | |
| E.8 | Drill Pole Holes - Rock (Contract) | 50 | Per Hole | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 1,000.00 | 50,000 | | |
| E.9 | Off Load Pole Delivery | 9 | Per Truck | | | 0 | | 0 | 16.0 | 144 | 55.00 | 7,920 | | 0 | | 0 | | 0 | | 4 Riggers for 4 Hrs Per Truck |
| E.10 | Move Poles to Site Locations (Riggers) | 140 | Per Pole | | | 0 | | 0 | 8.0 | 1,120 | 55.00 | 61,600 | | 0 | | 0 | | 0 | | |
| E.11 | Set Pole | 140 | Per Pole | | | 0 | | 0 | 24.0 | 3,360 | 55.00 | 184,800 | | 0 | | 0 | | 0 | | 6 Man Crew x 4Hrs |
| E.12 | Frame Single Pole Tangent | 100 | Per Str | | | 0 | | 0 | 30.0 | 3,000 | 55.00 | 165,000 | | 0 | | 0 | | 0 | | 6 Man Crew x 6Hrs |
| E.13 | Frame Single Pole Dead End | 30 | Per Str | | | 0 | | 0 | 55.0 | 1,650 | 55.00 | 90,750 | | 0 | | 0 | | 0 | | 6 Man Crew x 10Hrs |
| E.14 | String Conductor (3 Phases) | 13 | Mile | | | 0 | | 0 | 300.0 | 3,750 | 55.00 | 206,250 | | 0 | | 0 | | 0 | | 6 Man Crew x 5 10Hr Days |
| E.14 | String OPGW | 13 | Mile | | | 0 | | 0 | 180.0 | 2,250 | 55.00 | 123,750 | | 0 | | 0 | | 0 | | 6 Man Crew x 3 10Hr Day |
| E.14 | Clip In Conductors / Static | 13 | Mile | | | 0 | | 0 | 240.0 | 3,000 | 55.00 | 165,000 | | 0 | | 0 | | 0 | | 6 Man Crew x 4 10Hr Days |
| E.15 | Frame Three-Pole Dead End | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.16 | Supervision - Foreman | 11 | Month | | | 0 | | 0 | 150.0 | 1,650 | 60.00 | 99,000 | | 0 | | 0 | | 0 | | 10 Month Job |
| E.19 | Supervision - Construction Management | 12 | Month | | | 0 | | 0 | 100.0 | 1,200 | 55.00 | 66,000 | | 0 | | 0 | | 0 | | 12 Months |
| E.20 | R.O.W. / Site Restoration | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 10,000.00 | 125,000 | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|------|--------------------------------|----------|----------|------------------------|--------------------|--------------------------|---------|---------|--------------------|-------------------------|---------|------|------------------|--------|------------------------------------|-----------|--------------------------------------|-----------|--|--|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| E.21 | Install OPGW Splice Locations | 25 | Per Site | | | 0 | | 0 | | 0 | | 0 | | 0 | 1,500.00 | 37,500 | 1,000.00 | 25,000 | 2 Boxes per Mile (Includes Box + Splicing) | |
| E.22 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.23 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.24 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.25 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.26 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.27 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.28 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | 0 | | | | 141,725 | | | | | | 75,000 | | 4,322,500 | | 4,286,900 | | |
| | | | | | | 2,545 | | | | 21,374 | | | | | | | | | | |
| | | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | |

Part 2: Removals * All unit and total cost figures should be "raw costs", without any overhead markups. All markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|---|--------------------------------|----------|-------|-------------------------|--------------------|--------------------------|---------|------|--------------------|-------------------------|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|--|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | 0 | | | | 0 | | | | | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | | | 0 | | | | | | | | 0 | | |
| | | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|--------------------------------|----------|-------|------------------------|--------------------|----|---------|------|--------------------|----|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |

Part 3: Cost Estimate Summary

| ADDITIONS SUMMARY: | | | |
|----------------------------------|---------------------|---|---|
| Incurred To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | \$0 | <i>This figure must be manually entered if applicable</i> | |
| AFUDC Costs Incurred To-Date: | \$0 | <i>This figure must be manually entered if applicable</i> | |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$10,009,945 | | |
| Estimated Future Overheads: | \$1,209,842 | | |
| Estimated Future AFUDC: | \$0 | | |
| Subtotal Future Costs: | \$11,219,787 | | |
| Contingency Applied: | \$3,365,936 | 30.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL ADDITIONS: | \$14,585,723 | | |

| REMOVALS SUMMARY: | | | |
|----------------------------------|------------|---|---|
| Incurred To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | \$0 | <i>This figure must be manually entered if applicable</i> | |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$0 | | |
| Estimated Future Overheads: | \$0 | | |
| Subtotal Future Costs: | \$0 | | |
| Contingency Applied: | \$0 | 30.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL REMOVALS: | \$0 | | |

| | |
|--|---------------------|
| GRAND TOTAL ADDITIONS + REMOVALS: | \$14,585,723 |
|--|---------------------|

Assumptions, Notes, Clarifications, etc.:

Total Line Length Assumed to be 12.5 Miles / Majority of structures assumed to be single pole Direct Embed Class Equivalent Structures / 25 Engineered Structures for Long Spans and Angles / 30 Deadend Locations (Approx. one every 1/2 Mile) / All Holes assumed to be contracted and through rock or hard strata.



Project Cost Estimate

Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

Project Name: H Line 115kV Rebuild - Single Circuit
 Prepared By: Kyle Bragg
 Cost Estimate Level: Conceptual Estimate

Date: 7/14/2014
 Revision(s): 1
 WO #: 0853 A/R

+/-30% Accuracy... There is a general scope but few details available. Little or no design work completed yet.

| Part 1: Additions | | | | | | | | | | | | | | | | | | | |
|--|---|----------|-----------|------------------------|--------------------|-----|---------|--------|--------------------|-----|---------|--------|------------------|------|------------------------------------|------|--------------------------------------|---------|------------------------------------|
| * All unit and total cost figures should be future "raw costs", <u>without</u> any overhead markups. All markups are generated at the end of the estimate. | | | | | | | | | | | | | | | | | | | |
| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | |
| A.1 | Planning Labor | 100 | Hours | | 1.0 | 100 | 55.00 | 5,500 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| A.2 | Base Survey (Contract) | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 180,000.00 | 180,000 | Based off of WH 1&2 Bids |
| A.3 | Geotechnical Borings | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 40,000.00 | 40,000 | Approx. 25 Borings for Engr. Str.s |
| A.4 | Visual Renderings | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 30,000.00 | 30,000 | |
| A.5 | Lightening / Grounding Study | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 25,000.00 | 25,000 | |
| A.6 | Engineering Construction Administration | 250 | Hours | | 1.0 | 250 | 55.00 | 13,750 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| A.7 | Transmission Line Design | 600 | Hours | | 1.0 | 600 | 55.00 | 33,000 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| A.8 | Lidar - Asbuilts (Contract) | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 1,300.00 | 16,900 | \$1.3K Per Mile |
| A.9 | Foundation Designs (Contract) | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 35,000.00 | 35,000 | |
| A.10 | E.M.F. Study | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 30,000.00 | 30,000 | |
| A.11 | E.S.D. Supervision / Construction Support | 12 | Per Month | | 40.0 | 480 | 55.00 | 26,400 | | 0 | | 0 | | 0 | | 0 | | 0 | Assumed 4-5 Field Visits Per Month |
| A.12 | Drafting - Design Prints | 200 | Hours | | | 0 | | 0 | 1.0 | 200 | 55.00 | 11,000 | | 0 | | 0 | | 0 | 1/C Drafter |
| A.13 | Drafting - Closeout Prints | 50 | Hours | | | 0 | | 0 | 1.0 | 50 | 55.00 | 2,750 | | 0 | | 0 | | 0 | 1/C Drafter |
| A.14 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | |
| B.1 | Real Property Services | 220 | Hours | | 1.0 | 220 | 55.00 | 12,100 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.2 | Environmental Services | 220 | Hours | | 1.0 | 220 | 55.00 | 12,100 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.3 | Environmental / Permitting Consultant | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 312,000.00 | 312,000 | 52% of \$600K Bid Estimate |
| B.4 | Legal Consultation (Contract) | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 100,000.00 | 100,000 | |
| B.5 | Project Management | 550 | Hours | | 1.0 | 550 | 55.00 | 30,250 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.7 | Project Sponsors | 175 | Hours | | 1.0 | 175 | 65.00 | 11,375 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.8 | Easements | 1 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.9 | Purchase Additional R.O.W. | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 20,000.00 | 250,000 | |
| B.10 | Off R.O.W. Access Agreements | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 10,000.00 | 125,000 | |
| B.6 | | | | | | | | | | | | | | | | | | 0 | |
| B.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | |
| C.1 | Construction Trailers | 12 | months | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 1,000.00 | 12,000 | |
| C.2 | Temporary Toilet Facilities | 12 | months | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 500.00 | 6,000 | |
| C.3 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | | |
|--|--|----------|-----------|-------------------|--------------------|----|---------|------|--------------------|-------|---------|---------|------------------|--------|------------------------------------|-----------|--------------------------------------|-----------|---|--|--|
| | | | | Incurring To-Date | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | | |
| C.4 | | | | through xx/xx/xx | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| C.5 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| C.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| C.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| C.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| C.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| C.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| D MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | | | |
| D.1 | Light Duty Steel Poles w/ Vangs & Arms | 115 | Each | | | 0 | | 0 | | 0 | | 0 | | 0 | 8,500.00 | 977,500 | | 0 | | | |
| D.2 | Engineered Steel Poles | 25 | Each | | | 0 | | 0 | | 0 | | 0 | | 0 | 30,000.00 | 750,000 | | 0 | | | |
| D.3 | Engineered Foundations | 25 | Each | | | 0 | | 0 | | 0 | | 0 | | 0 | 75,000.00 | 1,875,000 | | 0 | | | |
| D.4 | Conductor (795 TERN) | 220,000 | Feet | | | 0 | | 0 | | 0 | | 0 | | 0 | 2.00 | 440,000 | | 0 | | | |
| D.5 | Static (OPGW) | 75,000 | Feet | | | 0 | | 0 | | 0 | | 0 | | 0 | 3.50 | 262,500 | | 0 | | | |
| D.6 | OPGW Hardware (Nonstock) | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | 5,000.00 | 65,000 | | 0 | Clamps, Splice Boxes, Misc Hardware (Fr | | |
| D.7 | Standard Stock Materials - Tangent | 110 | Each | | | 0 | | 0 | | 0 | | 0 | 400.00 | 44,000 | | 0 | | 0 | | | |
| D.8 | Standard Stock Materials - Dead End | 30 | Each | | | 0 | | 0 | | 0 | | 0 | 2,000.00 | 60,000 | | 0 | | 0 | | | |
| D.9 | Bucket / Digger Rental | 12 | Month | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 60,000.00 | 720,000 | | | |
| D.10 | Crane Service | 25 | Location | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 2,000.00 | 50,000 | | | |
| D.11 | Equipment Moves | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 12,000.00 | 150,000 | Assumed 3 Moves per Mile @ \$4K Per Mo | | |
| D.12 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| E CONSTRUCTION | | | | | | | | | | | | | | | | | | | | | |
| E.1 | Construction Staking (Contract) | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 60,000.00 | 60,000 | Based off of WH 1&2 Bids | | |
| E.2 | Erosion / Sediment Control Installation | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 5,000.00 | 62,500 | | | |
| E.3 | Install R.O.W. Access Controls (Gates, etc...) | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 8,000.00 | 100,000 | \$2K per Gate Assumed 4 Gates Per Mile | | |
| E.4 | R.O.W. Improvements - Access (Bulding / Upgrading Roads, Culverts, etc...) | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 15,000.00 | 187,500 | | | |
| E.5 | R.O.W. Improvements - Matting | 2 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 650,000.00 | 1,300,000 | Assumed 2 Miles of Matting Needed | | |
| E.6 | R.O.W. Improvements - Trimming | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 30,000.00 | 375,000 | | | |
| E.7 | Drill Pole Holes - Soil (Contract) | 90 | Per Hole | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 800.00 | 72,000 | | | |
| E.8 | Drill Pole Holes - Rock (Contract) | 50 | Per Hole | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 1,000.00 | 50,000 | | | |
| E.9 | Off Load Pole Delivery | 9 | Per Truck | | | 0 | | 0 | 16.0 | 144 | 55.00 | 7,920 | | 0 | | 0 | | 0 | 4 Riggers for 4 Hrs Per Truck | | |
| E.10 | Move Poles to Site Locations (Riggers) | 140 | Per Pole | | | 0 | | 0 | 8.0 | 1,120 | 55.00 | 61,600 | | 0 | | 0 | | 0 | | | |
| E.11 | Set Pole | 140 | Per Pole | | | 0 | | 0 | 24.0 | 3,360 | 55.00 | 184,800 | | 0 | | 0 | | 0 | 6 Man Crew x 4Hrs | | |
| E.12 | Frame Single Pole Tangent | 110 | Per Str | | | 0 | | 0 | 36.0 | 3,960 | 55.00 | 217,800 | | 0 | | 0 | | 0 | 6 Man Crew x 6Hrs | | |
| E.13 | Frame Single Pole Dead End | 30 | Per Str | | | 0 | | 0 | 60.0 | 1,800 | 55.00 | 99,000 | | 0 | | 0 | | 0 | 6 Man Crew x 10Hrs | | |
| E.14 | String Conductor (3 Phases) | 13 | Mile | | | 0 | | 0 | 300.0 | 3,750 | 55.00 | 206,250 | | 0 | | 0 | | 0 | 6 Man Crew x 5 10Hr Days | | |
| E.14 | String OPGW | 13 | Mile | | | 0 | | 0 | 180.0 | 2,250 | 55.00 | 123,750 | | 0 | | 0 | | 0 | 6 Man Crew x 3 10Hr Day | | |
| E.14 | Clip In Conductors / Static | 13 | Mile | | | 0 | | 0 | 240.0 | 3,000 | 55.00 | 165,000 | | 0 | | 0 | | 0 | 6 Man Crew x 4 10Hr Days | | |
| E.15 | Frame Three-Pole Dead End | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | |
| E.16 | Supervision - Foreman | 11 | Month | | | 0 | | 0 | 150.0 | 1,650 | 60.00 | 99,000 | | 0 | | 0 | | 0 | 10 Month Job | | |
| E.19 | Supervision - Construction Management | 12 | Month | | | 0 | | 0 | 100.0 | 1,200 | 55.00 | 66,000 | | 0 | | 0 | | 0 | 12 Months | | |
| E.20 | R.O.W. / Site Restoration | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 10,000.00 | 125,000 | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|------|--------------------------------|----------|----------|------------------------|--------------------|--------------------------|---------|---------|--------------------|-------------------------|---------|------|------------------|---------|------------------------------------|-----------|--------------------------------------|-----------|--|--|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| E.21 | Install OPGW Splice Locations | 25 | Per Site | | | 0 | | 0 | | 0 | | 0 | | 0 | 1,500.00 | 37,500 | 1,000.00 | 25,000 | 2 Boxes per Mile (Includes Box + Splicing) | |
| E.22 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.23 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.24 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.25 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.26 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.27 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.28 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | 0 | | | | 144,475 | | | | | | 104,000 | | 4,407,500 | | 4,438,900 | | |
| | | | | | | 2,595 | | | | 22,484 | | | | | | | | | | |
| | | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | |

Part 2: Removals

* All unit and total cost figures should be "raw costs", without any overhead markups. All markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|---|--------------------------------|----------|-------|-------------------------|--------------------|--------------------------|---------|------|--------------------|-------------------------|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|--|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | 0 | | | | 0 | | | | 0 | | 0 | | 0 | | 0 | | |
| | | | | 0 | | | | 0 | | | | | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | | | 0 | | | | | | | | 0 | | |
| | | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|--------------------------------|----------|-------|------------------------|--------------------|----|---------|------|--------------------|----|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |

Part 3: Cost Estimate Summary

| ADDITIONS SUMMARY: | | | |
|----------------------------------|---------------------|---|---|
| Incurring To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | \$0 | <i>This figure must be manually entered if applicable</i> | |
| AFUDC Costs Incurred To-Date: | \$0 | <i>This figure must be manually entered if applicable</i> | |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$10,339,745 | | |
| Estimated Future Overheads: | \$1,276,878 | | |
| Estimated Future AFUDC: | \$0 | | |
| Subtotal Future Costs: | \$11,616,623 | | |
| Contingency Applied: | \$3,484,987 | 30.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL ADDITIONS: | \$15,101,610 | | |

| REMOVALS SUMMARY: | | | |
|----------------------------------|------------|---|---|
| Incurring To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | \$0 | <i>This figure must be manually entered if applicable</i> | |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$0 | | |
| Estimated Future Overheads: | \$0 | | |
| Subtotal Future Costs: | \$0 | | |
| Contingency Applied: | \$0 | 30.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL REMOVALS: | \$0 | | |

| | |
|--|---------------------|
| GRAND TOTAL ADDITIONS + REMOVALS: | \$15,101,610 |
|--|---------------------|

Assumptions, Notes, Clarifications, etc.:

Total Line Length Assumed to be 12.5 Miles / Majority of structures assumed to be single pole Direct Embed Class Equivalent Structures / 25 Engineered Structures for Long Spans and Angles / 30 Deadend Locations (Approx. one every 1/2 Mile) / All Holes assumed to be contracted and through rock or hard strata.



Project Cost Estimate

Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

Project Name: H Line 115kV Rebuild Double Circuit
 Prepared By: Kyle Bragg
 Cost Estimate Level: Conceptual Estimate

Date: 7/14/2014
 Revision(s): 1
 WO #: 0853 A/R

+/-30% Accuracy... There is a general scope but few details available. Little or no design work completed yet.

| Part 1: Additions | | | | | | | | | | | | | | | | | | | |
|--|---|----------|-----------|------------------------|--------------------|-----|---------|--------|--------------------|-----|---------|--------|------------------|------|------------------------------------|------|--------------------------------------|---------|------------------------------------|
| * All unit and total cost figures should be future "raw costs", <u>without</u> any overhead markups. All markups are generated at the end of the estimate. | | | | | | | | | | | | | | | | | | | |
| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | |
| A.1 | Planning Labor | 100 | Hours | | 1.0 | 100 | 55.00 | 5,500 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| A.2 | Base Survey (Contract) | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 180,000.00 | 180,000 | Based off of WH 1&2 Bids |
| A.3 | Geotechnical Borings | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 100,000.00 | 100,000 | Boring at every location |
| A.4 | Visual Renderings | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 30,000.00 | 30,000 | |
| A.5 | Lightening / Grounding Study | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 25,000.00 | 25,000 | |
| A.6 | Engineering Construction Administration | 250 | Hours | | 1.0 | 250 | 55.00 | 13,750 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| A.7 | Transmission Line Design | 600 | Hours | | 1.0 | 600 | 55.00 | 33,000 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| A.8 | Lidar - Asbuilts (Contract) | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 1,300.00 | 16,900 | \$1.3K Per Mile |
| A.9 | Foundation Designs (Contract) | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 35,000.00 | 35,000 | |
| A.10 | E.M.F. Study | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 30,000.00 | 30,000 | |
| A.11 | E.S.D. Supervision / Construction Support | 12 | Per Month | | 40.0 | 480 | 55.00 | 26,400 | | 0 | | 0 | | 0 | | 0 | | 0 | Assumed 4-5 Field Visits Per Month |
| A.12 | Drafting - Design Prints | 200 | Hours | | | 0 | | 0 | 1.0 | 200 | 55.00 | 11,000 | | 0 | | 0 | | 0 | 1/C Drafter |
| A.13 | Drafting - Closeout Prints | 50 | Hours | | | 0 | | 0 | 1.0 | 50 | 55.00 | 2,750 | | 0 | | 0 | | 0 | 1/C Drafter |
| A.14 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | |
| B.1 | Real Property Services | 220 | Hours | | 1.0 | 220 | 55.00 | 12,100 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.2 | Environmental Services | 220 | Hours | | 1.0 | 220 | 55.00 | 12,100 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.3 | Environmental / Permitting Consultant | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 312,000.00 | 312,000 | 52% of \$600K Bid Estimate |
| B.4 | Legal Consultation (Contract) | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 100,000.00 | 100,000 | |
| B.5 | Project Management | 550 | Hours | | 1.0 | 550 | 55.00 | 30,250 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.7 | Project Sponsors | 175 | Hours | | 1.0 | 175 | 65.00 | 11,375 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.8 | Easements | 1 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.9 | Purchase Additional R.O.W. | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 20,000.00 | 250,000 | |
| B.10 | Off R.O.W. Access Agreements | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 10,000.00 | 125,000 | |
| B.6 | | | | | | | | | | | | | | | | | | 0 | |
| B.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| B.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | |
| C.1 | Construction Trailers | 12 | months | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 1,000.00 | 12,000 | |
| C.2 | Temporary Toilet Facilities | 12 | months | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 500.00 | 6,000 | |
| C.3 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|----------|--|----------|-----------|------------------|--------------------|----|---------|------|--------------------|-------|---------|---------|------------------|--------|------------------------------------|-----------|--------------------------------------|-----------|-------|---|
| | | | | Incurred To-Date | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| C.4 | | | | through xx/xx/xx | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.5 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.8 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D | MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | |
| D.1 | Light Duty Steel Poles w/ Vangs & Arms | | Each | | | 0 | | 0 | | 0 | | 0 | | 0 | 8,500.00 | 0 | | 0 | | |
| D.2 | Engineered Steel Poles | 140 | Each | | | 0 | | 0 | | 0 | | 0 | | 0 | 25,000.00 | 3,500,000 | | 0 | | |
| D.3 | Engineered Foundations | 140 | Each | | | 0 | | 0 | | 0 | | 0 | | 0 | 35,000.00 | 4,900,000 | | 0 | | |
| D.4 | Conductor (795 TERN) | 875,000 | Feet | | | 0 | | 0 | | 0 | | 0 | | 0 | 2.00 | 1,750,000 | | 0 | | |
| D.5 | Static (OPGW) | 150,000 | Feet | | | 0 | | 0 | | 0 | | 0 | | 0 | 3.50 | 525,000 | | 0 | | |
| D.6 | OPGW Hardware (Nonstock) | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | 10,000.00 | 130,000 | | 0 | | Clamps, Splice Boxes, Misc Hardware (Fr |
| D.7 | Standard Stock Materials - Tangent | 110 | Each | | | 0 | | 0 | | 0 | | 0 | 400.00 | 44,000 | | 0 | | 0 | | |
| D.8 | Standard Stock Materials - Dead End | 30 | Each | | | 0 | | 0 | | 0 | | 0 | 2,000.00 | 60,000 | | 0 | | 0 | | |
| D.9 | Bucket / Digger Rental | 12 | Month | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 60,000.00 | 720,000 | | |
| D.10 | Crane Service | 140 | Location | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 2,000.00 | 280,000 | | |
| D.11 | Equipment Moves | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 12,000.00 | 150,000 | | Assumed 3 Moves per Mile @ \$4K Per Mo |
| D.12 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E | CONSTRUCTION | | | | | | | | | | | | | | | | | | | |
| E.1 | Construction Staking (Contract) | 1 | Contract | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 60,000.00 | 60,000 | | Based off of WH 1&2 Bids |
| E.2 | Erosion / Sediment Control Installation | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 5,000.00 | 62,500 | | |
| E.3 | Install R.O.W. Access Controls (Gates, etc...) | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 8,000.00 | 100,000 | | \$2K per Gate Assumed 4 Gates Per Mile |
| E.4 | R.O.W. Improvements - Access (Bulding / Upgrading Roads, Culverts, etc...) | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 15,000.00 | 187,500 | | |
| E.5 | R.O.W. Improvements - Matting | 2 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 650,000.00 | 1,300,000 | | Assumed 2 Miles of Matting Needed |
| E.6 | R.O.W. Improvements - Trimming | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 30,000.00 | 375,000 | | |
| E.7 | Drill Pole Holes - Soil (Contract) | 0 | Per Hole | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 800.00 | 0 | | |
| E.8 | Drill Pole Holes - Rock (Contract) | 0 | Per Hole | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 1,000.00 | 0 | | |
| E.9 | Off Load Pole Delivery | 100 | Per Truck | | | 0 | | 0 | 8.0 | 800 | 55.00 | 44,000 | | 0 | | 0 | | 0 | | 4 Riggers for 4 Hrs Per Truck |
| E.10 | Move Poles to Site Locations (Riggers) | 140 | Per Pole | | | 0 | | 0 | 8.0 | 1,120 | 55.00 | 61,600 | | 0 | | 0 | | 0 | | |
| E.11 | Set Pole | 140 | Per Pole | | | 0 | | 0 | 24.0 | 3,360 | 55.00 | 184,800 | | 0 | | 0 | | 0 | | 6 Man Crew x 4Hrs |
| E.12 | Frame Single Pole Tangent | 110 | Per Str | | | 0 | | 0 | 48.0 | 5,280 | 55.00 | 290,400 | | 0 | | 0 | | 0 | | 6 Man Crew x 8Hrs |
| E.13 | Frame Single Pole Dead End | 30 | Per Str | | | 0 | | 0 | 72.0 | 2,160 | 55.00 | 118,800 | | 0 | | 0 | | 0 | | 6 Man Crew x 12Hrs |
| E.14 | String Conductor (3 Phases) | 26 | Mile | | | 0 | | 0 | 300.0 | 7,800 | 55.00 | 429,000 | | 0 | | 0 | | 0 | | 6 Man Crew x 5 10Hr Days |
| E.14 | String OPGW | 26 | Mile | | | 0 | | 0 | 180.0 | 4,680 | 55.00 | 257,400 | | 0 | | 0 | | 0 | | 6 Man Crew x 3 10Hr Day |
| E.14 | Clip In Conductors / Static | 26 | Mile | | | 0 | | 0 | 240.0 | 6,240 | 55.00 | 343,200 | | 0 | | 0 | | 0 | | 6 Man Crew x 4 10Hr Days |
| E.15 | Frame Three-Pole Dead End | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.16 | Supervision - Foreman | 11 | Month | | | 0 | | 0 | 150.0 | 1,650 | 60.00 | 99,000 | | 0 | | 0 | | 0 | | 10 Month Job |
| E.19 | Supervision - Construction Management | 12 | Month | | | 0 | | 0 | 100.0 | 1,200 | 55.00 | 66,000 | | 0 | | 0 | | 0 | | 12 Months |
| E.20 | R.O.W. / Site Restoration | 13 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 10,000.00 | 125,000 | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|------|--------------------------------|----------|----------|------------------------|--------------------|--------------------------|---------|---------|--------------------|-------------------------|---------|------|------------------|---------|------------------------------------|--------|--------------------------------------|-----------|--|--|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| E.21 | Install OPGW Splice Locations | 25 | Per Site | | | 0 | | 0 | | 0 | | 0 | | 0 | 1,500.00 | 37,500 | 1,000.00 | 25,000 | 2 Boxes per Mile (Includes Box + Splicing) | |
| E.22 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.23 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.24 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.25 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.26 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.27 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.28 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | 0 | | | | 144,475 | | | | | | 104,000 | | ##### | | 4,606,900 | | |
| | | | | | | 2,595 | | | | 34,540 | | | | | | | | | | |
| | | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | |

Part 2: Removals * All unit and total cost figures should be "raw costs", without any overhead markups. All markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|---|--------------------------------|----------|-------|-------------------------|--------------------|--------------------------|---------|------|--------------------|-------------------------|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|--|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | 0 | | | | 0 | | | | | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | | | 0 | | | | | | | | 0 | | |
| | | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|--------------------------------|----------|-------|------------------------|--------------------|----|---------|------|--------------------|----|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |

Part 3: Cost Estimate Summary

| ADDITIONS SUMMARY: | | | |
|----------------------------------|---------------------|---|---|
| Incurred To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | \$0 | <i>This figure must be manually entered if applicable</i> | |
| AFUDC Costs Incurred To-Date: | \$0 | <i>This figure must be manually entered if applicable</i> | |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$17,605,825 | | |
| Estimated Future Overheads: | \$1,873,650 | | |
| Estimated Future AFUDC: | \$0 | | |
| Subtotal Future Costs: | \$19,479,475 | | |
| Contingency Applied: | \$5,843,843 | 30.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL ADDITIONS: | \$25,323,318 | | |

| REMOVALS SUMMARY: | | | |
|----------------------------------|------------|---|---|
| Incurred To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | \$0 | <i>This figure must be manually entered if applicable</i> | |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$0 | | |
| Estimated Future Overheads: | \$0 | | |
| Subtotal Future Costs: | \$0 | | |
| Contingency Applied: | \$0 | 30.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL REMOVALS: | \$0 | | |

| | |
|--|---------------------|
| GRAND TOTAL ADDITIONS + REMOVALS: | \$25,323,318 |
|--|---------------------|

Assumptions, Notes, Clarifications, etc.:

Total Line Length Assumed to be 12.5 Miles / Majority of structures assumed to be single pole engineered steel with concrete caisson foundations. Assumed 30 Deadend Locations (Approx. one every 1/2 Mile) / All Holes assumed to be contracted and through rock or hard strata.

| Attachment #8 | | | | | | | | | | | 2/11/2013 | |
|---|--|---------------|---------------|---------------|-------|----------------|---------------|------------|----------|-----------|----------------------------|-------|
| Installation Estimate for SB Line Rebuild --PREFERRED ROUTE (NO NEW RIGHT OF WAY) | | | | | | | | | | | By R.K.Fourier | |
| Location: Between the Hurley Ave and Saugerties Substations | | | | | | | | | | | | |
| Project No: | | | | | | | | | | | | |
| TOTAL UNITS | Construction Activity | UNIT COST | | | | TOTAL Man Hrs. | TOTAL COST | | Overhead | | Total (includes overheads) | |
| | | MATERIAL (\$) | LABOR MH/unit | LABOR \$ / MH | | | Material (\$) | Labor (\$) | Material | Labor | Material | Labor |
| 1 | Mat Access (by mileage) (based on 303 Line data) | 650,000 | Contract | Contract | 0 | 650,000 | 0 | 52,000 | 0 | 702,000 | 0 | |
| 1 | Tree Trimming (lump sum) | 50,000 | Contract | Contract | 0 | 50,000 | 0 | 4,000 | 0 | 54,000 | 0 | |
| 1 | Site Restoration | 100,000 | Contract | Contract | 0 | 100,000 | 0 | 8,000 | 0 | 108,000 | 0 | |
| 1 | Erosion Control (silt fence, hay bales, etc) | 50,000 | Contract | Contract | 0 | 50,000 | 0 | 4,000 | 0 | 54,000 | 0 | |
| 1 | Building Access Roads (stone, etc) | 100,000 | Contract | Contract | 0 | 100,000 | 0 | 8,000 | 0 | 108,000 | 0 | |
| 0 | Drill Pole Holes (includes auger and dewater) | 0 | 8 | 125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 172 | Drill ROCK Pole Holes (per hole) | 1,200 | Contract | Contract | 0 | 206,400 | 0 | 41,280 | 0 | 247,680 | 0 | |
| 8 | Equipment Moves (mobilization) | 0 | 4 | 125 | 32 | 0 | 4,000 | 0 | 800 | 0 | 4,800 | |
| 172 | Haul Materials (from storage site to job site) | 0 | 8 | 125 | 1,376 | 0 | 172,000 | 0 | 34,400 | 0 | 206,400 | |
| 263 | Pole and Anchor Staking (survey work) | 75 | Contract | Contract | 0 | 19,725 | 0 | 1,578 | 0 | 21,303 | 0 | |
| 12 | Edge of ROW Staking (survey work) (per mile) | 225 | Contract | Contract | 0 | 2,700 | 0 | 216 | 0 | 2,916 | 0 | |
| 150 | Set Pole (wood or steel) | 0 | 20 | 125 | 3,000 | 0 | 375,000 | 0 | 75,000 | 0 | 450,000 | |
| 150 | Frame Single Pole Tangent/Angle (Post or Davit) | 0 | 40 | 125 | 6,000 | 0 | 750,000 | 0 | 150,000 | 0 | 900,000 | |
| 0 | Frame Double Pole Tangent/Angle (H-Frame) | 0 | 75 | 125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | Frame Single Pole Deadend (vertical or Davit) | 0 | 50 | 125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | Frame Three-Pole Structure | 0 | 100 | 125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | Install Bog Shoe Assembly (per structure) | 8,000 | Contract | Contract | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | Install 20' Culvert for Swamp Pole Installation | 11,100 | Contract | Contract | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 22 | Install Foundation | 60,000 | Contract | Contract | 0 | 1,320,000 | 0 | 105,600 | 0 | 1,425,600 | 0 | |
| 18 | Install Engineered Single Pole Structure | 20,000 | 40 | 125 | 720 | 360,000 | 90,000 | 28,800 | 18,000 | 388,800 | 108,000 | |
| 113 | Install Anchor | 0 | 20 | 125 | 2,260 | 0 | 282,500 | 0 | 56,500 | 0 | 339,000 | |
| 113 | Install Guy | 0 | 10 | 125 | 1,130 | 0 | 141,250 | 0 | 28,250 | 0 | 169,500 | |
| 172 | Transfer Static (one wire - per structure) | 0 | 5 | 125 | 860 | 0 | 107,500 | 0 | 21,500 | 0 | 129,000 | |
| 172 | Transfer Conductor (three wires - per structure) | 0 | 15 | 125 | 2,580 | 0 | 322,500 | 0 | 64,500 | 0 | 387,000 | |
| 34 | String New Conductor (per mile - per phase) | 0 | 100 | 125 | 3,400 | 0 | 425,000 | 0 | 85,000 | 0 | 510,000 | |
| 12 | String New Static/OPGW (per mile per phase) | 0 | 100 | 125 | 1,200 | 0 | 150,000 | 0 | 30,000 | 0 | 180,000 | |
| 45 | Sag Wires (per mile per phase) | 0 | 100 | 125 | 4,500 | 0 | 562,500 | 0 | 112,500 | 0 | 675,000 | |
| 688 | Clip in Wire (Per structure, per phase) | 0 | 1 | 125 | 688 | 0 | 86,000 | 0 | 17,200 | 0 | 103,200 | |
| 4 | Thruway crossing (possible underground transition) | 30,000 | 50 | 125 | 200 | 120,000 | 25,000 | 9,600 | 5,000 | 129,600 | 30,000 | |
| 0.75 | Underground beneath Thruway (per mile) | 1,000,000 | Contract | Contract | 0 | 750,000 | 0 | 60,000 | 0 | 810,000 | 0 | |
| 4 | Soil borings for Thruway | 10,000 | Contract | Contract | 0 | 40,000 | 0 | 3,200 | 0 | 43,200 | 0 | |
| 18 | Soil borings for engineered structures | 45,000 | Contract | Contract | 0 | 810,000 | 0 | 64,800 | 0 | 874,800 | 0 | |
| 12 | Rental Trailer (per month) | 1,000 | Contract | Contract | 0 | 12,000 | 0 | 960 | 0 | 12,960 | 0 | |
| 12 | Rental Facilities (per month) | 1,000 | Contract | Contract | 0 | 12,000 | 0 | 960 | 0 | 12,960 | 0 | |
| 150 | Non Stock Poles | 4,900 | 0 | 0 | 0 | 735,000 | 0 | 58,800 | 0 | 793,800 | 0 | |
| 0 | Non Stock Cross Arms | 1,100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | Non Stock Bracing | 900 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 185000 | Non Stock Conductor (per foot) | 2 | 0 | 0 | 0 | 370,000 | 0 | 29,600 | 0 | 399,600 | 0 | |
| 62000 | Non Stock Static Wire/OPGW (per foot) | 4 | 0 | 0 | 0 | 248,000 | 0 | 19,840 | 0 | 267,840 | 0 | |
| 0 | Non Stock Other (per structure) | 500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 172 | Standard Stock Materials (per structure) | 950 | 0 | 0 | 0 | 163,400 | 0 | 57,190 | 0 | 220,590 | 0 | |
| 12 | Material Staging Areas (rent/month) | 1,000 | 0 | 0 | 0 | 12,000 | 0 | 960 | 0 | 12,960 | 0 | |
| 32 | Switching | 0 | 8 | 60 | 256 | 0 | 15,360 | 0 | 21,412 | 0 | 36,772 | |
| 0 | Distribution Switching | 0 | 8 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Management & Other Services | | | | | | | | | | | | |
| 4 | Drafting (per week) | 0 | 30 | 40 | 120 | 0 | 4,800 | 0 | 6,691 | 0 | 11,491 | |
| 1.5 | CH Project Management | 0 | 500 | 60 | 750 | 0 | 45,000 | 0 | 47,655 | 0 | 92,655 | |
| 1.5 | CH Engineering & Engineering Management | 0 | 800 | 60 | 1,200 | 0 | 72,000 | 0 | 76,248 | 0 | 148,248 | |
| 1 | Contract Engineering (Design) | 0 | Contract | Contract | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 1 | Contract Engineering (Technician) | 60,000 | Contract | Contract | 0 | 60,000 | 0 | 4,950 | 0 | 64,950 | 0 | |
| 1 | CH Environmental Management (DEC Reg. Wetlands) | 0 | 500 | 60 | 500 | 0 | 30,000 | 0 | 31,770 | 0 | 61,770 | |
| 1 | CH Special Services Management | 0 | 300 | 60 | 300 | 0 | 18,000 | 0 | 19,062 | 0 | 37,062 | |
| 1.5 | System Construction Management (MP) | 0 | 800 | 60 | 1,200 | 0 | 72,000 | 0 | 76,248 | 0 | 148,248 | |
| 1.5 | Construction Supervision (CHGE Foreman) (WP) | 0 | 700 | 60 | 1,050 | 0 | 63,000 | 0 | 87,822 | 0 | 150,822 | |
| 1 | Contract Legal | 200,000 | Contract | Contract | 0 | 200,000 | 0 | 16,500 | 0 | 216,500 | 0 | |
| 1 | Contract Permitting (EDR) | 100,000 | Contract | Contract | 0 | 100,000 | 0 | 8,250 | 0 | 108,250 | 0 | |
| 0 | ROW Costs | 100,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 1 | LiDAR Survey | 16,000 | Contract | Contract | 0 | 16,000 | 0 | 1,320 | 0 | 17,320 | 0 | |
| - SUBTOTALS - | | | | | | | | | | | | |
| Total District M-hrs.(w/o contingency) | | | | | | 33,322 | | | | | | |
| Overheads | | | | | | | | | | | | |
| Weekly Labor O.H. @ 139.4% (included above) | | | | | | | | | | | | |
| Monthly Labor O.H. @ 105.9% (included above) | | | | | | | | | | | | |
| Direct Purch. Mat. O.H. @ 8.25% (included above) | | | | | | | | | | | | |
| Contract O.H. @ 22% (included above) (See Note 3) | | | | | | | | | | | | |
| Stock Mat. O.H. @ 35% (included above) | | | | | | | | | | | | |
| Subtotals | | | | | | | | | | | | |
| Total Mat. & Labor with O.H. | | | | | | | | | | 7,097,629 | 4,878,968 | |
| Accounting O.H. @ 14% of first \$300k | | | | | | | | | | | 42,000 | |
| Estimated AFUDC | | | | | | | | | | | 131,743 | |
| Contingency @ 15% | | | | | | | | | | | 1,796,490 | |
| Grand Total | | | | | | | | | | | 13,946,829 | |
| Approximate | | | | | | | | | | | 13,947,000 | |

Note 1: Construction labor is based on the lump sum bid proposed by awarded contractor - Thirau LLC on 9/21/2012
Note 2: Rock Hole line item assumes the use of a contractor for 100% of the poles called out on the scope at a price of \$1,200 per hole
Note 3: 22% Overhead applied to all contracts recommended by Construction based on costs incurred to-date on recent projects.

This Estimate is for the SB Line. It does not include costs for "PHASE III" the new 115kV line from Hurley Ave to North Catskill
This estimate assumes using Class Wood Pole equivalent Steel Poles without foundations and a side guy where necessary to stabilize the structure in the NESC H Overload conditions where available.

Current design utilizes single pole single circuit davit arm design.
Foundation installed where necessary.

Approximately \$1,255,000 per mile
Approximately \$81,000 per structure (this is higher than the "pro forma" lattice tower replacement because of the addition of possible boring and undergrounding at the NYS Thruway)
Estimate assumes approximately 12 months for construction.
*Substantial ROW may be required depending on the final route selection



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | |
|--|--|--------------------------------------|
| Project/Program Name: 69kV HG Line Rebuild - (Honk Falls - Neversink) - Part102 | | Work Order #: 1 9 7 9 - H |
| Budget Group: Electric | Budget Category: 12 | Funding Project Number: 10261 |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 6/1/2020 | In-Service: 6/1/2028 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
Portions of the existing HG-Line include an electric distribution underbuild that will require an associated rebuild and/or relocation and connection work orders. Project may require OPGW fiber terminations in the substations.

Describe the project objective and scope of work:
Rebuild the 16.25-mile 69kV HG-Line located in both Neversink and Wawarsing. Approximately 54% of the existing structures on the line have been identified as part of the company's comprehensive inspection program as having conditions warranting replacement. While various maintenance projects have been completed on the line, a majority of the infrastructure is exhibiting advanced age and has reached the end of its useful life. Comprehensive rebuild of the line including conductors, poles, static wires, etc.. is needed.

Describe specific scope exclusions, assumptions and constraints:
This rebuild project is early in its planning stage and the need and/or scope of the following project components have not yet been well quantified and/or defined: access improvements including any significant earthwork; easement deficiencies; encroachments; FAA lighting; constraints related to protection of sensitive environmental resources.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Repair of the existing assets or other transmission system upgrades are considered in the early design and planning memo process, in this case a comprehensive rebuild was chosen as the best option given the age of the assets. Localized re-routes, alternate structure configurations and material types are considered as part of detailed planning, design and permitting processes.

Why was the proposed project scope chosen over other alternatives?

Rebuild of the majority of the line on existing ROW proved to be the most cost effective option.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

If the project is not completed in the identified timeframe there is a heightened risk of in-service failure of the existing infrastructure prompting unplanned and costly repairs as well as impacts to the local hydro-generation facilities precluding them from being able to generate.

What are the risks and consequences of not completing this project?

Due to the age and condition of existing structures and conductor, the most significant risk of not completing the project are increased outages due to component failures. The consequences include negative impacts to both SAIFI and CAIDI metrics.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

This project was submitted to NYS DPS as one that helps supports the state's CLCPA goals and should be prioritized accordingly.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|------------------------|--|------------------------|------------------------|------------------------|---------------------|
| \$40,417,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 3,358,200 | 46,700 | 25,000 | 480,000 | 1,100,000 | 1,100,000 | 606,500 | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 8,395,500 | 116,750 | 62,500 | 1,200,000 | 2,750,000 | 2,750,000 | 1,516,250 | |
| | Contractors (A/P tax exempt) | 21,828,300 | 303,550 | 162,500 | 3,120,000 | 7,150,000 | 7,150,000 | 3,942,250 | |
| | Overheads | 3,263,000 | | | 191,000 | 968,000 | 1,152,000 | 952,000 | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 36,845,000 | 467,000 | 250,000 | 4,991,000 | 11,968,000 | 12,152,000 | 7,017,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 331,400 | | | 25,000 | 135,000 | 134,900 | 36,500 | |
| | Contractors (A/P tax exempt) | 2,982,600 | | | 225,000 | 1,215,000 | 1,214,100 | 328,500 | |
| | Overheads | 258,000 | | | 11,000 | 90,000 | 118,000 | 39,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 3,572,000 | 0 | 0 | 261,000 | 1,440,000 | 1,467,000 | 404,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|------------------|------------------|------------------|
| Current Approved Rate Case Funding (\$): | 3,872,000 | 482,000 | 3,390,000 |
| | | 2021-2023 | 2024 |

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 28,291,900 Maximum (\$): 52,542,100

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

The provided cost estimate was based on historical project data from completed project actuals of a similar type.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Total project cost estimate is based on the total conceptual project cost detailed in the provided estimate. The cost breakdown provided above is displayed based on an averaged historical percentage split of project Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively. Removals are similarly split 90/10 by Contractor AP charges and Internal Labor respectively. This historical split has also been applied to the prior year actuals / projections column as well.

Cost Estimate Summary: 397.5 ACSR

| ADDITIONS SUMMARY: | | | |
|----------------------------------|---------------------|-------|---|
| Incurred To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | | | <i>This figure must be manually entered if applicable</i> |
| AFUDC Costs Incurred To-Date: | | | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$10,958,780 | | |
| Estimated Future Overheads: | \$882,016 | | |
| Estimated Future AFUDC: | \$387,054 | | |
| Subtotal Future Costs: | \$12,227,850 | | |
| Contingency Applied: | \$3,668,355 | 30.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL ADDITIONS: | \$15,896,205 | | |

| REMOVALS SUMMARY: | | | |
|----------------------------------|--------------------|-------|---|
| Incurred To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | \$0 | | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$923,000 | | |
| Estimated Future Overheads: | \$26,058 | | |
| Subtotal Future Costs: | \$949,058 | | |
| Contingency Applied: | \$284,717 | 30.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL REMOVALS: | \$1,233,775 | | |

Assumptions, Notes, Clarifications, etc.:

- 397 Ibis ACSR
- Underbuild distribution 336 Merlin ACSR
- OPGW overhead Shield wire, 42/57/669, FIBER
- 16 mile line
- 283 total structures. 240 new structures and 43 structures to be re-used.
- 2 miles of matting required
- Assumes no temporary or permanent off ROW access acquisitions

**GRAND TOTAL
ADDITIONS + REMOVALS:**

\$17,129,981

Cost Estimate Summary: 795 ACSR

ADDITIONS SUMMARY:

Incurred To-Date:

| | | |
|----------------------------------|---------------------|---|
| Raw Costs Incurred To-Date: | \$0 | |
| Overhead Costs Incurred To-Date: | | <i>This figure must be manually entered if applicable</i> |
| AFUDC Costs Incurred To-Date: | | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$0 | |
| Estimated Future Raw Costs: | \$12,804,780 | |
| Estimated Future Overheads: | \$955,338 | |
| Estimated Future AFUDC: | \$449,793 | |
| Subtotal Future Costs: | \$14,209,911 | |
| Contingency Applied: | \$4,262,973 | 30.0% <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL ADDITIONS: | \$18,472,885 | |

REMOVALS SUMMARY:

Incurred To-Date:

| | | |
|----------------------------------|--------------------|---|
| Raw Costs Incurred To-Date: | \$0 | |
| Overhead Costs Incurred To-Date: | \$0 | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$0 | |
| Estimated Future Raw Costs: | \$968,000 | |
| Estimated Future Overheads: | \$24,800 | |
| Subtotal Future Costs: | \$992,800 | |
| Contingency Applied: | \$297,840 | 30.0% <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL REMOVALS: | \$1,290,640 | |

**GRAND TOTAL
ADDITIONS + REMOVALS:**

\$19,763,525

Assumptions, Notes, Clarifications, etc.:

- 795 Tern ACSR
- Underbuild distribution 336 Merlin ACSR
- OPGW overhead Shield wire, 42/57/669, FIBER
- 16 mile line
- 283 total structures. 250 new structures and 33 structures to be re-used.
- 2 miles of matting required
- Assumes no temporary or permanent off ROW access acquisitions



Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

Project Name: HG Line Rebuild - Part 102 69kV Date: 1/6/2023 WO #: Rebuild Length
 Prepared By: Sam Pozorski Revision(s): 1 16.138 miles
 Cost Estimate Level: Conceptual Estimate +/-30% Accuracy... There is a general scope but few details available. Little or no design work completed yet.

Part 1: Additions

* All unit and total cost figures should be "raw costs", without any overhead markups. Markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through xx/xx/xx | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|---|---|----------|-------|---|--------------------|-------|---------|---------|--------------------|-------|---------|--------|------------------|---------|------------------------------------|-----------|--------------------------------------|-----------|-------|---|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | | |
| A.1 | Engineering Design -121 | 16 | miles | | 348.4 | 5,623 | 60.00 | 337,355 | | 0 | | 0 | | 0 | | 0 | | 0 | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.2 | Engineering Supervision; Project Sponsor - | 16 | miles | | 6.5 | 106 | 60.00 | 6,337 | | 0 | | 0 | | 0 | | 0 | | 0 | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.3 | Drafting - 132 | 16 | miles | | | | | 0 | 49.7 | 801 | 60.00 | 48,090 | | 0 | | 0 | | 0 | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.4 | ESP - 125 | 16 | miles | | 7.8 | 126 | 60.00 | 7,553 | | 0 | | 0 | | 0 | | 0 | | 0 | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +50% for multiple substations |
| A.5 | Planning - 126 | 16 | miles | | 18.4 | 296 | 60.00 | 17,787 | | 0 | | 0 | | 0 | | 0 | | 0 | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.6 | Misc Internal Support | 16 | miles | | 4.7 | 76 | 60.00 | 4,580 | | 0 | | 0 | | 0 | | 0 | | 0 | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.7 | LIDAR | 16 | miles | | | | | 0 | | 0 | | 0 | | 0 | | 0 | 2,400.00 | 38,731 | | pre/post project LIDAR flights |
| A.8 | Engineering and Related Contractors | 16 | miles | | | | | 0 | | 0 | | 0 | | 0 | | 0 | 22,512.60 | 363,308 | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.9 | | | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | | |
| B.1 | Environmental Consultant | 16 | miles | | | | | 0 | | 0 | | 0 | | 0 | | 0 | 40,409.60 | 652,130 | | Avg of G, CL, TV, KM, EF, HF ignored due to short length and high cost. H&SB and A&C ignored due to Article VII. +10% |
| B.2 | Legal Consultant | 16 | miles | | | | | 0 | | 0 | | 0 | | 0 | | 0 | 57,532.20 | 928,455 | | Avg of G, TV, KM, +10%. CL, EF, HF ignored due to lack of significant legal costs. Varies significantly with PMO approach and municipalities. |
| B.3 | Project Manager - 110 | 16 | miles | | 202.3 | 3,264 | 60.00 | 195,856 | | 0 | | 0 | | 0 | | 0 | | 0 | | Avg of G, EF, HF, CL, TV, KM \$/mile to hrs/mile +10% |
| B.4 | Environmental - 726 | 16 | miles | | 55.5 | 895 | 60.00 | 53,717 | | 0 | | 0 | | 0 | | 0 | | 0 | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| B.5 | Real Property Services - 124 | 16 | miles | | 48.2 | 778 | 60.00 | 46,705 | | 0 | | 0 | | 0 | | 0 | | 0 | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| B.6 | System Ops - 330 | 16 | miles | | 15.5 | 250 | 60.00 | 15,008 | 18.6 | 300 | 60.00 | 17,994 | | 0 | | 0 | | 0 | | Avg of G, EF, HF, CL, TV. +25% for multiple substations |
| B.7 | | | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | | |
| C.1 | Surveying/Staking | 16 | miles | | | | | 0 | | 0 | | 0 | | 0 | | 0 | 22,647.90 | 365,492 | | Avg of G, EF, HF, CL, TV. +10% |
| C.2 | Easements/Access Right/Laydown Yards | 16 | miles | | | | | 0 | | 0 | | 0 | | 0 | | 0 | 21,116.70 | 340,781 | | Avg of G, EF, HF, CL, TV, KM, H&SB, A&C. +10% |
| C.3 | | | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| C.4 | Filing Fees | 16 | miles | | | | | 0 | | 0 | | 0 | | 0 | | 0 | 6,279.90 | 101,345 | | Avg of G, EF, HF, CL, TV, KM. +10% |
| C.5 | Misc AP (cluding material) | 16 | miles | | | | | 0 | | 0 | | 0 | | 0 | | 0 | 9,227.90 | 148,920 | | Avg of G, EF, HF, CL, TV. +10% |
| C.6 | | | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| D MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | | |
| D.1 | Conductor 397 ACSR Ibis (30-50-134) | 268,407 | FT | | | | | 0 | | 0 | | 0 | 1.90 | 510,721 | | 0 | | 0 | | Adjusted CME Quote 11/21/22. \$/FT for 1033.5 Ortolan * (Ibis X-Sect Area/Ortolan X-Sect Area) |
| D.2 | OPGW (30-50-205) | 92,025 | FT | | | | | 0 | | 0 | | 0 | 3.34 | 307,595 | | 0 | | 0 | | MMS price as of 12/5/22 |
| D.3 | Poles | 1 | 314 | | | | | 0 | | 0 | | 0 | | 0 | 4,372,000.00 | 4,372,000 | | 0 | | SB PO#91505: 80' H4 Tangent Davit Item #3 - 20% for 69kV post, +1 for each 2-pole structure. +1 for each swing angle. - Engineered Structures |
| D.4 | Major Engineered Structures | | Str | | | | | 0 | | 0 | | 0 | | 0 | 75,000.00 | 0 | | 0 | | |
| D.5 | Moderate Engineered Structures | 4 | Str | | | | | 0 | | 0 | | 0 | | 0 | 37,500.00 | 150,000 | | 0 | | |
| D.6 | 69kV Inline post Structure | 230 | Str | | | | | 0 | | 0 | | 0 | 1,152.79 | 265,142 | | 0 | | 0 | | SS Cost as of 11/4/22 |
| D.7 | 69kV Swing Angle Structure | 20 | Str | | | | | 0 | | 0 | | 0 | 3,104.10 | 62,082 | | 0 | | 0 | | SS Cost as of 11/4/22 |
| D.8 | 69kV Deadend Structure | 30 | Str | | | | | 0 | | 0 | | 0 | 8,521.36 | 255,641 | | 0 | | 0 | | SS Cost as of 11/4/22 |
| D.9 | Crossarms and X-Braces for 2-poles | 46 | Str | | | | | 0 | | 0 | | 0 | 1,238.00 | 56,948 | 1,850.00 | 85,100 | | 0 | | 34-79-006,008,009 MMS \$ as of 11/7/22 |
| D.10 | Misc Material | 280 | str | | | | | 0 | | 0 | | 0 | 500.00 | 140,000 | 250.00 | 70,000 | | 0 | | |
| D.10 | | | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E CONSTRUCTION | | | | | | | | | | | | | | | | | | | | |
| E.1 | Line Construction | 16 | miles | | | | | 0 | | 0 | | 0 | | 0 | | 0 | 396,420.20 | 6,397,429 | | Avg of recent Part 102s (EF/HF/CL/TV). +10% |
| E.2 | Major Drilled Pier Foundations | 0 | Str | | | | | 0 | | 0 | | 0 | | 0 | | 0 | 350,000.00 | 0 | | |
| E.3 | Moderate Drilled Pier Foundations | 4 | Str | | | | | 0 | | 0 | | 0 | | 0 | | 0 | 175,000.00 | 700,000 | | |
| E.4 | Drilling / Site Work / Matting / Access / Trimming / Restoration / etc. | 16 | miles | | | | | 0 | | 0 | | 0 | | 0 | | 0 | 495,642.40 | 7,998,677 | | Avg of Part 102s (G/EF/HF/CL/TV). Combined all associated costs because of overlap between contractors. +10% |
| E.5 | Equipment Moves/Rentals | 16 | miles | | | | | 0 | | 0 | | 0 | | 0 | | 0 | 6,747.40 | 108,890 | | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.6 | T&D Foreman - 215 | 16 | miles | | | | | 485.0 | 7,827 | 60.00 | 469,624 | | 0 | | 0 | 0 | | 0 | | Avg of recent Part 102s (CL/TV) with foreman more solely dedicated to project. +10% |
| E.7 | T&D Engineer, Planner, Director - 215 | 16 | miles | | 130.5 | 2,106 | 60.00 | 126,340 | | 0 | | 0 | | 0 | | 0 | | 0 | | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.8 | OS Foreman - 221 | 16 | miles | | | | | 0 | 6.8 | 109 | 60.00 | 6,550 | | 0 | | 0 | | 0 | | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.9 | Storekeepers - 223 | 16 | miles | | | | | 0 | 2.1 | 33 | 60.00 | 1,988 | | 0 | | 0 | | 0 | | Avg of Part 102s (G/EF/HF/CL/TV). +10% |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through xx/xx/xx | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|------|--------------------------------|----------|-------|---|--------------------|--------------------------|---------|------|--------------------|--------|-------------------------|---------|------------------|-----------|------------------------------------|-----------|--------------------------------------|------------|---|--|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| E.10 | Mechanics - 224 | 16 | miles | | | 0 | | 0 | 29.8 | 481 | 60.00 | 28,847 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% | |
| E.11 | Electricians - 225 | 16 | miles | | | 0 | | 0 | 45.6 | 736 | 60.00 | 44,158 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +25% for multiple substations | |
| E.12 | Substation Technicians - 226 | 16 | miles | | | 0 | | 0 | 90.5 | 1,460 | 60.00 | 87,623 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% | |
| E.13 | District Line Crews | 16 | miles | | | 0 | | 0 | 19.8 | 319 | 60.00 | 19,154 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% | |
| E.14 | Misc WP | 16 | miles | | | 0 | | 0 | 1.6 | 25 | 60.00 | 1,509 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% | |
| | | | | 0 | | | 811,238 | | | | | 725,536 | | 1,598,128 | | 4,677,100 | | 18,144,158 | | |
| | | | | | 13,521 | Manhours Monthly Payroll | | | | 12,092 | Manhours Weekly Payroll | | | | | | | | | |

Part 2: Removals * All unit and total cost figures should be "raw costs", without any overhead markups. All markups are generated at the end of the estimate.



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Retirement of O&OB Line Section from Dasville to Ohioville
Budget Group: Electric Budget Category: 12
Is this a Specific Project, Program or Blanket? Specific
Work Order #: 4 3 1 9 - G
Funding Project Number: 1-1212-02-18
Target Schedule - Start: 1/1/2022 In-Service: 12/31/2025

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
There will potentially be other Cat#12 and Cat#13 Work Orders to retire the old Ohioville Substation as part of this project, re-route and remove the transmission lines immediately outside of the existing Ohioville Substation and make modifications to the station as required to remove the lines.

Describe the project objective and scope of work:
In 2016, Central Hudson's new 115kV Sturgeon Pool Substation was put into service. This will ultimately allow the upgrade of the existing 69kV "P", "FK", "HK", "MG", "MK" and "GK" Lines to 115kV. As a consequence of these upgrades, Central Hudson will be retiring approximately 6.2 Miles (60 Towers) of the existing 69kV "O" and "OB" Lines from "O/OB" Tower 131 heading south to the Ohioville Substation.

Describe specific scope exclusions, assumptions and constraints:
Conceptual Project assumptions and estimates do not assume special provisions for access, matting, environmental controls or permitting.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Please see EP Memo referenced above.

Why was the proposed project scope chosen over other alternatives?

Please see EP Memo referenced above.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Completing the project in the requested timeframe will reduce the risk of an aged asset failing unexpectedly and causing damage to private property.

What are the risks and consequences of not completing this project?

The longer the old assets remain in place, there is an elevated risk of failure

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|---|----------------------------------|--|---|----------------|--|----------------|----------------|----------------|--------------|
| \$1,753,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 172,900 | 104,900 | 32,400 | 35,600 | | | | |
| | Contractors (A/P tax exempt) | 1,556,100 | 944,100 | 291,600 | 320,400 | | | | |
| | Overheads | 24,000 | | 8,000 | 16,000 | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | 1,753,000 | 1,049,000 | 332,000 | 372,000 | 0 | 0 | 0 | 0 | |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------------|------------------|----------------|
| Current Approved Rate Case Funding (\$): | 744,000 | 420,000 | 324,000 |
| | | 2021-2023 | 2024 |

Prior years funding;
not actuals.



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,227,100 Maximum (\$): 2,278,900

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

No explanation on confidence level required.

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Base estimate for the removal of approximately 60 towers from 2023-2025 is based on a per tower removal cost of \$18K per tower plus \$11K per tower for span removals. Prior year spending accounts for actuals associated with removal of the conductors.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Estimate assumes a 90/10 split for AP and internal labor charges. This split was applied to prior year / projections column.

PRELIMINARY Installation Estimate for Transmission Line reroutes (OR, OB, O, and P) associated with new Sturgeon Pool Sul

8/28/2012

Location: *OR, O, OB and P Lines around Sturgeon Pool -- RIFTON CROSSING OPTION*

By: *R.K.Fournier*

Project No: TBD

| TOTAL | UNITS | Construction Activity | UNIT COST | | | TOTAL | TOTAL COST | | Overhead | | Total (includes overheads) | |
|-------|-------|---|---------------|---------------|----------|--------------|------------|---------------|------------|----------|----------------------------|----------------|
| | | | MATERIAL (\$) | LABOR MH/unit | \$ / MH | | Man Hrs. | Material (\$) | Labor (\$) | Material | Labor | Material | Labor |
| | 1 | Building Access Road (stone, swamp mats, tree removal) | 5,000 | Contract | Contract | 0 | 5,000 | 0 | 1,100 | 0 | 6,100 | 0 |
| | 1 | Erosion Control (silt fence, hay bales, etc.) and Restoration | 2,500 | Contract | Contract | 0 | 2,500 | 0 | 550 | 0 | 3,050 | 0 |
| | 1 | Restoration | 7,500 | Contract | Contract | 0 | 7,500 | 0 | 1,650 | 0 | 9,150 | 0 |
| | 1 | Construction Labor (See Note 1) (Thirau USA) | 120,000 | Contract | Contract | 0 | 120,000 | 0 | 26,400 | 0 | 146,400 | 0 |
| | 1 | ROW Clearing | 25,000 | Contract | Contract | 0 | 25,000 | 0 | 0 | 0 | 25,000 | 0 |
| | 21 | Dig Rock Hole (See Note 2) | 1,200 | Contract | Contract | 0 | 25,200 | 0 | 0 | 0 | 25,200 | 0 |
| | 4 | Switching (Electricians Rate = 1.5) | 0 | 8 | 50 | 32 | 0 | 1,600 | 0 | 2,230 | 0 | 3,830 |
| | 21 | Non Stock Materials (steel poles, wood poles, ect.) | 5,000 | 0 | 0 | 0 | 105,000 | 0 | 8,663 | 0 | 113,663 | 0 |
| | 1 | Non Stock Materials (wire) | 33,000 | 0 | 0 | 0 | 33,000 | 0 | 2,723 | 0 | 35,723 | 0 |
| | 21 | Standard Stock Materials (average \$ per structure) | 1,000 | 0 | 0 | 0 | 21,000 | 0 | 7,350 | 0 | 28,350 | 0 |
| | | Management & Other Services | | | | | | | | | | |
| | 1 | Drafting | 0 | 150 | 40 | 150 | 0 | 6,000 | 0 | 8,364 | 0 | 14,364 |
| | 1 | CH Engineering & Engineering Management | 10 | | | | 10 | 8,250 | | 8,737 | 10 | 16,987 |
| | 1 | CH Environmental Management (DEC Reg. Wetlands) | 0 | | | | 0 | 8,250 | | 8,737 | 0 | 16,987 |
| | 1 | CH Special Services Management | 0 | | | | 0 | 8,250 | | 8,737 | 0 | 16,987 |
| | 1 | System Construction Supervision | 0 | | | | 0 | 13,000 | | 13,767 | 0 | 26,767 |
| | 1 | Construction Supervision (CHGE Foreman) | 0 | | | | 0 | 13,000 | | 18,122 | 0 | 31,122 |
| | 1 | ROW | 65,000 | | | 0 | 65,000 | 0 | | 0 | 65,000 | 0 |
| | | - SUBTOTALS - | | | | | 344,210 | 58,350 | | | 392,645 | 127,044 |
| | | Total District M-hrs.(w/o contingency) | | | | 1,032 | | | | | | |
| | | Overheads | | | | | | | | | | |
| | | Weekly Labor O.H. @ 139.4% (included above) | | | | | | | | | | |
| | | Monthly Labor O.H. @105.9% (included above) | | | | | | | | | | |
| | | Direct Purch. Matl. O.H. @8.25% (included above) | | | | | | | | | | |
| | | Stock Matl. O.H. @35% (included above) | | | | | | | | | | |
| | | Subtotals | | | | | | | | | | |
| | | Total Matl. & Labor with O.H. | | | | | | | | | 392,645 | 127,044 |
| | | Accounting O.H. @14% of first \$300k | | | | | | | | | | 42,000 |
| | | Estimated AFUDC | | | | | | | | | | 6,000 |
| | | Contingency @15% | | | | | | | | | | 77,953 |
| | | Grand Total | | | | 1,032 | | | | | | 645,642 |
| | | Approximate | | | | 1,030 | | | | | | 646,000 |

Note 1: This line item represents recent pricing accepted from Thirau USA Inc. This assumes 14 structures on the OR (7 into sub and 7 out of sub), 5 structures on the P, and 2 on the N/OB

It is assumed that the OR structures can be done without an outage, with decent access it is assumed that 2 structures could be installed each day. All other structure work assumes a rate of 1.5 structures per day

Note 2: Rock Hole line item assumes the use of a contractor for 100% of the poles called out on the scope at a price of \$1,200 per hole

| Installation Estimate for O/N Underground Transmission into Sturgeon Pool | | | | | | | | |
|---|----------|--------|----------------|--------------------|----------|-----------|------------------|------------------|
| 600' (Over Ridge Adjacent to Sturgeon Pool Substation) - RKF 8/24/12 | | | | | | | | |
| Description | Quantity | Units | Unit cost (\$) | Material cost (\$) | Quantity | Unit cost | Labor cost (\$) | Total (\$) |
| Cable and accessories | | | | | | | | |
| 69 kV cable | 4,000 | Ft | 80 | 320,000 | 7 | 50,000 | 350,000 | 670,000 |
| 69 kv terminations | 4 | Ea | 10,000 | 40,000 | 4 | 6,000 | 24,000 | 64,000 |
| 69 kV arresters | 4 | Ea | 2,500 | 10,000 | 4 | 3,000 | 12,000 | 22,000 |
| vault grounding | 4 | Ea | 5,000 | 20,000 | 4 | 3,000 | 12,000 | 32,000 |
| link box/SVL | 4 | Ea | 700 | 2,800 | 4 | 1,800 | 7,200 | 10,000 |
| fiber optic cable | 2,000 | ft | 1 | 2,000 | 2,000 | 3 | 6,000 | 8,000 |
| continuity conductor | 2,200 | ft | 6 | 13,200 | 2,200 | 4 | 8,800 | 22,000 |
| testing | | | | | 2 | 10,000 | 20,000 | 20,000 |
| Subtotals | | | | 408,000 | | | 440,000 | 848,000 |
| Riser structures | | | | | | | | |
| 69kv riser structure | 4 | Ea | 40,000 | 160,000 | 4 | 12,000 | 48,000 | 208,000 |
| Subtotals | | | | 160,000 | | | 48,000 | 208,000 |
| Ductbank/Earthwork | | | | | | | | |
| conduit | 2,000 | Ft | 8 | 16,000 | 2,000 | 7 | 14,000 | 30,000 |
| spacers | 150 | units | 3 | 450 | 150 | 11 | 1,650 | 2,100 |
| rock excavation | 650 | | | | 650 | 200 | 130,000 | 130,000 |
| Thermal Backfill | 400 | Cu Yd | 125 | 50,000 | 400 | 35 | 14,000 | 64,000 |
| duct encasement | 400 | Cu Yd | 200 | 80,000 | 400 | 50 | 20,000 | 100,000 |
| electric manholes | 2 | Ea | 10,000 | 20,000 | 2 | 5,000 | 10,000 | 30,000 |
| comm. manholes | 2 | Ea | 8,000 | 16,000 | 2 | 4,000 | 8,000 | 24,000 |
| electric vaults | 2 | Ea | 20,000 | 40,000 | 2 | 15,000 | 30,000 | 70,000 |
| horizontal boring | 650 | Ft | 250 | 162,500 | 650 | 500 | 325,000 | 487,500 |
| Subtotals | | | | 384,950 | | | 552,650 | 937,600 |
| Overhead Structure Modifications | | | | | | | | |
| New single pole OR struct | 3 | Ea | 7,000 | 21,000 | 150 | 120 | 18,000 | 39,000 |
| New OB/O Structure | 1 | Ea | 6,000 | 6,000 | 150 | 120 | 18,000 | 24,000 |
| New OB/N Structure | 1 | Ea | 6,000 | 6,000 | 150 | 120 | 18,000 | 24,000 |
| Installation of new OB Conductor | 600 | Ft | 2 | 1,200 | 150 | 240 | 36,000 | 37,200 |
| Installation of new O Conductor | 150 | Ft | 2 | 300 | 150 | 60 | 9,000 | 9,300 |
| Installation of new N Conductor | 150 | Ft | 2 | 300 | 150 | 60 | 9,000 | 9,300 |
| Installation of new OR Conductor | 2,400 | Ft | 2 | 4,800 | 150 | 360 | 54,000 | 58,800 |
| Installation of new OR OPGW | 800 | Ft | 3 | 2,400 | 150 | 300 | 45,000 | 47,400 |
| Installation of new OB OPGW | 200 | Ft | 3 | 600 | 150 | 300 | 45,000 | 45,600 |
| Dig Pole Hole | 5 | Ea | 1,500 | 7,500 | 0 | 0 | 0 | 7,500 |
| Standard Stock Materials | 5 | | 1,000 | 5,000 | 0 | 0 | 0 | 5,000 |
| Nonstock Materials | 5 | | 6,000 | 30,000 | | | | |
| Switching | 500 | | 0 | 0 | 100 | 64 | 6,400 | 6,400 |
| Subtotals | | | | 85,100 | | | 258,400 | 343,500 |
| Management and Other Services | | | | | | | | |
| Drafting | 40 | Man Hr | 50 | 250 | | | 2,000 | |
| CH Engineering & Eng. Management | | | | | | | 8,000 | |
| Contract Engineering | | | | | | | 15,000 | |
| CH Environmental Man. (DEC Wetlands) | | | | | | | 10,000 | |
| CH Special Services Management | | | | | | | 5,000 | |
| Construction Supervision | 100 | Man Hr | 50 | | | | 5,000 | |
| Contract Permitting (legal fees included) | | | | 100,000 | | | 0 | |
| Right of Way Cost | | | | 0 | | | 0 | |
| Right of Way Restoration | | | | 30,000 | | | 0 | |
| Subtotals | | | | 130,250 | | | 45,000 | 175,250 |
| Engineering | | | | | | | | |
| engin./admin./other | | 15% | | | | | | 299,040 |
| Totals for Southern Section | | | | 1,083,200 | | | 1,085,650 | 2,811,390 |
| This estimate used data from CHA estimate for WM Line underground options dated 2/11 | | | | | | | | |
| Removal for this option is estimated to be \$25,000. This includes removing the existing O/OB/N structure. | | | | | | | | |

| Installation Estimate for OR Underground Transmission into Sturgeon Pool | | | | | | | | | |
|---|------------------------------------|--------|----------------|--------------------|----------|-----------|------------------|------------------|--|
| 850' (Over Ridge Adjacent to Sturgeon Pool Substation) - RKF 8/23/12 | | | | | | | | | |
| Description | Quantity | Units | Unit cost (\$) | Material cost (\$) | Quantity | Unit cost | Labor cost (\$) | Total (\$) | |
| Cable and accessories | | | | | | | | | |
| 115 kV cable | 6,600 | Ft | 80 | 528,000 | 7 | 50,000 | 350,000 | 878,000 | |
| 115 kv terminations | 4 | Ea | 10,000 | 40,000 | 4 | 6,000 | 24,000 | 64,000 | |
| 115 kV arresters | 4 | Ea | 2,500 | 10,000 | 4 | 3,000 | 12,000 | 22,000 | |
| vault grounding | 4 | Ea | 5,000 | 20,000 | 4 | 3,000 | 12,000 | 32,000 | |
| link box/SVL | 4 | Ea | 700 | 2,800 | 4 | 1,800 | 7,200 | 10,000 | |
| fiber optic cable | 2,000 | ft | 1 | 2,000 | 2,000 | 3 | 6,000 | 8,000 | |
| continuity conductor | 2,200 | ft | 6 | 13,200 | 2,200 | 4 | 8,800 | 22,000 | |
| testing | | | | | 2 | 10,000 | 20,000 | 20,000 | |
| | Subtotals | | | 616,000 | | | 440,000 | 1,056,000 | |
| Riser structures | | | | | | | | | |
| 115kv riser structure | 4 | Ea | 40,000 | 160,000 | 4 | 12,000 | 48,000 | 208,000 | |
| | Subtotals | | | 160,000 | | | 48,000 | 208,000 | |
| Ductbank/Earthwork | | | | | | | | | |
| conduit | 2,000 | Ft | 8 | 16,000 | 2,000 | 7 | 14,000 | 30,000 | |
| spacers | 200 | units | 3 | 600 | 200 | 11 | 2,200 | 2,800 | |
| rock excavation | 850 | | | | 850 | 200 | 170,000 | 170,000 | |
| Thermal Backfill | 500 | Cu Yd | 125 | 62,500 | 500 | 35 | 17,500 | 80,000 | |
| duct encasement | 500 | Cu Yd | 200 | 100,000 | 500 | 50 | 25,000 | 125,000 | |
| electric manholes | 2 | Ea | 10,000 | 20,000 | 2 | 5,000 | 10,000 | 30,000 | |
| comm. manholes | 2 | Ea | 8,000 | 16,000 | 2 | 4,000 | 8,000 | 24,000 | |
| electric vaults | 2 | Ea | 20,000 | 40,000 | 2 | 15,000 | 30,000 | 70,000 | |
| horizontal boring | 850 | Ft | 250 | 212,500 | 850 | 500 | 425,000 | 637,500 | |
| | Subtotals | | | 467,600 | | | 701,700 | 1,169,300 | |
| Overhead Modifications | | | | | | | | | |
| New single pole OR struct | 1 | Ea | 6,000 | 6,000 | 150 | 120 | 18,000 | 24,000 | |
| Installation of new OR Conductor | 600 | Ft | 2 | 1,200 | 150 | 240 | 36,000 | 37,200 | |
| Installation of new OR OPGW | 100 | Ft | 3 | 300 | 150 | 60 | 9,000 | 9,300 | |
| Dig Pole Hole | 1 | Ea | 1,500 | 1,500 | 0 | 0 | 0 | 1,500 | |
| Standard Stock Materials | 1 | | 1,000 | 1,000 | 0 | 0 | 0 | 1,000 | |
| Nonstock Materials | 1 | | 6,000 | 6,000 | | | | | |
| Switching | 500 | | 0 | 0 | 100 | 64 | 6,400 | 6,400 | |
| | Subtotals | | | 16,000 | | | 69,400 | 85,400 | |
| Management and Other Services | | | | | | | | | |
| Drafting | 40 | Man Hr | 50 | 250 | | | 2,000 | | |
| CH Engineering & Eng. Management | | | | | | | 8,000 | | |
| Contract Engineering | | | | | | | 15,000 | | |
| CH Environmental Man. (DEC Wetlands) | | | | | | | 10,000 | | |
| CH Special Services Management | | | | | | | 5,000 | | |
| Construction Supervision | 100 | Man Hr | 50 | | | | 5,000 | | |
| Contract Permitting (legal fees included) | | | | 100,000 | | | 0 | | |
| Right of Way Cost | | | | 0 | | | 0 | | |
| Right of Way Restoration | | | | 30,000 | | | 0 | | |
| | Subtotals | | | 130,250 | | | 45,000 | 175,250 | |
| Engineering | | | | | | | | | |
| engin./admin./other | | | 15% | | | | | 364,995 | |
| | | | | | | | | | |
| | | | | | | | | | |
| | Totals for Southern Section | | | 1,373,850 | | | 1,234,700 | 3,058,945 | |
| This estimate used data from CHA estimate for WM Line underground options dated 2/11 | | | | | | | | | |

| Installation Estimate for OR and O/N Underground Transmission into Sturgeon Pool | | | | | | | | |
|---|-----------------------------|--------|----------------|--------------------|----------|-----------|-----------------|------------|
| 1500' (Over Ridge Adjacent to Sturgeon Pool Substation) - RKF 8/24/12 | | | | | | | | |
| Description | Quantity | Units | Unit cost (\$) | Material cost (\$) | Quantity | Unit cost | Labor cost (\$) | Total (\$) |
| Cable and accessories | | | | | | | | |
| 115 kV cable | 6,600 | Ft | 80 | 528,000 | 7 | 50,000 | 350,000 | 878,000 |
| 115 kv terminations | 4 | Ea | 10,000 | 40,000 | 4 | 6,000 | 24,000 | 64,000 |
| 115 kV arresters | 4 | Ea | 2,500 | 10,000 | 4 | 3,000 | 12,000 | 22,000 |
| 69 kV cable | 4,000 | Ft | 80 | 320,000 | 7 | 50,000 | 350,000 | 670,000 |
| 69 kv terminations | 4 | Ea | 10,000 | 40,000 | 4 | 6,000 | 24,000 | 64,000 |
| 69 kV arresters | 4 | Ea | 2,500 | 10,000 | 4 | 3,000 | 12,000 | 22,000 |
| vault grounding | 8 | Ea | 5,000 | 40,000 | 4 | 3,000 | 12,000 | 52,000 |
| link box/SVL | 8 | Ea | 700 | 5,600 | 4 | 1,800 | 7,200 | 12,800 |
| fiber optic cable | 4,000 | ft | 1 | 4,000 | 4,000 | 3 | 12,000 | 16,000 |
| continuity conductor | 4,400 | ft | 5 | 26,400 | 4,400 | 4 | 17,600 | 44,000 |
| testing | | | | | 4 | 10,000 | 40,000 | 40,000 |
| | Subtotals | | | 1,024,000 | | | 860,800 | 1,884,800 |
| Riser structures | | | | | | | | |
| 115kv riser structure | 4 | Ea | 40,000 | 160,000 | 4 | 12,000 | 48,000 | 208,000 |
| 69kv riser structure | 4 | Ea | 40,000 | 160,000 | 4 | 12,000 | 48,000 | 208,000 |
| | Subtotals | | | 320,000 | | | 96,000 | 416,000 |
| Ductbank/Earthwork | | | | | | | | |
| conduit | 4,000 | Ft | 8 | 32,000 | 4,000 | 7 | 28,000 | 60,000 |
| spacers | 350 | units | 3 | 1,050 | 350 | 11 | 3,850 | 4,900 |
| rock excavation | 1,500 | | | | 1,500 | 200 | 300,000 | 300,000 |
| Thermal Backfill | 900 | Cu Yd | 125 | 112,500 | 900 | 35 | 31,500 | 144,000 |
| duct encasement | 900 | Cu Yd | 200 | 180,000 | 900 | 50 | 45,000 | 225,000 |
| electric manholes | 4 | Ea | 10,000 | 40,000 | 4 | 5,000 | 20,000 | 60,000 |
| comm. manholes | 4 | Ea | 8,000 | 32,000 | 4 | 4,000 | 16,000 | 48,000 |
| electric vaults | 4 | Ea | 20,000 | 80,000 | 4 | 15,000 | 60,000 | 140,000 |
| horizontal boring | 1500 | Ft | 250 | 375,000 | 1,500 | 500 | 750,000 | 1,125,000 |
| | Subtotals | | | 852,550 | | | 1,254,350 | 2,106,900 |
| Overhead Structure Modifications | | | | | | | | |
| Switching | 500 | | 0 | 0 | 100 | 64 | 6,400 | 6,400 |
| | Subtotals | | | 0 | | | 6,400 | 6,400 |
| Management and Other Services | | | | | | | | |
| Drafting | 40 | Man Hr | 50 | 250 | | | 2,000 | |
| CH Engineering & Eng. Management | | | | | | | 8,000 | |
| Contract Engineering | | | | | | | 15,000 | |
| CH Environmental Man. (DEC Wetlands) | | | | | | | 10,000 | |
| CH Special Services Management | | | | | | | 5,000 | |
| Construction Supervision | 100 | Man Hr | 50 | | | | 5,000 | |
| Contract Permitting (legal fees included) | | | | 100,000 | | | 0 | |
| Right of Way Cost | | | | 0 | | | 0 | |
| Right of Way Restoration | | | | 30,000 | | | 0 | |
| | Subtotals | | | 130,250 | | | 45,000 | 175,250 |
| Engineering | | | | | | | | |
| engin./admin./other | | 15% | | | | | | 661,155 |
| | Totals for Southern Section | | | 2,326,800 | | | 2,256,150 | 5,250,505 |
| This estimate used data from CHA estimate for WM Line underground options dated 2/11 | | | | | | | | |



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | |
|---|--|--------------------------------------|
| Project/Program Name: Q Line Electric Transmission Rebuild | | Work Order #: 2002 - H |
| Budget Group: Electric | Budget Category: 12 | Funding Project Number: 10260 |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 5/1/2020 | In-Service: 12/30/2030 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
 Project will require OPGW fiber terminations in the substations as well as various other improvements. More extensive upgrades to other substation equipment may be required if the line is energized to 115kV.

Describe the project objective and scope of work:
 The Q line is 20.5 miles in length traversing from Pleasant Valley to Rhinebeck. The line was originally constructed in the 1950's and based on results from Central Hudson's 5-year comprehensive inspections, approximately 65% of the structures are in need of replacement with numerous other exhibiting an array of minor defect. Due to the condition of the line, Central Hudson is evaluating a more comprehensive approach to mitigation and developing recommendations to rebuild the line at 115kV.

Describe specific scope exclusions, assumptions and constraints:
 This rebuild project is early in its planning stage and the need and/or scope of the following project components have not yet been well quantified and/or defined: access improvements including any significant earthwork; easement deficiencies; encroachments; FAA lighting; constraints related to protection of sensitive environmental resources. Discussions are still staking place regarding the potential to build the line to 115kV which would affect the required scope and permitting requirements through NYS DPS.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

The repairing of defective structures (over 65% of existing line) was considered but would not be able to meaningfully extend the life of the structures given their age and current condition. Spot replacement of each structure individually was also considered but creates other long-term operational constraints for the line moving forward as opposed to a more comprehensive rebuild.

Why was the proposed project scope chosen over other alternatives?

Repairing defective structures (over 65% of existing line) will not prove to be cost effective over time and will make design and construction difficult when trying to meet current NEC and CHG&E standards. Repairs would also limit the ability to enhance/improve the structure locations to create better access or to avoid sensitive environmental resources.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

The majority of the structures and conductors on the Q Line have reached the end of their useful life. The existing infrastructure is in need of replacement to mitigate the increased risk of failure due to advanced age.

What are the risks and consequences of not completing this project?

Due to the age and condition of existing structures and conductor, the most significant risk of not completing the project are increased outages due to component failures. The consequences include negative impacts to both SAIFI and CAIDI metrics.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

The project has also been submitted by Central Hudson as a Phase I project that supports NYS CLCPA and renewable energy goals.

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|--|----------------------------------|--|---|----------------|--|------------------|------------------|-------------------|-------------------|
| \$66,363,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 5,670,000 | 32,200 | 60,000 | 60,000 | 100,000 | 800,000 | 1,500,000 | 3,117,800 |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 14,175,000 | 80,500 | 150,000 | 150,000 | 250,000 | 2,000,000 | 3,750,000 | 7,794,500 |
| | Contractors (A/P tax exempt) | 36,855,000 | 209,300 | 390,000 | 390,000 | 650,000 | 5,200,000 | 9,750,000 | 20,265,700 |
| | Overheads | 3,303,000 | | | 24,000 | 88,000 | 838,000 | 2,353,000 | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 60,003,000 | 322,000 | 600,000 | 624,000 | 1,088,000 | 8,838,000 | 17,353,000 | 31,178,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 610,000 | | | | | 50,000 | 200,000 | 360,000 |
| | Contractors (A/P tax exempt) | 5,490,000 | | | | | 450,000 | 1,800,000 | 3,240,000 |
| | Overheads | 260,000 | | | | | 44,000 | 216,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 6,360,000 | 0 | 0 | 0 | 0 | 544,000 | 2,216,000 | 3,600,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|

| | | | |
|---|------------------|----------------|----------------|
| Current Approved Rate Case Funding (\$): | 746,000 | 519,000 | 227,000 |
| | 2021-2023 | | 2024 |

Prior years funding;
not actuals.



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 46,454,100 Maximum (\$): 86,271,900

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Please see provided conceptual estimate for details - Estimate was created using historic pricing on projects of a similar scope and permitting requirements with project specific adjustments.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Cost Estimate breakdown is based on the total conceptual project cost provided and detailed in the provided estimate. The cost breakdown provided above is displayed based on an averaged historical percentage split of project Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively. This historical split has also been applied to the prior year actuals / projections column as well. Removals are split between Accounts Payable / AA and Internal Labor at a rate of 90% and 10% respectively.



Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

Project Name: Q Line Rebuild - Article VII 115kV Date: 11/7/2022 WO #: 2002A/R-H Rebuild Ler
 Prepared By: Sam Pozorski Revision(s): 1 16.681
 Cost Estimate Level: Conceptual Estimate +/-30% Accuracy... There is a general scope but few details available. Little or no design work completed yet.

Part 1: Additions

* All unit and total cost figures should be "raw costs", without any overhead markups. Markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|---|---|----------|-----------|-------------------------|------------------|--------------------|-------|---------|-----------------|--------------------|-------|---------|------------------|-----------|------------------------------------|-----------|--------------------------------------|-----------|-------|--|
| | | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | | Cost |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | | |
| A.1 | Engineering Design -121 | 17 | miles | | 395.9 | 6,604 | 60.00 | 396,257 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) +25% |
| A.2 | Engineering Supervision; Project Sponsor -310 | 17 | miles | | 7.4 | 124 | 60.00 | 7,444 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) |
| A.3 | Drafting - 132 | 17 | miles | | | 0 | | 0 | 45.2 | 753 | 60.00 | 45,189 | | 0 | | 0 | | 0 | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) |
| A.4 | ESP - 125 | 17 | miles | | 10.4 | 173 | 60.00 | 10,409 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) x2 for multiple su |
| A.5 | Planning - 126 | 17 | miles | | 33.4 | 557 | 60.00 | 33,429 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) x2 for multiple su |
| A.6 | Misc Internal Support | 17 | miles | | 5.4 | 90 | 60.00 | 5,380 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) +25% |
| A.7 | LIDAR | 17 | miles | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 2,400.00 | 40,034 | 0 | pre/post project LIDAR flights |
| A.8 | Engineering and Related Contractors | 17 | miles | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 25,565.00 | 426,450 | 0 | Avg of G/EF/HF/CL/TV/KM/H&SB/A&C +25% |
| A.9 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | | |
| B.1 | Environmental Consultant | 17 | miles | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 110,239.00 | 1,838,897 | 0 | H&SB as of 11/4/22 +\$30k/mile for during construction |
| B.2 | Legal Consultant | 17 | miles | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 30,000.00 | 500,430 | 0 | Typical cost per mile for Article VII. Assumed lower legal |
| B.3 | Project Manager - 110 | 17 | miles | | 321.7 | 5,366 | 60.00 | 321,943 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | Avg of A&C, H&SB \$/mile to hrs/mile +25% for continuec |
| B.4 | Environmental - 726 | 17 | miles | | 158.7 | 2,648 | 60.00 | 158,866 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | Avg of A&C, H&SB \$/mile to hrs/mile +25% for continuec |
| B.5 | Real Property Services - 124 | 17 | miles | | 80.7 | 1,346 | 60.00 | 80,761 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | Avg of A&C, H&SB \$/mile to hrs/mile +15% for continuec |
| B.6 | System Ops - 330 | 17 | miles | | 15.5 | 259 | 60.00 | 15,513 | 18.6 | 310 | 60.00 | 18,599 | | 0 | | 0 | | 0 | 0 | Avg of G, EF, HF, CL, TV. +25% for multiple substations |
| B.7 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | | |
| C.1 | Surveying/Staking | 17 | miles | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 40,884.53 | 681,995 | 0 | Avg of H&SB+50% and A&C, +10% |
| C.2 | Easements/Access Right/Laydown Yards | 17 | miles | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 58,276.05 | 972,103 | 0 | H&SB +5% for minor continued charges |
| C.3 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | |
| C.4 | Filing Fees | 17 | miles | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 680.90 | 11,358 | 0 | Avg of H&SB, A&C +10% |
| C.5 | Misc AP (ecluding material) | 17 | miles | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 10,748.40 | 179,294 | 0 | Avg of G, EF, HF, CL, TV, A&C. +20% for Art VII |
| C.6 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | |
| D MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | | |
| D.1 | Conductor 795 Drake ACSR (30-50-180) | 277,438 | FT | | | 0 | | 0 | | 0 | | 0 | 3.81 | 1,057,121 | | 0 | | 0 | 0 | Adjusted CME Quote 11/21/22. \$/FT for 1033.5 Orloan |
| D.2 | OPGW (30-50-205) | 95,122 | FT | | | 0 | | 0 | | 0 | | 0 | 3.34 | 317,944 | | 0 | | 0 | 0 | MMS price as of 12/5/22 |
| D.3 | Poles | 1 | 235 Poles | | | 0 | | 0 | | 0 | | 0 | | 0 | 3,657,977.00 | 3,657,977 | | 0 | 0 | SB PO#91505: 85' H4 Tangent Davit Item #5, 85' H4 for |
| D.4 | Major Engineered Structures | 4 | Str | | | 0 | | 0 | | 0 | | 0 | | 0 | 85,000.00 | 340,000 | | 0 | 0 | |
| D.5 | Moderate Engineered Structures | 14 | Str | | | 0 | | 0 | | 0 | | 0 | | 0 | 42,500.00 | 595,000 | | 0 | 0 | |
| D.6 | 115kV Tangent Davit Structure | 169 | Str | | | 0 | | 0 | | 0 | | 0 | 1,311.56 | 221,654 | | 0 | | 0 | 0 | SS Cost as of 11/4/22 |
| D.7 | 115kV Swing Angle Structure | 30 | Str | | | 0 | | 0 | | 0 | | 0 | 3,262.87 | 97,886 | | 0 | | 0 | 0 | SS Cost as of 11/4/22 |
| D.8 | 115kV Deadend Structure | 13 | Str | | | 0 | | 0 | | 0 | | 0 | 9,155.63 | 119,023 | | 0 | | 0 | 0 | SS Cost as of 11/4/22 |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|-----------------------|---|----------|-------|-------------------------|--------------------|--------|---------|-----------|--------------------|--------|---------|---------|------------------|-----------|------------------------------------|-----------|--------------------------------------|------------|---|--|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| D.9 | Crossarms and X-Braces for 2-poles | 41 | Str | | | 0 | | 0 | | 0 | | 0 | 1,238.00 | 50,758 | 1,850.00 | 75,850 | | 0 | 34-79-006,008,009 MMS \$ as of 11/7/22 | |
| D.10 | Misc Material | 212 | str | | | 0 | | 0 | | 0 | | 0 | 500.00 | 106,000 | 250.00 | 53,000 | | 0 | | |
| D.10 | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E CONSTRUCTION | | | | | | | | | | | | | | | | | | | | |
| E.1 | Line Construction | 17 | miles | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 432,458.40 | 7,213,839 | Avg of recent Part 102s (EF/HF/CL/TV). +20% for Art VII | |
| E.2 | Major Drilled Pier Foundations | 4 | Str | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 375,000.00 | 1,500,000 | | |
| E.3 | Moderate Drilled Pier Foundations | 14 | Str | | | | | | | | | | | | | | 50,000.00 | 700,000 | | |
| E.4 | Drilling / Site Work / Matting / Access / Trimming / Restoration / etc. | 17 | miles | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 585,759.20 | 9,771,049 | Avg of Part 102s (G/EF/HF/CL/TV). Combined all associ | |
| E.5 | Equipment Moves/Rentals | 17 | miles | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 7,360.80 | 122,786 | Avg of Part 102s (G/EF/HF/CL/TV). +20% | |
| E.6 | T&D Foreman - 215 | 17 | miles | | | 0 | | 0 | 661.4 | 11,032 | 60.00 | 661,944 | | 0 | | 0 | | 0 | Avg of recent Part 102s (CL/TV) with foreman more sole | |
| E.7 | T&D Engineer, Planner, Director - 215 | 17 | miles | | 177.9 | 2,968 | 60.00 | 178,078 | | 0 | | 0 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +50% for Article VII | |
| E.8 | OS Foreman - 221 | 17 | miles | | | 0 | | 0 | 6.8 | 113 | 60.00 | 6,771 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% | |
| E.9 | Storekeepers - 223 | 17 | miles | | | 0 | | 0 | 9.3 | 156 | 60.00 | 9,341 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). x5 for Article VII | |
| E.10 | Riggers/Mechanics - 224 | 17 | miles | | | 0 | | 0 | 33.9 | 565 | 60.00 | 33,883 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +25% | |
| E.11 | Electricians - 225 | 17 | miles | | | 0 | | 0 | 45.6 | 761 | 60.00 | 45,643 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +25% for multiple si | |
| E.12 | Substation Technicians - 226 | 17 | miles | | | 0 | | 0 | 90.5 | 1,510 | 60.00 | 90,571 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% | |
| E.13 | District Line Crews | 17 | miles | | | 0 | | 0 | 19.8 | 330 | 60.00 | 19,799 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% | |
| E.14 | Misc WP | 17 | miles | | | 0 | | 0 | 1.6 | 26 | 60.00 | 1,560 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% | |
| | | | | 0 | | | | 1,208,080 | | | | 933,300 | | 1,970,386 | | 4,721,827 | | 23,958,234 | | |
| | | | | | | 20,135 | | | | 15,555 | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|--|----------------------------------|----------|---------------------|-------------------------|--------------------|----|---------|------|--------------------|----|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |
| REMOVALS SUMMARY: | | | | | | | | | | | | | | | | | | | |
| Incurred To-Date: | | | | | | | | | | | | | | | | | | | |
| | Raw Costs Incurred To-Date: | | \$0 | | | | | | | | | | | | | | | | |
| | Overhead Costs Incurred To-Date: | | \$0 | | | | | | | | | | | | | | | | |
| | Subtotal Costs To-Date: | | \$0 | | | | | | | | | | | | | | | | |
| | Estimated Future Raw Costs: | | \$3,420,054 | | | | | | | | | | | | | | | | |
| | Estimated Future Overheads: | | \$104,247 | | | | | | | | | | | | | | | | |
| | Subtotal Future Costs: | | \$3,524,301 | | | | | | | | | | | | | | | | |
| | Contingency Applied: | | \$352,430 | | 10.0% | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | GRAND TOTAL REMOVALS: | | \$3,876,731 | | | | | | | | | | | | | | | | |
| GRAND TOTAL ADDITIONS + REMOVALS: | | | \$46,270,272 | | | | | | | | | | | | | | | | |

Structures 69408 to 69412 are built on what look to be manmade peninsulas into a dammed up portion of the Fall Kill near Creek Rd in Poughkeepsie, with very limited on and off ROW access. This section may require significant access improvements, easement acquisitions, and/or a line re-route. This has been excluded from specific estimate line items until options are developed. The allowance for engineered structures mentioned above should account for the likely need for these style structures in this location if an alternative route is not acquired.

1 new structure to be installed between 69455-69456 and East Park.



Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

I Line Structures 14
X Line Structures 40
I -> X Factor 2.857

Project Name: Q-Line Rebuild Tower Section w/ X Line Date: 12/5/2022 WO #: 2002-H or TBD
Prepared By: Sam Pozorski (factored C. Rottkamp SB Line estimate) Revision(s): 1
Cost Estimate Level: Conceptual Estimate +/-30% Accuracy... There is a general scope but few details available. Little or no design work completed yet.

Part 1: Additions

* All unit and total cost figures should be "raw costs", without any overhead markups. Markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | | |
|---|---|----------|--------|-------------------------|--------------------|-------|---------|---------|--------------------|-------|---------|---------|------------------|----------|------------------------------------|---------|--------------------------------------|-----------|-------|---|---|
| | | | | through 9/9/2022 | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | | |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | | | |
| A.1 | Raw Costs Accrued To-Date in Work Order | | Isum | 568,646 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per PowerPlan 9/9/2022 |
| A.2 | Transfer Precon. Costs from WO #0854-D | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per request to Plant Accounting 9-7-22. SCP:x0 for Q est because assumed these costs are captured in Q pole section estimate. |
| A.3 | Transmission Engineer - Construction | 74 | weeks | 0 | 13.5 | 1,003 | 71.00 | 71,203 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Kyle B. email 8/5/2022 (27 hrs/week split between SB-Line and I-Line) |
| A.4 | Transmission Engineer - Administration | 74 | weeks | 0 | 4.0 | 297 | 71.00 | 21,097 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Kyle B. email 8/5/2022 |
| A.5 | Engineering - Survey for Sagging | 9 | days | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 750.00 | 6,429 | | Per Kyle B. email 8/5/2022 (\$1,500/day split between SB-Line and I-Line) | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | | | |
| B.1 | Project Manager - Preconstruction Phase | 11 | weeks | 0 | 4.0 | 46 | 71.00 | 3,246 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per discussions between Chris R. and Erika R. 9/8/22 (no billing against I-Line planned) |
| B.2 | Project Manager - Construction Phase | 74 | weeks | 0 | 20.0 | 1,486 | 71.00 | 105,486 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per discussions between Chris R. and Erika R. 9/8/22 (no billing against I-Line planned) |
| B.3 | Project Manager - Restoration/Closeout | 17 | weeks | 0 | 6.0 | 103 | 71.00 | 7,303 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per discussions between Chris R. and Erika R. 9/8/22 (no billing against I-Line planned) |
| B.4 | Env. Affairs - Preconstruction Phase | 11 | weeks | 0 | 4.0 | 46 | 71.00 | 3,246 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per discussions between Chris R. and Erika R. 9/8/22 (no billing against I-Line planned) |
| B.5 | Env. Affairs - Construction Phase | 74 | weeks | 0 | 8.0 | 594 | 71.00 | 42,194 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per discussions between Chris R. and Erika R. 9/8/22 (no billing against I-Line planned) |
| B.6 | Env. Affairs - Restoration/Closeout | 17 | weeks | 0 | 2.0 | 34 | 71.00 | 2,434 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per discussions between Chris R. and Erika R. 9/8/22 (no billing against I-Line planned) |
| B.7 | Real Property Services Support | 0 | weeks | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per discussions with Kate W. 9/8/22, we do not anticipate any further Real Property support on the WO. |
| B.8 | Vegetation Manager | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 1,000.00 | 2,857 | | Allowance | |
| B.9 | Daily Environmental Monitor, Construction | 409 | days | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 1,092.00 | 446,160 | | Assumes 10-hrs/day, 5.5-days per week; rate includes labor, truck, meals, lodging (EDR) | |
| B.10 | SWPPP Inspections Post-Construction | 11 | days | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 1,092.00 | 12,480 | | Assumes 0.5-day per week for 8 weeks (EDR) | |
| B.11 | Env. Consultant Support As-Needed | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 2,000.00 | 5,714 | | Allowance for EDR | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | | | |
| C.1 | Marshalling Yard Lease "Duke's Pit" | 17 | months | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 400.00 | 6,857 | | Distribution of \$1,000/month lease provided by Pat H. 9/9/22 | |
| C.2 | CHG&E Trailer, Storage, Rent, Sanitary | 35 | weeks | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 170.00 | 5,877 | | Per Pat H. detailed construction cost estimate received 7-6-2022; Weeks = 26x46.7% per Pat H. | |
| C.3 | Marshalling Yard/Laydown Improvements | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 17.0 | 49 | 90.00 | 4,371 | 0.00 | 0 | 1,700.00 | 4,857 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 (85%/15% A/R Split) *Edited labor rate |
| C.4 | Matting in laydown/marshalling yards | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 149.0 | 426 | 90.00 | 38,314 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 (85%/15% A/R Split) *Edited labor rate |
| C.5 | Snow Removal Allowance | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 17,000.00 | 48,571 | | \$20,000 Allowance, split 85% A, 15% R | |
| C.6 | Security (lighting; signage; fencing, etc.) | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 40.0 | 114 | 90.00 | 10,286 | 0.00 | 0 | 2,000.00 | 5,714 | 0.00 | 0 | 0.00 | 0 | |
| C.7 | Surveying Offsets & Remarkings as needed | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 4,000.00 | 11,429 | | Initial survey markouts already in costs incurred to-date | |
| C.8 | Miscellaneous Expenses | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 500.00 | 1,429 | 1,000.00 | 2,857 | 1,000.00 | 2,857 | | | |
| D MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | | | |
| D.1 | BILL OF MATERIALS Estimate | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | (28,446.00) | (81,274) | 287,211.00 | 820,603 | 0.00 | 0 | 0.00 | 0 | See spreadsheet by Sharon 9/8/22: Reduced Stock Material by \$93,598 already charged to WO |
| E CONSTRUCTION | | | | | | | | | | | | | | | | | | | | | |
| E.1 | Construction Bid / Contract Award | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 1,248,692.00 | 3,567,691 | | Per Pat H. detailed construction cost estimate received 7-6-2022 | |
| E.2 | Line Clearance; Tree Trimming; Mowing | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 38.0 | 109 | 90.00 | 9,771 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 (85%/15% A/R Split) *Edited labor rate |
| E.3 | Flagging | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 10.0 | 29 | 90.00 | 2,571 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 (85%/15% A/R Split) *Edited labor rate |
| E.4 | Foremen (Field Supervision) | 74 | weeks | 0 | 0.0 | 0 | 0.00 | 0 | 43.0 | 3,194 | 90.00 | 287,486 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | (85%/15% A/R Split) |
| E.5 | Operations Services Foreman | 3 | day | 0 | 0.0 | 0 | 0.00 | 0 | 7.0 | 20 | 90.00 | 1,800 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | (85%/15% A/R Split) |
| E.6 | T&D Field Clerk | 6 | day | 0 | 0.0 | 0 | 0.00 | 0 | 8.0 | 46 | 71.00 | 3,246 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022; *Edited labor rate |
| E.7 | Operations Services Electricians Switching | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 64.0 | 183 | 71.00 | 12,983 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022; *Edited labor rate |
| E.8 | T&D General Supervision | 74 | weeks | 0 | 7.0 | 520 | 71.00 | 36,920 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022; *Edited labor rate |
| E.9 | T&D Engineer | 74 | weeks | 0 | 8.5 | 631 | 71.00 | 44,831 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022; *Edited labor rate |
| E.10 | T&D Planner | 74 | weeks | 0 | 2.0 | 149 | 71.00 | 10,549 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022; *Edited labor rate |

568,646 4,909 348,509 4,169 370,829 (79,846) 834,031 4,116,923
 Manhours Monthly Payroll Manhours Weekly Payroll

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through 9/9/2022 | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|--------------------------------|----------|-------|---|--------------------|----|---------|------|--------------------|----|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |

Part 2: Removals

* All unit and total cost figures should be "raw costs", without any overhead markups. All markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through 9/9/2022 | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|------|---|----------|--------|---|--------------------|-----|---------|--------|--------------------|-----|---------|--------|------------------|------|------------------------------------|--------|--------------------------------------|---------|---|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |
| R.1 | Raw Costs Accrued To-Date in Work Order | 3 | Isum | 3,324 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per PowerPlan 9/8/2022 |
| R.2 | Construction Bid / Contract Award | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 220,357.00 | 629,591 | Per Pat H. detailed construction cost estimate received 7-6-2022 |
| R.3 | Marshalling Yard Lease "Duke's Pit" | 17 | months | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 100.00 | 1,714 | Distribution of \$1,000/month lease provided by Pat H. 9/9/22 |
| R.4 | CHG&E Trailer, Storage, Rent, Sanitary | 35 | weeks | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 30.00 | 1,037 | Per Pat H. detailed construction cost estimate received 7-6-2022: Weeks = 26x46.7% per Pat H. |
| R.5 | 30 CY Dumpsters | 9 | each | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 1,200.00 | 10,286 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 |
| R.6 | Marshalling Yard/Laydown Improvements | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 3.0 | 9 | 90.00 | 771 | 0.00 | 0 | 300.00 | 857 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 (85%/15% A/R Split) *Edited labor rate |
| R.7 | Line Clearance: Tree Trimming: Mowing | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 7.0 | 20 | 90.00 | 1,800 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 (85%/15% A/R Split) *Edited labor rate |
| R.8 | Matting in laydown/marshalling yards | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 26.0 | 74 | 90.00 | 6,686 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 (85%/15% A/R Split) *Edited labor rate |
| R.9 | Foremen (Field Supervision) | 74 | weeks | 0 | 0.0 | 0 | 0.00 | 0 | 8.0 | 594 | 90.00 | 53,486 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | (85%/15% A/R Split) |
| R.10 | Operations Services Foreman | 3 | day | 0 | 0.0 | 0 | 0.00 | 0 | 1.0 | 3 | 90.00 | 257 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | (85%/15% A/R Split) |
| R.11 | Snow Removal Allowance | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 3,000.00 | 8,571 | \$20,000 Allowance, split 85% A, 15% R |
| R.12 | Additional Allowance for Tower Removal | 40 | str | 0 | 5.0 | 200 | 60.00 | 12,000 | 8.0 | 320 | 60.00 | 19,200 | 0 | 0 | 0 | 0 | 5,000.00 | 200,000 | |
| | | | | 3,324 | | | | 12,000 | | | | 82,200 | | 0 | | 11,143 | | 840,914 | |

Manhours Monthly Payroll: 200
Manhours Weekly Payroll: 1,020

Part 3: Cost Estimate Summary

ADDITIONS SUMMARY:

| Incurred To-Date: | | | |
|----------------------------------|--------------------|---|---|
| Raw Costs Incurred To-Date: | \$568,646 | | |
| Overhead Costs Incurred To-Date: | \$336,431 | <i>This figure must be manually entered if applicable</i> | |
| AFUDC Costs Incurred To-Date: | \$823 | <i>This figure must be manually entered if applicable</i> | |
| Subtotal Costs To-Date: | \$905,900 | | |
| Estimated Future Raw Costs: | \$5,590,446 | | |
| Estimated Future Overheads: | \$751,604 | | |
| Estimated Future AFUDC: | \$369,384 | | |
| Subtotal Future Costs: | \$6,711,433 | | |
| Contingency Applied: | \$761,733 | 10.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL ADDITIONS: | \$8,379,067 | | |

REMOVALS SUMMARY:

| Incurred To-Date: | | | |
|----------------------------------|--------------------|---|---|
| Raw Costs Incurred To-Date: | \$3,324 | | |
| Overhead Costs Incurred To-Date: | \$2,669 | <i>This figure must be manually entered if applicable</i> | |
| Subtotal Costs To-Date: | \$5,993 | | |
| Estimated Future Raw Costs: | \$946,257 | | |
| Estimated Future Overheads: | \$116,507 | | |
| Subtotal Future Costs: | \$1,062,764 | | |
| Contingency Applied: | \$106,876 | 10.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL REMOVALS: | \$1,175,632 | | |

GRAND TOTAL ADDITIONS + REMOVALS: \$9,554,699

Assumptions, Notes, Clarifications, etc.:

This Q Line Tower Section estimate is based on the definitive estimate for the SB and I Line Rail Trail Section of the H&SB Rebuild. The SB estimate was used as a direct correlation for the Q Line portion, while the X portion was similarly based on the I component. Structure size, style and loading for the SB&I is assumed to be comparable for the Q/X. However, for the SB&I the span lengths are limited by the distribution underbuild, which results in a higher density of transmission structures per mile of line. To account for this, the SB & I costs were extrapolated for the Q & X (respectfully), on a per structure rather than per miles basis. Nearly the entire estimate is based on this assumption, with the only differences being:

- Removed the transferred preconstruction costs, since these are accounted for in the separate Q Line 115kV Rebuild - Pole Section estimate.
- Allowance for additional removal costs for the existing lattice towers on the Q & X that are not present on the SB & I.
- 10% contingency. Greater than SB&I contingency (5%) because the costs are just a similar example and not specific to the Q & X project, but lower than the Q Line Pole Section (20%) because this is based on the definitive estimate for a comparable project.

This estimate does not account for any modification, replacement or reconductor of the tower section between the East Park Tap and the Inwood Avenue Substation.



Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

I Line Structures 14
X Line Structures 40
I -> X Factor 2.857

Project Name: X-Line Partial Rebuild w/ Q Line Date: 12/5/2022 WO #: TBD
 Prepared By: Sam Pozorski (factored C. Rottkamp I Line estimate) Revision(s): 1
 Cost Estimate Level: Conceptual Estimate +/-30% Accuracy... There is a general scope but few details available. Little or no design work completed yet.

Part 1: Additions

* All unit and total cost figures should be "raw costs", without any overhead markups. Markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | | | | | |
|---|---|----------|--------|-------------------------|--------------------------|-------|---------|--------|-------------------------|-------|---------|---------|------------------|---------|------------------------------------|---------|--------------------------------------|-----------|-------|---|---|--|-----------|--|
| | | | | through 9/12/2022 | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | | | | | |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | | | | | | |
| A.1 | Raw Costs Accrued To-Date in Work Order | 1 | Isum | 155,760 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per PowerPlan 9/12/2022 | | | |
| A.2 | Transmission Engineer - Construction | 74 | weeks | 0 | 13.5 | 1,003 | 71.00 | 71,203 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Kyle B. email 8/5/2022 (27 hrs/week split between SB-Line and I-Line) | | | |
| A.3 | Transmission Engineer - Administration | 74 | weeks | 0 | 4.0 | 297 | 71.00 | 21,097 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Kyle B. email 8/5/2022 | | | |
| A.4 | Engineering - Survey for Sagging | 9 | days | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 750.00 | 6,429 | 0 | Per Kyle B. email 8/5/2022 (\$1,500/day split between SB-Line and I-Line) | | | | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | | | | | | |
| B.1 | Project Manager - Preconstruction Phase | 11 | weeks | 0 | 0.0 | 0 | 71.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Anticipate all PM time being charged to SB-Line | | | |
| B.2 | Project Manager - Construction Phase | 74 | weeks | 0 | 0.0 | 0 | 71.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Anticipate all PM time being charged to SB-Line Rail Trail Section | | | |
| B.3 | Project Manager - Restoration/Closeout | 17 | weeks | 0 | 0.0 | 0 | 71.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Anticipate all PM time being charged to SB-Line Rail Trail Section | | | |
| B.4 | Env. Affairs - Preconstruction Phase | 11 | weeks | 0 | 0.0 | 0 | 71.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Anticipate all Env. Affairs time being charged to SB-Line Rail Trail Section | | | |
| B.5 | Env. Affairs - Construction Phase | 74 | weeks | 0 | 0.0 | 0 | 71.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Anticipate all Env. Affairs time being charged to SB-Line Rail Trail Section | | | |
| B.6 | Env. Affairs - Restoration/Closeout | 17 | weeks | 0 | 0.0 | 0 | 71.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Anticipate all Env. Affairs time being charged to SB-Line Rail Trail Section | | | |
| B.7 | Real Property Services Support | 0 | weeks | 0 | 0.0 | 0 | 71.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per discussions with Kate W. 9/8/22, we do not anticipate any further Real Property support on the WO. | | | |
| B.8 | Vegetation Manager | 3 | Isum | 0 | 0.0 | 0 | 71.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Little anticipated; Assume any veg. management will only be charged to SB-Line Rail Trail | | | |
| B.9 | Daily Environmental Monitor, Construction | 409 | days | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Anticipate all environmental monitor time to be charged to SB-Line Rail Trail Section | | | |
| B.10 | SWPPP Inspections Post-Construction | 11 | days | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Anticipate all SWPPP inspection work to be charged to SB-Line Rail Trail Section | | | |
| B.11 | Env. Consultant Support As-Needed | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Any consulting support work required would most likely be charged to SB-Line Rail Trail Section | | | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | | | | | | |
| C.1 | Marshalling Yard Lease "Duke's Pit" | 17 | months | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 400.00 | 6,857 | 0 | 0 | Distribution of \$1,000/month lease provided by Pat H. 9/8/22 | | | |
| C.2 | CHG&E Trailer, Storage, Rent, Sanitary | 31 | weeks | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 170.00 | 5,343 | 0 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022; Weeks = 26x39.2% per Pat H. | | | |
| C.3 | Marshalling Yard/Laydown Improvements | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 17.0 | 49 | 90.00 | 4,371 | 0.00 | 0 | 1,700.00 | 4,857 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 (85%/15% A/R Split) *Edited labor rate | | | |
| C.4 | Matting in laydown/marshalling yards | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 125.0 | 357 | 90.00 | 32,143 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 (85%/15% A/R Split) *Edited labor rate | | | |
| C.5 | Snow Removal Allowance | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 17,000.00 | 48,571 | 0 | 0 | \$20,000 Allowance, split 85% A, 15% R | | | |
| C.6 | Security (lighting; signage; fencing, etc.) | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 40.0 | 114 | 90.00 | 10,286 | 0.00 | 0 | 2,000.00 | 5,714 | 0.00 | 0 | 0.00 | 0 | | | | |
| C.7 | Surveying Offsets & Remarkings as needed | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 4,000.00 | 11,429 | 0 | 0 | Initial survey markouts already in costs incurred to-date | | | |
| C.8 | Miscellaneous Expenses | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 500.00 | 1,429 | 1,000.00 | 2,857 | 1,000.00 | 2,857 | 0 | 0 | | | | |
| D MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | | | | | | |
| D.1 | BILL OF MATERIALS Estimate | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 7,489.00 | 21,397 | 189,251.00 | 540,717 | 0.00 | 0 | 0.00 | 0 | See spreadsheet by Kyle B. 8/5/22: Reduced Stock Material by \$35,403 already charged to WO | | | |
| E CONSTRUCTION | | | | | | | | | | | | | | | | | | | | | | | | |
| E.1 | Construction Bid / Contract Award | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 1,048,152.00 | 2,994,720 | 0 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 | | | |
| E.2 | Line Clearance; Tree Trimming; Mowing | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 67.0 | 191 | 90.00 | 17,229 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 (85%/15% A/R Split) *Edited labor rate | | | |
| E.3 | Flagging | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 10.0 | 29 | 90.00 | 2,571 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022; *Edited labor rate | | | |
| E.4 | Foremen (Field Supervision) | 74 | weeks | 0 | 0.0 | 0 | 0.00 | 0 | 37.0 | 2,749 | 90.00 | 247,371 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | (85%/15% A/R Split) | | | |
| E.5 | Operations Services Foreman | 3 | day | 0 | 0.0 | 0 | 0.00 | 0 | 7.0 | 20 | 90.00 | 1,800 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | (85%/15% A/R Split) | | | |
| E.6 | T&D Field Clerk | 6 | day | 0 | 0.0 | 0 | 0.00 | 0 | 8.0 | 46 | 71.00 | 3,246 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022; *Edited labor rate | | | |
| E.7 | Operations Services Electricians Switching | 3 | Isum | 0 | 0.0 | 0 | 0.00 | 0 | 64.0 | 183 | 71.00 | 12,983 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022; *Edited labor rate | | | |
| E.8 | T&D General Supervision | 74 | weeks | 0 | 7.0 | 520 | 71.00 | 36,920 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022; *Edited labor rate | | | |
| E.9 | T&D Engineer | 74 | weeks | 0 | 8.5 | 631 | 71.00 | 44,831 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022; *Edited labor rate | | | |
| E.10 | T&D Planner | 74 | weeks | 0 | 1.7 | 126 | 71.00 | 8,966 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022; *Edited labor rate | | | |
| | | | | 155,760 | | | | | 183,018 | | | | | 332,000 | | | 22,826 | | | 554,146 | | | 3,076,206 | |
| | | | | | | | | | 2,578 | | | | | 3,737 | | | | | | | | | | |
| | | | | | Manhours Monthly Payroll | | | | Manhours Weekly Payroll | | | | | | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|--------------------------------|----------|-------|-------------------------|--------------------|----|---------|------|--------------------|----|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|
| | | | | through 9/12/2022 | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |

Part 2: Removals

* All unit and total cost figures should be "raw costs", without any overhead markups. All markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|------|---|----------|--------|-------------------------|--------------------|-----|---------|--------|--------------------|-----|---------|--------|------------------|------|------------------------------------|--------|--------------------------------------|---------|---|
| | | | | through 9/12/22 | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |
| R.1 | Raw Costs Accrued To-Date in Work Order | 1 | lsum | 6,571 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per PowerPlan 9/12/2022 |
| R.2 | Construction Bid / Contract Award | 3 | lsum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 184,968.00 | 528,480 | Per Pat H. detailed construction cost estimate received 7-6-2022 |
| R.3 | Marshalling Yard Lease "Duke's Pit" | 17 | months | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 100.00 | 1,714 | Distribution of \$1,000/month lease provided by Pat H. 9/8/22 |
| R.4 | CHG&E Trailer, Storage, Rent, Sanitary | 31 | weeks | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 30.00 | 943 | Per Pat H. detailed construction cost estimate received 7-6-2022: Weeks = 26x39.2% per Pat H. |
| R.5 | 30 CY Dumpsters | 9 | each | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 1,200.00 | 10,286 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 |
| R.6 | Marshalling Yard/Laydown Improvements | 3 | lsum | 0 | 0.0 | 0 | 0.00 | 0 | 3.0 | 9 | 90.00 | 771 | 0.00 | 0 | 300.00 | 857 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 (85%/15% A/R Split) *Edited labor rate |
| R.7 | Line Clearance: Tree Trimming: Mowing | 3 | lsum | 0 | 0.0 | 0 | 0.00 | 0 | 12.0 | 34 | 90.00 | 3,086 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 (85%/15% A/R Split) *Edited labor rate |
| R.8 | Matting in laydown/marshalling yards | 3 | lsum | 0 | 0.0 | 0 | 0.00 | 0 | 22.0 | 63 | 90.00 | 5,657 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | Per Pat H. detailed construction cost estimate received 7-6-2022 (85%/15% A/R Split) *Edited labor rate |
| R.9 | Foremen (Field Supervision) | 74 | weeks | 0 | 0.0 | 0 | 0.00 | 0 | 6.5 | 483 | 90.00 | 43,457 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | (85%/15% A/R Split) |
| R.10 | Operations Services Foreman | 3 | day | 0 | 0.0 | 0 | 0.00 | 0 | 1.0 | 3 | 90.00 | 257 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | (85%/15% A/R Split) |
| R.11 | Snow Removal Allowance | 3 | lsum | 0 | 0.0 | 0 | 0.00 | 0 | 0.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 3,000.00 | 8,571 | \$20,000 Allowance, split 85% A, 15% R |
| R.12 | Additional Allowance for Tower Removal | 40 | str | 0 | 5.0 | 200 | 60.00 | 12,000 | 8.0 | 320 | 60.00 | 19,200 | 0 | 0 | 0 | 0 | 5,000.00 | 200,000 | |
| | | | | 6,571 | | | | 12,000 | | | | 72,429 | | | 0 | | 11,143 | 739,709 | |
| | | | | | | 200 | | | | 911 | | | | | | | | | |

Manhours Monthly Payroll

Manhours Weekly Payroll

Part 3: Cost Estimate Summary

ADDITIONS SUMMARY:

Incurred To-Date:

| | | |
|----------------------------------|--------------------|---|
| Raw Costs Incurred To-Date: | \$155,760 | |
| Overhead Costs Incurred To-Date: | \$82,134 | <i>This figure must be manually entered if applicable</i> |
| AFUDC Costs Incurred To-Date: | \$0 | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$237,894 | |
| Estimated Future Raw Costs: | \$4,168,195 | |
| Estimated Future Overheads: | \$705,031 | |
| Estimated Future AFUDC: | \$243,556 | |
| Subtotal Future Costs: | \$5,116,782 | |
| Contingency Applied: | \$535,468 | 10.0% <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL ADDITIONS: | \$5,890,143 | |

REMOVALS SUMMARY:

Incurred To-Date:

| | | |
|----------------------------------|--------------------|---|
| Raw Costs Incurred To-Date: | \$6,571 | |
| Overhead Costs Incurred To-Date: | \$66 | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$6,637 | |
| Estimated Future Raw Costs: | \$835,280 | |
| Estimated Future Overheads: | \$122,403 | |
| Subtotal Future Costs: | \$957,683 | |
| Contingency Applied: | \$96,432 | 10.0% <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL REMOVALS: | \$1,060,752 | |

GRAND TOTAL ADDITIONS + REMOVALS: \$6,950,896

Assumptions, Notes, Clarifications, etc.:

This X Line Tower Section estimate is based on the definitive estimate for the SB and I Line Rail Trail Section of the H&SB Rebuild. The SB estimate was used as a direct correlation for the Q Line portion, while the X portion was similarly based on the I component. Structure size, style and loading for the SB&I is assumed to be comparable for the Q/X. However, for the SB&I the span lengths are limited by the distribution underbuild, which results in a higher density of transmission structures per mile of line. To account for this, the SB & I costs were extrapolated for the Q & X (respectfully), on a per structure rather than per miles basis. Nearly the entire estimate is based on this assumption, with the only differences being:

- Removed the transferred preconstruction costs, since these are accounted for in the separate Q Line 115kV Rebuild - Pole Section estimate.
- Allowance for additional removal costs for the existing lattice towers on the Q & X that are not present on the SB & I.
- 10% contingency. Greater than SB&I contingency (5%) because the costs are just a similar example and not specific to the Q & X project, but lower than the Q Line Pole Section (20%) because this is based on the definitive estimate for a comparable project.

This estimate does not account for any modification, replacement or reconductor of the tower section between the East Park Tap and the Inwood Avenue Substation.



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|-------------------------------|
| Project/Program Name: Removal of SD/SJ and WM Tap Lines | | Work Order #: | <input type="text" value=""/> |
| Budget Group: Electric | Budget Category: 12 | Funding Project Number: | PEND |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 6/1/2023 | In-Service: | 12/31/3025 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
N/A

Describe the project objective and scope of work:

These lines were constructed in the early 1900's as a tie between Central Hudson and neighboring New Jersey Power & Light and Orange & Rockland Utilities. These lines are currently used to reserve New Jersey load post-contingency and for maintenance conditions and provide no benefit to Central Hudson's transmission system. Given their age these lines are scheduled to be decommissioned and retired.

Describe specific scope exclusions, assumptions and constraints:

Conceptual Project assumptions do not assume special provisions for access, matting, environmental controls or permitting.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Central Hudson is currently in the process of creating an RFP of Sale for the SD & SJ Lines. Once finalized, these line will then be either sold or retired. Central Hudson is also in discussion with Orange & Rockland Utilities regarding the timeline for retirement of the WM Line Tap pending completion of system improvements at the Blooming Grove Substation. Exact schedule will be determined as part of those discussions.

Why was the proposed project scope chosen over other alternatives?

Retirement or sale of the lines is based on current and/or future need and discussions with the neighboring interconnected utility that they serve. As these lines serve no benefit to Central Hudson Customers rebuilding them would be based mostly on the needs of the interconnected utility.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Compelling the project in the requested timeframe will reduce the risk of an aged asset failing unexpectedly and potentially causing damage to private property and/or requiring a costly unplanned repair.

What are the risks and consequences of not completing this project?

The longer the old assets remain in place, the more elevated risk of failure

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|---|----------------------------------|---|-----------------------------------|------------------|---|-------------|-------------|-------------|--------------|
| | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| \$2,874,000 | | | | | | | | | |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 279,000 | 28,900 | 129,500 | 120,600 | | | | |
| | Contractors (A/P tax exempt) | 2,511,000 | 260,100 | 1,165,500 | 1,085,400 | | | | |
| | Overheads | 84,000 | | 30,000 | 54,000 | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 2,874,000 | 289,000 | 1,325,000 | 1,260,000 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|------------------|------------------|----------|
| Current Approved Rate Case Funding (\$): | 3,122,000 | 3,122,000 | 0 |
|---|------------------|------------------|----------|

2021-2023 2024

Prior years funding;
not actuals.



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Specific project details relevant to the removal of the structures is still unknown such as environmental and access constraints and local permitting.

Basis for estimate: Historical Unit Pricing; Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Base estimate for the removal of the towers in 2023-2025 is based on the removal of 155 structures (88 on the SD/SJ and 67 on the WM Tap) at a per structure Pro-Forma removal cost of \$18K which includes provisions for internal labor, permitting approvals, etc....

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Estimates assumes a 90/10 split for AP and internal labor charges.



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|-----------------------------------|
| Project/Program Name: 69kV GM Line: Retirement of Clinton Avenue Tap Section | | Work Order #: | <input type="text" value=""/> |
| Budget Group: Electric | Budget Category: 12 | Funding Project Number: | <input type="text" value="PEND"/> |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 1/1/2025 | In-Service: 12/31/2025 | |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
 There will potentially be other Cat#13 and Cat#15 Work Orders required to re-route the existing distribution circuits being fed from Clinton Avenue and to retire the Substation. This would also include upgrades to the Greenfield Road Substation.

Describe the project objective and scope of work:
 Central Hudson's 69kV GM Line currently runs between the Honk Falls and Greenfield Road Substations with a 1.75 mile long tap section that provides service to the Clinton Avenue Substation. The Clinton Avenue Substation was constructed in the late 1950's and has reached the end of its useful life. Planning is evaluating a project to retire the Clinton Avenue Substation and transfer the relevant load to other local distribution circuits. This project will cover the removal of the transmission tap section.

Describe specific scope exclusions, assumptions and constraints:
 Conceptual Project assumptions do not assume special provisions for access, matting, environmental controls or permitting.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Please see Planning memo for alternatives considered.

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Completing the project in the requested timeframe will reduce the risk of an aged asset failing unexpectedly and causing damage to private property.

What are the risks and consequences of not completing this project?

The longer the old assets remain in place, there is an elevated risk of failure.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|-------------|-------------|-------------|--------------|
| \$650,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 5,700 | | | 5,700 | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 14,250 | | | 14,250 | | | | |
| | Contractors (A/P tax exempt) | 37,050 | | | 37,050 | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 57,000 | 0 | 0 | 57,000 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 59,300 | | | 59,300 | | | | |
| | Contractors (A/P tax exempt) | 533,700 | | | 533,700 | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 593,000 | 0 | 0 | 593,000 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------------|----------|----------------|
| Current Approved Rate Case Funding (\$): | 650,000 | 0 | 650,000 |
|---|----------------|----------|----------------|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Specific project details relevant to the removal of the structures is still unknown such as environmental and access constraints and local permitting.

Basis for estimate: Historical Data + Job Specific Adjustments; Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Conceptual Project Cost Estimate assumes a proforma of approximately \$300K per mile for the removal of the tap line and in the installation of (1) new structure at the connection of the tap with the remaining portion of the 69kV GM Line.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Estimates assumes a 90/10 split for AP and internal labor charges related to the removal of the line. For the installation of the new structure, an averaged historical percentage split per project of Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively was used.



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|--------------------|
| Project/Program Name: 115kV SK Line Rebuild | | Work Order #: | 1 4 9 1 - K |
| Budget Group: Electric | Budget Category: 12 | Funding Project Number: | 10400 |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 6/1/2022 | In-Service: | 12/31/2029 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

There may be other supporting Cat#13 work orders related to connection work at both the Knapp's Corners and Spackenkill Substations associated with the rebuild of the transmission line.

Describe the project objective and scope of work:

Field inspection findings on the 2.4 mile 115kV "SK" Line (Knapp's Corners Substation - Spackenkill Road Substation) showed that over 75% of the existing structure plant would require replacement due to component defects with an additional 5% of structures exhibiting significant defects. Recent Right-of-Way deficiency surveys have also indicated that the line is currently offset within the existing 100ft-wide easement corridor creating a deficiency to one side. Given the level of replacement needed to repair the identified component defects, as well as the need to address the identified deficiencies, it has been proposed to rebuild all 2.4 miles of the existing 115kV "SK" Line. This would include replacement of all structures, conductor and overhead ground wire while allowing the re-alignment of the centerline to the middle of the existing R.O.W to correct the identified deficiencies without the need to pursue additional easement rights from private landowners.

Describe specific scope exclusions, assumptions and constraints:

Detailed design and permitting work has not been completed. Estimates to date do not account for specific conditions related to matting, access, permitting, outage constraints, etc...

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Direct replacement of the existing structures showing actionable conditions was considered initially. However, the results of a ROW deficiency study showed a general lack of easement on one side of the line and a surplus on the other. In an attempt to solve both issues, rebuilding the line in the center of the existing corridor was chosen as the preferred option to mitigate both the infrastructure and ROW related deficiencies.

Why was the proposed project scope chosen over other alternatives?

The rebuild was chosen as it was unlikely without the use of condemnation to acquire the level of ROW required along the entire length of the line. When also considering the overall vintage of the line along with the ROW issues, the rebuild option proved to be a better option.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Given the conditions identified as part of the inspection process, it is important to complete the project to reduce the risk of an in-service failure.

What are the risks and consequences of not completing this project?

Delaying the project would increase the risk of an unplanned outage and subsequent repair.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$6,022,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 548,400 | 2,000 | | | 10,000 | 20,000 | 20,000 | 496,400 |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 1,366,000 | | | | 25,000 | 50,000 | 50,000 | 1,241,000 |
| | Contractors (A/P tax exempt) | 3,551,600 | | | | 65,000 | 130,000 | 130,000 | 3,226,600 |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 61,000 | | | | 9,000 | 21,000 | 31,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 5,527,000 | 2,000 | 0 | 0 | 109,000 | 221,000 | 231,000 | 4,964,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 49,500 | | | | | | | 49,500 |
| | Contractors (A/P tax exempt) | 445,500 | | | | | | | 445,500 |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 495,000 | 0 | 0 | 0 | 0 | 0 | 0 | 495,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|------------------|----------------|----------------|
| Current Approved Rate Case Funding (\$): | 271,000 | 158,000 | 113,000 |
| | 2021-2023 | | 2024 |

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 4,215,400 Maximum (\$): 7,828,600

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

No explanation on confidence level required.

Permitting, material and construction costs may vary causing a potential variance in the pro-forma estimate. A more accurate estimate will be created upon completion of preliminary design work.

Basis for estimate: Historical Proforma Pricing; Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Please see provided estimate for details on assumptions. Cost figures were based on historical costs for projects of similar construction and permitting requirements.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

The cost breakdown provided is estimated based on an averaged historical percentage split per project of Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively. Removals were split based on a 90%/10% split of Contractor (AP) and Monthly Labor respectively.



Project Name: SK Line Rebuild - Part 102 115kV
 Prepared By: John Dittmann
 Cost Estimate Level: Preliminary Estimate

Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

Date: 01/03/2023
 Revision(s): 0
 WO #: 1491-K

Rebuild Length
2.3 miles

+/-20% accuracy... design underway but not yet complete. Still lacking some significant details.

Part 1: Additions

* All unit and total cost figures should be "raw costs", without any overhead markups. Markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|---|---|----------|----------|-------------------------|--------------------|-----|---------|---------|--------------------|-------|---------|---------|------------------|---------|------------------------------------|------------|--------------------------------------|-----------|-------|--|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | | |
| A.1 | Engineering Design -121 | 2 | miles | | 348.4 | 801 | 71.00 | 56,895 | | | 0 | | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.2 | Engineering Supervision; Project Sponsor -310 | 2 | miles | | 6.5 | 15 | 71.00 | 1,069 | | | 0 | | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.3 | Drafting - 132 | 2 | miles | | | | | 0 | 49.7 | 114 | 71.00 | 8,110 | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.4 | ESP - 125 | 2 | miles | | 7.8 | 18 | 71.00 | 1,274 | | | 0 | | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) x1.5 for 115kV upgrade |
| A.5 | Planning - 126 | 2 | miles | | 25.1 | 58 | 71.00 | 4,091 | | | 0 | | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) x1.5 for 115kV upgrade |
| A.6 | Misc Internal Support | 2 | miles | | 4.7 | 11 | 71.00 | 772 | | | 0 | | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.7 | LIDAR | 2 | miles | | | | | 0 | | | 0 | | | 0 | | | 2,400.00 | 5,520 | 0 | pre/post project LIDAR flights |
| A.8 | Engineering and Related Contractors | 2 | miles | | | | | 0 | | | 0 | | | 0 | | | 22,512.60 | 51,779 | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.9 | | | | | | | | 0 | | | 0 | | | 0 | | | | | 0 | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | | |
| B.1 | Environmental Consultant | 2 | miles | | | | | 0 | | | 0 | | | 0 | | | 40,409.60 | 92,942 | 0 | Avg of G, CL, TV, KM, EF, HF ignored due to short length and high cost. H&SB and A&C ignored due to Article VII. +10% |
| B.2 | Legal Consultant | 2 | miles | | | | | 0 | | | 0 | | | 0 | | | 57,532.20 | 132,324 | 0 | Avg of G, TV, KM, +10% CL, EF, HF ignored due to lack of significant legal costs. Varies significantly with PMO approach and municipalities. |
| B.3 | Project Manager - 110 | 2 | miles | | 202.3 | 465 | 71.00 | 33,031 | | | 0 | | | 0 | | | | | 0 | Avg of G, EF, HF, CL, TV, KM \$/mile to hrs/mile +10% |
| B.4 | Environmental - 726 | 2 | miles | | 55.5 | 128 | 71.00 | 9,059 | | | 0 | | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| B.5 | Real Property Services - 124 | 2 | miles | | 48.2 | 111 | 71.00 | 7,877 | | | 0 | | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| B.6 | System Ops - 330 | 2 | miles | | 13.6 | 31 | 71.00 | 2,227 | 18.6 | 43 | 71.00 | 3,035 | | 0 | | | | | 0 | Avg of G, EF, HF, CL, TV. +10% |
| B.7 | | | | | | | | 0 | | | 0 | | | 0 | | | | | 0 | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | | |
| C.1 | Surveying/Staking | 2 | miles | | | | | 0 | | | 0 | | | 0 | | | 22,647.90 | 52,090 | 0 | Avg of G, EF, HF, CL, TV. +10% |
| C.2 | Easements/Access Right/Laydown Yards | 2 | miles | | | | | 0 | | | 0 | | | 0 | | | 21,116.70 | 48,568 | 0 | Avg of G, EF, HF, CL, TV, KM, H&SB, A&C. +10% |
| C.3 | Filing Fees | 2 | miles | | | | | 0 | | | 0 | | | 0 | | | 6,279.90 | 14,444 | 0 | Avg of G, EF, HF, CL, TV, KM. +10% |
| C.4 | Misc AP (excluding material) | 2 | miles | | | | | 0 | | | 0 | | | 0 | | | 9,227.90 | 21,224 | 0 | Avg of G, EF, HF, CL, TV. +10% |
| C.5 | | | | | | | | 0 | | | 0 | | | 0 | | | | | 0 | |
| C.6 | | | | | | | | 0 | | | 0 | | | 0 | | | | | 0 | |
| D MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | | |
| D.1 | Conductor 1033.5 Ortolan ACSR (30-50-164) | 38,254 | FT | | | | | 0 | | | 0 | | 4.55 | 174,054 | | | | | 0 | CME Quote 11/21/22. \$/FT for 1033.5 Ortolan. |
| D.2 | OPGW (30-50-205) | 13,116 | FT | | | | | 0 | | | 0 | | 3.34 | 43,839 | | | | | 0 | MMS price as of 12/5/22 |
| D.3 | Direct Embed Poles | 1 | 34 Poles | | | | | 0 | | | 0 | | | 0 | | 611,196.40 | 611,196 | 0 | 0 | SB PO#91505: 85' H4 Tangent Davit Item #5, 85' H4 for 2-Pole Item #19 +10% for additional 5' (no example) |
| D.4 | Moderate Engineered Structures | 1 | Str | | | | | 0 | | | 0 | | | 0 | | 42,500.00 | 42,500 | 0 | 0 | |
| D.5 | 115kV Tangent Braced Post Structure | 30 | Str | | | | | 0 | | | 0 | | 2,000.00 | 60,000 | | | | | 0 | Estimated, HF-\$1,600 |
| D.6 | 115kV Swing Angle Structure | 2 | Str | | | | | 0 | | | 0 | | 3,262.87 | 6,526 | | | | | 0 | SS Cost as of 11/4/22 |
| D.7 | 115kV Deadend Structure | 3 | Str | | | | | 0 | | | 0 | | 9,155.63 | 27,467 | | | | | 0 | SS Cost as of 11/4/22 |
| D.8 | Crossarms and X-Braces for 2-poles | 2 | Str | | | | | 0 | | | 0 | | 1,238.00 | 2,476 | 1,850.00 | 3,700 | | | 0 | 34-79-006,008,009 MMS \$ as of 11/7/22 |
| D.9 | Misc Material | 36 | str | | | | | 0 | | | 0 | | 500.00 | 18,000 | 250.00 | 9,000 | | | 0 | |
| E CONSTRUCTION | | | | | | | | | | | | | | | | | | | | |
| E.1 | Line Construction | 2 | miles | | | | | 0 | | | 0 | | | 0 | | | 414,439.30 | 953,210 | 0 | Avg of recent Part 102s (EF/HF/CL/TV). +15% for 115kV Upgrade |
| E.2 | Moderate Drilled Pier Foundations | 1 | Str | | | | | 0 | | | 0 | | | 0 | | | 187,500.00 | 187,500 | 0 | |
| E.3 | Drilling / Site Work / Matting / Access / Trimming / Restoration / etc. | 2 | miles | | | | | 0 | | | 0 | | | 0 | | | 518,171.60 | 1,191,795 | 0 | Avg of Part 102s (G/EF/HF/CL/TV). Combined all associated costs because of overlap between contractors. +15% for 115kV Upgrade |
| E.4 | Equipment Moves/Rentals | 2 | miles | | | | | 0 | | | 0 | | | 0 | | | 6,747.40 | 15,519 | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.5 | T&D Foreman - 215 | 2 | miles | | | | | 0 | 485.0 | 1,116 | 71.00 | 79,202 | | 0 | | | | | 0 | Avg of recent Part 102s (CL/TV) with foreman more solely dedicated to project. +10% |
| E.6 | T&D Engineer, Planner, Director - 215 | 2 | miles | | 130.5 | 300 | 71.00 | 21,307 | | | 0 | 0.00 | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.7 | OS Foreman - 221 | 2 | miles | | | | | 0 | 6.8 | 16 | 71.00 | 1,105 | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.8 | Storekeepers - 223 | 2 | miles | | | | | 0 | 2.1 | 5 | 71.00 | 335 | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.9 | Mechanics - 224 | 2 | miles | | | | | 0 | 29.8 | 69 | 71.00 | 4,865 | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.10 | Electricians - 225 | 2 | miles | | | | | 0 | 40.1 | 92 | 71.00 | 6,554 | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.11 | Substation Technicians - 226 | 2 | miles | | | | | 0 | 90.5 | 208 | 71.00 | 14,778 | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.12 | District Line Crews | 2 | miles | | | | | 0 | 19.8 | 45 | 71.00 | 3,230 | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.13 | Misc WP | 2 | miles | | | | | 0 | 1.6 | 4 | 71.00 | 254 | | 0 | | | | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| | | | | | 0 | | | 137,602 | | | 1,711 | 121,468 | | 332,361 | | | 666,396 | 2,766,916 | | |
| | | | | | | | | | 1,938 | | | | | | | | | | | |

Manhours Monthly Payroll Manhours Weekly Payroll

Copy to: Mr. B Arteta
Mr. P. E. Haering
Mr. P. Harpolis
Mr. T. P. Burns
Mr. L. E. Mangels
Mr. B. Fuoco
Mr. B. DuBois
Mr. M. Campagna

Mr. K. D. Bragg
Mr. W. J. Mancroni
Mr. D. Schultz
Mr. M. D. James
Mr. G. H. Yozzo
Mr. C. Hay
E. P. #2020-001

February 21, 2020

Mr. H. W. Turner

115 kV SK Line Rebuild

Recommendations

For the reasons discussed in the body of this memo, Electric Transmission Planning recommends the following:

- The 115 kV SK line be rebuilt with 1033.5 ACSR Ortolan conductor.
- For communication, OPGW should be installed on the SK line with 144 single mode fiber.
- The SK line rebuild should be completed and in-service by December 2023.
- Replace the 795 ACSR and 1272 AAC station connections at Spackenkill with a larger size station connections such that the connections do not limit the line conductor.
- For the Knapps Corners substation rebuild, use 1590 ACSR or 1590 AAC for the substation station connections as well as the connections to the SK line breakers and switches.

Background

The 115 kV Knapps Corners to Spackenkill line, was built in 1965 with 795 ACSR Tern, totaling approximately 2.4 miles of circuit length. There are 37 structures on the SK Line. Of the 32 wood structures, 14 have severity 5 defeats (requiring mitigation within one year of discovery), 14 have severity 4 defects (requiring mitigation within three years of discovery). Replacements or repairs are required for over 75% of the line's structures with an additional 5% containing significant defects, justifying a complete line rebuild.

Conductor Consideration

Two ACSR conductor sizes were considered for the SK Line rebuild, the existing 795 ACSR Tern and 1033.5 ACSR Ortolan. Factors such as thermal performance, net present value (NPV) of conductor losses and material cost of each conductor was reviewed to determine which conductor size would be most beneficial.

February 21, 2020; E. P. #2020-001

This rebuild will replace all existing wooden poles with steel poles and replace existing conductors with either new 795 ACSR Tern or 1033.5 ACSR Ortolan.

Thermal Performance

The following table shows the thermal ratings of the existing and proposed SK line conductors. While the 1033.5 ACSR Ortolan would increase the SK line conductor ratings by more than 15%, other limiting elements exist in the SK line path. The existing station connections and bushing CTs at Knapps Corners, as well as, the station connections at Spackenkill currently limit the facility ratings as shown in Attachment 1. The oil circuit breaker at Knapps Corners Substation¹ and 1272 AAC station connections at Spackenkill also would limit the 1033.5 ACSR “Ortolan” conductor.

| Overhead Conductor | | Summer (MVA) | | | Winter (MVA) | | |
|--------------------|------------------------------|--------------|-----|-----|--------------|-----|-----|
| | | Normal | LTE | STE | Normal | LTE | STE |
| Existing | 795 ACSR (45/7) “Tern” | 217 | 250 | 279 | 265 | 290 | 315 |
| Proposed | 795 ACSR (45/7) “Tern” | 217 | 250 | 279 | 265 | 290 | 315 |
| | 1033.5 ACSR (45/7) “Ortolan” | 255 | 294 | 333 | 310 | 341 | 375 |

Losses Analysis

The I²R losses associated with the proposed conductors vary based on their resistance. Larger conductors allow more capacity of current flow as a result of lower resistance, reducing the amount of line losses for the same current. An hourly loss analysis was performed for each proposed conductor. Future “Location Based Marginal Prices” (LBMP) for Zone G were obtained from Energy Resources and are shown in Attachment 2. Energy Resources took the average of the off peak and on peak pricing forecast to compute the average LBMP.

As shown in Attachment 2, price forecast was limited to a six year outlook. For the purpose of Transmission Planning, a 55 year price forecast of NYISO Zone G was drawn from a linear extrapolation based off the six year outlook. The estimated cost of losses calculated for proposed conductors over a 55 year period are shown below.

| Conductor Losses (NPV) | |
|------------------------|-----------|
| 795 ACSR Tern | \$137,635 |
| 1033.5 ACSR Ortolan | \$120,813 |

¹ The limitations at Knapps Corners Substation will be addressed as part of the rebuild, which is planned to be complete by June 2021.

The 1033.5 ACSR conductor would have approximately \$17,000 less NPV in losses than the 795 ACSR conductor over a 55 year period. The Net Present Value calculations are shown in Attachment 3 for 795 and 1033.5 ACSR conductors.

Cost Estimates

Transmission Design developed cost estimated for construction with the proposed 795 and 1033.5 ACSR conductors as shown in Attachment 4 and 5 respectively. A comparison of estimated project costs including addition/removal cost of the rebuild and net present value (NPV) of losses is shown in the following table.

| | 795 ACSR Tern | 1033.5 ACSR Ortolan |
|----------------|---------------|---------------------|
| Additions Cost | \$3,489,151 | \$3,520,191 |
| Removals Cost | \$255,366 | \$255,366 |
| Contingency | \$1,123,355 | \$1,132,667 |
| NPV Losses | \$137,635 | \$120,813 |
| Total Cost | \$5,005,507 | \$5,029,037 |

Based on the estimated cost of the HF Line rebuild and estimated losses of the proposed conductor, the cost difference between the 795 ACSR Tern and 1033.5 ACSR Ortolan is \$23,530, which is a minimal difference and within the accuracy of the estimates.

System Load Serving Capability (LSC)

With the planned rebuild of the HF line (East Fishkill to Fishkill Plains) to 1033.5 ACSR Q1 2020, the System Load Serving Capability will be 1660 MW, limited by the HF line following the loss of the EF line (East Fishkill – Shenandoah). The next limiting element is the M line (Pleasant Valley – Manchester), also following the loss of the EF line at a system load level of approximately 1760 MW. The 2019 summer peak is 1,109 MW. The rebuilt with 1033.5 ACSR SK line would limit the system LSC at approximately 3700 MW. No further consideration based on the system LSC is needed at this time.

Conclusion

Inspection reports indicate the SK Line is in poor condition with 75% of its structures requiring replacements or repairs with an additional 5% containing significant defects. To address these issues, a complete rebuild is warranted. Based on the above analysis, 1033.5 ACSR is the recommended conductor. In addition, the 795 ACSR and 1272 AAC station connections at Spackenkill Substation would limit the facility ratings and should be replaced.

Ruby Chan
 Ruby Chan
Ruby
R. Chan

CHGE Tie Line Ratings

Attachment #1

Linename SK **Voltage (kV):** 115 **Route:** Spackenkill - Knapps Corners

| Miles | Symbol | Description: | Equipment | Name-Plate | Summer | | | Winter | | |
|-----------------------|--------|-----------------|-------------------|------------|------------|-------------|---------------|-------------|-------------|-------------|
| | | | | | NORM | LTE | STE | NORM | LTE | STE |
| Spackenkill | | | | | | | | | | |
| | --+- | | Bus-Terminal | | | | | | | |
| | [G] | MC-200-SK | Breaker-SF6 | 3000A | 3120 | 3480 | 3990 | 3660 | 4020 | 4470 |
| | E+ | 2000/5 | CT-Bushing | 2000A | 4000 | 4000 | 4000 | 4000 | 4000 | 4000 |
| | E+ | 2000/5 | CT-Bushing | 2000A | 4000 | 4000 | 4000 | 4000 | 4000 | 4000 |
|  | \| | 1272 AAC 61STR | STA Connection | | 1167 | 1292 | 1525 | 1463 | 1557 | 1753 |
| | /a | SK-902 | Switch (30C rise) | 1200A | 1296 | 1836 | 2400 | 1692 | 2136 | 2400 |
|  | \| | 3.50" AL (IPS) | Bus Tube | | 2626 | 2938 | 3615 | 3406 | 3634 | 4199 |
| | <-+ | To Tr #2 | Tap Left | | | | | | | |
|  | \| | 3.50" AL (IPS) | Bus Tube | | 2626 | 2938 | 3615 | 3406 | 3634 | 4199 |
|  | \| | 1272 AAC 61STR | STA Connection | | 1167 | 1292 | 1525 | 1463 | 1557 | 1753 |
| | /a | SK-702 | Switch (30C rise) | 1200A | 1296 | 1836 | 2400 | 1692 | 2136 | 2400 |
|  | \| | 795 ACSR (45/7) | STA Connection | | <u>995</u> | 1153 * | <u>1303</u> | 1218 * | 1338 * | 1470 * |
| 2.36 | \| | 795 ACSR (45/7) | O/H Line | | 1091 | 1257 | <u>1400</u> | 1330 | 1458 | 1582 |
|  | \| | 795 ACSR (45/7) | STA Connection | | <u>995</u> | 1153 * | <u>1303</u> | 1218 * | 1338 * | 1470 * |
| | /a | SK-1604 | Switch (30C rise) | 1200A | 1296 | 1836 | 2400 | 1692 | 2136 | 2400 |
|  | \| | 795 ACSR (45/7) | STA Connection | | <u>995</u> | 1153 * | <u>1303</u> | 1218 * | 1338 * | 1470 * |
| | <-+ | To TR#1 | Tap Left | | | | | | | |
|  | \| | 795 ACSR (45/7) | STA Connection | | <u>995</u> | 1153 * | <u>1303</u> | 1218 * | 1338 * | 1470 * |
| | /a | SK-1557 | Switch (30C rise) | 1200A | 1296 | 1836 | 2400 | 1692 | 2136 | 2400 |
|  | \| | 795 ACSR (45/7) | STA Connection | | <u>995</u> | 1153 * | <u>1303</u> | 1218 * | 1338 * | 1470 * |
| | E+ | 1200/5 | CT-Bushing | 1200A | 1248 | 1392 | 1596 | 1464 | 1608 | 1788 |
| | [O] | KB-1558-SK | Breaker-Oil | 1200A | 1248 | 1392 | 1596 | 1464 | 1608 | 1788 |
| | E+ | 1200-800/5 | CT-Bushing | 980A | 1019 * | <u>1137</u> | <u>1303</u> * | <u>1196</u> | <u>1313</u> | <u>1460</u> |
|  | \| | 795 ACSR (45/7) | STA Connection | | <u>995</u> | 1153 * | <u>1303</u> | 1218 * | 1338 * | 1470 * |
| | /a | KB-1559 | Switch (30C rise) | 1200A | 1296 | 1836 | 2400 | 1692 | 2136 | 2400 |
|  | \| | 795 ACSR (45/7) | STA Connection | | <u>995</u> | 1153 * | <u>1303</u> | 1218 * | 1338 * | 1470 * |
| | --+- | | Bus-Terminal | | | | | | | |
| Knapps Corners | | | | | | | | | | |

2.36 : Total Miles **Minimum Amps:** 995 1137 1303 1196 1313 1460

Minimum MVA: 198 226 260 238 262 291

* Indicates the Thermal Rating for the next most limiting equipment

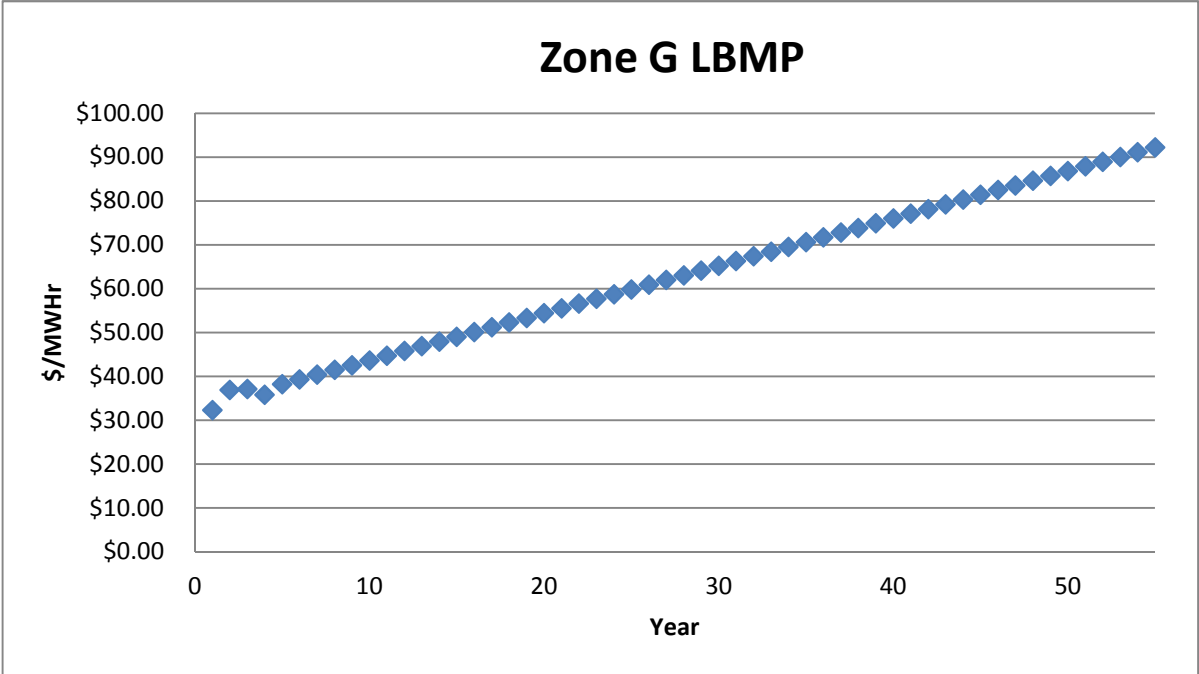
Comments:

20130919: Bus tube rating updated.
20101129: Added Spackenkill Substation

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From Energy Resources

| Year | Forecasted NYISO Zone G Price |
|------|-------------------------------|
| 2020 | \$30.75/MWH |
| 2021 | \$30.87/MWH |
| 2022 | \$32.32/MWH |
| 2023 | \$36.88/MWH |
| 2024 | \$37.11/MWH |
| 2025 | \$35.84/MWH |



795 ACSR

1033 ACSR

| Year | | Zone G LBMP | Sum Loss MWhr | Losses (\$) |
|------|----|-------------|---------------|-------------|
| 2022 | 1 | \$32.32 | 240.46 | \$7,771.74 |
| 2023 | 2 | \$36.88 | 240.46 | \$8,868.24 |
| 2024 | 3 | \$37.11 | 240.46 | \$8,923.55 |
| 2025 | 4 | \$35.84 | 240.46 | \$8,618.16 |
| 2026 | 5 | \$38.24 | 240.46 | \$9,194.07 |
| 2027 | 6 | \$39.31 | 240.46 | \$9,453.53 |
| 2028 | 7 | \$40.39 | 240.46 | \$9,712.99 |
| 2029 | 8 | \$41.47 | 240.46 | \$9,972.45 |
| 2030 | 9 | \$42.55 | 240.46 | \$10,231.91 |
| 2031 | 10 | \$43.63 | 240.46 | \$10,491.36 |
| 2032 | 11 | \$44.71 | 240.46 | \$10,750.82 |
| 2033 | 12 | \$45.79 | 240.46 | \$11,010.28 |
| 2034 | 13 | \$46.87 | 240.46 | \$11,269.74 |
| 2035 | 14 | \$47.95 | 240.46 | \$11,529.20 |
| 2036 | 15 | \$49.03 | 240.46 | \$11,788.66 |
| 2037 | 16 | \$50.10 | 240.46 | \$12,048.12 |
| 2038 | 17 | \$51.18 | 240.46 | \$12,307.58 |
| 2039 | 18 | \$52.26 | 240.46 | \$12,567.03 |
| 2040 | 19 | \$53.34 | 240.46 | \$12,826.49 |
| 2041 | 20 | \$54.42 | 240.46 | \$13,085.95 |
| 2042 | 21 | \$55.50 | 240.46 | \$13,345.41 |
| 2043 | 22 | \$56.58 | 240.46 | \$13,604.87 |
| 2044 | 23 | \$57.66 | 240.46 | \$13,864.33 |
| 2045 | 24 | \$58.74 | 240.46 | \$14,123.79 |
| 2046 | 25 | \$59.82 | 240.46 | \$14,383.24 |
| 2047 | 26 | \$60.89 | 240.46 | \$14,642.70 |
| 2048 | 27 | \$61.97 | 240.46 | \$14,902.16 |
| 2049 | 28 | \$63.05 | 240.46 | \$15,161.62 |
| 2050 | 29 | \$64.13 | 240.46 | \$15,421.08 |
| 2051 | 30 | \$65.21 | 240.46 | \$15,680.54 |
| 2052 | 31 | \$66.29 | 240.46 | \$15,940.00 |
| 2053 | 32 | \$67.37 | 240.46 | \$16,199.46 |
| 2054 | 33 | \$68.45 | 240.46 | \$16,458.91 |
| 2055 | 34 | \$69.53 | 240.46 | \$16,718.37 |
| 2056 | 35 | \$70.61 | 240.46 | \$16,977.83 |
| 2057 | 36 | \$71.68 | 240.46 | \$17,237.29 |
| 2058 | 37 | \$72.76 | 240.46 | \$17,496.75 |
| 2059 | 38 | \$73.84 | 240.46 | \$17,756.21 |
| 2060 | 39 | \$74.92 | 240.46 | \$18,015.67 |
| 2061 | 40 | \$76.00 | 240.46 | \$18,275.13 |
| 2062 | 41 | \$77.08 | 240.46 | \$18,534.58 |
| 2063 | 42 | \$78.16 | 240.46 | \$18,794.04 |
| 2064 | 43 | \$79.24 | 240.46 | \$19,053.50 |
| 2065 | 44 | \$80.32 | 240.46 | \$19,312.96 |
| 2066 | 45 | \$81.40 | 240.46 | \$19,572.42 |
| 2067 | 46 | \$82.47 | 240.46 | \$19,831.88 |
| 2068 | 47 | \$83.55 | 240.46 | \$20,091.34 |
| 2069 | 48 | \$84.63 | 240.46 | \$20,350.79 |
| 2070 | 49 | \$85.71 | 240.46 | \$20,610.25 |
| 2071 | 50 | \$86.79 | 240.46 | \$20,869.71 |
| 2072 | 51 | \$87.87 | 240.46 | \$21,129.17 |
| 2073 | 52 | \$88.95 | 240.46 | \$21,388.63 |
| 2074 | 53 | \$90.03 | 240.46 | \$21,648.09 |
| 2075 | 54 | \$91.11 | 240.46 | \$21,907.55 |
| 2076 | 55 | \$92.19 | 240.46 | \$22,167.01 |

| Year | | Zone G LBMP | Sum Loss MWhr | Losses (\$) |
|------|----|-------------|---------------|-------------|
| 2022 | 1 | \$32.32 | 211.07 | \$6,821.86 |
| 2023 | 2 | \$36.88 | 211.07 | \$7,784.35 |
| 2024 | 3 | \$37.11 | 211.07 | \$7,832.90 |
| 2025 | 4 | \$35.84 | 211.07 | \$7,564.83 |
| 2026 | 5 | \$38.24 | 211.07 | \$8,070.35 |
| 2027 | 6 | \$39.31 | 211.07 | \$8,298.10 |
| 2028 | 7 | \$40.39 | 211.07 | \$8,525.85 |
| 2029 | 8 | \$41.47 | 211.07 | \$8,753.59 |
| 2030 | 9 | \$42.55 | 211.07 | \$8,981.34 |
| 2031 | 10 | \$43.63 | 211.07 | \$9,209.09 |
| 2032 | 11 | \$44.71 | 211.07 | \$9,436.83 |
| 2033 | 12 | \$45.79 | 211.07 | \$9,664.58 |
| 2034 | 13 | \$46.87 | 211.07 | \$9,892.33 |
| 2035 | 14 | \$47.95 | 211.07 | \$10,120.08 |
| 2036 | 15 | \$49.03 | 211.07 | \$10,347.82 |
| 2037 | 16 | \$50.10 | 211.07 | \$10,575.57 |
| 2038 | 17 | \$51.18 | 211.07 | \$10,803.32 |
| 2039 | 18 | \$52.26 | 211.07 | \$11,031.06 |
| 2040 | 19 | \$53.34 | 211.07 | \$11,258.81 |
| 2041 | 20 | \$54.42 | 211.07 | \$11,486.56 |
| 2042 | 21 | \$55.50 | 211.07 | \$11,714.30 |
| 2043 | 22 | \$56.58 | 211.07 | \$11,942.05 |
| 2044 | 23 | \$57.66 | 211.07 | \$12,169.80 |
| 2045 | 24 | \$58.74 | 211.07 | \$12,397.55 |
| 2046 | 25 | \$59.82 | 211.07 | \$12,625.29 |
| 2047 | 26 | \$60.89 | 211.07 | \$12,853.04 |
| 2048 | 27 | \$61.97 | 211.07 | \$13,080.79 |
| 2049 | 28 | \$63.05 | 211.07 | \$13,308.53 |
| 2050 | 29 | \$64.13 | 211.07 | \$13,536.28 |
| 2051 | 30 | \$65.21 | 211.07 | \$13,764.03 |
| 2052 | 31 | \$66.29 | 211.07 | \$13,991.78 |
| 2053 | 32 | \$67.37 | 211.07 | \$14,219.52 |
| 2054 | 33 | \$68.45 | 211.07 | \$14,447.27 |
| 2055 | 34 | \$69.53 | 211.07 | \$14,675.02 |
| 2056 | 35 | \$70.61 | 211.07 | \$14,902.76 |
| 2057 | 36 | \$71.68 | 211.07 | \$15,130.51 |
| 2058 | 37 | \$72.76 | 211.07 | \$15,358.26 |
| 2059 | 38 | \$73.84 | 211.07 | \$15,586.00 |
| 2060 | 39 | \$74.92 | 211.07 | \$15,813.75 |
| 2061 | 40 | \$76.00 | 211.07 | \$16,041.50 |
| 2062 | 41 | \$77.08 | 211.07 | \$16,269.25 |
| 2063 | 42 | \$78.16 | 211.07 | \$16,496.99 |
| 2064 | 43 | \$79.24 | 211.07 | \$16,724.74 |
| 2065 | 44 | \$80.32 | 211.07 | \$16,952.49 |
| 2066 | 45 | \$81.40 | 211.07 | \$17,180.23 |
| 2067 | 46 | \$82.47 | 211.07 | \$17,407.98 |
| 2068 | 47 | \$83.55 | 211.07 | \$17,635.73 |
| 2069 | 48 | \$84.63 | 211.07 | \$17,863.48 |
| 2070 | 49 | \$85.71 | 211.07 | \$18,091.22 |
| 2071 | 50 | \$86.79 | 211.07 | \$18,318.97 |
| 2072 | 51 | \$87.87 | 211.07 | \$18,546.72 |
| 2073 | 52 | \$88.95 | 211.07 | \$18,774.46 |
| 2074 | 53 | \$90.03 | 211.07 | \$19,002.21 |
| 2075 | 54 | \$91.11 | 211.07 | \$19,229.96 |
| 2076 | 55 | \$92.19 | 211.07 | \$19,457.70 |

| Savings |
|------------|
| \$949.88 |
| \$1,083.90 |
| \$1,090.66 |
| \$1,053.33 |
| \$1,123.72 |
| \$1,155.43 |
| \$1,187.14 |
| \$1,218.85 |
| \$1,250.57 |
| \$1,282.28 |
| \$1,313.99 |
| \$1,345.70 |
| \$1,377.41 |
| \$1,409.12 |
| \$1,440.84 |
| \$1,472.55 |
| \$1,504.26 |
| \$1,535.97 |
| \$1,567.68 |
| \$1,599.39 |
| \$1,631.11 |
| \$1,662.82 |
| \$1,694.53 |
| \$1,726.24 |
| \$1,757.95 |
| \$1,789.66 |
| \$1,821.38 |
| \$1,853.09 |
| \$1,884.80 |
| \$1,916.51 |
| \$1,948.22 |
| \$1,979.93 |
| \$2,011.65 |
| \$2,043.36 |
| \$2,075.07 |
| \$2,106.78 |
| \$2,138.49 |
| \$2,170.20 |
| \$2,201.91 |
| \$2,233.63 |
| \$2,265.34 |
| \$2,297.05 |
| \$2,328.76 |
| \$2,360.47 |
| \$2,392.18 |
| \$2,423.90 |
| \$2,455.61 |
| \$2,487.32 |
| \$2,519.03 |
| \$2,550.74 |
| \$2,582.45 |
| \$2,614.17 |
| \$2,645.88 |
| \$2,677.59 |
| \$2,709.30 |

NPV Rate 8.01%
NPV \$137,635.53

NPV Rate 8.01%
NPV \$120,813.41
NPV Savings \$16,822.12

\$16,822.12



Project Cost Estimate

Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

Project Name: SK Line Rebuild Conceptual Estimate 795 ACSR Date: 11/13/2019 WO #: Attachment #4
 Prepared By: Bo DuBois Revision(s): 00
 Cost Estimate Level: Conceptual Estimate +/-30% Accuracy... There is a general scope but few details available. Little or no design work completed yet.

Part 1: Additions

* All unit and total cost figures should be "raw costs", without any overhead markups. Markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | | |
|---|------------------------------------|----------|-----------|-------------------------|------------------|--------------------|-------|---------|-----------------|--------------------|-------|---------|------------------|-----------|------------------------------------|-----------|--------------------------------------|------------|---------|--------------------------|----------------------------------|
| | | | | | Through xox/xox | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | | Cost | |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | | | |
| A.1 | Transmission Design | 900 | Hours | | 1.0 | 900 | 60.00 | 54,000 | | | 0 | | | 0 | | 0 | | | 0 | | |
| A.2 | Drafting | 200 | Hours | | | | 0 | 0 | 1.0 | 200 | 50.00 | 10,000 | | 0 | | 0 | | | 0 | | |
| A.3 | Planning Time | | Hours | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | | 0 | | |
| A.4 | LiDAR | 3 | Mile | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | 1,200.00 | 3,240 | Closeout | |
| A.5 | | | | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| A.6 | | | | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| A.7 | | | | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| A.8 | | | | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| A.9 | | | | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| A.10 | | | | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | | | |
| B.1 | Project Management | 900 | Hour | | 1.0 | 900 | 60.00 | 54,000 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| B.2 | Environmental | 250 | Hour | | 1.0 | 250 | 60.00 | 15,000 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| B.3 | Real Property | 300 | Hour | | 1.0 | 300 | 60.00 | 18,000 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| B.4 | Environmental Consultant/Part 102c | 1 | Contract | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | 125,000.00 | 125,000 | Based on HF Line EDR Bid | |
| B.5 | Legal Consultant | 1 | Contract | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | 50,000.00 | 50,000 | | |
| B.6 | | | | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| B.7 | | | | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| B.8 | | | | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| B.9 | | | | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| B.10 | | | | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | | | |
| C.1 | Construction Staking | 2.7 | Miles | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | 20,000.00 | 54,000 | Based off of WH1&2 Costs | |
| C.2 | Construction Trailers | 5.0 | Months | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | 1,000.00 | 5,000 | | |
| C.3 | Temporary Toilet Facilities | 5.0 | Months | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | 250.00 | 1,250 | | |
| C.4 | Staging Area | 7.0 | Months | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | 3,000.00 | 21,000 | Contract | |
| C.6 | Tree Clearing | 4.0 | Section | | | | 0 | 0 | 200.0 | 800 | 50.00 | 40,000 | | 0 | | 0 | | | | 0 | |
| C.7 | SWPP Inspections | 4.0 | Months | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | 18,750.00 | 75,000 | Based off of WH1&2 Costs | |
| C.9 | | | | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| C.10 | | | | | | | 0 | 0 | | | 0 | 0 | | 0 | | 0 | | | | 0 | |
| D MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | | | |
| D.1 | Light Duty Steel Poles | 37.0 | Each | | | | 0 | 0 | | | 0 | 0 | | 0 | | 8,346.00 | 308,802 | | | 0 | CL Line Quote for 70' H3 |
| D.2 | Engineered Steel Poles | 1.0 | Each | | | | 0 | 0 | | | 0 | 0 | | 0 | | 20,000.00 | 20,000 | | | 0 | Based off of G-Line Structure G2 |
| D.3 | Engineered Foundations | 1.0 | Each | | | | 0 | 0 | | | 0 | 0 | | 0 | | 50,000.00 | 50,000 | | | 0 | Estimated (Structure G2) |
| D.4 | Conductor (795 ACSR TERN) | 38,000.0 | Feet | | | | 0 | 0 | | | 0 | 0 | 2.00 | 75,913 | | 0 | | | | 0 | MMS Stock Avg Cost |
| D.5 | Static (OPGW) | 13,000.0 | Feet | | | | 0 | 0 | | | 0 | 0 | 3.34 | 43,469 | | 0 | | | | 0 | MMS Stock Avg Cost |
| D.6 | Standard Stock Material- Tangent | 32.0 | Structure | | | | 0 | 0 | | | 0 | 0 | 250.00 | 8,000 | | 0 | | | | 0 | MMS Stock Avg Cost |
| D.7 | Standard stock material - Dead End | 2.0 | Structure | | | | 0 | 0 | | | 0 | 0 | 2,000.00 | 4,000 | | 0 | | | | 0 | MMS Stock Avg Cost |
| D.8 | Non-Stock Insulators | 32.0 | Structure | | | | 0 | 0 | | | 0 | 0 | 953.00 | 30,496 | | 0 | | | | 0 | Quoted Price |
| D.9 | Crane Service | 1.0 | Location | | | | 0 | 0 | | | 0 | 0 | | 0 | | 4,000.00 | 4,000 | | | 0 | Estimated |
| D.10 | Equipment Moves | 2.7 | Mile | | | | 0 | 0 | | | 0 | 0 | | 0 | | 12,000.00 | 32,400 | | | 0 | Estimated |
| E CONSTRUCTION | | | | | | | | | | | | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | | |
|------|--|----------|-----------|-------------------------|---------------------------|--------------------|----|---------|--------------------------|--------------------|-----|---------|------------------|-----------|------------------------------------|-----------|--------------------------------------|------------|-----------|--|-----------|
| | | | | | Through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | | Cost | |
| E.1 | Environmental/Restoration Contractor | 2.7 | Mile | | | | 0 | | 0 | | | 0 | | 0 | | | 0 | 97,852.40 | 264,201 | Based on HF Line Estimate R.O.W. Improvements - Access (Building / Upgrading Roads, Culverts, etc...) Erosion/Sediment Control Installation | |
| E.2 | Install R.O.W. Access Controls (Gates, etc...) | 2.7 | Mile | | | | 0 | | 0 | | | 0 | | 0 | | | 0 | 5,000.00 | 13,500 | | |
| E.4 | R.O.W. Improvements - Matting | 1,500.0 | Feet | | | | 0 | | 0 | | | 0 | | 0 | | | 0 | 60.00 | 90,000 | | |
| E.5 | R.O.W. Improvements - Trimming | 0.0 | Mile | | | | 0 | | 0 | | | 0 | | 0 | | | 0 | | 0 | | |
| E.6 | Drill Pole Holes - Soil (Contract) | 18.0 | Line | | | | 0 | | 0 | | | 0 | | 0 | | | 0 | 3,000.00 | 54,000 | Soil Hole and Grounding | |
| E.7 | Drill Pole Holes - Rock (Contract) | 19.0 | Line | | | | 0 | | 0 | | | 0 | | 0 | | | 0 | 6,000.00 | 114,000 | Rock Hole and Grounding | |
| E.8 | Off Load Pole Delivery | 4.0 | Per Truck | | | | 0 | | 0 | 16.0 | 64 | 55.00 | 3,520 | | | | 0 | | 0 | | |
| E.9 | Line Construction (Contract) | 2.7 | Mile | | | | 0 | | 0 | | | 0 | | 0 | | | 0 | 489,262.00 | 1,321,007 | Based off of HF Line Bid | |
| E.10 | Supervision - Foreman | 4.0 | Month | | | | 0 | | 0 | 160.0 | 640 | 65.00 | 41,600 | | | | 0 | | 0 | | |
| E.11 | Install OPGW Splice Locations | 3.0 | Per Site | | | | 0 | | 0 | | | 0 | | 0 | | | 0 | 1,000.00 | 3,000 | | |
| | | | | 0 | 2,350 | | | | 1,704 | | | | 141,000 | | 95,120 | | 161,878 | | 418,202 | | 2,194,199 |
| | | | | | Man-hours Monthly Payroll | | | | Man-hours Weekly Payroll | | | | | | | | | | | | |

Part 2: Removals * All unit and total cost figures should be "raw costs", without any overhead markups. All markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|---|--------------------------------------|----------|-------|-------------------------|---------------------------|--------------------|----|---------|--------------------------|--------------------|----|---------|------------------|-----------|------------------------------------|-----------|--------------------------------------|-----------|---------|---|
| | | | | | Through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | | Cost |
| | Pole Removals | 2.7 | Mile | | | | 0 | | 0 | | | 0 | | 0 | | | 0 | 66,717.50 | 180,137 | Based off of HF Line Bid |
| | Environmental/Restoration Contractor | 2.7 | Mile | | | | 0 | | 0 | | | 0 | | 0 | | | 0 | 13,343.50 | 36,027 | Based on HF Line Estimate R.O.W. Restoration Erosion/Sediment Control Removal |
| | R.O.W. Improvements - Matting | 1,500.0 | Feet | | | | 0 | | 0 | | | 0 | | 0 | | | 0 | 15.00 | 22,500 | |
| | Supervision - Foreman | 4.0 | Month | | | | 0 | | 0 | 20.0 | 80 | 65.00 | 5,200 | | | | 0 | | 0 | |
| | | | | | | | 0 | | 0 | | | 0 | | 0 | | | 0 | | 0 | |
| | | | | 0 | 0 | | | | 80 | | | | 5,200 | | 0 | | 0 | | 238,665 | |
| | | | | | Man-hours Monthly Payroll | | | | Man-hours Weekly Payroll | | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Included To-Date* | Monthly Payroll | | Weekly Payroll | | Stock Materials | | Non-Stock Materials (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|--------------------------------|----------|-------|-------------------|--------------------|--------|--------------------|--------|-----------------|-----------|-----------------------------------|-----------|--------------------------------------|-----------|-------|
| | | | | | Production MH/Unit | Cos/MH | Production MH/Unit | Cos/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | |

Part 3: Cost Estimate Summary

| ADDITIONS SUMMARY: | |
|--|--------------------|
| Included To-Date: | \$0 |
| Raw Costs Incurred To-Date: | \$0 |
| Overhead Costs Incurred To-Date: | \$0 |
| AFUDC Costs Incurred To-Date: | \$0 |
| Subtotal Costs To-Date: | \$0 |
| Estimated Future Raw Costs: | \$3,010,399 |
| Estimated Future Overheads: | \$367,105 |
| Estimated Future AFUDC: | \$111,647 |
| Subtotal Future Costs: | \$3,489,151 |
| Contingency Applied: | \$1,046,745 |
| 30.0% Contingency factor from Overheads & AFUDC Calculator (optional). <i>Contingency will be factored on top of future costs only.</i> | \$4,535,896 |
| GRAND TOTAL ADDITIONS: | \$4,535,896 |

| REMOVALS SUMMARY: | |
|--|------------------|
| Included To-Date: | \$0 |
| Raw Costs Incurred To-Date: | \$0 |
| Overhead Costs Incurred To-Date: | \$0 |
| Estimated Future Raw Costs: | \$243,865 |
| Estimated Future Overheads: | \$11,501 |
| Subtotal Future Costs: | \$255,366 |
| Contingency Applied: | \$76,610 |
| 30.0% Contingency factor from Overheads & AFUDC Calculator (optional). <i>Contingency will be factored on top of future costs only.</i> | \$331,975 |
| GRAND TOTAL REMOVALS: | \$331,975 |

| ADDITIONS + REMOVALS: | |
|-----------------------|--------------------|
| GRAND TOTAL | \$4,867,871 |

Assumptions, Notes, Clarifications, etc.:

Estimated 3 months to complete. Estimate represents cost to construct & assumed Part 102C filing only permitting. Assume local site plan approval, 30% contingency applied.



Project Cost Estimate

Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

Project Name: SK Line Rebuild Conceptual Estimate 1033 ACSR
 Prepared By: Bo DuBois
 Cost Estimate Level: Conceptual Estimate

Date: 11/13/2019
 Revision(s): 00
 WO #: Attachment #5

+/-30% Accuracy... There is a general scope but few details available. Little or no design work completed yet.

Part 1: Additions

* All unit and total cost figures should be "raw costs", without any overhead markups. Markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | | | |
|---|--------------------------------------|----------|-----------|-------------------------|--------------------|-----|---------|--------|--------------------|-----|---------|--------|------------------|----------|------------------------------------|------|--------------------------------------|------------|-----------|--------------------------|----------------------------------|---|
| | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | | | |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | | | | |
| A.1 | Transmission Design | 900 | Hours | | 1.0 | 900 | 60.00 | 54,000 | | | | | | | | | | | | | | |
| A.2 | Drafting | 200 | Hours | | | | | | 1.0 | 200 | 50.00 | 10,000 | | | | | | | | | | |
| A.3 | Planning Time | | Hours | | | | 60.00 | | | | | | | | | | | | | | | |
| A.4 | LIDAR | 3 | Mile | | | | | | | | | | | | | | | 1,200.00 | 3,240 | Closeout | | |
| A.5 | | | | | | | | | | | | | | | | | | | | | | |
| A.6 | | | | | | | | | | | | | | | | | | | | | | |
| A.7 | | | | | | | | | | | | | | | | | | | | | | |
| A.8 | | | | | | | | | | | | | | | | | | | | | | |
| A.9 | | | | | | | | | | | | | | | | | | | | | | |
| A.10 | | | | | | | | | | | | | | | | | | | | | | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | | | | |
| B.1 | Project Management | 900 | Hour | | 1.0 | 900 | 60.00 | 54,000 | | | | | | | | | | | | | | |
| B.2 | Environmental | 250 | Hour | | 1.0 | 250 | 60.00 | 15,000 | | | | | | | | | | | | | | |
| B.3 | Real Property | 300 | Hour | | 1.0 | 300 | 60.00 | 18,000 | | | | | | | | | | | | | | |
| B.4 | Environmental Consultant | 1 | Contract | | | | | | | | | | | | | | | 125,000.00 | 125,000 | Based on HF Line EDR Bid | | |
| B.5 | Legal Consultant | 1 | Contract | | | | | | | | | | | | | | | 50,000.00 | 50,000 | | | |
| B.6 | | | | | | | | | | | | | | | | | | | | | | |
| B.7 | | | | | | | | | | | | | | | | | | | | | | |
| B.8 | | | | | | | | | | | | | | | | | | | | | | |
| B.9 | | | | | | | | | | | | | | | | | | | | | | |
| B.10 | | | | | | | | | | | | | | | | | | | | | | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | | | | |
| C.1 | Construction Staking | 2.7 | Miles | | | | | | | | | | | | | | | 20,000.00 | 54,000 | Based off of WH1&2 Costs | | |
| C.2 | Construction Trailers | 5.0 | Months | | | | | | | | | | | | | | | | 1,000.00 | 5,000 | | |
| C.3 | Temporary Toilet Facilities | 5.0 | Months | | | | | | | | | | | | | | | | 250.00 | 1,250 | | |
| C.4 | Staging Area | 7.0 | Months | | | | | | | | | | | | | | | | 3,000.00 | 21,000 | Contract | |
| C.6 | Tree Clearing | 4.0 | Section | | | | | | 200.0 | 800 | 50.00 | 40,000 | | | | | | | | | | |
| C.7 | SWPP Inspections | 4.0 | Months | | | | | | | | | | | | | | | | 18,750.00 | 75,000 | Based off of WH1&2 Costs | |
| C.9 | | | | | | | | | | | | | | | | | | | | | | |
| C.10 | | | | | | | | | | | | | | | | | | | | | | |
| D MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | | | | |
| D.1 | Light Duty Steel Poles | 37.0 | Each | | | | | | | | | | | | | | | | 8,986.00 | 332,482 | HF Line Quote for 70' H4 | |
| D.2 | Engineered Steel Poles | 1.0 | Each | | | | | | | | | | | | | | | | 20,000.00 | 20,000 | Based off of G-Line Structure G2 | |
| D.3 | Engineered Foundations | 1.0 | Each | | | | | | | | | | | | | | | | 50,000.00 | 50,000 | Estimated (Structure G2) | |
| D.4 | Conductor (1033 ACSR Ortolan) | 38,000.0 | Feet | | | | | | | | | | | 2.08 | 79,040 | | | | | | MMS Stock Avg Cost | |
| D.5 | Static (OPGW) | 13,000.0 | Feet | | | | | | | | | | | 3.34 | 43,469 | | | | | | MMS Stock Avg Cost | |
| D.6 | Standard Stock Material- Tangent | 32.0 | Structure | | | | | | | | | | | 250.00 | 8,000 | | | | | | MMS Stock Avg Cost | |
| D.7 | Standard stock material - Dead End | 2.0 | Structure | | | | | | | | | | | 2,000.00 | 4,000 | | | | | | MMS Stock Avg Cost | |
| D.8 | Non-Stock Insulators - Dead End | 32.0 | Structure | | | | | | | | | | | 953.00 | 30,496 | | | | | | Quoted Price | |
| D.9 | Crane Service | 1.0 | Location | | | | | | | | | | | | | | | | 4,000.00 | 4,000 | Estimated | |
| D.10 | Equipment Moves | 2.7 | Mile | | | | | | | | | | | | | | | | 12,000.00 | 32,400 | Estimated | |
| E CONSTRUCTION | | | | | | | | | | | | | | | | | | | | | | |
| E.1 | Environmental/Restoration Contractor | 2.7 | Mile | | | | | | | | | | | | | | | | | 97,852.40 | 264,201 | Based on HF Line Estimate R.O.W. Improvements - Access (Building / Upgrading Roads, Culverts, etc...) Erosion/Sediment Control Installation |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through xx/xx/xx | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|------|--|----------|-----------|--|---------------------------|----|---------|------|--------------------------|-----|---------|--------|------------------|---------|---------------------------------------|---------|---|-----------|--------------------------|--|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| E.2 | Install R.O.W. Access Controls (Gates, etc...) | 2.7 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 5,000.00 | 13,500 | | |
| E.4 | R.O.W. Improvements - Matting | 1,500.0 | Feet | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 60.00 | 90,000 | | |
| E.5 | R.O.W. Improvements - Trimming | 0.0 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| E.6 | Drill Pole Holes - Soil (Contract) | 18.0 | Line | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 3,000.00 | 54,000 | Soil Hole and Grounding | |
| E.7 | Drill Pole Holes - Rock (Contract) | 19.0 | Line | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 6,000.00 | 114,000 | Rock Hole and Grounding | |
| E.8 | Off Load Pole Delivery | 4.0 | Per Truck | | | 0 | | 0 | 16.0 | 64 | 55.00 | 3,520 | | 0 | | 0 | | 0 | | |
| E.9 | Line Construction (Contract) | 2.7 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 489,262.00 | 1,321,007 | Based off of HF Line Bid | |
| E.10 | Supervision - Foreman | 4.0 | Month | | | 0 | | 0 | 160.0 | 640 | 65.00 | 41,600 | | 0 | | 0 | | 0 | | |
| E.11 | Install OPGW Splice Locations | 3.0 | Per Site | | | 0 | | 0 | | | | 0 | | 0 | 1,000.00 | 3,000 | 1,000.00 | 3,000 | | |
| | | | | 0 | | | 141,000 | | | | | 95,120 | | 165,005 | | 441,882 | | 2,194,199 | | |
| | | | | | 2,350 | | | | 1,704 | | | | | | | | | | | |
| | | | | | Man-hours Monthly Payroll | | | | Man-hours Weekly Payroll | | | | | | | | | | | |

Part 2: Removals * All unit and total cost figures should be "raw costs", without any overhead markups. All markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through xx/xx/xx | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|---|--------------------------------------|----------|-------|--|---------------------------|----|---------|------|--------------------------|----|---------|-------|------------------|------|---------------------------------------|------|---|---------|---|--|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | | |
| | Pole Removals | 2.7 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 66,717.50 | 180,137 | Based off of HF Line Bid | |
| | Environmental/Restoration Contractor | 2.7 | Mile | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 13,343.50 | 36,027 | Based on HF Line Estimate R.O.W. Restoration Erosion/Sediment Control Removal | |
| | R.O.W. Improvements - Matting | 1,500.0 | Feet | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 15.00 | 22,500 | | |
| | Supervision - Foreman | 4.0 | Month | | | 0 | | 0 | 20.0 | 80 | 65.00 | 5,200 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | |
| | | | | 0 | | | 0 | | | | | 5,200 | | 0 | | 0 | | 238,665 | | |
| | | | | | 0 | | | | 80 | | | | | | | | | | | |
| | | | | | Man-hours Monthly Payroll | | | | Man-hours Weekly Payroll | | | | | | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|---|--------------------------------|----------|-------|-------------------------|--------------------|----|---------|------|--------------------|----|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|
| | | | | through xxx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |

Part 3: Cost Estimate Summary

| ADDITIONS SUMMARY: | | | |
|----------------------------------|--------------------|-------|---|
| Incurred To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | | | <i>This figure must be manually entered if applicable</i> |
| AFUDC Costs Incurred To-Date: | | | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$3,037,206 | | |
| Estimated Future Overheads: | \$370,336 | | |
| Estimated Future AFUDC: | \$112,649 | | |
| Subtotal Future Costs: | \$3,520,191 | | |
| Contingency Applied: | \$1,056,057 | 30.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL ADDITIONS: | \$4,576,249 | | |

| REMOVALS SUMMARY: | | | |
|----------------------------------|------------------|-------|---|
| Incurred To-Date: | | | |
| Raw Costs Incurred To-Date: | \$0 | | |
| Overhead Costs Incurred To-Date: | \$0 | | <i>This figure must be manually entered if applicable</i> |
| Subtotal Costs To-Date: | \$0 | | |
| Estimated Future Raw Costs: | \$243,865 | | |
| Estimated Future Overheads: | \$11,501 | | |
| Subtotal Future Costs: | \$255,366 | | |
| Contingency Applied: | \$76,610 | 30.0% | <i>Contingency factor from Overheads & AFUDC Calculator (optional). Contingency will be factored on top of future costs only.</i> |
| GRAND TOTAL REMOVALS: | \$331,975 | | |

| | |
|--|--------------------|
| GRAND TOTAL ADDITIONS + REMOVALS: | \$4,908,224 |
|--|--------------------|

Assumptions, Notes, Clarifications, etc.:

Estimated 3 months to complete. Estimate represents cost to construct & assumed Part 102c filing only permitting. Assume local site plan approval. 30% contingency applied. Although local permitting for installing 1033 instead of 795 could result in increased legal/environmental consultant fees due to public opposition to EMF, aesthetics, etc. the additional costs are difficult to estimate and therefore not included in this estimate. Cost estimate increase over 795 ACSR is based on incremental cost of wire and increasing pole class from H3 to H4 based on conceptual design for deflection criteria.



Submission Date: April 28, 2023
Submitted By: Kyle Bragg

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|---|
| Project/Program Name: 115kV 5 Line Rebuild | | Work Order #: | <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> |
| Budget Group: Electric | Budget Category: 12 | Funding Project Number: | PEND |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 6/1/2023 | In-Service: | 3/1/2027 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The Rebuild of Central Hudson's 2.87-mile portion the 5 Line is intended to address significant infrastructure issues identified on the line as part of the company's routine inspection cycle. The line was originally constructed in the 1910's and runs to CHG&E's North Catskill Substation to an interconnection with the National Grid owned section of the line. Inspection results have shown that 57% of the structures on the line are in need of replacement with an additional 36% requiring some level of repair.

Describe specific scope exclusions, assumptions and constraints:

Detailed design and permitting work has not been completed. Estimates to date do not account for specific conditions related to matting, access, permitting, outage constraints, etc...

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Replacement in-kind of the existing structures showing actionable conditions was considered although given the high percentage of issues on the line overall and the use of a non-standard conductor which makes replacements in this manner more complex, a more comprehensive rebuild was decided upon.

Why was the proposed project scope chosen over other alternatives?

The one-for-one replacement of structures on the 5 line is not an efficient approach given the number of dead-end structures. This combined with the need to install a standard conductor type makes rebuilding the line the most efficient option for mitigation.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Given the conditions identified as part fo the inspection process, it is important to complete the project to reduce the risk of an in-service failure.

What are the risks and consequences of not completing this project?

Delaying the project would increase the risk of an unplanned outage and subsequent repair.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

The 5 Line was an emergent project that was identified after the prior-year budget cycle. In the interest of reducing risk, this project was prioritized over others given the complex nature and potentially long duration associated with constructing spot replacements and/or repairs.

What other factor were considered during the prioritization process?

This line is an interconnection to another utility.

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|---|----------------------------------|--|---|----------------|--|------------------|------------------|----------------|--------------|
| \$9,906,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 798,300 | | 25,000 | 40,000 | 233,300 | 500,000 | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 1,995,750 | | 62,500 | 100,000 | 583,250 | 1,250,000 | | |
| | Contractors (A/P tax exempt) | 5,188,950 | | 162,500 | 260,000 | 1,516,450 | 3,250,000 | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 745,000 | | | 16,000 | 205,000 | 524,000 | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 8,728,000 | 0 | 250,000 | 416,000 | 2,538,000 | 5,524,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 108,700 | | | | 18,700 | 90,000 | | |
| | Contractors (A/P tax exempt) | 978,300 | | | | 168,300 | 810,000 | | |
| | Overheads | 91,000 | | | | 13,000 | 78,000 | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 1,178,000 | 0 | 0 | 0 | 200,000 | 978,000 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|

| | | | |
|---|---|---|---|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|---|---|---|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 6,934,200 Maximum (\$): 12,877,800

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

No explanation on confidence level required.

Permitting, material and construction costs may vary causing a potential variance in the pro-forma estimate. A more accurate estimate will be created upon completion of preliminary design work.

Basis for estimate: Historical Proforma Pricing; Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Please see provided estimate for details on assumptions. Cost figures were based on historical costs for projects of similar construction and permitting requirements.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

The cost breakdown provided is estimated based on an averaged historical percentage split per project of Materials Costs, Accounts Payable / AA and Internal Labor of 25%, 65% and 10% respectively. Removals were split based on a 90%/10% split of Contractor (AP) and Monthly Labor respectively.



Project Name: 5 Line Rebuild - Part 102 115kV
 Prepared By: Sam Pozorski
 Cost Estimate Level: Conceptual Estimate

Note: Except where data entries are permitted, this spreadsheet is locked in order to prevent users from accidentally deleting important formulas. If user needs to add/delete rows, or make other edits, the password "Estimate" may be used to unlock the spreadsheet. Caution should be used in order to keep the integrity of the spreadsheet.

Date: 12/6/2022
 Revision(s): 0
 WO #:

Rebuild Length
2.87 miles

+/-30% Accuracy... There is a general scope but few details available. Little or no design work completed yet.

Part 1: Additions

* All unit and total cost figures should be "raw costs", without any overhead markups. Markups are generated at the end of the estimate.

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes | |
|---|---|----------|----------|-------------------------|------------------|--------------------|-------|---------|-----------------|--------------------|-------|---------|------------------|-----------|------------------------------------|-----------|--------------------------------------|-----------|-------|---|
| | | | | | through xx/xx/xx | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | | Cost |
| A PLANNING & ENGINEERING | | | | | | | | | | | | | | | | | | | | |
| A.1 | Engineering Design - 121 | 3 | miles | | 348.4 | 1,000 | 60.00 | 60,016 | | | | | | | | | | | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.2 | Engineering Supervision; Project Sponsor - | 3 | miles | | 6.5 | 19 | 60.00 | 1,127 | | | | | | | | | | | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.3 | Drafting - 132 | 3 | miles | | | | | | 49.7 | 143 | 60.00 | 8,555 | | | | | | | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.4 | ESP - 125 | 3 | miles | | 5.7 | 16 | 60.00 | 985 | | | | | | | | | | | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.5 | Planning - 126 | 3 | miles | | 18.4 | 53 | 60.00 | 3,164 | | | | | | | | | | | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.6 | Misc Internal Support | 3 | miles | | 4.7 | 14 | 60.00 | 815 | | | | | | | | | | | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.7 | LIDAR | 3 | miles | | | | | | | | | | | | | | 2,400.00 | 6,890 | | pre/post project LIDAR flights |
| A.8 | Engineering and Related Contractors | 3 | miles | | | | | | | | | | | | | | 22,512.60 | 64,633 | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| A.9 | | | | | | | | | | | | | | | | | | | | |
| B PROJECT MANAGEMENT, ENVIRONMENTAL & SUPPORT SERVICES | | | | | | | | | | | | | | | | | | | | |
| B.1 | Environmental Consultant | 3 | miles | | | | | | | | | | | | | | 40,409.60 | 116,016 | | Avg of G, CL, TV, KM, EF, HF ignored due to short length and high cost. H&SB and A&C ignored due to Article VII. +10% |
| B.2 | Legal Consultant | 3 | miles | | | | | | | | | | | | | | 57,532.20 | 165,174 | | Avg of G, TV, KM. +10%. CL, EF, HF ignored due to lack of significant legal costs. Varies significantly with PMO approach and municipalities. |
| B.3 | Project Manager - 110 | 3 | miles | | 202.3 | 581 | 60.00 | 34,843 | | | | | | | | | | | | Avg of G, EF, HF, CL, TV, KM \$/mile to hrs/mile +10% |
| B.4 | Environmental - 726 | 3 | miles | | 55.5 | 159 | 60.00 | 9,556 | | | | | | | | | | | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| B.5 | Real Property Services - 124 | 3 | miles | | 48.2 | 138 | 60.00 | 8,309 | | | | | | | | | | | | Avg of Part 102s (G/EF/HF/CL/TV/KM) +10% |
| B.6 | System Ops - 330 | 3 | miles | | 13.6 | 39 | 60.00 | 2,350 | 18.6 | 53 | 60.00 | 3,201 | | | | | | | | Avg of G, EF, HF, CL, TV. +10% |
| B.7 | | | | | | | | | | | | | | | | | | | | |
| C GENERAL CONDITIONS | | | | | | | | | | | | | | | | | | | | |
| C.1 | Surveying/Staking | 3 | miles | | | | | | | | | | | | | | 22,647.90 | 65,022 | | Avg of G, EF, HF, CL, TV. +10% |
| C.2 | Easements/Access Right/Laydown Yards | 3 | miles | | | | | | | | | | | | | | 21,116.70 | 60,626 | | Avg of G, EF, HF, CL, TV, KM, H&SB, A&C. +10% |
| C.3 | | | | | | | | | | | | | | | | | | | | |
| C.4 | Filing Fees | 3 | miles | | | | | | | | | | | | | | 6,279.90 | 18,030 | | Avg of G, EF, HF, CL, TV, KM. +10% |
| C.5 | Misc AP (excluding material) | 3 | miles | | | | | | | | | | | | | | 9,227.90 | 26,493 | | Avg of G, EF, HF, CL, TV. +10% |
| C.6 | | | | | | | | | | | | | | | | | | | | |
| D MAJOR EQUIPMENT & MATERIALS | | | | | | | | | | | | | | | | | | | | |
| D.1 | Conductor 795 Drake ACSR (30-50-180) | 47,750 | FT | | | | | | | | | | 4.55 | 217,264 | | | | | | Adjusted CME Quote 11/21/22. \$/FT for 1033.5 Orloan |
| D.2 | OPGW (30-50-205) | 16,372 | FT | | | | | | | | | | 3.34 | 54,722 | | | | | | MMS price as of 12/5/22 |
| D.3 | Poles | 1 | 33 Poles | | | | | | | | | | | | | | 543,082.10 | 543,082 | | SB PO#91505: 85' H4 Tangent Davit Item #5, 85' H4 for 2-Pole Item #19 +10% for additional 5' (no example) |
| D.4 | Major Engineered Structures | 2 | Str | | | | | | | | | | | | | | 85,000.00 | 170,000 | | |
| D.5 | Moderate Engineered Structures | 1 | Str | | | | | | | | | | | | | | 42,500.00 | 42,500 | | |
| D.6 | 115kV Tangent Davit Structure | 22 | Str | | | | | | | | | | 1,311.56 | 28,854 | | | | | | SS Cost as of 11/4/22 |
| D.7 | 115kV Swing Angle Structure | 4 | Str | | | | | | | | | | 3,262.87 | 13,051 | | | | | | SS Cost as of 11/4/22 |
| D.8 | 115kV Deadend Structure | 4 | Str | | | | | | | | | | 9,155.63 | 36,623 | | | | | | SS Cost as of 11/4/22 |
| D.9 | Crossarms and X-Braces for 2-poles | 5 | Str | | | | | | | | | | 1,238.00 | 6,190 | 1,850.00 | 9,250 | | | | 34-79-006,008,009 MMS \$ as of 11/7/22 |
| D.10 | Misc Material | 30 | str | | | | | | | | | | 500.00 | 15,000 | 250.00 | 7,500 | | | | |
| D.10 | | | | | | | | | | | | | | | | | | | | |
| E CONSTRUCTION | | | | | | | | | | | | | | | | | | | | |
| E.1 | Line Construction | 3 | miles | | | | | | | | | | | | | | 414,439.30 | 1,189,851 | | Avg of recent Part 102s (EF/HF/CL/TV). +15% for 115kV |
| E.2 | Major Drilled Pier Foundations | 2 | Str | | | | | | | | | | | | | | 375,000.00 | 750,000 | | |
| E.3 | Moderate Drilled Pier Foundations | 1 | Str | | | | | | | | | | | | | | 187,500.00 | 187,500 | | |
| E.4 | Drilling / Site Work / Matting / Access / Trimming / Restoration / etc. | 3 | miles | | | | | | | | | | | | | | 518,171.60 | 1,487,665 | | Avg of Part 102s (G/EF/HF/CL/TV). Combined all associated costs because of overlap between contractors. +15% for 115kV Upgrade |
| E.5 | Equipment Moves/Rentals | 3 | miles | | | | | | | | | | | | | | 6,747.40 | 19,372 | | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.6 | T&D Foreman - 215 | 3 | miles | | | | | | 485.0 | 1,392 | 60.00 | 83,547 | | | | | | | | Avg of recent Part 102s (CL/TV) with foreman more solely dedicated to project. +10% |
| E.7 | T&D Engineer, Planner, Director - 215 | 3 | miles | | 130.5 | 375 | 60.00 | 22,476 | | | | | | | | | | | | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.8 | OS Foreman - 221 | 3 | miles | | | | | | 6.8 | 19 | 60.00 | 1,165 | | | | | | | | Avg of Part 102s (G/EF/HF/CL/TV). +10% |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through xx/xx/xx | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|------|--------------------------------|----------|-------|---|--------------------|-------|--------------------------|---------|--------------------|-----|---------|---------|-------------------------|---------|------------------------------------|---------|--------------------------------------|-----------|--|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |
| E.9 | Storekeepers - 223 | 3 | miles | | | 0 | | 0 | 2.1 | 6 | 60.00 | 354 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.10 | Mechanics - 224 | 3 | miles | | | 0 | | 0 | 29.8 | 86 | 60.00 | 5,132 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.11 | Electricians - 225 | 3 | miles | | | 0 | | 0 | 40.1 | 115 | 60.00 | 6,913 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.12 | Substation Technicians - 226 | 3 | miles | | | 0 | | 0 | 90.5 | 260 | 60.00 | 15,588 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.13 | District Line Crews | 3 | miles | | | 0 | | 0 | 19.8 | 57 | 60.00 | 3,408 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| E.14 | Misc WP | 3 | miles | | | 0 | | 0 | 1.6 | 4 | 60.00 | 268 | | 0 | | 0 | | 0 | Avg of Part 102s (G/EF/HF/CL/TV). +10% |
| | | | | 0 | | | | 143,643 | | | | 128,132 | | 371,704 | | 772,332 | | 4,157,272 | |
| | | | | | | 2,394 | Manhours Monthly Payroll | | | | | 2,136 | Manhours Weekly Payroll | | | | | | |

| # | Work Breakdown Structure (WBS) | Quantity | Units | Costs Incurred To-Date* through xx/xx/xx | Monthly Payroll* | | | | Weekly Payroll* | | | | Stock Materials* | | Non-Stock Materials* (A/P Taxable) | | Contractors & Fees* (A/P Tax-Exempt) | | Notes |
|--|--------------------------------|----------|-------|---|--------------------|----|---------|------|--------------------|----|---------|------|------------------|------|------------------------------------|------|--------------------------------------|------|-------|
| | | | | | Production MH/Unit | MH | Cost/MH | Cost | Production MH/Unit | MH | Cost/MH | Cost | Cost/Unit | Cost | Cost/Unit | Cost | Cost/Unit | Cost | |
| GRAND TOTAL ADDITIONS + REMOVALS: | | | | \$9,069,878 | | | | | | | | | | | | | | | |

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A: Infrastructure Replacements

Why was the proposed project scope chosen over other alternatives?

N/A: Infrastructure Replacements

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Infrastructure Replacements as required.

What are the risks and consequences of not completing this project?

Failed equipment would not be replaced possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$8,674,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 627,000 | 87,000 | 56,000 | 56,000 | 58,000 | 60,000 | 60,000 | 250,000 |
| | Labor (Monthly Payroll) | 313,000 | 43,000 | 28,000 | 28,000 | 29,000 | 30,000 | 30,000 | 125,000 |
| | Stock Materials | 313,000 | 43,000 | 28,000 | 28,000 | 29,000 | 30,000 | 30,000 | 125,000 |
| | Non-Stock Material (A/P taxable) | 1,250,000 | 173,000 | 112,000 | 112,000 | 115,000 | 119,000 | 119,000 | 500,000 |
| | Contractors (A/P tax exempt) | 438,000 | 61,000 | 39,000 | 39,000 | 40,000 | 42,000 | 42,000 | 175,000 |
| | Overheads | 3,123,000 | 433,000 | 280,000 | 280,000 | 287,000 | 297,000 | 296,000 | 1,250,000 |
| | AFUDC* | 187,000 | 25,000 | 17,000 | 17,000 | 17,000 | 18,000 | 18,000 | 75,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 6,251,000 | 865,000 | 560,000 | 560,000 | 575,000 | 596,000 | 595,000 | 2,500,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 363,000 | 30,000 | 34,000 | 31,000 | 38,000 | 33,000 | 32,000 | 165,000 |
| | Labor (Monthly Payroll) | 727,000 | 60,000 | 69,000 | 62,000 | 76,000 | 65,000 | 65,000 | 330,000 |
| | Contractors (A/P tax exempt) | 122,000 | 10,000 | 11,000 | 10,000 | 14,000 | 11,000 | 11,000 | 55,000 |
| | Overheads | 1,211,000 | 100,000 | 115,000 | 103,000 | 127,000 | 108,000 | 108,000 | 550,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 2,423,000 | 200,000 | 229,000 | 206,000 | 255,000 | 217,000 | 216,000 | 1,100,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|--------------|--------------|------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 2,194 | 1,595 | 599 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 6,071,800 Maximum (\$): 11,276,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

[Empty text area for additional information]

Submission Date: April 11, 2023
Submitted By: Brett Arteta

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Greenfield Road Substation Upgrade

Work Order #: 0 4 0 4 - H

Budget Group: Electric

Budget Category: 13

Funding Project Number: 1-1312-99-19

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2023

In-Service: 6/1/2024

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

As part of the ongoing review of the substation power transformer fleet, Operations Services completes a condition-based assessment of those transformers that are 55 years old or greater. This assessment is based on routine testing and monitoring to determine an overall condition and condition-trend of the transformer. Based on this assessment, the existing 69-4.16kV Greenfield Road Substation transformers have reached the end of their useful life and require replacement.

Describe specific scope exclusions, assumptions and constraints:

Retire all of the 4 kV equipment including Transformers #1 and #3 and all other associated equipment. Two existing 69-13.8kV three phase transformers will be utilized (current plans are to use the Modena Substation spare and the retired Kerhonkson Substation transformers). The MG Line from Modena to Galeville must be converted to 115 kV prior to the removal of the Transformer at Modena to be used at Greenfield Road.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To replace obsolete equipment before failure.

What are the risks and consequences of not completing this project?

Risk of power transformer failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|------------------------|------------------------|------------------------|------------------------|---------------------|
| \$1,942,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 181,600 | 80,600 | 101,000 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 90,300 | 40,300 | 50,000 | 0 | 0 | 0 | 0 | 0 |
| | Stock Materials | 90,300 | 40,300 | 50,000 | 0 | 0 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 363,200 | 161,200 | 202,000 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 128,420 | 56,420 | 72,000 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 907,000 | 403,000 | 504,000 | 0 | 0 | 0 | 0 | 0 |
| | AFUDC* | 54,180 | 24,180 | 30,000 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,815,000 | 806,000 | 1,009,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 18,750 | 3,750 | 15,000 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 38,500 | 7,500 | 31,000 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 6,250 | 1,250 | 5,000 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 63,500 | 12,500 | 51,000 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 127,000 | 25,000 | 102,000 | 0 | 0 | 0 | 0 | 0 |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 0 | 0 | 0 | | | | | |

* AFUDC may require adjustment after Finance Department review.

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,553,600 Maximum (\$): 2,330,400

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

| | | | |
|----------|-------------------|------------------|------------------|
| Copy to: | Mr. P. E. Haering | Mr. D. Dittmann | Mr. L. Saltis |
| | Mr. P. Harpolis | Mr. M. Sefcik | Mr. A. Onevelo |
| | Mr. K. Post | Mr. H. W. Turner | Mr. J. Kisch |
| | Ms. J. Caserto | Mr. D. L. DuBois | Mr. M. Englishby |
| | Mr. J. Ferrara | Ms. J. Paull | Mr. G. Yozzo |
| | Mr. R. Wright | Mr. N. Conza | |

E.P. #2016-012

August 18, 2016

Ms. H. M. Adams

Spare 10/12MVA Transformer Relocations

Overview

Due to recent and future substation upgrades at Saugerties, Modena, and Kerhonkson, three 10/12MVA transformers will be available for use. The three transformers from these locations each operate at 69/13.8kV, two are wye-delta-wye, one wye-wye and are 34, 6, and 14 years old, respectively. Because the transformers are still in good working condition, it is recommended they be relocated for future use.

Location Recommendations

The first transformer, T-10000-10, is the spare Saugerties Substation Transformer made available by the retirement of the old Saugerties Substation. As stated in the Draft Cocksackie/New Baltimore/Freehold Area Study, it was recommended that the spare Saugerties transformer replace the existing 1935 Freehold transformer. This replacement was completed in 2016.

The system spare transformer, T-10000-18, is currently located at the Modena Substation. The Modena Substation Upgrade Assessment (E.P. 2012-013) indicated that this transformer should be relocated following the update of the P and MK Lines and the retirement of the 69kV at Modena. Due to the timing of the P & MK line project, this transformer will not be available until 2020. Because the installation of a 10MVA transformer will be required at the Stanfordville Substation by 2019, Distribution Planning recommends a new 10/12MVA transformer be purchased for use at this location.

The third transformer, T-10000-17, is available from the recently retired Kerhonkson Substation. Currently, Operations Services is monitoring the existing 10MVA transformer at Greenfield Road due to its high DGA content. Because of this, it is recommended that the spare Kerhonkson 10MVA be held for use at the Greenfield Road Substation in the event of a transformer failure. Based on the Area Study completed for the Greenfield Road/Clinton Avenue Substations, it is also recommended that the system spare transformer, T-10000-18 located at Modena be used at Greenfield Road in 2020 as part of the 4kV to 13.2kV upgrade and the retirement of the aging 4kV infrastructure. A new 10/12MVA transformer should then be purchased for use as a system spare. The future use of the second spare transformer (old Kerhonkson Transformer # 2) made available by the retirement of the Kerhonkson Substation was also explored; however, this

transformer is 78 years old and in poor condition. Therefore, Operation Services recommends its retirement.

Conclusion

The following 10/12MVA transformers should be relocated or purchased for the substations listed below:

- Spare Saugerties T-10000-10:** Freehold Substation (2016)
- Purchase New 10/12MVA:** Stanfordville Substation (2019)
- Spare Kerhonkson T-10000-17:** Greenfield Road Substation (as needed or in 2020)
- Spare Modena T-10000-18:** Greenfield Road Substation (2020)
- Purchase New 10/12MVA:** System Spare (2020)



Stephanie Genesee
Electric Distribution Planning

Submission Date: April 11, 2023
Submitted By: Brett Arteta

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: New Baltimore Substation Upgrade

Work Order #: 2 1 6 7 - K

Budget Group: Electric

Budget Category: 13

Funding Project Number: 1-1312-99-19

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2023

In-Service: 12/1/2024

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

The New Baltimore (FKA Freehold) DEC Peaker Regulation Project will also be designed and constructed alongside the Substation Upgrade. The Peaker Project was established due to the retirements of the Cocksackie and South Cairo Gas Turbines.

Describe the project objective and scope of work:

Due to their proximity, the Coxackie and New Baltimore Substations provide reserve capability and operating flexibility between the two substations. The existing distribution infrastructure between the substations is aging, in poor condition and has access limitations due to CSX railroad expansion. To maintain reliability and operating flexibility in this area, the distribution infrastructure requires replacement. A review of the area determined that a more cost effective solution is to install a second transformer and associated circuit positions at the New Baltimore

Describe specific scope exclusions, assumptions and constraints:

Add an additional 13.4 MVA, 115x69/13.8 kV transformer and associated distribution feeders to the New Baltimore Substation. The cross rated transformer is due to future plans to upgrade the transmission feeds to the substation from 69 kV to 115 kV.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

In order to improve operating flexibility in the New Baltimore/Coxsackie area and to provide reserve capability in the event of a transformer failure at the New Baltimore Substation.

What are the risks and consequences of not completing this project?

Risk of power transformer failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$5,141,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 496,000 | 191,000 | 305,000 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 248,500 | 95,500 | 153,000 | 0 | 0 | 0 | 0 | 0 |
| | Stock Materials | 248,500 | 95,500 | 153,000 | 0 | 0 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 992,000 | 382,000 | 610,000 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 347,700 | 133,700 | 214,000 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 2,480,000 | 955,000 | 1,525,000 | 0 | 0 | 0 | 0 | 0 |
| | AFUDC* | 148,300 | 57,300 | 91,000 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 4,961,000 | 1,910,000 | 3,051,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 26,900 | 3,900 | 23,000 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 53,800 | 7,800 | 46,000 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 9,300 | 1,300 | 8,000 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 90,000 | 13,000 | 77,000 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 180,000 | 26,000 | 154,000 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|--------------|--------------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 1,553 | 1,553 | 0 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 4,112,800 Maximum (\$): 6,169,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Required retirements of the South Cairo and Coxsackie Gas Turbines by 2025.

What are the risks and consequences of not completing this project?

There would be no system stability and voltage regulation on the system due to the retirement of the South Cairo and Coxsackie Gas Turbines.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$3,926,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 382,000 | 180,000 | 202,000 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 191,000 | 90,000 | 101,000 | 0 | 0 | 0 | 0 | 0 |
| | Stock Materials | 191,000 | 90,000 | 101,000 | 0 | 0 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 765,000 | 360,000 | 405,000 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 267,000 | 125,000 | 142,000 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 1,912,000 | 900,000 | 1,012,000 | 0 | 0 | 0 | 0 | 0 |
| | AFUDC* | 116,000 | 55,000 | 61,000 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,824,000 | 1,800,000 | 2,024,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 15,000 | 0 | 15,000 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 31,000 | 0 | 31,000 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 5,000 | 0 | 5,000 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 51,000 | 0 | 51,000 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 102,000 | 0 | 102,000 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|--------------|--------------|--------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 7,604 | 4,017 | 3,587 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 3,140,800 Maximum (\$): 4,711,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Required retirements of the South Cairo and Coxsackie Gas Turbines by 2025.

What are the risks and consequences of not completing this project?

There would be no system stability and voltage regulation on the system due to the retirement of the South Cairo and Coxsackie Gas Turbines.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$8,210,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 811,000 | 100,000 | 711,000 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 405,000 | 50,000 | 355,000 | 0 | 0 | 0 | 0 | 0 |
| | Stock Materials | 405,000 | 50,000 | 355,000 | 0 | 0 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 1,622,000 | 200,000 | 1,422,000 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 568,000 | 70,000 | 498,000 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 4,054,000 | 500,000 | 3,554,000 | 0 | 0 | 0 | 0 | 0 |
| | AFUDC* | 243,000 | 30,000 | 213,000 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 8,108,000 | 1,000,000 | 7,108,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 15,000 | 0 | 15,000 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 31,000 | 0 | 31,000 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 5,000 | 0 | 5,000 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 51,000 | 0 | 51,000 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 102,000 | 0 | 102,000 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|--------------|--------------|--------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 7,928 | 1,004 | 6,924 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 6,568,000 Maximum (\$): 9,852,000

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Empty text area for additional information.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Required retirements of the South Cairo and Coxsackie Gas Turbines by 2025.

What are the risks and consequences of not completing this project?

There would be no system stability and voltage regulation on the system due to the retirement of the South Cairo and Coxsackie Gas Turbines.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$3,769,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 367,000 | 155,000 | 212,000 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 183,500 | 77,500 | 106,000 | 0 | 0 | 0 | 0 | 0 |
| | Stock Materials | 183,500 | 77,500 | 106,000 | 0 | 0 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 733,000 | 310,000 | 423,000 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 256,500 | 108,500 | 148,000 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 1,833,000 | 775,000 | 1,058,000 | 0 | 0 | 0 | 0 | 0 |
| | AFUDC* | 110,500 | 46,500 | 64,000 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,667,000 | 1,550,000 | 2,117,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 15,000 | 0 | 15,000 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 31,000 | 0 | 31,000 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 5,000 | 0 | 5,000 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 51,000 | 0 | 51,000 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 102,000 | 0 | 102,000 | 0 | 0 | 0 | 0 | 0 |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 0 | 0 | 0 | | | | | |

* AFUDC may require adjustment after Finance Department review.

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 3,015,200 Maximum (\$): 4,522,800

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: April 11, 2023
Submitted By: Brett Arteta

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Grid Modernization

Work Order #: -

Budget Group: Electric

Budget Category: 13

Funding Project Number: 1-1312-99-19

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2023

In-Service: 12/1/2024

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

The Central Hudson Grid Modernization Program is comprised of six critical projects: Distribution Automation, Distribution Management System, Distribution System Operations, Geographic Information System (GIS) Model, Network Strategy, and Substation Metering Infrastructure.

Describe the project objective and scope of work:

Installation of substation feeder metering upgrades for per phase metering and fault data reporting. This includes electric and gas customer metering upgrades to provide remote monitoring and control. These infrastructures will be leveraged for remote metering, outage reporting, and energy savings. Installations include upgraded transformer LTC controllers and distribution circuit relaying upgrades at multiple substations.

Describe specific scope exclusions, assumptions and constraints:

A systematic approach installing Grid Modernization equipment within substations has taken place. The Poughkeepsie and Fishkill Districts will be completed first, followed by Newburgh, Kingston, and Catskill Districts, respectively.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Grid Modernization projects are a key Central Hudson initiative that will help create a smarter grid that will meet the changing energy landscape and prepare for the operating needs of the future.

What are the risks and consequences of not completing this project?

Risk of decreased reliability possibly increasing SAIFI or CAIDI due to decreased automated restoration.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Grid Modernization aligns with our Corporate Goals by improving customer reliability.

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$3,876,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 328,100 | 147,100 | 165,000 | 0 | 16,000 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 163,550 | 73,550 | 82,000 | 0 | 8,000 | 0 | 0 | 0 |
| | Stock Materials | 163,550 | 73,550 | 82,000 | 0 | 8,000 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 655,200 | 294,200 | 330,000 | 0 | 31,000 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 228,970 | 102,970 | 115,000 | 0 | 11,000 | 0 | 0 | 0 |
| | Overheads | 1,638,500 | 735,500 | 825,000 | 0 | 78,000 | 0 | 0 | 0 |
| | AFUDC* | 98,130 | 44,130 | 49,000 | 0 | 5,000 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,276,000 | 1,471,000 | 1,648,000 | 0 | 157,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 89,750 | 3,750 | 78,000 | 0 | 8,000 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 180,500 | 7,500 | 157,000 | 0 | 16,000 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 30,250 | 1,250 | 26,000 | 0 | 3,000 | 0 | 0 | 0 |
| | Overheads | 299,500 | 12,500 | 261,000 | 0 | 26,000 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 600,000 | 25,000 | 522,000 | 0 | 53,000 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 3,100,800 Maximum (\$): 4,651,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

[Empty text area for additional information]

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To replace obsolete equipment before failure.

What are the risks and consequences of not completing this project?

Risk of power transformer failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$6,357,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 608,000 | 0 | 100,000 | 508,000 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 304,000 | 0 | 50,000 | 254,000 | 0 | 0 | 0 | 0 |
| | Stock Materials | 304,000 | 0 | 50,000 | 254,000 | 0 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 1,215,000 | 0 | 200,000 | 1,015,000 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 425,000 | 0 | 70,000 | 355,000 | 0 | 0 | 0 | 0 |
| | Overheads | 3,039,000 | 0 | 500,000 | 2,539,000 | 0 | 0 | 0 | 0 |
| | AFUDC* | 182,000 | 0 | 30,000 | 152,000 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 6,077,000 | 0 | 1,000,000 | 5,077,000 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 42,000 | 0 | 15,000 | 27,000 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 84,000 | 0 | 31,000 | 53,000 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 14,000 | 0 | 5,000 | 9,000 | 0 | 0 | 0 | 0 |
| | Overheads | 140,000 | 0 | 51,000 | 89,000 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 280,000 | 0 | 102,000 | 178,000 | 0 | 0 | 0 | 0 |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 0 | 0 | 0 | | | | | |

* AFUDC may require adjustment after Finance Department review.

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 5,085,600 Maximum (\$): 7,628,400

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

[Empty text area for additional information]

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A: Replacement of obsolete PLC equipment.

Why was the proposed project scope chosen over other alternatives?

N/A: Replacement of obsolete PLC equipment.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To replace obsolete equipment before failure.

What are the risks and consequences of not completing this project?

Lack of Supervisory control and information in the substation possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$2,292,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 203,000 | 0 | 10,000 | 193,000 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 101,000 | 0 | 5,000 | 96,000 | 0 | 0 | 0 | 0 |
| | Stock Materials | 101,000 | 0 | 5,000 | 96,000 | 0 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 407,000 | 0 | 21,000 | 386,000 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 143,000 | 0 | 8,000 | 135,000 | 0 | 0 | 0 | 0 |
| | Overheads | 1,016,000 | 0 | 51,000 | 965,000 | 0 | 0 | 0 | 0 |
| | AFUDC* | 61,000 | 0 | 3,000 | 58,000 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,032,000 | 0 | 103,000 | 1,929,000 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 39,000 | 0 | 8,000 | 31,000 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 78,000 | 0 | 15,000 | 63,000 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 14,000 | 0 | 3,000 | 11,000 | 0 | 0 | 0 | 0 |
| | Overheads | 129,000 | 0 | 25,000 | 104,000 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 260,000 | 0 | 51,000 | 209,000 | 0 | 0 | 0 | 0 |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 0 | 0 | 0 | | | | | |

* AFUDC may require adjustment after Finance Department review.

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,604,400 Maximum (\$): 2,979,600

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

This project was part of the original RTU and PLC Replacement Program that has been separated out by project.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

N/A: Infrastructure Replacements

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$1,015,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 102,000 | 0 | 0 | 102,000 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 51,000 | 0 | 0 | 51,000 | 0 | 0 | 0 | 0 |
| | Stock Materials | 51,000 | 0 | 0 | 51,000 | 0 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 203,000 | 0 | 0 | 203,000 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 70,000 | 0 | 0 | 70,000 | 0 | 0 | 0 | 0 |
| | Overheads | 508,000 | 0 | 0 | 508,000 | 0 | 0 | 0 | 0 |
| | AFUDC* | 30,000 | 0 | 0 | 30,000 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,015,000 | 0 | 0 | 1,015,000 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 710,500 Maximum (\$): 1,319,500

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

N/A: Infrastructure Replacements

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|---|----------------------------------|--|-----------------------------------|-------------|--|------------------|-------------|-------------|--------------|
| \$3,660,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 334,000 | 0 | 0 | 20,000 | 314,000 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 167,000 | 0 | 0 | 10,000 | 157,000 | 0 | 0 | 0 |
| | Stock Materials | 167,000 | 0 | 0 | 10,000 | 157,000 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 668,000 | 0 | 0 | 41,000 | 627,000 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 234,000 | 0 | 0 | 14,000 | 220,000 | 0 | 0 | 0 |
| | Overheads | 1,671,000 | 0 | 0 | 102,000 | 1,569,000 | 0 | 0 | 0 |
| | AFUDC* | 99,000 | 0 | 0 | 6,000 | 93,000 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,340,000 | 0 | 0 | 203,000 | 3,137,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 48,000 | 0 | 0 | 0 | 48,000 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 96,000 | 0 | 0 | 0 | 96,000 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 16,000 | 0 | 0 | 0 | 16,000 | 0 | 0 | 0 |
| | Overheads | 160,000 | 0 | 0 | 0 | 160,000 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 320,000 | 0 | 0 | 0 | 320,000 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,562,000 Maximum (\$): 4,758,000

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

Risk of equipment failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$1,279,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 123,000 | 0 | 123,000 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 61,000 | 0 | 61,000 | 0 | 0 | 0 | 0 | 0 |
| | Stock Materials | 61,000 | 0 | 61,000 | 0 | 0 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 245,000 | 0 | 245,000 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 86,000 | 0 | 86,000 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 613,000 | 0 | 613,000 | 0 | 0 | 0 | 0 | 0 |
| | AFUDC* | 37,000 | 0 | 37,000 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,226,000 | 0 | 1,226,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 8,000 | 0 | 0 | 0 | 8,000 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 16,000 | 0 | 0 | 0 | 16,000 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 3,000 | 0 | 0 | 0 | 3,000 | 0 | 0 | 0 |
| | Overheads | 26,000 | 0 | 0 | 0 | 26,000 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 53,000 | 0 | 0 | 0 | 53,000 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 895,300 Maximum (\$): 1,662,700

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Copy to: Mr. B. Arteta Mr. N. Conza Mr. P. Kothe Mr. G. Depoala E. Fortier
Mr. E. Kearney Mr. M. James Mr. E. Loeven Mr. K. Palen E.P. #2022-015
Mr. T. Burns Mr. R Hawthorne Mr. K. Pratt Mr. H. Turner
Mr. A. Salemo Mr. J. Kisch Mr. V. Narkaj Mr. R. Wright

January 27, 2023

To: Ms. S. Palmer:

EP# 2022-015: East Fishkill Area Review

Recommendation

For the reasons discussed in this memo it is recommended that Option 3 in the below with the following projects be budgeted and completed as follows to address the area loading and operational concerns:

Year 2026

- Re-configure the Wicopee Substation to operate similar to a standard highside half-breaker / two transformer substation (normally open 13.8kV bus tie with the ability to automatically transfer load for loss of a transformer). Complete the required controls and relay upgrades to support the new configuration and Grid Mod. Upgrade relays and control on the 8031, 8032, 8033 and 8034 circuits, the majority of this work is already budgeted to support the Grid Mod program. **\$1 Million**
- Extend the 8032 circuit from the first manhole to Rt. 52. Install new 8033 circuit from the breaker to Rt. 52. Circuits should be designed with a 9/14 MVA rating. **\$750,000**
- Polyphase 0.44 miles of the 8094 to Hopewell Glen. **\$200,000**

Year 2025-2026

- Double circuit west along Rt. 52 towards 82 for the 8032 circuit 0.73 miles. **\$330,000**
- Add pole plant for the 8072 circuit east along Rt. 52 to off load the 8093 2.21 miles. **\$1 Million**

Area and Load Serve Capability

The Southeast Fishkill Area being reviewed is depicted in Figure 1 below. This area straddles Route 52 and begins just to the east of the Merritt Park Substation, south of the East Fishkill Substation and heads

south and east to the edge of the service. The area is being reviewed due to circuit loading and proposed spot load growth near the Shenandoah Substation area and iPark 84 formerly the IBM complex.

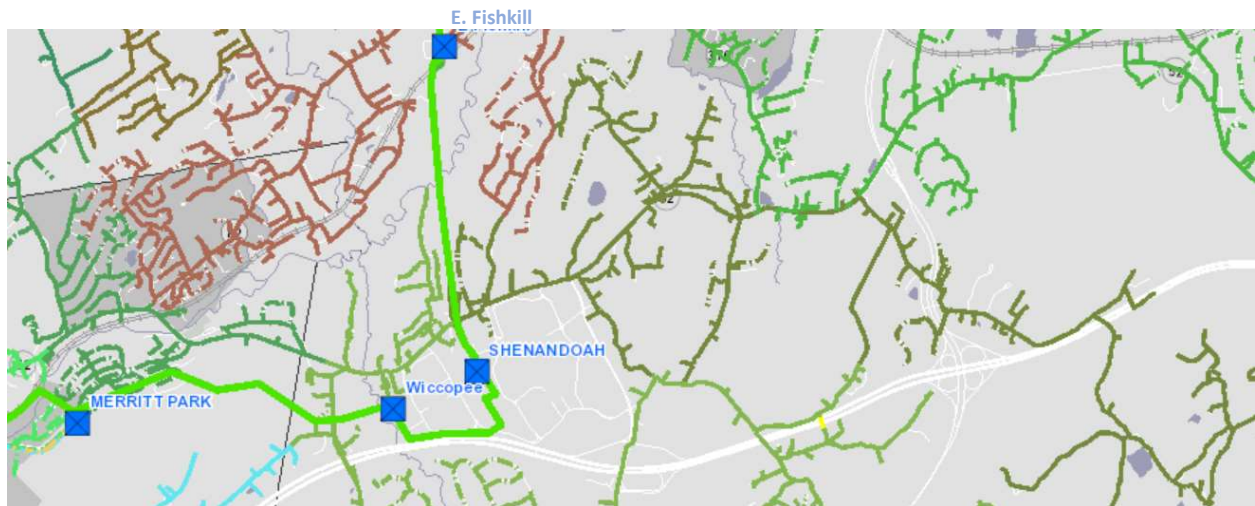


Figure 1 Southeast Fishkill Area

The area is supplied by the following circuitry: Shenandoah 8071 and 8072; Fishkill Plains 8093, 8094 and 8095; and the Merritt Park 8065. Table 1 Area Load below is a listing of the Substations and circuits supplying the area along with their design ratings and non-coincident peak loads.

| Substations & Circuits | Rating (MVA) | 2021 (MVA) |
|------------------------|--------------|------------|
| Shenandoah | 18 | 13.8 |
| 8071 | 9/12 | 8.1 |
| 8072 | 9/12 | 7.4 |
| Fishkill Plains | 48 | 46.6 |
| 8093 | 9/12 | 8.7 |
| 8094 | 9/12 | 8.4 |
| 8095 | 9/12 | 11.0 |
| Merritt Park | 51 | 32.7 |
| 8065 | 6/9 | 5.7 |

Table 1 Area Load

Many of the circuits supplying the area load are approaching their design limits. Although the loading is currently within thermal limits, there are concerns regarding operational flexibility during peak period switching, which is further limited as new spot load requests materialize. It should be noted that the ratings for Merritt Park and Fishkill Plains substations are firm ratings and Shenandoah is not since it is a single transformer substation, therefore for any substation related outage at Shenandoah the load would need to be transferred to neighboring circuits.

The East Fishkill/Shenandoah area was identified as a candidate for a Non-Wires Alternative (NWA) in 2014/2015 to address the ratings of the area substations and to defer the Phillips Road Substation. The NWA was launched in 2015 to reduce the area loading by 5 MW in order to defer the need for the Phillips Road Substation to 2025. Table 2 NWA Fishkill/Shenandoah below shows the achieved NWA for

Fishkill/Shenandoah which was reduced by 1.6 MW to 3.4 MW during the last avoided T&D cost study. The targeted energy efficiency program reduces the area load by 259 kW and the Peak Perks program can further reduce the area loading by 2.8 MW including avoided line losses when triggered. Based on the NWA, the total area rating can be increased by approximately 2.8 MW for analysis; however, this is spread amongst all the Fishkill Plains and the Shenandoah circuits which only addresses the area’s total firm rating but will not support the immediate need to supply the recent spot loads in the Shenandoah area along Route 52 and iPark 84. In addition, the NWA does not address the need to reduce the distribution circuit loading to within their design ratings which currently limits the ability to serve the newly developed spot loads as well as provide the needed operational flexibility during abnormal and contingency conditions. With the recommended upgrades to supply the emergent spot loads and increase operation flexibility, it is recommended to review the current NWA for the East Fishkill Area to determine if it is recommended to extend the timeframe beyond the original deferment period (2025).

| Load Zone | Peak Perks: Residential & Small Commercial (kW) | Peak Perks: Large C&I (kW) | Targeted Efficiency (kW) | Avoided Line Losses (kW) | Total kW Available |
|---------------------|---|----------------------------------|--------------------------------|-----------------------------|-----------------------|
| Fishkill/Shenandoah | 2,664 | 0** | 259 | 144 | 3,063 |

Table 2 - NWA Fishkill/Shenandoah

Area Spot Loads

The recent addition of an Amazon distribution center as well as the Frito Lay distribution center and planned vehicle charging stations are expected to add approximately 9 MVA of load to the area. The Amazon distribution center’s 6 MVA was added to the former IBM Wiccopee Substation. The Amazon Distribution center is located near the Wiccopee Substation. This area was formerly part of the IBM complex load supplied by Wiccopee Substation. This location was a better fit to be supplied by Wiccopee instead of our Shenandoah distribution station due to the size and proximity of the load. Wiccopee is a “non-traditional” distribution substation with a closed bus tie which was designed for the former IBM complex and has higher fault currents than current distribution station design levels. This aligned with the operation of the former IBM closed bus medium voltage gear at the time. When completed, the Frito Lay distribution center will be added to the Shenandoah Substation on the 8071 circuit which will push this feeder above its normal design rating of 9MVA. There are three additional proposed distribution centers in the iPark 84 complex. Blue water group is a 530,000 square foot warehouse and Ashley Furniture has a proposed 260,000 furniture repair and warehouse facility both which have not yet provided load letters. Additionally, LIDL has a proposed grocery warehouse with refrigeration and a proposed load of 4 MW also pending a formal load letter. Based on the 2020 DSIP, the Shenandoah and Fishkill Plains Substations show a 1.4% and 1.2% growth rate, respectively without any spot loads being accounted for.

Operational Concerns

Loading near design ratings poses a concern for operating during peak periods which limits the flexibility for switching, connecting larger spot loads and distribution automation. As mentioned earlier the

Shenandoah Substation is a single transformer source and the loss of transformer #7 or the low side bus would cause a permanent interruption for the customers on the 8071 and 8072 circuits. These customers would need to be transferred to neighboring circuits which would require lengthy switching. Although there is some reserve capability on the neighboring circuits there would likely be some unreserved load as well as potential voltage concerns during peak periods. Circuit ties are also limited since these circuits are effectively radial to the eastern border of the territory.

The Wiccopee Substation was recently utilized to supply the Amazon Distribution center. During the planning stages to supply this distribution center it was recommended that a second feeder be added from the alternate 13.8kV bus at Wiccopee to support substation maintenance requirements and to limit customer interruption in the future for the 8031 circuit which feeds Amazon. This second feeder will also allow for a future distribution circuit in the area to support any future spot loads simply by extending this feeder from the manhole outside the station to Route 52. To utilize the Wiccopee circuitry as distribution feeders, the bus tie would need to be opened to reduce the circuit fault currents.

Options

The below options will address the area spot loads as well as addressing the operational flexibility needs and circuit loading in the Southern East Fishkill area. Each option supports both existing and planned Distributed Energy Resources (DERs) and has the potential to increase hosting capacity along the distribution feeders as well as at the substation level.

Option 1 Phillips Road Substation

This option was a previously identified project to construct a single transformer 12/16/20 MVA substation where Phillips Road intersects the FP line crossing. This would establish a source to the north of Route 216 on the east end of the Town of East Fishkill. This project was posed to add distribution circuits to off load the Fishkill Plains and Shenandoah eastern circuits. Although this option addresses the loading of some of the local rural circuits as well as the firm rating of the Fishkill Plains Substation, it does not support the load requirements near the Shenandoah Rt. 52 corridor. A budgetary estimate for the substation and distribution tie-ins is estimated to cost **\$8 million**.

Option 2 New circuit out of Shenandoah

A new circuit emanating from the Shenandoah Substation could provide load relief to the area. This option will not be further pursued since it is a single transformer source and the inability to provide automatic load transfers for loss of transformer, bus or transmission feed exists. The opportunity to expand this station is also limited due to space constraints.

Option 3 Reconfigure the Wiccopee Substation as a Distribution Substation (Recommended)

The Wiccopee Substation currently has two distribution circuits that were recently added. The 8031 supplies the Amazon Distribution Center and the 8032 circuit provides a second circuit to support

substation breaker maintenance and a potential future distribution circuit. The station currently operates with a closed bus which contributes to higher than desired fault currents for our distribution overhead facilities. To utilize this substation, it is recommended that the substation be reconfigured to operate with a normally open bus tie along with the necessary relay and controls upgrades to support the new configuration and Grid Modernization. Opening the bus tie will reduce the fault currents from approximately 18,000 A for a 3 phase and 17,000 A for a single-phase fault to 9,400 A for a 3 phase fault and 9,000 A for a single phase fault. It is estimated that the fault current will be within the design limits of the overhead facilities prior to load being tapped. The cost estimate to complete the substation work along with extending the 8032 and adding a third distribution feeder is estimated to cost \$1 million for the substation work and \$750K for the circuit exits for a total of **\$1.75 million**.

To fully integrate the Wicopee Substation circuits and address the spot loads as well as the area circuits over design rating, there were several options reviewed with the Fishkill Electric Operations Engineer. Figure 2 below illustrates the East Fishkill load relief plan including the recommended circuit reconfiguration and integration to address the area loading and operational needs.

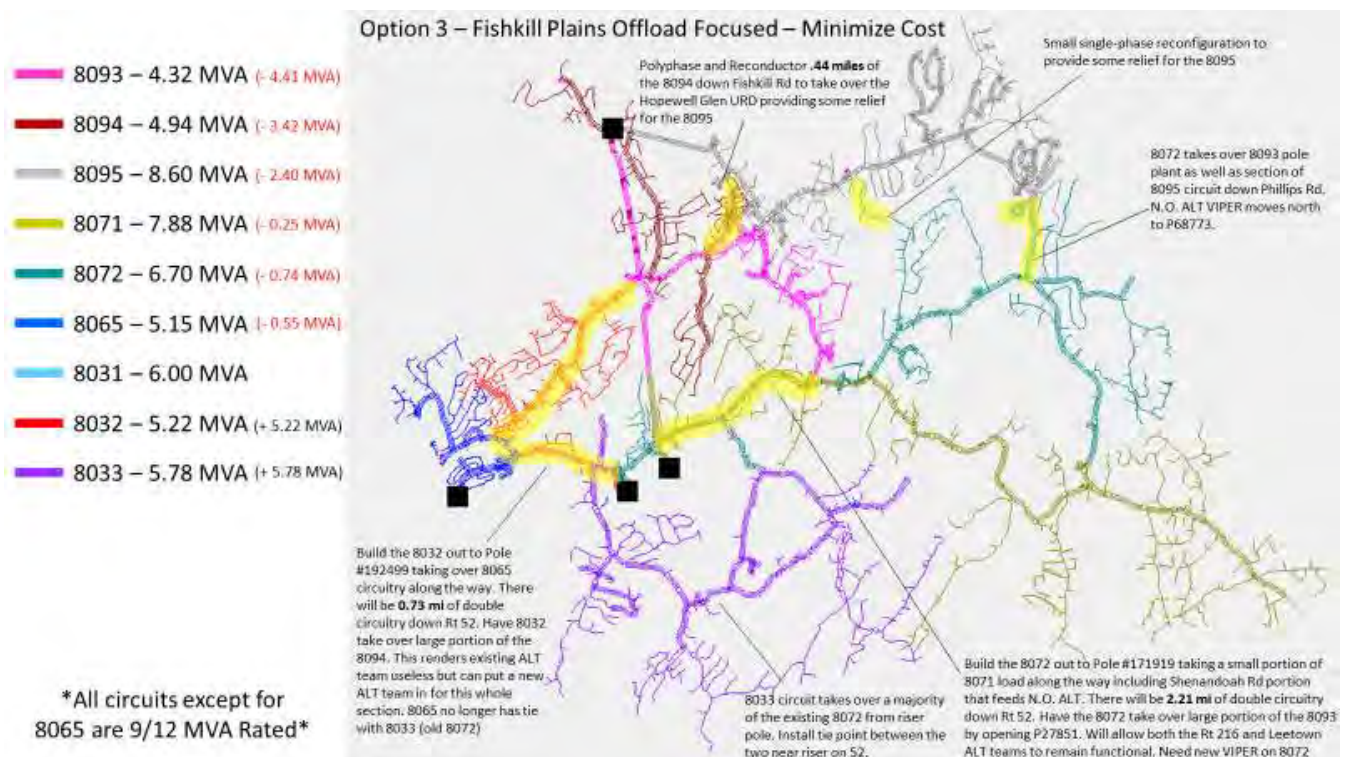


Figure 2 – East Fishkill load relief

There are three distribution projects that need to be incorporated within the capital budget in addition to the Wicopee circuit exits to balance the circuit loading and increase operational flexibility. The following projects are recommended at a total cost of **\$1.53 million**:

- Polyphase 0.44 miles of the 8094 to Hopewell Glen. \$200,000.
- Double circuit west along Rt. 52 towards 82 for the 8032 circuit 0.73 miles \$330,000.
- Install a second circuit for the 8072 to the east along Rt. 52 to off load the 8093 2.21 miles \$1M.

Russ Wagoner

1. Relays - The relays protect the electric transmission and distribution systems and can provide oscillography, targets, and phasor data. Electric System Protection (ESP) uses the relays to gather information on faults, including fault characteristics, fault locations, and phasor data. ESP interprets the oscillography data and then communicates our conclusions to: System Operations as an information point of contact; 2) Customer Services (Line Forces) to aid in fault locating and thereby limiting patrol time and area; 3) Operations Services for cases where there may be equipment issues.
2. Meters - The meters provide AC system quantities that are used to operate safely and to plan effectively for future system needs. The Electric Planning & Reliability area uses meter information for day-to-day operations (e.g., switching) and to aid in identifying and addressing locations requiring system reinforcements. System Operations (Sys Ops) uses meter data to monitor and operate the CH transmission system within the ratings of those facilities.
3. Controls and Communications - The RTUs, PLCs, and data concentrators provide status feedback and remote control capability; they also act as a conduit for meter and relay data. Sys Ops relies on the data provided by the RTUs and PLCs to monitor the status of the system from a centralized location, enabling them to respond quickly to system abnormalities. Also, Sys Ops has the ability to perform control operations through the RTUs and PLCs.

Equipment and Functions:

A variety of equipment exists in Central Hudson substations, including protective relays, meters, reclosers, and controls and communications instruments such as Remote Terminal Units (RTUs) and Programmable Logic Controllers (PLCs). Each of these components serves an integral role in contribution to the overall, integrated substation protection, control, and monitoring function. Various departments rely on information from these devices in order to perform their jobs, including Operations Services, Customer Services, line forces, Electric Transmission Planning, Distribution Planning, System Operations, Energy Accounting, and Electric System Protection. Brief summaries of these components are included in **Attachments I through 4**. The intention of this memo is to identify the concerns with continuing to use the identified outdated equipment, detail the benefits of combining functions when replacing equipment, establishing a policy for substation relaying, control, & monitoring functions, and laying out a plan to incorporate these components into a comprehensive substation renovation program.

I. Introduction:

Re: Substation Relays, Meters, Controls and Communications Infrastructure Opportunities

Mr. J.J. Borchert

June 24, 2011

Copy to:

Mr. P.E. Haering
 Mr. H.W. Turner
 Mr. P. Harpols

Mr. J. M. May
 Mr. D. J. Wittmann
 S.R. #2011-07

Waste Reduction:

New equipment can be utilized in an integrated fashion to eliminate or minimize the following tasks and unnecessary equipment (Excerpts are taken from the attached memos):

- Reading chart meters and manually entering data into the Meter Database (MDB).
 - Chart meters cost CH at least \$275,000 annually in labor expense (1130 man-hours), which can be devoted to other work.
- MV-90 circuits not for revenue or interchange metering purposes.
 - MV-90 circuits from Verizon cost CH approximately \$24,000 annually in expense.
- Running fault studies manually to determine fault locations.
 - Manual fault locating costs CH approximately \$15,000 annually in labor expenses.
- Metering transducers, auxiliary relays, timing relays, reclosing relays, and coil monitors.

Supporting the Future State:

New equipment, properly implemented and integrated, will better support current functions and create flexibility for added future functions as follows:

- Provide continuous metering data for the entire system, eliminating information “gaps” as a result of non-continuous and non-contiguous metering.
- Provide for robust planning capabilities and switching operations through use of trending and real-time data.
- Enable more accurate forecasting of area loads to increase risk tolerance, possibly resulting in deferral of substation and distribution projects.
- Offer flexibility for Distribution Automation and Smart Grid initiatives.
- Improve reliability and reduce CAIDI through automated event reporting and fault location.

II. Current State:

This section describes the mix of equipment by component, system wide, and the limitations of the non-digital devices.

1. Relays

There are 3500 active protection relays on the system, excluding LORs, SPRs, Regulator Controls, Recloser Controls, and Communication equipment.

Attachment 1

Copy to: Mr. P.E. Haering
Mr. H.W. Turner

Mr. P. Harpolis
Mr. J. M. May
S.R. #2011-03

June 23, 2011

Mr. J.J. Borchert

Re: Transmission & Distribution Protective Relay Review

Introduction:

Protective Relays represent a vital component for the reliable operation of the Central Hudson Electric Transmission and Distribution Systems. CH substations contain a generational mix of protective relay equipment that differs in capability, ease of use, and reliability. Relay technology has advanced; microprocessor-based (digital) relays not only offer numerous protection functions, but they provide metering capability as well in a compact footprint. This memo summarizes the existing transmission and distribution protective relay equipment, as well as recommendation for replacement options.

Discussion:

Relays perform various functions aimed at timely isolation of faulted areas and rapid restoration once the fault has been cleared. Some of the functions that relays provide include zone distance protection, high-speed pilot protection, overcurrent protection, differential protection, and automatic reclosing.

A. Outdated Devices:

The majority of substations contain a group of single-component electromechanical relays for each protected facility; these relays are responsible for protection functions exclusively. At these locations, metering is performed separately, also often in a single-function fashion. There are also stations that have more recent (but still outdated) types of relays, including solid state and early microprocessor relays. These relays have been failing recently, and a replacement program was created last year to address the concern with these relays. The following is a list (in order of decreasing replacement priority) of common relay types found in substations along with the reason that they have been superseded:

- Electromechanical Relays: These relays are obsolete for the reasons previously described (i.e.; physical size, calibration drift, single-function capabilities, etc).
- Solid State Relays: Like electromechanical relays, the relays on the CH system typically are single function. They have advanced technologically past the electromechanical relays, but not quite to the level of digital relays. They monitor current and voltage waveforms through analog circuits, which then are compared through potentiometers to user defined settings. They generally are unsupported, spare parts are hard to locate, and they contain components that deteriorate over time.

- 1st Generation Microprocessor Relays: Please see the 2010 Budget Memo, Re: Relay Replacement Program for Upgrade of 1st Generation Microprocessor Relays Remaining on the Central Hudson System, dated July 1, 2010, for the existing program.
- Schweitzer Engineering Laboratories (SEL) 200 Series Relays (SEL-251/ 267/ 279/ 2BFR): These relays are digital, but they make use of early logic processing methods, in which creating settings isn't as user-friendly as in modern digital relays. SEL has discontinued manufacturing parts for most of these relays, and limited service is provided with them.
- Basler BE1-79M Relays: These relays are multi-shot reclosing relays; they only provide the reclosing function. There are more recently developed relays that provide numerous protection functions and also perform reclosing operations and metering functions.
- Basler BE1-851 (H) Relays: These relays are multifunction, digital relays; however, they only receive current inputs. So, the only meter data available is Amps. Multifunction relays exist that receive current and voltage inputs and provide MW & MVAR data as well as a much larger variety of protection options.

B. Retrofit/Replacement Options:

Digital relays offer multiple protection functions as well as metering and substation equipment diagnostics. The use of multifunction digital relays greatly reduces the required panel space. Also, with few moving parts, digital relays do not need recalibration to remain accurate. Additionally, digital relays and digital relay controls offer the ability to have longer durations between maintenance cycles due to the combination of their internal error checking and their constantly monitored alarm outputs to SCADA.

Digital relays can be specified to offer equipment diagnostics for the devices they protect. For example, digital transformer relays have the ability to monitor the through-fault history of the transformers and to make determinations on the required maintenance as a result. The same case is true for feeder breakers protected by distribution relays.

- Digital Relays: A collection of proven products exists by a variety of manufacturers. These relays are microprocessor-based, multi-function relays that provide a large variety of protection, metering, and equipment diagnostic capability; they can be used for various protective functions. Some manufactures include SEL, GE, and Basler*. Electric System Design (ESD) has standardized the design to use SEL as primary protection and either GE or Basler relays for backup protection.

* Basler provides a BE1-951 relay, which conveniently fits into electromechanical relay panel cutouts.

C. Additional Considerations:

- o Data Concentrator (SEL-2032): This relay has 16 ports and can act as a data concentrator, a phone switch, and a basic logic processor. The 2032 connects to the RTU, acting as a slave device; it connects to other digital relays, polling them for meter information as a master. Once in the 2032, the meter data can be mathematically manipulated to maintain integrity and precision before it is transferred to a compatible RTU. The 2032 also is connected to a phone line to provide dial-in remote access for trained personnel, enabling event retrieval and relay interrogation.

- o Time Synchronization Devices: Various devices exist on the market that provides a means of time synchronization, including satellite clocks. These clocks provide a unified signal based on a sole source located at zero time offset. To avoid confusion between time zones, UTC time is used as a standard. Sequence of events reconstruction truly realizes the value of having all of the station relays linked to a universal source.

Conclusions:

Upgrading to digital relays provides the following benefits:

- ◆ They offer a more compact footprint and much more capability than their large, single-function predecessors.
- ◆ They provide digital metering capability. With proper SCADA infrastructure in place¹, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB/eDNA with little human intervention.
- ◆ The diagnostic capabilities of digital relays should be used to help in the condition assessment of substation equipment.
- ◆ They have a proven track record of good quality and high availability, along with excellent manufacturer support for current models.
- ◆ They provide oscillography, targets, and phasor data that can be accessed from a remote location through a modem. This capability assists in timely and accurate fault analysis.
- ◆ They have lower maintenance costs because they rarely fail and allow for an increased maintenance cycle (i.e. an increase of 50%; from 4 yrs. to 6 yrs.).

Eric A. Loeven

¹ Full integration requires a DNP compatible Remote Terminal Unit described in the "RTU Review" memo.

Attachment 2

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-04

June 23, 2011

Mr. J.J. Borchert

Re: Substation Metering Review

Introduction:

Substation metering data is used to plan and operate the Central Hudson Transmission and Distribution Systems. These metering data are necessary for the safe operation of existing facilities as well as the cost effective planning and design of new facilities. Many transmission lines, substation transformers, and distribution circuits have their MW & MVA_r flows monitored by the Energy Management System (EMS) and have the resultant data stored in the Meter Data Base (MDB) and Historian (eDNA). Many other circuits either are not metered or utilize local indicating metering, such as graphic charts or drag hands, to register data.

Technology has advanced; there are much more reliable and efficient means of measuring and transmitting metered load data, including by means of digital relays. This memo summarizes the existing meter equipment and the replacement options, as well as provides recommendations on the best option to gain appropriate metering data in the most efficient manner.

Discussion:

A large number of substations contain transducer-based meters, which register and report their data directly to a Remote Terminal Unit (RTU) by means of an analog signal. A handful of other stations contain chart meters, which provide local indication. In the stations that have chart meters, the metering is often registered in single function fashion, with circuit current measured in Amps and transformer load measured in Kilowatts and Kilovars. The meter data that is most useful for planning and operating the system is provided in the form of Watts and Vars. Additionally, the panel space taken up by the charts can be reduced greatly with the installation of digital relays, which offer protection functions as well as metering functions.

Technological advances have led to multi-function, digital relays with the capability to meter accurately. The digital relays can transfer instantaneously metered values to EMS. Once there, the data is stored in the Historian, integrated, and the peak hourly values are calculated and transferred to the MDB with little human intervention.

A. Outdated Devices:

The following is a list of common metering methods used in CH substations along with the reason that they have been superseded:

- Chart Meters: Graphic charts monitor single values such as MW, MVA_r, or circuit Amps. These charts rely on diligent maintenance practices to ensure that they function

as designed. Many of the charts run out of ink between maintenance cycles or fail mechanically, leaving "gaps" in data. Even the charts that record properly pose difficulty in capturing their data. The process of going to the substations to collect the charts, reviewing the charts and interpreting the data, and entering the data manually into the MDB is time consuming. Due to the cumbersome nature of the process, the charts are only interpreted for the annual system peaks, which leaves 2-4 data points in the MDB for that circuit or station element to use in planning.

- Other Local Indication Metering: Charts are not the only method of local metering. There are also substation Ammeters, Voltmeters, etc. that are remnants of a time when stations were manned and operated manually. Many of these devices are unsupported and have limited parts available.
- MV-90: An alternative method to metering by charts is to meter through MV-90. MV-90 is a system that uses a recorder to receive metered data directly from the instrument transformers and relies upon a dedicated telephone line to transmit that data to the master station collector; it is used for revenue metering as well as substation metering. Once the master has the data, it is transferred to the MDB. This method requires a dedicated line and the associated expenses.
- No Metering: Locations exist on the system where there are no methods of capturing load data. Some of these locations rely on grouped metering; they do not provide the granularity of individual circuit load data. At other locations, it hasn't been cost justified to install/repair any metering.
- Transducers: The transducers are wired directly to secondary AC quantities from current transformers and potential transformers. They convert the input quantities into an analog output signal, which is wired to the analog inputs of an RTU.
- Load checks: On a heavily loaded day, load checks are performed on circuits without automatic metering by having a worker physically go to a point on a circuit and manually perform a metering check.

B. Retrofit/Replacement Options:

- Digital Relays: Microprocessor-based relays not only offer protection functions; they provide metering capability as well in a compact footprint. The digital metering data provided by the digital relays is extremely accurate and has the ability to be entered into the MDB through Supervisory Control and Data Acquisition (SCADA) automatically once proper infrastructure is in place. The relays offer the ability to register numerous metering values simultaneously and in comm. format so that individual wires aren't needed for each metered point; rather, a single cable can be used to transmit multiple data points. Also, a separate phone line is not required for this method.
- Bitronics Power Meters: These meters provide bi-directional Watt and Var meter values as well as Volt and Amp values. They are capable of transmitting data through analog signal or through communication protocol to an RTU. They are cheaper alternatives, but do not provide any protection functions.

- Grid Sense: These are clip-on meters that report to a nearby data concentrator via radio. The data concentrator is linked to a POT's line outside of the station (no need for a Positron). The newest models provide directional Watt and Var metering, and they have the ability to report data in selectable time increments to the meter database. They represent a lower cost option and provide limited fault recording capabilities, but they do not provide protection functions.

Conclusions:

- ◆ Reading chart meters takes a great deal of time, and many of the charts are unsupported and are labor intensive to maintain. Data "gaps" exist when using chart meters, and the meters provide only a few, data points to the MDB each year, which need manual entry. The materials to repair and/or replace the charts are in short supply.
- ◆ Digital relays provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB with little human intervention.
- ◆ The AC quantities that the digital relays require for protection can be used for metering as well; therefore, there is no need for additional wiring from the instrument transformers to meters. Additionally, transducer equipment, which is susceptible to drift and requires regular maintenance, is no longer needed.
- ◆ The MV-90 system is a fully functional system, and it is an efficient method of collecting meter data in stations that do not have the relay and/or RTU capability to transmit data. MV-90 metering requires a dedicated phone line to transmit the meter data; this reoccurring expense can be eliminated with digital relaying and a proper RTU.
- ◆ Grid Sense meters can be installed relatively inexpensively and quickly to provide stopgap metering data until upgrades can be completed. They require a phone line and the monthly expenses associated with the line.

Eric A. Loeven

Appendix 1: Estimated Costs of Current Methods and Retrofit Options

| <u>Current Methods</u> | Time (Manhours) | | Cost |
|--|----------------------------|-----|--------------|
| | Field | Eng | TOTAL |
| MV-90 yearly (per station on average) | | | \$1,200 |
| Chart Meter maintenance & data retrieval | 1 | 10 | \$1,250 |

Note 1

Note 1: This cost is to retrieve the circular chart, review it, and enter it into the database. This process takes place on a suspected system peak day. At minimum, there are two times a year that this process is performed (Summer Peak and Winter Peak); however, there may be four or more times depending on when the actual peak occurs.

| <u>Retrofit Options</u> | Time | | | | Cost | | | TOTAL |
|--|--|-------|-------|-----|--------------|---------------------------------|----------|--------------|
| | Manhours | | | | Parts | Labor | | |
| | Tech | Elect | Draft | Eng | Device | Test Sw., Steel, etc. (w/OH) | | |
| Grid Sense Meter W / VAr | Hours are for the EOE and the Linemen. | | | | \$4,775 | | | \$5,700 |
| Data Concentrator 1 for every 4 ckt. | Per installation, each meter takes the lineman and the EOE 15 minutes to install. | | | | \$2,272 | | | \$2,700 |
| POT Line | Each data concentrator requires 20 minutes of lineman time and 15 minutes of EOE time. | | | | \$100 | | | \$110 |
| Labor (including travel time) per Station | Travel to each site has been assumed to be 1 hour. | | | | -waived- | | \$430 | \$430 |
| Site Registration per D/C | | | | | | | | |
| TOTAL GS Installation | | | | | | | | \$9,000 |
| Bitronics (Comm) | 40 | | 40 | 8 | \$2,000 | \$1,000 | \$11,400 | \$15,000 |
| Bitronics (HW-W/VAr/V) | 40 | | 40 | 12 | \$1,100 | \$1,000 | \$12,000 | \$14,500 |

Attachment 3

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-05

June 23, 2011

Mr. J.J. Borchert:

Re: Remote Terminal Unit Review

Introduction:

Real-time control and status feedback are vital components of a properly functioning substation. Without someone at the substation 24/7, a means of providing feedback and control operations is required; that means is a Remote Terminal Unit (RTU). This memo will describe the current state of the RTUs on the system, as well as the opportunity areas for retrofits and justification for the upgrades.

Discussion:

RTUs provide a means of transmitting important data in a substation to a master station via Supervisory Control and Data Acquisition (SCADA). The RTUs collect status and metering data and transmit it to a master station when polled. Also, they perform control operations that are initiated from the master station in a remote location. The RTUs can be dedicated line or dial-up depending on the application. RTUs have evolved with technology; existing CDC RTUs (protocol and provider) have been replaced with new flash ROM RTUs that utilize protocol suites including, but not limited to, CDC and the utility standard, DNP.

A. Outdated Devices:

- CDC 44-500 & CDC 88-90: These are different versions of dedicated line RTUs provided by CDC, a company that no longer exists. Retrofits have been performed to eliminate the CDC RTUs on the system because of the inability to get spare parts and due to their incompatibility with the digital relays. These RTUs utilize CDC protocol, which is an outdated protocol incapable of communicating with digital relays/data concentrators and is unable to receive digital metering data. They rely on analog signals and pulse accumulators sent from transducers to transmit meter information.
- G.E. M-4000: This is a smaller version of the G.E. Harris D20 RTU. It is used mainly in dial-up applications and is polled twice daily for SCADA data. It will report unsolicited if there is a change of status or if a metered point's dead band is exceeded. Based on the frequency that dial-up RTUs are polled, they cannot be used as sources to the meter database. Also, dial-up RTUs are not reliable because they rely on a plain old telephone (POT) line for communication. Due to this lack of reliability, control operations typically are not performed with dial-up RTUs. As a plus, the M-4000 has the capability to communicate through CDC or DNP protocol, and it also can be configured as a dedicated unit.

- G.E. D20: The functionality and hardware of this RTU are consistent with many modern RTUs; however, the configuration software is not user-friendly and uses a complicated, layered architecture. Additionally, with retiring technicians, the available workforce skilled in working with the configuration software is dwindling. This fact is of concern because emergency fixes will take longer to complete.

B. Retrofit/Replacement Options:

- Telvent Sage 2400¹: Telvent offers an RTU that fits into existing CDC RTU cabinets, and it has peripheral cards that resemble the CDC RTU cards. For these reasons, Telvent is the vendor of choice, providing the most seamless retrofit option. Telvent also offers a protocol suite for communications, including DNP and CDC. The DNP Master protocol allows direct communication with SEL-2020/2030/2032 data concentrators to transfer metering data from numerous digital relays in a substation.

C. Additional Considerations:

- Radio linked RTUs: As previously stated, the M-4000 can be polled as a dedicated RTU or as a dial-up unit. If there is a nearby, dedicated RTU, it is sometimes possible to install a radio link between the two stations and poll the M-4000 from the other station. In this configuration, there is access to real-time information and the ability to perform control operations at both stations. The need for the Positron Box at the radio-linked station is eliminated, and there is no extra cost incurred by installing a phone line and a Positron Box. The radio links require a clear line of site from one station to the next in order for the signal to be transmitted clearly. As such, the reliability of the circuits is largely dependent upon the terrain. Radio signals are also susceptible to interference from other mobile devices such as CB Radios.
- Positron Boxes: One major cost associated with RTUs, dedicated or dial-up, is the phone company's requirement of a Positron Box to isolate the outside phone line from the electric substation. This requirement is in place to provide a level of comfort for the phone company technician working in our substations, many of the existing stations have been allowed to function without this isolation in a grandfathered manner. However, any time that RTU retrofits are performed at these stations, the installation of a Positron Box is required. They are an expensive piece of equipment and have long lead times that may impact project schedules. There also is continued reliance on the phone company for maintenance and repairs.

¹ Telvent has been chosen as the preferred RTU for retrofits due to ease of configuration/use and the techs' familiarity with the units. All RTU cost estimates in this report are based on using this RTU.

Conclusions:

Upgrading old CDC, M-4000, and D-20 RTUs to Telvent RTUs provides the following benefits:

- ◆ Telvent RTUs are reliable and parts are available readily.
- ◆ The Telvent configuration software is user-friendly, making configuration and testing faster.
- ◆ DNP RTUs, of which Telvent is one, can receive communication-based metering & status and transmit it to the SCADA master.
- ◆ The Telvent RTU retrofits for the CDC 44-500's utilize the existing RTU cabinet and high powered tripping relays. The Telvent replaces the equipment susceptible to failure and makes use of the existing equipment that is less prone to failure.
- ◆ Using Telvent RTUs provides timesavings through standardization, and the engineers and technicians alike prefer to work with the Telvent for RTU retrofits.

Consideration also should be given to converting dialup RTUs to dedicated line RTUs. Dialup RTUs rely on POT lines, which have notoriously poor reliability; additional steps and equipment are required to perform the control operations safely. In contrast, dedicated line RTUs offer signal reliability, which provides the ability to perform control operations safely without added equipment and procedure steps.

Eric A. Loeven

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. D. J. Dittmann
Mr. J. M. May
S.R. #2011-06

June 23, 2011

Mr. J.J. Borchert

Re: Substation Recloser Review

Introduction:

Substation reclosers provide an alternate method of interrupting fault current on distribution and sub-transmission circuits. They are a convenient way to provide circuit protection in locations where it is not cost effective to install a circuit breaker and associated conduit to a control house. One disadvantage of using a recloser rather than a circuit breaker is that the recloser has reduced interrupting capability.

Recloser technology has advanced; hydraulic, oil-filled devices have given way to vacuum-interrupted, microprocessor-based (digital) recloser controls. This memo summarizes the existing substation recloser equipment, as well as replacement options. Also, this memo provides recommendations on the best retrofit options.

Discussion:

“An automatic circuit recloser is a self-contained device, which can sense and interrupt fault currents as well as reclose automatically in an attempt to re-energize a line.”* The existing hydraulic reclosers, a kin to electromechanical relays, have single component capability with limited flexibility in setting pickup curves, very little intelligence, and minimal ability to report feedback. New, digital recloser controls provide a wide range of pickup curves, are self-monitoring, grant instant notification of operations, offer desired metering capabilities, and require less frequent routine maintenance.

A. **Outdated Devices:**

Reclosers were installed in substations as a cost effective alternative to a distribution (15kV) or sub-transmission (34.5kV) circuit breaker combined with a reclosing relay. They can be single-phase or three-phase, be controlled mechanically (hydraulic) or digitally, and they have interrupting mediums of oil or vacuum. They make use of a series of fast and slow curves, providing coordination versatility and protection flexibility. A brief summary of the outdated reclosers on the CH system, specifically the hydraulically controlled type and the oil-interrupted type, is as follows:

- o Hydraulically controlled reclosers: These reclosers are self-contained and self-controlled; they have oil or vacuum interrupters. They are outdated due to their

* Page 124. Power Distribution Engineering: Fundamentals and Applications. James J. Burke. 1994.

C. Additional Considerations:

- Telemetric Interface: The Telemetric RTM II device can be installed to provide status and control of the SEL-651R DNP3 points. These data travel via cellular network and are displayed via a secure web interface. In addition, data travel to a SCADA Xchange server and then over frame relay to our SCADA system.
- R-Mag Circuit Breakers: As the most direct comparison to the substation recloser, these circuit breakers are a packaged breaker and relay combination. They are relatively inexpensive to install and there is familiarity with them by the techs, electricians, and engineers alike. These breakers provide a higher interrupting capability than the reclosers.

Conclusions:

Upgrading to vacuum interrupted, digitally controlled Viper reclosers provides the following benefits:

- ◆ Vacuum Interruption –
 - The speed of operation on these reclosers is not compromised by temperature.
 - The maintenance on these reclosers is not as labor-intensive as the oil-filled reclosers. They can operate up to 10,000 times before requiring an overhaul, with only the battery requiring simple in-field replacement in the meantime.
- ◆ Digital Control –
 - These recloser controls provide a wide range of pickup curves, which makes coordination easier and much more flexible than the hydraulically controlled reclosers.
 - These recloser controls offer digital metering capability and fault notification. The recloser can transmit its information through SCADA if the proper infrastructure is in place, or through Telemetric in stations with under-developed SCADA infrastructure.
 - These recloser controls can be interrogated to gather oscillography, targets, and phasor data from a remote location through a modem. This capability assists in timely and accurate fault analysis.

Some of the lower cost is lost when the recloser is installed in a substation if it is connected to the RTU in the control house, rather than through the Telemetric Unit. In this case, the added cost of conduit, steel work, and/or foundation needs to be considered. Regardless of the method of reporting to SCADA, installing the recloser in a substation comes with the added costs associated with technician time to commission and test the recloser and digital control over the cost of an installation on a distribution circuit.

Eric A. Loeven

Appendix 1: Estimated Costs of Retrofit Options

| Retrofit Options | Cost | | |
|---|----------|-----------|--------|
| | Parts | TOTAL | |
| Viper Reclosers with control relay and PT (on dist circuit) | \$21,000 | \$33,500 | Note 1 |
| Viper Reclosers with control relay (in a substation - Telemetric communication) | \$20,500 | \$33,000 | Note 1 |
| Viper Reclosers with control relay (in a substation - RTU communication) | \$20,500 | \$86,000* | Note 2 |
| R-Mag Breaker | \$25,000 | \$90,000 | |

Note 1: These represent one-time costs. There are additional annual costs for the SCADA Frame relay and the SCADA X-Change to Telemetric. The SCADA Frame Relay costs \$5200/yr. The SCADA X-Change to Telemetric costs \$2000/yr for 100 devices and \$1,500 for each 50 devices after that.

Note 2: This cost is estimated based on proposed work to bring the data through the RTU. No installations exist at this time in this manner.

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|-------|----------|--|
| Accord | 4 | 361 Ckt. | Charts - kW | ----- | EM | NONE | ----- | Retired as part of P/MK Upgrade |
| Ancram | 13.8 | 7085 Ckt. | Grid Sense | ----- | EM | NONE | ----- | Only has a 13.8 Voltage Regulator |
| Balmville | | | | | EM | | | |
| Balmville | 4 | 411 Ckt. | MV-90 | ----- | EM | | | |
| Balmville | 4 | 412 Ckt. | MV-90 | ----- | | C-300 | | |
| Barnegat | | | | | | | | Metering source? |
| Barnegat | 115 | KB Line | Amps | EM | ----- | | | |
| Barnegat | 115 | KC Line | None | EM | ----- | | | |
| Barnegat | 115 | KB-749-KC BKR | | EM | ----- | | | |
| Barnegat | 115/13.8 | T1 | SCADA | ----- | | | | IBM Feeds |
| Barnegat | 115/13.8 | T2 | SCADA | ----- | | | | |
| Barnegat | 13.8 | S1 | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2 | SCADA | ----- | EM | | | |
| Barnegat | 13.8 | S1-706 BKR | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2-734 BKR | SCADA | ----- | EM | | | |
| Beacon | | | | | | D-20 | | |
| Beacon | 13.8 | 8006 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 13.8 | 8015 Ckt. | SCADA | ----- | EM | | | Previously 8087A? |
| Beacon | 4 | 801 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 802 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 803 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | W-414 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | W-463 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | Bus 1 | SCADA | ----- | | | | |
| Beacon | 4 | Bus 2 | SCADA | ----- | | | | |
| Beacon | 13.8/4 | T1 | SCADA | ----- | EM | | | |
| Beacon | 13.8/4 | T2 | SCADA | ----- | EM | | | MDB has an entry with T1+T2 calculated |
| Beacon | 13.8 | BF Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | NM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | CM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 1 | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 2 | SCADA | ----- | EM | | | |
| Bethlehem Rd. | | | | | | 2400 | | |
| Bethlehem Rd. | 13.8 | 4091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4092 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4093 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4094 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4095 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4096 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4097 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4098 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 1 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 2 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 115 | RD Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | UB Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | RD-604-UB BKR | | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T1 | EMS | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T2 | EMS | EM | ----- | | | Metering combined |
| Bethlehem Rd. | 13.8 | W-613 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-619 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-804 BKR | | | EM | | | |
| Bordman Rd. | | | | | | NONE | | |
| Bordman Rd. | 13.8 | 6081A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | 6082A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-203 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-204 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-205 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-206 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-207 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-208 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-209 Ckt. | | ----- | EM | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|---------------|--------------------|-------------|-------------|--------|----------|---|
| Boulevard | | | | | | 2100 | | |
| Boulevard | 69 | OB Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | I Line | SCADA | uP | ----- | ----- | ----- | Line Amps & WVAR |
| Boulevard | 13.8 | KO Line | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | KK Line | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1011 | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1012 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1013 | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1014 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 69 | Bus 1 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Bus 2 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Overall | ----- | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | Metering combined |
| Boulevard | 69/13.8 | T3 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Clinton Ave. | | | | | | M-4000 | | |
| Clinton Ave. | 4 | 395 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 396 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 397 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | Bus | SCADA | ----- | ----- | ----- | ----- | |
| Clinton Ave. | 13.8/4 | T1 | MV-90 | ----- | Fuse | ----- | ----- | |
| Cold Spring | | | | | | NONE | | |
| Cold Spring | 4 | 871 Ckt. | Charts - kW | ----- | EM | ----- | ----- | Install a Grid Sense Package for two (2) circuits. |
| Cold Spring | 4 | 872 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Coldenham | | | | | | D-20 | | |
| Coldenham | 13.8 | 4021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4026 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4027 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4028 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | B1-B2 Tie | ----- | ----- | EM | ----- | ----- | |
| Coldenham | 115 | J Line | SCADA | Gen 1 | ----- | ----- | ----- | 95P is DLP; 95BU is REL-301; part of replacement program already. |
| Coldenham | 115 | CW Line | SCADA | Gen 1 | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115 | J-19-CW BKR | ----- | SS | ----- | ----- | ----- | |
| Converse St. | | | | | | NONE | | |
| Converse St. | 4 | 121 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 122 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 123 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | | | | | | NONE | | |
| Conway Place | 4 | 881 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | 4 | 882 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Coxsackie | | | | | | 8890 | | |
| Coxsackie | 13.8 | 1071 Ckt. | Charts - Amps | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | 1072 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | 1074 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Coxsackie | 13.8 | 1076 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | Bus 1 (T1+G1) | SCADA | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | Bus 2 | ??? | ----- | EM | ----- | ----- | Metering data available through relay, but not configured. |
| Coxsackie | 69 | CN Line | None | uP | ----- | ----- | ----- | |
| Coxsackie | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | 95P is SEL-587 |
| Coxsackie | 69/13.8 | T1 | Charts - Amps | uP/EM | ----- | ----- | ----- | |
| Coxsackie | 13.8 | G1 | SCADA | ----- | ----- | ----- | ----- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------------|--------------------|-----------------------|---------------|-------------|-------------|-------|----------|---|
| Danskammer | | | | | | 2100 | | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | AC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DB Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DR Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DW Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | RS Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | W - 323 BKR | ----- | SS | ----- | ----- | ----- | |
| Danskammer | 115 | North Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | Middle Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | South Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | DB-1171 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | DR-1421 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | DW-1061 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | T5&T6 | SCADA | EM | ----- | ----- | ----- | |
| Dashville | | | | | | 2300 | | |
| Dashville | 4 | 345 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single Phase; Vac; Hydr |
| Dashville | 6.6 | Bus | ----- | ----- | EM | ----- | ----- | |
| Dashville | | T1 | ----- | EM | ----- | ----- | ----- | Fused Transformer w/ CR 67 relay |
| Dashville | | G1-G2 | SCADA | ----- | ----- | ----- | ----- | |
| East Fishkill 345kV | | | | | | | | |
| East Fishkill 345kV | 345 | C9751 Breaker A1 BF | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 345 | C9751 Breaker A2 BF | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 1 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 2 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill | | | | | | 8890 | | |
| East Fishkill | 115 | EF Line | SCADA | uP* | ----- | ----- | ----- | 95P is MDAR; 95BU is Optimho - Replacing with 311C & D60. |
| East Fishkill | 115 | HF Line | SCADA | uP* | ----- | ----- | ----- | 95BU is Optimho - Replacing with D60. |
| East Fishkill | 115 | EF-672 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | EF-679 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | W-640 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | T1 | SCADA | see EFB | ----- | ----- | ----- | |
| East Kingston | | | | | | Orion | | |
| East Kingston | 13.8 | Bus 1 | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | Bus 2 | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1021 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1026 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1027 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1028 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 115 | ER Line | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115 | LR Line | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115 | LR-201-ER Breaker | ----- | uP | ----- | ----- | ----- | |
| East Kingston | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| East Kingston | 115/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| East Park | | | | | | 8890 | | |
| East Park | 13.8 | 6073 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6074 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6075 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| East Park | 69 | Q Line | None | EM | ----- | ----- | ----- | 95P is SEL-587 |
| East Park | 69/13.8 | T1 | SCADA | uP/EM | ----- | ----- | ----- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|------------------|-------------|-------------|------|----------|--|
| East Walden | | | | | | 2400 | | |
| East Walden | | | | | EM/uP | | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5041 Ckt. | Grid Sense | ----- | EM/uP | | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5042 Ckt. | Grid Sense | ----- | EM | | | GS not working |
| East Walden | 13.8 | 5043 Ckt. | Grid Sense | ----- | | | | Com |
| East Walden | 13.8 | Com Equipment | ----- | ----- | uP | | | |
| East Walden | 13.8 | B1 | SCADA | ----- | | | | 95P is DLP; part of replacement program already. |
| East Walden | 115 | CW Line | None | Gen1/uP | ----- | | | |
| East Walden | 115 | CW-712 | ----- | EM | | | | |
| East Walden | 115 | D Line | None | EM | | | | |
| East Walden | 115 | D-722 BKR | ----- | EM | | | | |
| East Walden | 115 | DW Line | SCADA | ----- | uP | | | |
| East Walden | 115 | DW-1071 BKR | ----- | uP | | | | |
| East Walden | 115 | EM Line | SCADA | ----- | uP | | | |
| East Walden | 115 | EM-642 BKR | ----- | uP | | | | |
| East Walden | 69 | WM Line | SCADA | ----- | uP | | | Amps & Volts |
| East Walden | 115 | W-644 | ----- | EM | | | | |
| East Walden | 115 | B1 | SCADA | ----- | EM | | | Combine Bus Volts to one point |
| East Walden | 115 | B2 | ----- | EM | | | | 95P is SEL-587 |
| East Walden | 69/13.8 | T1 | SCADA | ----- | uP/EM | | | 95BU is SEL-587 |
| East Walden | 69/13.8 | T3 | SCADA | ----- | EM/uP | | | |
| Fishkill Plains | | | | | | D-20 | | |
| Fishkill Plains | 13.8 | 8091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Fishkill Plains | 13.8 | 8092 Ckt. | MV-90 | ----- | EM | | | |
| Fishkill Plains | 13.8 | 8093 Ckt. | SCADA | ----- | uP- 200 | | | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8094 Ckt. | SCADA | ----- | uP- 200 | | | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8095 Ckt. | SCADA | ----- | uP | | | |
| Fishkill Plains | 13.8 | 8096 Ckt. | SCADA | ----- | uP | | | |
| Fishkill Plains | 115 | HF Line | SCADA | uP/Gen 1 | ----- | | | 95BU is Optimho; part of replacement program. |
| Fishkill Plains | 115 | HF-703 BKR | ----- | EM | | | | |
| Fishkill Plains | 115 | NF Line | None | EM | | | | |
| Fishkill Plains | 115 | A Line | SCADA | ----- | uP | | | |
| Fishkill Plains | 115 | A-1036-FP | ----- | uP- 200 | | | | 279/2BFR relays |
| Fishkill Plains | 115 | A-1498 | ----- | uP- 200 | | | | 279/2BFR relays |
| Fishkill Plains | 115 | Com Equipment | ----- | ----- | | | | Com |
| Fishkill Plains | 115 | FP Line | SCADA | uP/Gen 1 | ----- | | | 95P is DLP; part of replacement program already; 95BU is SEL-321 |
| Fishkill Plains | 115 | B1 | SCADA | EM | | | | |
| Fishkill Plains | 13.8 | B1 | SCADA | ----- | EM | | | Combine Bus Volts to one point |
| Fishkill Plains | 13.8 | B2 | ----- | EM | | | | |
| Fishkill Plains | 115/13.8 | T1 | SCADA | ----- | EM/uP | | | 95BU is SEL-587; metering is combined. |
| Fishkill Plains | 115/13.8 | T2 | ----- | EM/uP | | | | |
| Forgebrook | | | | | | 2300 | | |
| Forgebrook | 13.8 | Bus #1 | ----- | EM | | | | |
| Forgebrook | 13.8 | Bus #2 | Charts - kW/kVAR | ----- | EM | | | |
| Forgebrook | 13.8 | 8011 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8012 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8013 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8014 Ckt. | Charts - kW | ----- | uP/EM | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8015 Ckt. | Charts - kW | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8016 Ckt. | Charts - kW | ----- | EM | | | No Chart Data |
| Forgebrook | 115 | Com Equipment | ----- | ----- | | | | Com |
| Forgebrook | 115 | FO Line | None | EM | | | | |
| Forgebrook | 115 | FO-1430-FT | ----- | EM | | | | |
| Forgebrook | 115 | FT Line | None | EM | | | | |
| Forgebrook | 115 | FT-1432 | ----- | EM | | | | |
| Forgebrook | 115 | FT-882-WF | ----- | EM | | | | |
| Forgebrook | 115 | WF Line | SCADA | ----- | uP | | | |
| Forgebrook | 13.8 | CM Line | None | ----- | EM | | | Amps |
| Forgebrook | 13.8 | BF Line | SCADA | ----- | EM | | | |
| Forgebrook | 13.8 | W-1486 | ----- | EM | | | | |
| Forgebrook | 13.8 | W-994 | ----- | EM | | | | |
| Forgebrook | 115/13.8 | T1 | SCADA | ----- | EM | | | Metering combined |
| Forgebrook | 115/13.8 | T2 | ----- | EM | | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|------------------|-------------|-------------|---------------------------|----------|--|
| Freehold | | | | | | M-4000 | | |
| Freehold | 13.8 | 2061 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | 2071 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | W-1155 BKR | ----- | ----- | ----- | ----- | PR-560M | 3 phase; oil; electronic |
| Freehold | 13.8 | T1 | Charts - kW/kVAr | fuse | ----- | ----- | ----- | |
| Freehold | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | |
| Galeville | | | | | | Orion | | |
| Galeville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5030 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5031 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5032 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5033 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5034 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5035 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Galeville | 69 | MG Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69 | MG-200-MK BKR | ----- | uP | ----- | ----- | ----- | |
| Galeville | 69 | MK Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| Greenfield Rd. | | | | | | M-4000 | | |
| Greenfield Rd. | 13.8 | 3076 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 13.8 | 3078 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 4 | 375-376 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 4 | 377-378 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | W-1608 | ----- | ----- | EM | ----- | ES | 3 phase; oil; electronic |
| Greenfield Rd. | 13.8/4 | T2 | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Greenfield Rd. | 4 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Greenfield Rd. | 4 | B3 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Grimley Rd. | | | | | | NONE-Soon to have DNP RTU | | |
| Grimley Rd. | 4 | 385 Ckt. | Grid Sense | ----- | EM | ----- | Kyle L | Single Phase; Oil; Electronic |
| Grimley Rd. | 4 | 386 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| Hibernia | | | | | | Micro 1C | | |
| Hibernia | 13.8 | 7011 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | 7012 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 69/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | | | | | | D-20 | | |
| High Falls | 13.8 | 3021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 69 | HK Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 69 | HK-696-P BKR. | ----- | ----- | uP- 200 | ----- | ----- | SEL-279 |
| High Falls | 69 | P Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 13.8 | W-998 BKR. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | B1 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | B2 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |
| High Falls | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|--------------------|----------|-------------|-------------|--------|----------|---|
| Highland | | | | | | 2300 | | |
| Highland | | | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5081 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5082 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5083 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | 5084 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | 5085 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 115 | HR Line | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | OR Line | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | OR-761-HR BKR. | ---- | EM | ---- | ---- | ---- | |
| Highland | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | |
| Highland | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Highland | 115/13.8 | T1 | SCADA | uP/EM | ---- | ---- | ---- | 95BU is SEL-587 |
| Highland | 115/13.8 | T2 | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | | | | | | D-20 | | |
| Honk Falls | 13.8 | 3071 Ckt. | SCADA | ---- | EM | ---- | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | 3072 Ckt. | SCADA | ---- | EM | ---- | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | B1 | SCADA | EM | ---- | ---- | ---- | |
| Honk Falls | 69 | GM Line | SCADA | EM/uP | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | HG Line | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | 69 | HK Line | SCADA | uP/EM | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | MK Line | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | 69 | WH Line | SCADA | uP/EM | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | overall diff B1+T1 | SCADA | EM | ---- | ---- | ---- | |
| Honk Falls | 69/13.8 | T1 | ---- | fuse | ---- | ---- | ---- | |
| Hunter | | | | | | M-4000 | | |
| Hunter | 34.5 | Z-666 | | | | | VR-3S | 3 phase; vac; hyd |
| Hunter | 13.8 | 2081 Ckt. | MV-90 | ---- | ---- | ---- | Kyle W | 3 phase; oil; hyd |
| Hunter | 13.8 | Cap Bank | ---- | ---- | EM | ---- | ---- | |
| Hurley Ave. 345kV | | | | | | 2400 | | |
| Hurley Ave. 345kV | 345 | 30151 BKR. | ---- | EM | ---- | ---- | ---- | 79 Relay is EM |
| Hurley Ave. 345kV | 345 | 30151 A1 BF | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30152 A2 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 301 Line A1 | SCADA | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 301 Line A2 | SCADA | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30353 BKR. | ---- | EM* | ---- | ---- | ---- | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30353 A1 BF | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30353 A2 BF | ---- | EM* | ---- | ---- | ---- | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 30354 BKR. | ---- | EM* | ---- | ---- | ---- | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30354 A1 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30354 A2 BF | ---- | EM* | ---- | ---- | ---- | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 303 Line A1 | SCADA | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 303 Line A2 | SCADA | EM* | ---- | ---- | ---- | In process replacement with GE D90 |
| Hurley Ave. 345kV | 345 | Bus A1 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | Bus A2 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 BKR. | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 A1 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 A2 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A1 Out of Step | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A2 Out of Step | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A1 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A2 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | T1 LS | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | B1 | SCADA | ---- | ---- | ---- | ---- | Volts |

358

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------|--------------------|---------------|----------------------|-------------|-------------|--------|----------|---|
| Hurley Ave. | | | | | | 2400 | | |
| Hurley Ave. | | | | | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2091 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2092 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2093 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2094 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 115 | Cap Bank | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | HP Line | SCADA | EM | ---- | | | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 69 | I Line | SCADA | Gen1 | ---- | | | |
| Hurley Ave. | 115 | OR Line | SCADA | EM | ---- | | | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 69 | SB Line | SCADA | Gen1 | ---- | | | |
| Hurley Ave. | 115 | HP-1643 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | OR-1640 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 69 | W-142 BKR. | ---- | uP | ---- | | | |
| Hurley Ave. | 13.8 | W-1575 BKR. | ---- | EM | EM | | | |
| Hurley Ave. | 115 | W-389 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | B1 | None | EM | ---- | | | |
| Hurley Ave. | 115 | B2 | SCADA | EM | ---- | | | Volts |
| Hurley Ave. | 69 | B1 | SCADA | EM | ---- | | | Volts |
| Hurley Ave. | 13.8 | B1 | SCADA | ---- | EM | | | Volts |
| Hurley Ave. | 115/69 | T3 | SCADA | EM | ---- | | | |
| Hurley Ave. | 115/13.8 | T4 | SCADA | EM | ---- | | | |
| Hurley Ave. | 69/13.8 | T5 | ---- | EM | ---- | | | |
| Inwood Ave. | | | | | | 3030 | | |
| Inwood Ave. | 13.8 | 6061 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6062 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6063 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6064 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6065 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6066 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6067 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6068 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Inwood Ave. | 115 | IR Line | SCADA | uP | ---- | | | |
| Inwood Ave. | 115 | IR-201-X BKR. | ---- | uP | ---- | | | |
| Inwood Ave. | 115 | X Line | SCADA | uP | ---- | | | |
| Inwood Ave. | 13.8 | B1 | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | B2 | SCADA | ---- | uP | | | |
| Inwood Ave. | 115/13.8 | T1 | SCADA | uP | ---- | | | |
| Inwood Ave. | 115/13.8 | T2 | SCADA | uP | ---- | | | |
| Jansen Ave. | | | | | | M-4000 | | |
| Jansen Ave. | 13.8 | 1001 Ckt. | MV-90 | ---- | uP | | | |
| Jansen Ave. | 13.8 | 1002 Ckt. | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | 1003 Ckt. | MV-90 | ---- | uP | | | |
| Jansen Ave. | 13.8 | 1004 Ckt. | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | KL Line | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | KO Line | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | B1 | SCADA | ---- | EM | | | |
| Jansen Ave. | 13.8 | B2 | SCADA | ---- | EM | | | |
| Jansen Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Jansen Ave. | 13.8 | T - Grounding | MV-90 | ---- | uP | | | |
| Kerhonkson | | | | | | 8890 | | |
| Kerhonkson | 13.8 | 3081 Ckt. | Grid Sense | ---- | EM | | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 13.8 | 3082 Ckt. | Grid Sense | ---- | EM | | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 69 | MK-929 MOS | ---- | EM | ---- | | | |
| Kerhonkson | 69 | MK-930 MOS | ---- | EM | ---- | | | |
| Kerhonkson | 69/13.8 | T1 | Charts - kW/kVar IGS | fuse | ---- | | | Amps for each Transformer |
| Kerhonkson | 69/13.8 | T2 | | fuse | ---- | | | Volts & Amps |
| Kerhonkson | 69 | HK | SCADA | ---- | ---- | | | Volts & Amps |
| Kerhonkson | 69 | MK | SCADA | ---- | ---- | | | Volts & Amps |

359

Electric Substation Upy. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-----------------|------------------------|-------------|-------------|--------|----------|--------------------------------------|
| Knapps Corners | | | | | | 2100 | | |
| Knapps Corners | | | Charts - Amps/SCADA | | uP | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8021 Ckt. | Charts - Amps | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8022 Ckt. | Charts - Amps | | uP/EM | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8023 Ckt. | Charts - Amps/SCADA | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8024 Ckt. | Charts - kW | | EM | | | |
| Knapps Corners | 13.8 | 8025 Ckt. | Charts - kW | | | | | Com |
| Knapps Corners | 13.8 | Com Equipment | | | | | | |
| Knapps Corners | 115 | KB Line | None | EM | | | | SEL-279 |
| Knapps Corners | 115 | KB-1558-MC BKR. | | uP-200 | | | | |
| Knapps Corners | 115 | SK Line | SCADA | | uP | | | Amps |
| Knapps Corners | 13.8 | KN Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KR Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KS Line | SCADA* | EM | | | | |
| Knapps Corners | 69 | KM Line | SCADA | uP | | | | |
| Knapps Corners | 69 | TR Line | SCADA | EM | | | | |
| Knapps Corners | 69 | G Line | SCADA | uP | | | | |
| Knapps Corners | 13.8 | W-1215 BKR. | | | EM | | | |
| Knapps Corners | 69 | W-1409 BKR. | | | uP | | | |
| Knapps Corners | 13.8 | W-1462 BKR. | | | EM | | | |
| Knapps Corners | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Knapps Corners | 13.8 | B2 | | EM | | | | |
| Knapps Corners | 13.8 | B3 | | EM | | | | |
| Knapps Corners | 69 | 69k Bus | SCADA | EM | | | | Volts |
| Knapps Corners | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Knapps Corners | 115/13.8 | T3 | | EM | | | | |
| Knapps Corners | 115/69 | T2 | | SCADA | uP | | | |
| Lawrenceville | | | | | | M-4000 | | |
| Lawrenceville | 34.5 | 2385 Ckt. | Grid Sense | EM/uP | | | CXE-400A | 3 phase; oil; hyd |
| Lawrenceville | 34.5 | B1 | SCADA* | | | | | Volts |
| Lawrenceville | 69/34.5 | T1 | MV90/Grid Sense/SCADA | EM | | | | Amps |
| Lincoln Park | | | | | | 2300 | | |
| Lincoln Park | 13.8 | Com Equipment | | | | | | Com |
| Lincoln Park | 13.8 | 2011 Ckt. | Charts - Amps | | EM | | | |
| Lincoln Park | 13.8 | 2012 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2013 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2014 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2015 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2016 Ckt. | Charts - kW | | EM/uP* | | | GE F60 installed HiZ pilot |
| Lincoln Park | 13.8 | 2017 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2018 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 1 | | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 2 | | | EM | | | |
| Lincoln Park | 115 | HP Line | None | EM | | | | Relay Replacement Program in process |
| Lincoln Park | 115 | HP-1318 BKR. | | EM | | | | |
| Lincoln Park | 13.8 | KL Line | Charts - kW/kVar/SCADA | EM | | | | Amps to SCADA |
| Lincoln Park | 115 | LR-1219-HP BKR. | | EM | | | | |
| Lincoln Park | 115 | LR Line | SCADA | uP | | | | |
| Lincoln Park | 13.8 | W-1321 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-45 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-534 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-554 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-206 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-207 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-525 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-528 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Lincoln Park | 13.8 | B2 | | EM | | | | |
| Lincoln Park | 13.8 | B3 | | EM | | | | |
| Lincoln Park | 13.8 | B4 | None | | EM | | | Volts |
| Lincoln Park | 115 | 115k bus | SCADA | | EM | | | Volts |
| Lincoln Park | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Lincoln Park | 115/13.8 | T2 | | EM | | | | |
| Lincoln Park | 115/13.8 | T3 | | SCADA | EM | | | |

300

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|--------|----------|---|
| Manchester | | | | | | 2400 | | |
| Manchester | | | | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6091 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6092 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6093 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6094 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6095 Ckt. | MV-90 | | EM | | | |
| Manchester | 13.8 | 6096 Ckt. | MV-90 | | EM | | | |
| Manchester | 13.8 | 6097 Ckt. | MV-90 | | | | | Com |
| Manchester | 13.8 | Com Equipment | | | | | | 95BU is REL-301; part of replacement program. |
| Manchester | 115 | M Line | None | EM/Gen-1 | | | | |
| Manchester | 115 | MC Line | SCADA | uP | | | | Amps |
| Manchester | 13.8 | MS Line | SCADA* | | EM | | | |
| Manchester | 13.8 | W-1456 BKR. | | | EM | | | |
| Manchester | 13.8 | W-650 BKR. | | | EM | | | |
| Manchester | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Manchester | 13.8 | B2 | | | EM | | | |
| Manchester | 115/13.8 | T1 | SCADA | | EM | | | Combine load value |
| Manchester | 115/13.8 | T2 | | EM | | | | |
| Marlboro | | | | | | 8890 | | ???? |
| Marlboro | 13.8 | 5001 Ckt. | SCADA | | EM/uP | | | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5002 Ckt. | SCADA | | EM/uP | | | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5003 Ckt. | SCADA | | EM/uP | | | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5004 Ckt. | SCADA | | uP | | | |
| Marlboro | 13.8 | Com Equipment | | | | | | Com |
| Marlboro | 13.8 | B1 | SCADA | | uP | | | Volts |
| Marlboro | 115/13.8 | T1 | SCADA | uP/EM* | | | | 95P is SEL-587 |
| Marlboro | 115/13.8 | T2 | SCADA | uP | | | | |
| Maryland Ave. | | | | | | M-4000 | | |
| Maryland Ave. | 4 | 621 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 4 | 622 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 4 | 623 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 4 | 624 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 13.8 | MS Line | | | EM | | | |
| Maryland Ave. | 13.8 | PH-284 BKR. | | | EM | | | |
| Maryland Ave. | 13.8 | PH-286 BKR. | | | EM | | | |
| Maryland Ave. | 4 | W-1032 BKR. | | | EM | | | |
| Maryland Ave. | 4 | W-1033 BKR. | | | EM | | | |
| Maryland Ave. | 4 | W-1034 BKR. | | | EM | | | |
| Maryland Ave. | 13.8 | B1 | SCADA | | EM | | | Volts |
| Maryland Ave. | 13.8 | B2 | SCADA | | EM | | | Volts |
| Maryland Ave. | 4 | B1 | SCADA | | EM | | | Volts |
| Maryland Ave. | 4 | B2 | | | EM | | | |
| Maryland Ave. | 13.8/4 | T1 | | | EM | | | |
| Maryland Ave. | 13.8/4 | T2 | | | EM | | | |
| Maybrook | | | | | | M-4000 | | |
| Maybrook | 13.8 | 5051 Ckt. | MV-90 | | EM | | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | 5052 Ckt. | MV-90 | | uP | | | Previously 5081-83? |
| Maybrook | 13.8 | 5053 Ckt. | MV-90 | | EM | | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | B1 | SCADA | | | | | Volts |
| Maybrook | 13.8 | B2 | SCADA | | | | | Volts |
| Maybrook | 69/13.8 | T1 | None | | | | | |
| Maybrook | 69/13.8 | T2 | None | | | | | |
| McKinley St. | | | | | | NONE | | |
| McKinley St. | 4 | 845 Ckt. | MV-90 | | EM | | | |

301

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|----------------|-------------|-------------|-------------|-------|----------|--------------------------------------|
| Merritt Park | | | | | uP | BM | | |
| Merritt Park | 13.8 | 8061 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8062 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8063 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8064 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8065 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8066 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8067 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8068 Ckt. | SCADA | | uP | | | Com |
| Merritt Park | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | |
| Merritt Park | 115 | WF Line | SCADA | | uP | | | |
| Merritt Park | 115 | WP Line | SCADA | | uP | | | SEL-279 |
| Merritt Park | 115 | WF-439-WP BKR. | ----- | uP-200 | | | | |
| Merritt Park | 13.8 | B1 | SCADA | | uP | | | |
| Merritt Park | 13.8 | B2 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T1 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T2 | SCADA | | uP | | | |
| Milan | | | | | | BM | | |
| Milan | 13.8 | 7061 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | 7062 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Milan | 115 | B-4561 Ckt Sw | ----- | uP | | | | |
| Milan | 115 | MR Line | SCADA | | uP | | | |
| Milan | 115 | MR-501 BKR. | SCADA | | uP | | | |
| Milan | 115 | RT-7 BKR. | ----- | uP | | | | |
| Milan | 115 | R-10 BKR. | ----- | uP | | | | |
| Milan | 115 | T-7 Line | SCADA | | uP | | | |
| Milan | 115 | 10 Line | SCADA | | uP | | | |
| Milan | 115 | B1 | SCADA | | uP | | | |
| Milan | 13.8 | B1 | SCADA | | uP | | | |
| Milan | 115/13.8 | T1 | SCADA | | uP | | | |
| Millerton | | | | | | L&N | | |
| Millerton | 13.8 | 7081 Ckt. | SCADA | | EM | | | |
| Millerton | 69 | GE-823 MOS | ----- | EM | | | | |
| Millerton | 69/13.8 | T1 | SCADA | | EM | | | Only one feeder; T1 = 7081 load |
| Millerton | 69 | Line to SMI | SCADA | | | | | Volts |
| Millerton | 69 | Line to PUL | SCADA | | | | | Volts |
| Modena 115kV | | | | | | BM | | |
| Modena 115kV | 13.8 | B1 | SCADA | | uP | | | |
| Modena 115kV | 13.8 | C-1651 BKR. | ----- | | uP | | | |
| Modena 115kV | 13.8 | 5011 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5012 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5013 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Modena 115kV | 115 | EM Line | SCADA | | uP | | | |
| Modena 115kV | 115 | EM-201-PX BKR. | ----- | uP | | | | |
| Modena 115kV | 115 | PX Line | SCADA | | uP | | | |
| Modena 115kV | 115/13.8 | T3 | SCADA | | uP | | | Only has one 13.8 bus; T3 = Bus load |
| Modena 69kV | | | | | | 8890 | | volts |
| Modena 69kV | 69 | B1 | SCADA | | EM | | | |
| Modena 69kV | 69 | MG Line | SCADA | | uP | | | |
| Modena 69kV | 69 | W-941 BKR. | ----- | EM | | | | |
| Modena 69kV | 69 | MG-380 BKR. | ----- | EM | | | | |
| Modena 69kV | 115/69 | T1 | SCADA | | EM/uP | | | |
| Modena 69kV | 69/13.8 | T2 | None | | Fuse/uP | | | GE F35 is installed |
| Montgomery | | | | | | NONE | | |
| Montgomery | 4 | 571 Ckt. | Charts - kW | | EM | | V4L | Single phase; Vac; Hyd |
| Montgomery | 4 | 572 Ckt. | Charts - kW | | EM | | V4L | Single phase; Vac; Hyd |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|--------------------|-------------|-------------|--------|----------|--------------------------------|
| Montgomery St. | | | | | | M-4000 | | |
| Montgomery St. | | | | | EM | | | volts |
| Montgomery St. | 13.8 | B1 | SCADA | ..... | EM | ..... | ..... | Volts |
| Montgomery St. | 13.8 | B2 | SCADA | ..... | EM | ..... | ..... | volts |
| Montgomery St. | 13.8 | B3 | SCADA | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | B Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | 4001 Ckt. | Charts - kW/kVAr | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | 4002 Ckt. | Charts - kW/kVAr | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | 4003 Ckt. | Charts - kW/kVAr | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 401 Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 402-3 Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 404 Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 406A/B Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 407A/B Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 410A/B Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | B1 | SCADA | ..... | EM | ..... | ..... | Volts |
| Montgomery St. | 4 | B2 | SCADA | ..... | EM | ..... | ..... | volts |
| Montgomery St. | 13.8 | F Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | NB Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | NM Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | R Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | W-507 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | W-508 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | W-509 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | WN Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8/4 | T1 |  | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8/4 | T2 | Charts - kW/kVAr | ..... | EM | ..... | ..... | Combine load value |
| Myers Corners | | | | | | 44-550 | | |
| Myers Corners | 13.8 | 8041 Ckt. | Charts - kW | ..... | uP | ..... | ..... |  |
| Myers Corners | 13.8 | 8043 Ckt. | Charts - kW | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | 8044 Ckt. | Charts - kW | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | 8045 Ckt. | Charts - kW | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | 8046 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| Myers Corners | 69 | KM Line | None | EM | ..... | ..... | ..... |  |
| Myers Corners | 69 | TV Line | None | EM | ..... | ..... | ..... |  |
| Myers Corners | 69 | TV-399-KM BKR. | ..... | EM | ..... | ..... | ..... |  |
| Myers Corners | 13.8 | W-63 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | W-66 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | Feeder M1-75 | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | Feeder M2-76 | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | Feeder M3-91 | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | Feeder M4-90 | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | B1 |  | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | B2 | SCADA | ..... | EM | ..... | ..... | Combine Bus Volts to one point |
| Myers Corners | 69/13.8 | T1 | | EM | ..... | ..... | ..... |  |
| Myers Corners | 69/13.8 | T2 | SCADA | EM | ..... | ..... | ..... | Combine load value |
| Neversink | | | | | | 2200 | | |
| Neversink | 4 | 391 Ckt. | Charts - kW | ..... | EM | ..... | ..... |  |
| Neversink | 13.8 | 3091 Ckt. | Grid Sense | ..... | EM | ..... | Kyle W | 3 phase; Oil; Hyd |
| Neversink | 69 | HG Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Neversink | 69 | WH Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Neversink | 4 | W-1128 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Neversink | 69 | 69k Bus | SCADA | uP/EM | ..... | ..... | ..... | Volts |
| New Baltimore | | | | | | 2300 | | |
| New Baltimore | 13.8 | 1081 Ckt. | SCADA* | ..... | EM | ..... | ..... | kW |
| New Baltimore | 13.8 | 1082 Ckt. | SCADA* | ..... | EM | ..... | ..... | kW |
| New Baltimore | 13.8 | 1083 Ckt. | SCADA* | ..... | EM | ..... | ..... | kW |
| New Baltimore | 69 | Cap Bank | ..... | EM/uP | ..... | ..... | ..... | Com |
| New Baltimore | 13.8 | Com Equipment | ..... | ..... | ..... | ..... | ..... |  |
| New Baltimore | 69 | CN Line | None | uP | ..... | ..... | ..... |  |
| New Baltimore | 69 | NW Line | None | uP | ..... | ..... | ..... |  |
| New Baltimore | 13.8 | B1 | SCADA | ..... | EM | ..... | ..... | Volts |
| New Baltimore | 69/13.8 | T1 | SCADA | EM/uP | ..... | ..... | ..... | 95P is SEL-587 |

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|--------------------|------------------|-------------|-------------|-------|----------|------------------------|
| New Windsor | | | | | | NONE | | |
| New Windsor | 4 | 461 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 462 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 463 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 464 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 13.8 | UN & UW ATC | None | ----- | uP | ----- | ----- | Combine load value |
| New Windsor | 13.8/4 | T1 | Charts - kW/kVAR | ----- | uP | ----- | ----- | |
| New Windsor | 13.8/4 | T2 | | ----- | uP | ----- | ----- | |
| North Catskill | | | | | | D-20 | | |
| North Catskill | 13.8 | 2001A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2002A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2003A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2004 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2005 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2006 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| North Catskill | 115 | 2 Line | SCADA | EM | ----- | ----- | ----- | |
| North Catskill | 115 | R-2 BKR. | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 115 | RT-7 BKR. | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 115 | T-7 Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| North Catskill | 69 | Cap Bank | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 69 | CL Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | H Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | W-1107 BKR. | ----- | EM/uP* | ----- | ----- | ----- | check on TD-5 |
| North Catskill | 69 | W-269 BKR. | ----- | EM/uP* | ----- | ----- | ----- | check on TD-5 |
| North Catskill | 115 | W-791 BKR. | ----- | uP- 200 | ----- | ----- | ----- | SEL-2BFR |
| North Catskill | 69 | W-269 & W-1107 BKR | ----- | ----- | EM | ----- | ----- | IJS |
| North Catskill | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| North Catskill | 69 | B1 | SCADA | EM/uP | ----- | ----- | ----- | Volts |
| North Catskill | 69 | B2 | SCADA | EM/uP | ----- | ----- | ----- | Volts |
| North Catskill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | Volts: 95BU is DFP-100 |
| North Catskill | 13.8 | B2 | SCADA | ----- | EM/uP | ----- | ----- | Volts: 95BU is DFP-100 |
| North Catskill | 115/69 | T4 | SCADA | EM/uP* | ----- | ----- | ----- | Check on 64 relay |
| North Catskill | 115/69 | T5 | SCADA | EM/uP* | ----- | ----- | ----- | Check on 64 relay |
| North Catskill | 115/13.8 | T6 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| North Catskill | 115/13.8 | T7 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|---------------|-------------|-------------|-------|----------|-----------------------|
| North Chelsea | | | | | | BM | | |
| North Chelsea | | | | | | | | |
| North Chelsea | 13.8 | 8051 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8052 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8053 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8054 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8055 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8056 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8057 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8058 Ckt. | SCADA | ..... | uP | ..... | ..... | Com |
| North Chelsea | 13.8 | Com Equipment | ..... | ..... | ..... | ..... | ..... |  |
| North Chelsea | 115 | AC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | AC-1066 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | DC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | DC-1414 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | FO-1482 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | FO Line | SCADA | uP | ..... | ..... | ..... | 95P is LCB-II |
| North Chelsea | 115 | NF Line | SCADA | uP | ..... | ..... | ..... | 95P is LCB-II |
| North Chelsea | 115 | NF-1116 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | SC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | SC-1566 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 69 | TV Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2651 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2652 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2653 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | W-1572 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B1 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 13.8 | B1 | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | B2 | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 115/69 | T1 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115/13.8 | T2 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115/13.8 | T3 | SCADA | uP | ..... | ..... | ..... | Volts |
| Ohioville | | | | | | 2100 | | |
| Ohioville | 13.8 | 5021 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5022 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5023 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5024 Ckt. | Charts - kW | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5025 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| Ohioville | 13.8 | Com Equipment | ..... | ..... | ..... | ..... | ..... | Com |
| Ohioville | 115 | Cap Bank | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 69 | O Line | None | uP | ..... | ..... | ..... |  |
| Ohioville | 69 | OB Line | None | uP | ..... | ..... | ..... |  |
| Ohioville | 115 | OR Line | None | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | OR-1075 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | PX Line | SCADA | EM/uP | ..... | ..... | ..... |  |
| Ohioville | 115 | PX - 1659 BKR. | ..... | uP | ..... | ..... | ..... |  |
| Ohioville | 69 | W - 1511 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 13.8 | W - 1537 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 13.8 | W - 1600 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | B1 | SCADA | EM | ..... | ..... | ..... | Volts |
| Ohioville | 69 | 69k Bus | SCADA | EM | ..... | ..... | ..... | Volts |
| Ohioville | 13.8 | B1 | None | ..... | EM | ..... | ..... |  |
| Ohioville | 13.8 | B2 | None | ..... | EM | ..... | ..... |  |
| Ohioville | 115/13.8 | T1 | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 115/13.8 | T2 | SCADA | EM | | | | Combine load value |
| Ohioville | 115/69 | T3 | SCADA | EM/uP-200 | | | | 95BU is SEL-251 |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|----------|-------------|-------------|------|----------|--------------------------------------|
| | | | | | | 2300 | | Grid owns Line |
| Pleasant Valley | | | SCADA** | uP | | | | |
| Pleasant Valley | 115 | 8 Line | SCADA | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 10 Line | SCADA** | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 12 Line | SCADA** | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 13 Line | SCADA** | uP | | | | 95BU is Optimho; in replacement plan |
| Pleasant Valley | 115 | C Line | SCADA | EM/Gen-1 | | | | |
| Pleasant Valley | 115 | M Line | SCADA | EM | | | | |
| Pleasant Valley | 115 | X Line | SCADA | uP | | | | Com |
| Pleasant Valley | 115 | Com Equipment | | | | | | SEL-279 |
| Pleasant Valley | 115 | R-12 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-13 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-8 BKR. | | uP-200 | | | | |
| Pleasant Valley | 115 | RC-6 BKR. | | EM | | | | |
| Pleasant Valley | 115 | RM BKR. | | EM | | | | |
| Pleasant Valley | 115 | RX-4 BKR. | | uP | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-61 BKR. | SCADA** | EM | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-62 BKR. | SCADA** | EM | | | | |
| Pleasant Valley | 115 | R-643 BKR. | | EM | | | | |
| Pleasant Valley | 115 | R-81 BKR. | | EM | | | | |
| Pleasant Valley | 115 | B1 | SCADA | EM | | | | Volts |
| Pleasant Valley | 115 | B2 | SCADA | EM | | | | Volts |
| Pleasant Valley | 69 | E Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | G Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | Q Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | B1 | SCADA | uP | | | | Volts |
| Pleasant Valley | 13.8 | W-387 | | | EM | | | |
| Pleasant Valley | 345/115 | S1 | SCADA | | | | | Con Ed owns bank and protection |
| Pleasant Valley | 115/69 | T10 | SCADA | EM | | | | |
| Pulvers Corners | | | | | | D-20 | | |
| Pulvers Corners | 13.8 | 7091 Ckt. | SCADA | | EM | | V4L | single phase; vac; hyd |
| Pulvers Corners | 13.8 | 7092 Ckt. | SCADA | | EM | | Kyle L | single phase; oil; hyd |
| Pulvers Corners | 34.5 | 7395 Ckt. | SCADA | EM | | | RVE | 3 phase; oil; hyd |
| Pulvers Corners | 13.8 | Com Equipment | | | | | | Com |
| Pulvers Corners | 69 | Cap Bank | | EM | | | | |
| Pulvers Corners | 69 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 34.5 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 13.8 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 69/13.8 | T1 | SCADA | Fuse | | | | |
| Pulvers Corners | 69/34.5 | T2 | None | EM/uP | | | | 95P is SR-745 |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|-------------------|-------------|-------------|------|----------|---------------------------------|
| Reynolds Hill | | | | | | 2100 | | |
| Reynolds Hill | 13.8 | 6001 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Reynolds Hill | 13.8 | 6004 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | 6005 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Reynolds Hill | 13.8 | 6008 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | ---- | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Reynolds Hill | 115 | DR-1418 BKR. | ---- | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | DR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | HR-1285 BKR. | ---- | EM | ---- | ---- | ---- | |
| Reynolds Hill | 115 | HR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | IR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 13.8 | B Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | W Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PD Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PH Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PK Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PO Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PQ Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PS Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PU Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 115 | T-31 BKR. | ---- | EM | ---- | ---- | ---- | |
| Reynolds Hill | 115 | B1 | SCADA | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 115 | B2 | SCADA | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 13.8 | B1 | SCADA | ---- | EM/uP | ---- | ---- | 95BU is SEL-501 |
| Reynolds Hill | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | Volts |
| Reynolds Hill | 13.8 | B3 | SCADA | ---- | uP | ---- | ---- | Volts |
| Reynolds Hill | 115 | W-1543 BKR. | ---- | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 115/13.8 | T3 | SCADA | EM/uP | ---- | ---- | ---- | 95P is SEL-351A |
| Reynolds Hill | 115/13.8 | T4 | SCADA | EM/uP | ---- | ---- | ---- | 95P is SEL-351A |
| Rhinebeck | | | | | | 2300 | | |
| Rhinebeck | 13.8 | 7051 Ckt. | Charts - kW/SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | 13.8 | 7052 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7053 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7054 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7055 Ckt. | Charts - kW | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Rhinebeck | 13.8 | 7056 Ckt. | SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | 69 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Rhinebeck | 69 | Cap Bank | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 115 | ER Line | SCADA* | uP | ---- | ---- | ---- | Amps |
| Rhinebeck | 115 | LR-830-MR BKR. | ---- | uP | ---- | ---- | ---- | |
| Rhinebeck | 115 | MR Line | None | uP | ---- | ---- | ---- | |
| Rhinebeck | 69 | Q-1471 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-1017 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-1238 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 69 | W-258 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-367 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 69 | Q Line | SCADA* | ---- | EM | ---- | ---- | Volts |
| Rhinebeck | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | B2 | none | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Rhinebeck | 69 | 69kV Bus | SCADA | ---- | EM | ---- | ---- | Volts |
| Rhinebeck | 69/13.8 | T1 | SCADA* | EM | ---- | ---- | ---- | Amps & Volts |
| Rhinebeck | 69/13.8 | T2 | SCADA* | EM | ---- | ---- | ---- | Amps & Volts |
| Rhinebeck | 115/13.8 | T4 | SCADA | EM | ---- | ---- | ---- | |
| Rhinebeck | 115/69 | T3 | SCADA | EM | ---- | ---- | ---- | |

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Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|---------------|----------|-------------|-------------|------|----------|----------------|
| | | | | | | 2100 | | |
| Rock Tavern 345kV | | | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 311 Line A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 311 Line A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 3456 BKR. | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 3456 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 3456 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Cap Bank 1 A1 | SCADA* | EM | ---- | | | Combined MVArS |
| Rock Tavern 345kV | 345 | Cap Bank 1 A2 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A1 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A2 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 34 Line A1 | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 34 Line A2 | | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 37751 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 37751 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 37751 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 37752 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 37752 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 37752 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 377 Line A1 | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 377 Line A2 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 4255 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 4255 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 4255 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 42 Line A1 | ---- | SS | ---- | | | |
| Rock Tavern 345kV | 345 | 42 Line A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 346 | C3351 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3351 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3351 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3352 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3352 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3352 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3353 BKR. | ---- | UP- 200 | ---- | | | |
| Rock Tavern 345kV | 345 | C3353 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | C3353 BF A2 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 31153 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 31153 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 31153 BF A2 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 31154 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 31154 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 31154 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Com Equipment | ---- | ---- | ---- | | | Com |
| Rock Tavern 345kV | 345 | B1 A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | B1 A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | B2 A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | B2 A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345/115 | T1 A1 | SCADA | EM | ---- | | | |
| Rock Tavern 345kV | 345/115 | T1 A2 | | UP | ---- | | | |
| Rock Tavern 345kV | 345/115 | T3 A1 | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345/115 | T3 A2 | | UP | ---- | | | |

800

Electric Substation Up. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-----------------|-------------|-------------|-------------|-------|----------|--------------------------------|
| | | | | | | 2400 | | |
| Sand Dock | | | | | | | | |
| Sand Dock | 13.8 | 6011 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | BP-1296 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | BP-1570 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 1 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 2 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 3 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | GB Line | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 115 | KC-1447-SC BKR. | ---- | EM | ---- | ---- | ---- | |
| Sand Dock | 115 | KC Line | None | EM | ---- | ---- | ---- | |
| Sand Dock | 115 | SC Line | None | UP | ---- | ---- | ---- | |
| Sand Dock | 13.8 | SH-886 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | SH-911 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-902 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-909 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-910 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-116 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1449 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1453 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1467 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 115 | B1 | SCADA | ---- | ---- | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 115 | B4 | SCADA | ---- | ---- | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 13.8 | B2 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 13.8 | B4 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Sand Dock | 13.8 | T3 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Sand Dock | 13.8 | T4 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Saugerties | | | | | | Orion | | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-------------------|-------------|-------------|-------------|------|----------|--------------------------------------|
| Shenandoah | | | | | | 2400 | | |
| Shenandoah | 115 | East Bus | SCADA | EM | ---- | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 115 | West Bus | | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B2 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B4 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B5 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B6 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B7 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B8 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 1 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 2 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 3 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 4 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 5 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 6 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B-4451 BKR. (CB1) | ---- | ---- | UP | ---- | ---- | |
| Shenandoah | 13.8 | 8071 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | 8072 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 115 | EF Line | None | uP/Gen-1 | ---- | ---- | ---- | 95BU is Optimho; in replacement plan |
| Shenandoah | 115 | FS Line | None | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | EF-1514 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-739 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-892-EF BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-959 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S1 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S2 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S3 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S4 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S5 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S6 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S7 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S8 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S9 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S10 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S11 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S12 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S13 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S14 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S15 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 115/13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T2 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T3 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T4 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T5 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T6 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T7 | SCADA | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | W-1266 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1279 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1450 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1593 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-664 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-665 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-802 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-803 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-805 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-807 BKR. | ---- | ---- | EM | ---- | ---- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------------|--------------------|------------------|----------|-------------|-------------|--------|----------|---|
| Rock Tavern 115kV | | | | | | 44-550 | | |
| Rock Tavern 115kV | 115 | B1 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | B2 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | 115-0.48kV SST | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | Com Equipment |  | ..... | ..... | ..... | ..... | Com |
| Rock Tavern 115kV | 115 | D Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | D-448 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | J Line | SCADA* | GEN-1/EM | ..... | ..... | ..... | 95P is a DLP; identified in replacement program; Amps |
| Rock Tavern 115kV | 115 | J-788 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RD Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RD-809 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RJ Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RJ-818 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL Line | SCADA | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL-684 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-467 BKR. | ..... | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-681 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-814 BKR. | ..... | EM/UP | ..... | ..... | ..... | SEL-351 |
| Rock Tavern 115kV | 115 | WM Line | none | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115/69 | T2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | | | | | | 2100 | | |
| Roseton Switchyard | 345 | 30356 (B6) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A2 | SCADA | EM/UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31151 (B1) BKR | ..... | EM | ..... | ..... | ..... | SEL-501 for DBC |
| Roseton Switchyard | 345 | 31152 (B1) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B1) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B2 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U1 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U2 | SCADA | EM | ..... | ..... | ..... |  |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|-------------------|-------------|-------------|-------|----------|---|
| Smith Street | | | | | | 2300 | | Radio to INW |
| Smith Street | 4 | 631 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 632 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 633 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 634 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | MS Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | PQ Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | PS Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | W Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Volts |
| Smith Street | 13.8 | B2 | SCADA | ---- | EM | ---- | ---- | Volts |
| Smith Street | 4 | B1 | SCADA | ---- | uP | ---- | ---- | Volts |
| Smith Street | 4 | B2 | SCADA | ---- | uP | ---- | ---- | Volts |
| Smith Street | 13.8/4 | T1 | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8/4 | T2 | None | ---- | EM | ---- | ---- | |
| Smithfield | | | | | | 8890 | | |
| Smithfield | 13.8 | 7095 Ckt. | SCADA | ---- | uP | ---- | ---- | Com |
| Smithfield | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | 95P is SEL-267 |
| Smithfield | 69 | E Line | None | uP- 200/uP | ---- | ---- | ---- | 95P is SEL-267; Volts & Amps |
| Smithfield | 69 | FV Line | SCADA* | uP- 200/uP | ---- | ---- | ---- | Amps |
| Smithfield | 69 | GE Line | SCADA* | EM | ---- | ---- | ---- | Amps |
| Smithfield | 69 | S Line | SCADA* | EM | ---- | ---- | ---- | Volts & Amps |
| Smithfield | 69 | SA Line | SCADA* | EM | ---- | ---- | ---- | Volts |
| Smithfield | 69 | B2 | SCADA | ---- | ---- | ---- | ---- | Volts |
| Smithfield | 69 | B3 | SCADA | ---- | ---- | ---- | ---- | Volts |
| Smithfield | 69/13.8 | T1 | None* | ---- | ---- | ---- | ---- | Only one feeder; T1 = 7095 load |
| South Cairo | | | | | | 8890 | | |
| South Cairo | 13.8 | 2041 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2042 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2043 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| South Cairo | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| South Cairo | 69 | CF Line | None | EM/uP | ---- | ---- | ---- | 79 done with NLR |
| South Cairo | 69 | CL Line | None | uP | ---- | ---- | ---- | |
| South Cairo | 13.8 | B1+G1 | Charts - kW/SCADA | ---- | EM | ---- | ---- | SCADA Volts |
| South Cairo | 69/13.8 | T1 | Charts - Amps | EM/uP | ---- | ---- | ---- | 95P is SEL-587 |
| South Wall St. | | | | | | None | | |
| South Wall St. | 4 | 111 Ckt. | Grid Sense | ---- | EM | ---- | Kyle L | Single Phase; Oil; Hyd |
| South Wall St. | 4 | 112 Ckt. | Grid Sense | ---- | EM | ---- | Kyle L | Single Phase; Oil; Hyd; missing GS data |
| South Wall St. | 13.8/4 | T1 | Charts - kW/kVAr | ---- | EM | ---- | ---- | |
| Spackenkil | | | | | | Orion | | |
| Spackenkil | 13.8 | 6041 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6042 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6043 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6044 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6045 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6046 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6047 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6048 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Spackenkil | 13.8 | KR Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | KS Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | MC Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | MC-200-SK BKR. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | B1 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 115/13.8 | T1 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 115/13.8 | T2 | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | | | | | | BMI | | |
| Staatsburg | 13.8 | 7041 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | 7042 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | 7043 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Staatsburg | 13.8 | B1 | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 69/13.8 | T1 | SCADA | uP | ---- | ---- | ---- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-------------------|------------------|-------------|-------------|--------|----------|--------------------------------------|
| Standfordville | | | | | | M-4000 | | |
| Standfordville | 13.8 | 7071 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single phase; vac; hyd |
| Standfordville | 13.8 | 7072 Ckt. | MV-90 | ----- | EM | ----- | ----- | Volts |
| Standfordville | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Standfordville | 69/13.8 | T1 | MV-90 | Fuse | ----- | ----- | ----- | |
| Sturgeon Pool | | | | | | 2100 | | |
| Sturgeon Pool | 4 | 341 Ckt. | Grid Sense | ----- | EM | ----- | Kyle W | 3 phase; oil; hyd; missing data |
| Sturgeon Pool | 4 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Sturgeon Pool | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | O Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | P Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | 69k Bus | SCADA | EM | ----- | ----- | ----- | Volts |
| Sturgeon Pool | 69/13.8 | T5 | None | Fuse | ----- | ----- | ----- | |
| Sugarloaf | | | | | | 44-500 | | |
| Sugarloaf | 115 | SD Line | SCADA | EM | ----- | ----- | ----- | Combine load value |
| Sugarloaf | 115 | SJ Line | SCADA | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | SL Line | None | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| Sugarloaf | 115/69 | O & R Transformer | SCADA | EM | ----- | ----- | ----- | |
| Tinkertown | | | | | | 2300 | | Radio to PVL |
| Tinkertown | 13.8 | 7022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Tinkertown | 69/13.8 | T1 | SCADA | Fuse | ----- | ----- | ----- | |
| Tinkertown | 69/13.8 | T2 | SCADA | Fuse | ----- | ----- | ----- | |
| Tioronda | | | | | | M-4000 | | |
| Tioronda | 13.8 | 8085 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8086 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8087 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 115 | W-566 Ckt. Sw | ----- | EM | ----- | ----- | ----- | Agastat |
| Tioronda | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Tioronda | 115/13.8 | T1 | Charts - kW/kVAr | EM | ----- | ----- | ----- | |
| Todd Hill | | | | | | 2200 | | |
| Todd Hill | 13.8 | 6051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6055 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6056 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6057 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Todd Hill | 115 | A Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 115 | A-520-C BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | C Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 13.8 | W - 524 BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Todd Hill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is SEL-351A; Volts |
| Todd Hill | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Todd Hill | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95P is SEL-587 |
| Todd Hill | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|----------------|-------------|-------------|--------|----------|--------------------------------|
| Union Ave | | | | | | 2200 | | Volts |
| Union Ave | 115 | B1 | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | RJ Line | SCADA | EM | ----- | ----- | ----- | SEL-351A for BF |
| Union Ave | 115 | RJ-52 BKR. | ----- | EM/uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB Line | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB-51 BKR. | ----- | uP | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UN Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UW Line | SCADA* | EM | ----- | ----- | ----- | |
| Union Ave | 115 | W-1095 BKR. | ----- | EM | ----- | ----- | ----- | |
| Union Ave | 13.8 | B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B3 | SCADA | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B4 | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B3-B2 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B4-B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4041 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4042 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4043 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4044 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4045 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4046 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4047 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4055 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Union Ave | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T2 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T3 | SCADA | uP | ----- | ----- | ----- | |
| Van Wagner | | | | | | NONE | | |
| Van Wagner | 4 | 731 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Van Wagner | 4 | 732 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Vinegar Hill | | | | | | M-4000 | | |
| Vinegar Hill | 34.5 | 2389 Ckt. | MV-90 | ----- | uP | ----- | RVE | 3 phase; oil; hyd |
| West Balmville | | | | | | 2300 | | |
| West Balmville | 115 | B2 | SCADA | EM | ----- | ----- | ----- | Volts |
| West Balmville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Combine Bus Volts to one point |
| West Balmville | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | B Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 13.8 | 4011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | 4012 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4013 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4014 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4015 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| West Balmville | 115 | DB Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DB-875 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DW Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DW-662 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | F Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | R Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | W-478 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | W-855 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | WN Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | | T1 | SCADA | EM | ----- | ----- | ----- | Combine load value |
| West Balmville | | T2 | | EM | ----- | ----- | ----- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-------------------|----------|-------------|-------------|--------|----------|--------------------------------------|
| Westerlo | | | | | | BM | | |
| Westerlo | 13.8 | 1091 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1092 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1093 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Only has one 13.8 bus; T1 = Bus load |
| Westerlo | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | Cap Bank | ----- | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | NW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW-1500-NW BKR. | ----- | uP | ----- | ----- | ----- | |
| Wiccopee | | | | | | L&N | | |
| Wiccopee | 115 | FS Line | None | EM | ----- | ----- | ----- | |
| Wiccopee | 115 | WP Line | None | uP | ----- | ----- | ----- | |
| Wiccopee | 115 | FS - 1652-WP BKR. | ----- | EM | ----- | ----- | ----- | |
| Wiccopee | 13.8 | F1-292 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | F2-280 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-368 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-378 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-632 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-636 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #3) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #9) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B1 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B2 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Wiccopee | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Wiccopee | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Woodstock | | | | | | M-4000 | | |
| Woodstock | 13.8 | 3011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3012 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3013 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3014 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 13.8 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 69/13.8 | T2+SR Line | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 + B2 | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T1 | MV-90 | ----- | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 | MV-90 | ----- | ----- | ----- | ----- | |

Attachment 6

| | Station | Cost |
|------|-----------------|-------------|
| 2012 | Dashville | \$190,000 |
| | East Walden | \$610,000 |
| | Tioronda | \$200,000 |
| 2013 | Coxsackie | \$130,000 |
| | South Cairo | \$160,000 |
| | East Park | \$200,000 |
| | Pleasant Valley | \$360,000 |
| | Todd Hill | \$160,000 |
| 2014 | Sand Dock | \$510,000 |
| | Fishkill Plains | \$480,000 |
| | South Wall St. | \$84,000 |
| 2015 | Manchester | \$340,000 |
| | Forgebrook | \$730,000 |
| 2016 | Rock Tavern | \$1,060,000 |
| | | |
| Subs | | |
| | | |
| | | |

Preliminary
Copy

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To replace obsolete equipment before failure.

What are the risks and consequences of not completing this project?

Risk of power transformer failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|------------------|-------------|-------------|--------------|
| \$2,969,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 275,000 | 0 | 0 | 20,000 | 255,000 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 138,000 | 0 | 0 | 10,000 | 128,000 | 0 | 0 | 0 |
| | Stock Materials | 138,000 | 0 | 0 | 10,000 | 128,000 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 552,000 | 0 | 0 | 41,000 | 511,000 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 193,000 | 0 | 0 | 14,000 | 179,000 | 0 | 0 | 0 |
| | Overheads | 1,379,000 | 0 | 0 | 102,000 | 1,277,000 | 0 | 0 | 0 |
| | AFUDC* | 81,000 | 0 | 0 | 6,000 | 75,000 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,756,000 | 0 | 0 | 203,000 | 2,553,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 32,000 | 0 | 0 | 0 | 32,000 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 64,000 | 0 | 0 | 0 | 64,000 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 11,000 | 0 | 0 | 0 | 11,000 | 0 | 0 | 0 |
| | Overheads | 106,000 | 0 | 0 | 0 | 106,000 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 213,000 | 0 | 0 | 0 | 213,000 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,078,300 Maximum (\$): 3,859,700

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: April 11, 2023
Submitted By: Brett Arteta

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Myers Corners Switchgear Upgrade & 69 kV Breaker TV-399-KM Replace **Work Order #:** -

Budget Group: Electric **Budget Category:** 13 **Funding Project Number:** 1-1312-99-19

Is this a Specific Project, Program or Blanket? Specific **Target Schedule - Start:** 1/1/2025 **In-Service:** 12/1/2026

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The existing external switchgear has reached the end of its useful life and replacement parts are difficult to obtain or no longer available. The switchgear roof has been repaired over the years but water ingress has damaged much of the inner ceiling.

Describe specific scope exclusions, assumptions and constraints:

It is recommended that the external switchgear be replaced with a new switchgear. The switchgear will contain two bus's with a normally closed tie breaker, 15kV breakers rated 2000A and 1200A, protective relaying, interconnection cabinet, PT's, and station service transformers. The switchgear will contain provisions for future expansion. This project will include the replacement of the 69 kV TV-399-KM circuit breaker as part of the original 69 kV Breaker Replacement program that has also been broken out into individual projects.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

Risk of equipment failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|------------------|-------------|-------------|--------------|
| \$3,559,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 324,000 | 0 | 0 | 10,000 | 314,000 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 162,000 | 0 | 0 | 5,000 | 157,000 | 0 | 0 | 0 |
| | Stock Materials | 162,000 | 0 | 0 | 5,000 | 157,000 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 647,000 | 0 | 0 | 20,000 | 627,000 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 228,000 | 0 | 0 | 8,000 | 220,000 | 0 | 0 | 0 |
| | Overheads | 1,620,000 | 0 | 0 | 51,000 | 1,569,000 | 0 | 0 | 0 |
| | AFUDC* | 96,000 | 0 | 0 | 3,000 | 93,000 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,239,000 | 0 | 0 | 102,000 | 3,137,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 48,000 | 0 | 0 | 0 | 48,000 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 96,000 | 0 | 0 | 0 | 96,000 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 16,000 | 0 | 0 | 0 | 16,000 | 0 | 0 | 0 |
| | Overheads | 160,000 | 0 | 0 | 0 | 160,000 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 320,000 | 0 | 0 | 0 | 320,000 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|--------------|--------------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 1,808 | 1,808 | 0 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,491,300 Maximum (\$): 4,626,700

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

Risk of equipment failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|----------------|------------------|-------------|--------------|
| \$2,244,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 208,000 | 0 | 0 | 0 | 10,000 | 198,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 104,000 | 0 | 0 | 0 | 5,000 | 99,000 | 0 | 0 |
| | Stock Materials | 104,000 | 0 | 0 | 0 | 5,000 | 99,000 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 416,000 | 0 | 0 | 0 | 21,000 | 395,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 145,000 | 0 | 0 | 0 | 7,000 | 138,000 | 0 | 0 |
| | Overheads | 1,040,000 | 0 | 0 | 0 | 52,000 | 988,000 | 0 | 0 |
| | AFUDC* | 64,000 | 0 | 0 | 0 | 5,000 | 59,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,081,000 | 0 | 0 | 0 | 105,000 | 1,976,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 24,000 | 0 | 0 | 0 | 0 | 24,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 49,000 | 0 | 0 | 0 | 0 | 49,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 8,000 | 0 | 0 | 0 | 0 | 8,000 | 0 | 0 |
| | Overheads | 82,000 | 0 | 0 | 0 | 0 | 82,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 163,000 | 0 | 0 | 0 | 0 | 163,000 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|------------|------------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 724 | 724 | 0 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,570,800 Maximum (\$): 2,917,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

1. Relays - The relays protect the electric transmission and distribution systems and can provide oscillography, targets, and phasor data. Electric System Protection (ESP) uses the relays to gather information on faults, including fault characteristics, fault locations, and phasor data. ESP interprets the oscillography data and then communicates our conclusions to: System Operations as an information point of contact; 2) Customer Services (Line Forces) to aid in fault locating and thereby limiting patrol time and area; 3) Operations Services for cases where there may be equipment issues.
2. Meters - The meters provide AC system quantities that are used to operate safely and to plan effectively for future system needs. The Electric Planning & Reliability area uses meter information for day-to-day operations (e.g., switching) and to aid in identifying and addressing locations requiring system reinforcements. System Operations (Sys Ops) uses meter data to monitor and operate the CH transmission system within the ratings of those facilities.
3. Controls and Communications - The RTUs, PLCs, and data concentrators provide status feedback and remote control capability; they also act as a conduit for meter and relay data. Sys Ops relies on the data provided by the RTUs and PLCs to monitor the status of the system from a centralized location, enabling them to respond quickly to system abnormalities. Also, Sys Ops has the ability to perform control operations through the RTUs and PLCs.

Equipment and Functions:

A variety of equipment exists in Central Hudson substations, including protective relays, meters, reclosers, and controls and communications instruments such as Remote Terminal Units (RTUs) and Programmable Logic Controllers (PLCs). Each of these components serves an integral role in contribution to the overall, integrated substation protection, control, and monitoring function. Various departments rely on information from these devices in order to perform their jobs, including Operations Services, Customer Services, line forces, Electric Transmission Planning, Distribution Planning, System Operations, Energy Accounting, and Electric System Protection. Brief summaries of these components are included in **Attachments I through 4**. The intention of this memo is to identify the concerns with continuing to use the identified outdated equipment, detail the benefits of combining functions when replacing equipment, establishing a policy for substation relaying, control, & monitoring functions, and laying out a plan to incorporate these components into a comprehensive substation renovation program.

I. Introduction:

Re: Substation Relays, Meters, Controls and Communications Infrastructure Opportunities

Mr. J.J. Borchert

June 24, 2011

Copy to:

Mr. P.E. Haering
 Mr. H.W. Turner
 Mr. P. Harpols

Mr. J. M. May
 Mr. D. J. Wittmann
 S.R. #2011-07

Waste Reduction:

New equipment can be utilized in an integrated fashion to eliminate or minimize the following tasks and unnecessary equipment (Excerpts are taken from the attached memos):

- Reading chart meters and manually entering data into the Meter Database (MDB).
 - Chart meters cost CH at least \$275,000 annually in labor expense (1130 man-hours), which can be devoted to other work.
- MV-90 circuits not for revenue or interchange metering purposes.
 - MV-90 circuits from Verizon cost CH approximately \$24,000 annually in expense.
- Running fault studies manually to determine fault locations.
 - Manual fault locating costs CH approximately \$15,000 annually in labor expenses.
- Metering transducers, auxiliary relays, timing relays, reclosing relays, and coil monitors.

Supporting the Future State:

New equipment, properly implemented and integrated, will better support current functions and create flexibility for added future functions as follows:

- Provide continuous metering data for the entire system, eliminating information “gaps” as a result of non-continuous and non-contiguous metering.
- Provide for robust planning capabilities and switching operations through use of trending and real-time data.
- Enable more accurate forecasting of area loads to increase risk tolerance, possibly resulting in deferral of substation and distribution projects.
- Offer flexibility for Distribution Automation and Smart Grid initiatives.
- Improve reliability and reduce CAIDI through automated event reporting and fault location.

II. Current State:

This section describes the mix of equipment by component, system wide, and the limitations of the non-digital devices.

1. Relays

There are 3500 active protection relays on the system, excluding LORs, SPRs, Regulator Controls, Recloser Controls, and Communication equipment.

Attachment 1

Copy to: Mr. P.E. Haering
Mr. H.W. Turner

Mr. P. Harpolis
Mr. J. M. May
S.R. #2011-03

June 23, 2011

Mr. J.J. Borchert

Re: Transmission & Distribution Protective Relay Review

Introduction:

Protective Relays represent a vital component for the reliable operation of the Central Hudson Electric Transmission and Distribution Systems. CH substations contain a generational mix of protective relay equipment that differs in capability, ease of use, and reliability. Relay technology has advanced; microprocessor-based (digital) relays not only offer numerous protection functions, but they provide metering capability as well in a compact footprint. This memo summarizes the existing transmission and distribution protective relay equipment, as well as recommendation for replacement options.

Discussion:

Relays perform various functions aimed at timely isolation of faulted areas and rapid restoration once the fault has been cleared. Some of the functions that relays provide include zone distance protection, high-speed pilot protection, overcurrent protection, differential protection, and automatic reclosing.

A. Outdated Devices:

The majority of substations contain a group of single-component electromechanical relays for each protected facility; these relays are responsible for protection functions exclusively. At these locations, metering is performed separately, also often in a single-function fashion. There are also stations that have more recent (but still outdated) types of relays, including solid state and early microprocessor relays. These relays have been failing recently, and a replacement program was created last year to address the concern with these relays. The following is a list (in order of decreasing replacement priority) of common relay types found in substations along with the reason that they have been superseded:

- Electromechanical Relays: These relays are obsolete for the reasons previously described (i.e.; physical size, calibration drift, single-function capabilities, etc).
- Solid State Relays: Like electromechanical relays, the relays on the CH system typically are single function. They have advanced technologically past the electromechanical relays, but not quite to the level of digital relays. They monitor current and voltage waveforms through analog circuits, which then are compared through potentiometers to user defined settings. They generally are unsupported, spare parts are hard to locate, and they contain components that deteriorate over time.

- 1st Generation Microprocessor Relays: Please see the 2010 Budget Memo, **Re: Relay Replacement Program for Upgrade of 1st Generation Microprocessor Relays Remaining on the Central Hudson System**, dated July 1, 2010, for the existing program.
- Schweitzer Engineering Laboratories (SEL) 200 Series Relays (SEL-251/ 267/ 279/ 2BFR): These relays are digital, but they make use of early logic processing methods, in which creating settings isn't as user-friendly as in modern digital relays. SEL has discontinued manufacturing parts for most of these relays, and limited service is provided with them.
- Basler BE1-79M Relays: These relays are multi-shot reclosing relays; they only provide the reclosing function. There are more recently developed relays that provide numerous protection functions and also perform reclosing operations and metering functions.
- Basler BE1-851 (H) Relays: These relays are multifunction, digital relays; however, they only receive current inputs. So, the only meter data available is Amps. Multifunction relays exist that receive current and voltage inputs and provide MW & MVA_r data as well as a much larger variety of protection options.

B. Retrofit/Replacement Options:

Digital relays offer multiple protection functions as well as metering and substation equipment diagnostics. The use of multifunction digital relays greatly reduces the required panel space. Also, with few moving parts, digital relays do not need recalibration to remain accurate. Additionally, digital relays and digital relay controls offer the ability to have longer durations between maintenance cycles due to the combination of their internal error checking and their constantly monitored alarm outputs to SCADA.

Digital relays can be specified to offer equipment diagnostics for the devices they protect. For example, digital transformer relays have the ability to monitor the through-fault history of the transformers and to make determinations on the required maintenance as a result. The same case is true for feeder breakers protected by distribution relays.

- Digital Relays: A collection of proven products exists by a variety of manufacturers. These relays are microprocessor-based, multi-function relays that provide a large variety of protection, metering, and equipment diagnostic capability; they can be used for various protective functions. Some manufactures include SEL, GE, and Basler*. Electric System Design (ESD) has standardized the design to use SEL as primary protection and either GE or Basler relays for backup protection.

* Basler provides a BE1-951 relay, which conveniently fits into electromechanical relay panel cutouts.

memo.

Full integration requires a DNP compatible Remote Terminal Unit described in the "RTU Review"

Eric A. Loeven

- ◆ They have lower maintenance costs because they rarely fail and allow for an increased maintenance cycle (i.e. an increase of 50%; from 4 yrs. to 6 yrs.).
 - ◆ They provide oscillography, targets, and phasor data that can be accessed from a remote location through a modem. This capability assists in timely and accurate fault analysis.
 - ◆ They have a proven track record of good quality and high availability, along with excellent manufacturer support for current models.
 - ◆ The diagnostic capabilities of digital relays should be used to help in the condition assessment of substation equipment.
 - ◆ They provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB/eDNA with little human intervention.
 - ◆ They offer a more compact footprint and much more capability than their large, single-function predecessors.
- Upgrading to digital relays provides the following benefits:

Conclusions:

- Time Synchronization Devices: Various devices exist on the market that provides a means of time synchronization, including satellite clocks. These clocks provide a unified signal based on a sole source located at zero time offset. To avoid confusion between time zones, UTC time is used as a standard. Sequence of events reconstruction truly realizes the value of having all of the station relays linked to a universal source.
- Data Concentrator (SEL-2032): This relay has 16 ports and can act as a data concentrator, a phone switch, and a basic logic processor. The 2032 connects to the RTU, acting as a slave device; it connects to other digital relays, polling them for meter information as master. Once in the 2032, the meter data can be mathematically manipulated to maintain integrity and precision before it is transferred to a compatible RTU. The 2032 also is connected to a phone line to provide dial-in remote access for trained personnel, enabling event retrieval and relay interrogation.

C. Additional Considerations:

Attachment 2

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-04

June 23, 2011

Mr. J.J. Borchert

Re: Substation Metering Review

Introduction:

Substation metering data is used to plan and operate the Central Hudson Transmission and Distribution Systems. These metering data are necessary for the safe operation of existing facilities as well as the cost effective planning and design of new facilities. Many transmission lines, substation transformers, and distribution circuits have their MW & MVA_r flows monitored by the Energy Management System (EMS) and have the resultant data stored in the Meter Data Base (MDB) and Historian (eDNA). Many other circuits either are not metered or utilize local indicating metering, such as graphic charts or drag hands, to register data.

Technology has advanced; there are much more reliable and efficient means of measuring and transmitting metered load data, including by means of digital relays. This memo summarizes the existing meter equipment and the replacement options, as well as provides recommendations on the best option to gain appropriate metering data in the most efficient manner.

Discussion:

A large number of substations contain transducer-based meters, which register and report their data directly to a Remote Terminal Unit (RTU) by means of an analog signal. A handful of other stations contain chart meters, which provide local indication. In the stations that have chart meters, the metering is often registered in single function fashion, with circuit current measured in Amps and transformer load measured in Kilowatts and Kilovars. The meter data that is most useful for planning and operating the system is provided in the form of Watts and Vars. Additionally, the panel space taken up by the charts can be reduced greatly with the installation of digital relays, which offer protection functions as well as metering functions.

Technological advances have led to multi-function, digital relays with the capability to meter accurately. The digital relays can transfer instantaneously metered values to EMS. Once there, the data is stored in the Historian, integrated, and the peak hourly values are calculated and transferred to the MDB with little human intervention.

A. Outdated Devices:

The following is a list of common metering methods used in CH substations along with the reason that they have been superseded:

- Chart Meters: Graphic charts monitor single values such as MW, MVA_r, or circuit Amps. These charts rely on diligent maintenance practices to ensure that they function

as designed. Many of the charts run out of ink between maintenance cycles or fail mechanically, leaving "gaps" in data. Even the charts that record properly pose difficulty in capturing their data. The process of going to the substations to collect the charts, reviewing the charts and interpreting the data, and entering the data manually into the MDB is time consuming. Due to the cumbersome nature of the process, the charts are only interpreted for the annual system peaks, which leaves 2-4 data points in the MDB for that circuit or station element to use in planning.

- Other Local Indication Metering: Charts are not the only method of local metering. There are also substation Ammeters, Voltmeters, etc. that are remnants of a time when stations were manned and operated manually. Many of these devices are unsupported and have limited parts available.
- MV-90: An alternative method to metering by charts is to meter through MV-90. MV-90 is a system that uses a recorder to receive metered data directly from the instrument transformers and relies upon a dedicated telephone line to transmit that data to the master station collector; it is used for revenue metering as well as substation metering. Once the master has the data, it is transferred to the MDB. This method requires a dedicated line and the associated expenses.
- No Metering: Locations exist on the system where there are no methods of capturing load data. Some of these locations rely on grouped metering; they do not provide the granularity of individual circuit load data. At other locations, it hasn't been cost justified to install/repair any metering.
- Transducers: The transducers are wired directly to secondary AC quantities from current transformers and potential transformers. They convert the input quantities into an analog output signal, which is wired to the analog inputs of an RTU.
- Load checks: On a heavily loaded day, load checks are performed on circuits without automatic metering by having a worker physically go to a point on a circuit and manually perform a metering check.

B. Retrofit/Replacement Options:

- Digital Relays: Microprocessor-based relays not only offer protection functions; they provide metering capability as well in a compact footprint. The digital metering data provided by the digital relays is extremely accurate and has the ability to be entered into the MDB through Supervisory Control and Data Acquisition (SCADA) automatically once proper infrastructure is in place. The relays offer the ability to register numerous metering values simultaneously and in comm. format so that individual wires aren't needed for each metered point; rather, a single cable can be used to transmit multiple data points. Also, a separate phone line is not required for this method.
- Bitronics Power Meters: These meters provide bi-directional Watt and Var meter values as well as Volt and Amp values. They are capable of transmitting data through analog signal or through communication protocol to an RTU. They are cheaper alternatives, but do not provide any protection functions.

- Grid Sense: These are clip-on meters that report to a nearby data concentrator via radio. The data concentrator is linked to a POT's line outside of the station (no need for a Positron). The newest models provide directional Watt and Var metering, and they have the ability to report data in selectable time increments to the meter database. They represent a lower cost option and provide limited fault recording capabilities, but they do not provide protection functions.

Conclusions:

- ◆ Reading chart meters takes a great deal of time, and many of the charts are unsupported and are labor intensive to maintain. Data "gaps" exist when using chart meters, and the meters provide only a few, data points to the MDB each year, which need manual entry. The materials to repair and/or replace the charts are in short supply.
- ◆ Digital relays provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB with little human intervention.
- ◆ The AC quantities that the digital relays require for protection can be used for metering as well; therefore, there is no need for additional wiring from the instrument transformers to meters. Additionally, transducer equipment, which is susceptible to drift and requires regular maintenance, is no longer needed.
- ◆ The MV-90 system is a fully functional system, and it is an efficient method of collecting meter data in stations that do not have the relay and/or RTU capability to transmit data. MV-90 metering requires a dedicated phone line to transmit the meter data; this reoccurring expense can be eliminated with digital relaying and a proper RTU.
- ◆ Grid Sense meters can be installed relatively inexpensively and quickly to provide stopgap metering data until upgrades can be completed. They require a phone line and the monthly expenses associated with the line.

Eric A. Loeven

Appendix 1: Estimated Costs of Current Methods and Retrofit Options

| <u>Current Methods</u> | Time (Manhours) | | Cost |
|--|----------------------------|-----|----------------|
| | Field | Eng | TOTAL |
| MV-90 yearly (per station on average) | | | \$1,200 |
| Chart Meter maintenance & data retrieval | 1 | 10 | \$1,250 |

Note 1

Note 1: This cost is to retrieve the circular chart, review it, and enter it into the database. This process takes place on a suspected system peak day. At minimum, there are two times a year that this process is performed (Summer Peak and Winter Peak); however, there may be four or more times depending on when the actual peak occurs.

| <u>Retrofit Options</u> | Time | | | | Cost | | | TOTAL |
|--|--|-------|-------|-----|--------------|--|----------|-----------------|
| | Manhours | | | | Parts | Labor | | |
| | Tech | Elect | Draft | Eng | Device | Test Sw., Steel, etc. (w/OH) | | |
| Grid Sense Meter W / VAr | Hours are for the EOE and the Linemen. | | | | \$4,775 | | | \$5,700 |
| Data Concentrator 1 for every 4 ckt. | Per installation, each meter takes the lineman and the EOE 15 minutes to install. | | | | \$2,272 | | | \$2,700 |
| POT Line | Each data concentrator requires 20 minutes of lineman time and 15 minutes of EOE time. | | | | \$100 | | | \$110 |
| Labor (including travel time) per Station | Travel to each site has been assumed to be 1 hour. | | | | -waived- | | \$430 | \$430 |
| Site Registration per D/C | | | | | | | | |
| TOTAL GS Installation | | | | | | | | \$9,000 |
| Bitronics (Comm) | 40 | | 40 | 8 | \$2,000 | \$1,000 | \$11,400 | \$15,000 |
| Bitronics (HW-W/VAr/V) | 40 | | 40 | 12 | \$1,100 | \$1,000 | \$12,000 | \$14,500 |

Attachment 3

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-05

June 23, 2011

Mr. J.J. Borchert:

Re: Remote Terminal Unit Review

Introduction:

Real-time control and status feedback are vital components of a properly functioning substation. Without someone at the substation 24/7, a means of providing feedback and control operations is required; that means is a Remote Terminal Unit (RTU). This memo will describe the current state of the RTUs on the system, as well as the opportunity areas for retrofits and justification for the upgrades.

Discussion:

RTUs provide a means of transmitting important data in a substation to a master station via Supervisory Control and Data Acquisition (SCADA). The RTUs collect status and metering data and transmit it to a master station when polled. Also, they perform control operations that are initiated from the master station in a remote location. The RTUs can be dedicated line or dial-up depending on the application. RTUs have evolved with technology; existing CDC RTUs (protocol and provider) have been replaced with new flash ROM RTUs that utilize protocol suites including, but not limited to, CDC and the utility standard, DNP.

A. Outdated Devices:

- CDC 44-500 & CDC 88-90: These are different versions of dedicated line RTUs provided by CDC, a company that no longer exists. Retrofits have been performed to eliminate the CDC RTUs on the system because of the inability to get spare parts and due to their incompatibility with the digital relays. These RTUs utilize CDC protocol, which is an outdated protocol incapable of communicating with digital relays/data concentrators and is unable to receive digital metering data. They rely on analog signals and pulse accumulators sent from transducers to transmit meter information.
- G.E. M-4000: This is a smaller version of the G.E. Harris D20 RTU. It is used mainly in dial-up applications and is polled twice daily for SCADA data. It will report unsolicited if there is a change of status or if a metered point's dead band is exceeded. Based on the frequency that dial-up RTUs are polled, they cannot be used as sources to the meter database. Also, dial-up RTUs are not reliable because they rely on a plain old telephone (POT) line for communication. Due to this lack of reliability, control operations typically are not performed with dial-up RTUs. As a plus, the M-4000 has the capability to communicate through CDC or DNP protocol, and it also can be configured as a dedicated unit.

- G.E. D20: The functionality and hardware of this RTU are consistent with many modern RTUs; however, the configuration software is not user-friendly and uses a complicated, layered architecture. Additionally, with retiring technicians, the available workforce skilled in working with the configuration software is dwindling. This fact is of concern because emergency fixes will take longer to complete.

B. Retrofit/Replacement Options:

- Telvent Sage 2400¹: Telvent offers an RTU that fits into existing CDC RTU cabinets, and it has peripheral cards that resemble the CDC RTU cards. For these reasons, Telvent is the vendor of choice, providing the most seamless retrofit option. Telvent also offers a protocol suite for communications, including DNP and CDC. The DNP Master protocol allows direct communication with SEL-2020/2030/2032 data concentrators to transfer metering data from numerous digital relays in a substation.

C. Additional Considerations:

- Radio linked RTUs: As previously stated, the M-4000 can be polled as a dedicated RTU or as a dial-up unit. If there is a nearby, dedicated RTU, it is sometimes possible to install a radio link between the two stations and poll the M-4000 from the other station. In this configuration, there is access to real-time information and the ability to perform control operations at both stations. The need for the Positron Box at the radio-linked station is eliminated, and there is no extra cost incurred by installing a phone line and a Positron Box. The radio links require a clear line of site from one station to the next in order for the signal to be transmitted clearly. As such, the reliability of the circuits is largely dependent upon the terrain. Radio signals are also susceptible to interference from other mobile devices such as CB Radios.
- Positron Boxes: One major cost associated with RTUs, dedicated or dial-up, is the phone company's requirement of a Positron Box to isolate the outside phone line from the electric substation. This requirement is in place to provide a level of comfort for the phone company technician working in our substations, many of the existing stations have been allowed to function without this isolation in a grandfathered manner. However, any time that RTU retrofits are performed at these stations, the installation of a Positron Box is required. They are an expensive piece of equipment and have long lead times that may impact project schedules. There also is continued reliance on the phone company for maintenance and repairs.

¹ Telvent has been chosen as the preferred RTU for retrofits due to ease of configuration/use and the techs' familiarity with the units. All RTU cost estimates in this report are based on using this RTU.

Conclusions:

Upgrading old CDC, M-4000, and D-20 RTUs to Telvent RTUs provides the following benefits:

- ◆ Telvent RTUs are reliable and parts are available readily.
- ◆ The Telvent configuration software is user-friendly, making configuration and testing faster.
- ◆ DNP RTUs, of which Telvent is one, can receive communication-based metering & status and transmit it to the SCADA master.
- ◆ The Telvent RTU retrofits for the CDC 44-500's utilize the existing RTU cabinet and high powered tripping relays. The Telvent replaces the equipment susceptible to failure and makes use of the existing equipment that is less prone to failure.
- ◆ Using Telvent RTUs provides timesavings through standardization, and the engineers and technicians alike prefer to work with the Telvent for RTU retrofits.

Consideration also should be given to converting dialup RTUs to dedicated line RTUs. Dialup RTUs rely on POT lines, which have notoriously poor reliability; additional steps and equipment are required to perform the control operations safely. In contrast, dedicated line RTUs offer signal reliability, which provides the ability to perform control operations safely without added equipment and procedure steps.

Eric A. Loeven

Copy to: Mr. P.E. Haering
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Mr. D. J. Dittmann
Mr. J. M. May
S.R. #2011-06

June 23, 2011

Mr. J.J. Borchert

Re: Substation Recloser Review

Introduction:

Substation reclosers provide an alternate method of interrupting fault current on distribution and sub-transmission circuits. They are a convenient way to provide circuit protection in locations where it is not cost effective to install a circuit breaker and associated conduit to a control house. One disadvantage of using a recloser rather than a circuit breaker is that the recloser has reduced interrupting capability.

Recloser technology has advanced; hydraulic, oil-filled devices have given way to vacuum-interrupted, microprocessor-based (digital) recloser controls. This memo summarizes the existing substation recloser equipment, as well as replacement options. Also, this memo provides recommendations on the best retrofit options.

Discussion:

“An automatic circuit recloser is a self-contained device, which can sense and interrupt fault currents as well as reclose automatically in an attempt to re-energize a line.”* The existing hydraulic reclosers, a kin to electromechanical relays, have single component capability with limited flexibility in setting pickup curves, very little intelligence, and minimal ability to report feedback. New, digital recloser controls provide a wide range of pickup curves, are self-monitoring, grant instant notification of operations, offer desired metering capabilities, and require less frequent routine maintenance.

A. **Outdated Devices:**

Reclosers were installed in substations as a cost effective alternative to a distribution (15kV) or sub-transmission (34.5kV) circuit breaker combined with a reclosing relay. They can be single-phase or three-phase, be controlled mechanically (hydraulic) or digitally, and they have interrupting mediums of oil or vacuum. They make use of a series of fast and slow curves, providing coordination versatility and protection flexibility. A brief summary of the outdated reclosers on the CH system, specifically the hydraulically controlled type and the oil-interrupted type, is as follows:

- o Hydraulically controlled reclosers: These reclosers are self-contained and self-controlled; they have oil or vacuum interrupters. They are outdated due to their

* Page 124. Power Distribution Engineering: Fundamentals and Applications. James J. Burke. 1994.

C. Additional Considerations:

- Telemetric Interface: The Telemetric RTM II device can be installed to provide status and control of the SEL-651R DNP3 points. These data travel via cellular network and are displayed via a secure web interface. In addition, data travel to a SCADA Xchange server and then over frame relay to our SCADA system.
- R-Mag Circuit Breakers: As the most direct comparison to the substation recloser, these circuit breakers are a packaged breaker and relay combination. They are relatively inexpensive to install and there is familiarity with them by the techs, electricians, and engineers alike. These breakers provide a higher interrupting capability than the reclosers.

Conclusions:

Upgrading to vacuum interrupted, digitally controlled Viper reclosers provides the following benefits:

- ◆ Vacuum Interruption –
 - The speed of operation on these reclosers is not compromised by temperature.
 - The maintenance on these reclosers is not as labor-intensive as the oil-filled reclosers. They can operate up to 10,000 times before requiring an overhaul, with only the battery requiring simple in-field replacement in the meantime.
- ◆ Digital Control –
 - These recloser controls provide a wide range of pickup curves, which makes coordination easier and much more flexible than the hydraulically controlled reclosers.
 - These recloser controls offer digital metering capability and fault notification. The recloser can transmit its information through SCADA if the proper infrastructure is in place, or through Telemetric in stations with under-developed SCADA infrastructure.
 - These recloser controls can be interrogated to gather oscillography, targets, and phasor data from a remote location through a modem. This capability assists in timely and accurate fault analysis.

Some of the lower cost is lost when the recloser is installed in a substation if it is connected to the RTU in the control house, rather than through the Telemetric Unit. In this case, the added cost of conduit, steel work, and/or foundation needs to be considered. Regardless of the method of reporting to SCADA, installing the recloser in a substation comes with the added costs associated with technician time to commission and test the recloser and digital control over the cost of an installation on a distribution circuit.

Eric A. Loeven

Appendix 1: Estimated Costs of Retrofit Options

| Retrofit Options | Cost | | |
|---|----------|-----------|--------|
| | Parts | TOTAL | |
| Viper Reclosers with control relay and PT (on dist circuit) | \$21,000 | \$33,500 | Note 1 |
| Viper Reclosers with control relay (in a substation - Telemetric communication) | \$20,500 | \$33,000 | Note 1 |
| Viper Reclosers with control relay (in a substation - RTU communication) | \$20,500 | \$86,000* | Note 2 |
| R-Mag Breaker | \$25,000 | \$90,000 | |

Note 1: These represent one-time costs. There are additional annual costs for the SCADA Frame relay and the SCADA X-Change to Telemetric. The SCADA Frame Relay costs \$5200/yr. The SCADA X-Change to Telemetric costs \$2000/yr for 100 devices and \$1,500 for each 50 devices after that.

Note 2: This cost is estimated based on proposed work to bring the data through the RTU. No installations exist at this time in this manner.

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|-------|----------|--|
| Accord | 4 | 361 Ckt. | Charts - kW | ----- | EM | NONE | ----- | Retired as part of P/MK Upgrade |
| Ancram | 13.8 | 7085 Ckt. | Grid Sense | ----- | EM | NONE | ----- | Only has a 13.8 Voltage Regulator |
| Balmville | | | | | EM | | | |
| Balmville | 4 | 411 Ckt. | MV-90 | ----- | EM | | | |
| Balmville | 4 | 412 Ckt. | MV-90 | ----- | | C-300 | | |
| Barnegat | | | | | | | | Metering source? |
| Barnegat | 115 | KB Line | Amps | EM | ----- | | | |
| Barnegat | 115 | KC Line | None | EM | ----- | | | |
| Barnegat | 115 | KB-749-KC BKR | | EM | ----- | | | |
| Barnegat | 115/13.8 | T1 | SCADA | ----- | | | | IBM Feeds |
| Barnegat | 115/13.8 | T2 | SCADA | ----- | | | | |
| Barnegat | 13.8 | S1 | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2 | SCADA | ----- | EM | | | |
| Barnegat | 13.8 | S1-706 BKR | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2-734 BKR | SCADA | ----- | EM | | | |
| Beacon | | | | | | D-20 | | |
| Beacon | 13.8 | 8006 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 13.8 | 8015 Ckt. | SCADA | ----- | EM | | | Previously 8087A? |
| Beacon | 4 | 801 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 802 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 803 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | W-414 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | W-463 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | Bus 1 | SCADA | ----- | | | | |
| Beacon | 4 | Bus 2 | SCADA | ----- | | | | |
| Beacon | 13.8/4 | T1 | SCADA | ----- | EM | | | |
| Beacon | 13.8/4 | T2 | SCADA | ----- | EM | | | MDB has an entry with T1+T2 calculated |
| Beacon | 13.8 | BF Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | NM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | CM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 1 | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 2 | SCADA | ----- | EM | | | |
| Bethlehem Rd. | | | | | | 2400 | | |
| Bethlehem Rd. | 13.8 | 4091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4092 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4093 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4094 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4095 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4096 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4097 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4098 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 1 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 2 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 115 | RD Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | UB Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | RD-604-UB BKR | | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T1 | EMS | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T2 | EMS | EM | ----- | | | Metering combined |
| Bethlehem Rd. | 13.8 | W-613 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-619 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-804 BKR | | | EM | | | |
| Bordman Rd. | | | | | | NONE | | |
| Bordman Rd. | 13.8 | 6081A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | 6082A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-203 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-204 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-205 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-206 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-207 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-208 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-209 Ckt. | | ----- | EM | | | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|---------------|--------------------|-------------|-------------|--------|----------|---|
| Boulevard | | | | | | 2100 | | |
| Boulevard | 69 | OB Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | I Line | SCADA | uP | ----- | ----- | ----- | Line Amps & WVAR |
| Boulevard | 13.8 | KO Line | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | KK Line | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1011 | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1012 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1013 | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1014 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 69 | Bus 1 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Bus 2 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Overall | ----- | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | Metering combined |
| Boulevard | 69/13.8 | T3 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Clinton Ave. | | | | | | M-4000 | | |
| Clinton Ave. | 4 | 395 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 396 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 397 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | Bus | SCADA | ----- | ----- | ----- | ----- | |
| Clinton Ave. | 4 | T1 | MV-90 | ----- | Fuse | ----- | ----- | |
| Clinton Ave. | 13.8/4 | T1 | MV-90 | ----- | ----- | NONE | ----- | |
| Cold Spring | | | | | | | | Install a Grid Sense Package for two (2) circuits. |
| Cold Spring | 4 | 871 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Cold Spring | 4 | 872 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Coldenham | | | | | | D-20 | | |
| Coldenham | 13.8 | 4021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4026 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4027 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4028 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | B1-B2 Tie | ----- | ----- | EM | ----- | ----- | |
| Coldenham | 115 | J Line | SCADA | Gen 1 | ----- | ----- | ----- | 95P is DLP; 95BU is REL-301; part of replacement program already. |
| Coldenham | 115 | CW Line | SCADA | Gen 1 | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115 | J-19-CW BKR | ----- | SS | ----- | ----- | ----- | |
| Converse St. | | | | | | NONE | | |
| Converse St. | 4 | 121 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 122 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 123 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | | | | | | NONE | | |
| Conway Place | 4 | 881 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | 4 | 882 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Coxsackie | | | | | | 8890 | | |
| Coxsackie | 13.8 | 1071 Ckt. | Charts - Amps | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | 1072 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | 1074 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Coxsackie | 13.8 | 1076 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | Bus 1 (T1+G1) | SCADA | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | Bus 2 | ??? | ----- | EM | ----- | ----- | Metering data available through relay, but not configured. |
| Coxsackie | 69 | CN Line | None | uP | ----- | ----- | ----- | |
| Coxsackie | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | 95P is SEL-587 |
| Coxsackie | 69/13.8 | T1 | Charts - Amps | uP/EM | ----- | ----- | ----- | |
| Coxsackie | 13.8 | G1 | SCADA | ----- | ----- | ----- | ----- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------------|--------------------|-----------------------|---------------|-------------|-------------|-------|----------|---|
| Danskammer | | | | | | 2100 | | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | AC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DB Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DR Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DW Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | RS Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | W - 323 BKR | ----- | SS | ----- | ----- | ----- | |
| Danskammer | 115 | North Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | Middle Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | South Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | DB-1171 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | DR-1421 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | DW-1061 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | T5&T6 | SCADA | EM | ----- | ----- | ----- | |
| Dashville | | | | | | 2300 | | |
| Dashville | 4 | 345 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single Phase; Vac; Hydr |
| Dashville | 6.6 | Bus | ----- | ----- | EM | ----- | ----- | |
| Dashville | | T1 | ----- | EM | ----- | ----- | ----- | Fused Transformer w/ CR 67 relay |
| Dashville | | G1-G2 | SCADA | ----- | ----- | ----- | ----- | |
| East Fishkill 345kV | | | | | | | | |
| East Fishkill 345kV | 345 | C9751 Breaker A1 BR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 345 | C9751 Breaker A2 BR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 1 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 2 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill | | | | | | 8890 | | |
| East Fishkill | 115 | EF Line | SCADA | uP* | ----- | ----- | ----- | 95P is MDAR; 95BU is Optimho - Replacing with 311C & D60. |
| East Fishkill | 115 | HF Line | SCADA | uP* | ----- | ----- | ----- | 95BU is Optimho - Replacing with D60. |
| East Fishkill | 115 | EF-672 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | EF-679 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | W-640 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | T1 | SCADA | see EFB | ----- | ----- | ----- | |
| East Kingston | | | | | | Orion | | |
| East Kingston | 13.8 | Bus 1 | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | Bus 2 | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1021 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1026 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1027 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1028 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 115 | ER Line | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115 | LR Line | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115 | LR-201-ER Breaker | ----- | uP | ----- | ----- | ----- | |
| East Kingston | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| East Kingston | 115/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| East Park | | | | | | 8890 | | |
| East Park | 13.8 | 6073 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6074 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6075 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| East Park | 69 | Q Line | None | EM | ----- | ----- | ----- | 95P is SEL-587 |
| East Park | 69/13.8 | T1 | SCADA | uP/EM | ----- | ----- | ----- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|------------------|-------------|-------------|------|----------|--|
| East Walden | | | | | | 2400 | | |
| East Walden | | | | | EM/uP | | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5041 Ckt. | Grid Sense | ----- | EM/uP | | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5042 Ckt. | Grid Sense | ----- | EM | | | GS not working |
| East Walden | 13.8 | 5043 Ckt. | Grid Sense | ----- | | | | Com |
| East Walden | 13.8 | Com Equipment | ----- | ----- | uP | | | |
| East Walden | 13.8 | B1 | SCADA | ----- | | | | 95P is DLP; part of replacement program already. |
| East Walden | 115 | CW Line | None | Gen1/uP | ----- | | | |
| East Walden | 115 | CW-712 | ----- | EM | ----- | | | |
| East Walden | 115 | D Line | None | EM | ----- | | | |
| East Walden | 115 | D-722 BKR | ----- | EM | ----- | | | |
| East Walden | 115 | DW Line | SCADA | ----- | uP | | | |
| East Walden | 115 | DW-1071 BKR | ----- | uP | ----- | | | |
| East Walden | 115 | EM Line | SCADA | ----- | uP | | | |
| East Walden | 115 | EM-642 BKR | ----- | uP | ----- | | | |
| East Walden | 69 | WM Line | SCADA | ----- | uP | | | Amps & Volts |
| East Walden | 115 | W-644 | ----- | EM | ----- | | | |
| East Walden | 115 | B1 | SCADA | ----- | EM | | | Combine Bus Volts to one point |
| East Walden | 115 | B2 | ----- | EM | ----- | | | 95P is SEL-587 |
| East Walden | 69/13.8 | T1 | SCADA | ----- | uP/EM | | | 95BU is SEL-587 |
| East Walden | 69/13.8 | T3 | SCADA | ----- | EM/uP | | | |
| Fishkill Plains | | | | | | D-20 | | |
| Fishkill Plains | 13.8 | 8091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Fishkill Plains | 13.8 | 8092 Ckt. | MV-90 | ----- | EM | | | |
| Fishkill Plains | 13.8 | 8093 Ckt. | SCADA | ----- | uP-200 | | | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8094 Ckt. | SCADA | ----- | uP-200 | | | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8095 Ckt. | SCADA | ----- | uP | | | |
| Fishkill Plains | 13.8 | 8096 Ckt. | SCADA | ----- | uP | | | |
| Fishkill Plains | 115 | HF Line | SCADA | uP/Gen 1 | ----- | | | 95BU is Optimho; part of replacement program. |
| Fishkill Plains | 115 | HF-703 BKR | ----- | EM | ----- | | | |
| Fishkill Plains | 115 | NF Line | None | EM | ----- | | | |
| Fishkill Plains | 115 | A Line | SCADA | ----- | uP | | | |
| Fishkill Plains | 115 | A-1036-FP | ----- | uP-200 | ----- | | | 279/2BFR relays |
| Fishkill Plains | 115 | A-1498 | ----- | uP-200 | ----- | | | 279/2BFR relays |
| Fishkill Plains | 115 | Com Equipment | ----- | ----- | ----- | | | Com |
| Fishkill Plains | 115 | FP Line | SCADA | uP/Gen 1 | ----- | | | 95P is DLP; part of replacement program already; 95BU is SEL-321 |
| Fishkill Plains | 115 | B1 | SCADA | ----- | EM | | | |
| Fishkill Plains | 13.8 | B1 | ----- | EM | ----- | | | Combine Bus Volts to one point |
| Fishkill Plains | 13.8 | B2 | SCADA | ----- | EM | | | |
| Fishkill Plains | 115/13.8 | T1 | ----- | EM/uP | ----- | | | 95BU is SEL-587; metering is combined. |
| Fishkill Plains | 115/13.8 | T2 | SCADA | ----- | EM/uP | | | |
| Forgebrook | | | | | | 2300 | | |
| Forgebrook | 13.8 | Bus #1 | ----- | ----- | EM | | | |
| Forgebrook | 13.8 | Bus #2 | Charts - kW/kVAR | ----- | EM | | | |
| Forgebrook | 13.8 | 8011 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8012 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8013 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8014 Ckt. | Charts - kW | ----- | uP/EM | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8015 Ckt. | Charts - kW | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8016 Ckt. | Charts - kW | ----- | EM | | | No Chart Data |
| Forgebrook | 115 | Com Equipment | ----- | ----- | ----- | | | Com |
| Forgebrook | 115 | FO Line | None | EM | ----- | | | |
| Forgebrook | 115 | FO-1430-FT | ----- | EM | ----- | | | |
| Forgebrook | 115 | FT Line | None | EM | ----- | | | |
| Forgebrook | 115 | FT-1432 | ----- | EM | ----- | | | |
| Forgebrook | 115 | FT-882-WF | ----- | EM | ----- | | | |
| Forgebrook | 115 | WF Line | SCADA | ----- | uP | | | |
| Forgebrook | 13.8 | CM Line | None | ----- | EM | | | Amps |
| Forgebrook | 13.8 | BF Line | SCADA | ----- | EM | | | |
| Forgebrook | 13.8 | W-1486 | ----- | ----- | EM | | | |
| Forgebrook | 13.8 | W-994 | ----- | ----- | EM | | | |
| Forgebrook | 115/13.8 | T1 | SCADA | ----- | EM | | | Metering combined |
| Forgebrook | 115/13.8 | T2 | ----- | ----- | EM | | | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|------------------|-------------|-------------|---------------------------|----------|--|
| Freehold | | | | | | M-4000 | | |
| Freehold | 13.8 | 2061 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | 2071 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | W-1155 BKR | ----- | ----- | ----- | ----- | PR-560M | 3 phase; oil; electronic |
| Freehold | 13.8 | T1 | Charts - kW/kVAr | fuse | ----- | ----- | ----- | |
| Freehold | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | |
| Galeville | | | | | | Orion | | |
| Galeville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5030 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5031 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5032 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5033 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5034 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5035 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Galeville | 69 | MG Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69 | MG-200-MK BKR | ----- | uP | ----- | ----- | ----- | |
| Galeville | 69 | MK Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| Greenfield Rd. | | | | | | M-4000 | | |
| Greenfield Rd. | 13.8 | 3076 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 13.8 | 3078 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 4 | 375-376 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 4 | 377-378 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | W-1608 | ----- | ----- | EM | ----- | ES | 3 phase; oil; electronic |
| Greenfield Rd. | 13.8/4 | T2 | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Greenfield Rd. | 4 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Greenfield Rd. | 4 | B3 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Grimley Rd. | | | | | | NONE-Soon to have DNP RTU | | |
| Grimley Rd. | 4 | 385 Ckt. | Grid Sense | ----- | EM | ----- | Kyle L | Single Phase; Oil; Electronic |
| Grimley Rd. | 4 | 386 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| Hibernia | | | | | | Micro 1C | | |
| Hibernia | 13.8 | 7011 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | 7012 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 69/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | | | | | | D-20 | | |
| High Falls | 13.8 | 3021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 69 | HK Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 69 | HK-696-P BKR. | ----- | ----- | uP- 200 | ----- | ----- | SEL-279 |
| High Falls | 69 | P Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 13.8 | W-998 BKR. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | B1 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | B2 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |
| High Falls | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|--------------------|----------|-------------|-------------|--------|----------|---|
| Highland | | | | | | 2300 | | |
| Highland | | | | | EM/uP | | | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5081 Ckt. | SCADA | ---- | EM/uP | | | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5082 Ckt. | SCADA | ---- | EM/uP | | | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5083 Ckt. | SCADA | ---- | uP | | | |
| Highland | 13.8 | 5084 Ckt. | SCADA | ---- | uP | | | |
| Highland | 13.8 | 5085 Ckt. | SCADA | ---- | uP | | | |
| Highland | 115 | HR Line | SCADA | uP | ---- | | | |
| Highland | 115 | OR Line | SCADA | uP | ---- | | | |
| Highland | 115 | OR-761-HR BKR. | ---- | EM | ---- | | | |
| Highland | 13.8 | B1 | SCADA | ---- | EM | | | |
| Highland | 13.8 | B2 | SCADA | ---- | uP | | | |
| Highland | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Highland | 115/13.8 | T1 | SCADA | uP/EM | ---- | | | 95BU is SEL-587 |
| Highland | 115/13.8 | T2 | SCADA | uP | ---- | | | |
| Honk Falls | | | | | | D-20 | | |
| Honk Falls | 13.8 | 3071 Ckt. | SCADA | ---- | EM | | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | 3072 Ckt. | SCADA | ---- | EM | | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | B1 | SCADA | EM | ---- | | | |
| Honk Falls | 69 | GM Line | SCADA | EM/uP | ---- | | | 79 Relay is EM |
| Honk Falls | 69 | HG Line | SCADA | uP | ---- | | | |
| Honk Falls | 69 | HK Line | SCADA | uP/EM | ---- | | | 79 Relay is EM |
| Honk Falls | 69 | MK Line | SCADA | uP | ---- | | | |
| Honk Falls | 69 | WH Line | SCADA | uP/EM | ---- | | | 79 Relay is EM |
| Honk Falls | 69 | overall diff B1+T1 | SCADA | EM | ---- | | | |
| Honk Falls | 69/13.8 | T1 | ---- | fuse | ---- | | | |
| Hunter | | | | | | M-4000 | | |
| Hunter | 34.5 | Z-666 | | | | | VR-3S | 3 phase; vac; hyd |
| Hunter | 13.8 | 2081 Ckt. | MV-90 | ---- | ---- | | Kyle W | 3 phase; oil; hyd |
| Hunter | 13.8 | Cap Bank | ---- | ---- | EM | | | |
| Hurley Ave. 345kV | | | | | | 2400 | | |
| Hurley Ave. 345kV | 345 | 30151 BKR. | ---- | EM | ---- | | | 79 Relay is EM |
| Hurley Ave. 345kV | 345 | 30151 A1 BF | ---- | uP | ---- | | | |
| Hurley Ave. 345kV | 345 | 30152 A2 BF | ---- | EM | ---- | | | |
| Hurley Ave. 345kV | 345 | 301 Line A1 | SCADA | uP | ---- | | | |
| Hurley Ave. 345kV | 345 | 301 Line A2 | SCADA | EM | ---- | | | |
| Hurley Ave. 345kV | 345 | 30353 BKR. | ---- | EM* | ---- | | | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30353 A1 BF | ---- | uP | ---- | | | |
| Hurley Ave. 345kV | 345 | 30353 A2 BF | ---- | EM* | ---- | | | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 30354 BKR. | ---- | EM* | ---- | | | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30354 A1 BF | ---- | EM | ---- | | | |
| Hurley Ave. 345kV | 345 | 30354 A2 BF | ---- | EM* | ---- | | | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 303 Line A1 | SCADA | uP | ---- | | | |
| Hurley Ave. 345kV | 345 | 303 Line A2 | SCADA | EM* | ---- | | | In process replacement with GE D90 |
| Hurley Ave. 345kV | 345 | Bus A1 | ---- | EM | ---- | | | |
| Hurley Ave. 345kV | 345 | Bus A2 | ---- | EM | ---- | | | |
| Hurley Ave. 345kV | 115 | A2451 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. 345kV | 115 | A2451 A1 BF | ---- | EM | ---- | | | |
| Hurley Ave. 345kV | 115 | A2451 A2 BF | ---- | EM | ---- | | | |
| Hurley Ave. 345kV | 345 | T1 A1 Out of Step | ---- | EM | ---- | | | |
| Hurley Ave. 345kV | 345 | T1 A2 Out of Step | ---- | EM | ---- | | | |
| Hurley Ave. 345kV | 345 | T1 A1 | ---- | EM | ---- | | | |
| Hurley Ave. 345kV | 345 | T1 A2 | ---- | EM | ---- | | | |
| Hurley Ave. 345kV | 115 | T1 LS | ---- | uP | ---- | | | |
| Hurley Ave. 345kV | 115 | B1 | SCADA | ---- | ---- | | | Volts |

412

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------|--------------------|---------------|----------------------|-------------|-------------|--------|----------|---|
| Hurley Ave. | | | | | | 2400 | | |
| Hurley Ave. | | | | | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2091 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2092 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2093 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2094 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 115 | Cap Bank | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | HP Line | SCADA | EM | ---- | | | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 69 | I Line | SCADA | Gen1 | ---- | | | |
| Hurley Ave. | 115 | OR Line | SCADA | EM | ---- | | | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 69 | SB Line | SCADA | Gen1 | ---- | | | |
| Hurley Ave. | 115 | HP-1643 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | OR-1640 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 69 | W-142 BKR. | ---- | uP | ---- | | | |
| Hurley Ave. | 13.8 | W-1575 BKR. | ---- | EM | EM | | | |
| Hurley Ave. | 115 | W-389 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | B1 | None | EM | ---- | | | |
| Hurley Ave. | 115 | B2 | SCADA | EM | ---- | | | Volts |
| Hurley Ave. | 69 | B1 | SCADA | EM | ---- | | | Volts |
| Hurley Ave. | 13.8 | B1 | SCADA | ---- | EM | | | Volts |
| Hurley Ave. | 115/69 | T3 | SCADA | EM | ---- | | | |
| Hurley Ave. | 115/13.8 | T4 | SCADA | EM | ---- | | | |
| Hurley Ave. | 69/13.8 | T5 | ---- | EM | ---- | | | |
| Inwood Ave. | | | | | | 3030 | | |
| Inwood Ave. | 13.8 | 6061 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6062 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6063 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6064 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6065 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6066 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6067 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6068 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Inwood Ave. | 115 | IR Line | SCADA | uP | ---- | | | |
| Inwood Ave. | 115 | IR-201-X BKR. | ---- | uP | ---- | | | |
| Inwood Ave. | 115 | X Line | SCADA | uP | ---- | | | |
| Inwood Ave. | 13.8 | B1 | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | B2 | SCADA | ---- | uP | | | |
| Inwood Ave. | 115/13.8 | T1 | SCADA | uP | ---- | | | |
| Inwood Ave. | 115/13.8 | T2 | SCADA | uP | ---- | | | |
| Jansen Ave. | | | | | | M-4000 | | |
| Jansen Ave. | 13.8 | 1001 Ckt. | MV-90 | ---- | uP | | | |
| Jansen Ave. | 13.8 | 1002 Ckt. | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | 1003 Ckt. | MV-90 | ---- | uP | | | |
| Jansen Ave. | 13.8 | 1004 Ckt. | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | KL Line | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | KO Line | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | B1 | SCADA | ---- | EM | | | |
| Jansen Ave. | 13.8 | B2 | SCADA | ---- | EM | | | |
| Jansen Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Jansen Ave. | 13.8 | T - Grounding | MV-90 | ---- | uP | | | |
| Kerhonkson | | | | | | 8890 | | |
| Kerhonkson | 13.8 | 3081 Ckt. | Grid Sense | ---- | EM | | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 13.8 | 3082 Ckt. | Grid Sense | ---- | EM | | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 69 | MK-929 MOS | ---- | EM | ---- | | | |
| Kerhonkson | 69 | MK-930 MOS | ---- | EM | ---- | | | |
| Kerhonkson | 69/13.8 | T1 | Charts - kW/kVar IGS | fuse | ---- | | | Amps for each Transformer |
| Kerhonkson | 69/13.8 | T2 | | fuse | ---- | | | Volts & Amps |
| Kerhonkson | 69 | HK | SCADA | ---- | ---- | | | Volts & Amps |
| Kerhonkson | 69 | MK | SCADA | ---- | ---- | | | Volts & Amps |

413

Electric Substation Upy. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-----------------|------------------------|-------------|-------------|--------|----------|--------------------------------------|
| Knapps Corners | | | | | | 2100 | | |
| Knapps Corners | | | Charts - Amps/SCADA | | uP | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8021 Ckt. | Charts - Amps | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8022 Ckt. | Charts - Amps | | uP/EM | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8023 Ckt. | Charts - Amps/SCADA | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8024 Ckt. | Charts - kW | | EM | | | |
| Knapps Corners | 13.8 | 8025 Ckt. | Charts - kW | | | | | Com |
| Knapps Corners | 13.8 | Com Equipment | | | | | | |
| Knapps Corners | 115 | KB Line | None | EM | | | | SEL-279 |
| Knapps Corners | 115 | KB-1558-MC BKR. | | uP-200 | | | | |
| Knapps Corners | 115 | SK Line | SCADA | | uP | | | Amps |
| Knapps Corners | 13.8 | KN Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KR Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KS Line | SCADA* | EM | | | | |
| Knapps Corners | 69 | KM Line | SCADA | uP | | | | |
| Knapps Corners | 69 | TR Line | SCADA | EM | | | | |
| Knapps Corners | 69 | G Line | SCADA | uP | | | | |
| Knapps Corners | 13.8 | W-1215 BKR. | | | EM | | | |
| Knapps Corners | 69 | W-1409 BKR. | | | uP | | | |
| Knapps Corners | 13.8 | W-1462 BKR. | | | EM | | | |
| Knapps Corners | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Knapps Corners | 13.8 | B2 | | EM | | | | |
| Knapps Corners | 13.8 | B3 | | EM | | | | |
| Knapps Corners | 69 | 69k Bus | SCADA | EM | | | | Volts |
| Knapps Corners | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Knapps Corners | 115/13.8 | T3 | | EM | | | | |
| Knapps Corners | 115/69 | T2 | | SCADA | uP | | | |
| Lawrenceville | | | | | | M-4000 | | |
| Lawrenceville | 34.5 | 2385 Ckt. | Grid Sense | EM/uP | | | CXE-400A | 3 phase; oil; hyd |
| Lawrenceville | 34.5 | B1 | SCADA* | | | | | Volts |
| Lawrenceville | 69/34.5 | T1 | MV90/Grid Sense/SCADA | EM | | | | Amps. |
| Lincoln Park | | | | | | 2300 | | |
| Lincoln Park | 13.8 | Com Equipment | | | | | | Com |
| Lincoln Park | 13.8 | 2011 Ckt. | Charts - Amps | | EM | | | |
| Lincoln Park | 13.8 | 2012 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2013 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2014 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2015 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2016 Ckt. | Charts - kW | | EM/uP* | | | GE F60 installed HiZ pilot |
| Lincoln Park | 13.8 | 2017 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2018 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 1 | | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 2 | | | EM | | | |
| Lincoln Park | 115 | HP Line | None | EM | | | | Relay Replacement Program in process |
| Lincoln Park | 115 | HP-1318 BKR. | | EM | | | | |
| Lincoln Park | 13.8 | KL Line | Charts - kW/kVar/SCADA | EM | | | | Amps to SCADA |
| Lincoln Park | 115 | LR-1219-HP BKR. | | EM | | | | |
| Lincoln Park | 115 | LR Line | SCADA | uP | | | | |
| Lincoln Park | 13.8 | W-1321 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-45 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-534 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-554 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-206 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-207 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-525 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-528 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Lincoln Park | 13.8 | B2 | | EM | | | | |
| Lincoln Park | 13.8 | B3 | | EM | | | | |
| Lincoln Park | 13.8 | B4 | None | | EM | | | Volts |
| Lincoln Park | 115 | 115k bus | SCADA | | EM | | | Volts |
| Lincoln Park | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Lincoln Park | 115/13.8 | T2 | | EM | | | | |
| Lincoln Park | 115/13.8 | T3 | | SCADA | EM | | | |

414

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|--------|----------|---|
| Manchester | | | | | | 2400 | | |
| Manchester | 13.8 | 6091 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6092 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6093 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6094 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6095 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6096 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | 6097 Ckt. | MV-90 | ----- | EM | ----- | ----- | Com |
| Manchester | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | 95BU is REL-301; part of replacement program. |
| Manchester | 115 | M Line | None | EM/Gen-1 | ----- | ----- | ----- | |
| Manchester | 115 | MC Line | SCADA | uP | ----- | ----- | ----- | Amps |
| Manchester | 13.8 | MS Line | SCADA* | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | W-1456 BKR. | ----- | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | W-650 BKR. | ----- | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Combine Bus Volts to one point |
| Manchester | 13.8 | B2 | ----- | ----- | EM | ----- | ----- | |
| Manchester | 115/13.8 | T1 | SCADA | ----- | EM | ----- | ----- | Combine load value |
| Manchester | 115/13.8 | T2 | ----- | EM | ----- | ----- | ----- | |
| Marlboro | | | | | | 8890 | | ???? |
| Marlboro | 13.8 | 5001 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5002 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5003 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5004 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Marlboro | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Marlboro | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Volts |
| Marlboro | 115/13.8 | T1 | SCADA | uP/EM* | ----- | ----- | ----- | 95P is SEL-587 |
| Marlboro | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| Maryland Ave. | | | | | | M-4000 | | |
| Maryland Ave. | 4 | 621 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | 622 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | 623 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | 624 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | MS Line | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | PH-284 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | PH-286 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | W-1032 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | W-1033 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | W-1034 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Maryland Ave. | 13.8 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Maryland Ave. | 4 | B1 | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Maryland Ave. | 13.8/4 | T1 | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8/4 | T2 | ----- | ----- | EM | ----- | ----- | |
| Maybrook | | | | | | M-4000 | | |
| Maybrook | 13.8 | 5051 Ckt. | MV-90 | ----- | EM | ----- | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | 5052 Ckt. | MV-90 | ----- | uP | ----- | ----- | Previously 5081-83? |
| Maybrook | 13.8 | 5053 Ckt. | MV-90 | ----- | EM | ----- | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Maybrook | 13.8 | B2 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Maybrook | 69/13.8 | T1 | None | ----- | ----- | ----- | ----- | |
| Maybrook | 69/13.8 | T2 | None | ----- | ----- | ----- | ----- | |
| McKinley St. | | | | | | NONE | | |
| McKinley St. | 4 | 845 Ckt. | MV-90 | ----- | EM | ----- | ----- | |

415

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|----------------|-------------|-------------|-------------|-------|----------|--------------------------------------|
| Merritt Park | | | | | | BM | | |
| Merritt Park | 13.8 | 8061 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8062 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8063 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8064 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8065 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8066 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8067 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8068 Ckt. | SCADA | | uP | | | Com |
| Merritt Park | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | |
| Merritt Park | 115 | WF Line | SCADA | | uP | | | |
| Merritt Park | 115 | WP Line | SCADA | | uP | | | SEL-279 |
| Merritt Park | 115 | WF-439-WP BKR. | ----- | uP-200 | | | | |
| Merritt Park | 13.8 | B1 | SCADA | | uP | | | |
| Merritt Park | 13.8 | B2 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T1 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T2 | SCADA | | uP | | | |
| Merritt Park | | | | | | BM | | |
| Milan | | | | | | | | |
| Milan | 13.8 | 7061 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | 7062 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Milan | 115 | B-4561 Ckt Sw | ----- | uP | | | | |
| Milan | 115 | MR Line | SCADA | | uP | | | |
| Milan | 115 | MR-501 BKR. | SCADA | | uP | | | |
| Milan | 115 | RT-7 BKR. | ----- | uP | | | | |
| Milan | 115 | R-10 BKR. | ----- | uP | | | | |
| Milan | 115 | T-7 Line | SCADA | | uP | | | |
| Milan | 115 | 10 Line | SCADA | | uP | | | |
| Milan | 115 | B1 | SCADA | | uP | | | |
| Milan | 13.8 | B1 | SCADA | | uP | | | |
| Milan | 115/13.8 | T1 | SCADA | | uP | | | |
| Millerton | | | | | | L&N | | |
| Millerton | 13.8 | 7081 Ckt. | SCADA | | | | | |
| Millerton | 69 | GE-823 MOS | ----- | EM | | | | |
| Millerton | 69/13.8 | T1 | SCADA | | EM | | | Only one feeder; T1 = 7081 load |
| Millerton | 69 | Line to SMI | SCADA | | | | | Volts |
| Millerton | 69 | Line to PUL | SCADA | | | | | Volts |
| Modena 115kV | | | | | | BM | | |
| Modena 115kV | 13.8 | B1 | SCADA | | uP | | | |
| Modena 115kV | 13.8 | C-1651 BKR. | ----- | ----- | uP | | | |
| Modena 115kV | 13.8 | 5011 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5012 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5013 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Modena 115kV | 115 | EM Line | SCADA | | uP | | | |
| Modena 115kV | 115 | EM-201-PX BKR. | ----- | uP | | | | |
| Modena 115kV | 115 | PX Line | SCADA | | uP | | | |
| Modena 115kV | 115/13.8 | T3 | SCADA | | uP | | | Only has one 13.8 bus; T3 = Bus load |
| Modena 69kV | | | | | | 8890 | | volts |
| Modena 69kV | 69 | B1 | SCADA | | EM | | | |
| Modena 69kV | 69 | MG Line | SCADA | | uP | | | |
| Modena 69kV | 69 | W-941 BKR. | ----- | EM | | | | |
| Modena 69kV | 69 | MG-380 BKR. | ----- | EM | | | | |
| Modena 69kV | 115/69 | T1 | SCADA | | EM/uP | | | GE F35 is installed |
| Modena 69kV | 69/13.8 | T2 | None | | Fuse/uP | | | |
| Montgomery | | | | | | NONE | | |
| Montgomery | 4 | 571 Ckt. | Charts - kW | | EM | | V4L | Single phase; Vac; Hyd |
| Montgomery | 4 | 572 Ckt. | Charts - kW | | EM | | V4L | Single phase; Vac; Hyd |

416

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|--------------------|-------------|-------------|--------|----------|--------------------------------|
| Montgomery St. | | | | | | M-4000 | | |
| Montgomery St. | | | | | EM | | | volts |
| Montgomery St. | 13.8 | B1 | SCADA | ..... | EM | ..... | ..... | Volts |
| Montgomery St. | 13.8 | B2 | SCADA | ..... | EM | ..... | ..... | volts |
| Montgomery St. | 13.8 | B3 | SCADA | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | B Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | 4001 Ckt. | Charts - kW/kVAr | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | 4002 Ckt. | Charts - kW/kVAr | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | 4003 Ckt. | Charts - kW/kVAr | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 401 Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 402-3 Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 404 Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 406A/B Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 407A/B Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 410A/B Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | B1 | SCADA | ..... | EM | ..... | ..... | Volts |
| Montgomery St. | 4 | B2 | SCADA | ..... | EM | ..... | ..... | volts |
| Montgomery St. | 13.8 | F Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | NB Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | NM Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | R Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | W-507 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | W-508 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | W-509 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | WN Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8/4 | T1 |  | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8/4 | T2 | Charts - kW/kVAr | ..... | EM | ..... | ..... | Combine load value |
| Myers Corners | | | | | | 44-550 | | |
| Myers Corners | 13.8 | 8041 Ckt. | Charts - kW | ..... | uP | ..... | ..... |  |
| Myers Corners | 13.8 | 8043 Ckt. | Charts - kW | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | 8044 Ckt. | Charts - kW | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | 8045 Ckt. | Charts - kW | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | 8046 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| Myers Corners | 69 | KM Line | None | EM | ..... | ..... | ..... |  |
| Myers Corners | 69 | TV Line | None | EM | ..... | ..... | ..... |  |
| Myers Corners | 69 | TV-399-KM BKR. | ..... | EM | ..... | ..... | ..... |  |
| Myers Corners | 13.8 | W-63 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | W-66 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | Feeder M1-75 | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | Feeder M2-76 | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | Feeder M3-91 | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | Feeder M4-90 | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | B1 |  | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | B2 | SCADA | ..... | EM | ..... | ..... | Combine Bus Volts to one point |
| Myers Corners | 69/13.8 | T1 | | EM | ..... | ..... | ..... |  |
| Myers Corners | 69/13.8 | T2 | SCADA | EM | ..... | ..... | ..... | Combine load value |
| Neversink | | | | | | 2200 | | |
| Neversink | 4 | 391 Ckt. | Charts - kW | ..... | EM | ..... | ..... |  |
| Neversink | 13.8 | 3091 Ckt. | Grid Sense | ..... | EM | ..... | Kyle W | 3 phase; Oil; Hyd |
| Neversink | 69 | HG Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Neversink | 69 | WH Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Neversink | 4 | W-1128 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Neversink | 69 | 69k Bus | SCADA | uP/EM | ..... | ..... | ..... | Volts |
| New Baltimore | | | | | | 2300 | | |
| New Baltimore | 13.8 | 1081 Ckt. | SCADA* | ..... | EM | ..... | ..... | kW |
| New Baltimore | 13.8 | 1082 Ckt. | SCADA* | ..... | EM | ..... | ..... | kW |
| New Baltimore | 13.8 | 1083 Ckt. | SCADA* | ..... | EM | ..... | ..... | kW |
| New Baltimore | 69 | Cap Bank | ..... | EM/uP | ..... | ..... | ..... | Com |
| New Baltimore | 13.8 | Com Equipment | ..... | ..... | ..... | ..... | ..... |  |
| New Baltimore | 69 | CN Line | None | uP | ..... | ..... | ..... |  |
| New Baltimore | 69 | NW Line | None | uP | ..... | ..... | ..... |  |
| New Baltimore | 13.8 | B1 | SCADA | ..... | EM | ..... | ..... | Volts |
| New Baltimore | 69/13.8 | T1 | SCADA | EM/uP | ..... | ..... | ..... | 95P is SEL-587 |

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|--------------------|------------------|-------------|-------------|-------|----------|------------------------|
| | | | | | | NONE | | |
| New Windsor | | | | | | | | No DATA |
| New Windsor | 4 | 461 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 462 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 463 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 464 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 13.8 | UN & UW ATC | None | ----- | uP | ----- | ----- | Combine load value |
| New Windsor | 13.8/4 | T1 | Charts - kW/kVAR | ----- | uP | ----- | ----- | |
| New Windsor | 13.8/4 | T2 | | ----- | uP | ----- | ----- | |
| North Catskill | | | | | | D-20 | | |
| North Catskill | 13.8 | 2001A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2002A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2003A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2004 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2005 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2006 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| North Catskill | 115 | 2 Line | SCADA | EM | ----- | ----- | ----- | |
| North Catskill | 115 | R-2 BKR. | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 115 | RT-7 BKR. | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 115 | T-7 Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| North Catskill | 69 | Cap Bank | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 69 | CL Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | H Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | W-1107 BKR. | ----- | EM/uP* | ----- | ----- | ----- | check on TD-5 |
| North Catskill | 69 | W-269 BKR. | ----- | EM/uP* | ----- | ----- | ----- | check on TD-5 |
| North Catskill | 115 | W-791 BKR. | ----- | uP- 200 | ----- | ----- | ----- | SEL-2BFR |
| North Catskill | 69 | W-269 & W-1107 BKR | ----- | ----- | EM | ----- | ----- | IJS |
| North Catskill | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| North Catskill | 69 | B1 | SCADA | EM/uP | ----- | ----- | ----- | Volts |
| North Catskill | 69 | B2 | SCADA | EM/uP | ----- | ----- | ----- | Volts |
| North Catskill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | Volts: 95BU is DFP-100 |
| North Catskill | 13.8 | B2 | SCADA | ----- | EM/uP | ----- | ----- | Volts: 95BU is DFP-100 |
| North Catskill | 115/69 | T4 | SCADA | EM/uP* | ----- | ----- | ----- | Check on 64 relay |
| North Catskill | 115/69 | T5 | SCADA | EM/uP* | ----- | ----- | ----- | Check on 64 relay |
| North Catskill | 115/13.8 | T6 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| North Catskill | 115/13.8 | T7 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|---------------|-------------|-------------|-------|----------|-----------------------|
| North Chelsea | | | | | | BM | | |
| North Chelsea | | | | | | | | |
| North Chelsea | 13.8 | 8051 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8052 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8053 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8054 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8055 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8056 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8057 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8058 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | Com Equipment | ..... | ..... | ..... | ..... | ..... | Com |
| North Chelsea | 115 | AC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | AC-1066 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | DC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | DC-1414 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | FO-1482 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | FO Line | SCADA | uP | ..... | ..... | ..... | 95P is LCB-II |
| North Chelsea | 115 | NF Line | SCADA | uP | ..... | ..... | ..... | 95P is LCB-II |
| North Chelsea | 115 | NF-1116 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | SC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | SC-1566 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 69 | TV Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2651 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2652 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2653 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | W-1572 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B1 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 13.8 | B1 | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | B2 | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 115/69 | T1 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115/13.8 | T2 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115/13.8 | T3 | SCADA | uP | ..... | ..... | ..... | Volts |
| Ohioville | | | | | | 2100 | | |
| Ohioville | 13.8 | 5021 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5022 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5023 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5024 Ckt. | Charts - kW | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5025 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| Ohioville | 13.8 | Com Equipment | ..... | ..... | ..... | ..... | ..... | Com |
| Ohioville | 115 | Cap Bank | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 69 | O Line | None | uP | ..... | ..... | ..... |  |
| Ohioville | 69 | OB Line | None | uP | ..... | ..... | ..... |  |
| Ohioville | 115 | OR Line | None | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | OR-1075 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | PX Line | SCADA | EM/uP | ..... | ..... | ..... |  |
| Ohioville | 115 | PX - 1659 BKR. | ..... | uP | ..... | ..... | ..... |  |
| Ohioville | 69 | W - 1511 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 13.8 | W - 1537 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 13.8 | W - 1600 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | B1 | SCADA | EM | ..... | ..... | ..... | Volts |
| Ohioville | 69 | 69k Bus | SCADA | EM | ..... | ..... | ..... | Volts |
| Ohioville | 13.8 | B1 | None | ..... | EM | ..... | ..... |  |
| Ohioville | 13.8 | B2 | None | ..... | EM | ..... | ..... |  |
| Ohioville | 115/13.8 | T1 | SCADA | EM | ..... | ..... | ..... | Combine load value |
| Ohioville | 115/13.8 | T2 | SCADA | EM | ..... | ..... | ..... | Combine load value |
| Ohioville | 115/69 | T3 | SCADA | EM/uP-200 | ..... | ..... | ..... | 95BU is SEL-251 |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|----------|-------------|-------------|------|----------|--------------------------------------|
| | | | | | | 2300 | | Grid owns Line |
| Pleasant Valley | | | SCADA** | uP | | | | |
| Pleasant Valley | 115 | 8 Line | SCADA | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 10 Line | SCADA** | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 12 Line | SCADA** | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 13 Line | SCADA** | uP | | | | 95BU is Optimho; in replacement plan |
| Pleasant Valley | 115 | C Line | SCADA | EM/Gen-1 | | | | |
| Pleasant Valley | 115 | M Line | SCADA | EM | | | | |
| Pleasant Valley | 115 | X Line | SCADA | uP | | | | Com |
| Pleasant Valley | 115 | Com Equipment | | | | | | SEL-279 |
| Pleasant Valley | 115 | R-12 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-13 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-8 BKR. | | uP-200 | | | | |
| Pleasant Valley | 115 | RC-6 BKR. | | EM | | | | |
| Pleasant Valley | 115 | RM BKR. | | EM | | | | |
| Pleasant Valley | 115 | RX-4 BKR. | | uP | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-61 BKR. | SCADA** | EM | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-62 BKR. | SCADA** | EM | | | | |
| Pleasant Valley | 115 | R-643 BKR. | | EM | | | | |
| Pleasant Valley | 115 | R-81 BKR. | | EM | | | | |
| Pleasant Valley | 115 | B1 | SCADA | EM | | | | Volts |
| Pleasant Valley | 115 | B2 | SCADA | EM | | | | Volts |
| Pleasant Valley | 69 | E Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | G Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | Q Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | B1 | SCADA | uP | | | | Volts |
| Pleasant Valley | 13.8 | W-387 | | | EM | | | |
| Pleasant Valley | 345/115 | S1 | SCADA | | | | | Con Ed owns bank and protection |
| Pleasant Valley | 115/69 | T10 | SCADA | EM | | | | |
| Pulvers Corners | | | | | | D-20 | | |
| Pulvers Corners | 13.8 | 7091 Ckt. | SCADA | | EM | | V4L | single phase; vac; hyd |
| Pulvers Corners | 13.8 | 7092 Ckt. | SCADA | | EM | | Kyle L | single phase; oil; hyd |
| Pulvers Corners | 34.5 | 7395 Ckt. | SCADA | EM | | | RVE | 3 phase; oil; hyd |
| Pulvers Corners | 13.8 | Com Equipment | | | | | | Com |
| Pulvers Corners | 69 | Cap Bank | | EM | | | | |
| Pulvers Corners | 69 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 34.5 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 13.8 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 69/13.8 | T1 | SCADA | Fuse | | | | |
| Pulvers Corners | 69/34.5 | T2 | None | EM/uP | | | | 95P is SR-745 |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|-------------------|-------------|-------------|------|----------|---------------------------------|
| Reynolds Hill | | | | | | 2100 | | |
| Reynolds Hill | 13.8 | 6001 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Reynolds Hill | 13.8 | 6004 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | 6005 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Reynolds Hill | 13.8 | 6008 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | ---- | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Reynolds Hill | 115 | DR-1418 BKR. | ---- | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | DR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | HR-1285 BKR. | ---- | EM | ---- | ---- | ---- | |
| Reynolds Hill | 115 | HR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | IR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 13.8 | B Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | W Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PD Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PH Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PK Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PO Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PQ Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PS Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PU Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 115 | T-31 BKR. | ---- | EM | ---- | ---- | ---- | |
| Reynolds Hill | 115 | B1 | SCADA | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 115 | B2 | SCADA | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 13.8 | B1 | SCADA | ---- | EM/uP | ---- | ---- | 95BU is SEL-501 |
| Reynolds Hill | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | Volts |
| Reynolds Hill | 13.8 | B3 | SCADA | ---- | uP | ---- | ---- | Volts |
| Reynolds Hill | 115 | W-1543 BKR. | ---- | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 115/13.8 | T3 | SCADA | EM/uP | ---- | ---- | ---- | 95P is SEL-351A |
| Reynolds Hill | 115/13.8 | T4 | SCADA | EM/uP | ---- | ---- | ---- | 95P is SEL-351A |
| Rhinebeck | | | | | | 2300 | | |
| Rhinebeck | 13.8 | 7051 Ckt. | Charts - kW/SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | 13.8 | 7052 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7053 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7054 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7055 Ckt. | Charts - kW | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Rhinebeck | 13.8 | 7056 Ckt. | SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | 69 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Rhinebeck | 69 | Cap Bank | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 115 | ER Line | SCADA* | uP | ---- | ---- | ---- | Amps |
| Rhinebeck | 115 | LR-830-MR BKR. | ---- | uP | ---- | ---- | ---- | |
| Rhinebeck | 115 | MR Line | None | uP | ---- | ---- | ---- | |
| Rhinebeck | 69 | Q-1471 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-1017 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-1238 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 69 | W-258 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-367 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 69 | Q Line | SCADA* | ---- | EM | ---- | ---- | Volts |
| Rhinebeck | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | B2 | none | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Rhinebeck | 69 | 69kV Bus | SCADA | ---- | EM | ---- | ---- | Volts |
| Rhinebeck | 69/13.8 | T1 | SCADA* | EM | ---- | ---- | ---- | Amps & Volts |
| Rhinebeck | 69/13.8 | T2 | SCADA* | EM | ---- | ---- | ---- | Amps & Volts |
| Rhinebeck | 115/13.8 | T4 | SCADA | EM | ---- | ---- | ---- | |
| Rhinebeck | 115/69 | T3 | SCADA | EM | ---- | ---- | ---- | |

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Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|---------------|----------|-------------|-------------|------|----------|----------------|
| | | | | | | 2100 | | |
| Rock Tavern 345kV | | | | UP | | | | |
| Rock Tavern 345kV | 345 | 311 Line A1 | SCADA | EM | | | | |
| Rock Tavern 345kV | 345 | 311 Line A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 3456 BKR. | | UP | | | | |
| Rock Tavern 345kV | 345 | 3456 BF A1 | | UP | | | | |
| Rock Tavern 345kV | 345 | 3456 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | Cap Bank 1 A1 | SCADA* | EM | | | | Combined MVArS |
| Rock Tavern 345kV | 345 | Cap Bank 1 A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 34 Line A1 | SCADA | UP | | | | |
| Rock Tavern 345kV | 345 | 34 Line A2 | | UP | | | | |
| Rock Tavern 345kV | 345 | 37751 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | 37751 BF A1 | | UP | | | | |
| Rock Tavern 345kV | 345 | 37751 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 37752 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | 37752 BF A1 | | UP | | | | |
| Rock Tavern 345kV | 345 | 37752 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 377 Line A1 | SCADA | UP | | | | |
| Rock Tavern 345kV | 345 | 377 Line A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 4255 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | 4255 BF A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | 4255 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 42 Line A1 | | SS | | | | |
| Rock Tavern 345kV | 345 | 42 Line A2 | | EM | | | | |
| Rock Tavern 345kV | 346 | C3351 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | C3351 BF A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | C3351 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | C3352 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | C3352 BF A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | C3352 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | C3353 BKR. | | UP-200 | | | | |
| Rock Tavern 345kV | 345 | C3353 BF A1 | | UP | | | | |
| Rock Tavern 345kV | 345 | C3353 BF A2 | | UP | | | | |
| Rock Tavern 345kV | 345 | 31153 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | 31153 BF A1 | | UP | | | | |
| Rock Tavern 345kV | 345 | 31153 BF A2 | | UP | | | | |
| Rock Tavern 345kV | 345 | 31154 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | 31154 BF A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | 31154 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | Com Equipment | | | | | | Com |
| Rock Tavern 345kV | 345 | B1 A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | B1 A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | B2 A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | B2 A2 | | EM | | | | |
| Rock Tavern 345kV | 345/115 | T1 A1 | SCADA | EM | | | | |
| Rock Tavern 345kV | 345/115 | T1 A2 | | UP | | | | |
| Rock Tavern 345kV | 345/115 | T3 A1 | SCADA | UP | | | | |
| Rock Tavern 345kV | 345/115 | T3 A2 | | UP | | | | |

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Electric Substation Up. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-----------------|-------------|-------------|-------------|-------|----------|--------------------------------|
| | | | | | | 2400 | | |
| Sand Dock | | | | | | | | |
| Sand Dock | 13.8 | 6011 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | BP-1296 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | BP-1570 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 1 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 2 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 3 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | GB Line | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 115 | KC-1447-SC BKR. | ---- | EM | ---- | ---- | ---- | |
| Sand Dock | 115 | KC Line | None | EM | ---- | ---- | ---- | |
| Sand Dock | 115 | SC Line | None | UP | ---- | ---- | ---- | |
| Sand Dock | 13.8 | SH-886 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | SH-911 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-902 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-909 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-910 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-116 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1449 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1453 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1467 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 115 | B1 | SCADA | ---- | ---- | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 115 | B4 | SCADA | ---- | ---- | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 13.8 | B2 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 13.8 | B4 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Sand Dock | 13.8 | T3 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Sand Dock | 13.8 | T4 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Saugerties | | | | | | Orion | | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-------------------|-------------|-------------|-------------|------|----------|--------------------------------------|
| Shenandoah | | | | | | 2400 | | |
| Shenandoah | 115 | East Bus | SCADA | EM | ---- | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 115 | West Bus | | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B2 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B4 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B5 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B6 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B7 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B8 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 1 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 2 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 3 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 4 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 5 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 6 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B-4451 BKR. (CB1) | ---- | ---- | UP | ---- | ---- | |
| Shenandoah | 13.8 | 8071 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | 8072 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 115 | EF Line | None | uP/Gen-1 | ---- | ---- | ---- | 95BU is Optimho; in replacement plan |
| Shenandoah | 115 | FS Line | None | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | EF-1514 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-739 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-892-EF BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-959 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S1 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S2 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S3 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S4 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S5 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S6 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S7 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S8 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S9 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S10 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S11 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S12 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S13 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S14 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S15 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 115/13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T2 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T3 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T4 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T5 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T6 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T7 | SCADA | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | W-1266 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1279 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1450 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1593 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-664 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-665 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-802 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-803 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-805 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-807 BKR. | ---- | ---- | EM | ---- | ---- | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------------|--------------------|------------------|----------|-------------|-------------|--------|----------|---|
| Rock Tavern 115kV | | | | | | 44-550 | | |
| Rock Tavern 115kV | 115 | B1 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | B2 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | 115-0.48kV SST | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | Com Equipment |  | ..... | ..... | ..... | ..... | Com |
| Rock Tavern 115kV | 115 | D Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | D-448 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | J Line | SCADA* | GEN-1/EM | ..... | ..... | ..... | 95P is a DLP; identified in replacement program; Amps |
| Rock Tavern 115kV | 115 | J-788 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RD Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RD-809 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RJ Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RJ-818 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL Line | SCADA | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL-684 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-467 BKR. | ..... | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-681 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-814 BKR. | ..... | EM/UP | ..... | ..... | ..... | SEL-351 |
| Rock Tavern 115kV | 115 | WM Line | none | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115/69 | T2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | | | | | | 2100 | | |
| Roseton Switchyard | 345 | 30356 (B6) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A2 | SCADA | EM/UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31151 (B1) BKR | ..... | EM | ..... | ..... | ..... | SEL-501 for DBC |
| Roseton Switchyard | 345 | 31152 (B1) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B1) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B2 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U1 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U2 | SCADA | EM | ..... | ..... | ..... |  |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|-------------------|-------------|-------------|-------|----------|---|
| Smith Street | | | | | | 2300 | | Radio to INW |
| Smith Street | 4 | 631 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 632 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 633 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 634 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | MS Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | PQ Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | PS Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | W Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Volts |
| Smith Street | 13.8 | B2 | SCADA | ---- | EM | ---- | ---- | Volts |
| Smith Street | 4 | B1 | SCADA | ---- | uP | ---- | ---- | Volts |
| Smith Street | 4 | B2 | SCADA | ---- | uP | ---- | ---- | Volts |
| Smith Street | 13.8/4 | T1 | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8/4 | T2 | None | ---- | EM | ---- | ---- | |
| Smithfield | | | | | | 8890 | | |
| Smithfield | 13.8 | 7095 Ckt. | SCADA | ---- | uP | ---- | ---- | Com |
| Smithfield | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | 95P is SEL-267 |
| Smithfield | 69 | E Line | None | uP- 200/uP | ---- | ---- | ---- | 95P is SEL-267; Volts & Amps |
| Smithfield | 69 | FV Line | SCADA* | uP- 200/uP | ---- | ---- | ---- | Amps |
| Smithfield | 69 | GE Line | SCADA* | EM | ---- | ---- | ---- | Amps |
| Smithfield | 69 | S Line | SCADA* | EM | ---- | ---- | ---- | Volts & Amps |
| Smithfield | 69 | SA Line | SCADA* | EM | ---- | ---- | ---- | Volts |
| Smithfield | 69 | B2 | SCADA | ---- | ---- | ---- | ---- | Volts |
| Smithfield | 69 | B3 | SCADA | ---- | ---- | ---- | ---- | Volts |
| Smithfield | 69/13.8 | T1 | None* | ---- | ---- | ---- | ---- | Only one feeder; T1 = 7095 load |
| South Cairo | | | | | | 8890 | | |
| South Cairo | 13.8 | 2041 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2042 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2043 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| South Cairo | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| South Cairo | 69 | CF Line | None | EM/uP | ---- | ---- | ---- | 79 done with NLR |
| South Cairo | 69 | CL Line | None | uP | ---- | ---- | ---- | |
| South Cairo | 13.8 | B1+G1 | Charts - kW/SCADA | ---- | EM | ---- | ---- | SCADA Volts |
| South Cairo | 69/13.8 | T1 | Charts - Amps | EM/uP | ---- | ---- | ---- | 95P is SEL-587 |
| South Wall St. | | | | | | None | | |
| South Wall St. | 4 | 111 Ckt. | Grid Sense | ---- | EM | ---- | Kyle L | Single Phase; Oil; Hyd |
| South Wall St. | 4 | 112 Ckt. | Grid Sense | ---- | EM | ---- | Kyle L | Single Phase; Oil; Hyd; missing GS data |
| South Wall St. | 13.8/4 | T1 | Charts - kW/kVAr | ---- | EM | ---- | ---- | |
| Spackenkil | | | | | | Orion | | |
| Spackenkil | 13.8 | 6041 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6042 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6043 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6044 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6045 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6046 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6047 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6048 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Spackenkil | 13.8 | KR Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | KS Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | MC Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | MC-200-SK BKR. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | B1 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 115/13.8 | T1 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 115/13.8 | T2 | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | | | | | | BM | | |
| Staatsburg | 13.8 | 7041 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | 7042 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | 7043 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Staatsburg | 13.8 | B1 | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 69/13.8 | T1 | SCADA | uP | ---- | ---- | ---- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-------------------|------------------|-------------|-------------|--------|----------|--------------------------------------|
| Standfordville | | | | | | M-4000 | | |
| Standfordville | 13.8 | 7071 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single phase; vac; hyd |
| Standfordville | 13.8 | 7072 Ckt. | MV-90 | ----- | EM | ----- | ----- | Volts |
| Standfordville | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Standfordville | 69/13.8 | T1 | MV-90 | Fuse | ----- | ----- | ----- | |
| Sturgeon Pool | | | | | | 2100 | | |
| Sturgeon Pool | 4 | 341 Ckt. | Grid Sense | ----- | EM | ----- | Kyle W | 3 phase; oil; hyd; missing data |
| Sturgeon Pool | 4 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Sturgeon Pool | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | O Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | P Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | 69k Bus | SCADA | EM | ----- | ----- | ----- | Volts |
| Sturgeon Pool | 69/13.8 | T5 | None | Fuse | ----- | ----- | ----- | |
| Sugarloaf | | | | | | 44-500 | | |
| Sugarloaf | 115 | SD Line | SCADA | EM | ----- | ----- | ----- | Combine load value |
| Sugarloaf | 115 | SJ Line | SCADA | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | SL Line | None | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| Sugarloaf | 115/69 | O & R Transformer | SCADA | EM | ----- | ----- | ----- | |
| Tinkertown | | | | | | 2300 | | Radio to PVL |
| Tinkertown | 13.8 | 7022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Tinkertown | 69/13.8 | T1 | SCADA | Fuse | ----- | ----- | ----- | |
| Tinkertown | 69/13.8 | T2 | SCADA | Fuse | ----- | ----- | ----- | |
| Tioronda | | | | | | M-4000 | | |
| Tioronda | 13.8 | 8085 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8086 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8087 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 115 | W-566 Ckt. Sw | ----- | EM | ----- | ----- | ----- | Agastat |
| Tioronda | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Tioronda | 115/13.8 | T1 | Charts - kW/kVAr | EM | ----- | ----- | ----- | |
| Todd Hill | | | | | | 2200 | | |
| Todd Hill | 13.8 | 6051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6055 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6056 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6057 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Todd Hill | 115 | A Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 115 | A-520-C BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | C Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 13.8 | W - 524 BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Todd Hill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is SEL-351A; Volts |
| Todd Hill | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Todd Hill | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95P is SEL-587 |
| Todd Hill | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |

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Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|----------------|-------------|-------------|--------|----------|--------------------------------|
| Union Ave | | | | | | 2200 | | Volts |
| Union Ave | 115 | B1 | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | RJ Line | SCADA | EM | ----- | ----- | ----- | SEL-351A for BF |
| Union Ave | 115 | RJ-52 BKR. | ----- | EM/uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB Line | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB-51 BKR. | ----- | uP | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UN Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UW Line | SCADA* | EM | ----- | ----- | ----- | |
| Union Ave | 115 | W-1095 BKR. | ----- | EM | ----- | ----- | ----- | |
| Union Ave | 13.8 | B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B3 | SCADA | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B4 | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B3-B2 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B4-B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4041 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4042 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4043 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4044 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4045 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4046 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4047 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4055 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Union Ave | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T2 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T3 | SCADA | uP | ----- | ----- | ----- | |
| Van Wagner | | | | | | NONE | | |
| Van Wagner | 4 | 731 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Van Wagner | 4 | 732 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Vinegar Hill | | | | | | M-4000 | | |
| Vinegar Hill | 34.5 | 2389 Ckt. | MV-90 | ----- | uP | ----- | RVE | 3 phase; oil; hyd |
| West Balmville | | | | | | 2300 | | |
| West Balmville | 115 | B2 | SCADA | EM | ----- | ----- | ----- | Volts |
| West Balmville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Combine Bus Volts to one point |
| West Balmville | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | B Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 13.8 | 4011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | 4012 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4013 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4014 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4015 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| West Balmville | 115 | DB Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DB-875 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DW Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DW-662 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | F Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | R Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | W-478 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | W-855 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | WN Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | | T1 | SCADA | EM | ----- | ----- | ----- | Combine load value |
| West Balmville | | T2 | | EM | ----- | ----- | ----- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-------------------|----------|-------------|-------------|--------|----------|--------------------------------------|
| Westerlo | | | | | | BM | | |
| Westerlo | 13.8 | 1091 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1092 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1093 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Only has one 13.8 bus; T1 = Bus load |
| Westerlo | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | Cap Bank | ----- | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | NW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW-1500-NW BKR. | ----- | uP | ----- | ----- | ----- | |
| Wiccopee | | | | | | L&N | | |
| Wiccopee | 115 | FS Line | None | EM | ----- | ----- | ----- | |
| Wiccopee | 115 | WP Line | None | uP | ----- | ----- | ----- | |
| Wiccopee | 115 | FS - 1652-WP BKR. | ----- | EM | ----- | ----- | ----- | |
| Wiccopee | 13.8 | F1-292 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | F2-280 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-368 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-378 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-632 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-636 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #3) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #9) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B1 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B2 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Wiccopee | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Wiccopee | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Woodstock | | | | | | M-4000 | | |
| Woodstock | 13.8 | 3011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3012 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3013 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3014 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 13.8 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 69/13.8 | T2+SR Line | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 + B2 | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T1 | MV-90 | ----- | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 | MV-90 | ----- | ----- | ----- | ----- | |

Attachment 6

| | Station | Cost |
|------|-----------------|-------------|
| 2012 | Dashville | \$190,000 |
| | East Walden | \$610,000 |
| | Tioronda | \$200,000 |
| 2013 | Coxsackie | \$130,000 |
| | South Cairo | \$160,000 |
| | East Park | \$200,000 |
| | Pleasant Valley | \$360,000 |
| | Todd Hill | \$160,000 |
| 2014 | Sand Dock | \$510,000 |
| | Fishkill Plains | \$480,000 |
| | South Wall St. | \$84,000 |
| 2015 | Manchester | \$340,000 |
| | Forgebrook | \$730,000 |
| 2016 | Rock Tavern | \$1,060,000 |
| | | |
| Subs | | |
| | | |
| | | |

Preliminary
Copy

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

Risk of equipment failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|----------------|----------------|-------------|--------------|
| \$1,133,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 107,000 | 0 | 0 | 0 | 10,000 | 97,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 54,000 | 0 | 0 | 0 | 5,000 | 49,000 | 0 | 0 |
| | Stock Materials | 54,000 | 0 | 0 | 0 | 5,000 | 49,000 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 216,000 | 0 | 0 | 0 | 21,000 | 195,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 77,000 | 0 | 0 | 0 | 9,000 | 68,000 | 0 | 0 |
| | Overheads | 539,000 | 0 | 0 | 0 | 52,000 | 487,000 | 0 | 0 |
| | AFUDC* | 32,000 | 0 | 0 | 0 | 3,000 | 29,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,079,000 | 0 | 0 | 0 | 105,000 | 974,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 8,000 | 0 | 0 | 0 | 0 | 8,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 16,000 | 0 | 0 | 0 | 0 | 16,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 3,000 | 0 | 0 | 0 | 0 | 3,000 | 0 | 0 |
| | Overheads | 27,000 | 0 | 0 | 0 | 0 | 27,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 54,000 | 0 | 0 | 0 | 0 | 54,000 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 793,100 Maximum (\$): 1,472,900

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

No explanation on confidence level required.

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

1. Relays - The relays protect the electric transmission and distribution systems and can provide oscillography, targets, and phasor data. Electric System Protection (ESP) uses the relays to gather information on faults, including fault characteristics, fault locations, and phasor data. ESP interprets the oscillography data and then communicates our conclusions to: System Operations as an information point of contact; 2) Customer Services (Line Forces) to aid in fault locating and thereby limiting patrol time and area; 3) Operations Services for cases where there may be equipment issues.
2. Meters - The meters provide AC system quantities that are used to operate safely and to plan effectively for future system needs. The Electric Planning & Reliability area uses meter information for day-to-day operations (e.g., switching) and to aid in identifying and addressing locations requiring system reinforcements. System Operations (Sys Ops) uses meter data to monitor and operate the CH transmission system within the ratings of those facilities.
3. Controls and Communications - The RTUs, PLCs, and data concentrators provide status feedback and remote control capability; they also act as a conduit for meter and relay data. Sys Ops relies on the data provided by the RTUs and PLCs to monitor the status of the system from a centralized location, enabling them to respond quickly to system abnormalities. Also, Sys Ops has the ability to perform control operations through the RTUs and PLCs.

Equipment and Functions:

A variety of equipment exists in Central Hudson substations, including protective relays, meters, reclosers, and controls and communications instruments such as Remote Terminal Units (RTUs) and Programmable Logic Controllers (PLCs). Each of these components serves an integral role in contribution to the overall, integrated substation protection, control, and monitoring function. Various departments rely on information from these devices in order to perform their jobs, including Operations Services, Customer Services, line forces, Electric Transmission Planning, Distribution Planning, System Operations, Energy Accounting, and Electric System Protection. Brief summaries of these components are included in **Attachments I through 4**. The intention of this memo is to identify the concerns with continuing to use the identified outdated equipment, detail the benefits of combining functions when replacing equipment, establishing a policy for substation relaying, control, & monitoring functions, and laying out a plan to incorporate these components into a comprehensive substation renovation program.

I. Introduction:

Re: Substation Relays, Meters, Controls and Communications Infrastructure Opportunities

Mr. J.J. Borchert

June 24, 2011

Copy to:

Mr. P.E. Haering
 Mr. H.W. Turner
 Mr. P. Harpols

Mr. J. M. May
 Mr. D. J. Wittmann
 S.R. #2011-07

Waste Reduction:

New equipment can be utilized in an integrated fashion to eliminate or minimize the following tasks and unnecessary equipment (Excerpts are taken from the attached memos):

- Reading chart meters and manually entering data into the Meter Database (MDB).
 - Chart meters cost CH at least \$275,000 annually in labor expense (1130 man-hours), which can be devoted to other work.
- MV-90 circuits not for revenue or interchange metering purposes.
 - MV-90 circuits from Verizon cost CH approximately \$24,000 annually in expense.
- Running fault studies manually to determine fault locations.
 - Manual fault locating costs CH approximately \$15,000 annually in labor expenses.
- Metering transducers, auxiliary relays, timing relays, reclosing relays, and coil monitors.

Supporting the Future State:

New equipment, properly implemented and integrated, will better support current functions and create flexibility for added future functions as follows:

- Provide continuous metering data for the entire system, eliminating information “gaps” as a result of non-continuous and non-contiguous metering.
- Provide for robust planning capabilities and switching operations through use of trending and real-time data.
- Enable more accurate forecasting of area loads to increase risk tolerance, possibly resulting in deferral of substation and distribution projects.
- Offer flexibility for Distribution Automation and Smart Grid initiatives.
- Improve reliability and reduce CAIDI through automated event reporting and fault location.

II. Current State:

This section describes the mix of equipment by component, system wide, and the limitations of the non-digital devices.

1. Relays

There are 3500 active protection relays on the system, excluding LORs, SPRs, Regulator Controls, Recloser Controls, and Communication equipment.

Attachment 1

Copy to: Mr. P.E. Haering
Mr. H.W. Turner

Mr. P. Harpolis
Mr. J. M. May
S.R. #2011-03

June 23, 2011

Mr. J.J. Borchert

Re: Transmission & Distribution Protective Relay Review

Introduction:

Protective Relays represent a vital component for the reliable operation of the Central Hudson Electric Transmission and Distribution Systems. CH substations contain a generational mix of protective relay equipment that differs in capability, ease of use, and reliability. Relay technology has advanced; microprocessor-based (digital) relays not only offer numerous protection functions, but they provide metering capability as well in a compact footprint. This memo summarizes the existing transmission and distribution protective relay equipment, as well as recommendation for replacement options.

Discussion:

Relays perform various functions aimed at timely isolation of faulted areas and rapid restoration once the fault has been cleared. Some of the functions that relays provide include zone distance protection, high-speed pilot protection, overcurrent protection, differential protection, and automatic reclosing.

A. Outdated Devices:

The majority of substations contain a group of single-component electromechanical relays for each protected facility; these relays are responsible for protection functions exclusively. At these locations, metering is performed separately, also often in a single-function fashion. There are also stations that have more recent (but still outdated) types of relays, including solid state and early microprocessor relays. These relays have been failing recently, and a replacement program was created last year to address the concern with these relays. The following is a list (in order of decreasing replacement priority) of common relay types found in substations along with the reason that they have been superseded:

- o Electromechanical Relays: These relays are obsolete for the reasons previously described (i.e., physical size, calibration drift, single-function capabilities, etc).
- o Solid State Relays: Like electromechanical relays, the relays on the CH system typically are single function. They have advanced technologically past the electromechanical relays, but not quite to the level of digital relays. They monitor current and voltage waveforms through analog circuits, which then are compared through potentiometers to user defined settings. They generally are unsupported, spare parts are hard to locate, and they contain components that deteriorate over time.

- 1st Generation Microprocessor Relays: Please see the 2010 Budget Memo, **Re: Relay Replacement Program for Upgrade of 1st Generation Microprocessor Relays Remaining on the Central Hudson System**, dated July 1, 2010, for the existing program.
- Schweitzer Engineering Laboratories (SEL) 200 Series Relays (SEL-251/ 267/ 279/ 2BFR): These relays are digital, but they make use of early logic processing methods, in which creating settings isn't as user-friendly as in modern digital relays. SEL has discontinued manufacturing parts for most of these relays, and limited service is provided with them.
- Basler BE1-79M Relays: These relays are multi-shot reclosing relays; they only provide the reclosing function. There are more recently developed relays that provide numerous protection functions and also perform reclosing operations and metering functions.
- Basler BE1-851 (H) Relays: These relays are multifunction, digital relays; however, they only receive current inputs. So, the only meter data available is Amps. Multifunction relays exist that receive current and voltage inputs and provide MW & MVA_r data as well as a much larger variety of protection options.

B. Retrofit/Replacement Options:

Digital relays offer multiple protection functions as well as metering and substation equipment diagnostics. The use of multifunction digital relays greatly reduces the required panel space. Also, with few moving parts, digital relays do not need recalibration to remain accurate. Additionally, digital relays and digital relay controls offer the ability to have longer durations between maintenance cycles due to the combination of their internal error checking and their constantly monitored alarm outputs to SCADA.

Digital relays can be specified to offer equipment diagnostics for the devices they protect. For example, digital transformer relays have the ability to monitor the through-fault history of the transformers and to make determinations on the required maintenance as a result. The same case is true for feeder breakers protected by distribution relays.

- Digital Relays: A collection of proven products exists by a variety of manufacturers. These relays are microprocessor-based, multi-function relays that provide a large variety of protection, metering, and equipment diagnostic capability; they can be used for various protective functions. Some manufactures include SEL, GE, and Basler*. Electric System Design (ESD) has standardized the design to use SEL as primary protection and either GE or Basler relays for backup protection.

* Basler provides a BE1-951 relay, which conveniently fits into electromechanical relay panel cutouts.

C. Additional Considerations:

- o Data Concentrator (SEL-2032): This relay has 16 ports and can act as a data concentrator, a phone switch, and a basic logic processor. The 2032 connects to the RTU, acting as a slave device; it connects to other digital relays, polling them for meter information as a master. Once in the 2032, the meter data can be mathematically manipulated to maintain integrity and precision before it is transferred to a compatible RTU. The 2032 also is connected to a phone line to provide dial-in remote access for trained personnel, enabling event retrieval and relay interrogation.
- o Time Synchronization Devices: Various devices exist on the market that provides a means of time synchronization, including satellite clocks. These clocks provide a unified signal based on a sole source located at zero time offset. To avoid confusion between time zones, UTC time is used as a standard. Sequence of events reconstruction truly realizes the value of having all of the station relays linked to a universal source.

Conclusions:

Upgrading to digital relays provides the following benefits:

- ◆ They offer a more compact footprint and much more capability than their large, single-function predecessors.
- ◆ They provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB/eDNA with little human intervention.
- ◆ The diagnostic capabilities of digital relays should be used to help in the condition assessment of substation equipment.
- ◆ They have a proven track record of good quality and high availability, along with excellent manufacturer support for current models.
- ◆ They provide oscillography, targets, and phasor data that can be accessed from a remote location through a modem. This capability assists in timely and accurate fault analysis.
- ◆ They have lower maintenance costs because they rarely fail and allow for an increased maintenance cycle (i.e. an increase of 50%; from 4 yrs. to 6 yrs.).

Eric A. Loeven

Full integration requires a DNP compatible Remote Terminal Unit described in the "RTU Review" memo.

Attachment 2

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-04

June 23, 2011

Mr. J.J. Borchert

Re: Substation Metering Review

Introduction:

Substation metering data is used to plan and operate the Central Hudson Transmission and Distribution Systems. These metering data are necessary for the safe operation of existing facilities as well as the cost effective planning and design of new facilities. Many transmission lines, substation transformers, and distribution circuits have their MW & MVA_r flows monitored by the Energy Management System (EMS) and have the resultant data stored in the Meter Data Base (MDB) and Historian (eDNA). Many other circuits either are not metered or utilize local indicating metering, such as graphic charts or drag hands, to register data.

Technology has advanced; there are much more reliable and efficient means of measuring and transmitting metered load data, including by means of digital relays. This memo summarizes the existing meter equipment and the replacement options, as well as provides recommendations on the best option to gain appropriate metering data in the most efficient manner.

Discussion:

A large number of substations contain transducer-based meters, which register and report their data directly to a Remote Terminal Unit (RTU) by means of an analog signal. A handful of other stations contain chart meters, which provide local indication. In the stations that have chart meters, the metering is often registered in single function fashion, with circuit current measured in Amps and transformer load measured in Kilowatts and Kilovars. The meter data that is most useful for planning and operating the system is provided in the form of Watts and Vars. Additionally, the panel space taken up by the charts can be reduced greatly with the installation of digital relays, which offer protection functions as well as metering functions.

Technological advances have led to multi-function, digital relays with the capability to meter accurately. The digital relays can transfer instantaneously metered values to EMS. Once there, the data is stored in the Historian, integrated, and the peak hourly values are calculated and transferred to the MDB with little human intervention.

A. Outdated Devices:

The following is a list of common metering methods used in CH substations along with the reason that they have been superseded:

- Chart Meters: Graphic charts monitor single values such as MW, MVA_r, or circuit Amps. These charts rely on diligent maintenance practices to ensure that they function

as designed. Many of the charts run out of ink between maintenance cycles or fail mechanically, leaving "gaps" in data. Even the charts that record properly pose difficulty in capturing their data. The process of going to the substations to collect the charts, reviewing the charts and interpreting the data, and entering the data manually into the MDB is time consuming. Due to the cumbersome nature of the process, the charts are only interpreted for the annual system peaks, which leaves 2-4 data points in the MDB for that circuit or station element to use in planning.

- Other Local Indication Metering: Charts are not the only method of local metering. There are also substation Ammeters, Voltmeters, etc. that are remnants of a time when stations were manned and operated manually. Many of these devices are unsupported and have limited parts available.
- MV-90: An alternative method to metering by charts is to meter through MV-90. MV-90 is a system that uses a recorder to receive metered data directly from the instrument transformers and relies upon a dedicated telephone line to transmit that data to the master station collector; it is used for revenue metering as well as substation metering. Once the master has the data, it is transferred to the MDB. This method requires a dedicated line and the associated expenses.
- No Metering: Locations exist on the system where there are no methods of capturing load data. Some of these locations rely on grouped metering; they do not provide the granularity of individual circuit load data. At other locations, it hasn't been cost justified to install/repair any metering.
- Transducers: The transducers are wired directly to secondary AC quantities from current transformers and potential transformers. They convert the input quantities into an analog output signal, which is wired to the analog inputs of an RTU.
- Load checks: On a heavily loaded day, load checks are performed on circuits without automatic metering by having a worker physically go to a point on a circuit and manually perform a metering check.

B. Retrofit/Replacement Options:

- Digital Relays: Microprocessor-based relays not only offer protection functions; they provide metering capability as well in a compact footprint. The digital metering data provided by the digital relays is extremely accurate and has the ability to be entered into the MDB through Supervisory Control and Data Acquisition (SCADA) automatically once proper infrastructure is in place. The relays offer the ability to register numerous metering values simultaneously and in comm. format so that individual wires aren't needed for each metered point; rather, a single cable can be used to transmit multiple data points. Also, a separate phone line is not required for this method.
- Bitronics Power Meters: These meters provide bi-directional Watt and Var meter values as well as Volt and Amp values. They are capable of transmitting data through analog signal or through communication protocol to an RTU. They are cheaper alternatives, but do not provide any protection functions.

- Grid Sense: These are clip-on meters that report to a nearby data concentrator via radio. The data concentrator is linked to a POT's line outside of the station (no need for a Positron). The newest models provide directional Watt and Var metering, and they have the ability to report data in selectable time increments to the meter database. They represent a lower cost option and provide limited fault recording capabilities, but they do not provide protection functions.

Conclusions:

- ◆ Reading chart meters takes a great deal of time, and many of the charts are unsupported and are labor intensive to maintain. Data "gaps" exist when using chart meters, and the meters provide only a few, data points to the MDB each year, which need manual entry. The materials to repair and/or replace the charts are in short supply.
- ◆ Digital relays provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB with little human intervention.
- ◆ The AC quantities that the digital relays require for protection can be used for metering as well; therefore, there is no need for additional wiring from the instrument transformers to meters. Additionally, transducer equipment, which is susceptible to drift and requires regular maintenance, is no longer needed.
- ◆ The MV-90 system is a fully functional system, and it is an efficient method of collecting meter data in stations that do not have the relay and/or RTU capability to transmit data. MV-90 metering requires a dedicated phone line to transmit the meter data; this reoccurring expense can be eliminated with digital relaying and a proper RTU.
- ◆ Grid Sense meters can be installed relatively inexpensively and quickly to provide stopgap metering data until upgrades can be completed. They require a phone line and the monthly expenses associated with the line.

Eric A. Loeven

Appendix 1: Estimated Costs of Current Methods and Retrofit Options

| <u>Current Methods</u> | Time (Manhours) | | Cost |
|--|----------------------------|-----|--------------|
| | Field | Eng | TOTAL |
| MV-90 yearly (per station on average) | | | \$1,200 |
| Chart Meter maintenance & data retrieval | 1 | 10 | \$1,250 |

Note 1

Note 1: This cost is to retrieve the circular chart, review it, and enter it into the database. This process takes place on a suspected system peak day. At minimum, there are two times a year that this process is performed (Summer Peak and Winter Peak); however, there may be four or more times depending on when the actual peak occurs.

| <u>Retrofit Options</u> | Time | | | | Cost | | | TOTAL |
|--|--|-------|-------|-----|--------------|---------------------------------|----------|--------------|
| | Manhours | | | | Parts | Labor | | |
| | Tech | Elect | Draft | Eng | Device | Test Sw., Steel, etc. (w/OH) | | |
| Grid Sense Meter W / VAr | Hours are for the EOE and the Linemen. | | | | \$4,775 | | | \$5,700 |
| Data Concentrator 1 for every 4 ckt. | Per installation, each meter takes the lineman and the EOE 15 minutes to install. | | | | \$2,272 | | | \$2,700 |
| POT Line | Each data concentrator requires 20 minutes of lineman time and 15 minutes of EOE time. | | | | \$100 | | | \$110 |
| Labor (including travel time) per Station | Travel to each site has been assumed to be 1 hour. | | | | -waived- | | \$430 | \$430 |
| Site Registration per D/C | | | | | | | | |
| TOTAL GS Installation | | | | | | | | \$9,000 |
| Bitronics (Comm) | 40 | | 40 | 8 | \$2,000 | \$1,000 | \$11,400 | \$15,000 |
| Bitronics (HW-W/VAr/V) | 40 | | 40 | 12 | \$1,100 | \$1,000 | \$12,000 | \$14,500 |

Attachment 3

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-05

June 23, 2011

Mr. J.J. Borchert:

Re: Remote Terminal Unit Review

Introduction:

Real-time control and status feedback are vital components of a properly functioning substation. Without someone at the substation 24/7, a means of providing feedback and control operations is required; that means is a Remote Terminal Unit (RTU). This memo will describe the current state of the RTUs on the system, as well as the opportunity areas for retrofits and justification for the upgrades.

Discussion:

RTUs provide a means of transmitting important data in a substation to a master station via Supervisory Control and Data Acquisition (SCADA). The RTUs collect status and metering data and transmit it to a master station when polled. Also, they perform control operations that are initiated from the master station in a remote location. The RTUs can be dedicated line or dial-up depending on the application. RTUs have evolved with technology; existing CDC RTUs (protocol and provider) have been replaced with new flash ROM RTUs that utilize protocol suites including, but not limited to, CDC and the utility standard, DNP.

A. Outdated Devices:

- CDC 44-500 & CDC 88-90: These are different versions of dedicated line RTUs provided by CDC, a company that no longer exists. Retrofits have been performed to eliminate the CDC RTUs on the system because of the inability to get spare parts and due to their incompatibility with the digital relays. These RTUs utilize CDC protocol, which is an outdated protocol incapable of communicating with digital relays/data concentrators and is unable to receive digital metering data. They rely on analog signals and pulse accumulators sent from transducers to transmit meter information.
- G.E. M-4000: This is a smaller version of the G.E. Harris D20 RTU. It is used mainly in dial-up applications and is polled twice daily for SCADA data. It will report unsolicited if there is a change of status or if a metered point's dead band is exceeded. Based on the frequency that dial-up RTUs are polled, they cannot be used as sources to the meter database. Also, dial-up RTUs are not reliable because they rely on a plain old telephone (POT) line for communication. Due to this lack of reliability, control operations typically are not performed with dial-up RTUs. As a plus, the M-4000 has the capability to communicate through CDC or DNP protocol, and it also can be configured as a dedicated unit.

- G.E. D20: The functionality and hardware of this RTU are consistent with many modern RTUs; however, the configuration software is not user-friendly and uses a complicated, layered architecture. Additionally, with retiring technicians, the available workforce skilled in working with the configuration software is dwindling. This fact is of concern because emergency fixes will take longer to complete.

B. Retrofit/Replacement Options:

- Telvent Sage 2400¹: Telvent offers an RTU that fits into existing CDC RTU cabinets, and it has peripheral cards that resemble the CDC RTU cards. For these reasons, Telvent is the vendor of choice, providing the most seamless retrofit option. Telvent also offers a protocol suite for communications, including DNP and CDC. The DNP Master protocol allows direct communication with SEL-2020/2030/2032 data concentrators to transfer metering data from numerous digital relays in a substation.

C. Additional Considerations:

- Radio linked RTUs: As previously stated, the M-4000 can be polled as a dedicated RTU or as a dial-up unit. If there is a nearby, dedicated RTU, it is sometimes possible to install a radio link between the two stations and poll the M-4000 from the other station. In this configuration, there is access to real-time information and the ability to perform control operations at both stations. The need for the Positron Box at the radio-linked station is eliminated, and there is no extra cost incurred by installing a phone line and a Positron Box. The radio links require a clear line of site from one station to the next in order for the signal to be transmitted clearly. As such, the reliability of the circuits is largely dependent upon the terrain. Radio signals are also susceptible to interference from other mobile devices such as CB Radios.
- Positron Boxes: One major cost associated with RTUs, dedicated or dial-up, is the phone company's requirement of a Positron Box to isolate the outside phone line from the electric substation. This requirement is in place to provide a level of comfort for the phone company technician working in our substations, many of the existing stations have been allowed to function without this isolation in a grandfathered manner. However, any time that RTU retrofits are performed at these stations, the installation of a Positron Box is required. They are an expensive piece of equipment and have long lead times that may impact project schedules. There also is continued reliance on the phone company for maintenance and repairs.

¹ Telvent has been chosen as the preferred RTU for retrofits due to ease of configuration/use and the techs' familiarity with the units. All RTU cost estimates in this report are based on using this RTU.

Conclusions:

Upgrading old CDC, M-4000, and D-20 RTUs to Telvent RTUs provides the following benefits:

- ◆ Telvent RTUs are reliable and parts are available readily.
- ◆ The Telvent configuration software is user-friendly, making configuration and testing faster.
- ◆ DNP RTUs, of which Telvent is one, can receive communication-based metering & status and transmit it to the SCADA master.
- ◆ The Telvent RTU retrofits for the CDC 44-500's utilize the existing RTU cabinet and high powered tripping relays. The Telvent replaces the equipment susceptible to failure and makes use of the existing equipment that is less prone to failure.
- ◆ Using Telvent RTUs provides timesavings through standardization, and the engineers and technicians alike prefer to work with the Telvent for RTU retrofits.

Consideration also should be given to converting dialup RTUs to dedicated line RTUs. Dialup RTUs rely on POT lines, which have notoriously poor reliability; additional steps and equipment are required to perform the control operations safely. In contrast, dedicated line RTUs offer signal reliability, which provides the ability to perform control operations safely without added equipment and procedure steps.

Eric A. Loeven

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. D. J. Dittmann
Mr. J. M. May
S.R. #2011-06

June 23, 2011

Mr. J.J. Borchert

Re: Substation Recloser Review

Introduction:

Substation reclosers provide an alternate method of interrupting fault current on distribution and sub-transmission circuits. They are a convenient way to provide circuit protection in locations where it is not cost effective to install a circuit breaker and associated conduit to a control house. One disadvantage of using a recloser rather than a circuit breaker is that the recloser has reduced interrupting capability.

Recloser technology has advanced; hydraulic, oil-filled devices have given way to vacuum-interrupted, microprocessor-based (digital) recloser controls. This memo summarizes the existing substation recloser equipment, as well as replacement options. Also, this memo provides recommendations on the best retrofit options.

Discussion:

“An automatic circuit recloser is a self-contained device, which can sense and interrupt fault currents as well as reclose automatically in an attempt to re-energize a line.”* The existing hydraulic reclosers, a kin to electromechanical relays, have single component capability with limited flexibility in setting pickup curves, very little intelligence, and minimal ability to report feedback. New, digital recloser controls provide a wide range of pickup curves, are self-monitoring, grant instant notification of operations, offer desired metering capabilities, and require less frequent routine maintenance.

A. **Outdated Devices:**

Reclosers were installed in substations as a cost effective alternative to a distribution (15kV) or sub-transmission (34.5kV) circuit breaker combined with a reclosing relay. They can be single-phase or three-phase, be controlled mechanically (hydraulic) or digitally, and they have interrupting mediums of oil or vacuum. They make use of a series of fast and slow curves, providing coordination versatility and protection flexibility. A brief summary of the outdated reclosers on the CH system, specifically the hydraulically controlled type and the oil-interrupted type, is as follows:

- o Hydraulically controlled reclosers: These reclosers are self-contained and self-controlled; they have oil or vacuum interrupters. They are outdated due to their

* Page 124. Power Distribution Engineering: Fundamentals and Applications. James J. Burke. 1994.

C. Additional Considerations:

- Telemetric Interface: The Telemetric RTM II device can be installed to provide status and control of the SEL-651R DNP3 points. These data travel via cellular network and are displayed via a secure web interface. In addition, data travel to a SCADA Xchange server and then over frame relay to our SCADA system.
- R-Mag Circuit Breakers: As the most direct comparison to the substation recloser, these circuit breakers are a packaged breaker and relay combination. They are relatively inexpensive to install and there is familiarity with them by the techs, electricians, and engineers alike. These breakers provide a higher interrupting capability than the reclosers.

Conclusions:

Upgrading to vacuum interrupted, digitally controlled Viper reclosers provides the following benefits:

- ◆ Vacuum Interruption –
 - The speed of operation on these reclosers is not compromised by temperature.
 - The maintenance on these reclosers is not as labor-intensive as the oil-filled reclosers. They can operate up to 10,000 times before requiring an overhaul, with only the battery requiring simple in-field replacement in the meantime.
- ◆ Digital Control –
 - These recloser controls provide a wide range of pickup curves, which makes coordination easier and much more flexible than the hydraulically controlled reclosers.
 - These recloser controls offer digital metering capability and fault notification. The recloser can transmit its information through SCADA if the proper infrastructure is in place, or through Telemetric in stations with under-developed SCADA infrastructure.
 - These recloser controls can be interrogated to gather oscillography, targets, and phasor data from a remote location through a modem. This capability assists in timely and accurate fault analysis.

Some of the lower cost is lost when the recloser is installed in a substation if it is connected to the RTU in the control house, rather than through the Telemetric Unit. In this case, the added cost of conduit, steel work, and/or foundation needs to be considered. Regardless of the method of reporting to SCADA, installing the recloser in a substation comes with the added costs associated with technician time to commission and test the recloser and digital control over the cost of an installation on a distribution circuit.

Eric A. Loeven

Appendix 1: Estimated Costs of Retrofit Options

| Retrofit Options | Cost | | |
|---|----------|-----------|--------|
| | Parts | TOTAL | |
| Viper Reclosers with control relay and PT (on dist circuit) | \$21,000 | \$33,500 | Note 1 |
| Viper Reclosers with control relay (in a substation - Telemetric communication) | \$20,500 | \$33,000 | Note 1 |
| Viper Reclosers with control relay (in a substation - RTU communication) | \$20,500 | \$86,000* | Note 2 |
| R-Mag Breaker | \$25,000 | \$90,000 | |

Note 1: These represent one-time costs. There are additional annual costs for the SCADA Frame relay and the SCADA X-Change to Telemetric. The SCADA Frame Relay costs \$5200/yr. The SCADA X-Change to Telemetric costs \$2000/yr for 100 devices and \$1,500 for each 50 devices after that.

Note 2: This cost is estimated based on proposed work to bring the data through the RTU. No installations exist at this time in this manner.

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|-------|----------|--|
| Accord | 4 | 361 Ckt. | Charts - kW | ----- | EM | NONE | ----- | Retired as part of P/MK Upgrade |
| Ancram | 13.8 | 7085 Ckt. | Grid Sense | ----- | EM | NONE | ----- | Only has a 13.8 Voltage Regulator |
| Balmville | | | | | EM | | | |
| Balmville | 4 | 411 Ckt. | MV-90 | ----- | EM | | | |
| Balmville | 4 | 412 Ckt. | MV-90 | ----- | | C-300 | | |
| Barnegat | | | | | | | | Metering source? |
| Barnegat | 115 | KB Line | Amps | EM | ----- | | | |
| Barnegat | 115 | KC Line | None | EM | ----- | | | |
| Barnegat | 115 | KB-749-KC BKR | | EM | ----- | | | |
| Barnegat | 115/13.8 | T1 | SCADA | ----- | | | | IBM Feeds |
| Barnegat | 115/13.8 | T2 | SCADA | ----- | | | | |
| Barnegat | 13.8 | S1 | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2 | SCADA | ----- | EM | | | |
| Barnegat | 13.8 | S1-706 BKR | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2-734 BKR | SCADA | ----- | EM | | | |
| Beacon | | | | | | D-20 | | |
| Beacon | 13.8 | 8006 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 13.8 | 8015 Ckt. | SCADA | ----- | EM | | | Previously 8087A? |
| Beacon | 4 | 801 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 802 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 803 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | W-414 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | W-463 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | Bus 1 | SCADA | ----- | | | | |
| Beacon | 4 | Bus 2 | SCADA | ----- | | | | |
| Beacon | 13.8/4 | T1 | SCADA | ----- | EM | | | |
| Beacon | 13.8/4 | T2 | SCADA | ----- | EM | | | MDB has an entry with T1+T2 calculated |
| Beacon | 13.8 | BF Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | NM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | CM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 1 | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 2 | SCADA | ----- | EM | | | |
| Bethlehem Rd. | | | | | | 2400 | | |
| Bethlehem Rd. | 13.8 | 4091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4092 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4093 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4094 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4095 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4096 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4097 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4098 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 1 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 2 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 115 | RD Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | UB Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | RD-604-UB BKR | | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T1 | EMS | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T2 | EMS | EM | ----- | | | Metering combined |
| Bethlehem Rd. | 13.8 | W-613 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-619 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-804 BKR | | | EM | | | |
| Bordman Rd. | | | | | | NONE | | |
| Bordman Rd. | 13.8 | 6081A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | 6082A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-203 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-204 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-205 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-206 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-207 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-208 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-209 Ckt. | | ----- | EM | | | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|---------------|--------------------|-------------|-------------|--------|----------|---|
| Boulevard | | | | | | 2100 | | |
| Boulevard | 69 | OB Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | I Line | SCADA | uP | ----- | ----- | ----- | Line Amps & WVAR |
| Boulevard | 13.8 | KO Line | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | KK Line | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1011 | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1012 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1013 | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1014 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 69 | Bus 1 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Bus 2 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Overall | ----- | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | Metering combined |
| Boulevard | 69/13.8 | T3 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Clinton Ave. | | | | | | M-4000 | | |
| Clinton Ave. | 4 | 395 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 396 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 397 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | Bus | SCADA | ----- | ----- | ----- | ----- | |
| Clinton Ave. | 4 | T1 | MV-90 | ----- | Fuse | ----- | ----- | |
| Clinton Ave. | 13.8/4 | T1 | MV-90 | ----- | ----- | NONE | ----- | |
| Cold Spring | | | | | | | | Install a Grid Sense Package for two (2) circuits. |
| Cold Spring | 4 | 871 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Cold Spring | 4 | 872 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Coldenham | | | | | | D-20 | | |
| Coldenham | 13.8 | 4021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4026 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4027 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4028 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | B1-B2 Tie | ----- | ----- | EM | ----- | ----- | |
| Coldenham | 115 | J Line | SCADA | Gen 1 | ----- | ----- | ----- | 95P is DLP; 95BU is REL-301; part of replacement program already. |
| Coldenham | 115 | CW Line | SCADA | Gen 1 | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115 | J-19-CW BKR | ----- | SS | ----- | ----- | ----- | |
| Converse St. | | | | | | NONE | | |
| Converse St. | 4 | 121 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 122 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 123 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | | | | | | NONE | | |
| Conway Place | 4 | 881 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | 4 | 882 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Coxsackie | | | | | | 8890 | | |
| Coxsackie | 13.8 | 1071 Ckt. | Charts - Amps | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | 1072 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | 1074 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Coxsackie | 13.8 | 1076 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | Bus 1 (T1+G1) | SCADA | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | Bus 2 | ??? | ----- | EM | ----- | ----- | Metering data available through relay, but not configured. |
| Coxsackie | 69 | CN Line | None | uP | ----- | ----- | ----- | |
| Coxsackie | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | 95P is SEL-587 |
| Coxsackie | 69/13.8 | T1 | Charts - Amps | uP/EM | ----- | ----- | ----- | |
| Coxsackie | 13.8 | G1 | SCADA | ----- | ----- | ----- | ----- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------------|--------------------|-----------------------|---------------|-------------|-------------|-------|----------|---|
| Danskammer | | | | | | 2100 | | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | AC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DB Line | SCADA - Amps | UP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DR Line | SCADA - Amps | UP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DW Line | SCADA - Amps | UP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | RS Line | SCADA - Amps | EM | ----- | ----- | ----- | |
| Danskammer | 115 | W - 323 BKR | ----- | SS | ----- | ----- | ----- | |
| Danskammer | 115 | North Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | Middle Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | South Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | DB-1171 BKR | ----- | UP | ----- | ----- | ----- | |
| Danskammer | 115 | DR-1421 BKR | ----- | UP | ----- | ----- | ----- | |
| Danskammer | 115 | DW-1061 BKR | ----- | UP | ----- | ----- | ----- | |
| Danskammer | 115 | T5&T6 | SCADA | EM | ----- | ----- | ----- | |
| Dashville | | | | | | 2300 | | Single Phase; Vac; Hydr |
| Dashville | 4 | 345 Ckt. | MV-90 | ----- | EM | ----- | V4L | |
| Dashville | 6.6 | Bus | ----- | ----- | EM | ----- | ----- | Fused Transformer w/ CR 67 relay |
| Dashville | | T1 | ----- | EM | ----- | ----- | ----- | |
| Dashville | | G1-G2 | SCADA | ----- | ----- | ----- | ----- | |
| East Fishkill 345kV | | | | | | | | |
| East Fishkill 345kV | 345 | C9751 Breaker A1 BF | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 345 | C9751 Breaker A2 BF | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 1 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 2 | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | | | | | | 8890 | | |
| East Fishkill | 115 | EF Line | SCADA | UP* | ----- | ----- | ----- | 95P is MDAR; 95BU is Optimho - Replacing with 311C & D60. |
| East Fishkill | 115 | HF Line | SCADA | UP* | ----- | ----- | ----- | 95BU is Optimho - Replacing with D60. |
| East Fishkill | 115 | EF-672 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | EF-679 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | W-640 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | T1 | SCADA | see EFB | ----- | ----- | ----- | |
| East Kingston | | | | | | Orion | | |
| East Kingston | 13.8 | Bus 1 | SCADA | ----- | UP | ----- | ----- | |
| East Kingston | 13.8 | Bus 2 | SCADA | ----- | UP | ----- | ----- | |
| East Kingston | 13.8 | 1021 Ckt. | SCADA | ----- | UP | ----- | ----- | |
| East Kingston | 13.8 | 1022 Ckt. | SCADA | ----- | UP | ----- | ----- | |
| East Kingston | 13.8 | 1023 Ckt. | SCADA | ----- | UP | ----- | ----- | |
| East Kingston | 13.8 | 1024 Ckt. | SCADA | ----- | UP | ----- | ----- | |
| East Kingston | 13.8 | 1025 Ckt. | SCADA | ----- | UP | ----- | ----- | |
| East Kingston | 13.8 | 1026 Ckt. | SCADA | ----- | UP | ----- | ----- | |
| East Kingston | 13.8 | 1027 Ckt. | SCADA | ----- | UP | ----- | ----- | |
| East Kingston | 13.8 | 1028 Ckt. | SCADA | ----- | UP | ----- | ----- | |
| East Kingston | 115 | ER Line | SCADA | UP | ----- | ----- | ----- | |
| East Kingston | 115 | LR Line | SCADA | UP | ----- | ----- | ----- | |
| East Kingston | 115 | LR-201-ER Breaker | ----- | UP | ----- | ----- | ----- | |
| East Kingston | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| East Kingston | 115/13.8 | T1 | SCADA | UP | ----- | ----- | ----- | |
| East Kingston | 115/13.8 | T2 | SCADA | UP | ----- | ----- | ----- | |
| East Park | | | | | | 8890 | | |
| East Park | 13.8 | 6073 Ckt. | SCADA | ----- | EM/UP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6074 Ckt. | SCADA | ----- | EM/UP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6075 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| East Park | 69 | Q Line | None | EM | ----- | ----- | ----- | 95P is SEL-587 |
| East Park | 69/13.8 | T1 | SCADA | UP/EM | ----- | ----- | ----- | |

Electric Substation Upgrades Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|------------------|-------------|-------------|-------|----------|--|
| East Walden | | | | | | 2400 | | |
| East Walden | | | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5041 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5042 Ckt. | Grid Sense | ----- | EM | ----- | ----- | GS not working |
| East Walden | 13.8 | 5043 Ckt. | Grid Sense | ----- | ----- | ----- | ----- | Com |
| East Walden | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | |
| East Walden | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | 95P is DLP; part of replacement program already. |
| East Walden | 115 | CW Line | None | Gen1/uP | ----- | ----- | ----- | |
| East Walden | 115 | CW-712 | ----- | EM | ----- | ----- | ----- | |
| East Walden | 115 | D Line | None | EM | ----- | ----- | ----- | |
| East Walden | 115 | D-722 BKR | ----- | EM | ----- | ----- | ----- | |
| East Walden | 115 | DW Line | SCADA | ----- | uP | ----- | ----- | |
| East Walden | 115 | DW-1071 BKR | ----- | uP | ----- | ----- | ----- | |
| East Walden | 115 | EM Line | SCADA | ----- | uP | ----- | ----- | |
| East Walden | 115 | EM-642 BKR | ----- | uP | ----- | ----- | ----- | Amps & Volts |
| East Walden | 69 | WM Line | SCADA | ----- | uP | ----- | ----- | |
| East Walden | 115 | W-644 | ----- | EM | ----- | ----- | ----- | |
| East Walden | 115 | B1 | SCADA | ----- | EM | ----- | ----- | Combine Bus Volts to one point |
| East Walden | 115 | B2 | ----- | EM | ----- | ----- | ----- | 95P is SEL-587 |
| East Walden | 69/13.8 | T1 | SCADA | ----- | uP/EM | ----- | ----- | 95BU is SEL-587 |
| East Walden | 69/13.8 | T3 | SCADA | ----- | EM/uP | ----- | ----- | |
| Fishkill Plains | | | | | | D-20 | | |
| Fishkill Plains | 13.8 | 8091 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Fishkill Plains | 13.8 | 8092 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Fishkill Plains | 13.8 | 8093 Ckt. | SCADA | ----- | uP-200 | ----- | ----- | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8094 Ckt. | SCADA | ----- | uP-200 | ----- | ----- | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8095 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Fishkill Plains | 13.8 | 8096 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Fishkill Plains | 115 | HF Line | SCADA | uP/Gen 1 | ----- | ----- | ----- | 95BU is Optimho; part of replacement program. |
| Fishkill Plains | 115 | HF-703 BKR | ----- | EM | ----- | ----- | ----- | |
| Fishkill Plains | 115 | NF Line | None | EM | ----- | ----- | ----- | |
| Fishkill Plains | 115 | A Line | SCADA | ----- | uP | ----- | ----- | |
| Fishkill Plains | 115 | A-1036-FP | ----- | uP-200 | ----- | ----- | ----- | 279/2BFR relays |
| Fishkill Plains | 115 | A-1498 | ----- | uP-200 | ----- | ----- | ----- | 279/2BFR relays |
| Fishkill Plains | 115 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Fishkill Plains | 115 | FP Line | SCADA | uP/Gen 1 | ----- | ----- | ----- | 95P is DLP; part of replacement program already; 95BU is SEL-321 |
| Fishkill Plains | 115 | B1 | SCADA | EM | ----- | ----- | ----- | |
| Fishkill Plains | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Combine Bus Volts to one point |
| Fishkill Plains | 13.8 | B2 | ----- | EM | ----- | ----- | ----- | |
| Fishkill Plains | 115/13.8 | T1 | ----- | EM/uP | ----- | ----- | ----- | 95BU is SEL-587; metering is combined. |
| Fishkill Plains | 115/13.8 | T2 | SCADA | ----- | EM/uP | ----- | ----- | |
| Forgebrook | | | | | | 2300 | | |
| Forgebrook | 13.8 | Bus #1 | ----- | ----- | EM | ----- | ----- | |
| Forgebrook | 13.8 | Bus #2 | Charts - kW/kVAR | ----- | EM | ----- | ----- | |
| Forgebrook | 13.8 | 8011 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8012 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8013 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8014 Ckt. | Charts - kW | ----- | uP/EM | ----- | ----- | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8015 Ckt. | Charts - kW | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8016 Ckt. | Charts - kW | ----- | EM | ----- | ----- | No Chart Data |
| Forgebrook | 115 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Forgebrook | 115 | FO Line | None | EM | ----- | ----- | ----- | |
| Forgebrook | 115 | FO-1430-FT | ----- | EM | ----- | ----- | ----- | |
| Forgebrook | 115 | FT Line | None | EM | ----- | ----- | ----- | |
| Forgebrook | 115 | FT-1432 | ----- | EM | ----- | ----- | ----- | |
| Forgebrook | 115 | FT-882-WF | ----- | EM | ----- | ----- | ----- | |
| Forgebrook | 115 | WF Line | SCADA | ----- | uP | ----- | ----- | |
| Forgebrook | 13.8 | CM Line | None | ----- | EM | ----- | ----- | Amps |
| Forgebrook | 13.8 | BF Line | SCADA | ----- | EM | ----- | ----- | |
| Forgebrook | 13.8 | W-1486 | ----- | ----- | EM | ----- | ----- | |
| Forgebrook | 13.8 | W-994 | ----- | ----- | EM | ----- | ----- | Metering combined |
| Forgebrook | 115/13.8 | T1 | SCADA | ----- | EM | ----- | ----- | |
| Forgebrook | 115/13.8 | T2 | ----- | EM | ----- | ----- | ----- | |

454

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|------------------|-------------|-------------|---------------------------|----------|--|
| Freehold | | | | | | M-4000 | | |
| Freehold | 13.8 | 2061 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | 2071 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | W-1155 BKR | ----- | ----- | ----- | ----- | PR-560M | 3 phase; oil; electronic |
| Freehold | 13.8 | T1 | Charts - kW/kVAr | fuse | ----- | ----- | ----- | |
| Freehold | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | |
| Galeville | | | | | | Orion | | |
| Galeville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5030 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5031 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5032 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5033 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5034 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5035 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Galeville | 69 | MG Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69 | MG-200-MK BKR | ----- | uP | ----- | ----- | ----- | |
| Galeville | 69 | MK Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| Greenfield Rd. | | | | | | M-4000 | | |
| Greenfield Rd. | 13.8 | 3076 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 13.8 | 3078 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 4 | 375-376 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 4 | 377-378 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | W-1608 | ----- | ----- | EM | ----- | ES | 3 phase; oil; electronic |
| Greenfield Rd. | 13.8/4 | T2 | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Greenfield Rd. | 4 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Greenfield Rd. | 4 | B3 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Grimley Rd. | | | | | | NONE-Soon to have DNP RTU | | |
| Grimley Rd. | 4 | 385 Ckt. | Grid Sense | ----- | EM | ----- | Kyle L | Single Phase; Oil; Electronic |
| Grimley Rd. | 4 | 386 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| Hibernia | | | | | | Micro 1C | | |
| Hibernia | 13.8 | 7011 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | 7012 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 69/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | | | | | | D-20 | | |
| High Falls | 13.8 | 3021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 69 | HK Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 69 | HK-696-P BKR. | ----- | ----- | uP- 200 | ----- | ----- | SEL-279 |
| High Falls | 69 | P Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 13.8 | W-998 BKR. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | B1 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | B2 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |
| High Falls | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |

425

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|--------------------|----------|-------------|-------------|--------|----------|---|
| Highland | | | | | | 2300 | | |
| Highland | | | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5081 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5082 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5083 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | 5084 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | 5085 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 115 | HR Line | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | OR Line | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | OR-761-HR BKR. | ---- | EM | ---- | ---- | ---- | |
| Highland | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | |
| Highland | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Highland | 115/13.8 | T1 | SCADA | uP/EM | ---- | ---- | ---- | 95BU is SEL-587 |
| Highland | 115/13.8 | T2 | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | | | | | | D-20 | | |
| Honk Falls | 13.8 | 3071 Ckt. | SCADA | ---- | EM | ---- | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | 3072 Ckt. | SCADA | ---- | EM | ---- | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | B1 | SCADA | EM | ---- | ---- | ---- | |
| Honk Falls | 69 | GM Line | SCADA | EM/uP | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | HG Line | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | 69 | HK Line | SCADA | uP/EM | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | MK Line | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | 69 | WH Line | SCADA | uP/EM | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | overall diff B1+T1 | SCADA | EM | ---- | ---- | ---- | |
| Honk Falls | 69/13.8 | T1 | ---- | fuse | ---- | ---- | ---- | |
| Hunter | | | | | | M-4000 | | |
| Hunter | 34.5 | Z-666 | | | | | VR-3S | 3 phase; vac; hyd |
| Hunter | 13.8 | 2081 Ckt. | MV-90 | ---- | ---- | ---- | Kyle W | 3 phase; oil; hyd |
| Hunter | 13.8 | Cap Bank | ---- | ---- | EM | ---- | ---- | |
| Hurley Ave. 345kV | | | | | | 2400 | | |
| Hurley Ave. 345kV | 345 | 30151 BKR. | ---- | EM | ---- | ---- | ---- | 79 Relay is EM |
| Hurley Ave. 345kV | 345 | 30151 A1 BF | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30152 A2 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 301 Line A1 | SCADA | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 301 Line A2 | SCADA | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30353 BKR. | ---- | EM* | ---- | ---- | ---- | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30353 A1 BF | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30353 A2 BF | ---- | EM* | ---- | ---- | ---- | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 30354 BKR. | ---- | EM* | ---- | ---- | ---- | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30354 A1 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30354 A2 BF | ---- | EM* | ---- | ---- | ---- | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 303 Line A1 | SCADA | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 303 Line A2 | SCADA | EM* | ---- | ---- | ---- | In process replacement with GE D90 |
| Hurley Ave. 345kV | 345 | Bus A1 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | Bus A2 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 BKR. | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 A1 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 A2 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A1 Out of Step | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A2 Out of Step | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A1 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A2 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | T1 LS | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | B1 | SCADA | ---- | ---- | ---- | ---- | Volts |

456

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------|--------------------|---------------|----------------------|-------------|-------------|--------|----------|---|
| Hurley Ave. | | | | | | 2400 | | |
| Hurley Ave. | | | | | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2091 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2092 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2093 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2094 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 115 | Cap Bank | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | HP Line | SCADA | EM | ---- | | | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 69 | I Line | SCADA | Gen1 | ---- | | | |
| Hurley Ave. | 115 | OR Line | SCADA | EM | ---- | | | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 69 | SB Line | SCADA | Gen1 | ---- | | | |
| Hurley Ave. | 115 | HP-1643 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | OR-1640 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 69 | W-142 BKR. | ---- | uP | ---- | | | |
| Hurley Ave. | 13.8 | W-1575 BKR. | ---- | EM | EM | | | |
| Hurley Ave. | 115 | W-389 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | B1 | None | EM | ---- | | | |
| Hurley Ave. | 115 | B2 | SCADA | EM | ---- | | | Volts |
| Hurley Ave. | 69 | B1 | SCADA | EM | ---- | | | Volts |
| Hurley Ave. | 13.8 | B1 | SCADA | ---- | EM | | | Volts |
| Hurley Ave. | 115/69 | T3 | SCADA | EM | ---- | | | |
| Hurley Ave. | 115/13.8 | T4 | SCADA | EM | ---- | | | |
| Hurley Ave. | 69/13.8 | T5 | ---- | EM | ---- | | | |
| Inwood Ave. | | | | | | 3030 | | |
| Inwood Ave. | 13.8 | 6061 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6062 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6063 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6064 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6065 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6066 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6067 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6068 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Inwood Ave. | 115 | IR Line | SCADA | uP | ---- | | | |
| Inwood Ave. | 115 | IR-201-X BKR. | ---- | uP | ---- | | | |
| Inwood Ave. | 115 | X Line | SCADA | uP | ---- | | | |
| Inwood Ave. | 13.8 | B1 | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | B2 | SCADA | ---- | uP | | | |
| Inwood Ave. | 115/13.8 | T1 | SCADA | uP | ---- | | | |
| Inwood Ave. | 115/13.8 | T2 | SCADA | uP | ---- | | | |
| Jansen Ave. | | | | | | M-4000 | | |
| Jansen Ave. | 13.8 | 1001 Ckt. | MV-90 | ---- | uP | | | |
| Jansen Ave. | 13.8 | 1002 Ckt. | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | 1003 Ckt. | MV-90 | ---- | uP | | | |
| Jansen Ave. | 13.8 | 1004 Ckt. | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | KL Line | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | KO Line | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | B1 | SCADA | ---- | EM | | | |
| Jansen Ave. | 13.8 | B2 | SCADA | ---- | EM | | | |
| Jansen Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Jansen Ave. | 13.8 | T - Grounding | MV-90 | ---- | uP | | | |
| Kerhonkson | | | | | | 8890 | | |
| Kerhonkson | 13.8 | 3081 Ckt. | Grid Sense | ---- | EM | | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 13.8 | 3082 Ckt. | Grid Sense | ---- | EM | | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 69 | MK-929 MOS | ---- | EM | ---- | | | |
| Kerhonkson | 69 | MK-930 MOS | ---- | EM | ---- | | | |
| Kerhonkson | 69/13.8 | T1 | Charts - kW/kVar IGS | fuse | ---- | | | Amps for each Transformer |
| Kerhonkson | 69/13.8 | T2 | | fuse | ---- | | | Volts & Amps |
| Kerhonkson | 69 | HK | SCADA | ---- | ---- | | | Volts & Amps |
| Kerhonkson | 69 | MK | SCADA | ---- | ---- | | | Volts & Amps |

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Electric Substation Upy. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-----------------|------------------------|-------------|-------------|--------|----------|--------------------------------------|
| Knapps Corners | | | | | | 2100 | | |
| Knapps Corners | | | Charts - Amps/SCADA | | uP | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8021 Ckt. | Charts - Amps | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8022 Ckt. | Charts - Amps | | uP/EM | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8023 Ckt. | Charts - Amps/SCADA | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8024 Ckt. | Charts - kW | | EM | | | |
| Knapps Corners | 13.8 | 8025 Ckt. | Charts - kW | | | | | Com |
| Knapps Corners | 13.8 | Com Equipment | | | | | | |
| Knapps Corners | 115 | KB Line | None | EM | | | | SEL-279 |
| Knapps Corners | 115 | KB-1558-MC BKR. | | uP-200 | | | | |
| Knapps Corners | 115 | SK Line | SCADA | | uP | | | Amps |
| Knapps Corners | 13.8 | KN Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KR Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KS Line | SCADA* | EM | | | | |
| Knapps Corners | 69 | KM Line | SCADA | uP | | | | |
| Knapps Corners | 69 | TR Line | SCADA | EM | | | | |
| Knapps Corners | 69 | G Line | SCADA | uP | | | | |
| Knapps Corners | 13.8 | W-1215 BKR. | | | EM | | | |
| Knapps Corners | 69 | W-1409 BKR. | | | uP | | | |
| Knapps Corners | 13.8 | W-1462 BKR. | | | EM | | | |
| Knapps Corners | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Knapps Corners | 13.8 | B2 | | EM | | | | |
| Knapps Corners | 13.8 | B3 | | EM | | | | |
| Knapps Corners | 69 | 69k Bus | SCADA | EM | | | | Volts |
| Knapps Corners | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Knapps Corners | 115/13.8 | T3 | | EM | | | | |
| Knapps Corners | 115/69 | T2 | | SCADA | uP | | | |
| Lawrenceville | | | | | | M-4000 | | |
| Lawrenceville | 34.5 | 2385 Ckt. | Grid Sense | EM/uP | | | CXE-400A | 3 phase; oil; hyd |
| Lawrenceville | 34.5 | B1 | SCADA* | | | | | Volts |
| Lawrenceville | 69/34.5 | T1 | MV90/Grid Sense/SCADA | EM | | | | Amps. |
| Lincoln Park | | | | | | 2300 | | |
| Lincoln Park | 13.8 | Com Equipment | | | | | | Com |
| Lincoln Park | 13.8 | 2011 Ckt. | Charts - Amps | | EM | | | |
| Lincoln Park | 13.8 | 2012 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2013 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2014 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2015 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2016 Ckt. | Charts - kW | | EM/uP* | | | GE F60 installed HiZ pilot |
| Lincoln Park | 13.8 | 2017 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2018 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 1 | | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 2 | | | EM | | | |
| Lincoln Park | 115 | HP Line | None | EM | | | | Relay Replacement Program in process |
| Lincoln Park | 115 | HP-1318 BKR. | | EM | | | | |
| Lincoln Park | 13.8 | KL Line | Charts - kW/kVar/SCADA | EM | | | | Amps to SCADA |
| Lincoln Park | 115 | LR-1219-HP BKR. | | EM | | | | |
| Lincoln Park | 115 | LR Line | SCADA | uP | | | | |
| Lincoln Park | 13.8 | W-1321 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-45 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-534 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-554 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-206 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-207 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-525 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-528 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Lincoln Park | 13.8 | B2 | | EM | | | | |
| Lincoln Park | 13.8 | B3 | | EM | | | | |
| Lincoln Park | 13.8 | B4 | None | | EM | | | Volts |
| Lincoln Park | 115 | 115k bus | SCADA | | EM | | | Volts |
| Lincoln Park | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Lincoln Park | 115/13.8 | T2 | | EM | | | | |
| Lincoln Park | 115/13.8 | T3 | | SCADA | EM | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|--------|----------|---|
| Manchester | | | | | | 2400 | | |
| Manchester | | | | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6091 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6092 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6093 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6094 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6095 Ckt. | MV-90 | | EM | | | |
| Manchester | 13.8 | 6096 Ckt. | MV-90 | | EM | | | |
| Manchester | 13.8 | 6097 Ckt. | MV-90 | | | | | Com |
| Manchester | 13.8 | Com Equipment | | | | | | 95BU is REL-301; part of replacement program. |
| Manchester | 115 | M Line | None | EM/Gen-1 | | | | |
| Manchester | 115 | MC Line | SCADA | uP | | | | Amps |
| Manchester | 13.8 | MS Line | SCADA* | | EM | | | |
| Manchester | 13.8 | W-1456 BKR. | | | EM | | | |
| Manchester | 13.8 | W-650 BKR. | | | EM | | | |
| Manchester | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Manchester | 13.8 | B2 | | | EM | | | |
| Manchester | 115/13.8 | T1 | SCADA | | EM | | | Combine load value |
| Manchester | 115/13.8 | T2 | | EM | | | | |
| Marlboro | | | | | | 8890 | | ???? |
| Marlboro | 13.8 | 5001 Ckt. | SCADA | | EM/uP | | | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5002 Ckt. | SCADA | | EM/uP | | | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5003 Ckt. | SCADA | | EM/uP | | | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5004 Ckt. | SCADA | | uP | | | |
| Marlboro | 13.8 | Com Equipment | | | | | | Com |
| Marlboro | 13.8 | B1 | SCADA | | uP | | | Volts |
| Marlboro | 115/13.8 | T1 | SCADA | uP/EM* | | | | 95P is SEL-587 |
| Marlboro | 115/13.8 | T2 | SCADA | uP | | | | |
| Maryland Ave. | | | | | | M-4000 | | |
| Maryland Ave. | 4 | 621 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 4 | 622 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 4 | 623 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 4 | 624 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 13.8 | MS Line | | | EM | | | |
| Maryland Ave. | 13.8 | PH-284 BKR. | | | EM | | | |
| Maryland Ave. | 13.8 | PH-286 BKR. | | | EM | | | |
| Maryland Ave. | 4 | W-1032 BKR. | | | EM | | | |
| Maryland Ave. | 4 | W-1033 BKR. | | | EM | | | |
| Maryland Ave. | 4 | W-1034 BKR. | | | EM | | | |
| Maryland Ave. | 13.8 | B1 | SCADA | | EM | | | Volts |
| Maryland Ave. | 13.8 | B2 | SCADA | | EM | | | Volts |
| Maryland Ave. | 4 | B1 | | | EM | | | |
| Maryland Ave. | 4 | B2 | SCADA | | EM | | | Volts |
| Maryland Ave. | 13.8/4 | T1 | | | EM | | | |
| Maryland Ave. | 13.8/4 | T2 | | | EM | | | |
| Maybrook | | | | | | M-4000 | | |
| Maybrook | 13.8 | 5051 Ckt. | MV-90 | | EM | | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | 5052 Ckt. | MV-90 | | uP | | | Previously 5081-83? |
| Maybrook | 13.8 | 5053 Ckt. | MV-90 | | EM | | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | B1 | SCADA | | | | | Volts |
| Maybrook | 13.8 | B2 | SCADA | | | | | Volts |
| Maybrook | 69/13.8 | T1 | None | | | | | |
| Maybrook | 69/13.8 | T2 | None | | | | | |
| McKinley St. | | | | | | NONE | | |
| McKinley St. | 4 | 845 Ckt. | MV-90 | | EM | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|----------------|-------------|-------------|-------------|-------|----------|--------------------------------------|
| Merritt Park | | | | | uP | BM | | |
| Merritt Park | 13.8 | 8061 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8062 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8063 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8064 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8065 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8066 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8067 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8068 Ckt. | SCADA | | uP | | | Com |
| Merritt Park | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | |
| Merritt Park | 115 | WF Line | SCADA | | uP | | | |
| Merritt Park | 115 | WP Line | SCADA | | uP | | | SEL-279 |
| Merritt Park | 115 | WF-439-WP BKR. | ----- | uP-200 | ----- | ----- | ----- | |
| Merritt Park | 13.8 | B1 | SCADA | | uP | | | |
| Merritt Park | 13.8 | B2 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T1 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T2 | SCADA | | uP | | | |
| Milan | | | | | | BM | | |
| Milan | 13.8 | 7061 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | 7062 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Milan | 115 | B-4561 Ckt Sw | ----- | uP | ----- | ----- | ----- | |
| Milan | 115 | MR Line | SCADA | | uP | | | |
| Milan | 115 | MR-501 BKR. | SCADA | | uP | | | |
| Milan | 115 | RT-7 BKR. | ----- | uP | ----- | ----- | ----- | |
| Milan | 115 | R-10 BKR. | ----- | uP | ----- | ----- | ----- | |
| Milan | 115 | T-7 Line | SCADA | | uP | | | |
| Milan | 115 | 10 Line | SCADA | | uP | | | |
| Milan | 115 | B1 | SCADA | | uP | | | |
| Milan | 13.8 | B1 | SCADA | | uP | | | |
| Milan | 115/13.8 | T1 | SCADA | | uP | | | |
| Millerton | | | | | | L&N | | |
| Millerton | 13.8 | 7081 Ckt. | SCADA | | EM | | | |
| Millerton | 69 | GE-823 MOS | ----- | EM | ----- | ----- | ----- | |
| Millerton | 69/13.8 | T1 | SCADA | | EM | | | Only one feeder; T1 = 7081 load |
| Millerton | 69 | Line to SMI | SCADA | | ----- | ----- | ----- | Volts |
| Millerton | 69 | Line to PUL | SCADA | | ----- | ----- | ----- | Volts |
| Modena 115kV | | | | | | BM | | |
| Modena 115kV | 13.8 | B1 | SCADA | | uP | | | |
| Modena 115kV | 13.8 | C-1651 BKR. | ----- | ----- | uP | | | |
| Modena 115kV | 13.8 | 5011 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5012 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5013 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Modena 115kV | 115 | EM Line | SCADA | | uP | | | |
| Modena 115kV | 115 | EM-201-PX BKR. | ----- | uP | ----- | ----- | ----- | |
| Modena 115kV | 115 | PX Line | SCADA | | uP | | | |
| Modena 115kV | 115/13.8 | T3 | SCADA | | uP | | | Only has one 13.8 bus; T3 = Bus load |
| Modena 69kV | | | | | | 8890 | | volts |
| Modena 69kV | 69 | B1 | SCADA | | EM | | | |
| Modena 69kV | 69 | MG Line | SCADA | | uP | | | |
| Modena 69kV | 69 | W-941 BKR. | ----- | EM | ----- | ----- | ----- | |
| Modena 69kV | 69 | MG-380 BKR. | ----- | EM | ----- | ----- | ----- | |
| Modena 69kV | 115/69 | T1 | SCADA | | EM/uP | | | GE F35 is installed |
| Modena 69kV | 69/13.8 | T2 | None | | Fuse/uP | | | |
| Montgomery | | | | | | NONE | | |
| Montgomery | 4 | 571 Ckt. | Charts - kW | | EM | | V4L | Single phase; Vac; Hyd |
| Montgomery | 4 | 572 Ckt. | Charts - kW | | EM | | V4L | Single phase; Vac; Hyd |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|--------------------|-------------|-------------|--------|----------|--------------------------------|
| Montgomery St. | | | | | | M-4000 | | |
| Montgomery St. | | | | | EM | | | volts |
| Montgomery St. | 13.8 | B1 | SCADA | ---- | EM | | | Volts |
| Montgomery St. | 13.8 | B2 | SCADA | ---- | EM | | | volts |
| Montgomery St. | 13.8 | B3 | SCADA | ---- | EM | | | |
| Montgomery St. | 13.8 | B Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | 4001 Ckt. | Charts - kW/kVAr | ---- | EM | | | |
| Montgomery St. | 13.8 | 4002 Ckt. | Charts - kW/kVAr | ---- | EM | | | |
| Montgomery St. | 13.8 | 4003 Ckt. | Charts - kW/kVAr | ---- | EM | | | |
| Montgomery St. | 4 | 401 Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 402-3 Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 404 Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 406A/B Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 407A/B Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 410A/B Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | B1 | SCADA | ---- | EM | | | Volts |
| Montgomery St. | 4 | B2 | SCADA | ---- | EM | | | volts |
| Montgomery St. | 13.8 | F Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | NB Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | NM Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | R Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | W-507 BKR. | ---- | ---- | EM | | | |
| Montgomery St. | 13.8 | W-508 BKR. | ---- | ---- | EM | | | |
| Montgomery St. | 13.8 | W-509 BKR. | ---- | ---- | EM | | | |
| Montgomery St. | 13.8 | WN Line | None | ---- | EM | | | |
| Montgomery St. | 13.8/4 | T1 | | ---- | EM | | | |
| Montgomery St. | 13.8/4 | T2 | Charts - kW/kVAr | ---- | EM | | | Combine load value |
| Myers Corners | | | | | | 44-550 | | |
| Myers Corners | 13.8 | 8041 Ckt. | Charts - kW | ---- | uP | | | |
| Myers Corners | 13.8 | 8043 Ckt. | Charts - kW | ---- | EM | | | |
| Myers Corners | 13.8 | 8044 Ckt. | Charts - kW | ---- | EM | | | |
| Myers Corners | 13.8 | 8045 Ckt. | Charts - kW | ---- | EM | | | |
| Myers Corners | 13.8 | 8046 Ckt. | SCADA | ---- | uP | | | |
| Myers Corners | 69 | KM Line | None | EM | ---- | | | |
| Myers Corners | 69 | TV Line | None | EM | ---- | | | |
| Myers Corners | 69 | TV-399-KM BKR. | ---- | EM | ---- | | | |
| Myers Corners | 13.8 | W-63 BKR. | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | W-66 BKR. | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | Feeder M1-75 | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | Feeder M2-76 | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | Feeder M3-91 | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | Feeder M4-90 | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | B1 | | ---- | EM | | | |
| Myers Corners | 13.8 | B2 | SCADA | ---- | EM | | | Combine Bus Volts to one point |
| Myers Corners | 69/13.8 | T1 | | EM | ---- | | | |
| Myers Corners | 69/13.8 | T2 | SCADA | EM | ---- | | | Combine load value |
| Neversink | | | | | | 2200 | | |
| Neversink | 4 | 391 Ckt. | Charts - kW | ---- | EM | | | |
| Neversink | 13.8 | 3091 Ckt. | Grid Sense | ---- | EM | | Kyle W | 3 phase; Oil; Hyd |
| Neversink | 69 | HG Line | SCADA* | EM | ---- | | | Amps |
| Neversink | 69 | WH Line | SCADA* | EM | ---- | | | Amps |
| Neversink | 4 | W-1128 BKR. | ---- | ---- | EM | | | |
| Neversink | 69 | 69k Bus | SCADA | uP/EM | ---- | | | Volts |
| New Baltimore | | | | | | 2300 | | |
| New Baltimore | 13.8 | 1081 Ckt. | SCADA* | ---- | EM | | | kW |
| New Baltimore | 13.8 | 1082 Ckt. | SCADA* | ---- | EM | | | kW |
| New Baltimore | 13.8 | 1083 Ckt. | SCADA* | ---- | EM | | | kW |
| New Baltimore | 69 | Cap Bank | ---- | EM/uP | ---- | | | Com |
| New Baltimore | 13.8 | Com Equipment | ---- | ---- | ---- | | | |
| New Baltimore | 69 | CN Line | None | uP | ---- | | | |
| New Baltimore | 69 | NW Line | None | uP | ---- | | | |
| New Baltimore | 13.8 | B1 | SCADA | ---- | EM | | | Volts |
| New Baltimore | 69/13.8 | T1 | SCADA | EM/uP | ---- | | | 95P is SEL-587 |

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|--------------------|------------------|-------------|-------------|-------|----------|------------------------|
| | | | | | | NONE | | |
| New Windsor | | | | | | | | No DATA |
| New Windsor | 4 | 461 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 462 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 463 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 464 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 13.8 | UN & UW ATC | None | ----- | uP | ----- | ----- | Combine load value |
| New Windsor | 13.8/4 | T1 | Charts - kW/kVAR | ----- | uP | ----- | ----- | |
| New Windsor | 13.8/4 | T2 | | ----- | uP | ----- | ----- | |
| | | | | | | D-20 | | |
| North Catskill | | | | | | | | 95P is SEL-251 |
| North Catskill | 13.8 | 2001A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2002A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2003A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2004 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2005 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2006 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| North Catskill | 115 | 2 Line | SCADA | EM | ----- | ----- | ----- | |
| North Catskill | 115 | R-2 BKR. | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 115 | RT-7 BKR. | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 115 | T-7 Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| North Catskill | 69 | Cap Bank | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 69 | CL Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | H Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | W-1107 BKR. | ----- | EM/uP* | ----- | ----- | ----- | check on TD-5 |
| North Catskill | 69 | W-269 BKR. | ----- | EM/uP* | ----- | ----- | ----- | check on TD-5 |
| North Catskill | 115 | W-791 BKR. | ----- | uP- 200 | ----- | ----- | ----- | SEL-2BFR |
| North Catskill | 69 | W-269 & W-1107 BKR | ----- | ----- | EM | ----- | ----- | IJS |
| North Catskill | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| North Catskill | 69 | B1 | SCADA | EM/uP | ----- | ----- | ----- | Volts |
| North Catskill | 69 | B2 | SCADA | EM/uP | ----- | ----- | ----- | Volts |
| North Catskill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | Volts: 95BU is DFP-100 |
| North Catskill | 13.8 | B2 | SCADA | ----- | EM/uP | ----- | ----- | Volts: 95BU is DFP-100 |
| North Catskill | 115/69 | T4 | SCADA | EM/uP* | ----- | ----- | ----- | Check on 64 relay |
| North Catskill | 115/69 | T5 | SCADA | EM/uP* | ----- | ----- | ----- | Check on 64 relay |
| North Catskill | 115/13.8 | T6 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| North Catskill | 115/13.8 | T7 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|---------------|-------------|-------------|-------|----------|-----------------------|
| North Chelsea | | | | | | BM | | |
| North Chelsea | | | | | | | | |
| North Chelsea | 13.8 | 8051 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8052 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8053 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8054 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8055 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8056 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8057 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8058 Ckt. | SCADA | ..... | uP | ..... | ..... | Com |
| North Chelsea | 13.8 | Com Equipment | ..... | ..... | ..... | ..... | ..... |  |
| North Chelsea | 115 | AC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | AC-1066 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | DC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | DC-1414 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | FO-1482 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | FO Line | SCADA | uP | ..... | ..... | ..... | 95P is LCB-II |
| North Chelsea | 115 | NF Line | SCADA | uP | ..... | ..... | ..... | 95P is LCB-II |
| North Chelsea | 115 | NF-1116 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | SC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | SC-1566 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 69 | TV Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2651 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2652 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2653 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | W-1572 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B1 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 13.8 | B1 | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | B2 | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 115/69 | T1 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115/13.8 | T2 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115/13.8 | T3 | SCADA | uP | ..... | ..... | ..... | Volts |
| Ohioville | | | | | | 2100 | | |
| Ohioville | 13.8 | 5021 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5022 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5023 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5024 Ckt. | Charts - kW | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5025 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| Ohioville | 13.8 | Com Equipment | ..... | ..... | ..... | ..... | ..... | Com |
| Ohioville | 115 | Cap Bank | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 69 | O Line | None | uP | ..... | ..... | ..... |  |
| Ohioville | 69 | OB Line | None | uP | ..... | ..... | ..... |  |
| Ohioville | 115 | OR Line | None | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | OR-1075 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | PX Line | SCADA | EM/uP | ..... | ..... | ..... |  |
| Ohioville | 115 | PX - 1659 BKR. | ..... | uP | ..... | ..... | ..... |  |
| Ohioville | 69 | W - 1511 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 13.8 | W - 1537 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 13.8 | W - 1600 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | B1 | SCADA | EM | ..... | ..... | ..... | Volts |
| Ohioville | 69 | 69k Bus | SCADA | EM | ..... | ..... | ..... | Volts |
| Ohioville | 13.8 | B1 | None | ..... | EM | ..... | ..... |  |
| Ohioville | 13.8 | B2 | None | ..... | EM | ..... | ..... |  |
| Ohioville | 115/13.8 | T1 | SCADA | EM | ..... | ..... | ..... | Combine load value |
| Ohioville | 115/13.8 | T2 | SCADA | EM | | | | 95BU is SEL-251 |
| Ohioville | 115/69 | T3 | SCADA | EM/uP-200 | | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|----------|-------------|-------------|------|----------|--------------------------------------|
| | | | | | | 2300 | | Grid owns Line |
| Pleasant Valley | | | SCADA** | uP | | | | |
| Pleasant Valley | 115 | 8 Line | SCADA | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 10 Line | SCADA** | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 12 Line | SCADA** | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 13 Line | SCADA** | uP | | | | 95BU is Optimho; in replacement plan |
| Pleasant Valley | 115 | C Line | SCADA | EM/Gen-1 | | | | |
| Pleasant Valley | 115 | M Line | SCADA | EM | | | | |
| Pleasant Valley | 115 | X Line | SCADA | uP | | | | Com |
| Pleasant Valley | 115 | Com Equipment | | | | | | SEL-279 |
| Pleasant Valley | 115 | R-12 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-13 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-8 BKR. | | uP-200 | | | | |
| Pleasant Valley | 115 | RC-6 BKR. | | EM | | | | |
| Pleasant Valley | 115 | RM BKR. | | EM | | | | |
| Pleasant Valley | 115 | RX-4 BKR. | | uP | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-61 BKR. | SCADA** | EM | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-62 BKR. | SCADA** | EM | | | | |
| Pleasant Valley | 115 | R-643 BKR. | | EM | | | | |
| Pleasant Valley | 115 | R-81 BKR. | | EM | | | | |
| Pleasant Valley | 115 | B1 | SCADA | EM | | | | Volts |
| Pleasant Valley | 115 | B2 | SCADA | EM | | | | Volts |
| Pleasant Valley | 69 | E Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | G Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | Q Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | B1 | SCADA | uP | | | | Volts |
| Pleasant Valley | 13.8 | W-387 | | | EM | | | |
| Pleasant Valley | 345/115 | S1 | SCADA | | | | | Con Ed owns bank and protection |
| Pleasant Valley | 115/69 | T10 | SCADA | EM | | | | |
| Pulvers Corners | | | | | | D-20 | | |
| Pulvers Corners | 13.8 | 7091 Ckt. | SCADA | | EM | | V4L | single phase; vac; hyd |
| Pulvers Corners | 13.8 | 7092 Ckt. | SCADA | | EM | | Kyle L | single phase; oil; hyd |
| Pulvers Corners | 34.5 | 7395 Ckt. | SCADA | EM | | | RVE | 3 phase; oil; hyd |
| Pulvers Corners | 13.8 | Com Equipment | | | | | | Com |
| Pulvers Corners | 69 | Cap Bank | | EM | | | | |
| Pulvers Corners | 69 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 34.5 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 13.8 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 69/13.8 | T1 | SCADA | Fuse | | | | |
| Pulvers Corners | 69/34.5 | T2 | None | EM/uP | | | | 95P is SR-745 |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|-------------------|-------------|-------------|------|----------|---------------------------------|
| Reynolds Hill | | | | | | 2100 | | |
| Reynolds Hill | 13.8 | 6001 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Reynolds Hill | 13.8 | 6004 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | 6005 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Reynolds Hill | 13.8 | 6008 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | ----- | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Reynolds Hill | 115 | DR-1418 BKR. | ---- | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | DR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | HR-1285 BKR. | ---- | EM | ---- | ---- | ---- | |
| Reynolds Hill | 115 | HR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | IR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 13.8 | B Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | W Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PD Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PH Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PK Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PO Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PQ Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PS Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PU Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 115 | T-31 BKR. | ---- | EM | ---- | ---- | ---- | |
| Reynolds Hill | 115 | B1 | SCADA | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 115 | B2 | SCADA | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 13.8 | B1 | SCADA | ---- | EM/uP | ---- | ---- | 95BU is SEL-501 |
| Reynolds Hill | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | Volts |
| Reynolds Hill | 13.8 | B3 | SCADA | ---- | uP | ---- | ---- | Volts |
| Reynolds Hill | 115 | W-1543 BKR. | ---- | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 115/13.8 | T3 | SCADA | EM/uP | ---- | ---- | ---- | 95P is SEL-351A |
| Reynolds Hill | 115/13.8 | T4 | SCADA | EM/uP | ---- | ---- | ---- | 95P is SEL-351A |
| Rhinebeck | | | | | | 2300 | | |
| Rhinebeck | 13.8 | 7051 Ckt. | Charts - kW/SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | 13.8 | 7052 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7053 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7054 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7055 Ckt. | Charts - kW | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Rhinebeck | 13.8 | 7056 Ckt. | SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | ----- | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Rhinebeck | 69 | Cap Bank | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 115 | ER Line | SCADA* | uP | ---- | ---- | ---- | Amps |
| Rhinebeck | 115 | LR-830-MR BKR. | ---- | uP | ---- | ---- | ---- | |
| Rhinebeck | 115 | MR Line | None | uP | ---- | ---- | ---- | |
| Rhinebeck | 69 | Q-1471 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-1017 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-1238 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 69 | W-258 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-367 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 69 | Q Line | SCADA* | ---- | EM | ---- | ---- | Volts |
| Rhinebeck | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | B2 | none | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Rhinebeck | 69 | 69kV Bus | SCADA | ---- | EM | ---- | ---- | Volts |
| Rhinebeck | 69/13.8 | T1 | SCADA* | EM | ---- | ---- | ---- | Amps & Volts |
| Rhinebeck | 69/13.8 | T2 | SCADA* | EM | ---- | ---- | ---- | Amps & Volts |
| Rhinebeck | 115/13.8 | T4 | SCADA | EM | ---- | ---- | ---- | |
| Rhinebeck | 115/69 | T3 | SCADA | EM | ---- | ---- | ---- | |

405

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|---------------|----------|-------------|-------------|------|----------|----------------|
| | | | | | | 2100 | | |
| Rock Tavern 345kV | | | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 311 Line A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 311 Line A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 3456 BKR. | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 3456 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 3456 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Cap Bank 1 A1 | SCADA* | EM | ---- | | | Combined MVArS |
| Rock Tavern 345kV | 345 | Cap Bank 1 A2 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A1 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A2 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 34 Line A1 | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 34 Line A2 | | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 37751 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 37751 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 37751 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 37752 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 37752 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 37752 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 377 Line A1 | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 377 Line A2 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 4255 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 4255 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 4255 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 42 Line A1 | ---- | SS | ---- | | | |
| Rock Tavern 345kV | 345 | 42 Line A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 346 | C3351 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3351 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3351 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3352 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3352 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3352 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3353 BKR. | ---- | UP-200 | ---- | | | |
| Rock Tavern 345kV | 345 | C3353 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | C3353 BF A2 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 31153 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 31153 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 31153 BF A2 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 31154 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 31154 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 31154 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Com Equipment | ---- | ---- | ---- | | | Com |
| Rock Tavern 345kV | 345 | B1 A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | B1 A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | B2 A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | B2 A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345/115 | T1 A1 | SCADA | EM | ---- | | | |
| Rock Tavern 345kV | 345/115 | T1 A2 | | UP | ---- | | | |
| Rock Tavern 345kV | 345/115 | T3 A1 | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345/115 | T3 A2 | | UP | ---- | | | |

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Electric Substation Up. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-----------------|-------------|-------------|-------------|-------|----------|--------------------------------|
| | | | | | | 2400 | | |
| Sand Dock | | | | | EM | | | |
| Sand Dock | 13.8 | 6011 Ckt. | Charts - kW | ---- | EM | | | |
| Sand Dock | 13.8 | BP-1296 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | BP-1570 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | Cap Bank 1 | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | Cap Bank 2 | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | Cap Bank 3 | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | GB Line | SCADA | ---- | EM | | | |
| Sand Dock | 115 | KC-1447-SC BKR. | ---- | EM | ---- | | | |
| Sand Dock | 115 | KC Line | None | EM | ---- | | | |
| Sand Dock | 115 | SC Line | None | UP | ---- | | | |
| Sand Dock | 13.8 | SH-886 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | SH-911 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | TW-902 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | TW-909 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | TW-910 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | W-116 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | W-1449 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | W-1453 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | W-1467 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 115 | B1 | SCADA | ---- | ---- | | | Combine Bus Volts to one point |
| Sand Dock | 115 | B4 | | ---- | ---- | | | |
| Sand Dock | 13.8 | B1 | | ---- | EM | | | Combine Bus Volts to one point |
| Sand Dock | 13.8 | B2 | SCADA | ---- | EM | | | |
| Sand Dock | 13.8 | B3 | | ---- | EM | | | |
| Sand Dock | 13.8 | B4 | SCADA | ---- | EM | | | |
| Sand Dock | 13.8 | T1 | SCADA | EM | | | | Combine load value |
| Sand Dock | 13.8 | T3 | | EM | | | | |
| Sand Dock | 13.8 | T4 | SCADA | EM | | | | |
| Saugerties | | | | | | Orion | | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-------------------|-------------|-------------|-------------|------|----------|--------------------------------------|
| Shenandoah | | | | | | 2400 | | |
| Shenandoah | 115 | East Bus | SCADA | EM | ---- | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 115 | West Bus | | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B2 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B4 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B5 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B6 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B7 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B8 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 1 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 2 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 3 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 4 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 5 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 6 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B-4451 BKR. (CB1) | ---- | ---- | UP | ---- | ---- | |
| Shenandoah | 13.8 | 8071 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | 8072 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 115 | EF Line | None | uP/Gen-1 | ---- | ---- | ---- | 95BU is Optimho; in replacement plan |
| Shenandoah | 115 | FS Line | None | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | EF-1514 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-739 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-892-EF BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-959 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S1 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S2 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S3 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S4 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S5 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S6 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S7 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S8 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S9 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S10 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S11 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S12 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S13 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S14 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S15 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 115/13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T2 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T3 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T4 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T5 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T6 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T7 | SCADA | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | W-1266 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1279 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1450 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1593 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-664 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-665 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-802 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-803 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-805 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-807 BKR. | ---- | ---- | EM | ---- | ---- | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------------|--------------------|------------------|----------|-------------|-------------|--------|----------|---|
| Rock Tavern 115kV | | | | | | 44-550 | | |
| Rock Tavern 115kV | 115 | B1 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | B2 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | 115-0.48kV SST | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | Com Equipment |  | ..... | ..... | ..... | ..... | Com |
| Rock Tavern 115kV | 115 | D Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | D-448 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | J Line | SCADA* | GEN-1/EM | ..... | ..... | ..... | 95P is a DLP; identified in replacement program; Amps |
| Rock Tavern 115kV | 115 | J-788 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RD Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RD-809 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RJ Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RJ-818 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL Line | SCADA | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL-684 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-467 BKR. | ..... | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-681 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-814 BKR. | ..... | EM/UP | ..... | ..... | ..... | SEL-351 |
| Rock Tavern 115kV | 115 | WM Line | none | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115/69 | T2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | | | | | | 2100 | | |
| Roseton Switchyard | 345 | 30356 (B6) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A2 | SCADA | EM/UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31151 (B1) BKR | ..... | EM | ..... | ..... | ..... | SEL-501 for DBC |
| Roseton Switchyard | 345 | 31152 (B1) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B1) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B2 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U1 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U2 | SCADA | EM | ..... | ..... | ..... |  |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|-------------------|-------------|-------------|-------|----------|---|
| Smith Street | | | | | | 2300 | | Radio to INW |
| Smith Street | 4 | 631 Ckt. | Charts - kW | ----- | | | | |
| Smith Street | 4 | 632 Ckt. | Charts - kW | ----- | | | | |
| Smith Street | 4 | 633 Ckt. | Charts - kW | ----- | | | | |
| Smith Street | 4 | 634 Ckt. | Charts - kW | ----- | | | | |
| Smith Street | 13.8 | MS Line | None | ----- | | | | |
| Smith Street | 13.8 | PQ Line | None | ----- | | | | |
| Smith Street | 13.8 | PS Line | None | ----- | | | | |
| Smith Street | 13.8 | W Line | None | ----- | | | | |
| Smith Street | 13.8 | B1 | SCADA | ----- | | | | Volts |
| Smith Street | 13.8 | B2 | SCADA | ----- | | | | Volts |
| Smith Street | 4 | B1 | SCADA | ----- | | | | Volts |
| Smith Street | 4 | B2 | SCADA | ----- | | | | Volts |
| Smith Street | 13.8/4 | T1 | None | ----- | | | | |
| Smith Street | 13.8/4 | T2 | None | ----- | | | | |
| Smithfield | | | | | | 8890 | | |
| Smithfield | 13.8 | 7095 Ckt. | SCADA | ----- | | | | |
| Smithfield | 13.8 | Com Equipment | ----- | | | | | Com |
| Smithfield | 69 | E Line | None | uP- 200/uP | ----- | | | 95P is SEL-267 |
| Smithfield | 69 | FV Line | SCADA* | uP- 200/uP | ----- | | | 95P is SEL-267; Volts & Amps |
| Smithfield | 69 | GE Line | SCADA* | EM | ----- | | | Amps |
| Smithfield | 69 | S Line | SCADA* | EM | ----- | | | Amps |
| Smithfield | 69 | SA Line | SCADA* | EM | ----- | | | Volts & Amps |
| Smithfield | 69 | B2 | SCADA | ----- | | | | Volts |
| Smithfield | 69 | B3 | SCADA | ----- | | | | Volts |
| Smithfield | 69/13.8 | T1 | None* | ----- | | | | Only one feeder; T1 = 7095 load |
| South Cairo | | | | | | 8890 | | |
| South Cairo | 13.8 | 2041 Ckt. | Charts - Amps | ----- | | | | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2042 Ckt. | Charts - Amps | ----- | | | | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2043 Ckt. | Charts - kW | ----- | | | | |
| South Cairo | 13.8 | Com Equipment | ----- | | | | | Com |
| South Cairo | 69 | CF Line | None | EM/uP | ----- | | | 79 done with NLR |
| South Cairo | 69 | CL Line | None | uP | ----- | | | |
| South Cairo | 13.8 | B1+G1 | Charts - kW/SCADA | ----- | | | | SCADA Volts |
| South Cairo | 69/13.8 | T1 | Charts - Amps | EM/uP | ----- | | | 95P is SEL-587 |
| South Wall St. | | | | | | None | | |
| South Wall St. | 4 | 111 Ckt. | Grid Sense | ----- | | | | Single Phase; Oil; Hyd |
| South Wall St. | 4 | 112 Ckt. | Grid Sense | ----- | | | | Single Phase; Oil; Hyd; missing GS data |
| South Wall St. | 13.8/4 | T1 | Charts - kW/kVAr | ----- | | | | |
| Spackenkil | | | | | | Orion | | |
| Spackenkil | 13.8 | 6041 Ckt. | SCADA | ----- | | | | |
| Spackenkil | 13.8 | 6042 Ckt. | SCADA | ----- | | | | |
| Spackenkil | 13.8 | 6043 Ckt. | SCADA | ----- | | | | |
| Spackenkil | 13.8 | 6044 Ckt. | SCADA | ----- | | | | |
| Spackenkil | 13.8 | 6045 Ckt. | SCADA | ----- | | | | |
| Spackenkil | 13.8 | 6046 Ckt. | SCADA | ----- | | | | |
| Spackenkil | 13.8 | 6047 Ckt. | SCADA | ----- | | | | |
| Spackenkil | 13.8 | 6048 Ckt. | SCADA | ----- | | | | |
| Spackenkil | 13.8 | Com Equipment | ----- | | | | | |
| Spackenkil | 13.8 | KR Line | SCADA | ----- | | | | |
| Spackenkil | 13.8 | KS Line | SCADA | ----- | | | | |
| Spackenkil | 13.8 | MC Line | SCADA | ----- | | | | |
| Spackenkil | 13.8 | MC-200-SK BKR. | SCADA | ----- | | | | |
| Spackenkil | 13.8 | B1 | SCADA | ----- | | | | |
| Spackenkil | 13.8 | B2 | SCADA | ----- | | | | |
| Spackenkil | 115/13.8 | T1 | SCADA | uP | ----- | | | |
| Spackenkil | 115/13.8 | T2 | SCADA | uP | ----- | | | |
| Staatsburg | | | | | | BMI | | |
| Staatsburg | 13.8 | 7041 Ckt. | SCADA | ----- | | | | |
| Staatsburg | 13.8 | 7042 Ckt. | SCADA | ----- | | | | |
| Staatsburg | 13.8 | 7043 Ckt. | SCADA | ----- | | | | |
| Staatsburg | 13.8 | Com Equipment | ----- | | | | | |
| Staatsburg | 13.8 | B1 | SCADA | ----- | | | | |
| Staatsburg | 69/13.8 | T1 | SCADA | uP | ----- | | | |

470

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-------------------|------------------|-------------|-------------|--------|----------|--------------------------------------|
| Standfordville | | | | | | M-4000 | | |
| Standfordville | 13.8 | 7071 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single phase; vac; hyd |
| Standfordville | 13.8 | 7072 Ckt. | MV-90 | ----- | EM | ----- | ----- | Volts |
| Standfordville | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Standfordville | 69/13.8 | T1 | MV-90 | Fuse | ----- | ----- | ----- | |
| Sturgeon Pool | | | | | | 2100 | | |
| Sturgeon Pool | 4 | 341 Ckt. | Grid Sense | ----- | EM | ----- | Kyle W | 3 phase; oil; hyd; missing data |
| Sturgeon Pool | 4 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Sturgeon Pool | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | O Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | P Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | 69k Bus | SCADA | EM | ----- | ----- | ----- | Volts |
| Sturgeon Pool | 69/13.8 | T5 | None | Fuse | ----- | ----- | ----- | |
| Sugarloaf | | | | | | 44-500 | | |
| Sugarloaf | 115 | SD Line | SCADA | EM | ----- | ----- | ----- | Combine load value |
| Sugarloaf | 115 | SJ Line | SCADA | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | SL Line | None | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| Sugarloaf | 115/69 | O & R Transformer | SCADA | EM | ----- | ----- | ----- | |
| Tinkertown | | | | | | 2300 | | Radio to PVL |
| Tinkertown | 13.8 | 7022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Tinkertown | 69/13.8 | T1 | SCADA | Fuse | ----- | ----- | ----- | |
| Tinkertown | 69/13.8 | T2 | SCADA | Fuse | ----- | ----- | ----- | |
| Tioronda | | | | | | M-4000 | | |
| Tioronda | 13.8 | 8085 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8086 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8087 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 115 | W-566 Ckt. Sw | ----- | EM | ----- | ----- | ----- | Agastat |
| Tioronda | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Tioronda | 115/13.8 | T1 | Charts - kW/kVAr | EM | ----- | ----- | ----- | |
| Todd Hill | | | | | | 2200 | | |
| Todd Hill | 13.8 | 6051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6055 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6056 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6057 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Todd Hill | 115 | A Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 115 | A-520-C BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | C Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 13.8 | W - 524 BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Todd Hill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is SEL-351A; Volts |
| Todd Hill | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Todd Hill | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95P is SEL-587 |
| Todd Hill | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|----------------|-------------|-------------|--------|----------|--------------------------------|
| Union Ave | | | | | | 2200 | | Volts |
| Union Ave | 115 | B1 | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | RJ Line | SCADA | EM | ----- | ----- | ----- | SEL-351A for BF |
| Union Ave | 115 | RJ-52 BKR. | ----- | EM/uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB Line | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB-51 BKR. | ----- | uP | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UN Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UW Line | SCADA* | EM | ----- | ----- | ----- | |
| Union Ave | 115 | W-1095 BKR. | ----- | EM | ----- | ----- | ----- | |
| Union Ave | 13.8 | B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B3 | SCADA | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B4 | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B3-B2 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B4-B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4041 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4042 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4043 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4044 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4045 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4046 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4047 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4055 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Union Ave | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T2 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T3 | SCADA | uP | ----- | ----- | ----- | |
| Van Wagner | | | | | | NONE | | |
| Van Wagner | 4 | 731 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Van Wagner | 4 | 732 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Vinegar Hill | | | | | | M-4000 | | |
| Vinegar Hill | 34.5 | 2389 Ckt. | MV-90 | ----- | uP | ----- | RVE | 3 phase; oil; hyd |
| West Balmville | | | | | | 2300 | | |
| West Balmville | 115 | B2 | SCADA | EM | ----- | ----- | ----- | Volts |
| West Balmville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Combine Bus Volts to one point |
| West Balmville | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | B Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 13.8 | 4011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | 4012 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4013 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4014 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4015 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| West Balmville | 115 | DB Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DB-875 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DW Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DW-662 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | F Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | R Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | W-478 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | W-855 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | WN Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | | T1 | SCADA | EM | ----- | ----- | ----- | Combine load value |
| West Balmville | | T2 | | EM | ----- | ----- | ----- | |

472

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|--------------------|----------|-------------|-------------|--------|----------|--------------------------------------|
| Westerlo | | | | | | BM | | |
| Westerlo | 13.8 | 1091 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1092 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1093 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Only has one 13.8 bus; T1 = Bus load |
| Westerlo | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | Cap Bank | ----- | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | NW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW-1500-NW BKR. | ----- | uP | ----- | ----- | ----- | |
| Wiccopee | | | | | | L&N | | |
| Wiccopee | 115 | FS Line | None | EM | ----- | ----- | ----- | |
| Wiccopee | 115 | WP Line | None | uP | ----- | ----- | ----- | |
| Wiccopee | 115 | FS - 1652- WP BKR. | ----- | EM | ----- | ----- | ----- | |
| Wiccopee | 13.8 | F1-292 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | F2-280 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-368 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-378 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-632 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-636 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #3) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #9) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B1 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B2 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Wiccopee | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Wiccopee | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Woodstock | | | | | | M-4000 | | |
| Woodstock | 13.8 | 3011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3012 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3013 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3014 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 13.8 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 69/13.8 | T2+SR Line | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 + B2 | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T1 | MV-90 | ----- | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 | MV-90 | ----- | ----- | ----- | ----- | |

Attachment 6

| | Station | Cost |
|------|-----------------|-------------|
| 2012 | Dashville | \$190,000 |
| | East Walden | \$610,000 |
| | Tioronda | \$200,000 |
| 2013 | Coxsackie | \$130,000 |
| | South Cairo | \$160,000 |
| | East Park | \$200,000 |
| | Pleasant Valley | \$360,000 |
| | Todd Hill | \$160,000 |
| 2014 | Sand Dock | \$510,000 |
| | Fishkill Plains | \$480,000 |
| | South Wall St. | \$84,000 |
| 2015 | Manchester | \$340,000 |
| | Forgebrook | \$730,000 |
| 2016 | Rock Tavern | \$1,060,000 |
| | | |
| Subs | | |
| | | |
| | | |

Preliminary
Copy

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A: Replacement of obsolete PLC equipment.

Why was the proposed project scope chosen over other alternatives?

N/A: Replacement of obsolete PLC equipment.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To replace obsolete equipment before failure.

What are the risks and consequences of not completing this project?

Lack of Supervisory control and information in the substation possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|-------------|------------------|-------------|--------------|
| \$1,192,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 108,000 | 0 | 0 | 0 | 0 | 108,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 54,000 | 0 | 0 | 0 | 0 | 54,000 | 0 | 0 |
| | Stock Materials | 54,000 | 0 | 0 | 0 | 0 | 54,000 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 217,000 | 0 | 0 | 0 | 0 | 217,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 77,000 | 0 | 0 | 0 | 0 | 77,000 | 0 | 0 |
| | Overheads | 541,000 | 0 | 0 | 0 | 0 | 541,000 | 0 | 0 |
| | AFUDC* | 32,000 | 0 | 0 | 0 | 0 | 32,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,083,000 | 0 | 0 | 0 | 0 | 1,083,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 16,000 | 0 | 0 | 0 | 0 | 16,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 33,000 | 0 | 0 | 0 | 0 | 33,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 6,000 | 0 | 0 | 0 | 0 | 6,000 | 0 | 0 |
| | Overheads | 54,000 | 0 | 0 | 0 | 0 | 54,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 109,000 | 0 | 0 | 0 | 0 | 109,000 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 834,400 Maximum (\$): 1,549,600

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

This project was part of the original RTU and PLC Replacement Program that has been separated out by project.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To replace obsolete equipment before failure.

What are the risks and consequences of not completing this project?

Risk of circuit breaker failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|-------------|------------------|-------------|--------------|
| \$1,192,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 108,000 | 0 | 0 | 0 | 0 | 108,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 54,000 | 0 | 0 | 0 | 0 | 54,000 | 0 | 0 |
| | Stock Materials | 54,000 | 0 | 0 | 0 | 0 | 54,000 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 217,000 | 0 | 0 | 0 | 0 | 217,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 76,000 | 0 | 0 | 0 | 0 | 76,000 | 0 | 0 |
| | Overheads | 542,000 | 0 | 0 | 0 | 0 | 542,000 | 0 | 0 |
| | AFUDC* | 32,000 | 0 | 0 | 0 | 0 | 32,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,083,000 | 0 | 0 | 0 | 0 | 1,083,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 16,000 | 0 | 0 | 0 | 0 | 16,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 33,000 | 0 | 0 | 0 | 0 | 33,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 6,000 | 0 | 0 | 0 | 0 | 6,000 | 0 | 0 |
| | Overheads | 54,000 | 0 | 0 | 0 | 0 | 54,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 109,000 | 0 | 0 | 0 | 0 | 109,000 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 953,600 Maximum (\$): 1,430,400

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.


Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

INFRASTRUCTURE REVIEW & RECOMMENDATIONS

VERSION HISTORY

| Memo No. | Date | Action | Author | Approval |
|------------|-----------|---------------------------|----------|---|
| OS2018-002 | 6/25/2018 | Initial Document Creation | B. Perry |  |
| | | | | |

This memo is to memorialize Operations Services annual review of its infrastructure, maintenance and inspection programs for various pieces of substation equipment as well as physical infrastructure. This document will be modified annually.

Breaker Replacement

Below are the 115kV oil breakers remaining and the planned replacement as identified in the capital budget.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|----------------|---------------|----------|----------------|-----------------|--------------|-----------|
| 2018 | ROCK TAVERN | 115 kV | RJ-818 | ALLIS CHALMERS | BZO-115-10000 | OIL | 1971 |
| 2018 | ROCK TAVERN | 115 kV | W-681 | GE | FK-121-43000 | OIL | 1971 |
| 2018 | UNION AVE | 115 kV | RJ-52 | GE | FK-439-115-3500 | OIL | 1952 |
| 2019 | WEST BALMVILLE | 115 kV | DW-662 | ALLIS CHALMERS | BZO-115-7500 | OIL | 1965 |
| 2019 | HURLEY AVE | 115 kV | HP-1643 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1969 |
| 2019 | HURLEY AVE | 115 kV | W-389 | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1973 |
| 2019 | HURLEY AVE | 115 kV | OR-1640 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1969 |
| 2019 | HURLEY AVE | 115 kV | A-2451 | ALLIS CHALMERS | BZO-121-40-3PST | OIL | 1973 |
| 2019 | ROCK TAVERN | 115 kV | W-814 | GE | FK-121-43000 | OIL | 1971 |
| 2019 | ROCK TAVERN | 115 kV | RD-809 | ALLIS CHALMERS | BZO-115-10000 | OIL | 1971 |

| | | | | | | | |
|--------------------------|-----------------|--------|------------|----------------|-----------------|-----|------|
| 2019 | ROCK TAVERN | 115 kV | J-788 | ALLIS CHALMERS | BZO-115-10000 | OIL | 1971 |
| 2020 | BETHLEHEM ROAD | 115 kV | RD-604-UB | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1974 |
| 2020 | PLEASANT VALLEY | 115 kV | R-8 | SIEMENS | BZO-121-50-6 | OIL | 1991 |
| 2020 | PLEASANT VALLEY | 115 kV | RX-4 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1968 |
| 2020 | PLEASANT VALLEY | 115 kV | R-81 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1968 |
| 2020 | PLEASANT VALLEY | 115 kV | R-10 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1980 |
| 2020 | PLEASANT VALLEY | 115 kV | R-62 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1980 |
| 2020 | PLEASANT VALLEY | 115 kV | R-61 | MCGRAW EDISON | OHT-54 | OIL | 1973 |
| 2020 | PLEASANT VALLEY | 115 kV | R-643 | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1980 |
| 2021 | LINCOLN PARK | 115 kV | LR-1219-HP | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1969 |
| 2021 | LINCOLN PARK | 115 kV | HP-1318 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1969 |
| 2021 | NORTH CATSKILL | 115 kV | R-2 | SIEMENS | BZO-121-20-7 | OIL | 1985 |
| 2022 | SHENANDOAH | 115 kV | FS-739 | SIEMENS | BZO-121-40-6 | OIL | 1983 |
| 2022 | SHENANDOAH | 115 kV | FS-959 | SIEMENS | BZO-121-40-6 | OIL | 1983 |
| 2022 | BARNEGAT | 115 kV | KB-749-KC | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1987 |
| Recommendation Requested | WICCOPEE | 115 kV | FS-1652-WP | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1988 |

**Wicopee has essentially no distribution load present. A recommendation about the necessity of this station is required for equipment replacement to be planned appropriately*

Outlined below are the 69 kV oil breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|----------------|---------------|-----------|-----------------------------|----------------|--------------|-----------|
| 2018 | HURLEY AVE | 69 kV | SB-233 | GE | FK-69-2500-5 | OIL | 1963 |
| 2018 | HURLEY AVE | 69 kV | I-442 | GE | FK-69-2500-5 | OIL | 1963 |
| 2018 | HURLEY AVE | 69 kV | W-142 | GE | FK-69-2500-5 | OIL | 1963 |
| 2019 | HONK FALLS | 69 kV | GM-737 | GE | FK-69-2500 | OIL | 1963 |
| 2019 | HONK FALLS | 69 kV | HG-709 | ALLIS CHALMERS | FZO-151-69F | OIL | 1953 |
| 2019 | HONK FALLS | 69 kV | WH-769 | ALLIS CHALMERS | FZO-151-69F | OIL | 1952 |
| 2019 | ROCK TAVERN | 69 kV | WM-1675 | GENERAL ELECTRIC | FK-69-2500-5 | OIL | 1964 |
| 2020 | MYERS CORNERS | 69 kV | TV-399-KM | SIEMENS | TDO-72.5-20000 | OIL | 1981 |
| 2023 | HIBERNIA | 69 kV | E-972 | ITE CIRCUIT BREAKER COMPANY | 69KSB2500-12 | OIL | 1967 |
| Substation Rebuild | KNAPPS CORNERS | 69 kV | G-1175 | SIEMENS ALLIS | TDO-72.5-20000 | OIL | 1981 |
| Substation Rebuild | KNAPPS CORNERS | 69 kV | KM-1185 | SIEMENS ALLIS | TDO-72.5-20000 | OIL | 1981 |
| Substation Rebuild | KNAPPS CORNERS | 69 kV | TR-1195 | SIEMENS ALLIS | TDO-72.5-20000 | OIL | 1981 |
| Substation Rebuild | KNAPPS CORNERS | 69 kV | W-1409 | SIEMENS ALLIS | TDO-72.5-20000 | OIL | 1981 |

Outlined below are the 15 kV oil breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|---------------|---------------|----------|----------------|-------------------|--------------|-----------|
| 2020 | NEW BALTIMORE | 15 kV | TD-1081 | SIEMENS | SDO-15-500 | OIL | 1990 |
| 2020 | NEW BALTIMORE | 15 kV | TD-1082 | SIEMENS | SDO-15-500 | OIL | 1982 |
| 2020 | NEW BALTIMORE | 15 kV | TD-1083 | SIEMENS | SDO-15-500 | OIL | 1990 |
| 2022 | JANSEN AVE | 15 kV | K-553 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | KL-543 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | K-583 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | K-593 | GE | FK-255-250 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | KO-533 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | TD-1001 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | TD-1002 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | TD-1004 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2023 | STURGEON POOL | 15 kV | OS-1 | GE | FK-255-150 | OIL | 1924 |
| 2023 | STURGEON POOL | 15 kV | OS-2 | GE | FKR-255 | OIL | 1924 |
| 2023 | STURGEON POOL | 15 kV | OS-3 | WESTINGHOUSE | E-8 | OIL | 1924 |
| Substation Retirement | BEACON | 15 kV | CM-311 | ALLIS CHALMERS | FZO-15-1000-H | OIL | 1958 |
| Substation Retirement | BEACON | 15 kV | TD-8006 | ALLIS CHALMERS | FZO-15-1000-H | OIL | 1958 |
| Substation Retirement | BEACON | 15 kV | W-426 | ALLIS CHALMERS | FZO-15-1000-H | OIL | 1958 |
| Substation Retirement | CONWAY PLACE | 15 kV | CKT 881 | GE | FK-143 | OIL | 1958 |
| Substation Retirement | CONWAY PLACE | 15 kV | CKT 882 | GE | FK-143 | OIL | 1958 |

| | | | | | | | |
|-----------------------|----------------|-------|----------|----|------------------|-----|------|
| Substation Retirement | MARYLAND AVE | 15 kV | W-426 | GE | FK-46 | OIL | 1951 |
| Substation Retirement | MARYLAND AVE | 15 kV | CKT 881 | GE | FK-46 | OIL | 1951 |
| Substation Retirement | MARYLAND AVE | 15 kV | CKT 882 | GE | FK-46 | OIL | 1951 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | CKT 8026 | GE | FKD-15.5-18000-4 | OIL | 1966 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | CKT 8027 | GE | FK-14.4-500 | OIL | 1958 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | CKT 8028 | GE | FK-14.4-500-1 | OIL | 1959 |

Outlined below are the 5 kV oil breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|-----------------|---------------|----------|--------------|-------------------|--------------|-----------|
| Substation Retirement | BEACON | 5 kV | CKT 801 | GE | FKR-155-16 | OIL | 1929 |
| Substation Retirement | BEACON | 5 kV | CKT 802 | GE | FKR-155-16 | OIL | 1929 |
| Substation Retirement | BEACON | 5 kV | CKT 803 | GE | FKR-155-16 | OIL | 1929 |
| Substation Retirement | BEACON | 5 kV | W-414 | GE | FKR-255-7.2-100-2 | OIL | 1957 |
| Substation Retirement | BEACON | 5 kV | W-463 | GE | FKR-255-7.2-100-2 | OIL | 1957 |
| Low Voltage Retirement | GREENFIELD ROAD | 5 kV | CKT 375 | GE | FKR-255-100 | OIL | 1938 |
| Low Voltage Retirement | GREENFIELD ROAD | 5 kV | CKT 376 | GE | FKR-255-100 | OIL | 1938 |
| Low Voltage Retirement | GREENFIELD ROAD | 5 kV | CKT 377 | GE | FKR-255-100 | OIL | 1938 |
| Low Voltage Retirement | GREENFIELD ROAD | 5 kV | CKT 378 | GE | FKR-255-100 | OIL | 1938 |

345kV SF6 Breaker Replacement

A replacement recommendation is in affect for Westinghouse type SFA SF6 breakers as these breakers have historically been leak prone and maintenance is extremely time consuming because of the design complexity. Outlined below are the type SFA breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|------------|---------------|----------|--------------|------------|--------------|-----------|
| 2020 | HURLEY AVE | 345 kV | 30354 | WESTINGHOUSE | 362-SFA-40 | SF6 GAS | 1976 |
| 2021 | HURLEY AVE | 345 kV | 30353 | WESTINGHOUSE | 362-SFA-40 | SF6 GAS | 1976 |
| 2022 | HURLEY AVE | 345 kV | 30151 | WESTINGHOUSE | 362-SFA-40 | SF6 GAS | 1976 |

15kV Breaker Replacement

A replacement recommendation is in affect for Westinghouse type DH and DHP breakers as these breakers are known to have components that contain asbestos. Outlined below are the type DH and DHP breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|-----------------|---------------|----------|--------------|-------------|--------------|-----------|
| 2018 | FISHKILL PLAINS | 15 kV | TD-8091 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | TD-8092 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | TD-8093 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | TD-8094 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | W-975 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | W-976 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | W-1000 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | UNION AVE | 15 kV | W-1105 | WESTINGHOUSE | 150-DH-500E | AIR | 1961 |
| 2018 | UNION AVE | 15 kV | W-1095 | WESTINGHOUSE | 150-DH-500E | AIR | 1961 |
| 2018 | UNION AVE | 15 kV | W-837 | WESTINGHOUSE | 150-DH-500E | AIR | 1964 |
| 2018 | UNION AVE | 15 kV | TD-4049 | WESTINGHOUSE | 150-DH-500A | AIR | 1967 |
| 2018 | UNION AVE | 15 kV | UW-1494 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2018 | UNION AVE | 15 kV | UN-594 | WESTINGHOUSE | 150-DH-250A | AIR | 1957 |
| 2018 | UNION AVE | 15 kV | TD-4046 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2018 | UNION AVE | 15 kV | TD-4045 | WESTINGHOUSE | 150-DH-500A | AIR | 1956 |
| 2018 | UNION AVE | 15 kV | TD-4044 | WESTINGHOUSE | 150-DH-500E | AIR | 1969 |
| 2018 | UNION AVE | 15 kV | TD-4043 | WESTINGHOUSE | 150-DH-500A | AIR | 1957 |
| 2018 | UNION AVE | 15 kV | TD-4042 | WESTINGHOUSE | 150-DH-500A | AIR | 1956 |
| 2018 | UNION AVE | 15 kV | TD-4041 | WESTINGHOUSE | 150-DH-500E | AIR | 1964 |
| 2019 | MONTGOMERY ST. | 15 kV | NM-384 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | NB-385 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | TD-4001 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | TD-4002 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |

| | | | | | | | |
|-----------------------|----------------|-------|----------|--------------|-------------|-----|------|
| 2019 | MONTGOMERY ST. | 15 kV | TD-4003 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-507 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-508 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-509 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | R-350 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | F-351 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | B-352 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-359 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | WN-486 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-489 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2023 | SAND DOCK | 15 kV | BP-1296 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | BP-1570 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | TW-909 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | TW-910 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | W-1449 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | W-1453 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | W-1568 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | W-1573 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | TW-902 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2024 | REYNOLDS HILL | 15 kV | TD-6001 | WESTINGHOUSE | 150-DHP | AIR | 1972 |
| 2024 | REYNOLDS HILL | 15 kV | TD-6005 | WESTINGHOUSE | 150-DHP | AIR | 1973 |
| Substation Retirement | BEACON | 15 kV | NM-402 | WESTINGHOUSE | 150-DH-500E | AIR | 1958 |
| Substation Retirement | BEACON | 15 kV | TD-8015A | WESTINGHOUSE | 150-DH-500E | AIR | 1959 |
| Substation Retirement | BEACON | 15 kV | W-408 | WESTINGHOUSE | 150-DH-500E | AIR | 1959 |
| Substation Retirement | BEACON | 15 kV | W-420 | WESTINGHOUSE | 150-DH-500E | AIR | 1959 |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-201 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-202 | WESTINGHOUSE | 150-DH-250A | AIR | |

| | | | | | | | |
|-----------------------|---------------|-------|----------|--------------|--------------|-----|------|
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-203 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-204 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-205 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-206 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-208 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-209 | WESTINGHOUSE | 150-DH-250A | AIR | |
| 2025/2026 | SHENANDOAH | 15 kV | B-4453 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | B-4454 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | B-4455 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | B-4456 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S10-1015 | WESTINGHOUSE | 150-DHP-500 | AIR | 1980 |
| 2025/2026 | SHENANDOAH | 15 kV | S11-405 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S12-401 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S13-412 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S14-410 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S7-1102 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | S8-1014 | WESTINGHOUSE | 150-DHP-500 | AIR | 1980 |
| 2025/2026 | SHENANDOAH | 15 kV | S9-1009 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | TD-8071 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | TD-8072 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-1059 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | W-1279 | WESTINGHOUSE | 150-DHP-500 | AIR | 1980 |
| 2025/2026 | SHENANDOAH | 15 kV | W-1593 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | W-664 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |

| | | | | | | | |
|-------------------------|------------|-------|---------|--------------|--------------|-----|------|
| 2025/2026 | SHENANDOAH | 15 kV | W-665 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-802 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-803 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-805 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-807 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-845 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | W-846 | WESTINGHOUSE | 150-DH-500 | AIR | 1980 |
| Replacement Deferral | TIORONDA | 15 kV | TD-8085 | WESTINGHOUSE | 150-DHP-500 | AIR | 1971 |
| Replacement Deferral | TIORONDA | 15 kV | TD-8086 | WESTINGHOUSE | 150-DHP-500 | AIR | 1971 |
| Replacement Deferral | TIORONDA | 15 kV | W-567 | WESTINGHOUSE | 150-DHP-500 | AIR | 1971 |
| Replacement Deferral | TIORONDA | 15 kV | TD-8087 | WESTINGHOUSE | 150-DHP-500 | AIR | 1971 |

**Operations Services recommends the deferral of the Tioronda breaker replacement until a proper cost benefit switchgear replacement is developed to weigh the value of component replacement (wires, AC power, breakers, etc.) versus entire switchgear. The switchgear condition is questionable (discussed further in later section)*

A replacement recommendation is in affect for General Electric type AM breakers as replacement parts are not available for these breakers and continuous issues have been reported. Outlined below are the type AM breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|----------------|---------------|----------|--------------|-----------------------|--------------|-----------|
| 2019 | COXSACKIE | 15 kV | TD-1071 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | TD-1072 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | TD-1076 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | TD-1074A | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | W-1398 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | W-296 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | W-484 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2020 | JANSEN AVE | 15 kV | TD-1003 | GE | AM-15-250-1 | AIR | 1956 |
| 2020 | WOODSTOCK | 15 kV | TD-3012 | GE | AM-15-250-1 | AIR | 1947 |
| 2020 | WOODSTOCK | 15 kV | TD-3013 | GE | AM-15-250-1 | AIR | 1947 |
| 2020 | WOODSTOCK | 15 kV | W-1091 | GE | AM-15-250-1 | AIR | 1947 |
| 2020 | WOODSTOCK | 15 kV | W-25 | GE | AM-15-250-1 | AIR | 2001 |
| 2021 | NEVERSINK | 5 kV | CKT-391 | GE | AM-5-150-5 | AIR | 1950 |
| 2021 | NEVERSINK | 5 kV | W-1128 | GE | AM-5-150-5 | AIR | 1950 |
| Substation Retirement | MARYLAND AVE | 5 kV | CKT 623 | GE | AM-5-150-4 | AIR | 1951 |
| Substation Retirement | MARYLAND AVE | 5 kV | CKT 624 | GE | AM-5-150-7 | AIR | 1951 |
| Substation Retirement | MARYLAND AVE | 5 kV | W-1034 | GE | AM-5-150-4 | AIR | 1951 |
| Substation Retirement | MARYLAND AVE | 5 kV | W-540 | GE | AM-5-150-7 | AIR | 1951 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | W-1208 | GE | AM-13.8-500-5H | AIR | 1953 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | W-1215 | GE | AM-13.8-500-5H | AIR | 1953 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | W-1462 | GE | AM-13.8-500-5H | AIR | 1953 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | W-1562 | GE | AM-13.8-500-5H | AIR | 1953 |
| Low Voltage Retirement | CLINTON AVE | 5 kV | CKT 395 | GE | AM-2.4/4.16-150/250-3 | AIR | 1968 |
| Low Voltage Retirement | CLINTON AVE | 5 kV | CKT 396 | GE | AM-2.4/4.16-150/250-3 | AIR | 1968 |
| Low Voltage Retirement | CLINTON AVE | 5 kV | CKT 397 | GE | AM-2.4/4.16-100/150-1 | AIR | 1968 |

| | | | | | | | |
|-------------------------------|-------------|------|---------|----|-----------------------|-----|------|
| New Switchgear Recommendation | CONVERSE ST | 5 kV | CKT 121 | GE | AM-2.4/4.16-150/250-1 | AIR | 1955 |
| New Switchgear Recommendation | CONVERSE ST | 5 kV | CKT 122 | GE | AM-2.4/4.16-100/150-1 | AIR | 1955 |
| New Switchgear Recommendation | CONVERSE ST | 5 kV | CKT 123 | GE | AM-2.4/4.16-150/250-2 | AIR | 1955 |

**Operations Services recommends the replacement of the Converse Street breakers along with the switchgear due to parts constraints, wiring issues, old generation relaying, etc. A cost benefit analysis should be performed to determine the best course of action.*

Transformer Replacement

Typically a power transformer's useful life is 55 years old. When rebuilding a substation where the transformer is greater than 55 years old, consideration should be given to retiring and not reusing the transformer. Outlined below are the power transformers that are scheduled for replacement in the 5 year budget.

| Location | Asset Name | Age | Plan | Replacement Reason | Condition Analysis |
|----------------|-------------|-----|-------------------------|-------------------------|---|
| BOULEVARD | TR. #1 PH 1 | 64 | Substation Rebuild | Age | |
| BOULEVARD | TR. #1 PH 2 | 64 | Substation Rebuild | Age | |
| BOULEVARD | TR. #1 PH 3 | 64 | Substation Rebuild | Age | |
| BOULEVARD | TR. #2 | 78 | Substation Rebuild | Age | |
| BOULEVARD | TR. #3 | 47 | Substation Rebuild | Potential Spare | |
| CONVERSE ST | TR. #2 | 62 | Transformer Replacement | Condition | Very poor power factor test results and poor oil quality. |
| CONWAY PLACE | TR. #1 | 59 | Substation Retirement | Substation Retirement | |
| MONTGOMERY ST | TR. #1 | 80 | Transformer Replacement | Condition | Very poor power factor test results. |
| MONTGOMERY ST | TR. #2 | 80 | Transformer Replacement | Condition | Very poor power factor test results. |
| MARYLAND AVE | TR. #1 | 63 | Substation Retirement | Substation Retirement | |
| MARYLAND AVE | TR. #2 | 63 | Substation Retirement | Substation Retirement | |
| NORTH CATSKILL | TR. #4 | 67 | Transformer Replacement | Planning Recommendation | |
| NORTH CATSKILL | TR. #5 | 62 | Transformer Replacement | Planning Recommendation | |
| NORTH CHELSEA | TR. #1 PH 1 | 71 | Transformer Replacement | Condition | Very poor power factor test results. Poor DGA results. |
| NORTH CHELSEA | TR. #1 PH 2 | 71 | Transformer Replacement | Condition | Very poor power factor test results. |
| NORTH CHELSEA | TR. #1 PH 3 | 71 | Transformer Replacement | Condition | Very poor power factor test results. Poor DGA results. |
| REYNOLDS HILL | TR. #3 | 64 | Transformer Replacement | Age & Refined LTC | |
| REYNOLDS HILL | TR. #4 | 66 | Transformer Replacement | Age & Refined LTC | |
| KNAPPS CORNERS | TR. #1 | 52 | Substation Rebuild | Age & Condition | Poor power factor test results and poor oil quality. |
| KNAPPS CORNERS | TR. #2 | 40 | Substation Rebuild | Condition | Poor DGA results and poor oil quality. |

Central Hudson’s power transformers are evaluated based on analytical testing data compiled by Operations Services. Outlined below are the power transformers that need to be monitored for decreasing condition. Operations Services is requesting that planning make a recommendation related to the following power transformers.

| Location | Asset Name | Age | Comment |
|-----------------|-------------|-----|---|
| ANCRAM | Bank 1 PH 1 | 50 | Slightly elevated power factor results. Slightly elevated combustible gas content. |
| ANCRAM | Bank 1 PH 2 | 50 | Slightly elevated power factor results. Slightly elevated combustible gas content. |
| ANCRAM | Bank 1 PH 3 | 50 | Slightly elevated power factor results. Slightly elevated combustible gas content. |
| CONVERSE ST | TR. #1 | 49 | High hydrogen content. |
| FORGEBROOK | TR. #1 | 60 | High hydrogen content. High combustible gas content overall. Oil quality deteriorating. High power factor results on CH insulation. |
| GREENFIELD ROAD | TR. #2 | 45 | Very high CHL power factor results. Acetylene present in oil likely left over from previous lead damage. |
| HUNTER | TR. #1 | 23 | High ethylene and ethane content. High combustible content overall. |
| TINKERTOWN | TR. #2 | 61 | Elevated power factor results across the board. Relative saturation is elevated. |

Switchgear Replacement

Switchgear condition is evaluated by Operations Services on a five year schedule. Below is a list of switchgear that has been given a poor evaluation, where replacement needs to be considered.

| Location | Asset Type | Comment |
|-----------------|---------------------|--|
| MYERS CORNERS | Switchgear | Poor roof condition. Switchgear roof has rotted through allowing water to ingress over relays. Breaker roll in alignment is problematic. |
| WOODSTOCK | Switchgear | Roof and rust condition is poor. Switchgear wiring and panels have aged. Needs replacement. |
| SHENANDOAH | Multiple Switchgear | Very difficult to rack breakers in and out due to misalignment and shifting of the switchgear floor. This issue makes switching very challenging. |
| TIORONDA | Switchgear | Wiring and CTs with the gear are deteriorated. Breakers require 240 VAC which would lead to extensive rewiring. It is recommended that the switchgear be replaced with the breakers |
| CONVERSE STREET | Switchgear | Switchgear wiring has aged and contains old electromechanical relaying. Parts for the switchgear breakers are hard to procure. It is recommended to couple the replacement of the switchgear breakers with a new switchgear. |

Additionally, Operations Services is looking for several recommendations from planning related to the replacement of switchgear and possibility of low voltage conversion to assist with some of the substation initiatives.

- Lincoln Park outdoor switchgear necessity (some of these cables are in poor condition and are out of potentially out of service – needs engineering/planning review)
- Shenandoah Bus #1 & Bus #2 switchgears
- Neversink feasibility of 4kV conversion to 13.8kV

Switch Replacement

345 kV Switch Replacement

Recently, problems have developed with the Pascor type TTT-7 and Memco type EA, VR2 and VT-1 style motor operated 345kV air disconnects at the Roseton, Rock Tavern and Hurley Avenue substations. Replacement parts availability is limited for these switch styles.

Operations Services has determined that these disconnects have reached the end of their useful life due to increasing issues, troubleshooting and callouts.

Below is a list of remaining switches that need replacement based on this recommendation in prioritized order. This order can be shuffled if replacements are to be packaged together, but can be followed as a guideline.

| Location | Position | Voltage | Manufacturer | Model | Mfg. Date | Issues |
|-----------------------|------------|---------|-----------------|-------|-----------|---|
| ROCK TAVERN 345 kV | RTB-3451 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Hotspots, Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-C-3092 | 345 kV | MEMCO | EA | 1/1/1970 | Reoccurring Hotspots |
| HURLEY AVENUE - 345kV | HAB-30382 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Hotspots, Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-C-3091 | 345 kV | MEMCO | EA | 1/1/1970 | Reoccurring Hotspots |
| HURLEY AVENUE - 345kV | HAB-30393 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Hotspots, Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-4483 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Hotspots, Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB-30193 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-31194 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB-30181 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Hotspots |
| HURLEY AVENUE - 345kV | HAB-A-2492 | 345 kV | MEMCO | VR2 | 1/1/1976 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-31193 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-30398 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB-30394 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-30581 | 345 kV | MEMCO | EA | 1/1/1970 | Reoccurring Hotspots |
| ROCK TAVERN 345 kV | RTB-3493 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1986 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-3484 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Hotspots |

| | | | | | | |
|--------------------------|----------------|--------|--------------------|-------|----------|----------------------|
| ROCK TAVERN 345 kV | RTB-4491 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Hotspots |
| ROCK TAVERN 345 kV | RTB-C3392 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB-A- 2491 | 345 kV | MEMCO | VR2 | 1/1/1976 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-C3397 | 345 kV | MEMCO | VR2 | 1/1/1972 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-C3393 | 345 kV | MEMCO | VR2 | 1/1/1972 | Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB- 30192 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-C3394 | 345 kV | MEMCO | VR2 | 1/1/1972 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-31191 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-C- 3094 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-30392 | 345 kV | PASCOR ATLANTIC | VT-1 | 1/1/1980 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-C3396 | 345 kV | MEMCO | VR2 | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB-C3395 | 345 kV | MEMCO | VR2 | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB- 376934 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROCK TAVERN 345 kV | RTB- 376945 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROCK TAVERN 345 kV | RTB- C33911 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROSETON SWITCHYARD | RSB-C- 3093 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROSETON SWITCHYARD | RSB-31181 | 345 kV | PASCOR ATLANTIC | VT-1 | 1/1/1980 | |
| ROCK TAVERN 345 kV | RTB-31182 | 345 kV | MEMCO | EA | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB-C3398 | 345 kV | MEMCO | EA | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB-C3399 | 345 kV | MEMCO | EA | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB- C33910 | 345 kV | MEMCO | EA | 1/1/1972 | |
| HURLEY AVENUE - 345kV | HAB- 30191 | 345 kV | MEMCO | VR2 | 1/1/1976 | |
| ROSETON SWITCHYARD | RSB-30591 | 345 kV | MEMCO | VR2 | 1/1/1970 | |
| ROSETON SWITCHYARD | RSB-30391 | 345 kV | MEMCO | VR2 | 1/1/1970 | |
| ROCK TAVERN 345 kV | RTB-4492 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1986 | |
| ROCK TAVERN 345 kV | RTB-C3373 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROCK TAVERN 345 kV | RTB-C3371 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROSETON SWITCHYARD | RSB-31192 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROSETON SWITCHYARD | RSB-C- | 345 kV | PASCOR | VT-1 | 1/1/1980 | |

| | | | | | | |
|--------------------|------------|--------|--------------------|------|----------|--|
| | 3081 | | ATLANTIC | | | |
| ROSETON SWITCHYARD | RSB-C-3082 | 345 kV | PASCOR ATLANTIC | VT-1 | 1/1/1980 | |

115 kV Switch Replacement

Operations Services collects and trends hotspot information as well as trouble orders documenting issues with switches over the lifespan of a switch. Below is an identified list of 115 kV switches that are recommended for replacement.

| Location | Position | Voltage | Manufacturer | Model | Mfg. Date | Issues |
|------------------------|----------|---------|-----------------|----------|-----------|--|
| BARNEGAT | KB-747 | 115 kV | MEMCO | VM1-204 | 1987 | Reoccurring Hotspots |
| BARNEGAT | KB-748 | 115 kV | MEMCO | VM1-204 | 1987 | |
| BARNEGAT | KC-750 | 115 kV | MEMCO | VM1-204 | 1987 | |
| BARNEGAT | KC-752 | 115 kV | SOUTHERN STATES | VM-1-104 | 1987 | |
| INWOOD AVENUE | X-970 | 115 kV | SOUTHERN STATES | VM-1-208 | 1975 | Reoccurring Hotspots |
| INWOOD AVENUE | X-977 | 115 kV | SOUTHERN STATES | VM-1-208 | 1975 | |
| NORTH CATSKILL REACTOR | 293 | 115 kV | PASCOR | CBSA | 2014 | Reoccurring Hotspots, Adjustment Issues, Poor Quality Construction |
| PLEASANT VALLEY | 1077 | 115 kV | | | - | Reoccurring Hotspots causing switches to become inoperable. Switches are hand operated and are very difficult to open making operation dangerous during switching. |
| PLEASANT VALLEY | 1099 | 115 kV | | | - | |
| PLEASANT VALLEY | 1277 | 115 kV | | | - | |
| PLEASANT VALLEY | 1288 | 115 kV | | | - | |
| PLEASANT VALLEY | 1299 | 115 kV | | | - | |
| PLEASANT VALLEY | 1377 | 115 kV | | | - | |
| PLEASANT VALLEY | 1388 | 115 kV | | | - | |
| PLEASANT VALLEY | 1399 | 115 kV | | | - | |
| PLEASANT VALLEY | 6177 | 115 kV | | | - | |

| | | | | | | |
|-----------------|----------|--------|--|--|---|---|
| PLEASANT VALLEY | 6199 | 115 kV | | | - | <p>Reoccurring Hotspots causing switches to become inoperable. Switches are hand operated and are very difficult to open making operation dangerous during switching.</p> |
| PLEASANT VALLEY | 6277 | 115 kV | | | - | |
| PLEASANT VALLEY | 6299 | 115 kV | | | - | |
| PLEASANT VALLEY | 64377 | 115 kV | | | - | |
| PLEASANT VALLEY | 64399 | 115 kV | | | - | |
| PLEASANT VALLEY | 8171 | 115 kV | | | - | |
| PLEASANT VALLEY | 8172 | 115 kV | | | - | |
| PLEASANT VALLEY | 8191 | 115 kV | | | - | |
| PLEASANT VALLEY | 8192 | 115 kV | | | - | |
| PLEASANT VALLEY | 877 | 115 kV | | | - | |
| PLEASANT VALLEY | 888 | 115 kV | | | - | |
| PLEASANT VALLEY | 899 | 115 kV | | | - | |
| PLEASANT VALLEY | 93932-44 | 115 kV | | | - | |
| PLEASANT VALLEY | 93931-44 | 115 kV | | | - | |

| | | | | | | |
|-----------------|-------|--------|---------|-------|------|--|
| PLEASANT VALLEY | C677 | 115 kV | | | - | Reoccurring Hotspots causing switches to become inoperable. Switches are hand operated and are very difficult to open making operation dangerous during switching. |
| PLEASANT VALLEY | C688 | 115 kV | | | - | |
| PLEASANT VALLEY | C699 | 115 kV | | | - | |
| PLEASANT VALLEY | M77 | 115 kV | | | - | |
| PLEASANT VALLEY | M88 | 115 kV | | | - | |
| PLEASANT VALLEY | M99 | 115 kV | | | - | |
| PLEASANT VALLEY | Q302 | 115 kV | | | - | |
| PLEASANT VALLEY | X-477 | 115 kV | | | - | |
| PLEASANT VALLEY | X-488 | 115 kV | | | - | |
| PLEASANT VALLEY | X-499 | 115 kV | | | - | |
| TODD HILL | A-523 | 115 kV | SIEMENS | CM-4A | 1989 | Hotspot issues, DC motor problems, switches have been burning up motors. We recommend replacing with same style switches as install on the C line during recent work order |

| | | | | | | |
|-----------|-------|--------|---------|-------|------|--|
| TODD HILL | A-702 | 115 kV | SIEMENS | CM-4A | 1989 | Hotspot issues, DC motor problems, switches have been burning up motors. We recommend replacing with same style switches as install on the C line during recent work order |
| TODD HILL | A-521 | 115 kV | SIEMENS | CM-4A | 1989 | |
| TODD HILL | C-519 | 115 kV | SIEMENS | CM-4A | 1989 | |

**Model numbers for switches may not always be accurate*

Operations Services recommends that the switches at Pleasant Valley be replaced with or prior to the planned replacement of the existing 115kV oil breakers in 2020, a systematic plan needs to be coordinated to allow for proper isolation of each breaker prior to replacement. The existing switch problems will prevent proper clearances to be taken if they are not replaced prior to the breakers.

Non-Equipment Based Replacements

A 5 year substation evaluation program that assesses “non-equipment” assets has been implemented in 2016 to address the following equipment: steel, foundations, fence, ground grid, etc. As projects are identified through this program, Operations Services will bring issues to the attention of Substation Design or manage with local work orders as needed.

Steel Replacement

As replacement recommendations are identified, this work should be completed with future rebuilds unless there is imminent danger of failure, in which case the repairs should be handled sooner. It is also recommended that during any future rebuilds, that Substation Design evaluates the steel in and around any equipment that will be affected during the work order. An example of this is in 2019, as part of the Boulevard substation upgrade, the steel on the 69kV portion of the yard will be replaced due to condition concerns which were caused by poor foundations.

Foundation Replacement

These replacement recommendations should be considered during future work order planning to improve the existing infrastructure. Overall foundations are acceptable, with some older stations showing deteriorated foundations due to weather such as flaking. Some flaking is addressed as part of general maintenance by patching the foundations as necessary.

Fence Review

Operations Services completes fence inspections on a monthly as well as a more thorough inspection on a 5 year cycle and recommends either fence maintenance repair or complete rebuilds. Most recently the East Walden Substation fence was replaced which had rotten top rails as well as posts. It is recommended that 1 inch fence fabric is utilized for new substation fences to limit fence cuts.

Ground Grid Review

Operations Services completes ground grid testing on an 8 year cycle and reports ground grid deficiencies as they are determined. When adding or replacing equipment within a substation, the ground grid should be reviewed by Substation Design to ensure that the existing grid is adequate.

| Substation | Comments |
|----------------|---|
| Manchester | There are ground grid deficiencies that were noted during recent construction. It is recommended that a formal review of the substation ground grid be conducted. |
| West Balmville | During fence repair an electrical arc was drawn. This could be due to lack of fence bonding, however as part of the future breaker replacements, it is recommended that a more thorough engineered review be completed. |

Stone Review

Operations Services recommendation is to review the integrity of the stone fill within a substation when any major work order is being executed to ensure there is adequate stone coverage throughout the entire station and incorporate this work as part of any major work to be performed.

Submission Date: April 11, 2023
Submitted By: Brett Arteta

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Converse Street Upgrade

Work Order #: 2020 - H

Budget Group: Electric

Budget Category: 13

Funding Project Number: 1-1312-99-19

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2020

In-Service: 12/31/2027

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

A variety of equipment exists in Central Hudson substations, including protective relays, meters, recloser controls, and other control & communications equipment such as Remote Terminal Units (RTUs). Each of these components serves an integral role in contribution to the overall, integrated substation protection, control, and monitoring function. This equipment is at the end of its useful life and must be upgraded to current standards.

Describe specific scope exclusions, assumptions and constraints:

Replacement of Transformer #1, Transformer #2, and Bus #1 and Bus #2 switchgears. The substation is in poor condition requiring a full substation rebuild.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

Risk of equipment failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|----------------|------------------|-------------|--------------|
| \$2,577,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 236,000 | 4,000 | 0 | 0 | 21,000 | 211,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 118,000 | 2,000 | 0 | 0 | 10,000 | 106,000 | 0 | 0 |
| | Stock Materials | 118,000 | 2,000 | 0 | 0 | 10,000 | 106,000 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 472,000 | 8,000 | 0 | 0 | 42,000 | 422,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 165,800 | 2,800 | 0 | 0 | 15,000 | 148,000 | 0 | 0 |
| | Overheads | 1,181,000 | 20,000 | 0 | 0 | 105,000 | 1,056,000 | 0 | 0 |
| | AFUDC* | 69,200 | 1,200 | 0 | 0 | 6,000 | 62,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,360,000 | 40,000 | 0 | 0 | 209,000 | 2,111,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 32,150 | 150 | 0 | 0 | 8,000 | 24,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 65,300 | 300 | 0 | 0 | 16,000 | 49,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 11,050 | 50 | 0 | 0 | 3,000 | 8,000 | 0 | 0 |
| | Overheads | 108,500 | 500 | 0 | 0 | 26,000 | 82,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 217,000 | 1,000 | 0 | 0 | 53,000 | 163,000 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|------------|------------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 727 | 727 | 0 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,803,900 Maximum (\$): 3,350,100

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: April 11, 2023
Submitted By: Brett Arteta

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Shenandoah Substation Upgrade

Work Order #: -

Budget Group: Electric **Budget Category:** 13

Funding Project Number: 1-1312-99-19

Is this a Specific Project, Program or Blanket? Specific **Target Schedule - Start:** 1/1/2025 **In-Service:** 12/31/2027

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Much of the equipment at the Shenandoah Substation has been identified for replacement on the following programs that have been broken out into individual projects: Breaker Replacement Program, DA/LTC Replacement Program, and the ESP Infrastructure Replacement Program.

Describe specific scope exclusions, assumptions and constraints:

The various programs above have been combined into one substation modernization project. All electromechanical relays will be replaced along with the replacement of 25-15 kV circuit breakers.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

Risk of equipment failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$7,100,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 656,000 | 0 | 0 | 61,000 | 188,000 | 407,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 328,000 | 0 | 0 | 30,000 | 94,000 | 204,000 | 0 | 0 |
| | Stock Materials | 328,000 | 0 | 0 | 30,000 | 94,000 | 204,000 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 1,312,000 | 0 | 0 | 122,000 | 376,000 | 814,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 461,000 | 0 | 0 | 43,000 | 133,000 | 285,000 | 0 | 0 |
| | Overheads | 3,282,000 | 0 | 0 | 305,000 | 941,000 | 2,036,000 | 0 | 0 |
| | AFUDC* | 196,000 | 0 | 0 | 18,000 | 56,000 | 122,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 6,563,000 | 0 | 0 | 609,000 | 1,882,000 | 4,072,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 81,000 | 0 | 0 | 16,000 | 16,000 | 49,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 161,000 | 0 | 0 | 31,000 | 32,000 | 98,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 27,000 | 0 | 0 | 5,000 | 6,000 | 16,000 | 0 | 0 |
| | Overheads | 268,000 | 0 | 0 | 52,000 | 53,000 | 163,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 537,000 | 0 | 0 | 104,000 | 107,000 | 326,000 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|--------------|--------------|--------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 3,539 | 1,722 | 1,817 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 4,970,000 Maximum (\$): 9,230,000

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To replace obsolete equipment before failure.

What are the risks and consequences of not completing this project?

Risk of power transformer failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|----------------|------------------|-------------|--------------|
| \$3,405,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 311,000 | 0 | 0 | 0 | 84,000 | 227,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 156,000 | 0 | 0 | 0 | 42,000 | 114,000 | 0 | 0 |
| | Stock Materials | 156,000 | 0 | 0 | 0 | 42,000 | 114,000 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 622,000 | 0 | 0 | 0 | 167,000 | 455,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 218,000 | 0 | 0 | 0 | 59,000 | 159,000 | 0 | 0 |
| | Overheads | 1,555,000 | 0 | 0 | 0 | 418,000 | 1,137,000 | 0 | 0 |
| | AFUDC* | 93,000 | 0 | 0 | 0 | 25,000 | 68,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,111,000 | 0 | 0 | 0 | 837,000 | 2,274,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 44,000 | 0 | 0 | 0 | 0 | 44,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 88,000 | 0 | 0 | 0 | 0 | 88,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 15,000 | 0 | 0 | 0 | 0 | 15,000 | 0 | 0 |
| | Overheads | 147,000 | 0 | 0 | 0 | 0 | 147,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 294,000 | 0 | 0 | 0 | 0 | 294,000 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,383,500 Maximum (\$): 4,426,500

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A: Replacement of obsolete PLC equipment.

Why was the proposed project scope chosen over other alternatives?

N/A: Replacement of obsolete PLC equipment.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To replace obsolete equipment before failure.

What are the risks and consequences of not completing this project?

Lack of Supervisory control and information in the substation possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|-------------|----------------|----------------|--------------|
| \$1,204,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 108,000 | 0 | 0 | 0 | 0 | 11,000 | 97,000 | 0 |
| | Labor (Monthly Payroll) | 54,000 | 0 | 0 | 0 | 0 | 5,000 | 49,000 | 0 |
| | Stock Materials | 54,000 | 0 | 0 | 0 | 0 | 5,000 | 49,000 | 0 |
| | Non-Stock Material (A/P taxable) | 217,000 | 0 | 0 | 0 | 0 | 22,000 | 195,000 | 0 |
| | Contractors (A/P tax exempt) | 76,000 | 0 | 0 | 0 | 0 | 8,000 | 68,000 | 0 |
| | Overheads | 541,000 | 0 | 0 | 0 | 0 | 54,000 | 487,000 | 0 |
| | AFUDC* | 32,000 | 0 | 0 | 0 | 0 | 3,000 | 29,000 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,082,000 | 0 | 0 | 0 | 0 | 108,000 | 974,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 18,000 | 0 | 0 | 0 | 0 | 5,000 | 13,000 | 0 |
| | Labor (Monthly Payroll) | 37,000 | 0 | 0 | 0 | 0 | 10,000 | 27,000 | 0 |
| | Contractors (A/P tax exempt) | 7,000 | 0 | 0 | 0 | 0 | 2,000 | 5,000 | 0 |
| | Overheads | 60,000 | 0 | 0 | 0 | 0 | 16,000 | 44,000 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 122,000 | 0 | 0 | 0 | 0 | 33,000 | 89,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 842,800 Maximum (\$): 1,565,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

This project was part of the original RTU and PLC Replacement Program that has been separated out by project.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A: Replacement of obsolete PLC equipment.

Why was the proposed project scope chosen over other alternatives?

N/A: Replacement of obsolete PLC equipment.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To replace obsolete equipment before failure.

What are the risks and consequences of not completing this project?

Lack of Supervisory control and information in the substation possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|-------------|---------------|------------------|--------------|
| \$1,204,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 108,000 | 0 | 0 | 0 | 0 | 0 | 108,000 | 0 |
| | Labor (Monthly Payroll) | 54,000 | 0 | 0 | 0 | 0 | 0 | 54,000 | 0 |
| | Stock Materials | 54,000 | 0 | 0 | 0 | 0 | 0 | 54,000 | 0 |
| | Non-Stock Material (A/P taxable) | 216,000 | 0 | 0 | 0 | 0 | 0 | 216,000 | 0 |
| | Contractors (A/P tax exempt) | 77,000 | 0 | 0 | 0 | 0 | 0 | 77,000 | 0 |
| | Overheads | 541,000 | 0 | 0 | 0 | 0 | 0 | 541,000 | 0 |
| | AFUDC* | 32,000 | 0 | 0 | 0 | 0 | 0 | 32,000 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,082,000 | 0 | 0 | 0 | 0 | 0 | 1,082,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 18,000 | 0 | 0 | 0 | 0 | 5,000 | 13,000 | 0 |
| | Labor (Monthly Payroll) | 37,000 | 0 | 0 | 0 | 0 | 10,000 | 27,000 | 0 |
| | Contractors (A/P tax exempt) | 7,000 | 0 | 0 | 0 | 0 | 2,000 | 5,000 | 0 |
| | Overheads | 60,000 | 0 | 0 | 0 | 0 | 16,000 | 44,000 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 122,000 | 0 | 0 | 0 | 0 | 33,000 | 89,000 | 0 |
| * AFUDC may require adjustment after Finance Department review. | | | | | | | | | |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 0 | 0 | 0 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 842,800 Maximum (\$): 1,565,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

This project was part of the original RTU and PLC Replacement Program that has been separated out by project.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A: Replacement of obsolete PLC equipment.

Why was the proposed project scope chosen over other alternatives?

N/A: Replacement of obsolete PLC equipment.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To replace obsolete equipment before failure.

What are the risks and consequences of not completing this project?

Lack of Supervisory control and information in the substation possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|-------------|---------------|------------------|--------------|
| \$1,204,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 108,000 | 0 | 0 | 0 | 0 | 0 | 108,000 | 0 |
| | Labor (Monthly Payroll) | 54,000 | 0 | 0 | 0 | 0 | 0 | 54,000 | 0 |
| | Stock Materials | 54,000 | 0 | 0 | 0 | 0 | 0 | 54,000 | 0 |
| | Non-Stock Material (A/P taxable) | 216,000 | 0 | 0 | 0 | 0 | 0 | 216,000 | 0 |
| | Contractors (A/P tax exempt) | 77,000 | 0 | 0 | 0 | 0 | 0 | 77,000 | 0 |
| | Overheads | 541,000 | 0 | 0 | 0 | 0 | 0 | 541,000 | 0 |
| | AFUDC* | 32,000 | 0 | 0 | 0 | 0 | 0 | 32,000 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,082,000 | 0 | 0 | 0 | 0 | 0 | 1,082,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 18,000 | 0 | 0 | 0 | 0 | 5,000 | 13,000 | 0 |
| | Labor (Monthly Payroll) | 37,000 | 0 | 0 | 0 | 0 | 10,000 | 27,000 | 0 |
| | Contractors (A/P tax exempt) | 7,000 | 0 | 0 | 0 | 0 | 2,000 | 5,000 | 0 |
| | Overheads | 60,000 | 0 | 0 | 0 | 0 | 16,000 | 44,000 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 122,000 | 0 | 0 | 0 | 0 | 33,000 | 89,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 842,800 Maximum (\$): 1,565,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

This project was part of the original RTU and PLC Replacement Program that has been separated out by project.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

Risk of equipment failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|-------------|----------------|------------------|--------------|
| \$3,079,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 274,000 | 0 | 0 | 0 | 0 | 58,000 | 216,000 | 0 |
| | Labor (Monthly Payroll) | 137,000 | 0 | 0 | 0 | 0 | 29,000 | 108,000 | 0 |
| | Stock Materials | 137,000 | 0 | 0 | 0 | 0 | 29,000 | 108,000 | 0 |
| | Non-Stock Material (A/P taxable) | 550,000 | 0 | 0 | 0 | 0 | 117,000 | 433,000 | 0 |
| | Contractors (A/P tax exempt) | 193,000 | 0 | 0 | 0 | 0 | 41,000 | 152,000 | 0 |
| | Overheads | 1,374,000 | 0 | 0 | 0 | 0 | 292,000 | 1,082,000 | 0 |
| | AFUDC* | 83,000 | 0 | 0 | 0 | 0 | 18,000 | 65,000 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,748,000 | 0 | 0 | 0 | 0 | 584,000 | 2,164,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 49,000 | 0 | 0 | 0 | 0 | 16,000 | 33,000 | 0 |
| | Labor (Monthly Payroll) | 99,000 | 0 | 0 | 0 | 0 | 33,000 | 66,000 | 0 |
| | Contractors (A/P tax exempt) | 17,000 | 0 | 0 | 0 | 0 | 5,000 | 12,000 | 0 |
| | Overheads | 166,000 | 0 | 0 | 0 | 0 | 55,000 | 111,000 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 331,000 | 0 | 0 | 0 | 0 | 109,000 | 222,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|---|---|---|---|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,155,300 Maximum (\$): 4,002,700

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

Risk of equipment failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$5,731,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 516,000 | 0 | 0 | 0 | 0 | 11,000 | 305,000 | 200,000 |
| | Labor (Monthly Payroll) | 257,000 | 0 | 0 | 0 | 0 | 5,000 | 152,000 | 100,000 |
| | Stock Materials | 257,000 | 0 | 0 | 0 | 0 | 5,000 | 152,000 | 100,000 |
| | Non-Stock Material (A/P taxable) | 1,031,000 | 0 | 0 | 0 | 0 | 22,000 | 609,000 | 400,000 |
| | Contractors (A/P tax exempt) | 362,000 | 0 | 0 | 0 | 0 | 8,000 | 214,000 | 140,000 |
| | Overheads | 2,577,000 | 0 | 0 | 0 | 0 | 54,000 | 1,523,000 | 1,000,000 |
| | AFUDC* | 154,000 | 0 | 0 | 0 | 0 | 3,000 | 91,000 | 60,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 5,154,000 | 0 | 0 | 0 | 0 | 108,000 | 3,046,000 | 2,000,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 87,000 | 0 | 0 | 0 | 0 | 0 | 42,000 | 45,000 |
| | Labor (Monthly Payroll) | 173,000 | 0 | 0 | 0 | 0 | 0 | 83,000 | 90,000 |
| | Contractors (A/P tax exempt) | 29,000 | 0 | 0 | 0 | 0 | 0 | 14,000 | 15,000 |
| | Overheads | 288,000 | 0 | 0 | 0 | 0 | 0 | 138,000 | 150,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 577,000 | 0 | 0 | 0 | 0 | 0 | 277,000 | 300,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|--------------|------------|------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 1,356 | 501 | 855 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 4,011,700 Maximum (\$): 7,450,300

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

Risk of equipment failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$6,833,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 654,000 | 0 | 0 | 0 | 0 | 0 | 354,000 | 300,000 |
| | Labor (Monthly Payroll) | 327,000 | 0 | 0 | 0 | 0 | 0 | 177,000 | 150,000 |
| | Stock Materials | 327,000 | 0 | 0 | 0 | 0 | 0 | 177,000 | 150,000 |
| | Non-Stock Material (A/P taxable) | 1,308,000 | 0 | 0 | 0 | 0 | 0 | 708,000 | 600,000 |
| | Contractors (A/P tax exempt) | 458,000 | 0 | 0 | 0 | 0 | 0 | 248,000 | 210,000 |
| | Overheads | 3,270,000 | 0 | 0 | 0 | 0 | 0 | 1,770,000 | 1,500,000 |
| | AFUDC* | 195,000 | 0 | 0 | 0 | 0 | 0 | 105,000 | 90,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 6,539,000 | 0 | 0 | 0 | 0 | 0 | 3,539,000 | 3,000,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 44,000 | 0 | 0 | 0 | 0 | 0 | 29,000 | 15,000 |
| | Labor (Monthly Payroll) | 88,000 | 0 | 0 | 0 | 0 | 0 | 58,000 | 30,000 |
| | Contractors (A/P tax exempt) | 15,000 | 0 | 0 | 0 | 0 | 0 | 10,000 | 5,000 |
| | Overheads | 147,000 | 0 | 0 | 0 | 0 | 0 | 97,000 | 50,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 294,000 | 0 | 0 | 0 | 0 | 0 | 194,000 | 100,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 4,783,100 Maximum (\$): 8,882,900

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

1. Relays - The relays protect the electric transmission and distribution systems and can provide oscillography, targets, and phasor data. Electric System Protection (ESP) uses the relays to gather information on faults, including fault characteristics, fault locations, and phasor data. ESP interprets the oscillography data and then communicates our conclusions to: System Operations as an information point of contact; 2) Customer Services (Line Forces) to aid in fault locating and thereby limiting patrol time and area; 3) Operations Services for cases where there may be equipment issues.
2. Meters - The meters provide AC system quantities that are used to operate safely and to plan effectively for future system needs. The Electric Planning & Reliability area uses meter information for day-to-day operations (e.g., switching) and to aid in identifying and addressing locations requiring system reinforcements. System Operations (Sys Ops) uses meter data to monitor and operate the CH transmission system within the ratings of those facilities.
3. Controls and Communications - The RTUs, PLCs, and data concentrators provide status feedback and remote control capability; they also act as a conduit for meter and relay data. Sys Ops relies on the data provided by the RTUs and PLCs to monitor the status of the system from a centralized location, enabling them to respond quickly to system abnormalities. Also, Sys Ops has the ability to perform control operations through the RTUs and PLCs.

Equipment and Functions:

A variety of equipment exists in Central Hudson substations, including protective relays, meters, reclosers, and controls and communications instruments such as Remote Terminal Units (RTUs) and Programmable Logic Controllers (PLCs). Each of these components serves an integral role in contribution to the overall, integrated substation protection, control, and monitoring function. Various departments rely on information from these devices in order to perform their jobs, including Operations Services, Customer Services, line forces, Electric Transmission Planning, Distribution Planning, System Operations, Energy Accounting, and Electric System Protection. Brief summaries of these components are included in Attachments I through 4. The intention of this memo is to identify the concerns with continuing to use the identified outdated equipment, detail the benefits of combining functions when replacing equipment, establishing a policy for substation relaying, control, & monitoring functions, and laying out a plan to incorporate these components into a comprehensive substation renovation program.

I. Introduction:

Re: Substation Relays, Meters, Controls and Communications Infrastructure Opportunities

Mr. J.J. Borchert

June 24, 2011

Copy to:

Mr. P.E. Haering
 Mr. H.W. Turner
 Mr. P. Harpols

Mr. J. M. May
 Mr. D. J. Wittmann
 S.R. #2011-07

Waste Reduction:

New equipment can be utilized in an integrated fashion to eliminate or minimize the following tasks and unnecessary equipment (Excerpts are taken from the attached memos):

- Reading chart meters and manually entering data into the Meter Database (MDB).
 - Chart meters cost CH at least \$275,000 annually in labor expense (1130 man-hours), which can be devoted to other work.
- MV-90 circuits not for revenue or interchange metering purposes.
 - MV-90 circuits from Verizon cost CH approximately \$24,000 annually in expense.
- Running fault studies manually to determine fault locations.
 - Manual fault locating costs CH approximately \$15,000 annually in labor expenses.
- Metering transducers, auxiliary relays, timing relays, reclosing relays, and coil monitors.

Supporting the Future State:

New equipment, properly implemented and integrated, will better support current functions and create flexibility for added future functions as follows:

- Provide continuous metering data for the entire system, eliminating information “gaps” as a result of non-continuous and non-contiguous metering.
- Provide for robust planning capabilities and switching operations through use of trending and real-time data.
- Enable more accurate forecasting of area loads to increase risk tolerance, possibly resulting in deferral of substation and distribution projects.
- Offer flexibility for Distribution Automation and Smart Grid initiatives.
- Improve reliability and reduce CAIDI through automated event reporting and fault location.

II. Current State:

This section describes the mix of equipment by component, system wide, and the limitations of the non-digital devices.

1. Relays

There are 3500 active protection relays on the system, excluding LORs, SPRs, Regulator Controls, Recloser Controls, and Communication equipment.

Attachment 1

Copy to: Mr. P.E. Haering
Mr. H.W. Turner

Mr. P. Harpolis
Mr. J. M. May
S.R. #2011-03

June 23, 2011

Mr. J.J. Borchert

Re: Transmission & Distribution Protective Relay Review

Introduction:

Protective Relays represent a vital component for the reliable operation of the Central Hudson Electric Transmission and Distribution Systems. CH substations contain a generational mix of protective relay equipment that differs in capability, ease of use, and reliability. Relay technology has advanced; microprocessor-based (digital) relays not only offer numerous protection functions, but they provide metering capability as well in a compact footprint. This memo summarizes the existing transmission and distribution protective relay equipment, as well as recommendation for replacement options.

Discussion:

Relays perform various functions aimed at timely isolation of faulted areas and rapid restoration once the fault has been cleared. Some of the functions that relays provide include zone distance protection, high-speed pilot protection, overcurrent protection, differential protection, and automatic reclosing.

A. Outdated Devices:

The majority of substations contain a group of single-component electromechanical relays for each protected facility; these relays are responsible for protection functions exclusively. At these locations, metering is performed separately, also often in a single-function fashion. There are also stations that have more recent (but still outdated) types of relays, including solid state and early microprocessor relays. These relays have been failing recently, and a replacement program was created last year to address the concern with these relays. The following is a list (in order of decreasing replacement priority) of common relay types found in substations along with the reason that they have been superseded:

- Electromechanical Relays: These relays are obsolete for the reasons previously described (i.e.; physical size, calibration drift, single-function capabilities, etc).
- Solid State Relays: Like electromechanical relays, the relays on the CH system typically are single function. They have advanced technologically past the electromechanical relays, but not quite to the level of digital relays. They monitor current and voltage waveforms through analog circuits, which then are compared through potentiometers to user defined settings. They generally are unsupported, spare parts are hard to locate, and they contain components that deteriorate over time.

- 1st Generation Microprocessor Relays: Please see the 2010 Budget Memo, **Re: Relay Replacement Program for Upgrade of 1st Generation Microprocessor Relays Remaining on the Central Hudson System**, dated July 1, 2010, for the existing program.
- Schweitzer Engineering Laboratories (SEL) 200 Series Relays (SEL-251/ 267/ 279/ 2BFR): These relays are digital, but they make use of early logic processing methods, in which creating settings isn't as user-friendly as in modern digital relays. SEL has discontinued manufacturing parts for most of these relays, and limited service is provided with them.
- Basler BE1-79M Relays: These relays are multi-shot reclosing relays; they only provide the reclosing function. There are more recently developed relays that provide numerous protection functions and also perform reclosing operations and metering functions.
- Basler BE1-851 (H) Relays: These relays are multifunction, digital relays; however, they only receive current inputs. So, the only meter data available is Amps. Multifunction relays exist that receive current and voltage inputs and provide MW & MVar data as well as a much larger variety of protection options.

B. Retrofit/Replacement Options:

Digital relays offer multiple protection functions as well as metering and substation equipment diagnostics. The use of multifunction digital relays greatly reduces the required panel space. Also, with few moving parts, digital relays do not need recalibration to remain accurate. Additionally, digital relays and digital relay controls offer the ability to have longer durations between maintenance cycles due to the combination of their internal error checking and their constantly monitored alarm outputs to SCADA.

Digital relays can be specified to offer equipment diagnostics for the devices they protect. For example, digital transformer relays have the ability to monitor the through-fault history of the transformers and to make determinations on the required maintenance as a result. The same case is true for feeder breakers protected by distribution relays.

- Digital Relays: A collection of proven products exists by a variety of manufacturers. These relays are microprocessor-based, multi-function relays that provide a large variety of protection, metering, and equipment diagnostic capability; they can be used for various protective functions. Some manufactures include SEL, GE, and Basler*. Electric System Design (ESD) has standardized the design to use SEL as primary protection and either GE or Basler relays for backup protection.

* Basler provides a BE1-951 relay, which conveniently fits into electromechanical relay panel cutouts.

memo.

Full integration requires a DNP compatible Remote Terminal Unit described in the "RTU Review"

Eric A. Loeven

- ◆ They have lower maintenance costs because they rarely fail and allow for an increased maintenance cycle (i.e. an increase of 50%; from 4 yrs. to 6 yrs.).
 - ◆ They provide oscillography, targets, and phasor data that can be accessed from a remote location through a modem. This capability assists in timely and accurate fault analysis.
 - ◆ They have a proven track record of good quality and high availability, along with excellent manufacturer support for current models.
 - ◆ The diagnostic capabilities of digital relays should be used to help in the condition assessment of substation equipment.
 - ◆ They provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB/eDNA with little human intervention.
 - ◆ They offer a more compact footprint and much more capability than their large, single-function predecessors.
- Upgrading to digital relays provides the following benefits:

Conclusions:

- Time Synchronization Devices: Various devices exist on the market that provides a means of time synchronization, including satellite clocks. These clocks provide a unified signal based on a sole source located at zero time offset. To avoid confusion between time zones, UTC time is used as a standard. Sequence of events reconstruction truly realizes the value of having all of the station relays linked to a universal source.
- Data Concentrator (SEL-2032): This relay has 16 ports and can act as a data concentrator, a phone switch, and a basic logic processor. The 2032 connects to the RTU, acting as a slave device; it connects to other digital relays, polling them for meter information as master. Once in the 2032, the meter data can be mathematically manipulated to maintain integrity and precision before it is transferred to a compatible RTU. The 2032 also is connected to a phone line to provide dial-in remote access for trained personnel, enabling event retrieval and relay interrogation.

C. Additional Considerations:

Attachment 2

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-04

June 23, 2011

Mr. J.J. Borchert

Re: Substation Metering Review

Introduction:

Substation metering data is used to plan and operate the Central Hudson Transmission and Distribution Systems. These metering data are necessary for the safe operation of existing facilities as well as the cost effective planning and design of new facilities. Many transmission lines, substation transformers, and distribution circuits have their MW & MVA_r flows monitored by the Energy Management System (EMS) and have the resultant data stored in the Meter Data Base (MDB) and Historian (eDNA). Many other circuits either are not metered or utilize local indicating metering, such as graphic charts or drag hands, to register data.

Technology has advanced; there are much more reliable and efficient means of measuring and transmitting metered load data, including by means of digital relays. This memo summarizes the existing meter equipment and the replacement options, as well as provides recommendations on the best option to gain appropriate metering data in the most efficient manner.

Discussion:

A large number of substations contain transducer-based meters, which register and report their data directly to a Remote Terminal Unit (RTU) by means of an analog signal. A handful of other stations contain chart meters, which provide local indication. In the stations that have chart meters, the metering is often registered in single function fashion, with circuit current measured in Amps and transformer load measured in Kilowatts and Kilovars. The meter data that is most useful for planning and operating the system is provided in the form of Watts and Vars. Additionally, the panel space taken up by the charts can be reduced greatly with the installation of digital relays, which offer protection functions as well as metering functions.

Technological advances have led to multi-function, digital relays with the capability to meter accurately. The digital relays can transfer instantaneously metered values to EMS. Once there, the data is stored in the Historian, integrated, and the peak hourly values are calculated and transferred to the MDB with little human intervention.

A. Outdated Devices:

The following is a list of common metering methods used in CH substations along with the reason that they have been superseded:

- Chart Meters: Graphic charts monitor single values such as MW, MVA_r, or circuit Amps. These charts rely on diligent maintenance practices to ensure that they function

as designed. Many of the charts run out of ink between maintenance cycles or fail mechanically, leaving "gaps" in data. Even the charts that record properly pose difficulty in capturing their data. The process of going to the substations to collect the charts, reviewing the charts and interpreting the data, and entering the data manually into the MDB is time consuming. Due to the cumbersome nature of the process, the charts are only interpreted for the annual system peaks, which leaves 2-4 data points in the MDB for that circuit or station element to use in planning.

- Other Local Indication Metering: Charts are not the only method of local metering. There are also substation Ammeters, Voltmeters, etc. that are remnants of a time when stations were manned and operated manually. Many of these devices are unsupported and have limited parts available.
- MV-90: An alternative method to metering by charts is to meter through MV-90. MV-90 is a system that uses a recorder to receive metered data directly from the instrument transformers and relies upon a dedicated telephone line to transmit that data to the master station collector; it is used for revenue metering as well as substation metering. Once the master has the data, it is transferred to the MDB. This method requires a dedicated line and the associated expenses.
- No Metering: Locations exist on the system where there are no methods of capturing load data. Some of these locations rely on grouped metering; they do not provide the granularity of individual circuit load data. At other locations, it hasn't been cost justified to install/repair any metering.
- Transducers: The transducers are wired directly to secondary AC quantities from current transformers and potential transformers. They convert the input quantities into an analog output signal, which is wired to the analog inputs of an RTU.
- Load checks: On a heavily loaded day, load checks are performed on circuits without automatic metering by having a worker physically go to a point on a circuit and manually perform a metering check.

B. Retrofit/Replacement Options:

- Digital Relays: Microprocessor-based relays not only offer protection functions; they provide metering capability as well in a compact footprint. The digital metering data provided by the digital relays is extremely accurate and has the ability to be entered into the MDB through Supervisory Control and Data Acquisition (SCADA) automatically once proper infrastructure is in place. The relays offer the ability to register numerous metering values simultaneously and in comm. format so that individual wires aren't needed for each metered point; rather, a single cable can be used to transmit multiple data points. Also, a separate phone line is not required for this method.
- Bitronics Power Meters: These meters provide bi-directional Watt and Var meter values as well as Volt and Amp values. They are capable of transmitting data through analog signal or through communication protocol to an RTU. They are cheaper alternatives, but do not provide any protection functions.

- Grid Sense: These are clip-on meters that report to a nearby data concentrator via radio. The data concentrator is linked to a POT's line outside of the station (no need for a Positron). The newest models provide directional Watt and Var metering, and they have the ability to report data in selectable time increments to the meter database. They represent a lower cost option and provide limited fault recording capabilities, but they do not provide protection functions.

Conclusions:

- ◆ Reading chart meters takes a great deal of time, and many of the charts are unsupported and are labor intensive to maintain. Data "gaps" exist when using chart meters, and the meters provide only a few, data points to the MDB each year, which need manual entry. The materials to repair and/or replace the charts are in short supply.
- ◆ Digital relays provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB with little human intervention.
- ◆ The AC quantities that the digital relays require for protection can be used for metering as well; therefore, there is no need for additional wiring from the instrument transformers to meters. Additionally, transducer equipment, which is susceptible to drift and requires regular maintenance, is no longer needed.
- ◆ The MV-90 system is a fully functional system, and it is an efficient method of collecting meter data in stations that do not have the relay and/or RTU capability to transmit data. MV-90 metering requires a dedicated phone line to transmit the meter data; this reoccurring expense can be eliminated with digital relaying and a proper RTU.
- ◆ Grid Sense meters can be installed relatively inexpensively and quickly to provide stopgap metering data until upgrades can be completed. They require a phone line and the monthly expenses associated with the line.

Eric A. Loeven

Appendix 1: Estimated Costs of Current Methods and Retrofit Options

| <u>Current Methods</u> | Time (Manhours) | | Cost |
|--|----------------------------|-----|--------------|
| | Field | Eng | TOTAL |
| MV-90 yearly (per station on average) | | | \$1,200 |
| Chart Meter maintenance & data retrieval | 1 | 10 | \$1,250 |

Note 1

Note 1: This cost is to retrieve the circular chart, review it, and enter it into the database. This process takes place on a suspected system peak day. At minimum, there are two times a year that this process is performed (Summer Peak and Winter Peak); however, there may be four or more times depending on when the actual peak occurs.

| <u>Retrofit Options</u> | Time | | | | Cost | | | TOTAL |
|--|--|-------|-------|-----|--------------|---------------------------------|----------|--------------|
| | Manhours | | | | Parts | Labor | | |
| | Tech | Elect | Draft | Eng | Device | Test Sw., Steel, etc. (w/OH) | | |
| Grid Sense Meter W / VAr | Hours are for the EOE and the Linemen. | | | | \$4,775 | | | \$5,700 |
| Data Concentrator 1 for every 4 ckt. | Per installation, each meter takes the lineman and the EOE 15 minutes to install. | | | | \$2,272 | | | \$2,700 |
| POT Line | Each data concentrator requires 20 minutes of lineman time and 15 minutes of EOE time. | | | | \$100 | | | \$110 |
| Labor (including travel time) per Station | Travel to each site has been assumed to be 1 hour. | | | | -waived- | | \$430 | \$430 |
| Site Registration per D/C | | | | | | | | |
| TOTAL GS Installation | | | | | | | | \$9,000 |
| Bitronics (Comm) | 40 | | 40 | 8 | \$2,000 | \$1,000 | \$11,400 | \$15,000 |
| Bitronics (HW-W/VAr/V) | 40 | | 40 | 12 | \$1,100 | \$1,000 | \$12,000 | \$14,500 |

Attachment 3

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-05

June 23, 2011

Mr. J.J. Borchert:

Re: Remote Terminal Unit Review

Introduction:

Real-time control and status feedback are vital components of a properly functioning substation. Without someone at the substation 24/7, a means of providing feedback and control operations is required; that means is a Remote Terminal Unit (RTU). This memo will describe the current state of the RTUs on the system, as well as the opportunity areas for retrofits and justification for the upgrades.

Discussion:

RTUs provide a means of transmitting important data in a substation to a master station via Supervisory Control and Data Acquisition (SCADA). The RTUs collect status and metering data and transmit it to a master station when polled. Also, they perform control operations that are initiated from the master station in a remote location. The RTUs can be dedicated line or dial-up depending on the application. RTUs have evolved with technology; existing CDC RTUs (protocol and provider) have been replaced with new flash ROM RTUs that utilize protocol suites including, but not limited to, CDC and the utility standard, DNP.

A. Outdated Devices:

- CDC 44-500 & CDC 88-90: These are different versions of dedicated line RTUs provided by CDC, a company that no longer exists. Retrofits have been performed to eliminate the CDC RTUs on the system because of the inability to get spare parts and due to their incompatibility with the digital relays. These RTUs utilize CDC protocol, which is an outdated protocol incapable of communicating with digital relays/data concentrators and is unable to receive digital metering data. They rely on analog signals and pulse accumulators sent from transducers to transmit meter information.
- G.E. M-4000: This is a smaller version of the G.E. Harris D20 RTU. It is used mainly in dial-up applications and is polled twice daily for SCADA data. It will report unsolicited if there is a change of status or if a metered point's dead band is exceeded. Based on the frequency that dial-up RTUs are polled, they cannot be used as sources to the meter database. Also, dial-up RTUs are not reliable because they rely on a plain old telephone (POT) line for communication. Due to this lack of reliability, control operations typically are not performed with dial-up RTUs. As a plus, the M-4000 has the capability to communicate through CDC or DNP protocol, and it also can be configured as a dedicated unit.

- G.E. D20: The functionality and hardware of this RTU are consistent with many modern RTUs; however, the configuration software is not user-friendly and uses a complicated, layered architecture. Additionally, with retiring technicians, the available workforce skilled in working with the configuration software is dwindling. This fact is of concern because emergency fixes will take longer to complete.

B. Retrofit/Replacement Options:

- Telvent Sage 2400¹: Telvent offers an RTU that fits into existing CDC RTU cabinets, and it has peripheral cards that resemble the CDC RTU cards. For these reasons, Telvent is the vendor of choice, providing the most seamless retrofit option. Telvent also offers a protocol suite for communications, including DNP and CDC. The DNP Master protocol allows direct communication with SEL-2020/2030/2032 data concentrators to transfer metering data from numerous digital relays in a substation.

C. Additional Considerations:

- Radio linked RTUs: As previously stated, the M-4000 can be polled as a dedicated RTU or as a dial-up unit. If there is a nearby, dedicated RTU, it is sometimes possible to install a radio link between the two stations and poll the M-4000 from the other station. In this configuration, there is access to real-time information and the ability to perform control operations at both stations. The need for the Positron Box at the radio-linked station is eliminated, and there is no extra cost incurred by installing a phone line and a Positron Box. The radio links require a clear line of site from one station to the next in order for the signal to be transmitted clearly. As such, the reliability of the circuits is largely dependent upon the terrain. Radio signals are also susceptible to interference from other mobile devices such as CB Radios.
- Positron Boxes: One major cost associated with RTUs, dedicated or dial-up, is the phone company's requirement of a Positron Box to isolate the outside phone line from the electric substation. This requirement is in place to provide a level of comfort for the phone company technician working in our substations, many of the existing stations have been allowed to function without this isolation in a grandfathered manner. However, any time that RTU retrofits are performed at these stations, the installation of a Positron Box is required. They are an expensive piece of equipment and have long lead times that may impact project schedules. There also is continued reliance on the phone company for maintenance and repairs.

¹ Telvent has been chosen as the preferred RTU for retrofits due to ease of configuration/use and the techs' familiarity with the units. All RTU cost estimates in this report are based on using this RTU.

Conclusions:

Upgrading old CDC, M-4000, and D-20 RTUs to Telvent RTUs provides the following benefits:

- ◆ Telvent RTUs are reliable and parts are available readily.
- ◆ The Telvent configuration software is user-friendly, making configuration and testing faster.
- ◆ DNP RTUs, of which Telvent is one, can receive communication-based metering & status and transmit it to the SCADA master.
- ◆ The Telvent RTU retrofits for the CDC 44-500's utilize the existing RTU cabinet and high powered tripping relays. The Telvent replaces the equipment susceptible to failure and makes use of the existing equipment that is less prone to failure.
- ◆ Using Telvent RTUs provides timesavings through standardization, and the engineers and technicians alike prefer to work with the Telvent for RTU retrofits.

Consideration also should be given to converting dialup RTUs to dedicated line RTUs. Dialup RTUs rely on POT lines, which have notoriously poor reliability; additional steps and equipment are required to perform the control operations safely. In contrast, dedicated line RTUs offer signal reliability, which provides the ability to perform control operations safely without added equipment and procedure steps.

Eric A. Loeven

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. D. J. Dittmann
Mr. J. M. May
S.R. #2011-06

June 23, 2011

Mr. J.J. Borchert

Re: Substation Recloser Review

Introduction:

Substation reclosers provide an alternate method of interrupting fault current on distribution and sub-transmission circuits. They are a convenient way to provide circuit protection in locations where it is not cost effective to install a circuit breaker and associated conduit to a control house. One disadvantage of using a recloser rather than a circuit breaker is that the recloser has reduced interrupting capability.

Recloser technology has advanced; hydraulic, oil-filled devices have given way to vacuum-interrupted, microprocessor-based (digital) recloser controls. This memo summarizes the existing substation recloser equipment, as well as replacement options. Also, this memo provides recommendations on the best retrofit options.

Discussion:

“An automatic circuit recloser is a self-contained device, which can sense and interrupt fault currents as well as reclose automatically in an attempt to re-energize a line.”* The existing hydraulic reclosers, a kin to electromechanical relays, have single component capability with limited flexibility in setting pickup curves, very little intelligence, and minimal ability to report feedback. New, digital recloser controls provide a wide range of pickup curves, are self-monitoring, grant instant notification of operations, offer desired metering capabilities, and require less frequent routine maintenance.

A. **Outdated Devices:**

Reclosers were installed in substations as a cost effective alternative to a distribution (15kV) or sub-transmission (34.5kV) circuit breaker combined with a reclosing relay. They can be single-phase or three-phase, be controlled mechanically (hydraulic) or digitally, and they have interrupting mediums of oil or vacuum. They make use of a series of fast and slow curves, providing coordination versatility and protection flexibility. A brief summary of the outdated reclosers on the CH system, specifically the hydraulically controlled type and the oil-interrupted type, is as follows:

- o Hydraulically controlled reclosers: These reclosers are self-contained and self-controlled; they have oil or vacuum interrupters. They are outdated due to their

* Page 124. Power Distribution Engineering: Fundamentals and Applications. James J. Burke. 1994.

C. Additional Considerations:

- Telemetric Interface: The Telemetric RTM II device can be installed to provide status and control of the SEL-651R DNP3 points. These data travel via cellular network and are displayed via a secure web interface. In addition, data travel to a SCADA Xchange server and then over frame relay to our SCADA system.
- R-Mag Circuit Breakers: As the most direct comparison to the substation recloser, these circuit breakers are a packaged breaker and relay combination. They are relatively inexpensive to install and there is familiarity with them by the techs, electricians, and engineers alike. These breakers provide a higher interrupting capability than the reclosers.

Conclusions:

Upgrading to vacuum interrupted, digitally controlled Viper reclosers provides the following benefits:

- ◆ Vacuum Interruption –
 - The speed of operation on these reclosers is not compromised by temperature.
 - The maintenance on these reclosers is not as labor-intensive as the oil-filled reclosers. They can operate up to 10,000 times before requiring an overhaul, with only the battery requiring simple in-field replacement in the meantime.
- ◆ Digital Control –
 - These recloser controls provide a wide range of pickup curves, which makes coordination easier and much more flexible than the hydraulically controlled reclosers.
 - These recloser controls offer digital metering capability and fault notification. The recloser can transmit its information through SCADA if the proper infrastructure is in place, or through Telemetric in stations with under-developed SCADA infrastructure.
 - These recloser controls can be interrogated to gather oscillography, targets, and phasor data from a remote location through a modem. This capability assists in timely and accurate fault analysis.

Some of the lower cost is lost when the recloser is installed in a substation if it is connected to the RTU in the control house, rather than through the Telemetric Unit. In this case, the added cost of conduit, steel work, and/or foundation needs to be considered. Regardless of the method of reporting to SCADA, installing the recloser in a substation comes with the added costs associated with technician time to commission and test the recloser and digital control over the cost of an installation on a distribution circuit.

Eric A. Loeven

Appendix 1: Estimated Costs of Retrofit Options

| Retrofit Options | Cost | | |
|---|----------|-----------|--------|
| | Parts | TOTAL | |
| Viper Reclosers with control relay and PT (on dist circuit) | \$21,000 | \$33,500 | Note 1 |
| Viper Reclosers with control relay (in a substation - Telemetric communication) | \$20,500 | \$33,000 | Note 1 |
| Viper Reclosers with control relay (in a substation - RTU communication) | \$20,500 | \$86,000* | Note 2 |
| R-Mag Breaker | \$25,000 | \$90,000 | |

Note 1: These represent one-time costs. There are additional annual costs for the SCADA Frame relay and the SCADA X-Change to Telemetric. The SCADA Frame Relay costs \$5200/yr. The SCADA X-Change to Telemetric costs \$2000/yr for 100 devices and \$1,500 for each 50 devices after that.

Note 2: This cost is estimated based on proposed work to bring the data through the RTU. No installations exist at this time in this manner.

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|-------|----------|--|
| Accord | 4 | 361 Ckt. | Charts - kW | ----- | EM | NONE | ----- | Retired as part of P/MK Upgrade |
| Ancram | 13.8 | 7085 Ckt. | Grid Sense | ----- | EM | NONE | ----- | Only has a 13.8 Voltage Regulator |
| Balmville | | | | | EM | | | |
| Balmville | 4 | 411 Ckt. | MV-90 | ----- | EM | | | |
| Balmville | 4 | 412 Ckt. | MV-90 | ----- | | C-300 | | |
| Barnegat | | | | | | | | Metering source? |
| Barnegat | 115 | KB Line | Amps | EM | ----- | | | |
| Barnegat | 115 | KC Line | None | EM | ----- | | | |
| Barnegat | 115 | KB-749-KC BKR | | EM | ----- | | | |
| Barnegat | 115/13.8 | T1 | SCADA | ----- | | | | IBM Feeds |
| Barnegat | 115/13.8 | T2 | SCADA | ----- | | | | |
| Barnegat | 13.8 | S1 | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2 | SCADA | ----- | EM | | | |
| Barnegat | 13.8 | S1-706 BKR | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2-734 BKR | SCADA | ----- | EM | | | |
| Beacon | | | | | | D-20 | | |
| Beacon | 13.8 | 8006 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 13.8 | 8015 Ckt. | SCADA | ----- | EM | | | Previously 8087A? |
| Beacon | 4 | 801 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 802 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 803 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | W-414 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | W-463 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | Bus 1 | SCADA | ----- | | | | |
| Beacon | 4 | Bus 2 | SCADA | ----- | | | | |
| Beacon | 13.8/4 | T1 | SCADA | ----- | EM | | | |
| Beacon | 13.8/4 | T2 | SCADA | ----- | EM | | | MDB has an entry with T1+T2 calculated |
| Beacon | 13.8 | BF Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | NM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | CM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 1 | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 2 | SCADA | ----- | EM | | | |
| Bethlehem Rd. | | | | | | 2400 | | |
| Bethlehem Rd. | 13.8 | 4091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4092 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4093 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4094 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4095 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4096 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4097 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4098 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 1 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 2 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 115 | RD Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | UB Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | RD-604-UB BKR | | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T1 | EMS | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T2 | EMS | EM | ----- | | | Metering combined |
| Bethlehem Rd. | 13.8 | W-613 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-619 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-804 BKR | | | EM | | | |
| Bordman Rd. | | | | | | NONE | | |
| Bordman Rd. | 13.8 | 6081A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | 6082A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-203 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-204 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-205 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-206 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-207 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-208 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-209 Ckt. | | ----- | EM | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|---------------|--------------------|-------------|-------------|--------|----------|---|
| Boulevard | | | | | | 2100 | | |
| Boulevard | 69 | OB Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | I Line | SCADA | uP | ----- | ----- | ----- | Line Amps & WVAR |
| Boulevard | 13.8 | KO Line | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | KK Line | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1011 | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1012 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1013 | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1014 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 69 | Bus 1 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Bus 2 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Overall | ----- | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | Metering combined |
| Boulevard | 69/13.8 | T3 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Clinton Ave. | | | | | | M-4000 | | |
| Clinton Ave. | 4 | 395 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 396 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 397 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | Bus | SCADA | ----- | ----- | ----- | ----- | |
| Clinton Ave. | 13.8/4 | T1 | MV-90 | ----- | Fuse | ----- | ----- | |
| Cold Spring | | | | | | NONE | | |
| Cold Spring | 4 | 871 Ckt. | Charts - kW | ----- | EM | ----- | ----- | Install a Grid Sense Package for two (2) circuits. |
| Cold Spring | 4 | 872 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Coldenham | | | | | | D-20 | | |
| Coldenham | 13.8 | 4021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4026 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4027 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4028 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | B1-B2 Tie | ----- | ----- | EM | ----- | ----- | |
| Coldenham | 115 | J Line | SCADA | Gen 1 | ----- | ----- | ----- | 95P is DLP; 95BU is REL-301; part of replacement program already. |
| Coldenham | 115 | CW Line | SCADA | Gen 1 | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115 | J-19-CW BKR | ----- | SS | ----- | ----- | ----- | |
| Converse St. | | | | | | NONE | | |
| Converse St. | 4 | 121 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 122 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 123 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | | | | | | NONE | | |
| Conway Place | 4 | 881 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | 4 | 882 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Coxsackie | | | | | | 8890 | | |
| Coxsackie | 13.8 | 1071 Ckt. | Charts - Amps | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | 1072 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | 1074 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Coxsackie | 13.8 | 1076 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | Bus 1 (T1+G1) | SCADA | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | Bus 2 | ??? | ----- | EM | ----- | ----- | Metering data available through relay, but not configured. |
| Coxsackie | 69 | CN Line | None | uP | ----- | ----- | ----- | |
| Coxsackie | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | 95P is SEL-587 |
| Coxsackie | 69/13.8 | T1 | Charts - Amps | uP/EM | ----- | ----- | ----- | |
| Coxsackie | 13.8 | G1 | SCADA | ----- | ----- | ----- | ----- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------------|--------------------|-----------------------|---------------|-------------|-------------|-------|----------|---|
| Danskammer | | | | | | 2100 | | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | AC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DB Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DR Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DW Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | RS Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | W - 323 BKR | ----- | SS | ----- | ----- | ----- | |
| Danskammer | 115 | North Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | Middle Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | South Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | DB-1171 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | DR-1421 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | DW-1061 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | T5&T6 | SCADA | EM | ----- | ----- | ----- | |
| Dashville | | | | | | 2300 | | |
| Dashville | 4 | 345 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single Phase; Vac; Hydr |
| Dashville | 6.6 | Bus | ----- | ----- | EM | ----- | ----- | |
| Dashville | | T1 | ----- | EM | ----- | ----- | ----- | Fused Transformer w/ CR 67 relay |
| Dashville | | G1-G2 | SCADA | ----- | ----- | ----- | ----- | |
| East Fishkill 345kV | | | | | | | | |
| East Fishkill 345kV | 345 | C9751 Breaker A1 BR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 345 | C9751 Breaker A2 BR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 1 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 2 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill | | | | | | 8890 | | |
| East Fishkill | 115 | EF Line | SCADA | uP* | ----- | ----- | ----- | 95P is MDAR; 95BU is Optimho - Replacing with 311C & D60. |
| East Fishkill | 115 | HF Line | SCADA | uP* | ----- | ----- | ----- | 95BU is Optimho - Replacing with D60. |
| East Fishkill | 115 | EF-672 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | EF-679 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | W-640 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | T1 | SCADA | see EFB | ----- | ----- | ----- | |
| East Kingston | | | | | | Orion | | |
| East Kingston | 13.8 | Bus 1 | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | Bus 2 | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1021 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1026 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1027 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1028 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 115 | ER Line | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115 | LR Line | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115 | LR-201-ER Breaker | ----- | uP | ----- | ----- | ----- | |
| East Kingston | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| East Kingston | 115/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| East Park | | | | | | 8890 | | |
| East Park | 13.8 | 6073 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6074 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6075 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| East Park | 69 | Q Line | None | EM | ----- | ----- | ----- | 95P is SEL-587 |
| East Park | 69/13.8 | T1 | SCADA | uP/EM | ----- | ----- | ----- | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|------------------|-------------|-------------|------|----------|--|
| East Walden | | | | | | 2400 | | |
| East Walden | | | | | EM/uP | | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5041 Ckt. | Grid Sense | ----- | EM/uP | | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5042 Ckt. | Grid Sense | ----- | EM | | | GS not working |
| East Walden | 13.8 | 5043 Ckt. | Grid Sense | ----- | | | | Com |
| East Walden | 13.8 | Com Equipment | ----- | ----- | uP | | | |
| East Walden | 13.8 | B1 | SCADA | ----- | | | | 95P is DLP; part of replacement program already. |
| East Walden | 115 | CW Line | None | Gen1/uP | ----- | | | |
| East Walden | 115 | CW-712 | ----- | EM | | | | |
| East Walden | 115 | D Line | None | EM | | | | |
| East Walden | 115 | D-722 BKR | ----- | EM | | | | |
| East Walden | 115 | DW Line | SCADA | ----- | uP | | | |
| East Walden | 115 | DW-1071 BKR | ----- | uP | | | | |
| East Walden | 115 | EM Line | SCADA | ----- | uP | | | |
| East Walden | 115 | EM-642 BKR | ----- | uP | | | | |
| East Walden | 69 | WM Line | SCADA | ----- | uP | | | Amps & Volts |
| East Walden | 115 | W-644 | ----- | EM | | | | |
| East Walden | 115 | B1 | SCADA | ----- | EM | | | Combine Bus Volts to one point |
| East Walden | 115 | B2 | ----- | EM | | | | 95P is SEL-587 |
| East Walden | 69/13.8 | T1 | SCADA | ----- | uP/EM | | | 95BU is SEL-587 |
| East Walden | 69/13.8 | T3 | SCADA | ----- | EM/uP | | | |
| Fishkill Plains | | | | | | D-20 | | |
| Fishkill Plains | 13.8 | 8091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Fishkill Plains | 13.8 | 8092 Ckt. | MV-90 | ----- | EM | | | |
| Fishkill Plains | 13.8 | 8093 Ckt. | SCADA | ----- | uP-200 | | | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8094 Ckt. | SCADA | ----- | uP-200 | | | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8095 Ckt. | SCADA | ----- | uP | | | |
| Fishkill Plains | 13.8 | 8096 Ckt. | SCADA | ----- | uP | | | |
| Fishkill Plains | 115 | HF Line | SCADA | uP/Gen 1 | ----- | | | 95BU is Optimho; part of replacement program. |
| Fishkill Plains | 115 | HF-703 BKR | ----- | EM | | | | |
| Fishkill Plains | 115 | NF Line | None | EM | | | | |
| Fishkill Plains | 115 | A Line | SCADA | ----- | uP | | | |
| Fishkill Plains | 115 | A-1036-FP | ----- | uP-200 | | | | 279/2BFR relays |
| Fishkill Plains | 115 | A-1498 | ----- | uP-200 | | | | 279/2BFR relays |
| Fishkill Plains | 115 | Com Equipment | ----- | ----- | | | | Com |
| Fishkill Plains | 115 | FP Line | SCADA | uP/Gen 1 | ----- | | | 95P is DLP; part of replacement program already; 95BU is SEL-321 |
| Fishkill Plains | 115 | B1 | SCADA | ----- | EM | | | |
| Fishkill Plains | 13.8 | B1 | ----- | EM | | | | Combine Bus Volts to one point |
| Fishkill Plains | 13.8 | B2 | SCADA | ----- | EM | | | |
| Fishkill Plains | 115/13.8 | T1 | ----- | EM/uP | | | | 95BU is SEL-587; metering is combined. |
| Fishkill Plains | 115/13.8 | T2 | SCADA | ----- | EM/uP | | | |
| Forgebrook | | | | | | 2300 | | |
| Forgebrook | 13.8 | Bus #1 | ----- | ----- | EM | | | |
| Forgebrook | 13.8 | Bus #2 | Charts - kW/kVAR | ----- | EM | | | |
| Forgebrook | 13.8 | 8011 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8012 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8013 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8014 Ckt. | Charts - kW | ----- | uP/EM | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8015 Ckt. | Charts - kW | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8016 Ckt. | Charts - kW | ----- | EM | | | No Chart Data |
| Forgebrook | 115 | Com Equipment | ----- | ----- | | | | Com |
| Forgebrook | 115 | FO Line | None | EM | | | | |
| Forgebrook | 115 | FO-1430-FT | ----- | EM | | | | |
| Forgebrook | 115 | FT Line | None | EM | | | | |
| Forgebrook | 115 | FT-1432 | ----- | EM | | | | |
| Forgebrook | 115 | FT-882-WF | ----- | EM | | | | |
| Forgebrook | 115 | WF Line | SCADA | ----- | uP | | | |
| Forgebrook | 13.8 | CM Line | None | ----- | EM | | | Amps |
| Forgebrook | 13.8 | BF Line | SCADA | ----- | EM | | | |
| Forgebrook | 13.8 | W-1486 | ----- | ----- | EM | | | |
| Forgebrook | 13.8 | W-994 | ----- | ----- | EM | | | |
| Forgebrook | 115/13.8 | T1 | ----- | EM | | | | Metering combined |
| Forgebrook | 115/13.8 | T2 | SCADA | ----- | EM | | | |

572

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|------------------|-------------|-------------|---------------------------|----------|--|
| Freehold | | | | | | M-4000 | | |
| Freehold | 13.8 | 2061 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | 2071 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | W-1155 BKR | ----- | ----- | ----- | ----- | PR-560M | 3 phase; oil; electronic |
| Freehold | 13.8 | T1 | Charts - kW/kVAr | fuse | ----- | ----- | ----- | |
| Freehold | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | |
| Galeville | | | | | | Orion | | |
| Galeville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5030 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5031 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5032 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5033 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5034 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5035 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Galeville | 69 | MG Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69 | MG-200-MK BKR | ----- | uP | ----- | ----- | ----- | |
| Galeville | 69 | MK Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| Greenfield Rd. | | | | | | M-4000 | | |
| Greenfield Rd. | 13.8 | 3076 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 13.8 | 3078 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 4 | 375-376 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 4 | 377-378 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | W-1608 | ----- | ----- | EM | ----- | ES | 3 phase; oil; electronic |
| Greenfield Rd. | 13.8/4 | T2 | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Greenfield Rd. | 4 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Greenfield Rd. | 4 | B3 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Grimley Rd. | | | | | | NONE-Soon to have DNP RTU | | |
| Grimley Rd. | 4 | 385 Ckt. | Grid Sense | ----- | EM | ----- | Kyle L | Single Phase; Oil; Electronic |
| Grimley Rd. | 4 | 386 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| Hibernia | | | | | | Micro 1C | | |
| Hibernia | 13.8 | 7011 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | 7012 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 69/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | | | | | | D-20 | | |
| High Falls | 13.8 | 3021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 69 | HK Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 69 | HK-696-P BKR. | ----- | ----- | uP- 200 | ----- | ----- | SEL-279 |
| High Falls | 69 | P Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 13.8 | W-998 BKR. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | B1 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | B2 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |
| High Falls | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |

573

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|--------------------|----------|-------------|-------------|--------|----------|---|
| Highland | | | | | | 2300 | | |
| Highland | | | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5081 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5082 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5083 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | 5084 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | 5085 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 115 | HR Line | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | OR Line | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | OR-761-HR BKR. | ---- | EM | ---- | ---- | ---- | |
| Highland | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | |
| Highland | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Highland | 115/13.8 | T1 | SCADA | uP/EM | ---- | ---- | ---- | 95BU is SEL-587 |
| Highland | 115/13.8 | T2 | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | | | | | | D-20 | | |
| Honk Falls | 13.8 | 3071 Ckt. | SCADA | ---- | EM | ---- | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | 3072 Ckt. | SCADA | ---- | EM | ---- | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | B1 | SCADA | EM | ---- | ---- | ---- | |
| Honk Falls | 69 | GM Line | SCADA | EM/uP | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | HG Line | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | 69 | HK Line | SCADA | uP/EM | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | MK Line | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | 69 | WH Line | SCADA | uP/EM | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | overall diff B1+T1 | SCADA | EM | ---- | ---- | ---- | |
| Honk Falls | 69/13.8 | T1 | ---- | fuse | ---- | ---- | ---- | |
| Hunter | | | | | | M-4000 | | |
| Hunter | 34.5 | Z-666 | | | | | VR-3S | 3 phase; vac; hyd |
| Hunter | 13.8 | 2081 Ckt. | MV-90 | ---- | ---- | ---- | Kyle W | 3 phase; oil; hyd |
| Hunter | 13.8 | Cap Bank | ---- | ---- | EM | ---- | ---- | |
| Hurley Ave. 345kV | | | | | | 2400 | | |
| Hurley Ave. 345kV | 345 | 30151 BKR. | ---- | EM | ---- | ---- | ---- | 79 Relay is EM |
| Hurley Ave. 345kV | 345 | 30151 A1 BF | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30152 A2 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 301 Line A1 | SCADA | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 301 Line A2 | SCADA | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30353 BKR. | ---- | EM* | ---- | ---- | ---- | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30353 A1 BF | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30353 A2 BF | ---- | EM* | ---- | ---- | ---- | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 30354 BKR. | ---- | EM* | ---- | ---- | ---- | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30354 A1 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30354 A2 BF | ---- | EM* | ---- | ---- | ---- | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 303 Line A1 | SCADA | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 303 Line A2 | SCADA | EM* | ---- | ---- | ---- | In process replacement with GE D90 |
| Hurley Ave. 345kV | 345 | Bus A1 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | Bus A2 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 BKR. | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 A1 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 A2 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A1 Out of Step | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A2 Out of Step | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A1 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A2 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | T1 LS | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | B1 | SCADA | ---- | ---- | ---- | ---- | Volts |

574

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------|--------------------|---------------|----------------------|-------------|-------------|--------|----------|---|
| | | | | | | 2400 | | |
| Hurley Ave. | | | | | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2091 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2092 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2093 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2094 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 115 | Cap Bank | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | HP Line | SCADA | EM | ---- | | | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 69 | I Line | SCADA | Gen1 | ---- | | | |
| Hurley Ave. | 115 | OR Line | SCADA | EM | ---- | | | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 69 | SB Line | SCADA | Gen1 | ---- | | | |
| Hurley Ave. | 115 | HP-1643 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | OR-1640 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 69 | W-142 BKR. | ---- | uP | ---- | | | |
| Hurley Ave. | 13.8 | W-1575 BKR. | ---- | EM | EM | | | |
| Hurley Ave. | 115 | W-389 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | B1 | None | EM | ---- | | | |
| Hurley Ave. | 115 | B2 | SCADA | EM | ---- | | | Volts |
| Hurley Ave. | 69 | B1 | SCADA | EM | ---- | | | Volts |
| Hurley Ave. | 13.8 | B1 | SCADA | ---- | EM | | | Volts |
| Hurley Ave. | 115/69 | T3 | SCADA | EM | ---- | | | |
| Hurley Ave. | 115/13.8 | T4 | SCADA | EM | ---- | | | |
| Hurley Ave. | 69/13.8 | T5 | ---- | EM | ---- | | | |
| | | | | | | 3030 | | |
| Inwood Ave. | 13.8 | 6061 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6062 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6063 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6064 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6065 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6066 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6067 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6068 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Inwood Ave. | 115 | IR Line | SCADA | uP | ---- | | | |
| Inwood Ave. | 115 | IR-201-X BKR. | ---- | uP | ---- | | | |
| Inwood Ave. | 115 | X Line | SCADA | uP | ---- | | | |
| Inwood Ave. | 13.8 | B1 | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | B2 | SCADA | ---- | uP | | | |
| Inwood Ave. | 115/13.8 | T1 | SCADA | uP | ---- | | | |
| Inwood Ave. | 115/13.8 | T2 | SCADA | uP | ---- | | | |
| | | | | | | M-4000 | | |
| Jansen Ave. | 13.8 | 1001 Ckt. | MV-90 | ---- | uP | | | |
| Jansen Ave. | 13.8 | 1002 Ckt. | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | 1003 Ckt. | MV-90 | ---- | uP | | | |
| Jansen Ave. | 13.8 | 1004 Ckt. | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | KL Line | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | KO Line | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | B1 | SCADA | ---- | EM | | | |
| Jansen Ave. | 13.8 | B2 | SCADA | ---- | EM | | | |
| Jansen Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Jansen Ave. | 13.8 | T - Grounding | MV-90 | ---- | uP | | | |
| | | | | | | 8890 | | |
| Kerhonkson | 13.8 | 3081 Ckt. | Grid Sense | ---- | EM | | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 13.8 | 3082 Ckt. | Grid Sense | ---- | EM | | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 69 | MK-929 MOS | ---- | EM | ---- | | | |
| Kerhonkson | 69 | MK-930 MOS | ---- | EM | ---- | | | |
| Kerhonkson | 69/13.8 | T1 | Charts - kW/kVar IGS | fuse | ---- | | | Amps for each Transformer |
| Kerhonkson | 69/13.8 | T2 | | fuse | ---- | | | Volts & Amps |
| Kerhonkson | 69 | HK | SCADA | ---- | ---- | | | Volts & Amps |
| Kerhonkson | 69 | MK | SCADA | ---- | ---- | | | Volts & Amps |

Electric Substation Upy. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-----------------|------------------------|-------------|-------------|--------|----------|--------------------------------------|
| Knapps Corners | | | | | | 2100 | | |
| Knapps Corners | | | Charts - Amps/SCADA | | uP | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8021 Ckt. | Charts - Amps | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8022 Ckt. | Charts - Amps | | uP/EM | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8023 Ckt. | Charts - Amps/SCADA | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8024 Ckt. | Charts - kW | | EM | | | |
| Knapps Corners | 13.8 | 8025 Ckt. | Charts - kW | | | | | Com |
| Knapps Corners | 13.8 | Com Equipment | | | | | | |
| Knapps Corners | 115 | KB Line | None | EM | | | | SEL-279 |
| Knapps Corners | 115 | KB-1558-MC BKR. | | uP-200 | | | | |
| Knapps Corners | 115 | SK Line | SCADA | | uP | | | Amps |
| Knapps Corners | 13.8 | KN Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KR Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KS Line | SCADA* | EM | | | | |
| Knapps Corners | 69 | KM Line | SCADA | uP | | | | |
| Knapps Corners | 69 | TR Line | SCADA | EM | | | | |
| Knapps Corners | 69 | G Line | SCADA | uP | | | | |
| Knapps Corners | 13.8 | W-1215 BKR. | | | EM | | | |
| Knapps Corners | 69 | W-1409 BKR. | | | uP | | | |
| Knapps Corners | 13.8 | W-1462 BKR. | | | EM | | | |
| Knapps Corners | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Knapps Corners | 13.8 | B2 | | | EM | | | |
| Knapps Corners | 13.8 | B3 | | | EM | | | |
| Knapps Corners | 69 | 69k Bus | SCADA | EM | | | | Volts |
| Knapps Corners | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Knapps Corners | 115/13.8 | T3 | | EM | | | | |
| Knapps Corners | 115/69 | T2 | | SCADA | uP | | | |
| Lawrenceville | | | | | | M-4000 | | |
| Lawrenceville | 34.5 | 2385 Ckt. | Grid Sense | EM/uP | | | CXE-400A | 3 phase; oil; hyd |
| Lawrenceville | 34.5 | B1 | SCADA* | | | | | Volts |
| Lawrenceville | 69/34.5 | T1 | MV90/Grid Sense/SCADA | EM | | | | Amps. |
| Lincoln Park | | | | | | 2300 | | |
| Lincoln Park | 13.8 | Com Equipment | | | | | | Com |
| Lincoln Park | 13.8 | 2011 Ckt. | Charts - Amps | | EM | | | |
| Lincoln Park | 13.8 | 2012 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2013 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2014 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2015 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2016 Ckt. | Charts - kW | | EM/uP* | | | GE F60 installed HiZ pilot |
| Lincoln Park | 13.8 | 2017 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2018 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 1 | | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 2 | | | EM | | | |
| Lincoln Park | 115 | HP Line | None | EM | | | | Relay Replacement Program in process |
| Lincoln Park | 115 | HP-1318 BKR. | | EM | | | | |
| Lincoln Park | 13.8 | KL Line | Charts - kW/kVar/SCADA | EM | | | | Amps to SCADA |
| Lincoln Park | 115 | LR-1219-HP BKR. | | EM | | | | |
| Lincoln Park | 115 | LR Line | SCADA | uP | | | | |
| Lincoln Park | 13.8 | W-1321 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-45 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-534 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-554 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-206 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-207 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-525 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-528 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Lincoln Park | 13.8 | B2 | | | EM | | | |
| Lincoln Park | 13.8 | B3 | | SCADA | | EM |  |  | Volts |
| Lincoln Park | 13.8 | B4 | None | | EM | | | Volts |
| Lincoln Park | 115 | 115k bus | SCADA | | EM | | | Volts |
| Lincoln Park | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Lincoln Park | 115/13.8 | T2 | | EM | | | | |
| Lincoln Park | 115/13.8 | T3 | | SCADA | EM | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|--------|----------|---|
| Manchester | | | | | | 2400 | | |
| Manchester | | | | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6091 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6092 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6093 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6094 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6095 Ckt. | MV-90 | | EM | | | |
| Manchester | 13.8 | 6096 Ckt. | MV-90 | | EM | | | |
| Manchester | 13.8 | 6097 Ckt. | MV-90 | | | | | Com |
| Manchester | 13.8 | Com Equipment | | | | | | 95BU is REL-301; part of replacement program. |
| Manchester | 115 | M Line | None | EM/Gen-1 | | | | |
| Manchester | 115 | MC Line | SCADA | uP | | | | Amps |
| Manchester | 13.8 | MS Line | SCADA* | | EM | | | |
| Manchester | 13.8 | W-1456 BKR. | | | EM | | | |
| Manchester | 13.8 | W-650 BKR. | | | EM | | | |
| Manchester | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Manchester | 13.8 | B2 | | | EM | | | |
| Manchester | 115/13.8 | T1 | SCADA | | EM | | | Combine load value |
| Manchester | 115/13.8 | T2 | | EM | | | | |
| Marlboro | | | | | | 8890 | | ???? |
| Marlboro | 13.8 | 5001 Ckt. | SCADA | | EM/uP | | | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5002 Ckt. | SCADA | | EM/uP | | | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5003 Ckt. | SCADA | | EM/uP | | | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5004 Ckt. | SCADA | | uP | | | |
| Marlboro | 13.8 | Com Equipment | | | | | | Com |
| Marlboro | 13.8 | B1 | SCADA | | uP | | | Volts |
| Marlboro | 115/13.8 | T1 | SCADA | uP/EM* | | | | 95P is SEL-587 |
| Marlboro | 115/13.8 | T2 | SCADA | uP | | | | |
| Maryland Ave. | | | | | | M-4000 | | |
| Maryland Ave. | 4 | 621 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 4 | 622 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 4 | 623 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 4 | 624 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 13.8 | MS Line | | | EM | | | |
| Maryland Ave. | 13.8 | PH-284 BKR. | | | EM | | | |
| Maryland Ave. | 13.8 | PH-286 BKR. | | | EM | | | |
| Maryland Ave. | 4 | W-1032 BKR. | | | EM | | | |
| Maryland Ave. | 4 | W-1033 BKR. | | | EM | | | |
| Maryland Ave. | 4 | W-1034 BKR. | | | EM | | | |
| Maryland Ave. | 13.8 | B1 | SCADA | | EM | | | Volts |
| Maryland Ave. | 13.8 | B2 | SCADA | | EM | | | Volts |
| Maryland Ave. | 4 | B1 | SCADA | | EM | | | Volts |
| Maryland Ave. | 4 | B2 | | | EM | | | |
| Maryland Ave. | 13.8/4 | T1 | | | EM | | | |
| Maryland Ave. | 13.8/4 | T2 | | | EM | | | |
| Maybrook | | | | | | M-4000 | | |
| Maybrook | 13.8 | 5051 Ckt. | MV-90 | | EM | | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | 5052 Ckt. | MV-90 | | uP | | | Previously 5081-83? |
| Maybrook | 13.8 | 5053 Ckt. | MV-90 | | EM | | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | B1 | SCADA | | | | | Volts |
| Maybrook | 13.8 | B2 | SCADA | | | | | Volts |
| Maybrook | 69/13.8 | T1 | None | | | | | |
| Maybrook | 69/13.8 | T2 | None | | | | | |
| McKinley St. | | | | | | NONE | | |
| McKinley St. | 4 | 845 Ckt. | MV-90 | | EM | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|----------------|-------------|-------------|-------------|-------|----------|--------------------------------------|
| Merritt Park | | | | | | BM | | |
| Merritt Park | 13.8 | 8061 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8062 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8063 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8064 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8065 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8066 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8067 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8068 Ckt. | SCADA | | uP | | | Com |
| Merritt Park | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | |
| Merritt Park | 115 | WF Line | SCADA | | uP | | | |
| Merritt Park | 115 | WP Line | SCADA | | uP | | | SEL-279 |
| Merritt Park | 115 | WF-439-WP BKR. | ----- | uP-200 | | | | |
| Merritt Park | 13.8 | B1 | SCADA | | uP | | | |
| Merritt Park | 13.8 | B2 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T1 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T2 | SCADA | | uP | | | |
| Merritt Park | | | | | | BM | | |
| Milan | | | | | | | | |
| Milan | 13.8 | 7061 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | 7062 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Milan | 115 | B-4561 Ckt Sw | ----- | uP | | | | |
| Milan | 115 | MR Line | SCADA | | uP | | | |
| Milan | 115 | MR-501 BKR. | SCADA | | uP | | | |
| Milan | 115 | RT-7 BKR. | ----- | uP | | | | |
| Milan | 115 | R-10 BKR. | ----- | uP | | | | |
| Milan | 115 | T-7 Line | SCADA | | uP | | | |
| Milan | 115 | 10 Line | SCADA | | uP | | | |
| Milan | 115 | B1 | SCADA | | uP | | | |
| Milan | 13.8 | B1 | SCADA | | uP | | | |
| Milan | 115/13.8 | T1 | SCADA | | uP | | | |
| Millerton | | | | | | L&N | | |
| Millerton | 13.8 | 7081 Ckt. | SCADA | | | | | |
| Millerton | 69 | GE-823 MOS | ----- | EM | | | | |
| Millerton | 69/13.8 | T1 | SCADA | | EM | | | Only one feeder; T1 = 7081 load |
| Millerton | 69 | Line to SMI | SCADA | | | | | Volts |
| Millerton | 69 | Line to PUL | SCADA | | | | | Volts |
| Modena 115kV | | | | | | BM | | |
| Modena 115kV | 13.8 | B1 | SCADA | | uP | | | |
| Modena 115kV | 13.8 | C-1651 BKR. | ----- | ----- | uP | | | |
| Modena 115kV | 13.8 | 5011 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5012 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5013 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Modena 115kV | 115 | EM Line | SCADA | | uP | | | |
| Modena 115kV | 115 | EM-201-PX BKR. | ----- | uP | | | | |
| Modena 115kV | 115 | PX Line | SCADA | | uP | | | |
| Modena 115kV | 115/13.8 | T3 | SCADA | | uP | | | Only has one 13.8 bus; T3 = Bus load |
| Modena 69kV | | | | | | 8890 | | volts |
| Modena 69kV | 69 | B1 | SCADA | | EM | | | |
| Modena 69kV | 69 | MG Line | SCADA | | uP | | | |
| Modena 69kV | 69 | W-941 BKR. | ----- | EM | | | | |
| Modena 69kV | 69 | MG-380 BKR. | ----- | EM | | | | |
| Modena 69kV | 115/69 | T1 | SCADA | | EM/uP | | | GE F35 is installed |
| Modena 69kV | 69/13.8 | T2 | None | | Fuse/uP | | | |
| Montgomery | | | | | | NONE | | |
| Montgomery | 4 | 571 Ckt. | Charts - kW | | EM | | V4L | Single phase; Vac; Hyd |
| Montgomery | 4 | 572 Ckt. | Charts - kW | | EM | | V4L | Single phase; Vac; Hyd |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|--------------------|-------------|-------------|--------|----------|--------------------------------|
| Montgomery St. | | | | | | M-4000 | | |
| Montgomery St. | | | | | EM | | | volts |
| Montgomery St. | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Volts |
| Montgomery St. | 13.8 | B2 | SCADA | ---- | EM | ---- | ---- | volts |
| Montgomery St. | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | |
| Montgomery St. | 13.8 | B Line | None | ---- | EM | ---- | ---- | |
| Montgomery St. | 13.8 | 4001 Ckt. | Charts - kW/kVAr | ---- | EM | ---- | ---- | |
| Montgomery St. | 13.8 | 4002 Ckt. | Charts - kW/kVAr | ---- | EM | ---- | ---- | |
| Montgomery St. | 13.8 | 4003 Ckt. | Charts - kW/kVAr | ---- | EM | ---- | ---- | |
| Montgomery St. | 4 | 401 Ckt. | Charts - kW demand | ---- | EM | ---- | ---- | |
| Montgomery St. | 4 | 402-3 Ckt. | Charts - kW demand | ---- | EM | ---- | ---- | |
| Montgomery St. | 4 | 404 Ckt. | Charts - kW demand | ---- | EM | ---- | ---- | |
| Montgomery St. | 4 | 406A/B Ckt. | Charts - kW demand | ---- | EM | ---- | ---- | |
| Montgomery St. | 4 | 407A/B Ckt. | Charts - kW demand | ---- | EM | ---- | ---- | |
| Montgomery St. | 4 | 410A/B Ckt. | Charts - kW demand | ---- | EM | ---- | ---- | |
| Montgomery St. | 4 | B1 | SCADA | ---- | EM | ---- | ---- | Volts |
| Montgomery St. | 4 | B2 | SCADA | ---- | EM | ---- | ---- | volts |
| Montgomery St. | 13.8 | F Line | None | ---- | EM | ---- | ---- | |
| Montgomery St. | 13.8 | NB Line | None | ---- | EM | ---- | ---- | |
| Montgomery St. | 13.8 | NM Line | None | ---- | EM | ---- | ---- | |
| Montgomery St. | 13.8 | R Line | None | ---- | EM | ---- | ---- | |
| Montgomery St. | 13.8 | W-507 BKR. | ---- | ---- | EM | ---- | ---- | |
| Montgomery St. | 13.8 | W-508 BKR. | ---- | ---- | EM | ---- | ---- | |
| Montgomery St. | 13.8 | W-509 BKR. | ---- | ---- | EM | ---- | ---- | |
| Montgomery St. | 13.8 | WN Line | None | ---- | EM | ---- | ---- | |
| Montgomery St. | 13.8/4 | T1 | | ---- | EM | ---- | ---- | |
| Montgomery St. | 13.8/4 | T2 | Charts - kW/kVAr | ---- | EM | ---- | ---- | Combine load value |
| Myers Corners | | | | | | 44-550 | | |
| Myers Corners | 13.8 | 8041 Ckt. | Charts - kW | ---- | uP | ---- | ---- | |
| Myers Corners | 13.8 | 8043 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Myers Corners | 13.8 | 8044 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Myers Corners | 13.8 | 8045 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Myers Corners | 13.8 | 8046 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Myers Corners | 69 | KM Line | None | EM | ---- | ---- | ---- | |
| Myers Corners | 69 | TV Line | None | EM | ---- | ---- | ---- | |
| Myers Corners | 69 | TV-399-KM BKR. | ---- | EM | ---- | ---- | ---- | |
| Myers Corners | 13.8 | W-63 BKR. | ---- | ---- | EM | ---- | ---- | |
| Myers Corners | 13.8 | W-66 BKR. | ---- | ---- | EM | ---- | ---- | |
| Myers Corners | 13.8 | Feeder M1-75 | ---- | ---- | EM | ---- | ---- | |
| Myers Corners | 13.8 | Feeder M2-76 | ---- | ---- | EM | ---- | ---- | |
| Myers Corners | 13.8 | Feeder M3-91 | ---- | ---- | EM | ---- | ---- | |
| Myers Corners | 13.8 | Feeder M4-90 | ---- | ---- | EM | ---- | ---- | |
| Myers Corners | 13.8 | B1 | | ---- | EM | ---- | ---- | |
| Myers Corners | 13.8 | B2 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Myers Corners | 69/13.8 | T1 | | EM | ---- | ---- | ---- | |
| Myers Corners | 69/13.8 | T2 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Neversink | | | | | | 2200 | | |
| Neversink | 4 | 391 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Neversink | 13.8 | 3091 Ckt. | Grid Sense | ---- | EM | ---- | Kyle W | 3 phase; Oil; Hyd |
| Neversink | 69 | HG Line | SCADA* | EM | ---- | ---- | ---- | Amps |
| Neversink | 69 | WH Line | SCADA* | EM | ---- | ---- | ---- | Amps |
| Neversink | 4 | W-1128 BKR. | ---- | ---- | EM | ---- | ---- | |
| Neversink | 69 | 69k Bus | SCADA | uP/EM | ---- | ---- | ---- | Volts |
| New Baltimore | | | | | | 2300 | | |
| New Baltimore | 13.8 | 1081 Ckt. | SCADA* | ---- | EM | ---- | ---- | kW |
| New Baltimore | 13.8 | 1082 Ckt. | SCADA* | ---- | EM | ---- | ---- | kW |
| New Baltimore | 13.8 | 1083 Ckt. | SCADA* | ---- | EM | ---- | ---- | kW |
| New Baltimore | 69 | Cap Bank | ---- | EM/uP | ---- | ---- | ---- | Com |
| New Baltimore | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| New Baltimore | 69 | CN Line | None | uP | ---- | ---- | ---- | |
| New Baltimore | 69 | NW Line | None | uP | ---- | ---- | ---- | |
| New Baltimore | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Volts |
| New Baltimore | 69/13.8 | T1 | SCADA | EM/uP | ---- | ---- | ---- | 95P is SEL-587 |

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|--------------------|------------------|-------------|-------------|-------|----------|------------------------|
| | | | | | | NONE | | |
| New Windsor | | | | | | | | No DATA |
| New Windsor | 4 | 461 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 462 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 463 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 464 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 13.8 | UN & UW ATC | None | ----- | uP | ----- | ----- | Combine load value |
| New Windsor | 13.8/4 | T1 | Charts - kW/kVAR | ----- | uP | ----- | ----- | |
| New Windsor | 13.8/4 | T2 | | ----- | uP | ----- | ----- | |
| | | | | | | D-20 | | |
| North Catskill | | | | | | | | 95P is SEL-251 |
| North Catskill | 13.8 | 2001A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2002A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2003A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2004 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2005 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2006 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| North Catskill | 115 | 2 Line | SCADA | EM | ----- | ----- | ----- | |
| North Catskill | 115 | R-2 BKR. | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 115 | RT-7 BKR. | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 115 | T-7 Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| North Catskill | 69 | Cap Bank | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 69 | CL Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | H Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | W-1107 BKR. | ----- | EM/uP* | ----- | ----- | ----- | check on TD-5 |
| North Catskill | 69 | W-269 BKR. | ----- | EM/uP* | ----- | ----- | ----- | check on TD-5 |
| North Catskill | 115 | W-791 BKR. | ----- | uP- 200 | ----- | ----- | ----- | SEL-2BFR |
| North Catskill | 69 | W-269 & W-1107 BKR | ----- | ----- | EM | ----- | ----- | IJS |
| North Catskill | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| North Catskill | 69 | B1 | SCADA | EM/uP | ----- | ----- | ----- | Volts |
| North Catskill | 69 | B2 | SCADA | EM/uP | ----- | ----- | ----- | Volts |
| North Catskill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | Volts: 95BU is DFP-100 |
| North Catskill | 13.8 | B2 | SCADA | ----- | EM/uP | ----- | ----- | Volts: 95BU is DFP-100 |
| North Catskill | 115/69 | T4 | SCADA | EM/uP* | ----- | ----- | ----- | Check on 64 relay |
| North Catskill | 115/69 | T5 | SCADA | EM/uP* | ----- | ----- | ----- | Check on 64 relay |
| North Catskill | 115/13.8 | T6 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| North Catskill | 115/13.8 | T7 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|---------------|-------------|-------------|------|----------|-----------------------|
| North Chelsea | | | | | | BM | | |
| North Chelsea | | | | | | | | |
| North Chelsea | 13.8 | 8051 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8052 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8053 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8054 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8055 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8056 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8057 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8058 Ckt. | SCADA | ---- | uP | ---- | ---- | Com |
| North Chelsea | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| North Chelsea | 115 | AC Line | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | AC-1066 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | DC Line | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | DC-1414 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | FO-1482 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | FO Line | SCADA | uP | ---- | ---- | ---- | 95P is LCB-II |
| North Chelsea | 115 | NF Line | SCADA | uP | ---- | ---- | ---- | 95P is LCB-II |
| North Chelsea | 115 | NF-1116 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | SC Line | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | SC-1566 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 69 | TV Line | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | B-2651 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | B-2652 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | B-2653 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | W-1572 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | B1 | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 13.8 | B1 | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 115/69 | T1 | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115/13.8 | T2 | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115/13.8 | T3 | SCADA | uP | ---- | ---- | ---- | Volts |
| Ohioville | | | | | | 2100 | | |
| Ohioville | 13.8 | 5021 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5022 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5023 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5024 Ckt. | Charts - kW | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5025 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Ohioville | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Ohioville | 115 | Cap Bank | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 69 | O Line | None | uP | ---- | ---- | ---- | |
| Ohioville | 69 | OB Line | None | uP | ---- | ---- | ---- | |
| Ohioville | 115 | OR Line | None | EM | ---- | ---- | ---- | |
| Ohioville | 115 | OR-1075 BKR. | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 115 | PX Line | SCADA | EM/uP | ---- | ---- | ---- | |
| Ohioville | 115 | PX - 1659 BKR. | ---- | uP | ---- | ---- | ---- | |
| Ohioville | 69 | W - 1511 BKR. | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 13.8 | W - 1537 BKR. | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 13.8 | W - 1600 BKR. | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 115 | B1 | SCADA | EM | ---- | ---- | ---- | Volts |
| Ohioville | 69 | 69k Bus | SCADA | EM | ---- | ---- | ---- | Volts |
| Ohioville | 13.8 | B1 | None | ---- | EM | ---- | ---- | |
| Ohioville | 13.8 | B2 | None | ---- | EM | ---- | ---- | |
| Ohioville | 115/13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Ohioville | 115/13.8 | T2 | SCADA | EM | ---- | ---- | ---- | |
| Ohioville | 115/69 | T3 | SCADA | EM/uP-200 | ---- | ---- | ---- | 95BU is SEL-251 |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|----------|-------------|-------------|------|----------|--------------------------------------|
| | | | | | | 2300 | | Grid owns Line |
| Pleasant Valley | | | SCADA** | uP | | | | |
| Pleasant Valley | 115 | 8 Line | SCADA | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 10 Line | SCADA** | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 12 Line | SCADA** | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 13 Line | SCADA** | uP | | | | 95BU is Optimho; in replacement plan |
| Pleasant Valley | 115 | C Line | SCADA | EM/Gen-1 | | | | |
| Pleasant Valley | 115 | M Line | SCADA | EM | | | | |
| Pleasant Valley | 115 | X Line | SCADA | uP | | | | Com |
| Pleasant Valley | 115 | Com Equipment | | | | | | SEL-279 |
| Pleasant Valley | 115 | R-12 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-13 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-8 BKR. | | uP-200 | | | | |
| Pleasant Valley | 115 | RC-6 BKR. | | EM | | | | |
| Pleasant Valley | 115 | RM BKR. | | EM | | | | |
| Pleasant Valley | 115 | RX-4 BKR. | | uP | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-61 BKR. | SCADA** | EM | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-62 BKR. | SCADA** | EM | | | | |
| Pleasant Valley | 115 | R-643 BKR. | | EM | | | | |
| Pleasant Valley | 115 | R-81 BKR. | | EM | | | | |
| Pleasant Valley | 115 | B1 | SCADA | EM | | | | Volts |
| Pleasant Valley | 115 | B2 | SCADA | EM | | | | Volts |
| Pleasant Valley | 69 | E Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | G Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | Q Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | B1 | SCADA | uP | | | | Volts |
| Pleasant Valley | 13.8 | W-387 | | | EM | | | |
| Pleasant Valley | 345/115 | S1 | SCADA | | | | | Con Ed owns bank and protection |
| Pleasant Valley | 115/69 | T10 | SCADA | EM | | | | |
| Pulvers Corners | | | | | | D-20 | | |
| Pulvers Corners | 13.8 | 7091 Ckt. | SCADA | | EM | | V4L | single phase; vac; hyd |
| Pulvers Corners | 13.8 | 7092 Ckt. | SCADA | | EM | | Kyle L | single phase; oil; hyd |
| Pulvers Corners | 34.5 | 7395 Ckt. | SCADA | EM | | | RVE | 3 phase; oil; hyd |
| Pulvers Corners | 13.8 | Com Equipment | | | | | | Com |
| Pulvers Corners | 69 | Cap Bank | | EM | | | | |
| Pulvers Corners | 69 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 34.5 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 13.8 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 69/13.8 | T1 | SCADA | Fuse | | | | |
| Pulvers Corners | 69/34.5 | T2 | None | EM/uP | | | | 95P is SR-745 |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|-------------------|-------------|-------------|------|----------|---------------------------------|
| Reynolds Hill | | | | | | 2100 | | |
| Reynolds Hill | 13.8 | 6001 Ckt. | Charts - kW | ---- | EM | | | |
| Reynolds Hill | 13.8 | 6004 Ckt. | SCADA | ---- | uP | | | |
| Reynolds Hill | 13.8 | 6005 Ckt. | Charts - kW | ---- | EM | | | |
| Reynolds Hill | 13.8 | 6008 Ckt. | SCADA | ---- | uP | | | |
| Reynolds Hill | ----- | Com Equipment | ----- | ----- | ----- | | | Com |
| Reynolds Hill | 115 | DR-1418 BKR. | ----- | uP | ----- | | | |
| Reynolds Hill | 115 | DR Line | SCADA | uP | ----- | | | |
| Reynolds Hill | 115 | HR-1285 BKR. | ----- | EM | ----- | | | |
| Reynolds Hill | 115 | HR Line | SCADA | uP | ----- | | | |
| Reynolds Hill | 115 | IR Line | SCADA | uP | ----- | | | |
| Reynolds Hill | 13.8 | B Cable | SCADA | ----- | uP | | | |
| Reynolds Hill | 13.8 | W Cable | SCADA | ----- | uP | | | |
| Reynolds Hill | 13.8 | PD Cable | SCADA | ----- | uP | | | |
| Reynolds Hill | 13.8 | PH Line | SCADA | ----- | uP | | | |
| Reynolds Hill | 13.8 | PK Line | SCADA | ----- | uP | | | |
| Reynolds Hill | 13.8 | PO Line | SCADA | ----- | uP | | | |
| Reynolds Hill | 13.8 | PQ Line | SCADA | ----- | uP | | | |
| Reynolds Hill | 13.8 | PS Line | SCADA | ----- | uP | | | |
| Reynolds Hill | 13.8 | PU Cable | SCADA | ----- | uP | | | |
| Reynolds Hill | 115 | T-31 BKR. | ----- | EM | ----- | | | |
| Reynolds Hill | 115 | B1 | SCADA | EM | ----- | | | Volts |
| Reynolds Hill | 115 | B2 | SCADA | EM | ----- | | | Volts |
| Reynolds Hill | 13.8 | B1 | SCADA | ----- | EM/uP | | | 95BU is SEL-501 |
| Reynolds Hill | 13.8 | B2 | ----- | ----- | uP | | | Volts |
| Reynolds Hill | 13.8 | B3 | SCADA | ----- | uP | | | Volts |
| Reynolds Hill | 115 | W-1543 BKR. | ----- | EM | ----- | | | Volts |
| Reynolds Hill | 115/13.8 | T3 | SCADA | EM/uP | ----- | | | 95P is SEL-351A |
| Reynolds Hill | 115/13.8 | T4 | SCADA | EM/uP | ----- | | | 95P is SEL-351A |
| Rhinebeck | | | | | | 2300 | | |
| Rhinebeck | 13.8 | 7051 Ckt. | Charts - kW/SCADA | ----- | uP- 200/ uP | | | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | 13.8 | 7052 Ckt. | Charts - Amps | ----- | EM | | | |
| Rhinebeck | 13.8 | 7053 Ckt. | Charts - Amps | ----- | EM | | | |
| Rhinebeck | 13.8 | 7054 Ckt. | Charts - Amps | ----- | EM | | | |
| Rhinebeck | 13.8 | 7055 Ckt. | Charts - kW | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Rhinebeck | 13.8 | 7056 Ckt. | SCADA | ----- | uP- 200/ uP | | | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | ----- | Com Equipment | ----- | ----- | ----- | | | |
| Rhinebeck | 69 | Cap Bank | ----- | EM | ----- | | | |
| Rhinebeck | 115 | ER Line | SCADA* | uP | ----- | | | Amps |
| Rhinebeck | 115 | LR-830-MR BKR. | ----- | uP | ----- | | | |
| Rhinebeck | 115 | MR Line | None | uP | ----- | | | |
| Rhinebeck | 69 | Q-1471 BKR. | ----- | EM | ----- | | | |
| Rhinebeck | 13.8 | W-1017 BKR. | ----- | ----- | EM | | | |
| Rhinebeck | 13.8 | W-1238 BKR. | ----- | ----- | EM | | | |
| Rhinebeck | 69 | W-258 BKR. | ----- | EM | ----- | | | |
| Rhinebeck | 13.8 | W-367 BKR. | ----- | ----- | EM | | | |
| Rhinebeck | 69 | Q Line | SCADA* | ----- | ----- | | | Volts |
| Rhinebeck | 13.8 | B1 | SCADA | ----- | EM | | | |
| Rhinebeck | 13.8 | B2 | none | ----- | EM | | | Combine Bus Volts to one point |
| Rhinebeck | 69 | 69kV Bus | SCADA | ----- | ----- | | | Volts |
| Rhinebeck | 69/13.8 | T1 | SCADA* | EM | ----- | | | Amps & Volts |
| Rhinebeck | 69/13.8 | T2 | SCADA* | EM | ----- | | | Amps & Volts |
| Rhinebeck | 115/13.8 | T4 | SCADA | EM | ----- | | | |
| Rhinebeck | 115/69 | T3 | SCADA | EM | ----- | | | |

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Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|---------------|----------|-------------|-------------|------|----------|----------------|
| Rock Tavern 345kV | | | | | | 2100 | | |
| Rock Tavern 345kV | 345 | 311 Line A1 | SCADA | UP | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 311 Line A2 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 3456 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 3456 BF A1 | ---- | UP | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 3456 BF A2 | ---- | UP | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | Cap Bank 1 A1 | SCADA* | EM | ---- | ---- | ---- | Combined MVArS |
| Rock Tavern 345kV | 345 | Cap Bank 1 A2 | | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A1 | | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A2 | | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 34 Line A1 | SCADA | UP | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 34 Line A2 | | UP | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 37751 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 37751 BF A1 | ---- | UP | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 37751 BF A2 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 37752 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 37752 BF A1 | ---- | UP | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 37752 BF A2 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 377 Line A1 | SCADA | UP | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 377 Line A2 | | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 4255 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 4255 BF A1 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 4255 BF A2 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 42 Line A1 | ---- | SS | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 42 Line A2 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 346 | C3351 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | C3351 BF A1 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | C3351 BF A2 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | C3352 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | C3352 BF A1 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | C3352 BF A2 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | C3353 BKR. | ---- | UP-200 | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | C3353 BF A1 | ---- | UP | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | C3353 BF A2 | ---- | UP | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 31153 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 31153 BF A1 | ---- | UP | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 31153 BF A2 | ---- | UP | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 31154 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 31154 BF A1 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | 31154 BF A2 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Rock Tavern 345kV | 345 | B1 A1 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | B1 A2 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | B2 A1 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345 | B2 A2 | ---- | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345/115 | T1 A1 | SCADA | EM | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345/115 | T1 A2 | | UP | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345/115 | T3 A1 | SCADA | UP | ---- | ---- | ---- | |
| Rock Tavern 345kV | 345/115 | T3 A2 | | UP | ---- | ---- | ---- | |

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Electric Substation Up. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-----------------|-------------|-------------|-------------|-------|----------|--------------------------------|
| | | | | | | 2400 | | |
| Sand Dock | | | | | | | | |
| Sand Dock | 13.8 | 6011 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | BP-1296 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | BP-1570 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 1 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 2 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 3 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | GB Line | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 115 | KC-1447-SC BKR. | ---- | EM | ---- | ---- | ---- | |
| Sand Dock | 115 | KC Line | None | EM | ---- | ---- | ---- | |
| Sand Dock | 115 | SC Line | None | UP | ---- | ---- | ---- | |
| Sand Dock | 13.8 | SH-886 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | SH-911 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-902 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-909 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-910 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-116 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1449 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1453 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1467 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 115 | B1 | SCADA | ---- | ---- | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 115 | B4 | SCADA | ---- | ---- | ---- | ---- | |
| Sand Dock | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 13.8 | B2 | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | B4 | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Sand Dock | 13.8 | T3 | SCADA | EM | ---- | ---- | ---- | |
| Sand Dock | 13.8 | T4 | SCADA | EM | ---- | ---- | ---- | |
| Saugerties | | | | | | Orion | | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-------------------|-------------|-------------|-------------|------|----------|--------------------------------------|
| Shenandoah | | | | | | 2400 | | |
| Shenandoah | 115 | East Bus | SCADA | EM | ---- | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 115 | West Bus | | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B2 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B4 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B5 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B6 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B7 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B8 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 1 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 2 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 3 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 4 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 5 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 6 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B-4451 BKR. (CB1) | ---- | ---- | UP | ---- | ---- | |
| Shenandoah | 13.8 | 8071 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | 8072 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 115 | EF Line | None | uP/Gen-1 | ---- | ---- | ---- | 95BU is Optimho; in replacement plan |
| Shenandoah | 115 | FS Line | None | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | EF-1514 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-739 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-892-EF BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-959 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S1 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S2 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S3 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S4 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S5 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S6 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S7 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S8 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S9 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S10 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S11 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S12 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S13 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S14 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S15 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 115/13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T2 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T3 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T4 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T5 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T6 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T7 | SCADA | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | W-1266 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1279 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1450 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1593 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-664 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-665 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-802 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-803 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-805 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-807 BKR. | ---- | ---- | EM | ---- | ---- | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------------|--------------------|------------------|----------|-------------|-------------|--------|----------|---|
| Rock Tavern 115kV | | | | | | 44-550 | | |
| Rock Tavern 115kV | 115 | B1 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | B2 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | 115-0.48kV SST | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | Com Equipment |  | ..... | ..... | ..... | ..... | Com |
| Rock Tavern 115kV | 115 | D Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | D-448 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | J Line | SCADA* | GEN-1/EM | ..... | ..... | ..... | 95P is a DLP; identified in replacement program; Amps |
| Rock Tavern 115kV | 115 | J-788 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RD Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RD-809 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RJ Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RJ-818 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL Line | SCADA | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL-684 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-467 BKR. | ..... | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-681 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-814 BKR. | ..... | EM/UP | ..... | ..... | ..... | SEL-351 |
| Rock Tavern 115kV | 115 | WM Line | none | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115/69 | T2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | | | | | | 2100 | | |
| Roseton Switchyard | 345 | 30356 (B6) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A2 | SCADA | EM/UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31151 (B1) BKR | ..... | EM | ..... | ..... | ..... | SEL-501 for DBC |
| Roseton Switchyard | 345 | 31152 (B1) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B1) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B2 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U1 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U2 | SCADA | EM | ..... | ..... | ..... |  |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|-------------------|-------------|-------------|-------|----------|---|
| Smith Street | | | | | | 2300 | | Radio to INW |
| Smith Street | 4 | 631 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 632 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 633 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 634 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | MS Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | PQ Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | PS Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | W Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Volts |
| Smith Street | 13.8 | B2 | SCADA | ---- | EM | ---- | ---- | Volts |
| Smith Street | 4 | B1 | SCADA | ---- | uP | ---- | ---- | Volts |
| Smith Street | 4 | B2 | SCADA | ---- | uP | ---- | ---- | Volts |
| Smith Street | 13.8/4 | T1 | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8/4 | T2 | None | ---- | EM | ---- | ---- | |
| Smithfield | | | | | | 8890 | | |
| Smithfield | 13.8 | 7095 Ckt. | SCADA | ---- | uP | ---- | ---- | Com |
| Smithfield | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | 95P is SEL-267 |
| Smithfield | 69 | E Line | None | uP- 200/uP | ---- | ---- | ---- | 95P is SEL-267; Volts & Amps |
| Smithfield | 69 | FV Line | SCADA* | uP- 200/uP | ---- | ---- | ---- | Amps |
| Smithfield | 69 | GE Line | SCADA* | EM | ---- | ---- | ---- | Amps |
| Smithfield | 69 | S Line | SCADA* | EM | ---- | ---- | ---- | Volts & Amps |
| Smithfield | 69 | SA Line | SCADA* | EM | ---- | ---- | ---- | Volts |
| Smithfield | 69 | B2 | SCADA | ---- | ---- | ---- | ---- | Volts |
| Smithfield | 69 | B3 | SCADA | ---- | ---- | ---- | ---- | Volts |
| Smithfield | 69/13.8 | T1 | None* | ---- | ---- | ---- | ---- | Only one feeder; T1 = 7095 load |
| South Cairo | | | | | | 8890 | | |
| South Cairo | 13.8 | 2041 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2042 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2043 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| South Cairo | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| South Cairo | 69 | CF Line | None | EM/uP | ---- | ---- | ---- | 79 done with NLR |
| South Cairo | 69 | CL Line | None | uP | ---- | ---- | ---- | |
| South Cairo | 13.8 | B1+G1 | Charts - kW/SCADA | ---- | EM | ---- | ---- | SCADA Volts |
| South Cairo | 69/13.8 | T1 | Charts - Amps | EM/uP | ---- | ---- | ---- | 95P is SEL-587 |
| South Wall St. | | | | | | None | | |
| South Wall St. | 4 | 111 Ckt. | Grid Sense | ---- | EM | ---- | Kyle L | Single Phase; Oil; Hyd |
| South Wall St. | 4 | 112 Ckt. | Grid Sense | ---- | EM | ---- | Kyle L | Single Phase; Oil; Hyd; missing GS data |
| South Wall St. | 13.8/4 | T1 | Charts - kW/kVAr | ---- | EM | ---- | ---- | |
| Spackenkil | | | | | | Orion | | |
| Spackenkil | 13.8 | 6041 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6042 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6043 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6044 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6045 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6046 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6047 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6048 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Spackenkil | 13.8 | KR Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | KS Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | MC Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | MC-200-SK BKR. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | B1 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 115/13.8 | T1 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 115/13.8 | T2 | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | | | | | | BM | | |
| Staatsburg | 13.8 | 7041 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | 7042 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | 7043 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Staatsburg | 13.8 | B1 | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 69/13.8 | T1 | SCADA | uP | ---- | ---- | ---- | |

588

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-------------------|------------------|-------------|-------------|--------|----------|--------------------------------------|
| Standfordville | | | | | | M-4000 | | |
| Standfordville | 13.8 | 7071 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single phase; vac; hyd |
| Standfordville | 13.8 | 7072 Ckt. | MV-90 | ----- | EM | ----- | ----- | Volts |
| Standfordville | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Standfordville | 69/13.8 | T1 | MV-90 | Fuse | ----- | ----- | ----- | |
| Sturgeon Pool | | | | | | 2100 | | |
| Sturgeon Pool | 4 | 341 Ckt. | Grid Sense | ----- | EM | ----- | Kyle W | 3 phase; oil; hyd; missing data |
| Sturgeon Pool | 4 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Sturgeon Pool | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | O Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | P Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | 69k Bus | SCADA | EM | ----- | ----- | ----- | Volts |
| Sturgeon Pool | | T5 | None | Fuse | ----- | ----- | ----- | |
| Sugarloaf | | | | | | 44-500 | | |
| Sugarloaf | 115 | SD Line | SCADA | EM | ----- | ----- | ----- | Combine load value |
| Sugarloaf | 115 | SJ Line | ----- | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | SL Line | None | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| Sugarloaf | 115/69 | O & R Transformer | SCADA | EM | ----- | ----- | ----- | |
| Tinkertown | | | | | | 2300 | | Radio to PVL |
| Tinkertown | 13.8 | 7022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Tinkertown | 69/13.8 | T1 | SCADA | Fuse | ----- | ----- | ----- | |
| Tinkertown | 69/13.8 | T2 | SCADA | Fuse | ----- | ----- | ----- | |
| Tioronda | | | | | | M-4000 | | |
| Tioronda | 13.8 | 8085 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8086 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8087 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 115 | W-566 Ckt. Sw | ----- | EM | ----- | ----- | ----- | Agastat |
| Tioronda | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Tioronda | 115/13.8 | T1 | Charts - kW/kVAr | EM | ----- | ----- | ----- | |
| Todd Hill | | | | | | 2200 | | |
| Todd Hill | 13.8 | 6051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6055 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6056 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6057 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Todd Hill | 115 | A Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 115 | A-520-C BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | C Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 13.8 | W - 524 BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | B1 | SCADA | ----- | EM/uP | ----- | ----- | Volts |
| Todd Hill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is SEL-351A; Volts |
| Todd Hill | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Todd Hill | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95P is SEL-587 |
| Todd Hill | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|----------------|-------------|-------------|--------|----------|--------------------------------|
| Union Ave | | | | | | 2200 | | Volts |
| Union Ave | 115 | B1 | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | RJ Line | SCADA | EM | ----- | ----- | ----- | SEL-351A for BF |
| Union Ave | 115 | RJ-52 BKR. | ----- | EM/uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB Line | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB-51 BKR. | ----- | uP | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UN Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UW Line | SCADA* | EM | ----- | ----- | ----- | |
| Union Ave | 115 | W-1095 BKR. | ----- | EM | ----- | ----- | ----- | |
| Union Ave | 13.8 | B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B3 | SCADA | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B4 | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B3-B2 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B4-B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4041 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4042 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4043 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4044 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4045 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4046 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4047 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4055 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Union Ave | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T2 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T3 | SCADA | uP | ----- | ----- | ----- | |
| Van Wagner | | | | | | NONE | | |
| Van Wagner | 4 | 731 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Van Wagner | 4 | 732 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Vinegar Hill | | | | | | M-4000 | | |
| Vinegar Hill | 34.5 | 2389 Ckt. | MV-90 | ----- | uP | ----- | RVE | 3 phase; oil; hyd |
| West Balmville | | | | | | 2300 | | |
| West Balmville | 115 | B2 | SCADA | EM | ----- | ----- | ----- | Volts |
| West Balmville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Combine Bus Volts to one point |
| West Balmville | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | B Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 13.8 | 4011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | 4012 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4013 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4014 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4015 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| West Balmville | 115 | DB Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DB-875 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DW Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DW-662 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | F Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | R Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | W-478 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | W-855 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | WN Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | | T1 | SCADA | EM | ----- | ----- | ----- | Combine load value |
| West Balmville | | T2 | | EM | ----- | ----- | ----- | |

500

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-------------------|----------|-------------|-------------|--------|----------|--------------------------------------|
| Westerlo | | | | | | BM | | |
| Westerlo | 13.8 | 1091 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1092 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1093 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Only has one 13.8 bus; T1 = Bus load |
| Westerlo | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | Cap Bank | ----- | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | NW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW-1500-NW BKR. | ----- | uP | ----- | ----- | ----- | |
| Wiccopee | | | | | | L&N | | |
| Wiccopee | 115 | FS Line | None | EM | ----- | ----- | ----- | |
| Wiccopee | 115 | WP Line | None | uP | ----- | ----- | ----- | |
| Wiccopee | 115 | FS - 1652-WP BKR. | ----- | EM | ----- | ----- | ----- | |
| Wiccopee | 13.8 | F1-292 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | F2-280 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-368 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-378 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-632 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-636 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #3) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #9) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B1 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B2 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Wiccopee | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Wiccopee | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Woodstock | | | | | | M-4000 | | |
| Woodstock | 13.8 | 3011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3012 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3013 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3014 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 13.8 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 69/13.8 | T2+SR Line | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 + B2 | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T1 | MV-90 | ----- | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 | MV-90 | ----- | ----- | ----- | ----- | |

Attachment 6

| | Station | Cost |
|------|-----------------|-------------|
| 2012 | Dashville | \$190,000 |
| | East Walden | \$610,000 |
| | Tioronda | \$200,000 |
| 2013 | Coxsackie | \$130,000 |
| | South Cairo | \$160,000 |
| | East Park | \$200,000 |
| | Pleasant Valley | \$360,000 |
| | Todd Hill | \$160,000 |
| 2014 | Sand Dock | \$510,000 |
| | Fishkill Plains | \$480,000 |
| | South Wall St. | \$84,000 |
| 2015 | Manchester | \$340,000 |
| | Forgebrook | \$730,000 |
| 2016 | Rock Tavern | \$1,060,000 |
| | | |
| Subs | | |
| | | |
| | | |

Preliminary
Copy

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C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A: Infrastructure Replacements

Why was the proposed project scope chosen over other alternatives?

N/A: Infrastructure Replacements

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Infrastructure Replacements as required.

What are the risks and consequences of not completing this project?

Failed substation disconnect switches would not be replaced possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$6,753,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 556,100 | 54,100 | 51,000 | 51,000 | 52,000 | 54,000 | 54,000 | 240,000 |
| | Labor (Monthly Payroll) | 277,050 | 27,050 | 25,000 | 25,000 | 26,000 | 27,000 | 27,000 | 120,000 |
| | Stock Materials | 277,050 | 27,050 | 25,000 | 25,000 | 26,000 | 27,000 | 27,000 | 120,000 |
| | Non-Stock Material (A/P taxable) | 1,112,200 | 108,200 | 101,000 | 102,000 | 105,000 | 108,000 | 108,000 | 480,000 |
| | Contractors (A/P tax exempt) | 390,870 | 37,870 | 36,000 | 36,000 | 37,000 | 38,000 | 38,000 | 168,000 |
| | Overheads | 2,781,500 | 270,500 | 254,000 | 254,000 | 261,000 | 271,000 | 271,000 | 1,200,000 |
| | AFUDC* | 166,230 | 16,230 | 15,000 | 15,000 | 16,000 | 16,000 | 16,000 | 72,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 5,561,000 | 541,000 | 507,000 | 508,000 | 523,000 | 541,000 | 541,000 | 2,400,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 178,800 | 33,450 | 23,000 | 24,000 | 24,000 | 24,000 | 25,000 | 25,350 |
| | Labor (Monthly Payroll) | 357,600 | 66,900 | 46,000 | 47,000 | 48,000 | 49,000 | 50,000 | 50,700 |
| | Contractors (A/P tax exempt) | 59,600 | 11,150 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,450 |
| | Overheads | 596,000 | 111,500 | 77,000 | 78,000 | 80,000 | 82,000 | 83,000 | 84,500 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 1,192,000 | 223,000 | 154,000 | 157,000 | 160,000 | 163,000 | 166,000 | 169,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|--------------|--------------|------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 2,133 | 1,586 | 547 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 4,727,100 Maximum (\$): 8,778,900

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.


Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

INFRASTRUCTURE REVIEW & RECOMMENDATIONS

VERSION HISTORY

| Memo No. | Date | Action | Author | Approval |
|------------|-----------|---------------------------|----------|---|
| OS2018-002 | 6/25/2018 | Initial Document Creation | B. Perry |  |
| | | | | |

This memo is to memorialize Operations Services annual review of its infrastructure, maintenance and inspection programs for various pieces of substation equipment as well as physical infrastructure. This document will be modified annually.

Breaker Replacement

Below are the 115kV oil breakers remaining and the planned replacement as identified in the capital budget.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|----------------|---------------|----------|----------------|-----------------|--------------|-----------|
| 2018 | ROCK TAVERN | 115 kV | RJ-818 | ALLIS CHALMERS | BZO-115-10000 | OIL | 1971 |
| 2018 | ROCK TAVERN | 115 kV | W-681 | GE | FK-121-43000 | OIL | 1971 |
| 2018 | UNION AVE | 115 kV | RJ-52 | GE | FK-439-115-3500 | OIL | 1952 |
| 2019 | WEST BALMVILLE | 115 kV | DW-662 | ALLIS CHALMERS | BZO-115-7500 | OIL | 1965 |
| 2019 | HURLEY AVE | 115 kV | HP-1643 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1969 |
| 2019 | HURLEY AVE | 115 kV | W-389 | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1973 |
| 2019 | HURLEY AVE | 115 kV | OR-1640 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1969 |
| 2019 | HURLEY AVE | 115 kV | A-2451 | ALLIS CHALMERS | BZO-121-40-3PST | OIL | 1973 |
| 2019 | ROCK TAVERN | 115 kV | W-814 | GE | FK-121-43000 | OIL | 1971 |
| 2019 | ROCK TAVERN | 115 kV | RD-809 | ALLIS CHALMERS | BZO-115-10000 | OIL | 1971 |

| | | | | | | | |
|--------------------------|-----------------|--------|------------|----------------|-----------------|-----|------|
| 2019 | ROCK TAVERN | 115 kV | J-788 | ALLIS CHALMERS | BZO-115-10000 | OIL | 1971 |
| 2020 | BETHLEHEM ROAD | 115 kV | RD-604-UB | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1974 |
| 2020 | PLEASANT VALLEY | 115 kV | R-8 | SIEMENS | BZO-121-50-6 | OIL | 1991 |
| 2020 | PLEASANT VALLEY | 115 kV | RX-4 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1968 |
| 2020 | PLEASANT VALLEY | 115 kV | R-81 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1968 |
| 2020 | PLEASANT VALLEY | 115 kV | R-10 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1980 |
| 2020 | PLEASANT VALLEY | 115 kV | R-62 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1980 |
| 2020 | PLEASANT VALLEY | 115 kV | R-61 | MCGRAW EDISON | OHT-54 | OIL | 1973 |
| 2020 | PLEASANT VALLEY | 115 kV | R-643 | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1980 |
| 2021 | LINCOLN PARK | 115 kV | LR-1219-HP | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1969 |
| 2021 | LINCOLN PARK | 115 kV | HP-1318 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1969 |
| 2021 | NORTH CATSKILL | 115 kV | R-2 | SIEMENS | BZO-121-20-7 | OIL | 1985 |
| 2022 | SHENANDOAH | 115 kV | FS-739 | SIEMENS | BZO-121-40-6 | OIL | 1983 |
| 2022 | SHENANDOAH | 115 kV | FS-959 | SIEMENS | BZO-121-40-6 | OIL | 1983 |
| 2022 | BARNEGAT | 115 kV | KB-749-KC | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1987 |
| Recommendation Requested | WICCOPEE | 115 kV | FS-1652-WP | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1988 |

**Wicopee has essentially no distribution load present. A recommendation about the necessity of this station is required for equipment replacement to be planned appropriately*

Outlined below are the 69 kV oil breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|----------------|---------------|-----------|-----------------------------|----------------|--------------|-----------|
| 2018 | HURLEY AVE | 69 kV | SB-233 | GE | FK-69-2500-5 | OIL | 1963 |
| 2018 | HURLEY AVE | 69 kV | I-442 | GE | FK-69-2500-5 | OIL | 1963 |
| 2018 | HURLEY AVE | 69 kV | W-142 | GE | FK-69-2500-5 | OIL | 1963 |
| 2019 | HONK FALLS | 69 kV | GM-737 | GE | FK-69-2500 | OIL | 1963 |
| 2019 | HONK FALLS | 69 kV | HG-709 | ALLIS CHALMERS | FZO-151-69F | OIL | 1953 |
| 2019 | HONK FALLS | 69 kV | WH-769 | ALLIS CHALMERS | FZO-151-69F | OIL | 1952 |
| 2019 | ROCK TAVERN | 69 kV | WM-1675 | GENERAL ELECTRIC | FK-69-2500-5 | OIL | 1964 |
| 2020 | MYERS CORNERS | 69 kV | TV-399-KM | SIEMENS | TDO-72.5-20000 | OIL | 1981 |
| 2023 | HIBERNIA | 69 kV | E-972 | ITE CIRCUIT BREAKER COMPANY | 69KSB2500-12 | OIL | 1967 |
| Substation Rebuild | KNAPPS CORNERS | 69 kV | G-1175 | SIEMENS ALLIS | TDO-72.5-20000 | OIL | 1981 |
| Substation Rebuild | KNAPPS CORNERS | 69 kV | KM-1185 | SIEMENS ALLIS | TDO-72.5-20000 | OIL | 1981 |
| Substation Rebuild | KNAPPS CORNERS | 69 kV | TR-1195 | SIEMENS ALLIS | TDO-72.5-20000 | OIL | 1981 |
| Substation Rebuild | KNAPPS CORNERS | 69 kV | W-1409 | SIEMENS ALLIS | TDO-72.5-20000 | OIL | 1981 |

Outlined below are the 15 kV oil breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|---------------|---------------|----------|----------------|-------------------|--------------|-----------|
| 2020 | NEW BALTIMORE | 15 kV | TD-1081 | SIEMENS | SDO-15-500 | OIL | 1990 |
| 2020 | NEW BALTIMORE | 15 kV | TD-1082 | SIEMENS | SDO-15-500 | OIL | 1982 |
| 2020 | NEW BALTIMORE | 15 kV | TD-1083 | SIEMENS | SDO-15-500 | OIL | 1990 |
| 2022 | JANSEN AVE | 15 kV | K-553 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | KL-543 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | K-583 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | K-593 | GE | FK-255-250 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | KO-533 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | TD-1001 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | TD-1002 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | TD-1004 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2023 | STURGEON POOL | 15 kV | OS-1 | GE | FK-255-150 | OIL | 1924 |
| 2023 | STURGEON POOL | 15 kV | OS-2 | GE | FKR-255 | OIL | 1924 |
| 2023 | STURGEON POOL | 15 kV | OS-3 | WESTINGHOUSE | E-8 | OIL | 1924 |
| Substation Retirement | BEACON | 15 kV | CM-311 | ALLIS CHALMERS | FZO-15-1000-H | OIL | 1958 |
| Substation Retirement | BEACON | 15 kV | TD-8006 | ALLIS CHALMERS | FZO-15-1000-H | OIL | 1958 |
| Substation Retirement | BEACON | 15 kV | W-426 | ALLIS CHALMERS | FZO-15-1000-H | OIL | 1958 |
| Substation Retirement | CONWAY PLACE | 15 kV | CKT 881 | GE | FK-143 | OIL | 1958 |
| Substation Retirement | CONWAY PLACE | 15 kV | CKT 882 | GE | FK-143 | OIL | 1958 |

| | | | | | | | |
|-----------------------|----------------|-------|----------|----|------------------|-----|------|
| Substation Retirement | MARYLAND AVE | 15 kV | W-426 | GE | FK-46 | OIL | 1951 |
| Substation Retirement | MARYLAND AVE | 15 kV | CKT 881 | GE | FK-46 | OIL | 1951 |
| Substation Retirement | MARYLAND AVE | 15 kV | CKT 882 | GE | FK-46 | OIL | 1951 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | CKT 8026 | GE | FKD-15.5-18000-4 | OIL | 1966 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | CKT 8027 | GE | FK-14.4-500 | OIL | 1958 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | CKT 8028 | GE | FK-14.4-500-1 | OIL | 1959 |

Outlined below are the 5 kV oil breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|-----------------|---------------|----------|--------------|-------------------|--------------|-----------|
| Substation Retirement | BEACON | 5 kV | CKT 801 | GE | FKR-155-16 | OIL | 1929 |
| Substation Retirement | BEACON | 5 kV | CKT 802 | GE | FKR-155-16 | OIL | 1929 |
| Substation Retirement | BEACON | 5 kV | CKT 803 | GE | FKR-155-16 | OIL | 1929 |
| Substation Retirement | BEACON | 5 kV | W-414 | GE | FKR-255-7.2-100-2 | OIL | 1957 |
| Substation Retirement | BEACON | 5 kV | W-463 | GE | FKR-255-7.2-100-2 | OIL | 1957 |
| Low Voltage Retirement | GREENFIELD ROAD | 5 kV | CKT 375 | GE | FKR-255-100 | OIL | 1938 |
| Low Voltage Retirement | GREENFIELD ROAD | 5 kV | CKT 376 | GE | FKR-255-100 | OIL | 1938 |
| Low Voltage Retirement | GREENFIELD ROAD | 5 kV | CKT 377 | GE | FKR-255-100 | OIL | 1938 |
| Low Voltage Retirement | GREENFIELD ROAD | 5 kV | CKT 378 | GE | FKR-255-100 | OIL | 1938 |

345kV SF6 Breaker Replacement

A replacement recommendation is in affect for Westinghouse type SFA SF6 breakers as these breakers have historically been leak prone and maintenance is extremely time consuming because of the design complexity. Outlined below are the type SFA breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|------------|---------------|----------|--------------|------------|--------------|-----------|
| 2020 | HURLEY AVE | 345 kV | 30354 | WESTINGHOUSE | 362-SFA-40 | SF6 GAS | 1976 |
| 2021 | HURLEY AVE | 345 kV | 30353 | WESTINGHOUSE | 362-SFA-40 | SF6 GAS | 1976 |
| 2022 | HURLEY AVE | 345 kV | 30151 | WESTINGHOUSE | 362-SFA-40 | SF6 GAS | 1976 |

15kV Breaker Replacement

A replacement recommendation is in affect for Westinghouse type DH and DHP breakers as these breakers are known to have components that contain asbestos. Outlined below are the type DH and DHP breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|-----------------|---------------|----------|--------------|-------------|--------------|-----------|
| 2018 | FISHKILL PLAINS | 15 kV | TD-8091 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | TD-8092 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | TD-8093 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | TD-8094 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | W-975 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | W-976 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | W-1000 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | UNION AVE | 15 kV | W-1105 | WESTINGHOUSE | 150-DH-500E | AIR | 1961 |
| 2018 | UNION AVE | 15 kV | W-1095 | WESTINGHOUSE | 150-DH-500E | AIR | 1961 |
| 2018 | UNION AVE | 15 kV | W-837 | WESTINGHOUSE | 150-DH-500E | AIR | 1964 |
| 2018 | UNION AVE | 15 kV | TD-4049 | WESTINGHOUSE | 150-DH-500A | AIR | 1967 |
| 2018 | UNION AVE | 15 kV | UW-1494 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2018 | UNION AVE | 15 kV | UN-594 | WESTINGHOUSE | 150-DH-250A | AIR | 1957 |
| 2018 | UNION AVE | 15 kV | TD-4046 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2018 | UNION AVE | 15 kV | TD-4045 | WESTINGHOUSE | 150-DH-500A | AIR | 1956 |
| 2018 | UNION AVE | 15 kV | TD-4044 | WESTINGHOUSE | 150-DH-500E | AIR | 1969 |
| 2018 | UNION AVE | 15 kV | TD-4043 | WESTINGHOUSE | 150-DH-500A | AIR | 1957 |
| 2018 | UNION AVE | 15 kV | TD-4042 | WESTINGHOUSE | 150-DH-500A | AIR | 1956 |
| 2018 | UNION AVE | 15 kV | TD-4041 | WESTINGHOUSE | 150-DH-500E | AIR | 1964 |
| 2019 | MONTGOMERY ST. | 15 kV | NM-384 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | NB-385 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | TD-4001 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | TD-4002 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |

| | | | | | | | |
|-----------------------|----------------|-------|----------|--------------|-------------|-----|------|
| 2019 | MONTGOMERY ST. | 15 kV | TD-4003 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-507 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-508 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-509 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | R-350 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | F-351 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | B-352 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-359 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | WN-486 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-489 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2023 | SAND DOCK | 15 kV | BP-1296 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | BP-1570 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | TW-909 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | TW-910 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | W-1449 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | W-1453 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | W-1568 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | W-1573 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | TW-902 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2024 | REYNOLDS HILL | 15 kV | TD-6001 | WESTINGHOUSE | 150-DHP | AIR | 1972 |
| 2024 | REYNOLDS HILL | 15 kV | TD-6005 | WESTINGHOUSE | 150-DHP | AIR | 1973 |
| Substation Retirement | BEACON | 15 kV | NM-402 | WESTINGHOUSE | 150-DH-500E | AIR | 1958 |
| Substation Retirement | BEACON | 15 kV | TD-8015A | WESTINGHOUSE | 150-DH-500E | AIR | 1959 |
| Substation Retirement | BEACON | 15 kV | W-408 | WESTINGHOUSE | 150-DH-500E | AIR | 1959 |
| Substation Retirement | BEACON | 15 kV | W-420 | WESTINGHOUSE | 150-DH-500E | AIR | 1959 |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-201 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-202 | WESTINGHOUSE | 150-DH-250A | AIR | |

| | | | | | | | |
|-----------------------|---------------|-------|----------|--------------|--------------|-----|------|
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-203 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-204 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-205 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-206 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-208 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-209 | WESTINGHOUSE | 150-DH-250A | AIR | |
| 2025/2026 | SHENANDOAH | 15 kV | B-4453 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | B-4454 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | B-4455 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | B-4456 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S10-1015 | WESTINGHOUSE | 150-DHP-500 | AIR | 1980 |
| 2025/2026 | SHENANDOAH | 15 kV | S11-405 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S12-401 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S13-412 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S14-410 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S7-1102 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | S8-1014 | WESTINGHOUSE | 150-DHP-500 | AIR | 1980 |
| 2025/2026 | SHENANDOAH | 15 kV | S9-1009 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | TD-8071 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | TD-8072 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-1059 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | W-1279 | WESTINGHOUSE | 150-DHP-500 | AIR | 1980 |
| 2025/2026 | SHENANDOAH | 15 kV | W-1593 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | W-664 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |

| | | | | | | | |
|-------------------------|------------|-------|---------|--------------|--------------|-----|------|
| 2025/2026 | SHENANDOAH | 15 kV | W-665 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-802 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-803 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-805 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-807 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-845 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | W-846 | WESTINGHOUSE | 150-DH-500 | AIR | 1980 |
| Replacement Deferral | TIORONDA | 15 kV | TD-8085 | WESTINGHOUSE | 150-DHP-500 | AIR | 1971 |
| Replacement Deferral | TIORONDA | 15 kV | TD-8086 | WESTINGHOUSE | 150-DHP-500 | AIR | 1971 |
| Replacement Deferral | TIORONDA | 15 kV | W-567 | WESTINGHOUSE | 150-DHP-500 | AIR | 1971 |
| Replacement Deferral | TIORONDA | 15 kV | TD-8087 | WESTINGHOUSE | 150-DHP-500 | AIR | 1971 |

**Operations Services recommends the deferral of the Tioronda breaker replacement until a proper cost benefit switchgear replacement is developed to weigh the value of component replacement (wires, AC power, breakers, etc.) versus entire switchgear. The switchgear condition is questionable (discussed further in later section)*

A replacement recommendation is in affect for General Electric type AM breakers as replacement parts are not available for these breakers and continuous issues have been reported. Outlined below are the type AM breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|----------------|---------------|----------|--------------|-----------------------|--------------|-----------|
| 2019 | COXSACKIE | 15 kV | TD-1071 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | TD-1072 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | TD-1076 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | TD-1074A | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | W-1398 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | W-296 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | W-484 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2020 | JANSEN AVE | 15 kV | TD-1003 | GE | AM-15-250-1 | AIR | 1956 |
| 2020 | WOODSTOCK | 15 kV | TD-3012 | GE | AM-15-250-1 | AIR | 1947 |
| 2020 | WOODSTOCK | 15 kV | TD-3013 | GE | AM-15-250-1 | AIR | 1947 |
| 2020 | WOODSTOCK | 15 kV | W-1091 | GE | AM-15-250-1 | AIR | 1947 |
| 2020 | WOODSTOCK | 15 kV | W-25 | GE | AM-15-250-1 | AIR | 2001 |
| 2021 | NEVERSINK | 5 kV | CKT-391 | GE | AM-5-150-5 | AIR | 1950 |
| 2021 | NEVERSINK | 5 kV | W-1128 | GE | AM-5-150-5 | AIR | 1950 |
| Substation Retirement | MARYLAND AVE | 5 kV | CKT 623 | GE | AM-5-150-4 | AIR | 1951 |
| Substation Retirement | MARYLAND AVE | 5 kV | CKT 624 | GE | AM-5-150-7 | AIR | 1951 |
| Substation Retirement | MARYLAND AVE | 5 kV | W-1034 | GE | AM-5-150-4 | AIR | 1951 |
| Substation Retirement | MARYLAND AVE | 5 kV | W-540 | GE | AM-5-150-7 | AIR | 1951 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | W-1208 | GE | AM-13.8-500-5H | AIR | 1953 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | W-1215 | GE | AM-13.8-500-5H | AIR | 1953 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | W-1462 | GE | AM-13.8-500-5H | AIR | 1953 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | W-1562 | GE | AM-13.8-500-5H | AIR | 1953 |
| Low Voltage Retirement | CLINTON AVE | 5 kV | CKT 395 | GE | AM-2.4/4.16-150/250-3 | AIR | 1968 |
| Low Voltage Retirement | CLINTON AVE | 5 kV | CKT 396 | GE | AM-2.4/4.16-150/250-3 | AIR | 1968 |
| Low Voltage Retirement | CLINTON AVE | 5 kV | CKT 397 | GE | AM-2.4/4.16-100/150-1 | AIR | 1968 |

| | | | | | | | |
|-------------------------------|-------------|------|---------|----|-----------------------|-----|------|
| New Switchgear Recommendation | CONVERSE ST | 5 kV | CKT 121 | GE | AM-2.4/4.16-150/250-1 | AIR | 1955 |
| New Switchgear Recommendation | CONVERSE ST | 5 kV | CKT 122 | GE | AM-2.4/4.16-100/150-1 | AIR | 1955 |
| New Switchgear Recommendation | CONVERSE ST | 5 kV | CKT 123 | GE | AM-2.4/4.16-150/250-2 | AIR | 1955 |

**Operations Services recommends the replacement of the Converse Street breakers along with the switchgear due to parts constraints, wiring issues, old generation relaying, etc. A cost benefit analysis should be performed to determine the best course of action.*

Transformer Replacement

Typically a power transformer's useful life is 55 years old. When rebuilding a substation where the transformer is greater than 55 years old, consideration should be given to retiring and not reusing the transformer. Outlined below are the power transformers that are scheduled for replacement in the 5 year budget.

| Location | Asset Name | Age | Plan | Replacement Reason | Condition Analysis |
|----------------|-------------|-----|-------------------------|-------------------------|---|
| BOULEVARD | TR. #1 PH 1 | 64 | Substation Rebuild | Age | |
| BOULEVARD | TR. #1 PH 2 | 64 | Substation Rebuild | Age | |
| BOULEVARD | TR. #1 PH 3 | 64 | Substation Rebuild | Age | |
| BOULEVARD | TR. #2 | 78 | Substation Rebuild | Age | |
| BOULEVARD | TR. #3 | 47 | Substation Rebuild | Potential Spare | |
| CONVERSE ST | TR. #2 | 62 | Transformer Replacement | Condition | Very poor power factor test results and poor oil quality. |
| CONWAY PLACE | TR. #1 | 59 | Substation Retirement | Substation Retirement | |
| MONTGOMERY ST | TR. #1 | 80 | Transformer Replacement | Condition | Very poor power factor test results. |
| MONTGOMERY ST | TR. #2 | 80 | Transformer Replacement | Condition | Very poor power factor test results. |
| MARYLAND AVE | TR. #1 | 63 | Substation Retirement | Substation Retirement | |
| MARYLAND AVE | TR. #2 | 63 | Substation Retirement | Substation Retirement | |
| NORTH CATSKILL | TR. #4 | 67 | Transformer Replacement | Planning Recommendation | |
| NORTH CATSKILL | TR. #5 | 62 | Transformer Replacement | Planning Recommendation | |
| NORTH CHELSEA | TR. #1 PH 1 | 71 | Transformer Replacement | Condition | Very poor power factor test results. Poor DGA results. |
| NORTH CHELSEA | TR. #1 PH 2 | 71 | Transformer Replacement | Condition | Very poor power factor test results. |
| NORTH CHELSEA | TR. #1 PH 3 | 71 | Transformer Replacement | Condition | Very poor power factor test results. Poor DGA results. |
| REYNOLDS HILL | TR. #3 | 64 | Transformer Replacement | Age & Refined LTC | |
| REYNOLDS HILL | TR. #4 | 66 | Transformer Replacement | Age & Refined LTC | |
| KNAPPS CORNERS | TR. #1 | 52 | Substation Rebuild | Age & Condition | Poor power factor test results and poor oil quality. |
| KNAPPS CORNERS | TR. #2 | 40 | Substation Rebuild | Condition | Poor DGA results and poor oil quality. |

Central Hudson’s power transformers are evaluated based on analytical testing data compiled by Operations Services. Outlined below are the power transformers that need to be monitored for decreasing condition. Operations Services is requesting that planning make a recommendation related to the following power transformers.

| Location | Asset Name | Age | Comment |
|-----------------|-------------|-----|---|
| ANCRAM | Bank 1 PH 1 | 50 | Slightly elevated power factor results. Slightly elevated combustible gas content. |
| ANCRAM | Bank 1 PH 2 | 50 | Slightly elevated power factor results. Slightly elevated combustible gas content. |
| ANCRAM | Bank 1 PH 3 | 50 | Slightly elevated power factor results. Slightly elevated combustible gas content. |
| CONVERSE ST | TR. #1 | 49 | High hydrogen content. |
| FORGEBROOK | TR. #1 | 60 | High hydrogen content. High combustible gas content overall. Oil quality deteriorating. High power factor results on CH insulation. |
| GREENFIELD ROAD | TR. #2 | 45 | Very high CHL power factor results. Acetylene present in oil likely left over from previous lead damage. |
| HUNTER | TR. #1 | 23 | High ethylene and ethane content. High combustible content overall. |
| TINKERTOWN | TR. #2 | 61 | Elevated power factor results across the board. Relative saturation is elevated. |

Switchgear Replacement

Switchgear condition is evaluated by Operations Services on a five year schedule. Below is a list of switchgear that has been given a poor evaluation, where replacement needs to be considered.

| Location | Asset Type | Comment |
|-----------------|---------------------|--|
| MYERS CORNERS | Switchgear | Poor roof condition. Switchgear roof has rotted through allowing water to ingress over relays. Breaker roll in alignment is problematic. |
| WOODSTOCK | Switchgear | Roof and rust condition is poor. Switchgear wiring and panels have aged. Needs replacement. |
| SHENANDOAH | Multiple Switchgear | Very difficult to rack breakers in and out due to misalignment and shifting of the switchgear floor. This issue makes switching very challenging. |
| TIORONDA | Switchgear | Wiring and CTs with the gear are deteriorated. Breakers require 240 VAC which would lead to extensive rewiring. It is recommended that the switchgear be replaced with the breakers |
| CONVERSE STREET | Switchgear | Switchgear wiring has aged and contains old electromechanical relaying. Parts for the switchgear breakers are hard to procure. It is recommended to couple the replacement of the switchgear breakers with a new switchgear. |

Additionally, Operations Services is looking for several recommendations from planning related to the replacement of switchgear and possibility of low voltage conversion to assist with some of the substation initiatives.

- Lincoln Park outdoor switchgear necessity (some of these cables are in poor condition and are out of potentially out of service – needs engineering/planning review)
- Shenandoah Bus #1 & Bus #2 switchgears
- Neversink feasibility of 4kV conversion to 13.8kV

Switch Replacement

345 kV Switch Replacement

Recently, problems have developed with the Pascor type TTT-7 and Memco type EA, VR2 and VT-1 style motor operated 345kV air disconnects at the Roseton, Rock Tavern and Hurley Avenue substations. Replacement parts availability is limited for these switch styles.

Operations Services has determined that these disconnects have reached the end of their useful life due to increasing issues, troubleshooting and callouts.

Below is a list of remaining switches that need replacement based on this recommendation in prioritized order. This order can be shuffled if replacements are to be packaged together, but can be followed as a guideline.

| Location | Position | Voltage | Manufacturer | Model | Mfg. Date | Issues |
|-----------------------|------------|---------|-----------------|-------|-----------|---|
| ROCK TAVERN 345 kV | RTB-3451 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Hotspots, Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-C-3092 | 345 kV | MEMCO | EA | 1/1/1970 | Reoccurring Hotspots |
| HURLEY AVENUE - 345kV | HAB-30382 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Hotspots, Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-C-3091 | 345 kV | MEMCO | EA | 1/1/1970 | Reoccurring Hotspots |
| HURLEY AVENUE - 345kV | HAB-30393 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Hotspots, Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-4483 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Hotspots, Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB-30193 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-31194 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB-30181 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Hotspots |
| HURLEY AVENUE - 345kV | HAB-A-2492 | 345 kV | MEMCO | VR2 | 1/1/1976 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-31193 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-30398 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB-30394 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-30581 | 345 kV | MEMCO | EA | 1/1/1970 | Reoccurring Hotspots |
| ROCK TAVERN 345 kV | RTB-3493 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1986 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-3484 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Hotspots |

| | | | | | | |
|--------------------------|----------------|--------|--------------------|-------|----------|----------------------|
| ROCK TAVERN 345 kV | RTB-4491 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Hotspots |
| ROCK TAVERN 345 kV | RTB-C3392 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB-A- 2491 | 345 kV | MEMCO | VR2 | 1/1/1976 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-C3397 | 345 kV | MEMCO | VR2 | 1/1/1972 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-C3393 | 345 kV | MEMCO | VR2 | 1/1/1972 | Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB- 30192 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-C3394 | 345 kV | MEMCO | VR2 | 1/1/1972 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-31191 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-C- 3094 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-30392 | 345 kV | PASCOR ATLANTIC | VT-1 | 1/1/1980 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-C3396 | 345 kV | MEMCO | VR2 | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB-C3395 | 345 kV | MEMCO | VR2 | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB- 376934 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROCK TAVERN 345 kV | RTB- 376945 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROCK TAVERN 345 kV | RTB- C33911 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROSETON SWITCHYARD | RSB-C- 3093 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROSETON SWITCHYARD | RSB-31181 | 345 kV | PASCOR ATLANTIC | VT-1 | 1/1/1980 | |
| ROCK TAVERN 345 kV | RTB-31182 | 345 kV | MEMCO | EA | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB-C3398 | 345 kV | MEMCO | EA | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB-C3399 | 345 kV | MEMCO | EA | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB- C33910 | 345 kV | MEMCO | EA | 1/1/1972 | |
| HURLEY AVENUE - 345kV | HAB- 30191 | 345 kV | MEMCO | VR2 | 1/1/1976 | |
| ROSETON SWITCHYARD | RSB-30591 | 345 kV | MEMCO | VR2 | 1/1/1970 | |
| ROSETON SWITCHYARD | RSB-30391 | 345 kV | MEMCO | VR2 | 1/1/1970 | |
| ROCK TAVERN 345 kV | RTB-4492 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1986 | |
| ROCK TAVERN 345 kV | RTB-C3373 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROCK TAVERN 345 kV | RTB-C3371 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROSETON SWITCHYARD | RSB-31192 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROSETON SWITCHYARD | RSB-C- | 345 kV | PASCOR | VT-1 | 1/1/1980 | |

| | | | | | | |
|--------------------|------------|--------|--------------------|------|----------|--|
| | 3081 | | ATLANTIC | | | |
| ROSETON SWITCHYARD | RSB-C-3082 | 345 kV | PASCOR ATLANTIC | VT-1 | 1/1/1980 | |

115 kV Switch Replacement

Operations Services collects and trends hotspot information as well as trouble orders documenting issues with switches over the lifespan of a switch. Below is an identified list of 115 kV switches that are recommended for replacement.

| Location | Position | Voltage | Manufacturer | Model | Mfg. Date | Issues |
|------------------------|----------|---------|-----------------|----------|-----------|--|
| BARNEGAT | KB-747 | 115 kV | MEMCO | VM1-204 | 1987 | Reoccurring Hotspots |
| BARNEGAT | KB-748 | 115 kV | MEMCO | VM1-204 | 1987 | |
| BARNEGAT | KC-750 | 115 kV | MEMCO | VM1-204 | 1987 | |
| BARNEGAT | KC-752 | 115 kV | SOUTHERN STATES | VM-1-104 | 1987 | |
| INWOOD AVENUE | X-970 | 115 kV | SOUTHERN STATES | VM-1-208 | 1975 | Reoccurring Hotspots |
| INWOOD AVENUE | X-977 | 115 kV | SOUTHERN STATES | VM-1-208 | 1975 | |
| NORTH CATSKILL REACTOR | 293 | 115 kV | PASCOR | CBSA | 2014 | Reoccurring Hotspots, Adjustment Issues, Poor Quality Construction |
| PLEASANT VALLEY | 1077 | 115 kV | | | - | Reoccurring Hotspots causing switches to become inoperable. Switches are hand operated and are very difficult to open making operation dangerous during switching. |
| PLEASANT VALLEY | 1099 | 115 kV | | | - | |
| PLEASANT VALLEY | 1277 | 115 kV | | | - | |
| PLEASANT VALLEY | 1288 | 115 kV | | | - | |
| PLEASANT VALLEY | 1299 | 115 kV | | | - | |
| PLEASANT VALLEY | 1377 | 115 kV | | | - | |
| PLEASANT VALLEY | 1388 | 115 kV | | | - | |
| PLEASANT VALLEY | 1399 | 115 kV | | | - | |
| PLEASANT VALLEY | 6177 | 115 kV | | | - | |

| | | | | | | |
|-----------------|----------|--------|--|--|---|---|
| PLEASANT VALLEY | 6199 | 115 kV | | | - | <p>Reoccurring Hotspots causing switches to become inoperable. Switches are hand operated and are very difficult to open making operation dangerous during switching.</p> |
| PLEASANT VALLEY | 6277 | 115 kV | | | - | |
| PLEASANT VALLEY | 6299 | 115 kV | | | - | |
| PLEASANT VALLEY | 64377 | 115 kV | | | - | |
| PLEASANT VALLEY | 64399 | 115 kV | | | - | |
| PLEASANT VALLEY | 8171 | 115 kV | | | - | |
| PLEASANT VALLEY | 8172 | 115 kV | | | - | |
| PLEASANT VALLEY | 8191 | 115 kV | | | - | |
| PLEASANT VALLEY | 8192 | 115 kV | | | - | |
| PLEASANT VALLEY | 877 | 115 kV | | | - | |
| PLEASANT VALLEY | 888 | 115 kV | | | - | |
| PLEASANT VALLEY | 899 | 115 kV | | | - | |
| PLEASANT VALLEY | 93932-44 | 115 kV | | | - | |
| PLEASANT VALLEY | 93931-44 | 115 kV | | | - | |

| | | | | | | |
|-----------------|-------|--------|---------|-------|------|--|
| PLEASANT VALLEY | C677 | 115 kV | | | - | Reoccurring Hotspots causing switches to become inoperable. Switches are hand operated and are very difficult to open making operation dangerous during switching. |
| PLEASANT VALLEY | C688 | 115 kV | | | - | |
| PLEASANT VALLEY | C699 | 115 kV | | | - | |
| PLEASANT VALLEY | M77 | 115 kV | | | - | |
| PLEASANT VALLEY | M88 | 115 kV | | | - | |
| PLEASANT VALLEY | M99 | 115 kV | | | - | |
| PLEASANT VALLEY | Q302 | 115 kV | | | - | |
| PLEASANT VALLEY | X-477 | 115 kV | | | - | |
| PLEASANT VALLEY | X-488 | 115 kV | | | - | |
| PLEASANT VALLEY | X-499 | 115 kV | | | - | |
| TODD HILL | A-523 | 115 kV | SIEMENS | CM-4A | 1989 | Hotspot issues, DC motor problems, switches have been burning up motors. We recommend replacing with same style switches as install on the C line during recent work order |

| | | | | | | |
|-----------|-------|--------|---------|-------|------|--|
| TODD HILL | A-702 | 115 kV | SIEMENS | CM-4A | 1989 | Hotspot issues, DC motor problems, switches have been burning up motors. We recommend replacing with same style switches as install on the C line during recent work order |
| TODD HILL | A-521 | 115 kV | SIEMENS | CM-4A | 1989 | |
| TODD HILL | C-519 | 115 kV | SIEMENS | CM-4A | 1989 | |

**Model numbers for switches may not always be accurate*

Operations Services recommends that the switches at Pleasant Valley be replaced with or prior to the planned replacement of the existing 115kV oil breakers in 2020, a systematic plan needs to be coordinated to allow for proper isolation of each breaker prior to replacement. The existing switch problems will prevent proper clearances to be taken if they are not replaced prior to the breakers.

Non-Equipment Based Replacements

A 5 year substation evaluation program that assesses “non-equipment” assets has been implemented in 2016 to address the following equipment: steel, foundations, fence, ground grid, etc. As projects are identified through this program, Operations Services will bring issues to the attention of Substation Design or manage with local work orders as needed.

Steel Replacement

As replacement recommendations are identified, this work should be completed with future rebuilds unless there is imminent danger of failure, in which case the repairs should be handled sooner. It is also recommended that during any future rebuilds, that Substation Design evaluates the steel in and around any equipment that will be affected during the work order. An example of this is in 2019, as part of the Boulevard substation upgrade, the steel on the 69kV portion of the yard will be replaced due to condition concerns which were caused by poor foundations.

Foundation Replacement

These replacement recommendations should be considered during future work order planning to improve the existing infrastructure. Overall foundations are acceptable, with some older stations showing deteriorated foundations due to weather such as flaking. Some flaking is addressed as part of general maintenance by patching the foundations as necessary.

Fence Review

Operations Services completes fence inspections on a monthly as well as a more thorough inspection on a 5 year cycle and recommends either fence maintenance repair or complete rebuilds. Most recently the East Walden Substation fence was replaced which had rotten top rails as well as posts. It is recommended that 1 inch fence fabric is utilized for new substation fences to limit fence cuts.

Ground Grid Review

Operations Services completes ground grid testing on an 8 year cycle and reports ground grid deficiencies as they are determined. When adding or replacing equipment within a substation, the ground grid should be reviewed by Substation Design to ensure that the existing grid is adequate.

| Substation | Comments |
|----------------|---|
| Manchester | There are ground grid deficiencies that were noted during recent construction. It is recommended that a formal review of the substation ground grid be conducted. |
| West Balmville | During fence repair an electrical arc was drawn. This could be due to lack of fence bonding, however as part of the future breaker replacements, it is recommended that a more thorough engineered review be completed. |

Stone Review

Operations Services recommendation is to review the integrity of the stone fill within a substation when any major work order is being executed to ensure there is adequate stone coverage throughout the entire station and incorporate this work as part of any major work to be performed.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A: Infrastructure Replacements

Why was the proposed project scope chosen over other alternatives?

N/A: Infrastructure Replacements

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Infrastructure Replacements as required.

What are the risks and consequences of not completing this project?

Failed substation disconnect switches would not be replaced possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$7,568,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 682,900 | 11,900 | 11,000 | 81,000 | 84,000 | 87,000 | 87,000 | 321,000 |
| | Labor (Monthly Payroll) | 340,950 | 5,950 | 5,000 | 41,000 | 42,000 | 43,000 | 43,000 | 161,000 |
| | Stock Materials | 340,950 | 5,950 | 5,000 | 41,000 | 42,000 | 43,000 | 43,000 | 161,000 |
| | Non-Stock Material (A/P taxable) | 1,362,800 | 23,800 | 21,000 | 162,000 | 167,000 | 173,000 | 173,000 | 643,000 |
| | Contractors (A/P tax exempt) | 479,330 | 8,330 | 8,000 | 57,000 | 59,000 | 61,000 | 61,000 | 225,000 |
| | Overheads | 3,409,500 | 59,500 | 53,000 | 406,000 | 418,000 | 433,000 | 433,000 | 1,607,000 |
| | AFUDC* | 203,570 | 3,570 | 3,000 | 24,000 | 25,000 | 26,000 | 26,000 | 96,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 6,820,000 | 119,000 | 106,000 | 812,000 | 837,000 | 866,000 | 866,000 | 3,214,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 112,250 | 15,150 | 15,000 | 16,000 | 16,000 | 16,000 | 17,000 | 17,100 |
| | Labor (Monthly Payroll) | 224,500 | 30,300 | 31,000 | 31,000 | 32,000 | 33,000 | 33,000 | 34,200 |
| | Contractors (A/P tax exempt) | 38,750 | 5,050 | 5,000 | 5,000 | 6,000 | 6,000 | 6,000 | 5,700 |
| | Overheads | 372,500 | 50,500 | 51,000 | 52,000 | 53,000 | 54,000 | 55,000 | 57,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 748,000 | 101,000 | 102,000 | 104,000 | 107,000 | 109,000 | 111,000 | 114,000 |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 2,795 | 1,865 | 930 | | | | | |

* AFUDC may require adjustment after Finance Department review.

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 5,297,600 Maximum (\$): 9,838,400

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.


Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

INFRASTRUCTURE REVIEW & RECOMMENDATIONS

VERSION HISTORY

| Memo No. | Date | Action | Author | Approval |
|------------|-----------|---------------------------|----------|---|
| OS2018-002 | 6/25/2018 | Initial Document Creation | B. Perry |  |
| | | | | |

This memo is to memorialize Operations Services annual review of its infrastructure, maintenance and inspection programs for various pieces of substation equipment as well as physical infrastructure. This document will be modified annually.

Breaker Replacement

Below are the 115kV oil breakers remaining and the planned replacement as identified in the capital budget.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|----------------|---------------|----------|----------------|-----------------|--------------|-----------|
| 2018 | ROCK TAVERN | 115 kV | RJ-818 | ALLIS CHALMERS | BZO-115-10000 | OIL | 1971 |
| 2018 | ROCK TAVERN | 115 kV | W-681 | GE | FK-121-43000 | OIL | 1971 |
| 2018 | UNION AVE | 115 kV | RJ-52 | GE | FK-439-115-3500 | OIL | 1952 |
| 2019 | WEST BALMVILLE | 115 kV | DW-662 | ALLIS CHALMERS | BZO-115-7500 | OIL | 1965 |
| 2019 | HURLEY AVE | 115 kV | HP-1643 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1969 |
| 2019 | HURLEY AVE | 115 kV | W-389 | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1973 |
| 2019 | HURLEY AVE | 115 kV | OR-1640 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1969 |
| 2019 | HURLEY AVE | 115 kV | A-2451 | ALLIS CHALMERS | BZO-121-40-3PST | OIL | 1973 |
| 2019 | ROCK TAVERN | 115 kV | W-814 | GE | FK-121-43000 | OIL | 1971 |
| 2019 | ROCK TAVERN | 115 kV | RD-809 | ALLIS CHALMERS | BZO-115-10000 | OIL | 1971 |

| | | | | | | | |
|--------------------------|-----------------|--------|------------|----------------|-----------------|-----|------|
| 2019 | ROCK TAVERN | 115 kV | J-788 | ALLIS CHALMERS | BZO-115-10000 | OIL | 1971 |
| 2020 | BETHLEHEM ROAD | 115 kV | RD-604-UB | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1974 |
| 2020 | PLEASANT VALLEY | 115 kV | R-8 | SIEMENS | BZO-121-50-6 | OIL | 1991 |
| 2020 | PLEASANT VALLEY | 115 kV | RX-4 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1968 |
| 2020 | PLEASANT VALLEY | 115 kV | R-81 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1968 |
| 2020 | PLEASANT VALLEY | 115 kV | R-10 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1980 |
| 2020 | PLEASANT VALLEY | 115 kV | R-62 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1980 |
| 2020 | PLEASANT VALLEY | 115 kV | R-61 | MCGRAW EDISON | OHT-54 | OIL | 1973 |
| 2020 | PLEASANT VALLEY | 115 kV | R-643 | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1980 |
| 2021 | LINCOLN PARK | 115 kV | LR-1219-HP | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1969 |
| 2021 | LINCOLN PARK | 115 kV | HP-1318 | ALLIS CHALMERS | BZO-115-10000-2 | OIL | 1969 |
| 2021 | NORTH CATSKILL | 115 kV | R-2 | SIEMENS | BZO-121-20-7 | OIL | 1985 |
| 2022 | SHENANDOAH | 115 kV | FS-739 | SIEMENS | BZO-121-40-6 | OIL | 1983 |
| 2022 | SHENANDOAH | 115 kV | FS-959 | SIEMENS | BZO-121-40-6 | OIL | 1983 |
| 2022 | BARNEGAT | 115 kV | KB-749-KC | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1987 |
| Recommendation Requested | WICCOPEE | 115 kV | FS-1652-WP | ALLIS CHALMERS | BZO-121-40-6 | OIL | 1988 |

**Wicopee has essentially no distribution load present. A recommendation about the necessity of this station is required for equipment replacement to be planned appropriately*

Outlined below are the 69 kV oil breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|----------------|---------------|-----------|-----------------------------|----------------|--------------|-----------|
| 2018 | HURLEY AVE | 69 kV | SB-233 | GE | FK-69-2500-5 | OIL | 1963 |
| 2018 | HURLEY AVE | 69 kV | I-442 | GE | FK-69-2500-5 | OIL | 1963 |
| 2018 | HURLEY AVE | 69 kV | W-142 | GE | FK-69-2500-5 | OIL | 1963 |
| 2019 | HONK FALLS | 69 kV | GM-737 | GE | FK-69-2500 | OIL | 1963 |
| 2019 | HONK FALLS | 69 kV | HG-709 | ALLIS CHALMERS | FZO-151-69F | OIL | 1953 |
| 2019 | HONK FALLS | 69 kV | WH-769 | ALLIS CHALMERS | FZO-151-69F | OIL | 1952 |
| 2019 | ROCK TAVERN | 69 kV | WM-1675 | GENERAL ELECTRIC | FK-69-2500-5 | OIL | 1964 |
| 2020 | MYERS CORNERS | 69 kV | TV-399-KM | SIEMENS | TDO-72.5-20000 | OIL | 1981 |
| 2023 | HIBERNIA | 69 kV | E-972 | ITE CIRCUIT BREAKER COMPANY | 69KSB2500-12 | OIL | 1967 |
| Substation Rebuild | KNAPPS CORNERS | 69 kV | G-1175 | SIEMENS ALLIS | TDO-72.5-20000 | OIL | 1981 |
| Substation Rebuild | KNAPPS CORNERS | 69 kV | KM-1185 | SIEMENS ALLIS | TDO-72.5-20000 | OIL | 1981 |
| Substation Rebuild | KNAPPS CORNERS | 69 kV | TR-1195 | SIEMENS ALLIS | TDO-72.5-20000 | OIL | 1981 |
| Substation Rebuild | KNAPPS CORNERS | 69 kV | W-1409 | SIEMENS ALLIS | TDO-72.5-20000 | OIL | 1981 |

Outlined below are the 15 kV oil breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|---------------|---------------|----------|----------------|-------------------|--------------|-----------|
| 2020 | NEW BALTIMORE | 15 kV | TD-1081 | SIEMENS | SDO-15-500 | OIL | 1990 |
| 2020 | NEW BALTIMORE | 15 kV | TD-1082 | SIEMENS | SDO-15-500 | OIL | 1982 |
| 2020 | NEW BALTIMORE | 15 kV | TD-1083 | SIEMENS | SDO-15-500 | OIL | 1990 |
| 2022 | JANSEN AVE | 15 kV | K-553 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | KL-543 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | K-583 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | K-593 | GE | FK-255-250 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | KO-533 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | TD-1001 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | TD-1002 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2022 | JANSEN AVE | 15 kV | TD-1004 | GE | FK-255-13.8-250-1 | OIL | 1941 |
| 2023 | STURGEON POOL | 15 kV | OS-1 | GE | FK-255-150 | OIL | 1924 |
| 2023 | STURGEON POOL | 15 kV | OS-2 | GE | FKR-255 | OIL | 1924 |
| 2023 | STURGEON POOL | 15 kV | OS-3 | WESTINGHOUSE | E-8 | OIL | 1924 |
| Substation Retirement | BEACON | 15 kV | CM-311 | ALLIS CHALMERS | FZO-15-1000-H | OIL | 1958 |
| Substation Retirement | BEACON | 15 kV | TD-8006 | ALLIS CHALMERS | FZO-15-1000-H | OIL | 1958 |
| Substation Retirement | BEACON | 15 kV | W-426 | ALLIS CHALMERS | FZO-15-1000-H | OIL | 1958 |
| Substation Retirement | CONWAY PLACE | 15 kV | CKT 881 | GE | FK-143 | OIL | 1958 |
| Substation Retirement | CONWAY PLACE | 15 kV | CKT 882 | GE | FK-143 | OIL | 1958 |

| | | | | | | | |
|-----------------------|----------------|-------|----------|----|------------------|-----|------|
| Substation Retirement | MARYLAND AVE | 15 kV | W-426 | GE | FK-46 | OIL | 1951 |
| Substation Retirement | MARYLAND AVE | 15 kV | CKT 881 | GE | FK-46 | OIL | 1951 |
| Substation Retirement | MARYLAND AVE | 15 kV | CKT 882 | GE | FK-46 | OIL | 1951 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | CKT 8026 | GE | FKD-15.5-18000-4 | OIL | 1966 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | CKT 8027 | GE | FK-14.4-500 | OIL | 1958 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | CKT 8028 | GE | FK-14.4-500-1 | OIL | 1959 |

Outlined below are the 5 kV oil breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|-----------------|---------------|----------|--------------|-------------------|--------------|-----------|
| Substation Retirement | BEACON | 5 kV | CKT 801 | GE | FKR-155-16 | OIL | 1929 |
| Substation Retirement | BEACON | 5 kV | CKT 802 | GE | FKR-155-16 | OIL | 1929 |
| Substation Retirement | BEACON | 5 kV | CKT 803 | GE | FKR-155-16 | OIL | 1929 |
| Substation Retirement | BEACON | 5 kV | W-414 | GE | FKR-255-7.2-100-2 | OIL | 1957 |
| Substation Retirement | BEACON | 5 kV | W-463 | GE | FKR-255-7.2-100-2 | OIL | 1957 |
| Low Voltage Retirement | GREENFIELD ROAD | 5 kV | CKT 375 | GE | FKR-255-100 | OIL | 1938 |
| Low Voltage Retirement | GREENFIELD ROAD | 5 kV | CKT 376 | GE | FKR-255-100 | OIL | 1938 |
| Low Voltage Retirement | GREENFIELD ROAD | 5 kV | CKT 377 | GE | FKR-255-100 | OIL | 1938 |
| Low Voltage Retirement | GREENFIELD ROAD | 5 kV | CKT 378 | GE | FKR-255-100 | OIL | 1938 |

345kV SF6 Breaker Replacement

A replacement recommendation is in affect for Westinghouse type SFA SF6 breakers as these breakers have historically been leak prone and maintenance is extremely time consuming because of the design complexity. Outlined below are the type SFA breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|------------|---------------|----------|--------------|------------|--------------|-----------|
| 2020 | HURLEY AVE | 345 kV | 30354 | WESTINGHOUSE | 362-SFA-40 | SF6 GAS | 1976 |
| 2021 | HURLEY AVE | 345 kV | 30353 | WESTINGHOUSE | 362-SFA-40 | SF6 GAS | 1976 |
| 2022 | HURLEY AVE | 345 kV | 30151 | WESTINGHOUSE | 362-SFA-40 | SF6 GAS | 1976 |

15kV Breaker Replacement

A replacement recommendation is in affect for Westinghouse type DH and DHP breakers as these breakers are known to have components that contain asbestos. Outlined below are the type DH and DHP breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|-----------------|---------------|----------|--------------|-------------|--------------|-----------|
| 2018 | FISHKILL PLAINS | 15 kV | TD-8091 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | TD-8092 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | TD-8093 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | TD-8094 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | W-975 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | W-976 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | FISHKILL PLAINS | 15 kV | W-1000 | WESTINGHOUSE | 150-DH-500E | AIR | 1963 |
| 2018 | UNION AVE | 15 kV | W-1105 | WESTINGHOUSE | 150-DH-500E | AIR | 1961 |
| 2018 | UNION AVE | 15 kV | W-1095 | WESTINGHOUSE | 150-DH-500E | AIR | 1961 |
| 2018 | UNION AVE | 15 kV | W-837 | WESTINGHOUSE | 150-DH-500E | AIR | 1964 |
| 2018 | UNION AVE | 15 kV | TD-4049 | WESTINGHOUSE | 150-DH-500A | AIR | 1967 |
| 2018 | UNION AVE | 15 kV | UW-1494 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2018 | UNION AVE | 15 kV | UN-594 | WESTINGHOUSE | 150-DH-250A | AIR | 1957 |
| 2018 | UNION AVE | 15 kV | TD-4046 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2018 | UNION AVE | 15 kV | TD-4045 | WESTINGHOUSE | 150-DH-500A | AIR | 1956 |
| 2018 | UNION AVE | 15 kV | TD-4044 | WESTINGHOUSE | 150-DH-500E | AIR | 1969 |
| 2018 | UNION AVE | 15 kV | TD-4043 | WESTINGHOUSE | 150-DH-500A | AIR | 1957 |
| 2018 | UNION AVE | 15 kV | TD-4042 | WESTINGHOUSE | 150-DH-500A | AIR | 1956 |
| 2018 | UNION AVE | 15 kV | TD-4041 | WESTINGHOUSE | 150-DH-500E | AIR | 1964 |
| 2019 | MONTGOMERY ST. | 15 kV | NM-384 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | NB-385 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | TD-4001 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | TD-4002 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |

| | | | | | | | |
|-----------------------|----------------|-------|----------|--------------|-------------|-----|------|
| 2019 | MONTGOMERY ST. | 15 kV | TD-4003 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-507 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-508 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-509 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | R-350 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | F-351 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | B-352 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-359 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | WN-486 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2019 | MONTGOMERY ST. | 15 kV | W-489 | WESTINGHOUSE | 150-DH-500A | AIR | 1958 |
| 2023 | SAND DOCK | 15 kV | BP-1296 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | BP-1570 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | TW-909 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | TW-910 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | W-1449 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | W-1453 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | W-1568 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | W-1573 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2023 | SAND DOCK | 15 kV | TW-902 | WESTINGHOUSE | 150-DHP-500 | AIR | 1973 |
| 2024 | REYNOLDS HILL | 15 kV | TD-6001 | WESTINGHOUSE | 150-DHP | AIR | 1972 |
| 2024 | REYNOLDS HILL | 15 kV | TD-6005 | WESTINGHOUSE | 150-DHP | AIR | 1973 |
| Substation Retirement | BEACON | 15 kV | NM-402 | WESTINGHOUSE | 150-DH-500E | AIR | 1958 |
| Substation Retirement | BEACON | 15 kV | TD-8015A | WESTINGHOUSE | 150-DH-500E | AIR | 1959 |
| Substation Retirement | BEACON | 15 kV | W-408 | WESTINGHOUSE | 150-DH-500E | AIR | 1959 |
| Substation Retirement | BEACON | 15 kV | W-420 | WESTINGHOUSE | 150-DH-500E | AIR | 1959 |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-201 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-202 | WESTINGHOUSE | 150-DH-250A | AIR | |

| | | | | | | | |
|-----------------------|---------------|-------|----------|--------------|--------------|-----|------|
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-203 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-204 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-205 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-206 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-208 | WESTINGHOUSE | 150-DH-250A | AIR | |
| Substation Retirement | BOARDMAN ROAD | 15 kV | Z-209 | WESTINGHOUSE | 150-DH-250A | AIR | |
| 2025/2026 | SHENANDOAH | 15 kV | B-4453 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | B-4454 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | B-4455 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | B-4456 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S10-1015 | WESTINGHOUSE | 150-DHP-500 | AIR | 1980 |
| 2025/2026 | SHENANDOAH | 15 kV | S11-405 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S12-401 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S13-412 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S14-410 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | S7-1102 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | S8-1014 | WESTINGHOUSE | 150-DHP-500 | AIR | 1980 |
| 2025/2026 | SHENANDOAH | 15 kV | S9-1009 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | TD-8071 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | TD-8072 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-1059 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | W-1279 | WESTINGHOUSE | 150-DHP-500 | AIR | 1980 |
| 2025/2026 | SHENANDOAH | 15 kV | W-1593 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | W-664 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |

| | | | | | | | |
|-------------------------|------------|-------|---------|--------------|--------------|-----|------|
| 2025/2026 | SHENANDOAH | 15 kV | W-665 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-802 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-803 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-805 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-807 | WESTINGHOUSE | 150-DHP-750C | AIR | 1986 |
| 2025/2026 | SHENANDOAH | 15 kV | W-845 | WESTINGHOUSE | 150-DHP-500 | AIR | 1982 |
| 2025/2026 | SHENANDOAH | 15 kV | W-846 | WESTINGHOUSE | 150-DH-500 | AIR | 1980 |
| Replacement Deferral | TIORONDA | 15 kV | TD-8085 | WESTINGHOUSE | 150-DHP-500 | AIR | 1971 |
| Replacement Deferral | TIORONDA | 15 kV | TD-8086 | WESTINGHOUSE | 150-DHP-500 | AIR | 1971 |
| Replacement Deferral | TIORONDA | 15 kV | W-567 | WESTINGHOUSE | 150-DHP-500 | AIR | 1971 |
| Replacement Deferral | TIORONDA | 15 kV | TD-8087 | WESTINGHOUSE | 150-DHP-500 | AIR | 1971 |

**Operations Services recommends the deferral of the Tioronda breaker replacement until a proper cost benefit switchgear replacement is developed to weigh the value of component replacement (wires, AC power, breakers, etc.) versus entire switchgear. The switchgear condition is questionable (discussed further in later section)*

A replacement recommendation is in affect for General Electric type AM breakers as replacement parts are not available for these breakers and continuous issues have been reported. Outlined below are the type AM breakers remaining and the associated years of planned replacement.

| Anticipated Replacement | Location | Voltage Class | Position | Manufacturer | Model | Breaker Type | Mfg. Date |
|-------------------------|----------------|---------------|----------|--------------|-----------------------|--------------|-----------|
| 2019 | COXSACKIE | 15 kV | TD-1071 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | TD-1072 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | TD-1076 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | TD-1074A | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | W-1398 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | W-296 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2019 | COXSACKIE | 15 kV | W-484 | GE | AM-13.8-500-6H | AIR | 1969 |
| 2020 | JANSEN AVE | 15 kV | TD-1003 | GE | AM-15-250-1 | AIR | 1956 |
| 2020 | WOODSTOCK | 15 kV | TD-3012 | GE | AM-15-250-1 | AIR | 1947 |
| 2020 | WOODSTOCK | 15 kV | TD-3013 | GE | AM-15-250-1 | AIR | 1947 |
| 2020 | WOODSTOCK | 15 kV | W-1091 | GE | AM-15-250-1 | AIR | 1947 |
| 2020 | WOODSTOCK | 15 kV | W-25 | GE | AM-15-250-1 | AIR | 2001 |
| 2021 | NEVERSINK | 5 kV | CKT-391 | GE | AM-5-150-5 | AIR | 1950 |
| 2021 | NEVERSINK | 5 kV | W-1128 | GE | AM-5-150-5 | AIR | 1950 |
| Substation Retirement | MARYLAND AVE | 5 kV | CKT 623 | GE | AM-5-150-4 | AIR | 1951 |
| Substation Retirement | MARYLAND AVE | 5 kV | CKT 624 | GE | AM-5-150-7 | AIR | 1951 |
| Substation Retirement | MARYLAND AVE | 5 kV | W-1034 | GE | AM-5-150-4 | AIR | 1951 |
| Substation Retirement | MARYLAND AVE | 5 kV | W-540 | GE | AM-5-150-7 | AIR | 1951 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | W-1208 | GE | AM-13.8-500-5H | AIR | 1953 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | W-1215 | GE | AM-13.8-500-5H | AIR | 1953 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | W-1462 | GE | AM-13.8-500-5H | AIR | 1953 |
| Substation Rebuild | KNAPPS CORNERS | 15 kV | W-1562 | GE | AM-13.8-500-5H | AIR | 1953 |
| Low Voltage Retirement | CLINTON AVE | 5 kV | CKT 395 | GE | AM-2.4/4.16-150/250-3 | AIR | 1968 |
| Low Voltage Retirement | CLINTON AVE | 5 kV | CKT 396 | GE | AM-2.4/4.16-150/250-3 | AIR | 1968 |
| Low Voltage Retirement | CLINTON AVE | 5 kV | CKT 397 | GE | AM-2.4/4.16-100/150-1 | AIR | 1968 |

| | | | | | | | |
|-------------------------------|-------------|------|---------|----|-----------------------|-----|------|
| New Switchgear Recommendation | CONVERSE ST | 5 kV | CKT 121 | GE | AM-2.4/4.16-150/250-1 | AIR | 1955 |
| New Switchgear Recommendation | CONVERSE ST | 5 kV | CKT 122 | GE | AM-2.4/4.16-100/150-1 | AIR | 1955 |
| New Switchgear Recommendation | CONVERSE ST | 5 kV | CKT 123 | GE | AM-2.4/4.16-150/250-2 | AIR | 1955 |

**Operations Services recommends the replacement of the Converse Street breakers along with the switchgear due to parts constraints, wiring issues, old generation relaying, etc. A cost benefit analysis should be performed to determine the best course of action.*

Transformer Replacement

Typically a power transformer's useful life is 55 years old. When rebuilding a substation where the transformer is greater than 55 years old, consideration should be given to retiring and not reusing the transformer. Outlined below are the power transformers that are scheduled for replacement in the 5 year budget.

| Location | Asset Name | Age | Plan | Replacement Reason | Condition Analysis |
|----------------|-------------|-----|-------------------------|-------------------------|---|
| BOULEVARD | TR. #1 PH 1 | 64 | Substation Rebuild | Age | |
| BOULEVARD | TR. #1 PH 2 | 64 | Substation Rebuild | Age | |
| BOULEVARD | TR. #1 PH 3 | 64 | Substation Rebuild | Age | |
| BOULEVARD | TR. #2 | 78 | Substation Rebuild | Age | |
| BOULEVARD | TR. #3 | 47 | Substation Rebuild | Potential Spare | |
| CONVERSE ST | TR. #2 | 62 | Transformer Replacement | Condition | Very poor power factor test results and poor oil quality. |
| CONWAY PLACE | TR. #1 | 59 | Substation Retirement | Substation Retirement | |
| MONTGOMERY ST | TR. #1 | 80 | Transformer Replacement | Condition | Very poor power factor test results. |
| MONTGOMERY ST | TR. #2 | 80 | Transformer Replacement | Condition | Very poor power factor test results. |
| MARYLAND AVE | TR. #1 | 63 | Substation Retirement | Substation Retirement | |
| MARYLAND AVE | TR. #2 | 63 | Substation Retirement | Substation Retirement | |
| NORTH CATSKILL | TR. #4 | 67 | Transformer Replacement | Planning Recommendation | |
| NORTH CATSKILL | TR. #5 | 62 | Transformer Replacement | Planning Recommendation | |
| NORTH CHELSEA | TR. #1 PH 1 | 71 | Transformer Replacement | Condition | Very poor power factor test results. Poor DGA results. |
| NORTH CHELSEA | TR. #1 PH 2 | 71 | Transformer Replacement | Condition | Very poor power factor test results. |
| NORTH CHELSEA | TR. #1 PH 3 | 71 | Transformer Replacement | Condition | Very poor power factor test results. Poor DGA results. |
| REYNOLDS HILL | TR. #3 | 64 | Transformer Replacement | Age & Refined LTC | |
| REYNOLDS HILL | TR. #4 | 66 | Transformer Replacement | Age & Refined LTC | |
| KNAPPS CORNERS | TR. #1 | 52 | Substation Rebuild | Age & Condition | Poor power factor test results and poor oil quality. |
| KNAPPS CORNERS | TR. #2 | 40 | Substation Rebuild | Condition | Poor DGA results and poor oil quality. |

Central Hudson’s power transformers are evaluated based on analytical testing data compiled by Operations Services. Outlined below are the power transformers that need to be monitored for decreasing condition. Operations Services is requesting that planning make a recommendation related to the following power transformers.

| Location | Asset Name | Age | Comment |
|-----------------|-------------|-----|---|
| ANCRAM | Bank 1 PH 1 | 50 | Slightly elevated power factor results. Slightly elevated combustible gas content. |
| ANCRAM | Bank 1 PH 2 | 50 | Slightly elevated power factor results. Slightly elevated combustible gas content. |
| ANCRAM | Bank 1 PH 3 | 50 | Slightly elevated power factor results. Slightly elevated combustible gas content. |
| CONVERSE ST | TR. #1 | 49 | High hydrogen content. |
| FORGEBROOK | TR. #1 | 60 | High hydrogen content. High combustible gas content overall. Oil quality deteriorating. High power factor results on CH insulation. |
| GREENFIELD ROAD | TR. #2 | 45 | Very high CHL power factor results. Acetylene present in oil likely left over from previous lead damage. |
| HUNTER | TR. #1 | 23 | High ethylene and ethane content. High combustible content overall. |
| TINKERTOWN | TR. #2 | 61 | Elevated power factor results across the board. Relative saturation is elevated. |

Switchgear Replacement

Switchgear condition is evaluated by Operations Services on a five year schedule. Below is a list of switchgear that has been given a poor evaluation, where replacement needs to be considered.

| Location | Asset Type | Comment |
|-----------------|---------------------|--|
| MYERS CORNERS | Switchgear | Poor roof condition. Switchgear roof has rotted through allowing water to ingress over relays. Breaker roll in alignment is problematic. |
| WOODSTOCK | Switchgear | Roof and rust condition is poor. Switchgear wiring and panels have aged. Needs replacement. |
| SHENANDOAH | Multiple Switchgear | Very difficult to rack breakers in and out due to misalignment and shifting of the switchgear floor. This issue makes switching very challenging. |
| TIORONDA | Switchgear | Wiring and CTs with the gear are deteriorated. Breakers require 240 VAC which would lead to extensive rewiring. It is recommended that the switchgear be replaced with the breakers |
| CONVERSE STREET | Switchgear | Switchgear wiring has aged and contains old electromechanical relaying. Parts for the switchgear breakers are hard to procure. It is recommended to couple the replacement of the switchgear breakers with a new switchgear. |

Additionally, Operations Services is looking for several recommendations from planning related to the replacement of switchgear and possibility of low voltage conversion to assist with some of the substation initiatives.

- Lincoln Park outdoor switchgear necessity (some of these cables are in poor condition and are out of potentially out of service – needs engineering/planning review)
- Shenandoah Bus #1 & Bus #2 switchgears
- Neversink feasibility of 4kV conversion to 13.8kV

Switch Replacement

345 kV Switch Replacement

Recently, problems have developed with the Pascor type TTT-7 and Memco type EA, VR2 and VT-1 style motor operated 345kV air disconnects at the Roseton, Rock Tavern and Hurley Avenue substations. Replacement parts availability is limited for these switch styles.

Operations Services has determined that these disconnects have reached the end of their useful life due to increasing issues, troubleshooting and callouts.

Below is a list of remaining switches that need replacement based on this recommendation in prioritized order. This order can be shuffled if replacements are to be packaged together, but can be followed as a guideline.

| Location | Position | Voltage | Manufacturer | Model | Mfg. Date | Issues |
|-----------------------|------------|---------|-----------------|-------|-----------|---|
| ROCK TAVERN 345 kV | RTB-3451 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Hotspots, Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-C-3092 | 345 kV | MEMCO | EA | 1/1/1970 | Reoccurring Hotspots |
| HURLEY AVENUE - 345kV | HAB-30382 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Hotspots, Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-C-3091 | 345 kV | MEMCO | EA | 1/1/1970 | Reoccurring Hotspots |
| HURLEY AVENUE - 345kV | HAB-30393 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Hotspots, Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-4483 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Hotspots, Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB-30193 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-31194 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB-30181 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Hotspots |
| HURLEY AVENUE - 345kV | HAB-A-2492 | 345 kV | MEMCO | VR2 | 1/1/1976 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-31193 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-30398 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB-30394 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-30581 | 345 kV | MEMCO | EA | 1/1/1970 | Reoccurring Hotspots |
| ROCK TAVERN 345 kV | RTB-3493 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1986 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-3484 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Hotspots |

| | | | | | | |
|--------------------------|----------------|--------|--------------------|-------|----------|----------------------|
| ROCK TAVERN 345 kV | RTB-4491 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Hotspots |
| ROCK TAVERN 345 kV | RTB-C3392 | 345 kV | MEMCO | EA | 1/1/1972 | Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB-A- 2491 | 345 kV | MEMCO | VR2 | 1/1/1976 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-C3397 | 345 kV | MEMCO | VR2 | 1/1/1972 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-C3393 | 345 kV | MEMCO | VR2 | 1/1/1972 | Reoccurring Trouble |
| HURLEY AVENUE - 345kV | HAB- 30192 | 345 kV | MEMCO | EA | 1/1/1976 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-C3394 | 345 kV | MEMCO | VR2 | 1/1/1972 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-31191 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-C- 3094 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | Reoccurring Trouble |
| ROSETON SWITCHYARD | RSB-30392 | 345 kV | PASCOR ATLANTIC | VT-1 | 1/1/1980 | Reoccurring Trouble |
| ROCK TAVERN 345 kV | RTB-C3396 | 345 kV | MEMCO | VR2 | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB-C3395 | 345 kV | MEMCO | VR2 | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB- 376934 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROCK TAVERN 345 kV | RTB- 376945 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROCK TAVERN 345 kV | RTB- C33911 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROSETON SWITCHYARD | RSB-C- 3093 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROSETON SWITCHYARD | RSB-31181 | 345 kV | PASCOR ATLANTIC | VT-1 | 1/1/1980 | |
| ROCK TAVERN 345 kV | RTB-31182 | 345 kV | MEMCO | EA | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB-C3398 | 345 kV | MEMCO | EA | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB-C3399 | 345 kV | MEMCO | EA | 1/1/1972 | |
| ROCK TAVERN 345 kV | RTB- C33910 | 345 kV | MEMCO | EA | 1/1/1972 | |
| HURLEY AVENUE - 345kV | HAB- 30191 | 345 kV | MEMCO | VR2 | 1/1/1976 | |
| ROSETON SWITCHYARD | RSB-30591 | 345 kV | MEMCO | VR2 | 1/1/1970 | |
| ROSETON SWITCHYARD | RSB-30391 | 345 kV | MEMCO | VR2 | 1/1/1970 | |
| ROCK TAVERN 345 kV | RTB-4492 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1986 | |
| ROCK TAVERN 345 kV | RTB-C3373 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROCK TAVERN 345 kV | RTB-C3371 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROSETON SWITCHYARD | RSB-31192 | 345 kV | PASCOR ATLANTIC | TTT-7 | 1/1/1980 | |
| ROSETON SWITCHYARD | RSB-C- | 345 kV | PASCOR | VT-1 | 1/1/1980 | |

| | | | | | | |
|--------------------|------------|--------|--------------------|------|----------|--|
| | 3081 | | ATLANTIC | | | |
| ROSETON SWITCHYARD | RSB-C-3082 | 345 kV | PASCOR ATLANTIC | VT-1 | 1/1/1980 | |

115 kV Switch Replacement

Operations Services collects and trends hotspot information as well as trouble orders documenting issues with switches over the lifespan of a switch. Below is an identified list of 115 kV switches that are recommended for replacement.

| Location | Position | Voltage | Manufacturer | Model | Mfg. Date | Issues |
|------------------------|----------|---------|-----------------|----------|-----------|--|
| BARNEGAT | KB-747 | 115 kV | MEMCO | VM1-204 | 1987 | Reoccurring Hotspots |
| BARNEGAT | KB-748 | 115 kV | MEMCO | VM1-204 | 1987 | |
| BARNEGAT | KC-750 | 115 kV | MEMCO | VM1-204 | 1987 | |
| BARNEGAT | KC-752 | 115 kV | SOUTHERN STATES | VM-1-104 | 1987 | |
| INWOOD AVENUE | X-970 | 115 kV | SOUTHERN STATES | VM-1-208 | 1975 | Reoccurring Hotspots |
| INWOOD AVENUE | X-977 | 115 kV | SOUTHERN STATES | VM-1-208 | 1975 | |
| NORTH CATSKILL REACTOR | 293 | 115 kV | PASCOR | CBSA | 2014 | Reoccurring Hotspots, Adjustment Issues, Poor Quality Construction |
| PLEASANT VALLEY | 1077 | 115 kV | | | - | Reoccurring Hotspots causing switches to become inoperable. Switches are hand operated and are very difficult to open making operation dangerous during switching. |
| PLEASANT VALLEY | 1099 | 115 kV | | | - | |
| PLEASANT VALLEY | 1277 | 115 kV | | | - | |
| PLEASANT VALLEY | 1288 | 115 kV | | | - | |
| PLEASANT VALLEY | 1299 | 115 kV | | | - | |
| PLEASANT VALLEY | 1377 | 115 kV | | | - | |
| PLEASANT VALLEY | 1388 | 115 kV | | | - | |
| PLEASANT VALLEY | 1399 | 115 kV | | | - | |
| PLEASANT VALLEY | 6177 | 115 kV | | | - | |

| | | | | | | |
|-----------------|----------|--------|--|--|---|---|
| PLEASANT VALLEY | 6199 | 115 kV | | | - | <p>Reoccurring Hotspots causing switches to become inoperable. Switches are hand operated and are very difficult to open making operation dangerous during switching.</p> |
| PLEASANT VALLEY | 6277 | 115 kV | | | - | |
| PLEASANT VALLEY | 6299 | 115 kV | | | - | |
| PLEASANT VALLEY | 64377 | 115 kV | | | - | |
| PLEASANT VALLEY | 64399 | 115 kV | | | - | |
| PLEASANT VALLEY | 8171 | 115 kV | | | - | |
| PLEASANT VALLEY | 8172 | 115 kV | | | - | |
| PLEASANT VALLEY | 8191 | 115 kV | | | - | |
| PLEASANT VALLEY | 8192 | 115 kV | | | - | |
| PLEASANT VALLEY | 877 | 115 kV | | | - | |
| PLEASANT VALLEY | 888 | 115 kV | | | - | |
| PLEASANT VALLEY | 899 | 115 kV | | | - | |
| PLEASANT VALLEY | 93932-44 | 115 kV | | | - | |
| PLEASANT VALLEY | 93931-44 | 115 kV | | | - | |

| | | | | | | |
|-----------------|-------|--------|---------|-------|------|--|
| PLEASANT VALLEY | C677 | 115 kV | | | - | Reoccurring Hotspots causing switches to become inoperable. Switches are hand operated and are very difficult to open making operation dangerous during switching. |
| PLEASANT VALLEY | C688 | 115 kV | | | - | |
| PLEASANT VALLEY | C699 | 115 kV | | | - | |
| PLEASANT VALLEY | M77 | 115 kV | | | - | |
| PLEASANT VALLEY | M88 | 115 kV | | | - | |
| PLEASANT VALLEY | M99 | 115 kV | | | - | |
| PLEASANT VALLEY | Q302 | 115 kV | | | - | |
| PLEASANT VALLEY | X-477 | 115 kV | | | - | |
| PLEASANT VALLEY | X-488 | 115 kV | | | - | |
| PLEASANT VALLEY | X-499 | 115 kV | | | - | |
| TODD HILL | A-523 | 115 kV | SIEMENS | CM-4A | 1989 | Hotspot issues, DC motor problems, switches have been burning up motors. We recommend replacing with same style switches as install on the C line during recent work order |

| | | | | | | |
|-----------|-------|--------|---------|-------|------|--|
| TODD HILL | A-702 | 115 kV | SIEMENS | CM-4A | 1989 | Hotspot issues, DC motor problems, switches have been burning up motors. We recommend replacing with same style switches as install on the C line during recent work order |
| TODD HILL | A-521 | 115 kV | SIEMENS | CM-4A | 1989 | |
| TODD HILL | C-519 | 115 kV | SIEMENS | CM-4A | 1989 | |

**Model numbers for switches may not always be accurate*

Operations Services recommends that the switches at Pleasant Valley be replaced with or prior to the planned replacement of the existing 115kV oil breakers in 2020, a systematic plan needs to be coordinated to allow for proper isolation of each breaker prior to replacement. The existing switch problems will prevent proper clearances to be taken if they are not replaced prior to the breakers.

Non-Equipment Based Replacements

A 5 year substation evaluation program that assesses “non-equipment” assets has been implemented in 2016 to address the following equipment: steel, foundations, fence, ground grid, etc. As projects are identified through this program, Operations Services will bring issues to the attention of Substation Design or manage with local work orders as needed.

Steel Replacement

As replacement recommendations are identified, this work should be completed with future rebuilds unless there is imminent danger of failure, in which case the repairs should be handled sooner. It is also recommended that during any future rebuilds, that Substation Design evaluates the steel in and around any equipment that will be affected during the work order. An example of this is in 2019, as part of the Boulevard substation upgrade, the steel on the 69kV portion of the yard will be replaced due to condition concerns which were caused by poor foundations.

Foundation Replacement

These replacement recommendations should be considered during future work order planning to improve the existing infrastructure. Overall foundations are acceptable, with some older stations showing deteriorated foundations due to weather such as flaking. Some flaking is addressed as part of general maintenance by patching the foundations as necessary.

Fence Review

Operations Services completes fence inspections on a monthly as well as a more thorough inspection on a 5 year cycle and recommends either fence maintenance repair or complete rebuilds. Most recently the East Walden Substation fence was replaced which had rotten top rails as well as posts. It is recommended that 1 inch fence fabric is utilized for new substation fences to limit fence cuts.

Ground Grid Review

Operations Services completes ground grid testing on an 8 year cycle and reports ground grid deficiencies as they are determined. When adding or replacing equipment within a substation, the ground grid should be reviewed by Substation Design to ensure that the existing grid is adequate.

| Substation | Comments |
|----------------|---|
| Manchester | There are ground grid deficiencies that were noted during recent construction. It is recommended that a formal review of the substation ground grid be conducted. |
| West Balmville | During fence repair an electrical arc was drawn. This could be due to lack of fence bonding, however as part of the future breaker replacements, it is recommended that a more thorough engineered review be completed. |

Stone Review

Operations Services recommendation is to review the integrity of the stone fill within a substation when any major work order is being executed to ensure there is adequate stone coverage throughout the entire station and incorporate this work as part of any major work to be performed.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

In order to provide load serving capability to a large customer.

What are the risks and consequences of not completing this project?

Losing a large customer to another area or utility.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|-----------------------------------|--|-------------|-------------|-------------|-------------|--------------|
| \$1,727,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 163,000 | 10,000 | 153,000 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 81,000 | 5,000 | 76,000 | 0 | 0 | 0 | 0 | 0 |
| | Stock Materials | 81,000 | 5,000 | 76,000 | 0 | 0 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 325,000 | 20,000 | 305,000 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 114,000 | 7,000 | 107,000 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 813,000 | 50,000 | 763,000 | 0 | 0 | 0 | 0 | 0 |
| | AFUDC* | 48,000 | 3,000 | 45,000 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,625,000 | 100,000 | 1,525,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 15,000 | 0 | 15,000 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 31,000 | 0 | 31,000 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 5,000 | 0 | 5,000 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 51,000 | 0 | 51,000 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 102,000 | 0 | 102,000 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,208,900 Maximum (\$): 2,245,100

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: April 11, 2023
Submitted By: Brett Arteta

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Hurley Avenue 345 kV Relay Upgrade

Work Order #:

Budget Group: Electric **Budget Category:** 13

Funding Project Number: 1-1312-98-19

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2025

In-Service: 12/1/2026

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

A variety of equipment exists in Central Hudson substations, including protective relays, meters, recloser controls, and other control & communications equipment such as Remote Terminal Units (RTUs). Each of these components serves an integral role in contribution to the overall, integrated substation protection, control, and monitoring function. This equipment is at the end of its useful life and must be upgraded to current standards.

Describe specific scope exclusions, assumptions and constraints:

Part of the original ESP Infrastructure Replacement Program that has been broken out into individual projects. All electromechanical relays at Hurley Avenue 345 kV Substation will be upgraded to current microprocessor relay standards.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

Risk of equipment failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|------------------|-------------|-------------|--------------|
| \$1,163,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 105,000 | 0 | 0 | 0 | 105,000 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 52,000 | 0 | 0 | 0 | 52,000 | 0 | 0 | 0 |
| | Stock Materials | 52,000 | 0 | 0 | 0 | 52,000 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 209,000 | 0 | 0 | 0 | 209,000 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 74,000 | 0 | 0 | 0 | 74,000 | 0 | 0 | 0 |
| | Overheads | 523,000 | 0 | 0 | 0 | 523,000 | 0 | 0 | 0 |
| | AFUDC* | 31,000 | 0 | 0 | 0 | 31,000 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,046,000 | 0 | 0 | 0 | 1,046,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 18,000 | 0 | 0 | 2,000 | 16,000 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 35,000 | 0 | 0 | 3,000 | 32,000 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 7,000 | 0 | 0 | 1,000 | 6,000 | 0 | 0 | 0 |
| | Overheads | 57,000 | 0 | 0 | 4,000 | 53,000 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 117,000 | 0 | 0 | 10,000 | 107,000 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 814,100 Maximum (\$): 1,511,900

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

1. Relays - The relays protect the electric transmission and distribution systems and can provide oscillography, targets, and phasor data. Electric System Protection (ESP) uses the relays to gather information on faults, including fault characteristics, fault locations, and phasor data. ESP interprets the oscillography data and then communicates our conclusions to: System Operations as an information point of contact; 2) Customer Services (Line Forces) to aid in fault locating and thereby limiting patrol time and area; 3) Operations Services for cases where there may be equipment issues.
2. Meters - The meters provide AC system quantities that are used to operate safely and to plan effectively for future system needs. The Electric Planning & Reliability area uses meter information for day-to-day operations (e.g., switching) and to aid in identifying and addressing locations requiring system reinforcements. System Operations (Sys Ops) uses meter data to monitor and operate the CH transmission system within the ratings of those facilities.
3. Controls and Communications - The RTUs, PLCs, and data concentrators provide status feedback and remote control capability; they also act as a conduit for meter and relay data. Sys Ops relies on the data provided by the RTUs and PLCs to monitor the status of the system from a centralized location, enabling them to respond quickly to system abnormalities. Also, Sys Ops has the ability to perform control operations through the RTUs and PLCs.

Equipment and Functions:

A variety of equipment exists in Central Hudson substations, including protective relays, meters, reclosers, and controls and communications instruments such as Remote Terminal Units (RTUs) and Programmable Logic Controllers (PLCs). Each of these components serves an integral role in contribution to the overall, integrated substation protection, control, and monitoring function. Various departments rely on information from these devices in order to perform their jobs, including Operations Services, Customer Services, line forces, Electric Transmission Planning, Distribution Planning, System Operations, Energy Accounting, and Electric System Protection. Brief summaries of these components are included in **Attachments I through 4**. The intention of this memo is to identify the concerns with continuing to use the identified outdated equipment, detail the benefits of combining functions when replacing equipment, establishing a policy for substation relaying, control, & monitoring functions, and laying out a plan to incorporate these components into a comprehensive substation renovation program.

I. Introduction:

Re: Substation Relays, Meters, Controls and Communications Infrastructure Opportunities

Mr. J.J. Borchert

June 24, 2011

Copy to:

Mr. P.E. Haering
 Mr. H.W. Turner
 Mr. P. Harpols

Mr. J. M. May
 Mr. D. J. Wittmann
 S.R. #2011-07

Waste Reduction:

New equipment can be utilized in an integrated fashion to eliminate or minimize the following tasks and unnecessary equipment (Excerpts are taken from the attached memos):

- Reading chart meters and manually entering data into the Meter Database (MDB).
 - Chart meters cost CH at least \$275,000 annually in labor expense (1130 man-hours), which can be devoted to other work.
- MV-90 circuits not for revenue or interchange metering purposes.
 - MV-90 circuits from Verizon cost CH approximately \$24,000 annually in expense.
- Running fault studies manually to determine fault locations.
 - Manual fault locating costs CH approximately \$15,000 annually in labor expenses.
- Metering transducers, auxiliary relays, timing relays, reclosing relays, and coil monitors.

Supporting the Future State:

New equipment, properly implemented and integrated, will better support current functions and create flexibility for added future functions as follows:

- Provide continuous metering data for the entire system, eliminating information “gaps” as a result of non-continuous and non-contiguous metering.
- Provide for robust planning capabilities and switching operations through use of trending and real-time data.
- Enable more accurate forecasting of area loads to increase risk tolerance, possibly resulting in deferral of substation and distribution projects.
- Offer flexibility for Distribution Automation and Smart Grid initiatives.
- Improve reliability and reduce CAIDI through automated event reporting and fault location.

II. Current State:

This section describes the mix of equipment by component, system wide, and the limitations of the non-digital devices.

1. Relays

There are 3500 active protection relays on the system, excluding LORs, SPRs, Regulator Controls, Recloser Controls, and Communication equipment.

Attachment 1

Copy to: Mr. P.E. Haering
Mr. H.W. Turner

Mr. P. Harpolis
Mr. J. M. May
S.R. #2011-03

June 23, 2011

Mr. J.J. Borchert

Re: Transmission & Distribution Protective Relay Review

Introduction:

Protective Relays represent a vital component for the reliable operation of the Central Hudson Electric Transmission and Distribution Systems. CH substations contain a generational mix of protective relay equipment that differs in capability, ease of use, and reliability. Relay technology has advanced; microprocessor-based (digital) relays not only offer numerous protection functions, but they provide metering capability as well in a compact footprint. This memo summarizes the existing transmission and distribution protective relay equipment, as well as recommendation for replacement options.

Discussion:

Relays perform various functions aimed at timely isolation of faulted areas and rapid restoration once the fault has been cleared. Some of the functions that relays provide include zone distance protection, high-speed pilot protection, overcurrent protection, differential protection, and automatic reclosing.

A. Outdated Devices:

The majority of substations contain a group of single-component electromechanical relays for each protected facility; these relays are responsible for protection functions exclusively. At these locations, metering is performed separately, also often in a single-function fashion. There are also stations that have more recent (but still outdated) types of relays, including solid state and early microprocessor relays. These relays have been failing recently, and a replacement program was created last year to address the concern with these relays. The following is a list (in order of decreasing replacement priority) of common relay types found in substations along with the reason that they have been superseded:

- Electromechanical Relays: These relays are obsolete for the reasons previously described (i.e.; physical size, calibration drift, single-function capabilities, etc).
- Solid State Relays: Like electromechanical relays, the relays on the CH system typically are single function. They have advanced technologically past the electromechanical relays, but not quite to the level of digital relays. They monitor current and voltage waveforms through analog circuits, which then are compared through potentiometers to user defined settings. They generally are unsupported, spare parts are hard to locate, and they contain components that deteriorate over time.

- 1st Generation Microprocessor Relays: Please see the 2010 Budget Memo, **Re: Relay Replacement Program for Upgrade of 1st Generation Microprocessor Relays Remaining on the Central Hudson System**, dated July 1, 2010, for the existing program.
- Schweitzer Engineering Laboratories (SEL) 200 Series Relays (SEL-251/ 267/ 279/ 2BFR): These relays are digital, but they make use of early logic processing methods, in which creating settings isn't as user-friendly as in modern digital relays. SEL has discontinued manufacturing parts for most of these relays, and limited service is provided with them.
- Basler BE1-79M Relays: These relays are multi-shot reclosing relays; they only provide the reclosing function. There are more recently developed relays that provide numerous protection functions and also perform reclosing operations and metering functions.
- Basler BE1-851 (H) Relays: These relays are multifunction, digital relays; however, they only receive current inputs. So, the only meter data available is Amps. Multifunction relays exist that receive current and voltage inputs and provide MW & MVA_r data as well as a much larger variety of protection options.

B. Retrofit/Replacement Options:

Digital relays offer multiple protection functions as well as metering and substation equipment diagnostics. The use of multifunction digital relays greatly reduces the required panel space. Also, with few moving parts, digital relays do not need recalibration to remain accurate. Additionally, digital relays and digital relay controls offer the ability to have longer durations between maintenance cycles due to the combination of their internal error checking and their constantly monitored alarm outputs to SCADA.

Digital relays can be specified to offer equipment diagnostics for the devices they protect. For example, digital transformer relays have the ability to monitor the through-fault history of the transformers and to make determinations on the required maintenance as a result. The same case is true for feeder breakers protected by distribution relays.

- Digital Relays: A collection of proven products exists by a variety of manufacturers. These relays are microprocessor-based, multi-function relays that provide a large variety of protection, metering, and equipment diagnostic capability; they can be used for various protective functions. Some manufactures include SEL, GE, and Basler*. Electric System Design (ESD) has standardized the design to use SEL as primary protection and either GE or Basler relays for backup protection.

* Basler provides a BE1-951 relay, which conveniently fits into electromechanical relay panel cutouts.

memo.

Full integration requires a DNP compatible Remote Terminal Unit described in the "RTU Review"

Eric A. Loeven

- ◆ They have lower maintenance costs because they rarely fail and allow for an increased maintenance cycle (i.e. an increase of 50%; from 4 yrs. to 6 yrs.).
 - ◆ They provide oscillography, targets, and phasor data that can be accessed from a remote location through a modem. This capability assists in timely and accurate fault analysis.
 - ◆ They have a proven track record of good quality and high availability, along with excellent manufacturer support for current models.
 - ◆ The diagnostic capabilities of digital relays should be used to help in the condition assessment of substation equipment.
 - ◆ They provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB/eDNA with little human intervention.
 - ◆ They offer a more compact footprint and much more capability than their large, single-function predecessors.
- Upgrading to digital relays provides the following benefits:

Conclusions:

- Time Synchronization Devices: Various devices exist on the market that provides a means of time synchronization, including satellite clocks. These clocks provide a unified signal based on a sole source located at zero time offset. To avoid confusion between time zones, UTC time is used as a standard. Sequence of events reconstruction truly realizes the value of having all of the station relays linked to a universal source.
- Data Concentrator (SEL-2032): This relay has 16 ports and can act as a data concentrator, a phone switch, and a basic logic processor. The 2032 connects to the RTU, acting as a slave device; it connects to other digital relays, polling them for meter information as master. Once in the 2032, the meter data can be mathematically manipulated to maintain integrity and precision before it is transferred to a compatible RTU. The 2032 also is connected to a phone line to provide dial-in remote access for trained personnel, enabling event retrieval and relay interrogation.

C. Additional Considerations:

Attachment 2

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-04

June 23, 2011

Mr. J.J. Borchert

Re: Substation Metering Review

Introduction:

Substation metering data is used to plan and operate the Central Hudson Transmission and Distribution Systems. These metering data are necessary for the safe operation of existing facilities as well as the cost effective planning and design of new facilities. Many transmission lines, substation transformers, and distribution circuits have their MW & MVA_r flows monitored by the Energy Management System (EMS) and have the resultant data stored in the Meter Data Base (MDB) and Historian (eDNA). Many other circuits either are not metered or utilize local indicating metering, such as graphic charts or drag hands, to register data.

Technology has advanced; there are much more reliable and efficient means of measuring and transmitting metered load data, including by means of digital relays. This memo summarizes the existing meter equipment and the replacement options, as well as provides recommendations on the best option to gain appropriate metering data in the most efficient manner.

Discussion:

A large number of substations contain transducer-based meters, which register and report their data directly to a Remote Terminal Unit (RTU) by means of an analog signal. A handful of other stations contain chart meters, which provide local indication. In the stations that have chart meters, the metering is often registered in single function fashion, with circuit current measured in Amps and transformer load measured in Kilowatts and Kilovars. The meter data that is most useful for planning and operating the system is provided in the form of Watts and Vars. Additionally, the panel space taken up by the charts can be reduced greatly with the installation of digital relays, which offer protection functions as well as metering functions.

Technological advances have led to multi-function, digital relays with the capability to meter accurately. The digital relays can transfer instantaneously metered values to EMS. Once there, the data is stored in the Historian, integrated, and the peak hourly values are calculated and transferred to the MDB with little human intervention.

A. Outdated Devices:

The following is a list of common metering methods used in CH substations along with the reason that they have been superseded:

- Chart Meters: Graphic charts monitor single values such as MW, MVA_r, or circuit Amps. These charts rely on diligent maintenance practices to ensure that they function

as designed. Many of the charts run out of ink between maintenance cycles or fail mechanically, leaving "gaps" in data. Even the charts that record properly pose difficulty in capturing their data. The process of going to the substations to collect the charts, reviewing the charts and interpreting the data, and entering the data manually into the MDB is time consuming. Due to the cumbersome nature of the process, the charts are only interpreted for the annual system peaks, which leaves 2-4 data points in the MDB for that circuit or station element to use in planning.

- Other Local Indication Metering: Charts are not the only method of local metering. There are also substation Ammeters, Voltmeters, etc. that are remnants of a time when stations were manned and operated manually. Many of these devices are unsupported and have limited parts available.
- MV-90: An alternative method to metering by charts is to meter through MV-90. MV-90 is a system that uses a recorder to receive metered data directly from the instrument transformers and relies upon a dedicated telephone line to transmit that data to the master station collector; it is used for revenue metering as well as substation metering. Once the master has the data, it is transferred to the MDB. This method requires a dedicated line and the associated expenses.
- No Metering: Locations exist on the system where there are no methods of capturing load data. Some of these locations rely on grouped metering; they do not provide the granularity of individual circuit load data. At other locations, it hasn't been cost justified to install/repair any metering.
- Transducers: The transducers are wired directly to secondary AC quantities from current transformers and potential transformers. They convert the input quantities into an analog output signal, which is wired to the analog inputs of an RTU.
- Load checks: On a heavily loaded day, load checks are performed on circuits without automatic metering by having a worker physically go to a point on a circuit and manually perform a metering check.

B. Retrofit/Replacement Options:

- Digital Relays: Microprocessor-based relays not only offer protection functions; they provide metering capability as well in a compact footprint. The digital metering data provided by the digital relays is extremely accurate and has the ability to be entered into the MDB through Supervisory Control and Data Acquisition (SCADA) automatically once proper infrastructure is in place. The relays offer the ability to register numerous metering values simultaneously and in comm. format so that individual wires aren't needed for each metered point; rather, a single cable can be used to transmit multiple data points. Also, a separate phone line is not required for this method.
- Bitronics Power Meters: These meters provide bi-directional Watt and Var meter values as well as Volt and Amp values. They are capable of transmitting data through analog signal or through communication protocol to an RTU. They are cheaper alternatives, but do not provide any protection functions.

- Grid Sense: These are clip-on meters that report to a nearby data concentrator via radio. The data concentrator is linked to a POT's line outside of the station (no need for a Positron). The newest models provide directional Watt and Var metering, and they have the ability to report data in selectable time increments to the meter database. They represent a lower cost option and provide limited fault recording capabilities, but they do not provide protection functions.

Conclusions:

- ◆ Reading chart meters takes a great deal of time, and many of the charts are unsupported and are labor intensive to maintain. Data "gaps" exist when using chart meters, and the meters provide only a few, data points to the MDB each year, which need manual entry. The materials to repair and/or replace the charts are in short supply.
- ◆ Digital relays provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB with little human intervention.
- ◆ The AC quantities that the digital relays require for protection can be used for metering as well; therefore, there is no need for additional wiring from the instrument transformers to meters. Additionally, transducer equipment, which is susceptible to drift and requires regular maintenance, is no longer needed.
- ◆ The MV-90 system is a fully functional system, and it is an efficient method of collecting meter data in stations that do not have the relay and/or RTU capability to transmit data. MV-90 metering requires a dedicated phone line to transmit the meter data; this reoccurring expense can be eliminated with digital relaying and a proper RTU.
- ◆ Grid Sense meters can be installed relatively inexpensively and quickly to provide stopgap metering data until upgrades can be completed. They require a phone line and the monthly expenses associated with the line.

Eric A. Loeven

Appendix 1: Estimated Costs of Current Methods and Retrofit Options

| <u>Current Methods</u> | Time (Manhours) | | Cost |
|--|----------------------------|-----|--------------|
| | Field | Eng | TOTAL |
| MV-90 yearly (per station on average) | | | \$1,200 |
| Chart Meter maintenance & data retrieval | 1 | 10 | \$1,250 |

Note 1

Note 1: This cost is to retrieve the circular chart, review it, and enter it into the database. This process takes place on a suspected system peak day. At minimum, there are two times a year that this process is performed (Summer Peak and Winter Peak); however, there may be four or more times depending on when the actual peak occurs.

| <u>Retrofit Options</u> | Time | | | | Cost | | | TOTAL |
|--|--|-------|-------|-----|--------------|--|----------|--------------|
| | Manhours | | | | Parts | Labor | | |
| | Tech | Elect | Draft | Eng | Device | Test Sw., Steel, etc. (w/OH) | | |
| Grid Sense Meter W / VAr | Hours are for the EOE and the Linemen. | | | | \$4,775 | | | \$5,700 |
| Data Concentrator 1 for every 4 ckt. | Per installation, each meter takes the lineman and the EOE 15 minutes to install. | | | | \$2,272 | | | \$2,700 |
| POT Line | Each data concentrator requires 20 minutes of lineman time and 15 minutes of EOE time. | | | | \$100 | | | \$110 |
| Labor (including travel time) per Station | Travel to each site has been assumed to be 1 hour. | | | | -waived- | | \$430 | \$430 |
| Site Registration per D/C | | | | | | | | |
| TOTAL GS Installation | | | | | | | | \$9,000 |
| Bitronics (Comm) | 40 | | 40 | 8 | \$2,000 | \$1,000 | \$11,400 | \$15,000 |
| Bitronics (HW-W/VAr/V) | 40 | | 40 | 12 | \$1,100 | \$1,000 | \$12,000 | \$14,500 |

Attachment 3

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-05

June 23, 2011

Mr. J.J. Borchert:

Re: Remote Terminal Unit Review

Introduction:

Real-time control and status feedback are vital components of a properly functioning substation. Without someone at the substation 24/7, a means of providing feedback and control operations is required; that means is a Remote Terminal Unit (RTU). This memo will describe the current state of the RTUs on the system, as well as the opportunity areas for retrofits and justification for the upgrades.

Discussion:

RTUs provide a means of transmitting important data in a substation to a master station via Supervisory Control and Data Acquisition (SCADA). The RTUs collect status and metering data and transmit it to a master station when polled. Also, they perform control operations that are initiated from the master station in a remote location. The RTUs can be dedicated line or dial-up depending on the application. RTUs have evolved with technology; existing CDC RTUs (protocol and provider) have been replaced with new flash ROM RTUs that utilize protocol suites including, but not limited to, CDC and the utility standard, DNP.

A. Outdated Devices:

- CDC 44-500 & CDC 88-90: These are different versions of dedicated line RTUs provided by CDC, a company that no longer exists. Retrofits have been performed to eliminate the CDC RTUs on the system because of the inability to get spare parts and due to their incompatibility with the digital relays. These RTUs utilize CDC protocol, which is an outdated protocol incapable of communicating with digital relays/data concentrators and is unable to receive digital metering data. They rely on analog signals and pulse accumulators sent from transducers to transmit meter information.
- G.E. M-4000: This is a smaller version of the G.E. Harris D20 RTU. It is used mainly in dial-up applications and is polled twice daily for SCADA data. It will report unsolicited if there is a change of status or if a metered point's dead band is exceeded. Based on the frequency that dial-up RTUs are polled, they cannot be used as sources to the meter database. Also, dial-up RTUs are not reliable because they rely on a plain old telephone (POT) line for communication. Due to this lack of reliability, control operations typically are not performed with dial-up RTUs. As a plus, the M-4000 has the capability to communicate through CDC or DNP protocol, and it also can be configured as a dedicated unit.

- G.E. D20: The functionality and hardware of this RTU are consistent with many modern RTUs; however, the configuration software is not user-friendly and uses a complicated, layered architecture. Additionally, with retiring technicians, the available workforce skilled in working with the configuration software is dwindling. This fact is of concern because emergency fixes will take longer to complete.

B. Retrofit/Replacement Options:

- Telvent Sage 2400¹: Telvent offers an RTU that fits into existing CDC RTU cabinets, and it has peripheral cards that resemble the CDC RTU cards. For these reasons, Telvent is the vendor of choice, providing the most seamless retrofit option. Telvent also offers a protocol suite for communications, including DNP and CDC. The DNP Master protocol allows direct communication with SEL-2020/2030/2032 data concentrators to transfer metering data from numerous digital relays in a substation.

C. Additional Considerations:

- Radio linked RTUs: As previously stated, the M-4000 can be polled as a dedicated RTU or as a dial-up unit. If there is a nearby, dedicated RTU, it is sometimes possible to install a radio link between the two stations and poll the M-4000 from the other station. In this configuration, there is access to real-time information and the ability to perform control operations at both stations. The need for the Positron Box at the radio-linked station is eliminated, and there is no extra cost incurred by installing a phone line and a Positron Box. The radio links require a clear line of site from one station to the next in order for the signal to be transmitted clearly. As such, the reliability of the circuits is largely dependent upon the terrain. Radio signals are also susceptible to interference from other mobile devices such as CB Radios.
- Positron Boxes: One major cost associated with RTUs, dedicated or dial-up, is the phone company's requirement of a Positron Box to isolate the outside phone line from the electric substation. This requirement is in place to provide a level of comfort for the phone company technician working in our substations, many of the existing stations have been allowed to function without this isolation in a grandfathered manner. However, any time that RTU retrofits are performed at these stations, the installation of a Positron Box is required. They are an expensive piece of equipment and have long lead times that may impact project schedules. There also is continued reliance on the phone company for maintenance and repairs.

¹ Telvent has been chosen as the preferred RTU for retrofits due to ease of configuration/use and the techs' familiarity with the units. All RTU cost estimates in this report are based on using this RTU.

Conclusions:

Upgrading old CDC, M-4000, and D-20 RTUs to Telvent RTUs provides the following benefits:

- ◆ Telvent RTUs are reliable and parts are available readily.
- ◆ The Telvent configuration software is user-friendly, making configuration and testing faster.
- ◆ DNP RTUs, of which Telvent is one, can receive communication-based metering & status and transmit it to the SCADA master.
- ◆ The Telvent RTU retrofits for the CDC 44-500's utilize the existing RTU cabinet and high powered tripping relays. The Telvent replaces the equipment susceptible to failure and makes use of the existing equipment that is less prone to failure.
- ◆ Using Telvent RTUs provides timesavings through standardization, and the engineers and technicians alike prefer to work with the Telvent for RTU retrofits.

Consideration also should be given to converting dialup RTUs to dedicated line RTUs. Dialup RTUs rely on POT lines, which have notoriously poor reliability; additional steps and equipment are required to perform the control operations safely. In contrast, dedicated line RTUs offer signal reliability, which provides the ability to perform control operations safely without added equipment and procedure steps.

Eric A. Loeven

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. D. J. Dittmann
Mr. J. M. May
S.R. #2011-06

June 23, 2011

Mr. J.J. Borchert

Re: Substation Recloser Review

Introduction:

Substation reclosers provide an alternate method of interrupting fault current on distribution and sub-transmission circuits. They are a convenient way to provide circuit protection in locations where it is not cost effective to install a circuit breaker and associated conduit to a control house. One disadvantage of using a recloser rather than a circuit breaker is that the recloser has reduced interrupting capability.

Recloser technology has advanced; hydraulic, oil-filled devices have given way to vacuum-interrupted, microprocessor-based (digital) recloser controls. This memo summarizes the existing substation recloser equipment, as well as replacement options. Also, this memo provides recommendations on the best retrofit options.

Discussion:

“An automatic circuit recloser is a self-contained device, which can sense and interrupt fault currents as well as reclose automatically in an attempt to re-energize a line.”* The existing hydraulic reclosers, a kin to electromechanical relays, have single component capability with limited flexibility in setting pickup curves, very little intelligence, and minimal ability to report feedback. New, digital recloser controls provide a wide range of pickup curves, are self-monitoring, grant instant notification of operations, offer desired metering capabilities, and require less frequent routine maintenance.

A. **Outdated Devices:**

Reclosers were installed in substations as a cost effective alternative to a distribution (15kV) or sub-transmission (34.5kV) circuit breaker combined with a reclosing relay. They can be single-phase or three-phase, be controlled mechanically (hydraulic) or digitally, and they have interrupting mediums of oil or vacuum. They make use of a series of fast and slow curves, providing coordination versatility and protection flexibility. A brief summary of the outdated reclosers on the CH system, specifically the hydraulically controlled type and the oil-interrupted type, is as follows:

- o Hydraulically controlled reclosers: These reclosers are self-contained and self-controlled; they have oil or vacuum interrupters. They are outdated due to their

* Page 124. Power Distribution Engineering: Fundamentals and Applications. James J. Burke. 1994.

C. Additional Considerations:

- Telemetric Interface: The Telemetric RTM II device can be installed to provide status and control of the SEL-651R DNP3 points. These data travel via cellular network and are displayed via a secure web interface. In addition, data travel to a SCADA Xchange server and then over frame relay to our SCADA system.
- R-Mag Circuit Breakers: As the most direct comparison to the substation recloser, these circuit breakers are a packaged breaker and relay combination. They are relatively inexpensive to install and there is familiarity with them by the techs, electricians, and engineers alike. These breakers provide a higher interrupting capability than the reclosers.

Conclusions:

Upgrading to vacuum interrupted, digitally controlled Viper reclosers provides the following benefits:

- ◆ Vacuum Interruption –
 - The speed of operation on these reclosers is not compromised by temperature.
 - The maintenance on these reclosers is not as labor-intensive as the oil-filled reclosers. They can operate up to 10,000 times before requiring an overhaul, with only the battery requiring simple in-field replacement in the meantime.
- ◆ Digital Control –
 - These recloser controls provide a wide range of pickup curves, which makes coordination easier and much more flexible than the hydraulically controlled reclosers.
 - These recloser controls offer digital metering capability and fault notification. The recloser can transmit its information through SCADA if the proper infrastructure is in place, or through Telemetric in stations with under-developed SCADA infrastructure.
 - These recloser controls can be interrogated to gather oscillography, targets, and phasor data from a remote location through a modem. This capability assists in timely and accurate fault analysis.

Some of the lower cost is lost when the recloser is installed in a substation if it is connected to the RTU in the control house, rather than through the Telemetric Unit. In this case, the added cost of conduit, steel work, and/or foundation needs to be considered. Regardless of the method of reporting to SCADA, installing the recloser in a substation comes with the added costs associated with technician time to commission and test the recloser and digital control over the cost of an installation on a distribution circuit.

Eric A. Loeven

Appendix 1: Estimated Costs of Retrofit Options

| Retrofit Options | Cost | | |
|---|----------|-----------|--------|
| | Parts | TOTAL | |
| Viper Reclosers with control relay and PT (on dist circuit) | \$21,000 | \$33,500 | Note 1 |
| Viper Reclosers with control relay (in a substation - Telemetric communication) | \$20,500 | \$33,000 | Note 1 |
| Viper Reclosers with control relay (in a substation - RTU communication) | \$20,500 | \$86,000* | Note 2 |
| R-Mag Breaker | \$25,000 | \$90,000 | |

Note 1: These represent one-time costs. There are additional annual costs for the SCADA Frame relay and the SCADA X-Change to Telemetric. The SCADA Frame Relay costs \$5200/yr. The SCADA X-Change to Telemetric costs \$2000/yr for 100 devices and \$1500 for each 50 devices after that.

Note 2: This cost is estimated based on proposed work to bring the data through the RTU. No installations exist at this time in this manner.

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|-------|----------|--|
| Accord | 4 | 361 Ckt. | Charts - kW | ----- | EM | NONE | ----- | Retired as part of P/MK Upgrade |
| Ancram | 13.8 | 7085 Ckt. | Grid Sense | ----- | EM | NONE | ----- | Only has a 13.8 Voltage Regulator |
| Balmville | | | | | EM | | | |
| Balmville | 4 | 411 Ckt. | MV-90 | ----- | EM | | | |
| Balmville | 4 | 412 Ckt. | MV-90 | ----- | | C-300 | | |
| Barnegat | | | | | | | | Metering source? |
| Barnegat | 115 | KB Line | Amps | EM | ----- | | | |
| Barnegat | 115 | KC Line | None | EM | ----- | | | |
| Barnegat | 115 | KB-749-KC BKR | | EM | ----- | | | |
| Barnegat | 115/13.8 | T1 | SCADA | ----- | | | | IBM Feeds |
| Barnegat | 115/13.8 | T2 | SCADA | ----- | | | | |
| Barnegat | 13.8 | S1 | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2 | SCADA | ----- | EM | | | |
| Barnegat | 13.8 | S1-706 BKR | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2-734 BKR | SCADA | ----- | EM | | | |
| Beacon | | | | | | D-20 | | |
| Beacon | 13.8 | 8006 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 13.8 | 8015 Ckt. | SCADA | ----- | EM | | | Previously 8087A? |
| Beacon | 4 | 801 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 802 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 803 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | W-414 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | W-463 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | Bus 1 | SCADA | ----- | | | | |
| Beacon | 4 | Bus 2 | SCADA | ----- | | | | |
| Beacon | 13.8/4 | T1 | SCADA | ----- | EM | | | |
| Beacon | 13.8/4 | T2 | SCADA | ----- | EM | | | MDB has an entry with T1+T2 calculated |
| Beacon | 13.8 | BF Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | NM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | CM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 1 | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 2 | SCADA | ----- | EM | | | |
| Bethlehem Rd. | | | | | | 2400 | | |
| Bethlehem Rd. | 13.8 | 4091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4092 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4093 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4094 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4095 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4096 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4097 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4098 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 1 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 2 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 115 | RD Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | UB Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | RD-604-UB BKR | | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T1 | EMS | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T2 | EMS | EM | ----- | | | Metering combined |
| Bethlehem Rd. | 13.8 | W-613 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-619 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-804 BKR | | | EM | | | |
| Bordman Rd. | | | | | | NONE | | |
| Bordman Rd. | 13.8 | 6081A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | 6082A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-203 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-204 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-205 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-206 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-207 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-208 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-209 Ckt. | | ----- | EM | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|---------------|--------------------|-------------|-------------|--------|----------|---|
| Boulevard | | | | | | 2100 | | |
| Boulevard | 69 | OB Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | I Line | SCADA | uP | ----- | ----- | ----- | Line Amps & WVAR |
| Boulevard | 13.8 | KO Line | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | KK Line | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1011 | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1012 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1013 | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1014 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 69 | Bus 1 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Bus 2 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Overall | ----- | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | Metering combined |
| Boulevard | 69/13.8 | T3 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Clinton Ave. | | | | | | M-4000 | | |
| Clinton Ave. | 4 | 395 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 396 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 397 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | Bus | SCADA | ----- | ----- | ----- | ----- | |
| Clinton Ave. | 13.8/4 | T1 | MV-90 | ----- | Fuse | ----- | ----- | |
| Cold Spring | | | | | | NONE | | |
| Cold Spring | 4 | 871 Ckt. | Charts - kW | ----- | EM | ----- | ----- | Install a Grid Sense Package for two (2) circuits. |
| Cold Spring | 4 | 872 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Coldenham | | | | | | D-20 | | |
| Coldenham | 13.8 | 4021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4026 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4027 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4028 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | B1-B2 Tie | ----- | ----- | EM | ----- | ----- | |
| Coldenham | 115 | J Line | SCADA | Gen 1 | ----- | ----- | ----- | 95P is DLP; 95BU is REL-301; part of replacement program already. |
| Coldenham | 115 | CW Line | SCADA | Gen 1 | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115 | J-19-CW BKR | ----- | SS | ----- | ----- | ----- | |
| Converse St. | | | | | | NONE | | |
| Converse St. | 4 | 121 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 122 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 123 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | | | | | | NONE | | |
| Conway Place | 4 | 881 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | 4 | 882 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Coxsackie | | | | | | 8890 | | |
| Coxsackie | 13.8 | 1071 Ckt. | Charts - Amps | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | 1072 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | 1074 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Coxsackie | 13.8 | 1076 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | Bus 1 (T1+G1) | SCADA | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | Bus 2 | ??? | ----- | EM | ----- | ----- | Metering data available through relay, but not configured. |
| Coxsackie | 69 | CN Line | None | uP | ----- | ----- | ----- | |
| Coxsackie | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | 95P is SEL-587 |
| Coxsackie | 69/13.8 | T1 | Charts - Amps | uP/EM | ----- | ----- | ----- | |
| Coxsackie | 13.8 | G1 | SCADA | ----- | ----- | ----- | ----- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------------|--------------------|-----------------------|---------------|-------------|-------------|-------|----------|---|
| Danskammer | | | | | | 2100 | | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | AC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DB Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DR Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DW Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | RS Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | W - 323 BKR | ----- | SS | ----- | ----- | ----- | |
| Danskammer | 115 | North Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | Middle Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | South Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | DB-1171 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | DR-1421 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | DW-1061 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | T5&T6 | SCADA | EM | ----- | ----- | ----- | |
| Dashville | | | | | | 2300 | | |
| Dashville | 4 | 345 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single Phase; Vac; Hydr |
| Dashville | 6.6 | Bus | ----- | ----- | EM | ----- | ----- | |
| Dashville | | T1 | ----- | EM | ----- | ----- | ----- | Fused Transformer w/ CR 67 relay |
| Dashville | | G1-G2 | SCADA | ----- | ----- | ----- | ----- | |
| East Fishkill 345kV | | | | | | | | |
| East Fishkill 345kV | 345 | C9751 Breaker A1 BF | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 345 | C9751 Breaker A2 BF | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 1 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 2 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill | | | | | | 8890 | | |
| East Fishkill | 115 | EF Line | SCADA | uP* | ----- | ----- | ----- | 95P is MDAR; 95BU is Optimho - Replacing with 311C & D60. |
| East Fishkill | 115 | HF Line | SCADA | uP* | ----- | ----- | ----- | 95BU is Optimho - Replacing with D60. |
| East Fishkill | 115 | EF-672 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | EF-679 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | W-640 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | T1 | SCADA | see EFB | ----- | ----- | ----- | |
| East Kingston | | | | | | Orion | | |
| East Kingston | 13.8 | Bus 1 | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | Bus 2 | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1021 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1026 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1027 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1028 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 115 | ER Line | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115 | LR Line | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115 | LR-201-ER Breaker | ----- | uP | ----- | ----- | ----- | |
| East Kingston | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| East Kingston | 115/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| East Park | | | | | | 8890 | | |
| East Park | 13.8 | 6073 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6074 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6075 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| East Park | 69 | Q Line | None | EM | ----- | ----- | ----- | 95P is SEL-587 |
| East Park | 69/13.8 | T1 | SCADA | uP/EM | ----- | ----- | ----- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|-----------------|-------------|-------------|------|----------|--|
| East Walden | | | | | | 2400 | | |
| East Walden | | | | | EM/uP | | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5041 Ckt. | Grid Sense | ----- | EM/uP | | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5042 Ckt. | Grid Sense | ----- | EM | | | GS not working |
| East Walden | 13.8 | 5043 Ckt. | Grid Sense | ----- | | | | Com |
| East Walden | 13.8 | Com Equipment | | ----- | uP | | | |
| East Walden | 13.8 | B1 | SCADA | | | | | 95P is DLP; part of replacement program already. |
| East Walden | 115 | CW Line | None | Gen1/uP | | | | |
| East Walden | 115 | CW-712 | ----- | EM | | | | |
| East Walden | 115 | D Line | None | EM | | | | |
| East Walden | 115 | D-722 BKR | ----- | EM | | | | |
| East Walden | 115 | DW Line | SCADA | | uP | | | |
| East Walden | 115 | DW-1071 BKR | ----- | uP | | | | |
| East Walden | 115 | EM Line | SCADA | | uP | | | |
| East Walden | 115 | EM-642 BKR | ----- | uP | | | | |
| East Walden | 69 | WM Line | SCADA | | uP | | | Amps & Volts |
| East Walden | 115 | W-644 | ----- | EM | | | | |
| East Walden | 115 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| East Walden | 115 | B2 | ----- | EM | | | | 95P is SEL-587 |
| East Walden | 69/13.8 | T1 | SCADA | | uP/EM | | | 95BU is SEL-587 |
| East Walden | 69/13.8 | T3 | SCADA | | EM/uP | | | |
| Fishkill Plains | | | | | | D-20 | | |
| Fishkill Plains | 13.8 | 8091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Fishkill Plains | 13.8 | 8092 Ckt. | MV-90 | ----- | EM | | | |
| Fishkill Plains | 13.8 | 8093 Ckt. | SCADA | | uP- 200 | | | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8094 Ckt. | SCADA | | uP- 200 | | | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8095 Ckt. | SCADA | | uP | | | |
| Fishkill Plains | 13.8 | 8096 Ckt. | SCADA | | uP | | | |
| Fishkill Plains | 115 | HF Line | SCADA | uP/Gen 1 | | | | 95BU is Optimho; part of replacement program. |
| Fishkill Plains | 115 | HF-703 BKR | ----- | EM | | | | |
| Fishkill Plains | 115 | NF Line | None | EM | | | | |
| Fishkill Plains | 115 | A Line | SCADA | | uP | | | |
| Fishkill Plains | 115 | A-1036-FP | ----- | uP- 200 | | | | 279/2BFR relays |
| Fishkill Plains | 115 | A-1498 | ----- | uP- 200 | | | | 279/2BFR relays |
| Fishkill Plains | 115 | Com Equipment | ----- | | | | | Com |
| Fishkill Plains | 115 | FP Line | SCADA | uP/Gen 1 | | | | 95P is DLP; part of replacement program already; 95BU is SEL-321 |
| Fishkill Plains | 115 | B1 | SCADA | | EM | | | |
| Fishkill Plains | 13.8 | B1 | ----- | | EM | | | Combine Bus Volts to one point |
| Fishkill Plains | 13.8 | B2 | SCADA | | EM | | | |
| Fishkill Plains | 115/13.8 | T1 | ----- | | EM/uP | | | 95BU is SEL-587; metering is combined. |
| Fishkill Plains | 115/13.8 | T2 | SCADA | | EM/uP | | | |
| Forgebrook | | | | | | 2300 | | |
| Forgebrook | 13.8 | Bus #1 | | ----- | EM | | | |
| Forgebrook | 13.8 | Bus #2 | Charts - kW/kVA | ----- | EM | | | |
| Forgebrook | 13.8 | 8011 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8012 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8013 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8014 Ckt. | Charts - kW | ----- | uP/EM | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8015 Ckt. | Charts - kW | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8016 Ckt. | Charts - kW | ----- | EM | | | No Chart Data |
| Forgebrook | 115 | Com Equipment | ----- | | | | | Com |
| Forgebrook | 115 | FO Line | None | EM | | | | |
| Forgebrook | 115 | FO-1430-FT | ----- | EM | | | | |
| Forgebrook | 115 | FT Line | None | EM | | | | |
| Forgebrook | 115 | FT-1432 | ----- | EM | | | | |
| Forgebrook | 115 | FT-882-WF | ----- | EM | | | | |
| Forgebrook | 115 | WF Line | SCADA | | uP | | | |
| Forgebrook | 13.8 | CM Line | None | ----- | EM | | | Amps |
| Forgebrook | 13.8 | BF Line | SCADA | | EM | | | |
| Forgebrook | 13.8 | W-1486 | ----- | | EM | | | |
| Forgebrook | 13.8 | W-994 | ----- | | | | | Metering combined |
| Forgebrook | 115/13.8 | T1 | SCADA | | EM | | | |
| Forgebrook | 115/13.8 | T2 | ----- | | EM | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|------------------|-------------|-------------|---------------------------|----------|--|
| Freehold | | | | | | M-4000 | | |
| Freehold | 13.8 | 2061 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | 2071 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | W-1155 BKR | ----- | ----- | ----- | ----- | PR-560M | 3 phase; oil; electronic |
| Freehold | 13.8 | T1 | Charts - kW/kVAr | fuse | ----- | ----- | ----- | |
| Freehold | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | |
| Galeville | | | | | | Orion | | |
| Galeville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5030 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5031 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5032 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5033 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5034 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5035 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Galeville | 69 | MG Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69 | MG-200-MK BKR | ----- | ----- | ----- | ----- | ----- | |
| Galeville | 69 | MK Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| Greenfield Rd. | | | | | | M-4000 | | |
| Greenfield Rd. | 13.8 | 3076 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 13.8 | 3078 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 4 | 375-376 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 4 | 377-378 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | W-1608 | ----- | ----- | EM | ----- | ES | 3 phase; oil; electronic |
| Greenfield Rd. | 13.8/4 | T2 | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Greenfield Rd. | 4 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Greenfield Rd. | 4 | B3 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Grimley Rd. | | | | | | NONE-Soon to have DNP RTU | | |
| Grimley Rd. | 4 | 385 Ckt. | Grid Sense | ----- | EM | ----- | Kyle L | Single Phase; Oil; Electronic |
| Grimley Rd. | 4 | 386 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| Hibernia | | | | | | Micro 1C | | |
| Hibernia | 13.8 | 7011 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | 7012 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 69/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | | | | | | D-20 | | |
| High Falls | 13.8 | 3021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 69 | HK Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 69 | HK-696-P BKR. | ----- | ----- | uP- 200 | ----- | ----- | SEL-279 |
| High Falls | 69 | P Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 13.8 | W-998 BKR. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | B1 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | B2 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |
| High Falls | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |

080

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|--------------------|----------|-------------|-------------|--------|----------|---|
| Highland | | | | | | 2300 | | |
| Highland | | | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5081 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5082 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5083 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | 5084 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | 5085 Ckt. | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | HR Line | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | OR Line | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | OR-761-HR BKR. | ---- | EM | ---- | ---- | ---- | |
| Highland | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | |
| Highland | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | Com Equipment | ---- | uP/EM | ---- | ---- | ---- | Com |
| Highland | 115/13.8 | T1 | SCADA | uP/EM | ---- | ---- | ---- | 95BU is SEL-587 |
| Highland | 115/13.8 | T2 | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | | | | | | D-20 | | |
| Honk Falls | 13.8 | 3071 Ckt. | SCADA | ---- | EM | ---- | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | 3072 Ckt. | SCADA | ---- | EM | ---- | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | B1 | SCADA | EM | ---- | ---- | ---- | |
| Honk Falls | 69 | GM Line | SCADA | EM/uP | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | HG Line | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | 69 | HK Line | SCADA | uP/EM | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | MK Line | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | 69 | WH Line | SCADA | uP/EM | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | overall diff B1+T1 | SCADA | EM | ---- | ---- | ---- | |
| Honk Falls | 69/13.8 | T1 | ---- | fuse | ---- | ---- | ---- | |
| Hunter | | | | | | M-4000 | | |
| Hunter | 34.5 | Z-666 | | | | | VR-3S | 3 phase; vac; hyd |
| Hunter | 13.8 | 2081 Ckt. | MV-90 | ---- | ---- | ---- | Kyle W | 3 phase; oil; hyd |
| Hunter | 13.8 | Cap Bank | ---- | ---- | EM | ---- | ---- | |
| Hurley Ave. 345kV | | | | | | 2400 | | |
| Hurley Ave. 345kV | 345 | 30151 BKR. | ---- | EM | ---- | ---- | ---- | 79 Relay is EM |
| Hurley Ave. 345kV | 345 | 30151 A1 BF | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30152 A2 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 301 Line A1 | SCADA | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 301 Line A2 | SCADA | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30353 BKR. | ---- | EM* | ---- | ---- | ---- | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30353 A1 BF | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30353 A2 BF | ---- | EM* | ---- | ---- | ---- | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 30354 BKR. | ---- | EM* | ---- | ---- | ---- | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30354 A1 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30354 A2 BF | ---- | EM* | ---- | ---- | ---- | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 303 Line A1 | SCADA | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 303 Line A2 | SCADA | EM* | ---- | ---- | ---- | In process replacement with GE D90 |
| Hurley Ave. 345kV | 345 | Bus A1 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | Bus A2 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 BKR. | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 A1 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 A2 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A1 Out of Step | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A2 Out of Step | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A1 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A2 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | T1 LS | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | B1 | SCADA | ---- | ---- | ---- | ---- | Volts |

681

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------|--------------------|---------------|----------------------|-------------|-------------|--------|----------|---|
| Hurley Ave. | | | | | | 2400 | | |
| Hurley Ave. | | | | | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2091 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2092 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2093 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2094 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 115 | Cap Bank | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | HP Line | SCADA | EM | ---- | | | |
| Hurley Ave. | 69 | I Line | SCADA | Gen1 | ---- | | | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 115 | OR Line | SCADA | EM | ---- | | | |
| Hurley Ave. | 69 | SB Line | SCADA | Gen1 | ---- | | | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 115 | HP-1643 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | OR-1640 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 69 | W-142 BKR. | ---- | uP | ---- | | | |
| Hurley Ave. | 13.8 | W-1575 BKR. | ---- | EM | EM | | | |
| Hurley Ave. | 115 | W-389 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | B1 | None | EM | ---- | | | |
| Hurley Ave. | 115 | B2 | SCADA | EM | ---- | | | Volts |
| Hurley Ave. | 69 | B1 | SCADA | EM | ---- | | | Volts |
| Hurley Ave. | 13.8 | B1 | SCADA | ---- | EM | | | Volts |
| Hurley Ave. | 115/69 | T3 | SCADA | EM | ---- | | | |
| Hurley Ave. | 115/13.8 | T4 | SCADA | EM | ---- | | | |
| Hurley Ave. | 69/13.8 | T5 | ---- | EM | ---- | | | |
| Inwood Ave. | | | | | | 3030 | | |
| Inwood Ave. | 13.8 | 6061 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6062 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6063 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6064 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6065 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6066 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6067 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6068 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Inwood Ave. | 115 | IR Line | SCADA | uP | ---- | | | |
| Inwood Ave. | 115 | IR-201-X BKR. | ---- | uP | ---- | | | |
| Inwood Ave. | 115 | X Line | SCADA | uP | ---- | | | |
| Inwood Ave. | 13.8 | B1 | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | B2 | SCADA | ---- | uP | | | |
| Inwood Ave. | 115/13.8 | T1 | SCADA | uP | ---- | | | |
| Inwood Ave. | 115/13.8 | T2 | SCADA | uP | ---- | | | |
| Jansen Ave. | | | | | | M-4000 | | |
| Jansen Ave. | 13.8 | 1001 Ckt. | MV-90 | ---- | uP | | | |
| Jansen Ave. | 13.8 | 1002 Ckt. | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | 1003 Ckt. | MV-90 | ---- | uP | | | |
| Jansen Ave. | 13.8 | 1004 Ckt. | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | KL Line | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | KO Line | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | B1 | SCADA | ---- | EM | | | |
| Jansen Ave. | 13.8 | B2 | SCADA | ---- | EM | | | |
| Jansen Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Jansen Ave. | 13.8 | T - Grounding | MV-90 | ---- | uP | | | |
| Kerhonkson | | | | | | 8890 | | |
| Kerhonkson | 13.8 | 3081 Ckt. | Grid Sense | ---- | EM | | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 13.8 | 3082 Ckt. | Grid Sense | ---- | EM | | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 69 | MK-929 MOS | ---- | EM | ---- | | | |
| Kerhonkson | 69 | MK-930 MOS | ---- | EM | ---- | | | |
| Kerhonkson | 69/13.8 | T1 | Charts - kW/kVar IGS | fuse | ---- | | | Amps for each Transformer |
| Kerhonkson | 69/13.8 | T2 | | fuse | ---- | | | Volts & Amps |
| Kerhonkson | 69 | HK | SCADA | ---- | ---- | | | Volts & Amps |
| Kerhonkson | 69 | MK | SCADA | ---- | ---- | | | Volts & Amps |

682

Electric Substation Upy. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-----------------|------------------------|-------------|-------------|--------|----------|--------------------------------------|
| Knapps Corners | | | | | | 2100 | | |
| Knapps Corners | | | Charts - Amps/SCADA | | uP | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8021 Ckt. | Charts - Amps | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8022 Ckt. | Charts - Amps | | uP/EM | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8023 Ckt. | Charts - Amps/SCADA | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8024 Ckt. | Charts - kW | | EM | | | |
| Knapps Corners | 13.8 | 8025 Ckt. | Charts - kW | | | | | Com |
| Knapps Corners | 13.8 | Com Equipment | | | | | | |
| Knapps Corners | 115 | KB Line | None | EM | | | | SEL-279 |
| Knapps Corners | 115 | KB-1558-MC BKR. | | uP-200 | | | | |
| Knapps Corners | 115 | SK Line | SCADA | | uP | | | Amps |
| Knapps Corners | 13.8 | KN Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KR Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KS Line | SCADA* | EM | | | | |
| Knapps Corners | 69 | KM Line | SCADA | uP | | | | |
| Knapps Corners | 69 | TR Line | SCADA | EM | | | | |
| Knapps Corners | 69 | G Line | SCADA | uP | | | | |
| Knapps Corners | 13.8 | W-1215 BKR. | | | EM | | | |
| Knapps Corners | 69 | W-1409 BKR. | | | uP | | | |
| Knapps Corners | 13.8 | W-1462 BKR. | | | EM | | | |
| Knapps Corners | 13.8 | B1 | | | EM | | | Combine Bus Volts to one point |
| Knapps Corners | 13.8 | B2 | SCADA | | EM | | | |
| Knapps Corners | 13.8 | B3 | | | EM | | | |
| Knapps Corners | 69 | 69k Bus | SCADA | EM | | | | Volts |
| Knapps Corners | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Knapps Corners | 115/13.8 | T3 | | EM | | | | |
| Knapps Corners | 115/69 | T2 | SCADA | uP | | | | |
| Lawrenceville | | | | | | M-4000 | | |
| Lawrenceville | 34.5 | 2385 Ckt. | Grid Sense | EM/uP | | | CXE-400A | 3 phase; oil; hyd |
| Lawrenceville | 34.5 | B1 | SCADA* | | | | | Volts |
| Lawrenceville | 69/34.5 | T1 | MV90/Grid Sense/SCADA | EM | | | | Amps. |
| Lincoln Park | | | | | | 2300 | | |
| Lincoln Park | 13.8 | Com Equipment | | | | | | Com |
| Lincoln Park | 13.8 | 2011 Ckt. | Charts - Amps | | EM | | | |
| Lincoln Park | 13.8 | 2012 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2013 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2014 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2015 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2016 Ckt. | Charts - kW | | EM/uP* | | | GE F60 installed HiZ pilot |
| Lincoln Park | 13.8 | 2017 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2018 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 1 | | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 2 | | | EM | | | |
| Lincoln Park | 115 | HP Line | None | EM | | | | Relay Replacement Program in process |
| Lincoln Park | 115 | HP-1318 BKR. | | EM | | | | |
| Lincoln Park | 13.8 | KL Line | Charts - kW/kVar/SCADA | EM | | | | Amps to SCADA |
| Lincoln Park | 115 | LR-1219-HP BKR. | | EM | | | | |
| Lincoln Park | 115 | LR Line | SCADA | uP | | | | |
| Lincoln Park | 13.8 | W-1321 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-45 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-534 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-554 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-206 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-207 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-525 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-528 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Lincoln Park | 13.8 | B2 | | | EM | | | Volts |
| Lincoln Park | 13.8 | B3 | SCADA | | EM | | | |
| Lincoln Park | 13.8 | B4 | None | | EM | | | Volts |
| Lincoln Park | 115 | 115k bus | SCADA | | EM | | | Combine load value |
| Lincoln Park | 115/13.8 | T1 | SCADA | | EM | | | |
| Lincoln Park | 115/13.8 | T2 | | EM | | | | |
| Lincoln Park | 115/13.8 | T3 | SCADA | | EM | | | |

003

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|--------|----------|---|
| Manchester | | | | | | 2400 | | |
| Manchester | | | | | | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6091 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6092 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6093 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6094 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6095 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6096 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | 6097 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Manchester | 115 | M Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is REL-301; part of replacement program. |
| Manchester | 115 | MC Line | SCADA | uP | ----- | ----- | ----- | |
| Manchester | 13.8 | MS Line | SCADA* | ----- | EM | ----- | ----- | Amps |
| Manchester | 13.8 | W-1456 BKR. | ----- | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | W-650 BKR. | ----- | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Combine Bus Volts to one point |
| Manchester | 13.8 | B2 | ----- | ----- | EM | ----- | ----- | |
| Manchester | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | Combine load value |
| Manchester | 115/13.8 | T2 | ----- | EM | ----- | ----- | ----- | |
| Marlboro | | | | | | 8890 | | ???? |
| Marlboro | 13.8 | 5001 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5002 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5003 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5004 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Marlboro | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Marlboro | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Volts |
| Marlboro | 115/13.8 | T1 | SCADA | uP/EM* | ----- | ----- | ----- | 95P is SEL-587 |
| Marlboro | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| Maryland Ave. | | | | | | M-4000 | | |
| Maryland Ave. | 4 | 621 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | 622 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | 623 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | 624 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | MS Line | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | PH-284 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | PH-286 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | W-1032 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | W-1033 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | W-1034 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Maryland Ave. | 13.8 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Maryland Ave. | 4 | B1 | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Maryland Ave. | 13.8/4 | T1 | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8/4 | T2 | ----- | ----- | EM | ----- | ----- | |
| Maybrook | | | | | | M-4000 | | |
| Maybrook | 13.8 | 5051 Ckt. | MV-90 | ----- | EM | ----- | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | 5052 Ckt. | MV-90 | ----- | uP | ----- | ----- | Previously 5081-83? |
| Maybrook | 13.8 | 5053 Ckt. | MV-90 | ----- | EM | ----- | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Maybrook | 13.8 | B2 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Maybrook | 69/13.8 | T1 | None | ----- | ----- | ----- | ----- | |
| Maybrook | 69/13.8 | T2 | None | ----- | ----- | ----- | ----- | |
| McKinley St. | | | | | | NONE | | |
| McKinley St. | 4 | 845 Ckt. | MV-90 | ----- | EM | ----- | ----- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|----------------|-------------|-------------|-------------|-------|----------|--------------------------------------|
| Merritt Park | | | | | uP | BM | | |
| Merritt Park | 13.8 | 8061 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8062 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8063 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8064 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8065 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8066 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8067 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8068 Ckt. | SCADA | | uP | | | Com |
| Merritt Park | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | |
| Merritt Park | 115 | WF Line | SCADA | | uP | | | |
| Merritt Park | 115 | WP Line | SCADA | | uP | | | SEL-279 |
| Merritt Park | 115 | WF-439-WP BKR. | ----- | uP-200 | | | | |
| Merritt Park | 13.8 | B1 | SCADA | | uP | | | |
| Merritt Park | 13.8 | B2 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T1 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T2 | SCADA | | uP | | | |
| Milan | | | | | | BM | | |
| Milan | 13.8 | 7061 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | 7062 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Milan | 115 | B-4561 Ckt Sw | ----- | uP | | | | |
| Milan | 115 | MR Line | SCADA | | uP | | | |
| Milan | 115 | MR-501 BKR. | SCADA | | uP | | | |
| Milan | 115 | RT-7 BKR. | ----- | uP | | | | |
| Milan | 115 | R-10 BKR. | ----- | uP | | | | |
| Milan | 115 | T-7 Line | SCADA | | uP | | | |
| Milan | 115 | 10 Line | SCADA | | uP | | | |
| Milan | 115 | B1 | SCADA | | uP | | | |
| Milan | 13.8 | B1 | SCADA | | uP | | | |
| Milan | 115/13.8 | T1 | SCADA | | uP | | | |
| Millerton | | | | | | L&N | | |
| Millerton | 13.8 | 7081 Ckt. | SCADA | | EM | | | |
| Millerton | 69 | GE-823 MOS | ----- | EM | | | | |
| Millerton | 69/13.8 | T1 | SCADA | | EM | | | Only one feeder; T1 = 7081 load |
| Millerton | 69 | Line to SMI | SCADA | | | | | Volts |
| Millerton | 69 | Line to PUL | SCADA | | | | | Volts |
| Modena 115kV | | | | | | BM | | |
| Modena 115kV | 13.8 | B1 | SCADA | | uP | | | |
| Modena 115kV | 13.8 | C-1651 BKR. | ----- | uP | | | | |
| Modena 115kV | 13.8 | 5011 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5012 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5013 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Modena 115kV | 115 | EM Line | SCADA | | uP | | | |
| Modena 115kV | 115 | EM-201-PX BKR. | ----- | uP | | | | |
| Modena 115kV | 115 | PX Line | SCADA | | uP | | | |
| Modena 115kV | 115/13.8 | T3 | SCADA | | uP | | | Only has one 13.8 bus; T3 = Bus load |
| Modena 69kV | | | | | | 8890 | | volts |
| Modena 69kV | 69 | B1 | SCADA | | EM | | | |
| Modena 69kV | 69 | MG Line | SCADA | | uP | | | |
| Modena 69kV | 69 | W-941 BKR. | ----- | EM | | | | |
| Modena 69kV | 69 | MG-380 BKR. | ----- | EM | | | | |
| Modena 69kV | 115/69 | T1 | SCADA | | EM/uP | | | GE F35 is installed |
| Modena 69kV | 69/13.8 | T2 | None | | Fuse/uP | | | |
| Montgomery | | | | | | NONE | | |
| Montgomery | 4 | 571 Ckt. | Charts - kW | | EM | | V4L | Single phase; Vac; Hyd |
| Montgomery | 4 | 572 Ckt. | Charts - kW | | EM | | V4L | Single phase; Vac; Hyd |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|--------------------|-------------|-------------|--------|----------|--------------------------------|
| Montgomery St. | | | | | | M-4000 | | |
| Montgomery St. | | | | | EM | | | volts |
| Montgomery St. | 13.8 | B1 | SCADA | ---- | EM | | | Volts |
| Montgomery St. | 13.8 | B2 | SCADA | ---- | EM | | | volts |
| Montgomery St. | 13.8 | B3 | SCADA | ---- | EM | | | |
| Montgomery St. | 13.8 | B Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | 4001 Ckt. | Charts - kW/kVAr | ---- | EM | | | |
| Montgomery St. | 13.8 | 4002 Ckt. | Charts - kW/kVAr | ---- | EM | | | |
| Montgomery St. | 13.8 | 4003 Ckt. | Charts - kW/kVAr | ---- | EM | | | |
| Montgomery St. | 4 | 401 Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 402-3 Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 404 Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 406A/B Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 407A/B Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 410A/B Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | B1 | SCADA | ---- | EM | | | Volts |
| Montgomery St. | 4 | B2 | SCADA | ---- | EM | | | volts |
| Montgomery St. | 13.8 | F Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | NB Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | NM Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | R Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | W-507 BKR. | ---- | ---- | EM | | | |
| Montgomery St. | 13.8 | W-508 BKR. | ---- | ---- | EM | | | |
| Montgomery St. | 13.8 | W-509 BKR. | ---- | ---- | EM | | | |
| Montgomery St. | 13.8 | WN Line | None | ---- | EM | | | |
| Montgomery St. | 13.8/4 | T1 | | ---- | EM | | | |
| Montgomery St. | 13.8/4 | T2 | Charts - kW/kVAr | ---- | EM | | | Combine load value |
| Myers Corners | | | | | | 44-550 | | |
| Myers Corners | 13.8 | 8041 Ckt. | Charts - kW | ---- | uP | | | |
| Myers Corners | 13.8 | 8043 Ckt. | Charts - kW | ---- | EM | | | |
| Myers Corners | 13.8 | 8044 Ckt. | Charts - kW | ---- | EM | | | |
| Myers Corners | 13.8 | 8045 Ckt. | Charts - kW | ---- | EM | | | |
| Myers Corners | 13.8 | 8046 Ckt. | SCADA | ---- | uP | | | |
| Myers Corners | 69 | KM Line | None | EM | ---- | | | |
| Myers Corners | 69 | TV Line | None | EM | ---- | | | |
| Myers Corners | 69 | TV-399-KM BKR. | ---- | EM | ---- | | | |
| Myers Corners | 13.8 | W-63 BKR. | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | W-66 BKR. | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | Feeder M1-75 | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | Feeder M2-76 | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | Feeder M3-91 | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | Feeder M4-90 | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | B1 | | ---- | EM | | | |
| Myers Corners | 13.8 | B2 | SCADA | ---- | EM | | | Combine Bus Volts to one point |
| Myers Corners | 69/13.8 | T1 | | EM | ---- | | | |
| Myers Corners | 69/13.8 | T2 | SCADA | EM | ---- | | | Combine load value |
| Neversink | | | | | | 2200 | | |
| Neversink | 4 | 391 Ckt. | Charts - kW | ---- | EM | | | |
| Neversink | 13.8 | 3091 Ckt. | Grid Sense | ---- | EM | | Kyle W | 3 phase; Oil; Hyd |
| Neversink | 69 | HG Line | SCADA* | EM | ---- | | | Amps |
| Neversink | 69 | WH Line | SCADA* | EM | ---- | | | Amps |
| Neversink | 4 | W-1128 BKR. | ---- | ---- | EM | | | |
| Neversink | 69 | 69k Bus | SCADA | uP/EM | ---- | | | Volts |
| New Baltimore | | | | | | 2300 | | |
| New Baltimore | 13.8 | 1081 Ckt. | SCADA* | ---- | EM | | | kW |
| New Baltimore | 13.8 | 1082 Ckt. | SCADA* | ---- | EM | | | kW |
| New Baltimore | 13.8 | 1083 Ckt. | SCADA* | ---- | EM | | | kW |
| New Baltimore | 69 | Cap Bank | ---- | EM/uP | ---- | | | Com |
| New Baltimore | 13.8 | Com Equipment | ---- | ---- | ---- | | | |
| New Baltimore | 69 | CN Line | None | uP | ---- | | | |
| New Baltimore | 69 | NW Line | None | uP | ---- | | | |
| New Baltimore | 13.8 | B1 | SCADA | ---- | EM | | | Volts |
| New Baltimore | 69/13.8 | T1 | SCADA | EM/uP | ---- | | | 95P is SEL-587 |

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|--------------------|------------------|-------------|-------------|-------|----------|------------------------|
| | | | | | | NONE | | |
| New Windsor | | | | | | | | No DATA |
| New Windsor | 4 | 461 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 462 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 463 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 464 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 13.8 | UN & UW ATC | None | ----- | uP | ----- | ----- | Combine load value |
| New Windsor | 13.8/4 | T1 | Charts - kW/kVAR | ----- | uP | ----- | ----- | |
| New Windsor | 13.8/4 | T2 | | ----- | uP | ----- | ----- | |
| North Catskill | | | | | | D-20 | | |
| North Catskill | 13.8 | 2001A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2002A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2003A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2004 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2005 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2006 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| North Catskill | 115 | 2 Line | SCADA | EM | ----- | ----- | ----- | |
| North Catskill | 115 | R-2 BKR. | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 115 | RT-7 BKR. | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 115 | T-7 Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| North Catskill | 69 | Cap Bank | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 69 | CL Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | H Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | W-1107 BKR. | ----- | EM/uP* | ----- | ----- | ----- | check on TD-5 |
| North Catskill | 69 | W-269 BKR. | ----- | EM/uP* | ----- | ----- | ----- | check on TD-5 |
| North Catskill | 115 | W-791 BKR. | ----- | uP- 200 | ----- | ----- | ----- | SEL-2BFR |
| North Catskill | 69 | W-269 & W-1107 BKR | ----- | ----- | EM | ----- | ----- | IJS |
| North Catskill | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| North Catskill | 69 | B1 | SCADA | EM/uP | ----- | ----- | ----- | Volts |
| North Catskill | 69 | B2 | SCADA | EM/uP | ----- | ----- | ----- | Volts |
| North Catskill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | Volts: 95BU is DFP-100 |
| North Catskill | 13.8 | B2 | SCADA | ----- | EM/uP | ----- | ----- | Volts: 95BU is DFP-100 |
| North Catskill | 115/69 | T4 | SCADA | EM/uP* | ----- | ----- | ----- | Check on 64 relay |
| North Catskill | 115/69 | T5 | SCADA | EM/uP* | ----- | ----- | ----- | Check on 64 relay |
| North Catskill | 115/13.8 | T6 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| North Catskill | 115/13.8 | T7 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|---------------|-------------|-------------|-------|----------|-----------------------|
| North Chelsea | | | | | | BM | | |
| North Chelsea | | | | | | | | |
| North Chelsea | 13.8 | 8051 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8052 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8053 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8054 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8055 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8056 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8057 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8058 Ckt. | SCADA | ..... | uP | ..... | ..... | Com |
| North Chelsea | 13.8 | Com Equipment | ..... | ..... | ..... | ..... | ..... |  |
| North Chelsea | 115 | AC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | AC-1066 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | DC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | DC-1414 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | FO-1482 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | FO Line | SCADA | uP | ..... | ..... | ..... | 95P is LCB-II |
| North Chelsea | 115 | NF Line | SCADA | uP | ..... | ..... | ..... | 95P is LCB-II |
| North Chelsea | 115 | NF-1116 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | SC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | SC-1566 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 69 | TV Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2651 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2652 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2653 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | W-1572 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B1 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 13.8 | B1 | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | B2 | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 115/69 | T1 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115/13.8 | T2 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115/13.8 | T3 | SCADA | uP | ..... | ..... | ..... | Volts |
| Ohioville | | | | | | 2100 | | |
| Ohioville | 13.8 | 5021 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5022 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5023 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5024 Ckt. | Charts - kW | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5025 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| Ohioville | 13.8 | Com Equipment | ..... | ..... | ..... | ..... | ..... | Com |
| Ohioville | 115 | Cap Bank | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 69 | O Line | None | uP | ..... | ..... | ..... |  |
| Ohioville | 69 | OB Line | None | uP | ..... | ..... | ..... |  |
| Ohioville | 115 | OR Line | None | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | OR-1075 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | PX Line | SCADA | EM/uP | ..... | ..... | ..... |  |
| Ohioville | 115 | PX - 1659 BKR. | ..... | uP | ..... | ..... | ..... |  |
| Ohioville | 69 | W - 1511 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 13.8 | W - 1537 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 13.8 | W - 1600 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | B1 | SCADA | EM | ..... | ..... | ..... | Volts |
| Ohioville | 69 | 69k Bus | SCADA | EM | ..... | ..... | ..... | Volts |
| Ohioville | 13.8 | B1 | None | ..... | EM | ..... | ..... |  |
| Ohioville | 13.8 | B2 | None | ..... | EM | ..... | ..... |  |
| Ohioville | 115/13.8 | T1 | SCADA | EM | ..... | ..... | ..... | Combine load value |
| Ohioville | 115/13.8 | T2 | SCADA | EM | | | | 95BU is SEL-251 |
| Ohioville | 115/69 | T3 | SCADA | EM/uP-200 | | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|----------|-------------|-------------|------|----------|--------------------------------------|
| | | | | | | 2300 | | Grid owns Line |
| Pleasant Valley | | | SCADA** | uP | | | | |
| Pleasant Valley | 115 | 8 Line | SCADA | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 10 Line | SCADA** | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 12 Line | SCADA** | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 13 Line | SCADA** | uP | | | | 95BU is Optimho; in replacement plan |
| Pleasant Valley | 115 | C Line | SCADA | EM/Gen-1 | | | | |
| Pleasant Valley | 115 | M Line | SCADA | EM | | | | |
| Pleasant Valley | 115 | X Line | SCADA | uP | | | | Com |
| Pleasant Valley | 115 | Com Equipment | | | | | | SEL-279 |
| Pleasant Valley | 115 | R-12 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-13 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-8 BKR. | | uP-200 | | | | |
| Pleasant Valley | 115 | RC-6 BKR. | | EM | | | | |
| Pleasant Valley | 115 | RM BKR. | | EM | | | | |
| Pleasant Valley | 115 | RX-4 BKR. | | uP | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-61 BKR. | SCADA** | EM | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-62 BKR. | SCADA** | EM | | | | |
| Pleasant Valley | 115 | R-643 BKR. | | EM | | | | |
| Pleasant Valley | 115 | R-81 BKR. | | EM | | | | |
| Pleasant Valley | 115 | B1 | SCADA | EM | | | | Volts |
| Pleasant Valley | 115 | B2 | SCADA | EM | | | | Volts |
| Pleasant Valley | 69 | E Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | G Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | Q Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | B1 | SCADA | uP | | | | Volts |
| Pleasant Valley | 13.8 | W-387 | | | EM | | | |
| Pleasant Valley | 345/115 | S1 | SCADA | | | | | Con Ed owns bank and protection |
| Pleasant Valley | 115/69 | T10 | SCADA | EM | | | | |
| Pulvers Corners | | | | | | D-20 | | |
| Pulvers Corners | 13.8 | 7091 Ckt. | SCADA | | EM | | V4L | single phase; vac; hyd |
| Pulvers Corners | 13.8 | 7092 Ckt. | SCADA | | EM | | Kyle L | single phase; oil; hyd |
| Pulvers Corners | 34.5 | 7395 Ckt. | SCADA | EM | | | RVE | 3 phase; oil; hyd |
| Pulvers Corners | 13.8 | Com Equipment | | | | | | Com |
| Pulvers Corners | 69 | Cap Bank | | EM | | | | |
| Pulvers Corners | 69 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 34.5 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 13.8 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 69/13.8 | T1 | SCADA | Fuse | | | | |
| Pulvers Corners | 69/34.5 | T2 | None | EM/uP | | | | 95P is SR-745 |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|-------------------|-------------|-------------|------|----------|---------------------------------|
| Reynolds Hill | | | | | | 2100 | | |
| Reynolds Hill | 13.8 | 6001 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Reynolds Hill | 13.8 | 6004 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | 6005 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Reynolds Hill | 13.8 | 6008 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | ----- | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Reynolds Hill | 115 | DR-1418 BKR. | ---- | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | DR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | HR-1285 BKR. | ---- | EM | ---- | ---- | ---- | |
| Reynolds Hill | 115 | HR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | IR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 13.8 | B Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | W Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PD Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PH Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PK Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PO Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PQ Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PS Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PU Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 115 | T-31 BKR. | ---- | EM | ---- | ---- | ---- | |
| Reynolds Hill | 115 | B1 | SCADA | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 115 | B2 | SCADA | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 13.8 | B1 | SCADA | ---- | EM/uP | ---- | ---- | 95BU is SEL-501 |
| Reynolds Hill | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | Volts |
| Reynolds Hill | 13.8 | B3 | SCADA | ---- | uP | ---- | ---- | Volts |
| Reynolds Hill | 115 | W-1543 BKR. | ---- | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 115/13.8 | T3 | SCADA | EM/uP | ---- | ---- | ---- | 95P is SEL-351A |
| Reynolds Hill | 115/13.8 | T4 | SCADA | EM/uP | ---- | ---- | ---- | 95P is SEL-351A |
| Rhinebeck | | | | | | 2300 | | |
| Rhinebeck | 13.8 | 7051 Ckt. | Charts - kW/SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | 13.8 | 7052 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7053 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7054 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7055 Ckt. | Charts - kW | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Rhinebeck | 13.8 | 7056 Ckt. | SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | ----- | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Rhinebeck | 69 | Cap Bank | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 115 | ER Line | SCADA* | uP | ---- | ---- | ---- | Amps |
| Rhinebeck | 115 | LR-830-MR BKR. | ---- | uP | ---- | ---- | ---- | |
| Rhinebeck | 115 | MR Line | None | uP | ---- | ---- | ---- | |
| Rhinebeck | 69 | Q-1471 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-1017 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-1238 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 69 | W-258 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-367 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 69 | Q Line | SCADA* | ---- | EM | ---- | ---- | Volts |
| Rhinebeck | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | B2 | none | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Rhinebeck | 69 | 69kV Bus | SCADA | ---- | EM | ---- | ---- | Volts |
| Rhinebeck | 69/13.8 | T1 | SCADA* | EM | ---- | ---- | ---- | Amps & Volts |
| Rhinebeck | 69/13.8 | T2 | SCADA* | EM | ---- | ---- | ---- | Amps & Volts |
| Rhinebeck | 115/13.8 | T4 | SCADA | EM | ---- | ---- | ---- | |
| Rhinebeck | 115/69 | T3 | SCADA | EM | ---- | ---- | ---- | |

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Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|---------------|----------|-------------|-------------|------|----------|----------------|
| Rock Tavern 345kV | | | | | | 2100 | | |
| Rock Tavern 345kV | | | SCADA | UP | | | | |
| Rock Tavern 345kV | 345 | 311 Line A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | 311 Line A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 3456 BKR. | | UP | | | | |
| Rock Tavern 345kV | 345 | 3456 BF A1 | | UP | | | | |
| Rock Tavern 345kV | 345 | 3456 BF A2 | | EM | | | | Combined MVArS |
| Rock Tavern 345kV | 345 | Cap Bank 1 A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | Cap Bank 1 A2 | SCADA* | EM | | | | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A2 | | UP | | | | |
| Rock Tavern 345kV | 345 | 34 Line A1 | SCADA | UP | | | | |
| Rock Tavern 345kV | 345 | 34 Line A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 37751 BKR. | | UP | | | | |
| Rock Tavern 345kV | 345 | 37751 BF A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | 37751 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 37752 BKR. | | UP | | | | |
| Rock Tavern 345kV | 345 | 37752 BF A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | 37752 BF A2 | | UP | | | | |
| Rock Tavern 345kV | 345 | 377 Line A1 | SCADA | EM | | | | |
| Rock Tavern 345kV | 345 | 377 Line A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 4255 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | 4255 BF A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | 4255 BF A2 | | SS | | | | |
| Rock Tavern 345kV | 345 | 42 Line A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | 42 Line A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | C3351 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | C3351 BF A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | C3351 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | C3352 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | C3352 BF A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | C3352 BF A2 | | UP-200 | | | | |
| Rock Tavern 345kV | 345 | C3353 BKR. | | UP | | | | |
| Rock Tavern 345kV | 345 | C3353 BF A1 | | UP | | | | |
| Rock Tavern 345kV | 345 | C3353 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 31153 BKR. | | UP | | | | |
| Rock Tavern 345kV | 345 | 31153 BF A1 | | UP | | | | |
| Rock Tavern 345kV | 345 | 31153 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 31154 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | 31154 BF A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | 31154 BF A2 | | | | | | Com |
| Rock Tavern 345kV | 345 | Com Equipment | | EM | | | | |
| Rock Tavern 345kV | 345 | B1 A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | B1 A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | B2 A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | B2 A2 | | EM | | | | |
| Rock Tavern 345kV | 345/115 | T1 A1 | SCADA | EM | | | | |
| Rock Tavern 345kV | 345/115 | T1 A2 | | UP | | | | |
| Rock Tavern 345kV | 345/115 | T3 A1 | SCADA | UP | | | | |
| Rock Tavern 345kV | 345/115 | T3 A2 | | | | | | |

Electric Substation Up. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-----------------|-------------|-------------|-------------|-------|----------|--------------------------------|
| | | | | | | 2400 | | |
| Sand Dock | | | | | EM | | | |
| Sand Dock | 13.8 | 6011 Ckt. | Charts - kW | ---- | EM | | | |
| Sand Dock | 13.8 | BP-1296 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | BP-1570 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | Cap Bank 1 | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | Cap Bank 2 | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | Cap Bank 3 | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | GB Line | SCADA | ---- | EM | | | |
| Sand Dock | 115 | KC-1447-SC BKR. | ---- | EM | ---- | | | |
| Sand Dock | 115 | KC Line | None | EM | ---- | | | |
| Sand Dock | 115 | SC Line | None | UP | ---- | | | |
| Sand Dock | 13.8 | SH-886 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | SH-911 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | TW-902 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | TW-909 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | TW-910 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | W-116 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | W-1449 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | W-1453 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 13.8 | W-1467 BKR. | ---- | ---- | EM | | | |
| Sand Dock | 115 | B1 | SCADA | ---- | ---- | | | Combine Bus Volts to one point |
| Sand Dock | 115 | B4 | | ---- | ---- | | | |
| Sand Dock | 13.8 | B1 | | ---- | EM | | | Combine Bus Volts to one point |
| Sand Dock | 13.8 | B2 | SCADA | ---- | EM | | | |
| Sand Dock | 13.8 | B3 | | ---- | EM | | | |
| Sand Dock | 13.8 | B4 | SCADA | ---- | EM | | | |
| Sand Dock | 13.8 | T1 | SCADA | EM | | | | Combine load value |
| Sand Dock | 13.8 | T3 | | EM | | | | |
| Sand Dock | 13.8 | T4 | SCADA | EM | | | | |
| Saugerties | | | | | | Orion | | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-------------------|-------------|-------------|-------------|------|----------|--------------------------------------|
| Shenandoah | | | | | | 2400 | | |
| Shenandoah | 115 | East Bus | SCADA | EM | ---- | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 115 | West Bus | | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B2 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B4 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B5 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B6 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B7 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B8 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 1 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 2 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 3 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 4 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 5 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 6 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B-4451 BKR. (CB1) | ---- | ---- | UP | ---- | ---- | |
| Shenandoah | 13.8 | 8071 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | 8072 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 115 | EF Line | None | uP/Gen-1 | ---- | ---- | ---- | 95BU is Optimho; in replacement plan |
| Shenandoah | 115 | FS Line | None | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | EF-1514 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-739 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-892-EF BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-959 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S1 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S2 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S3 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S4 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S5 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S6 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S7 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S8 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S9 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S10 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S11 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S12 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S13 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S14 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S15 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 115/13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T2 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T3 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T4 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T5 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T6 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T7 | SCADA | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | W-1266 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1279 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1450 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1593 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-664 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-665 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-802 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-803 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-805 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-807 BKR. | ---- | ---- | EM | ---- | ---- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------------|--------------------|------------------|----------|-------------|-------------|--------|----------|---|
| Rock Tavern 115kV | | | | | | 44-550 | | |
| Rock Tavern 115kV | 115 | B1 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | B2 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | 115-0.48kV SST | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | Com Equipment |  | ..... | ..... | ..... | ..... | Com |
| Rock Tavern 115kV | 115 | D Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | D-448 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | J Line | SCADA* | GEN-1/EM | ..... | ..... | ..... | 95P is a DLP; identified in replacement program; Amps |
| Rock Tavern 115kV | 115 | J-788 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RD Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RD-809 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RJ Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RJ-818 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL Line | SCADA | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL-684 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-467 BKR. | ..... | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-681 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-814 BKR. | ..... | EM/UP | ..... | ..... | ..... | SEL-351 |
| Rock Tavern 115kV | 115 | WM Line | none | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115/69 | T2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | | | | | | 2100 | | |
| Roseton Switchyard | 345 | 30356 (B6) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A2 | SCADA | EM/UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31151 (B1) BKR | ..... | EM | ..... | ..... | ..... | SEL-501 for DBC |
| Roseton Switchyard | 345 | 31152 (B1) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B1) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B2 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U1 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U2 | SCADA | EM | ..... | ..... | ..... |  |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|-------------------|-------------|-------------|-------|----------|---|
| Smith Street | | | | | | 2300 | | Radio to INW |
| Smith Street | 4 | 631 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 632 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 633 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 634 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | MS Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | PQ Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | PS Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | W Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Volts |
| Smith Street | 13.8 | B2 | SCADA | ---- | EM | ---- | ---- | Volts |
| Smith Street | 4 | B1 | SCADA | ---- | uP | ---- | ---- | Volts |
| Smith Street | 4 | B2 | SCADA | ---- | uP | ---- | ---- | Volts |
| Smith Street | 13.8/4 | T1 | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8/4 | T2 | None | ---- | EM | ---- | ---- | |
| Smithfield | | | | | | 8890 | | |
| Smithfield | 13.8 | 7095 Ckt. | SCADA | ---- | uP | ---- | ---- | Com |
| Smithfield | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | 95P is SEL-267 |
| Smithfield | 69 | E Line | None | uP- 200/uP | ---- | ---- | ---- | 95P is SEL-267; Volts & Amps |
| Smithfield | 69 | FV Line | SCADA* | uP- 200/uP | ---- | ---- | ---- | Amps |
| Smithfield | 69 | GE Line | SCADA* | EM | ---- | ---- | ---- | Amps |
| Smithfield | 69 | S Line | SCADA* | EM | ---- | ---- | ---- | Volts & Amps |
| Smithfield | 69 | SA Line | SCADA* | EM | ---- | ---- | ---- | Volts |
| Smithfield | 69 | B2 | SCADA | ---- | ---- | ---- | ---- | Volts |
| Smithfield | 69 | B3 | SCADA | ---- | ---- | ---- | ---- | Volts |
| Smithfield | 69/13.8 | T1 | None* | ---- | ---- | ---- | ---- | Only one feeder; T1 = 7095 load |
| South Cairo | | | | | | 8890 | | |
| South Cairo | 13.8 | 2041 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2042 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2043 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| South Cairo | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| South Cairo | 69 | CF Line | None | EM/uP | ---- | ---- | ---- | 79 done with NLR |
| South Cairo | 69 | CL Line | None | uP | ---- | ---- | ---- | |
| South Cairo | 13.8 | B1+G1 | Charts - kW/SCADA | ---- | EM | ---- | ---- | SCADA Volts |
| South Cairo | 69/13.8 | T1 | Charts - Amps | EM/uP | ---- | ---- | ---- | 95P is SEL-587 |
| South Wall St. | | | | | | None | | |
| South Wall St. | 4 | 111 Ckt. | Grid Sense | ---- | EM | ---- | Kyle L | Single Phase; Oil; Hyd |
| South Wall St. | 4 | 112 Ckt. | Grid Sense | ---- | EM | ---- | Kyle L | Single Phase; Oil; Hyd; missing GS data |
| South Wall St. | 13.8/4 | T1 | Charts - kW/kVAr | ---- | EM | ---- | ---- | |
| Spackenkil | | | | | | Orion | | |
| Spackenkil | 13.8 | 6041 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6042 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6043 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6044 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6045 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6046 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6047 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6048 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Spackenkil | 13.8 | KR Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | KS Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | MC Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | MC-200-SK BKR. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | B1 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 115/13.8 | T1 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 115/13.8 | T2 | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | | | | | | BM | | |
| Staatsburg | 13.8 | 7041 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | 7042 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | 7043 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Staatsburg | 13.8 | B1 | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 69/13.8 | T1 | SCADA | uP | ---- | ---- | ---- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-------------------|------------------|-------------|-------------|--------|----------|--------------------------------------|
| Standfordville | | | | | | M-4000 | | |
| Standfordville | 13.8 | 7071 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single phase; vac; hyd |
| Standfordville | 13.8 | 7072 Ckt. | MV-90 | ----- | EM | ----- | ----- | Volts |
| Standfordville | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Standfordville | 69/13.8 | T1 | MV-90 | Fuse | ----- | ----- | ----- | |
| Sturgeon Pool | | | | | | 2100 | | |
| Sturgeon Pool | 4 | 341 Ckt. | Grid Sense | ----- | EM | ----- | Kyle W | 3 phase; oil; hyd; missing data |
| Sturgeon Pool | 4 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Sturgeon Pool | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | O Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | P Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | 69k Bus | SCADA | EM | ----- | ----- | ----- | Volts |
| Sturgeon Pool | 69/13.8 | T5 | None | Fuse | ----- | ----- | ----- | |
| Sugarloaf | | | | | | 44-500 | | |
| Sugarloaf | 115 | SD Line | ----- | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | SJ Line | SCADA | EM | ----- | ----- | ----- | Combine load value |
| Sugarloaf | 115 | SL Line | None | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| Sugarloaf | 115/69 | O & R Transformer | SCADA | EM | ----- | ----- | ----- | |
| Tinkertown | | | | | | 2300 | | |
| Tinkertown | 13.8 | 7022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Tinkertown | 69/13.8 | T1 | SCADA | Fuse | ----- | ----- | ----- | |
| Tinkertown | 69/13.8 | T2 | SCADA | Fuse | ----- | ----- | ----- | |
| Tioronda | | | | | | M-4000 | | |
| Tioronda | 13.8 | 8085 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | |
| Tioronda | 13.8 | 8086 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8087 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 115 | W-566 Ckt. Sw | ----- | EM | ----- | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Agastat |
| Tioronda | 115/13.8 | T1 | Charts - kW/kVAr | EM | ----- | ----- | ----- | Volts |
| Todd Hill | | | | | | 2200 | | |
| Todd Hill | 13.8 | 6051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6055 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6056 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6057 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Todd Hill | 115 | A Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 115 | A-520-C BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | C Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 13.8 | W - 524 BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Todd Hill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is SEL-351A; Volts |
| Todd Hill | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Todd Hill | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95P is SEL-587 |
| Todd Hill | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |

600

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|----------------|-------------|-------------|--------|----------|--------------------------------|
| Union Ave | | | | | | 2200 | | Volts |
| Union Ave | 115 | B1 | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | RJ Line | SCADA | EM | ----- | ----- | ----- | SEL-351A for BF |
| Union Ave | 115 | RJ-52 BKR. | ----- | EM/uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB Line | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB-51 BKR. | ----- | uP | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UN Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UW Line | SCADA* | EM | ----- | ----- | ----- | |
| Union Ave | 115 | W-1095 BKR. | ----- | EM | ----- | ----- | ----- | |
| Union Ave | 13.8 | B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B3 | SCADA | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B4 | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B3-B2 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B4-B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4041 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4042 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4043 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4044 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4045 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4046 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4047 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4055 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Union Ave | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T2 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T3 | SCADA | uP | ----- | ----- | ----- | |
| Van Wagner | | | | | | NONE | | |
| Van Wagner | 4 | 731 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Van Wagner | 4 | 732 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Vinegar Hill | | | | | | M-4000 | | |
| Vinegar Hill | 34.5 | 2389 Ckt. | MV-90 | ----- | uP | ----- | RVE | 3 phase; oil; hyd |
| West Balmville | | | | | | 2300 | | |
| West Balmville | 115 | B2 | SCADA | EM | ----- | ----- | ----- | Volts |
| West Balmville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Combine Bus Volts to one point |
| West Balmville | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | B Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 13.8 | 4011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | 4012 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4013 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4014 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4015 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| West Balmville | 115 | DB Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DB-875 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DW Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DW-662 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | F Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | R Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | W-478 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | W-855 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | WN Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | | T1 | SCADA | EM | ----- | ----- | ----- | Combine load value |
| West Balmville | | T2 | | EM | ----- | ----- | ----- | |

697

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-------------------|----------|-------------|-------------|--------|----------|--------------------------------------|
| Westerlo | | | | | | BM | | |
| Westerlo | 13.8 | 1091 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1092 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1093 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Only has one 13.8 bus; T1 = Bus load |
| Westerlo | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | Cap Bank | ----- | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | NW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW-1500-NW BKR. | ----- | uP | ----- | ----- | ----- | |
| Wiccopee | | | | | | L&N | | |
| Wiccopee | 115 | FS Line | None | EM | ----- | ----- | ----- | |
| Wiccopee | 115 | WP Line | None | uP | ----- | ----- | ----- | |
| Wiccopee | 115 | FS - 1652-WP BKR. | ----- | EM | ----- | ----- | ----- | |
| Wiccopee | 13.8 | F1-292 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | F2-280 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-368 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-378 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-632 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-636 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #3) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #9) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B1 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B2 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Wiccopee | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Wiccopee | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Woodstock | | | | | | M-4000 | | |
| Woodstock | 13.8 | 3011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3012 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3013 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3014 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 13.8 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 69/13.8 | T2+SR Line | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 + B2 | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T1 | MV-90 | ----- | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 | MV-90 | ----- | ----- | ----- | ----- | |

Attachment 6

| | Station | Cost |
|------|-----------------|-------------|
| 2012 | Dashville | \$190,000 |
| | East Walden | \$610,000 |
| | Tioronda | \$200,000 |
| 2013 | Coxsackie | \$130,000 |
| | South Cairo | \$160,000 |
| | East Park | \$200,000 |
| | Pleasant Valley | \$360,000 |
| | Todd Hill | \$160,000 |
| 2014 | Sand Dock | \$510,000 |
| | Fishkill Plains | \$480,000 |
| | South Wall St. | \$84,000 |
| 2015 | Manchester | \$340,000 |
| | Forgebrook | \$730,000 |
| 2016 | Rock Tavern | \$1,060,000 |
| | | |
| Subs | | |
| | | |
| | | |

Preliminary
Copy

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

Risk of equipment failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|-------------|------------------|----------------|--------------|
| \$3,086,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 298,000 | 0 | 0 | 0 | 0 | 238,000 | 60,000 | 0 |
| | Labor (Monthly Payroll) | 149,000 | 0 | 0 | 0 | 0 | 119,000 | 30,000 | 0 |
| | Stock Materials | 149,000 | 0 | 0 | 0 | 0 | 119,000 | 30,000 | 0 |
| | Non-Stock Material (A/P taxable) | 595,000 | 0 | 0 | 0 | 0 | 476,000 | 119,000 | 0 |
| | Contractors (A/P tax exempt) | 208,000 | 0 | 0 | 0 | 0 | 168,000 | 40,000 | 0 |
| | Overheads | 1,489,000 | 0 | 0 | 0 | 0 | 1,191,000 | 298,000 | 0 |
| | AFUDC* | 89,000 | 0 | 0 | 0 | 0 | 71,000 | 18,000 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,977,000 | 0 | 0 | 0 | 0 | 2,382,000 | 595,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 16,000 | 0 | 0 | 0 | 0 | 8,000 | 8,000 | 0 |
| | Labor (Monthly Payroll) | 32,000 | 0 | 0 | 0 | 0 | 16,000 | 16,000 | 0 |
| | Contractors (A/P tax exempt) | 6,000 | 0 | 0 | 0 | 0 | 3,000 | 3,000 | 0 |
| | Overheads | 55,000 | 0 | 0 | 0 | 0 | 27,000 | 28,000 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 109,000 | 0 | 0 | 0 | 0 | 54,000 | 55,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | |
|---|---|---|---|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,160,200 Maximum (\$): 4,011,800

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

1. Relays - The relays protect the electric transmission and distribution systems and can provide oscillography, targets, and phasor data. Electric System Protection (ESP) uses the relays to gather information on faults, including fault characteristics, fault locations, and phasor data. ESP interprets the oscillography data and then communicates our conclusions to: System Operations as an information point of contact; 2) Customer Services (Line Forces) to aid in fault locating and thereby limiting patrol time and area; 3) Operations Services for cases where there may be equipment issues.
2. Meters - The meters provide AC system quantities that are used to operate safely and to plan effectively for future system needs. The Electric Planning & Reliability area uses meter information for day-to-day operations (e.g., switching) and to aid in identifying and addressing locations requiring system reinforcements. System Operations (Sys Ops) uses meter data to monitor and operate the CH transmission system within the ratings of those facilities.
3. Controls and Communications - The RTUs, PLCs, and data concentrators provide status feedback and remote control capability; they also act as a conduit for meter and relay data. Sys Ops relies on the data provided by the RTUs and PLCs to monitor the status of the system from a centralized location, enabling them to respond quickly to system abnormalities. Also, Sys Ops has the ability to perform control operations through the RTUs and PLCs.

Equipment and Functions:

A variety of equipment exists in Central Hudson substations, including protective relays, meters, reclosers, and controls and communications instruments such as Remote Terminal Units (RTUs) and Programmable Logic Controllers (PLCs). Each of these components serves an integral role in contribution to the overall, integrated substation protection, control, and monitoring function. Various departments rely on information from these devices in order to perform their jobs, including Operations Services, Customer Services, line forces, Electric Transmission Planning, Distribution Planning, System Operations, Energy Accounting, and Electric System Protection. Brief summaries of these components are included in **Attachments I through 4**. The intention of this memo is to identify the concerns with continuing to use the identified outdated equipment, detail the benefits of combining functions when replacing equipment, establishing a policy for substation relaying, control, & monitoring functions, and laying out a plan to incorporate these components into a comprehensive substation renovation program.

I. Introduction:

Re: Substation Relays, Meters, Controls and Communications Infrastructure Opportunities

Mr. J.J. Borchert

June 24, 2011

Copy to:

Mr. P.E. Haering
 Mr. H.W. Turner
 Mr. P. Harpols

Mr. J. M. May
 Mr. D. J. Wittmann
 S.R. #2011-07

Waste Reduction:

New equipment can be utilized in an integrated fashion to eliminate or minimize the following tasks and unnecessary equipment (Excerpts are taken from the attached memos):

- Reading chart meters and manually entering data into the Meter Database (MDB).
 - Chart meters cost CH at least \$275,000 annually in labor expense (1130 man-hours), which can be devoted to other work.
- MV-90 circuits not for revenue or interchange metering purposes.
 - MV-90 circuits from Verizon cost CH approximately \$24,000 annually in expense.
- Running fault studies manually to determine fault locations.
 - Manual fault locating costs CH approximately \$15,000 annually in labor expenses.
- Metering transducers, auxiliary relays, timing relays, reclosing relays, and coil monitors.

Supporting the Future State:

New equipment, properly implemented and integrated, will better support current functions and create flexibility for added future functions as follows:

- Provide continuous metering data for the entire system, eliminating information “gaps” as a result of non-continuous and non-contiguous metering.
- Provide for robust planning capabilities and switching operations through use of trending and real-time data.
- Enable more accurate forecasting of area loads to increase risk tolerance, possibly resulting in deferral of substation and distribution projects.
- Offer flexibility for Distribution Automation and Smart Grid initiatives.
- Improve reliability and reduce CAIDI through automated event reporting and fault location.

II. Current State:

This section describes the mix of equipment by component, system wide, and the limitations of the non-digital devices.

1. Relays

There are 3500 active protection relays on the system, excluding LORs, SPRs, Regulator Controls, Recloser Controls, and Communication equipment.

Attachment 1

Copy to: Mr. P.E. Haering
Mr. H.W. Turner

Mr. P. Harpolis
Mr. J. M. May
S.R. #2011-03

June 23, 2011

Mr. J.J. Borchert

Re: Transmission & Distribution Protective Relay Review

Introduction:

Protective Relays represent a vital component for the reliable operation of the Central Hudson Electric Transmission and Distribution Systems. CH substations contain a generational mix of protective relay equipment that differs in capability, ease of use, and reliability. Relay technology has advanced; microprocessor-based (digital) relays not only offer numerous protection functions, but they provide metering capability as well in a compact footprint. This memo summarizes the existing transmission and distribution protective relay equipment, as well as recommendation for replacement options.

Discussion:

Relays perform various functions aimed at timely isolation of faulted areas and rapid restoration once the fault has been cleared. Some of the functions that relays provide include zone distance protection, high-speed pilot protection, overcurrent protection, differential protection, and automatic reclosing.

A. Outdated Devices:

The majority of substations contain a group of single-component electromechanical relays for each protected facility; these relays are responsible for protection functions exclusively. At these locations, metering is performed separately, also often in a single-function fashion. There are also stations that have more recent (but still outdated) types of relays, including solid state and early microprocessor relays. These relays have been failing recently, and a replacement program was created last year to address the concern with these relays. The following is a list (in order of decreasing replacement priority) of common relay types found in substations along with the reason that they have been superseded:

- Electromechanical Relays: These relays are obsolete for the reasons previously described (i.e.; physical size, calibration drift, single-function capabilities, etc).
- Solid State Relays: Like electromechanical relays, the relays on the CH system typically are single function. They have advanced technologically past the electromechanical relays, but not quite to the level of digital relays. They monitor current and voltage waveforms through analog circuits, which then are compared through potentiometers to user defined settings. They generally are unsupported, spare parts are hard to locate, and they contain components that deteriorate over time.

- 1st Generation Microprocessor Relays: Please see the 2010 Budget Memo, **Re: Relay Replacement Program for Upgrade of 1st Generation Microprocessor Relays Remaining on the Central Hudson System**, dated July 1, 2010, for the existing program.
- Schweitzer Engineering Laboratories (SEL) 200 Series Relays (SEL-251/ 267/ 279/ 2BFR): These relays are digital, but they make use of early logic processing methods, in which creating settings isn't as user-friendly as in modern digital relays. SEL has discontinued manufacturing parts for most of these relays, and limited service is provided with them.
- Basler BE1-79M Relays: These relays are multi-shot reclosing relays; they only provide the reclosing function. There are more recently developed relays that provide numerous protection functions and also perform reclosing operations and metering functions.
- Basler BE1-851 (H) Relays: These relays are multifunction, digital relays; however, they only receive current inputs. So, the only meter data available is Amps. Multifunction relays exist that receive current and voltage inputs and provide MW & MVA_r data as well as a much larger variety of protection options.

B. Retrofit/Replacement Options:

Digital relays offer multiple protection functions as well as metering and substation equipment diagnostics. The use of multifunction digital relays greatly reduces the required panel space. Also, with few moving parts, digital relays do not need recalibration to remain accurate. Additionally, digital relays and digital relay controls offer the ability to have longer durations between maintenance cycles due to the combination of their internal error checking and their constantly monitored alarm outputs to SCADA.

Digital relays can be specified to offer equipment diagnostics for the devices they protect. For example, digital transformer relays have the ability to monitor the through-fault history of the transformers and to make determinations on the required maintenance as a result. The same case is true for feeder breakers protected by distribution relays.

- Digital Relays: A collection of proven products exists by a variety of manufacturers. These relays are microprocessor-based, multi-function relays that provide a large variety of protection, metering, and equipment diagnostic capability; they can be used for various protective functions. Some manufactures include SEL, GE, and Basler*. Electric System Design (ESD) has standardized the design to use SEL as primary protection and either GE or Basler relays for backup protection.

* Basler provides a BE1-951 relay, which conveniently fits into electromechanical relay panel cutouts.

C. Additional Considerations:

- o Data Concentrator (SEL-2032): This relay has 16 ports and can act as a data concentrator, a phone switch, and a basic logic processor. The 2032 connects to the RTU, acting as a slave device; it connects to other digital relays, polling them for meter information as a master. Once in the 2032, the meter data can be mathematically manipulated to maintain integrity and precision before it is transferred to a compatible RTU. The 2032 also is connected to a phone line to provide dial-in remote access for trained personnel, enabling event retrieval and relay interrogation.
- o Time Synchronization Devices: Various devices exist on the market that provides a means of time synchronization, including satellite clocks. These clocks provide a unified signal based on a sole source located at zero time offset. To avoid confusion between time zones, UTC time is used as a standard. Sequence of events reconstruction truly realizes the value of having all of the station relays linked to a universal source.

Conclusions:

Upgrading to digital relays provides the following benefits:

- ◆ They offer a more compact footprint and much more capability than their large, single-function predecessors.
- ◆ They provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB/eDNA with little human intervention.
- ◆ The diagnostic capabilities of digital relays should be used to help in the condition assessment of substation equipment.
- ◆ They have a proven track record of good quality and high availability, along with excellent manufacturer support for current models.
- ◆ They provide oscillography, targets, and phasor data that can be accessed from a remote location through a modem. This capability assists in timely and accurate fault analysis.
- ◆ They have lower maintenance costs because they rarely fail and allow for an increased maintenance cycle (i.e. an increase of 50%; from 4 yrs. to 6 yrs.).

Eric A. Loeven

Full integration requires a DNP compatible Remote Terminal Unit described in the "RTU Review" memo.

Attachment 2

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-04

June 23, 2011

Mr. J.J. Borchert

Re: Substation Metering Review

Introduction:

Substation metering data is used to plan and operate the Central Hudson Transmission and Distribution Systems. These metering data are necessary for the safe operation of existing facilities as well as the cost effective planning and design of new facilities. Many transmission lines, substation transformers, and distribution circuits have their MW & MVA_r flows monitored by the Energy Management System (EMS) and have the resultant data stored in the Meter Data Base (MDB) and Historian (eDNA). Many other circuits either are not metered or utilize local indicating metering, such as graphic charts or drag hands, to register data.

Technology has advanced; there are much more reliable and efficient means of measuring and transmitting metered load data, including by means of digital relays. This memo summarizes the existing meter equipment and the replacement options, as well as provides recommendations on the best option to gain appropriate metering data in the most efficient manner.

Discussion:

A large number of substations contain transducer-based meters, which register and report their data directly to a Remote Terminal Unit (RTU) by means of an analog signal. A handful of other stations contain chart meters, which provide local indication. In the stations that have chart meters, the metering is often registered in single function fashion, with circuit current measured in Amps and transformer load measured in Kilowatts and Kilovars. The meter data that is most useful for planning and operating the system is provided in the form of Watts and Vars. Additionally, the panel space taken up by the charts can be reduced greatly with the installation of digital relays, which offer protection functions as well as metering functions.

Technological advances have led to multi-function, digital relays with the capability to meter accurately. The digital relays can transfer instantaneously metered values to EMS. Once there, the data is stored in the Historian, integrated, and the peak hourly values are calculated and transferred to the MDB with little human intervention.

A. Outdated Devices:

The following is a list of common metering methods used in CH substations along with the reason that they have been superseded:

- o Chart Meters: Graphic charts monitor single values such as MW, MVA_r, or circuit Amps. These charts rely on diligent maintenance practices to ensure that they function

as designed. Many of the charts run out of ink between maintenance cycles or fail mechanically, leaving "gaps" in data. Even the charts that record properly pose difficulty in capturing their data. The process of going to the substations to collect the charts, reviewing the charts and interpreting the data, and entering the data manually into the MDB is time consuming. Due to the cumbersome nature of the process, the charts are only interpreted for the annual system peaks, which leaves 2-4 data points in the MDB for that circuit or station element to use in planning.

- Other Local Indication Metering: Charts are not the only method of local metering. There are also substation Ammeters, Voltmeters, etc. that are remnants of a time when stations were manned and operated manually. Many of these devices are unsupported and have limited parts available.
- MV-90: An alternative method to metering by charts is to meter through MV-90. MV-90 is a system that uses a recorder to receive metered data directly from the instrument transformers and relies upon a dedicated telephone line to transmit that data to the master station collector; it is used for revenue metering as well as substation metering. Once the master has the data, it is transferred to the MDB. This method requires a dedicated line and the associated expenses.
- No Metering: Locations exist on the system where there are no methods of capturing load data. Some of these locations rely on grouped metering; they do not provide the granularity of individual circuit load data. At other locations, it hasn't been cost justified to install/repair any metering.
- Transducers: The transducers are wired directly to secondary AC quantities from current transformers and potential transformers. They convert the input quantities into an analog output signal, which is wired to the analog inputs of an RTU.
- Load checks: On a heavily loaded day, load checks are performed on circuits without automatic metering by having a worker physically go to a point on a circuit and manually perform a metering check.

B. Retrofit/Replacement Options:

- Digital Relays: Microprocessor-based relays not only offer protection functions; they provide metering capability as well in a compact footprint. The digital metering data provided by the digital relays is extremely accurate and has the ability to be entered into the MDB through Supervisory Control and Data Acquisition (SCADA) automatically once proper infrastructure is in place. The relays offer the ability to register numerous metering values simultaneously and in comm. format so that individual wires aren't needed for each metered point; rather, a single cable can be used to transmit multiple data points. Also, a separate phone line is not required for this method.
- Bitronics Power Meters: These meters provide bi-directional Watt and Var meter values as well as Volt and Amp values. They are capable of transmitting data through analog signal or through communication protocol to an RTU. They are cheaper alternatives, but do not provide any protection functions.

- Grid Sense: These are clip-on meters that report to a nearby data concentrator via radio. The data concentrator is linked to a POT's line outside of the station (no need for a Positron). The newest models provide directional Watt and Var metering, and they have the ability to report data in selectable time increments to the meter database. They represent a lower cost option and provide limited fault recording capabilities, but they do not provide protection functions.

Conclusions:

- ◆ Reading chart meters takes a great deal of time, and many of the charts are unsupported and are labor intensive to maintain. Data "gaps" exist when using chart meters, and the meters provide only a few, data points to the MDB each year, which need manual entry. The materials to repair and/or replace the charts are in short supply.
- ◆ Digital relays provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB with little human intervention.
- ◆ The AC quantities that the digital relays require for protection can be used for metering as well; therefore, there is no need for additional wiring from the instrument transformers to meters. Additionally, transducer equipment, which is susceptible to drift and requires regular maintenance, is no longer needed.
- ◆ The MV-90 system is a fully functional system, and it is an efficient method of collecting meter data in stations that do not have the relay and/or RTU capability to transmit data. MV-90 metering requires a dedicated phone line to transmit the meter data; this reoccurring expense can be eliminated with digital relaying and a proper RTU.
- ◆ Grid Sense meters can be installed relatively inexpensively and quickly to provide stopgap metering data until upgrades can be completed. They require a phone line and the monthly expenses associated with the line.

Eric A. Loeven

Appendix 1: Estimated Costs of Current Methods and Retrofit Options

| <u>Current Methods</u> | Time (Manhours) | | Cost |
|--|----------------------------|-----|----------------|
| | Field | Eng | TOTAL |
| MV-90 yearly (per station on average) | | | \$1,200 |
| Chart Meter maintenance & data retrieval | 1 | 10 | \$1,250 |

Note 1

Note 1: This cost is to retrieve the circular chart, review it, and enter it into the database. This process takes place on a suspected system peak day. At minimum, there are two times a year that this process is performed (Summer Peak and Winter Peak); however, there may be four or more times depending on when the actual peak occurs.

| <u>Retrofit Options</u> | Time | | | | Cost | | | TOTAL |
|--|--|-------|-------|-----|--------------|--|----------|-----------------|
| | Manhours | | | | Parts | Labor | | |
| | Tech | Elect | Draft | Eng | Device | Test Sw., Steel, etc. (w/OH) | | |
| Grid Sense Meter W / VAr | Hours are for the EOE and the Linemen. | | | | \$4,775 | | | \$5,700 |
| Data Concentrator 1 for every 4 ckt. | Per installation, each meter takes the lineman and the EOE 15 minutes to install. | | | | \$2,272 | | | \$2,700 |
| POT Line | Each data concentrator requires 20 minutes of lineman time and 15 minutes of EOE time. | | | | \$100 | | | \$110 |
| Labor (including travel time) per Station | Travel to each site has been assumed to be 1 hour. | | | | -waived- | | \$430 | \$430 |
| Site Registration per D/C | | | | | | | | |
| TOTAL GS Installation | | | | | | | | \$9,000 |
| Bitronics (Comm) | 40 | | 40 | 8 | \$2,000 | \$1,000 | \$11,400 | \$15,000 |
| Bitronics (HW-W/VAr/V) | 40 | | 40 | 12 | \$1,100 | \$1,000 | \$12,000 | \$14,500 |

Attachment 3

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-05

June 23, 2011

Mr. J.J. Borchert:

Re: Remote Terminal Unit Review

Introduction:

Real-time control and status feedback are vital components of a properly functioning substation. Without someone at the substation 24/7, a means of providing feedback and control operations is required; that means is a Remote Terminal Unit (RTU). This memo will describe the current state of the RTUs on the system, as well as the opportunity areas for retrofits and justification for the upgrades.

Discussion:

RTUs provide a means of transmitting important data in a substation to a master station via Supervisory Control and Data Acquisition (SCADA). The RTUs collect status and metering data and transmit it to a master station when polled. Also, they perform control operations that are initiated from the master station in a remote location. The RTUs can be dedicated line or dial-up depending on the application. RTUs have evolved with technology; existing CDC RTUs (protocol and provider) have been replaced with new flash ROM RTUs that utilize protocol suites including, but not limited to, CDC and the utility standard, DNP.

A. Outdated Devices:

- CDC 44-500 & CDC 88-90: These are different versions of dedicated line RTUs provided by CDC, a company that no longer exists. Retrofits have been performed to eliminate the CDC RTUs on the system because of the inability to get spare parts and due to their incompatibility with the digital relays. These RTUs utilize CDC protocol, which is an outdated protocol incapable of communicating with digital relays/data concentrators and is unable to receive digital metering data. They rely on analog signals and pulse accumulators sent from transducers to transmit meter information.
- G.E. M-4000: This is a smaller version of the G.E. Harris D20 RTU. It is used mainly in dial-up applications and is polled twice daily for SCADA data. It will report unsolicited if there is a change of status or if a metered point's dead band is exceeded. Based on the frequency that dial-up RTUs are polled, they cannot be used as sources to the meter database. Also, dial-up RTUs are not reliable because they rely on a plain old telephone (POT) line for communication. Due to this lack of reliability, control operations typically are not performed with dial-up RTUs. As a plus, the M-4000 has the capability to communicate through CDC or DNP protocol, and it also can be configured as a dedicated unit.

- G.E. D20: The functionality and hardware of this RTU are consistent with many modern RTUs; however, the configuration software is not user-friendly and uses a complicated, layered architecture. Additionally, with retiring technicians, the available workforce skilled in working with the configuration software is dwindling. This fact is of concern because emergency fixes will take longer to complete.

B. Retrofit/Replacement Options:

- Telvent Sage 2400¹: Telvent offers an RTU that fits into existing CDC RTU cabinets, and it has peripheral cards that resemble the CDC RTU cards. For these reasons, Telvent is the vendor of choice, providing the most seamless retrofit option. Telvent also offers a protocol suite for communications, including DNP and CDC. The DNP Master protocol allows direct communication with SEL-2020/2030/2032 data concentrators to transfer metering data from numerous digital relays in a substation.

C. Additional Considerations:

- Radio linked RTUs: As previously stated, the M-4000 can be polled as a dedicated RTU or as a dial-up unit. If there is a nearby, dedicated RTU, it is sometimes possible to install a radio link between the two stations and poll the M-4000 from the other station. In this configuration, there is access to real-time information and the ability to perform control operations at both stations. The need for the Positron Box at the radio-linked station is eliminated, and there is no extra cost incurred by installing a phone line and a Positron Box. The radio links require a clear line of site from one station to the next in order for the signal to be transmitted clearly. As such, the reliability of the circuits is largely dependent upon the terrain. Radio signals are also susceptible to interference from other mobile devices such as CB Radios.
- Positron Boxes: One major cost associated with RTUs, dedicated or dial-up, is the phone company's requirement of a Positron Box to isolate the outside phone line from the electric substation. This requirement is in place to provide a level of comfort for the phone company technician working in our substations, many of the existing stations have been allowed to function without this isolation in a grandfathered manner. However, any time that RTU retrofits are performed at these stations, the installation of a Positron Box is required. They are an expensive piece of equipment and have long lead times that may impact project schedules. There also is continued reliance on the phone company for maintenance and repairs.

¹ Telvent has been chosen as the preferred RTU for retrofits due to ease of configuration/use and the techs' familiarity with the units. All RTU cost estimates in this report are based on using this RTU.

Conclusions:

Upgrading old CDC, M-4000, and D-20 RTUs to Telvent RTUs provides the following benefits:

- ◆ Telvent RTUs are reliable and parts are available readily.
- ◆ The Telvent configuration software is user-friendly, making configuration and testing faster.
- ◆ DNP RTUs, of which Telvent is one, can receive communication-based metering & status and transmit it to the SCADA master.
- ◆ The Telvent RTU retrofits for the CDC 44-500's utilize the existing RTU cabinet and high powered tripping relays. The Telvent replaces the equipment susceptible to failure and makes use of the existing equipment that is less prone to failure.
- ◆ Using Telvent RTUs provides timesavings through standardization, and the engineers and technicians alike prefer to work with the Telvent for RTU retrofits.

Consideration also should be given to converting dialup RTUs to dedicated line RTUs. Dialup RTUs rely on POT lines, which have notoriously poor reliability; additional steps and equipment are required to perform the control operations safely. In contrast, dedicated line RTUs offer signal reliability, which provides the ability to perform control operations safely without added equipment and procedure steps.

Eric A. Loeven

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. D. J. Dittmann
Mr. J. M. May
S.R. #2011-06

June 23, 2011

Mr. J.J. Borchert

Re: Substation Recloser Review

Introduction:

Substation reclosers provide an alternate method of interrupting fault current on distribution and sub-transmission circuits. They are a convenient way to provide circuit protection in locations where it is not cost effective to install a circuit breaker and associated conduit to a control house. One disadvantage of using a recloser rather than a circuit breaker is that the recloser has reduced interrupting capability.

Recloser technology has advanced; hydraulic, oil-filled devices have given way to vacuum-interrupted, microprocessor-based (digital) recloser controls. This memo summarizes the existing substation recloser equipment, as well as replacement options. Also, this memo provides recommendations on the best retrofit options.

Discussion:

“An automatic circuit recloser is a self-contained device, which can sense and interrupt fault currents as well as reclose automatically in an attempt to re-energize a line.”* The existing hydraulic reclosers, a kin to electromechanical relays, have single component capability with limited flexibility in setting pickup curves, very little intelligence, and minimal ability to report feedback. New, digital recloser controls provide a wide range of pickup curves, are self-monitoring, grant instant notification of operations, offer desired metering capabilities, and require less frequent routine maintenance.

A. **Outdated Devices:**

Reclosers were installed in substations as a cost effective alternative to a distribution (15kV) or sub-transmission (34.5kV) circuit breaker combined with a reclosing relay. They can be single-phase or three-phase, be controlled mechanically (hydraulic) or digitally, and they have interrupting mediums of oil or vacuum. They make use of a series of fast and slow curves, providing coordination versatility and protection flexibility. A brief summary of the outdated reclosers on the CH system, specifically the hydraulically controlled type and the oil-interrupted type, is as follows:

- o Hydraulically controlled reclosers: These reclosers are self-contained and self-controlled; they have oil or vacuum interrupters. They are outdated due to their

* Page 124. Power Distribution Engineering: Fundamentals and Applications. James J. Burke. 1994.

C. Additional Considerations:

- Telemetric Interface: The Telemetric RTM II device can be installed to provide status and control of the SEL-651R DNP3 points. These data travel via cellular network and are displayed via a secure web interface. In addition, data travel to a SCADA Xchange server and then over frame relay to our SCADA system.
- R-Mag Circuit Breakers: As the most direct comparison to the substation recloser, these circuit breakers are a packaged breaker and relay combination. They are relatively inexpensive to install and there is familiarity with them by the techs, electricians, and engineers alike. These breakers provide a higher interrupting capability than the reclosers.

Conclusions:

Upgrading to vacuum interrupted, digitally controlled Viper reclosers provides the following benefits:

- ◆ Vacuum Interruption –
 - The speed of operation on these reclosers is not compromised by temperature.
 - The maintenance on these reclosers is not as labor-intensive as the oil-filled reclosers. They can operate up to 10,000 times before requiring an overhaul, with only the battery requiring simple in-field replacement in the meantime.
- ◆ Digital Control –
 - These recloser controls provide a wide range of pickup curves, which makes coordination easier and much more flexible than the hydraulically controlled reclosers.
 - These recloser controls offer digital metering capability and fault notification. The recloser can transmit its information through SCADA if the proper infrastructure is in place, or through Telemetric in stations with under-developed SCADA infrastructure.
 - These recloser controls can be interrogated to gather oscillography, targets, and phasor data from a remote location through a modem. This capability assists in timely and accurate fault analysis.

Some of the lower cost is lost when the recloser is installed in a substation if it is connected to the RTU in the control house, rather than through the Telemetric Unit. In this case, the added cost of conduit, steel work, and/or foundation needs to be considered. Regardless of the method of reporting to SCADA, installing the recloser in a substation comes with the added costs associated with technician time to commission and test the recloser and digital control over the cost of an installation on a distribution circuit.

Eric A. Loeven

Appendix 1: Estimated Costs of Retrofit Options

| Retrofit Options | Cost | | |
|---|----------|-----------|--------|
| | Parts | TOTAL | |
| Viper Reclosers with control relay and PT (on dist circuit) | \$21,000 | \$33,500 | Note 1 |
| Viper Reclosers with control relay (in a substation - Telemetric communication) | \$20,500 | \$33,000 | Note 1 |
| Viper Reclosers with control relay (in a substation - RTU communication) | \$20,500 | \$86,000* | Note 2 |
| R-Mag Breaker | \$25,000 | \$90,000 | |

Note 1: These represent one-time costs. There are additional annual costs for the SCADA Frame relay and the SCADA X-Change to Telemetric. The SCADA Frame Relay costs \$5200/yr. The SCADA X-Change to Telemetric costs \$2000/yr for 100 devices and \$1500 for each 50 devices after that.

Note 2: This cost is estimated based on proposed work to bring the data through the RTU. No installations exist at this time in this manner.

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|-------|----------|--|
| Accord | 4 | 361 Ckt. | Charts - kW | ----- | EM | NONE | ----- | Retired as part of P/MK Upgrade |
| Ancram | 13.8 | 7085 Ckt. | Grid Sense | ----- | EM | NONE | ----- | Only has a 13.8 Voltage Regulator |
| Balmville | | | | | EM | | | |
| Balmville | 4 | 411 Ckt. | MV-90 | ----- | EM | | | |
| Balmville | 4 | 412 Ckt. | MV-90 | ----- | | C-300 | | |
| Barnegat | | | | | | | | Metering source? |
| Barnegat | 115 | KB Line | Amps | EM | ----- | | | |
| Barnegat | 115 | KC Line | None | EM | ----- | | | |
| Barnegat | 115 | KB-749-KC BKR | | EM | ----- | | | |
| Barnegat | 115/13.8 | T1 | SCADA | ----- | | | | IBM Feeds |
| Barnegat | 115/13.8 | T2 | SCADA | ----- | | | | |
| Barnegat | 13.8 | S1 | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2 | SCADA | ----- | EM | | | |
| Barnegat | 13.8 | S1-706 BKR | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2-734 BKR | SCADA | ----- | EM | | | |
| Beacon | | | | | | D-20 | | |
| Beacon | 13.8 | 8006 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 13.8 | 8015 Ckt. | SCADA | ----- | EM | | | Previously 8087A? |
| Beacon | 4 | 801 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 802 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 803 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | W-414 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | W-463 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | Bus 1 | SCADA | ----- | | | | |
| Beacon | 4 | Bus 2 | SCADA | ----- | | | | |
| Beacon | 13.8/4 | T1 | SCADA | ----- | EM | | | |
| Beacon | 13.8/4 | T2 | SCADA | ----- | EM | | | MDB has an entry with T1+T2 calculated |
| Beacon | 13.8 | BF Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | NM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | CM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 1 | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 2 | SCADA | ----- | EM | | | |
| Bethlehem Rd. | | | | | | 2400 | | |
| Bethlehem Rd. | 13.8 | 4091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4092 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4093 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4094 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4095 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4096 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4097 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4098 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 1 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 2 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 115 | RD Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | UB Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | RD-604-UB BKR | | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T1 | EMS | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T2 | EMS | EM | ----- | | | Metering combined |
| Bethlehem Rd. | 13.8 | W-613 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-619 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-804 BKR | | | EM | | | |
| Bordman Rd. | | | | | | NONE | | |
| Bordman Rd. | 13.8 | 6081A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | 6082A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-203 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-204 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-205 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-206 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-207 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-208 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-209 Ckt. | | ----- | EM | | | |

720

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|---------------|--------------------|-------------|-------------|--------|----------|---|
| Boulevard | | | | | | 2100 | | |
| Boulevard | 69 | OB Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | I Line | SCADA | uP | ----- | ----- | ----- | Line Amps & WVAR |
| Boulevard | 13.8 | KO Line | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | KK Line | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1011 | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1012 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1013 | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1014 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 69 | Bus 1 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Bus 2 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Overall | ----- | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | Metering combined |
| Boulevard | 69/13.8 | T3 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Clinton Ave. | | | | | | M-4000 | | |
| Clinton Ave. | 4 | 395 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 396 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 397 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | Bus | SCADA | ----- | ----- | ----- | ----- | |
| Clinton Ave. | 13.8/4 | T1 | MV-90 | ----- | Fuse | ----- | ----- | |
| Cold Spring | | | | | | NONE | | |
| Cold Spring | 4 | 871 Ckt. | Charts - kW | ----- | EM | ----- | ----- | Install a Grid Sense Package for two (2) circuits. |
| Cold Spring | 4 | 872 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Coldenham | | | | | | D-20 | | |
| Coldenham | 13.8 | 4021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4026 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4027 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4028 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | B1-B2 Tie | ----- | ----- | EM | ----- | ----- | |
| Coldenham | 115 | J Line | SCADA | Gen 1 | ----- | ----- | ----- | 95P is DLP; 95BU is REL-301; part of replacement program already. |
| Coldenham | 115 | CW Line | SCADA | Gen 1 | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115 | J-19-CW BKR | ----- | SS | ----- | ----- | ----- | |
| Converse St. | | | | | | NONE | | |
| Converse St. | 4 | 121 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 122 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 123 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | | | | | | NONE | | |
| Conway Place | 4 | 881 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | 4 | 882 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Coxsackie | | | | | | 8890 | | |
| Coxsackie | 13.8 | 1071 Ckt. | Charts - Amps | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | 1072 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | 1074 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Coxsackie | 13.8 | 1076 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | Bus 1 (T1+G1) | SCADA | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | Bus 2 | ??? | ----- | EM | ----- | ----- | Metering data available through relay, but not configured. |
| Coxsackie | 69 | CN Line | None | uP | ----- | ----- | ----- | |
| Coxsackie | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | 95P is SEL-587 |
| Coxsackie | 69/13.8 | T1 | Charts - Amps | uP/EM | ----- | ----- | ----- | |
| Coxsackie | 13.8 | G1 | SCADA | ----- | ----- | ----- | ----- | |

721

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------------|--------------------|-----------------------|---------------|-------------|-------------|-------|----------|---|
| Danskammer | | | | | | 2100 | | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | AC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DB Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DR Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DW Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | RS Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | W - 323 BKR | ----- | SS | ----- | ----- | ----- | |
| Danskammer | 115 | North Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | Middle Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | South Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | DB-1171 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | DR-1421 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | DW-1061 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | T5&T6 | SCADA | EM | ----- | ----- | ----- | |
| Dashville | | | | | | 2300 | | |
| Dashville | 4 | 345 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single Phase; Vac; Hydr |
| Dashville | 6.6 | Bus | ----- | ----- | EM | ----- | ----- | |
| Dashville | | T1 | ----- | EM | ----- | ----- | ----- | Fused Transformer w/ CR 67 relay |
| Dashville | | G1-G2 | SCADA | ----- | ----- | ----- | ----- | |
| East Fishkill 345kV | | | | | | | | |
| East Fishkill 345kV | 345 | C9751 Breaker A1 BR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 345 | C9751 Breaker A2 BR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 1 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 2 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill | | | | | | 8890 | | |
| East Fishkill | 115 | EF Line | SCADA | uP* | ----- | ----- | ----- | 95P is MDAR; 95BU is Optimho - Replacing with 311C & D60. |
| East Fishkill | 115 | HF Line | SCADA | uP* | ----- | ----- | ----- | 95BU is Optimho - Replacing with D60. |
| East Fishkill | 115 | EF-672 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | EF-679 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | W-640 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | T1 | SCADA | see EFB | ----- | ----- | ----- | |
| East Kingston | | | | | | Orion | | |
| East Kingston | 13.8 | Bus 1 | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | Bus 2 | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1021 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1026 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1027 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1028 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 115 | ER Line | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115 | LR Line | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115 | LR-201-ER Breaker | ----- | uP | ----- | ----- | ----- | |
| East Kingston | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| East Kingston | 115/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| East Park | | | | | | 8890 | | |
| East Park | 13.8 | 6073 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6074 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6075 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| East Park | 69 | Q Line | None | EM | ----- | ----- | ----- | 95P is SEL-587 |
| East Park | 69/13.8 | T1 | SCADA | uP/EM | ----- | ----- | ----- | |

722

Electric Substation Upgrades Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|------------------|-------------|-------------|------|----------|--|
| East Walden | | | | | | 2400 | | |
| East Walden | | | | | EM/uP | | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5041 Ckt. | Grid Sense | ----- | EM/uP | | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5042 Ckt. | Grid Sense | ----- | EM | | | GS not working |
| East Walden | 13.8 | 5043 Ckt. | Grid Sense | ----- | | | | Com |
| East Walden | 13.8 | Com Equipment | | ----- | uP | | | |
| East Walden | 13.8 | B1 | SCADA | | | | | 95P is DLP; part of replacement program already. |
| East Walden | 115 | CW Line | None | Gen1/uP | | | | |
| East Walden | 115 | CW-712 | ----- | EM | | | | |
| East Walden | 115 | D Line | None | EM | | | | |
| East Walden | 115 | D-722 BKR | ----- | EM | | | | |
| East Walden | 115 | DW Line | SCADA | | uP | | | |
| East Walden | 115 | DW-1071 BKR | ----- | uP | | | | |
| East Walden | 115 | EM Line | SCADA | | uP | | | |
| East Walden | 115 | EM-642 BKR | ----- | uP | | | | |
| East Walden | 69 | WM Line | SCADA | | uP | | | Amps & Volts |
| East Walden | 115 | W-644 | ----- | EM | | | | |
| East Walden | 115 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| East Walden | 115 | B2 | ----- | EM | | | | 95P is SEL-587 |
| East Walden | 69/13.8 | T1 | SCADA | | uP/EM | | | 95BU is SEL-587 |
| East Walden | 69/13.8 | T3 | SCADA | | EM/uP | | | |
| Fishkill Plains | | | | | | D-20 | | |
| Fishkill Plains | 13.8 | 8091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Fishkill Plains | 13.8 | 8092 Ckt. | MV-90 | ----- | EM | | | |
| Fishkill Plains | 13.8 | 8093 Ckt. | SCADA | | uP- 200 | | | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8094 Ckt. | SCADA | | uP- 200 | | | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8095 Ckt. | SCADA | | uP | | | |
| Fishkill Plains | 13.8 | 8096 Ckt. | SCADA | | uP | | | |
| Fishkill Plains | 115 | HF Line | SCADA | uP/Gen 1 | | | | 95BU is Optimho; part of replacement program. |
| Fishkill Plains | 115 | HF-703 BKR | ----- | EM | | | | |
| Fishkill Plains | 115 | NF Line | None | EM | | | | |
| Fishkill Plains | 115 | A Line | SCADA | | uP | | | |
| Fishkill Plains | 115 | A-1036-FP | ----- | uP- 200 | | | | 279/2BFR relays |
| Fishkill Plains | 115 | A-1498 | ----- | uP- 200 | | | | 279/2BFR relays |
| Fishkill Plains | 115 | Com Equipment | ----- | | | | | Com |
| Fishkill Plains | 115 | FP Line | SCADA | uP/Gen 1 | | | | 95P is DLP; part of replacement program already; 95BU is SEL-321 |
| Fishkill Plains | 115 | B1 | SCADA | | EM | | | |
| Fishkill Plains | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Fishkill Plains | 13.8 | B2 | ----- | EM | | | | |
| Fishkill Plains | 115/13.8 | T1 | SCADA | | EM/uP | | | 95BU is SEL-587; metering is combined. |
| Fishkill Plains | 115/13.8 | T2 | ----- | EM/uP | | | | |
| Forgebrook | | | | | | 2300 | | |
| Forgebrook | 13.8 | Bus #1 | | ----- | EM | | | |
| Forgebrook | 13.8 | Bus #2 | Charts - kW/kVAr | ----- | EM | | | |
| Forgebrook | 13.8 | 8011 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8012 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8013 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8014 Ckt. | Charts - kW | ----- | uP/EM | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8015 Ckt. | Charts - kW | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8016 Ckt. | Charts - kW | ----- | EM | | | No Chart Data |
| Forgebrook | 115 | Com Equipment | ----- | | | | | Com |
| Forgebrook | 115 | FO Line | None | EM | | | | |
| Forgebrook | 115 | FO-1430-FT | ----- | EM | | | | |
| Forgebrook | 115 | FT Line | None | EM | | | | |
| Forgebrook | 115 | FT-1432 | ----- | EM | | | | |
| Forgebrook | 115 | FT-882-WF | ----- | EM | | | | |
| Forgebrook | 115 | WF Line | SCADA | | uP | | | |
| Forgebrook | 13.8 | CM Line | None | ----- | EM | | | Amps |
| Forgebrook | 13.8 | BF Line | SCADA | | EM | | | |
| Forgebrook | 13.8 | W-1486 | ----- | EM | | | | |
| Forgebrook | 13.8 | W-994 | ----- | EM | | | | |
| Forgebrook | 115/13.8 | T1 | SCADA | | EM | | | Metering combined |
| Forgebrook | 115/13.8 | T2 | ----- | EM | | | | |

723

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|------------------|-------------|-------------|---------------------------|----------|--|
| Freehold | | | | | | M-4000 | | |
| Freehold | 13.8 | 2061 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | 2071 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | W-1155 BKR | ----- | ----- | ----- | ----- | PR-560M | 3 phase; oil; electronic |
| Freehold | 13.8 | T1 | Charts - kW/kVAr | fuse | ----- | ----- | ----- | |
| Freehold | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | |
| Galeville | | | | | | Orion | | |
| Galeville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5030 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5031 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5032 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5033 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5034 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5035 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Galeville | 69 | MG Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69 | MG-200-MK BKR | ----- | uP | ----- | ----- | ----- | |
| Galeville | 69 | MK Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| Greenfield Rd. | | | | | | M-4000 | | |
| Greenfield Rd. | 13.8 | 3076 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 13.8 | 3078 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 4 | 375-376 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 4 | 377-378 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | W-1608 | ----- | ----- | EM | ----- | ES | 3 phase; oil; electronic |
| Greenfield Rd. | 13.8/4 | T2 | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Greenfield Rd. | 4 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Greenfield Rd. | 4 | B3 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Greenfield Rd. | 4 | B3 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Grimley Rd. | | | | | | NONE-Soon to have DNP RTU | | |
| Grimley Rd. | 4 | 385 Ckt. | Grid Sense | ----- | EM | ----- | Kyle L | Single Phase; Oil; Electronic |
| Grimley Rd. | 4 | 386 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| Hibernia | | | | | | Micro 1C | | |
| Hibernia | 13.8 | 7011 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | 7012 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 69/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | | | | | | D-20 | | |
| High Falls | 13.8 | 3021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 69 | HK Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 69 | HK-696-P BKR. | ----- | ----- | uP- 200 | ----- | ----- | SEL-279 |
| High Falls | 69 | P Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 13.8 | W-998 BKR. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | B1 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | B2 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |
| High Falls | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |

724

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|--------------------|----------|-------------|-------------|--------|----------|---|
| Highland | | | | | | 2300 | | |
| Highland | | | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5081 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5082 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5083 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | 5084 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | 5085 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 115 | HR Line | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | OR Line | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | OR-761-HR BKR. | ---- | EM | ---- | ---- | ---- | |
| Highland | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | |
| Highland | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Highland | 115/13.8 | T1 | SCADA | uP/EM | ---- | ---- | ---- | 95BU is SEL-587 |
| Highland | 115/13.8 | T2 | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | | | | | | D-20 | | |
| Honk Falls | 13.8 | 3071 Ckt. | SCADA | ---- | EM | ---- | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | 3072 Ckt. | SCADA | ---- | EM | ---- | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | B1 | SCADA | EM | ---- | ---- | ---- | |
| Honk Falls | 69 | GM Line | SCADA | EM/uP | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | HG Line | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | 69 | HK Line | SCADA | uP/EM | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | MK Line | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | 69 | WH Line | SCADA | uP/EM | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | overall diff B1+T1 | SCADA | EM | ---- | ---- | ---- | |
| Honk Falls | 69/13.8 | T1 | ---- | fuse | ---- | ---- | ---- | |
| Hunter | | | | | | M-4000 | | |
| Hunter | 34.5 | Z-666 | | | | | VR-3S | 3 phase; vac; hyd |
| Hunter | 13.8 | 2081 Ckt. | MV-90 | ---- | ---- | ---- | Kyle W | 3 phase; oil; hyd |
| Hunter | 13.8 | Cap Bank | ---- | ---- | EM | ---- | ---- | |
| Hurley Ave. 345kV | | | | | | 2400 | | |
| Hurley Ave. 345kV | 345 | 30151 BKR. | ---- | EM | ---- | ---- | ---- | 79 Relay is EM |
| Hurley Ave. 345kV | 345 | 30151 A1 BF | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30152 A2 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 301 Line A1 | SCADA | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 301 Line A2 | SCADA | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30353 BKR. | ---- | EM* | ---- | ---- | ---- | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30353 A1 BF | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30353 A2 BF | ---- | EM* | ---- | ---- | ---- | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 30354 BKR. | ---- | EM* | ---- | ---- | ---- | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30354 A1 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30354 A2 BF | ---- | EM* | ---- | ---- | ---- | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 303 Line A1 | SCADA | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 303 Line A2 | SCADA | EM* | ---- | ---- | ---- | In process replacement with GE D90 |
| Hurley Ave. 345kV | 345 | Bus A1 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | Bus A2 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 BKR. | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 A1 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 A2 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A1 Out of Step | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A2 Out of Step | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A1 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A2 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | T1 LS | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | B1 | SCADA | ---- | ---- | ---- | ---- | Volts |

725

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------|--------------------|---------------|----------------------|-------------|-------------|--------|----------|---|
| Hurley Ave. | | | | | | 2400 | | |
| Hurley Ave. | | | | | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2091 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2092 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2093 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2094 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 115 | Cap Bank | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | HP Line | SCADA | EM | ---- | | | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 69 | I Line | SCADA | Gen1 | ---- | | | |
| Hurley Ave. | 115 | OR Line | SCADA | EM | ---- | | | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 69 | SB Line | SCADA | Gen1 | ---- | | | |
| Hurley Ave. | 115 | HP-1643 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | OR-1640 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 69 | W-142 BKR. | ---- | uP | ---- | | | |
| Hurley Ave. | 13.8 | W-1575 BKR. | ---- | EM | EM | | | |
| Hurley Ave. | 115 | W-389 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | B1 | None | EM | ---- | | | |
| Hurley Ave. | 115 | B2 | SCADA | EM | ---- | | | Volts |
| Hurley Ave. | 69 | B1 | SCADA | EM | ---- | | | Volts |
| Hurley Ave. | 13.8 | B1 | SCADA | ---- | EM | | | Volts |
| Hurley Ave. | 115/69 | T3 | SCADA | EM | ---- | | | |
| Hurley Ave. | 115/13.8 | T4 | SCADA | EM | ---- | | | |
| Hurley Ave. | 69/13.8 | T5 | ---- | EM | ---- | | | |
| Inwood Ave. | | | | | | 3030 | | |
| Inwood Ave. | 13.8 | 6061 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6062 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6063 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6064 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6065 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6066 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6067 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6068 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Inwood Ave. | 115 | IR Line | SCADA | uP | ---- | | | |
| Inwood Ave. | 115 | IR-201-X BKR. | ---- | uP | ---- | | | |
| Inwood Ave. | 115 | X Line | SCADA | uP | ---- | | | |
| Inwood Ave. | 13.8 | B1 | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | B2 | SCADA | ---- | uP | | | |
| Inwood Ave. | 115/13.8 | T1 | SCADA | uP | ---- | | | |
| Inwood Ave. | 115/13.8 | T2 | SCADA | uP | ---- | | | |
| Jansen Ave. | | | | | | M-4000 | | |
| Jansen Ave. | 13.8 | 1001 Ckt. | MV-90 | ---- | uP | | | |
| Jansen Ave. | 13.8 | 1002 Ckt. | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | 1003 Ckt. | MV-90 | ---- | uP | | | |
| Jansen Ave. | 13.8 | 1004 Ckt. | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | KL Line | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | KO Line | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | B1 | SCADA | ---- | EM | | | |
| Jansen Ave. | 13.8 | B2 | SCADA | ---- | EM | | | |
| Jansen Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Jansen Ave. | 13.8 | T - Grounding | MV-90 | ---- | uP | | | |
| Kerhonkson | | | | | | 8890 | | |
| Kerhonkson | 13.8 | 3081 Ckt. | Grid Sense | ---- | EM | | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 13.8 | 3082 Ckt. | Grid Sense | ---- | EM | | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 69 | MK-929 MOS | ---- | EM | ---- | | | |
| Kerhonkson | 69 | MK-930 MOS | ---- | EM | ---- | | | |
| Kerhonkson | 69/13.8 | T1 | Charts - kW/kVar IGS | fuse | ---- | | | Amps for each Transformer |
| Kerhonkson | 69/13.8 | T2 | | fuse | ---- | | | Volts & Amps |
| Kerhonkson | 69 | HK | SCADA | ---- | ---- | | | Volts & Amps |
| Kerhonkson | 69 | MK | SCADA | ---- | ---- | | | Volts & Amps |

726

Electric Substation Upy. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-----------------|------------------------|-------------|-------------|--------|----------|--------------------------------------|
| Knapps Corners | | | | | | 2100 | | |
| Knapps Corners | | | Charts - Amps/SCADA | | uP | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8021 Ckt. | Charts - Amps | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8022 Ckt. | Charts - Amps | | uP/EM | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8023 Ckt. | Charts - Amps/SCADA | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8024 Ckt. | Charts - kW | | EM | | | |
| Knapps Corners | 13.8 | 8025 Ckt. | Charts - kW | | | | | Com |
| Knapps Corners | 13.8 | Com Equipment | | | | | | |
| Knapps Corners | 115 | KB Line | None | EM | | | | SEL-279 |
| Knapps Corners | 115 | KB-1558-MC BKR. | | uP-200 | | | | |
| Knapps Corners | 115 | SK Line | SCADA | | uP | | | Amps |
| Knapps Corners | 13.8 | KN Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KR Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KS Line | SCADA* | EM | | | | |
| Knapps Corners | 69 | KM Line | SCADA | uP | | | | |
| Knapps Corners | 69 | TR Line | SCADA | EM | | | | |
| Knapps Corners | 69 | G Line | SCADA | uP | | | | |
| Knapps Corners | 13.8 | W-1215 BKR. | | | EM | | | |
| Knapps Corners | 69 | W-1409 BKR. | | | uP | | | |
| Knapps Corners | 13.8 | W-1462 BKR. | | | EM | | | |
| Knapps Corners | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Knapps Corners | 13.8 | B2 | | | EM | | | |
| Knapps Corners | 13.8 | B3 | | | EM | | | |
| Knapps Corners | 69 | 69k Bus | SCADA | EM | | | | Volts |
| Knapps Corners | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Knapps Corners | 115/13.8 | T3 | | EM | | | | |
| Knapps Corners | 115/69 | T2 | | SCADA | uP | | | |
| Lawrenceville | | | | | | M-4000 | | |
| Lawrenceville | 34.5 | 2385 Ckt. | Grid Sense | EM/uP | | | CXE-400A | 3 phase; oil; hyd |
| Lawrenceville | 34.5 | B1 | SCADA* | | | | | Volts |
| Lawrenceville | 69/34.5 | T1 | MV90/Grid Sense/SCADA | EM | | | | Amps. |
| Lincoln Park | | | | | | 2300 | | |
| Lincoln Park | 13.8 | Com Equipment | | | | | | Com |
| Lincoln Park | 13.8 | 2011 Ckt. | Charts - Amps | | EM | | | |
| Lincoln Park | 13.8 | 2012 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2013 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2014 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2015 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2016 Ckt. | Charts - kW | | EM/uP* | | | GE F60 installed HiZ pilot |
| Lincoln Park | 13.8 | 2017 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2018 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 1 | | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 2 | | | EM | | | |
| Lincoln Park | 115 | HP Line | None | EM | | | | Relay Replacement Program in process |
| Lincoln Park | 115 | HP-1318 BKR. | | EM | | | | |
| Lincoln Park | 13.8 | KL Line | Charts - kW/kVar/SCADA | EM | | | | Amps to SCADA |
| Lincoln Park | 115 | LR-1219-HP BKR. | | EM | | | | |
| Lincoln Park | 115 | LR Line | SCADA | uP | | | | |
| Lincoln Park | 13.8 | W-1321 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-45 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-534 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-554 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-206 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-207 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-525 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-528 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Lincoln Park | 13.8 | B2 | | | EM | | | |
| Lincoln Park | 13.8 | B3 | | SCADA | | EM |  |  | Volts |
| Lincoln Park | 13.8 | B4 | None | | EM | | | Volts |
| Lincoln Park | 115 | 115k bus | SCADA | | EM | | | Volts |
| Lincoln Park | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Lincoln Park | 115/13.8 | T2 | | EM | | | | |
| Lincoln Park | 115/13.8 | T3 | | SCADA | EM | | | |

727

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|--------|----------|---|
| Manchester | | | | | | 2400 | | |
| Manchester | | | | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6091 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6092 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6093 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6094 Ckt. | MV-90 | | EM/uP | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6095 Ckt. | MV-90 | | EM | | | |
| Manchester | 13.8 | 6096 Ckt. | MV-90 | | EM | | | |
| Manchester | 13.8 | 6097 Ckt. | MV-90 | | | | | Com |
| Manchester | 13.8 | Com Equipment | | | | | | 95BU is REL-301; part of replacement program. |
| Manchester | 115 | M Line | None | EM/Gen-1 | | | | |
| Manchester | 115 | MC Line | SCADA | uP | | | | Amps |
| Manchester | 13.8 | MS Line | SCADA* | | EM | | | |
| Manchester | 13.8 | W-1456 BKR. | | | EM | | | |
| Manchester | 13.8 | W-650 BKR. | | | EM | | | |
| Manchester | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Manchester | 13.8 | B2 | | | EM | | | |
| Manchester | 115/13.8 | T1 | SCADA | | EM | | | Combine load value |
| Manchester | 115/13.8 | T2 | | EM | | | | |
| Marlboro | | | | | | 8890 | | ???? |
| Marlboro | 13.8 | 5001 Ckt. | SCADA | | EM/uP | | | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5002 Ckt. | SCADA | | EM/uP | | | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5003 Ckt. | SCADA | | EM/uP | | | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5004 Ckt. | SCADA | | uP | | | |
| Marlboro | 13.8 | Com Equipment | | | | | | Com |
| Marlboro | 13.8 | B1 | SCADA | | uP | | | Volts |
| Marlboro | 115/13.8 | T1 | SCADA | uP/EM* | | | | 95P is SEL-587 |
| Marlboro | 115/13.8 | T2 | SCADA | uP | | | | |
| Maryland Ave. | | | | | | M-4000 | | |
| Maryland Ave. | 4 | 621 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 4 | 622 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 4 | 623 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 4 | 624 Ckt. | Charts - kW | | EM | | | |
| Maryland Ave. | 13.8 | MS Line | | | EM | | | |
| Maryland Ave. | 13.8 | PH-284 BKR. | | | EM | | | |
| Maryland Ave. | 13.8 | PH-286 BKR. | | | EM | | | |
| Maryland Ave. | 4 | W-1032 BKR. | | | EM | | | |
| Maryland Ave. | 4 | W-1033 BKR. | | | EM | | | |
| Maryland Ave. | 4 | W-1034 BKR. | | | EM | | | |
| Maryland Ave. | 13.8 | B1 | SCADA | | EM | | | Volts |
| Maryland Ave. | 13.8 | B2 | SCADA | | EM | | | Volts |
| Maryland Ave. | 4 | B1 | | | EM | | | |
| Maryland Ave. | 4 | B2 | SCADA | | EM | | | Volts |
| Maryland Ave. | 13.8/4 | T1 | | | EM | | | |
| Maryland Ave. | 13.8/4 | T2 | | | EM | | | |
| Maybrook | | | | | | M-4000 | | |
| Maybrook | 13.8 | 5051 Ckt. | MV-90 | | EM | | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | 5052 Ckt. | MV-90 | | uP | | | Previously 5081-83? |
| Maybrook | 13.8 | 5053 Ckt. | MV-90 | | EM | | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | B1 | SCADA | | | | | Volts |
| Maybrook | 13.8 | B2 | SCADA | | | | | Volts |
| Maybrook | 69/13.8 | T1 | None | | | | | |
| Maybrook | 69/13.8 | T2 | None | | | | | |
| McKinley St. | | | | | | NONE | | |
| McKinley St. | 4 | 845 Ckt. | MV-90 | | EM | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|----------------|-------------|-------------|-------------|-------|----------|--------------------------------------|
| Merritt Park | | | | | | BM | | |
| Merritt Park | 13.8 | 8061 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8062 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8063 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8064 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8065 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8066 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8067 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8068 Ckt. | SCADA | | uP | | | Com |
| Merritt Park | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | |
| Merritt Park | 115 | WF Line | SCADA | | uP | | | |
| Merritt Park | 115 | WP Line | SCADA | | uP | | | SEL-279 |
| Merritt Park | 115 | WF-439-WP BKR. | ----- | uP-200 | | | | |
| Merritt Park | 13.8 | B1 | SCADA | | uP | | | |
| Merritt Park | 13.8 | B2 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T1 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T2 | SCADA | | uP | | | |
| Milan | | | | | | BM | | |
| Milan | 13.8 | 7061 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | 7062 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Milan | 115 | B-4561 Ckt Sw | ----- | uP | | | | |
| Milan | 115 | MR Line | SCADA | | uP | | | |
| Milan | 115 | MR-501 BKR. | SCADA | | uP | | | |
| Milan | 115 | RT-7 BKR. | ----- | uP | | | | |
| Milan | 115 | R-10 BKR. | ----- | uP | | | | |
| Milan | 115 | T-7 Line | SCADA | | uP | | | |
| Milan | 115 | 10 Line | SCADA | | uP | | | |
| Milan | 115 | B1 | SCADA | | uP | | | |
| Milan | 13.8 | B1 | SCADA | | uP | | | |
| Milan | 115/13.8 | T1 | SCADA | | uP | | | |
| Millerton | | | | | | L&N | | |
| Millerton | 13.8 | 7081 Ckt. | SCADA | | | | | |
| Millerton | 69 | GE-823 MOS | ----- | | EM | | | |
| Millerton | 69/13.8 | T1 | SCADA | | EM | | | Only one feeder; T1 = 7081 load |
| Millerton | 69 | Line to SMI | SCADA | | | | | Volts |
| Millerton | 69 | Line to PUL | SCADA | | | | | Volts |
| Modena 115kV | | | | | | BM | | |
| Modena 115kV | 13.8 | B1 | SCADA | | uP | | | |
| Modena 115kV | 13.8 | C-1651 BKR. | ----- | | uP | | | |
| Modena 115kV | 13.8 | 5011 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5012 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5013 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Modena 115kV | 115 | EM Line | SCADA | | uP | | | |
| Modena 115kV | 115 | EM-201-PX BKR. | ----- | | uP | | | |
| Modena 115kV | 115 | PX Line | SCADA | | uP | | | |
| Modena 115kV | 115/13.8 | T3 | SCADA | | uP | | | Only has one 13.8 bus; T3 = Bus load |
| Modena 69kV | | | | | | 8890 | | volts |
| Modena 69kV | 69 | B1 | SCADA | | EM | | | |
| Modena 69kV | 69 | MG Line | SCADA | | uP | | | |
| Modena 69kV | 69 | W-941 BKR. | ----- | | EM | | | |
| Modena 69kV | 69 | MG-380 BKR. | ----- | | EM | | | |
| Modena 69kV | 115/69 | T1 | SCADA | | EM/uP | | | GE F35 is installed |
| Modena 69kV | 69/13.8 | T2 | None | | Fuse/uP | | | |
| Montgomery | | | | | | NONE | | |
| Montgomery | 4 | 571 Ckt. | Charts - kW | | | | V4L | Single phase; Vac; Hyd |
| Montgomery | 4 | 572 Ckt. | Charts - kW | | | | V4L | Single phase; Vac; Hyd |

729

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|--------------------|-------------|-------------|--------|----------|--------------------------------|
| Montgomery St. | | | | | | M-4000 | | |
| Montgomery St. | | | | | | | | volts |
| Montgomery St. | 13.8 | B1 | SCADA | EM | EM | | | Volts |
| Montgomery St. | 13.8 | B2 | SCADA | EM | EM | | | volts |
| Montgomery St. | 13.8 | B3 | SCADA | EM | EM | | | |
| Montgomery St. | 13.8 | B Line | None | EM | EM | | | |
| Montgomery St. | 13.8 | 4001 Ckt. | Charts - kW/kVAr | EM | EM | | | |
| Montgomery St. | 13.8 | 4002 Ckt. | Charts - kW/kVAr | EM | EM | | | |
| Montgomery St. | 13.8 | 4003 Ckt. | Charts - kW/kVAr | EM | EM | | | |
| Montgomery St. | 4 | 401 Ckt. | Charts - kW demand | EM | EM | | | |
| Montgomery St. | 4 | 402-3 Ckt. | Charts - kW demand | EM | EM | | | |
| Montgomery St. | 4 | 404 Ckt. | Charts - kW demand | EM | EM | | | |
| Montgomery St. | 4 | 406A/B Ckt. | Charts - kW demand | EM | EM | | | |
| Montgomery St. | 4 | 407A/B Ckt. | Charts - kW demand | EM | EM | | | |
| Montgomery St. | 4 | 410A/B Ckt. | Charts - kW demand | EM | EM | | | |
| Montgomery St. | 4 | B1 | SCADA | EM | EM | | | Volts |
| Montgomery St. | 4 | B2 | SCADA | EM | EM | | | volts |
| Montgomery St. | 13.8 | F Line | None | EM | EM | | | |
| Montgomery St. | 13.8 | NB Line | None | EM | EM | | | |
| Montgomery St. | 13.8 | NM Line | None | EM | EM | | | |
| Montgomery St. | 13.8 | R Line | None | EM | EM | | | |
| Montgomery St. | 13.8 | W-507 BKR. | | EM | EM | | | |
| Montgomery St. | 13.8 | W-508 BKR. | | EM | EM | | | |
| Montgomery St. | 13.8 | W-509 BKR. | | EM | EM | | | |
| Montgomery St. | 13.8 | WN Line | None | EM | EM | | | |
| Montgomery St. | 13.8/4 | T1 | | EM | EM | | | |
| Montgomery St. | 13.8/4 | T2 | Charts - kW/kVAr | EM | EM | | | Combine load value |
| Myers Corners | | | | | | 44-550 | | |
| Myers Corners | 13.8 | 8041 Ckt. | Charts - kW | EM | uP | | | |
| Myers Corners | 13.8 | 8043 Ckt. | Charts - kW | EM | EM | | | |
| Myers Corners | 13.8 | 8044 Ckt. | Charts - kW | EM | EM | | | |
| Myers Corners | 13.8 | 8045 Ckt. | Charts - kW | EM | EM | | | |
| Myers Corners | 13.8 | 8046 Ckt. | SCADA | EM | uP | | | |
| Myers Corners | 69 | KM Line | None | EM | | | | |
| Myers Corners | 69 | TV Line | None | EM | | | | |
| Myers Corners | 69 | TV-399-KM BKR. | | EM | | | | |
| Myers Corners | 13.8 | W-63 BKR. | | EM | | | | |
| Myers Corners | 13.8 | W-66 BKR. | | EM | | | | |
| Myers Corners | 13.8 | Feeder M1-75 | | EM | | | | |
| Myers Corners | 13.8 | Feeder M2-76 | | EM | | | | |
| Myers Corners | 13.8 | Feeder M3-91 | | EM | | | | |
| Myers Corners | 13.8 | Feeder M4-90 | | EM | | | | |
| Myers Corners | 13.8 | B1 | | EM | | | | |
| Myers Corners | 13.8 | B2 | SCADA | EM | EM | | | Combine Bus Volts to one point |
| Myers Corners | 69/13.8 | T1 | | EM | | | | |
| Myers Corners | 69/13.8 | T2 | SCADA | EM | | | | Combine load value |
| Neversink | | | | | | 2200 | | |
| Neversink | 4 | 391 Ckt. | Charts - kW | EM | EM | | | |
| Neversink | 13.8 | 3091 Ckt. | Grid Sense | EM | EM | | Kyle W | 3 phase; Oil; Hyd |
| Neversink | 69 | HG Line | SCADA* | EM | | | | Amps |
| Neversink | 69 | WH Line | SCADA* | EM | | | | Amps |
| Neversink | 4 | W-1128 BKR. | | EM | | | | |
| Neversink | 69 | 69k Bus | SCADA | uP/EM | | | | Volts |
| New Baltimore | | | | | | 2300 | | |
| New Baltimore | 13.8 | 1081 Ckt. | SCADA* | EM | EM | | | kW |
| New Baltimore | 13.8 | 1082 Ckt. | SCADA* | EM | EM | | | kW |
| New Baltimore | 13.8 | 1083 Ckt. | SCADA* | EM | EM | | | kW |
| New Baltimore | 69 | Cap Bank | | EM/uP | | | | Com |
| New Baltimore | 13.8 | Com Equipment | | | | | | |
| New Baltimore | 69 | CN Line | None | uP | | | | |
| New Baltimore | 69 | NW Line | None | uP | | | | |
| New Baltimore | 13.8 | B1 | SCADA | EM | EM | | | Volts |
| New Baltimore | 69/13.8 | T1 | SCADA | EM/uP | | | | 95P is SEL-587 |

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|--------------------|------------------|-------------|-------------|------|----------|------------------------|
| | | | | | | NONE | | No DATA |
| New Windsor | | | Grid Sense | ---- | EM | ---- | ---- | No DATA |
| New Windsor | 4 | 461 Ckt. | Grid Sense | ---- | EM | ---- | ---- | No DATA |
| New Windsor | 4 | 462 Ckt. | Grid Sense | ---- | EM | ---- | ---- | No DATA |
| New Windsor | 4 | 463 Ckt. | Grid Sense | ---- | EM | ---- | ---- | No DATA |
| New Windsor | 4 | 464 Ckt. | Grid Sense | ---- | uP | ---- | ---- | |
| New Windsor | 13.8 | UN & UW ATC | None | ---- | uP | ---- | ---- | Combine load value |
| New Windsor | 13.8/4 | T1 | Charts - kW/kVAr | ---- | uP | ---- | ---- | |
| New Windsor | 13.8/4 | T2 | | ---- | uP | ---- | ---- | |
| North Catskill | | | SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251 |
| North Catskill | 13.8 | 2001A Ckt. | SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251 |
| North Catskill | 13.8 | 2002A Ckt. | SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251 |
| North Catskill | 13.8 | 2003A Ckt. | SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251 |
| North Catskill | 13.8 | 2004 Ckt. | SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251 |
| North Catskill | 13.8 | 2005 Ckt. | SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251 |
| North Catskill | 13.8 | 2006 Ckt. | SCADA | ---- | uP- 200/ uP | ---- | ---- | Com |
| North Catskill | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| North Catskill | 115 | 2 Line | SCADA | EM | ---- | ---- | ---- | |
| North Catskill | 115 | R-2 BKR. | ---- | EM | ---- | ---- | ---- | |
| North Catskill | 115 | RT-7 BKR. | ---- | EM | ---- | ---- | ---- | Amps |
| North Catskill | 115 | T-7 Line | SCADA* | EM | ---- | ---- | ---- | |
| North Catskill | 69 | Cap Bank | ---- | EM | ---- | ---- | ---- | |
| North Catskill | 69 | CL Line | SCADA | uP | ---- | ---- | ---- | |
| North Catskill | 69 | H Line | SCADA | uP | ---- | ---- | ---- | |
| North Catskill | 69 | NC Line | SCADA | uP | ---- | ---- | ---- | |
| North Catskill | 69 | W-1107 BKR. | ---- | EM/uP* | ---- | ---- | ---- | check on TD-5 |
| North Catskill | 69 | W-269 BKR. | ---- | EM/uP* | ---- | ---- | ---- | check on TD-5 |
| North Catskill | 69 | W-791 BKR. | ---- | uP- 200 | ---- | ---- | ---- | SEL-2BFR |
| North Catskill | 115 | W-269 & W-1107 BKR | ---- | EM | ---- | ---- | ---- | IJS |
| North Catskill | 69 | B1 | SCADA | EM | ---- | ---- | ---- | Volts |
| North Catskill | 115 | B1 | SCADA | EM/uP | ---- | ---- | ---- | Volts |
| North Catskill | 69 | B2 | SCADA | EM/uP | ---- | ---- | ---- | Volts |
| North Catskill | 13.8 | B1 | SCADA | ---- | EM/uP | ---- | ---- | Volts: 95BU is DFP-100 |
| North Catskill | 13.8 | B2 | SCADA | ---- | EM/uP | ---- | ---- | Volts: 95BU is DFP-100 |
| North Catskill | 115/69 | T4 | SCADA | EM/uP* | ---- | ---- | ---- | Check on 64 relay |
| North Catskill | 115/69 | T5 | SCADA | EM/uP* | ---- | ---- | ---- | Check on 64 relay |
| North Catskill | 115/13.8 | T6 | SCADA | EM/uP | ---- | ---- | ---- | 95BU is DFP-100 |
| North Catskill | 115/13.8 | T7 | SCADA | EM/uP | ---- | ---- | ---- | 95BU is DFP-100 |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|---------------|-------------|-------------|-------|----------|-----------------------|
| North Chelsea | | | | | | BM | | |
| North Chelsea | | | | | | | | |
| North Chelsea | 13.8 | 8051 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8052 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8053 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8054 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8055 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8056 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8057 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | 8058 Ckt. | SCADA | ..... | uP | ..... | ..... | Com |
| North Chelsea | 13.8 | Com Equipment | ..... | ..... | ..... | ..... | ..... |  |
| North Chelsea | 115 | AC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | AC-1066 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | DC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | DC-1414 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | FO-1482 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | FO Line | SCADA | uP | ..... | ..... | ..... | 95P is LCB-II |
| North Chelsea | 115 | NF Line | SCADA | uP | ..... | ..... | ..... | 95P is LCB-II |
| North Chelsea | 115 | NF-1116 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | SC Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | SC-1566 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 69 | TV Line | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2651 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2652 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B-2653 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | W-1572 BKR. | ..... | uP | ..... | ..... | ..... |  |
| North Chelsea | 115 | B1 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 13.8 | B1 | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 13.8 | B2 | SCADA | ..... | uP | ..... | ..... |  |
| North Chelsea | 115/69 | T1 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115/13.8 | T2 | SCADA | uP | ..... | ..... | ..... |  |
| North Chelsea | 115/13.8 | T3 | SCADA | uP | ..... | ..... | ..... | Volts |
| Ohioville | | | | | | 2100 | | |
| Ohioville | 13.8 | 5021 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5022 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5023 Ckt. | Charts - Amps | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5024 Ckt. | Charts - kW | ..... | EM/uP | ..... | ..... | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5025 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| Ohioville | 13.8 | Com Equipment | ..... | ..... | ..... | ..... | ..... | Com |
| Ohioville | 115 | Cap Bank | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 69 | O Line | None | uP | ..... | ..... | ..... |  |
| Ohioville | 69 | OB Line | None | uP | ..... | ..... | ..... |  |
| Ohioville | 115 | OR Line | None | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | OR-1075 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | PX Line | SCADA | EM/uP | ..... | ..... | ..... |  |
| Ohioville | 115 | PX - 1659 BKR. | ..... | uP | ..... | ..... | ..... |  |
| Ohioville | 69 | W - 1511 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 13.8 | W - 1537 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 13.8 | W - 1600 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Ohioville | 115 | B1 | SCADA | EM | ..... | ..... | ..... | Volts |
| Ohioville | 69 | 69k Bus | SCADA | EM | ..... | ..... | ..... | Volts |
| Ohioville | 13.8 | B1 | None | ..... | EM | ..... | ..... |  |
| Ohioville | 13.8 | B2 | None | ..... | EM | ..... | ..... |  |
| Ohioville | 115/13.8 | T1 | SCADA | EM | ..... | ..... | ..... | Combine load value |
| Ohioville | 115/13.8 | T2 | SCADA | EM | ..... | ..... | ..... | 95BU is SEL-251 |
| Ohioville | 115/69 | T3 | SCADA | EM/uP-200 | ..... | ..... | ..... |  |

732

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|----------|-------------|-------------|------|----------|--------------------------------------|
| | | | | | | 2300 | | Grid owns Line |
| Pleasant Valley | | | SCADA** | uP | | | | |
| Pleasant Valley | 115 | 8 Line | SCADA | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 10 Line | SCADA** | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 12 Line | SCADA** | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 13 Line | SCADA** | uP | | | | 95BU is Optimho; in replacement plan |
| Pleasant Valley | 115 | C Line | SCADA | EM/Gen-1 | | | | |
| Pleasant Valley | 115 | M Line | SCADA | EM | | | | |
| Pleasant Valley | 115 | X Line | SCADA | uP | | | | Com |
| Pleasant Valley | 115 | Com Equipment | | | | | | SEL-279 |
| Pleasant Valley | 115 | R-12 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-13 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-8 BKR. | | uP-200 | | | | |
| Pleasant Valley | 115 | RC-6 BKR. | | EM | | | | |
| Pleasant Valley | 115 | RM BKR. | | EM | | | | |
| Pleasant Valley | 115 | RX-4 BKR. | | uP | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-61 BKR. | SCADA** | EM | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-62 BKR. | SCADA** | EM | | | | |
| Pleasant Valley | 115 | R-643 BKR. | | EM | | | | |
| Pleasant Valley | 115 | R-81 BKR. | | EM | | | | |
| Pleasant Valley | 115 | B1 | SCADA | EM | | | | Volts |
| Pleasant Valley | 115 | B2 | SCADA | EM | | | | Volts |
| Pleasant Valley | 69 | E Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | G Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | Q Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | B1 | SCADA | uP | | | | Volts |
| Pleasant Valley | 13.8 | W-387 | | | EM | | | |
| Pleasant Valley | 345/115 | S1 | SCADA | | | | | Con Ed owns bank and protection |
| Pleasant Valley | 115/69 | T10 | SCADA | EM | | | | |
| Pulvers Corners | | | | | | D-20 | | |
| Pulvers Corners | 13.8 | 7091 Ckt. | SCADA | | EM | | V4L | single phase; vac; hyd |
| Pulvers Corners | 13.8 | 7092 Ckt. | SCADA | | EM | | Kyle L | single phase; oil; hyd |
| Pulvers Corners | 34.5 | 7395 Ckt. | SCADA | EM | | | RVE | 3 phase; oil; hyd |
| Pulvers Corners | 13.8 | Com Equipment | | | | | | Com |
| Pulvers Corners | 69 | Cap Bank | | EM | | | | |
| Pulvers Corners | 69 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 34.5 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 13.8 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 69/13.8 | T1 | SCADA | Fuse | | | | |
| Pulvers Corners | 69/34.5 | T2 | None | EM/uP | | | | 95P is SR-745 |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|-------------------|-------------|-------------|------|----------|---------------------------------|
| Reynolds Hill | | | | | | 2100 | | |
| Reynolds Hill | 13.8 | 6001 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Reynolds Hill | 13.8 | 6004 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | 6005 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Reynolds Hill | 13.8 | 6008 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | ----- | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Reynolds Hill | 115 | DR-1418 BKR. | ---- | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | DR Line | SCADA | ---- | ---- | ---- | ---- | |
| Reynolds Hill | 115 | HR-1285 BKR. | ---- | EM | ---- | ---- | ---- | |
| Reynolds Hill | 115 | HR Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 115 | IR Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | B Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | W Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PD Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PH Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PK Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PO Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PQ Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PS Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PU Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 115 | T-31 BKR. | ---- | EM | ---- | ---- | ---- | |
| Reynolds Hill | 115 | B1 | SCADA | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 115 | B2 | SCADA | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 13.8 | B1 | SCADA | ---- | EM/uP | ---- | ---- | 95BU is SEL-501 |
| Reynolds Hill | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | Volts |
| Reynolds Hill | 13.8 | B3 | SCADA | ---- | uP | ---- | ---- | Volts |
| Reynolds Hill | 115 | W-1543 BKR. | ---- | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 115/13.8 | T3 | SCADA | EM/uP | ---- | ---- | ---- | 95P is SEL-351A |
| Reynolds Hill | 115/13.8 | T4 | SCADA | EM/uP | ---- | ---- | ---- | 95P is SEL-351A |
| Rhinebeck | | | | | | 2300 | | |
| Rhinebeck | 13.8 | 7051 Ckt. | Charts - kW/SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | 13.8 | 7052 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7053 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7054 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7055 Ckt. | Charts - kW | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Rhinebeck | 13.8 | 7056 Ckt. | SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | ----- | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Rhinebeck | 69 | Cap Bank | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 115 | ER Line | SCADA* | uP | ---- | ---- | ---- | Amps |
| Rhinebeck | 115 | LR-830-MR BKR. | ---- | uP | ---- | ---- | ---- | |
| Rhinebeck | 115 | MR Line | None | uP | ---- | ---- | ---- | |
| Rhinebeck | 69 | Q-1471 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-1017 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-1238 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 69 | W-258 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-367 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 69 | Q Line | SCADA* | ---- | EM | ---- | ---- | Volts |
| Rhinebeck | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | B2 | none | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Rhinebeck | 69 | 69kV Bus | SCADA | ---- | EM | ---- | ---- | Volts |
| Rhinebeck | 69/13.8 | T1 | SCADA* | EM | ---- | ---- | ---- | Amps & Volts |
| Rhinebeck | 69/13.8 | T2 | SCADA* | EM | ---- | ---- | ---- | Amps & Volts |
| Rhinebeck | 115/13.8 | T4 | SCADA | EM | ---- | ---- | ---- | |
| Rhinebeck | 115/69 | T3 | SCADA | EM | ---- | ---- | ---- | |

734

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|---------------|----------|-------------|-------------|------|----------|----------------|
| | | | | | | 2100 | | |
| Rock Tavern 345kV | | | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 311 Line A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 311 Line A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 3456 BKR. | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 3456 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 3456 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Cap Bank 1 A1 | SCADA* | EM | ---- | | | Combined MVArS |
| Rock Tavern 345kV | 345 | Cap Bank 1 A2 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A1 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A2 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 34 Line A1 | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 34 Line A2 | | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 37751 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 37751 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 37751 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 37752 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 37752 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 37752 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 377 Line A1 | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 377 Line A2 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 4255 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 4255 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 4255 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 42 Line A1 | ---- | SS | ---- | | | |
| Rock Tavern 345kV | 345 | 42 Line A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 346 | C3351 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3351 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3351 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3352 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3352 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3352 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3353 BKR. | ---- | UP-200 | ---- | | | |
| Rock Tavern 345kV | 345 | C3353 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | C3353 BF A2 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 31153 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 31153 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 31153 BF A2 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 31154 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 31154 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 31154 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Com Equipment | ---- | ---- | ---- | | | Com |
| Rock Tavern 345kV | 345 | B1 A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | B1 A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | B2 A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | B2 A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345/115 | T1 A1 | SCADA | EM | ---- | | | |
| Rock Tavern 345kV | 345/115 | T1 A2 | | UP | ---- | | | |
| Rock Tavern 345kV | 345/115 | T3 A1 | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345/115 | T3 A2 | | UP | ---- | | | |

735

Electric Substation Up. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-----------------|-------------|-------------|-------------|-------|----------|--------------------------------|
| | | | | | | 2400 | | |
| Sand Dock | | | | | | | | |
| Sand Dock | 13.8 | 6011 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | BP-1296 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | BP-1570 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 1 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 2 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 3 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | GB Line | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 115 | KC-1447-SC BKR. | ---- | EM | ---- | ---- | ---- | |
| Sand Dock | 115 | KC Line | None | EM | ---- | ---- | ---- | |
| Sand Dock | 115 | SC Line | None | UP | ---- | ---- | ---- | |
| Sand Dock | 13.8 | SH-886 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | SH-911 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-902 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-909 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-910 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-116 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1449 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1453 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1467 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 115 | B1 | SCADA | ---- | ---- | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 115 | B4 | SCADA | ---- | ---- | ---- | ---- | |
| Sand Dock | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 13.8 | B2 | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | B4 | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Sand Dock | 13.8 | T3 | SCADA | EM | ---- | ---- | ---- | |
| Sand Dock | 13.8 | T4 | SCADA | EM | ---- | ---- | ---- | |
| Saugerties | | | | | | Orion | | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-------------------|-------------|-------------|-------------|------|----------|--------------------------------------|
| Shenandoah | | | | | | 2400 | | |
| Shenandoah | 115 | East Bus | SCADA | EM | ---- | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 115 | West Bus | | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B2 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B4 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B5 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B6 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B7 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B8 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 1 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 2 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 3 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 4 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 5 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 6 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B-4451 BKR. (CB1) | ---- | ---- | UP | ---- | ---- | |
| Shenandoah | 13.8 | 8071 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | 8072 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 115 | EF Line | None | uP/Gen-1 | ---- | ---- | ---- | 95BU is Optimho; in replacement plan |
| Shenandoah | 115 | FS Line | None | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | EF-1514 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-739 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-892-EF BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-959 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S1 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S2 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S3 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S4 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S5 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S6 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S7 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S8 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S9 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S10 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S11 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S12 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S13 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S14 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S15 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 115/13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T2 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T3 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T4 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T5 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T6 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T7 | SCADA | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | W-1266 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1279 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1450 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1593 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-664 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-665 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-802 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-803 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-805 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-807 BKR. | ---- | ---- | EM | ---- | ---- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------------|--------------------|------------------|----------|-------------|-------------|--------|----------|---|
| Rock Tavern 115kV | | | | | | 44-550 | | |
| Rock Tavern 115kV | 115 | B1 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | B2 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | 115-0.48kV SST | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | Com Equipment |  | ..... | ..... | ..... | ..... | Com |
| Rock Tavern 115kV | 115 | D Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | D-448 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | J Line | SCADA* | GEN-1/EM | ..... | ..... | ..... | 95P is a DLP; identified in replacement program; Amps |
| Rock Tavern 115kV | 115 | J-788 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RD Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RD-809 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RJ Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RJ-818 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL Line | SCADA | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL-684 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-467 BKR. | ..... | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-681 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-814 BKR. | ..... | EM/UP | ..... | ..... | ..... | SEL-351 |
| Rock Tavern 115kV | 115 | WM Line | none | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115/69 | T2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | | | | | | 2100 | | |
| Roseton Switchyard | 345 | 30356 (B6) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A2 | SCADA | EM/UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31151 (B1) BKR | ..... | EM | ..... | ..... | ..... | SEL-501 for DBC |
| Roseton Switchyard | 345 | 31152 (B1) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B1) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B2 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U1 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U2 | SCADA | EM | ..... | ..... | ..... |  |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|-------------------|-------------|-------------|-------|----------|---|
| Smith Street | | | | | | 2300 | | Radio to INW |
| Smith Street | 4 | 631 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 632 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 633 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 4 | 634 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | MS Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | PQ Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | PS Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | W Line | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Volts |
| Smith Street | 13.8 | B2 | SCADA | ---- | EM | ---- | ---- | Volts |
| Smith Street | 4 | B1 | SCADA | ---- | uP | ---- | ---- | Volts |
| Smith Street | 4 | B2 | SCADA | ---- | uP | ---- | ---- | Volts |
| Smith Street | 13.8/4 | T1 | None | ---- | EM | ---- | ---- | |
| Smith Street | 13.8/4 | T2 | None | ---- | EM | ---- | ---- | |
| Smithfield | | | | | | 8890 | | |
| Smithfield | 13.8 | 7095 Ckt. | SCADA | ---- | uP | ---- | ---- | Com |
| Smithfield | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | 95P is SEL-267 |
| Smithfield | 69 | E Line | None | uP- 200/uP | ---- | ---- | ---- | 95P is SEL-267; Volts & Amps |
| Smithfield | 69 | FV Line | SCADA* | uP- 200/uP | ---- | ---- | ---- | Amps |
| Smithfield | 69 | GE Line | SCADA* | EM | ---- | ---- | ---- | Amps |
| Smithfield | 69 | S Line | SCADA* | EM | ---- | ---- | ---- | Volts & Amps |
| Smithfield | 69 | SA Line | SCADA* | EM | ---- | ---- | ---- | Volts |
| Smithfield | 69 | B2 | SCADA | ---- | ---- | ---- | ---- | Volts |
| Smithfield | 69 | B3 | SCADA | ---- | ---- | ---- | ---- | Volts |
| Smithfield | 69/13.8 | T1 | None* | ---- | ---- | ---- | ---- | Only one feeder; T1 = 7095 load |
| South Cairo | | | | | | 8890 | | |
| South Cairo | 13.8 | 2041 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2042 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2043 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| South Cairo | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| South Cairo | 69 | CF Line | None | EM/uP | ---- | ---- | ---- | 79 done with NLR |
| South Cairo | 69 | CL Line | None | uP | ---- | ---- | ---- | |
| South Cairo | 13.8 | B1+G1 | Charts - kW/SCADA | ---- | EM | ---- | ---- | SCADA Volts |
| South Cairo | 69/13.8 | T1 | Charts - Amps | EM/uP | ---- | ---- | ---- | 95P is SEL-587 |
| South Wall St. | | | | | | None | | |
| South Wall St. | 4 | 111 Ckt. | Grid Sense | ---- | EM | ---- | Kyle L | Single Phase; Oil; Hyd |
| South Wall St. | 4 | 112 Ckt. | Grid Sense | ---- | EM | ---- | Kyle L | Single Phase; Oil; Hyd; missing GS data |
| South Wall St. | 13.8/4 | T1 | Charts - kW/kVAr | ---- | EM | ---- | ---- | |
| Spackenkil | | | | | | Orion | | |
| Spackenkil | 13.8 | 6041 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6042 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6043 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6044 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6045 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6046 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6047 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | 6048 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Spackenkil | 13.8 | KR Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | KS Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | MC Line | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | MC-200-SK BKR. | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | B1 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 115/13.8 | T1 | SCADA | ---- | uP | ---- | ---- | |
| Spackenkil | 115/13.8 | T2 | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | | | | | | BM | | |
| Staatsburg | 13.8 | 7041 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | 7042 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | 7043 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Staatsburg | 13.8 | B1 | SCADA | ---- | uP | ---- | ---- | |
| Staatsburg | 69/13.8 | T1 | SCADA | uP | ---- | ---- | ---- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-------------------|------------------|-------------|-------------|--------|----------|--------------------------------------|
| Standfordville | | | | | | M-4000 | | |
| Standfordville | 13.8 | 7071 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single phase; vac; hyd |
| Standfordville | 13.8 | 7072 Ckt. | MV-90 | ----- | EM | ----- | ----- | Volts |
| Standfordville | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Standfordville | 69/13.8 | T1 | MV-90 | Fuse | ----- | ----- | ----- | |
| Sturgeon Pool | | | | | | 2100 | | |
| Sturgeon Pool | 4 | 341 Ckt. | Grid Sense | ----- | EM | ----- | Kyle W | 3 phase; oil; hyd; missing data |
| Sturgeon Pool | 4 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Sturgeon Pool | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | O Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | P Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | 69k Bus | SCADA | EM | ----- | ----- | ----- | Volts |
| Sturgeon Pool | 69/13.8 | T5 | None | Fuse | ----- | ----- | ----- | |
| Sugarloaf | | | | | | 44-500 | | |
| Sugarloaf | 115 | SD Line | SCADA | EM | ----- | ----- | ----- | Combine load value |
| Sugarloaf | 115 | SJ Line | SCADA | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | SL Line | None | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| Sugarloaf | 115/69 | O & R Transformer | SCADA | EM | ----- | ----- | ----- | |
| Tinkertown | | | | | | 2300 | | Radio to PVL |
| Tinkertown | 13.8 | 7022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Tinkertown | 69/13.8 | T1 | SCADA | Fuse | ----- | ----- | ----- | |
| Tinkertown | 69/13.8 | T2 | SCADA | Fuse | ----- | ----- | ----- | |
| Tioronda | | | | | | M-4000 | | |
| Tioronda | 13.8 | 8085 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8086 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8087 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 115 | W-566 Ckt. Sw | ----- | EM | ----- | ----- | ----- | Agastat |
| Tioronda | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Tioronda | 115/13.8 | T1 | Charts - kW/kVAr | EM | ----- | ----- | ----- | |
| Todd Hill | | | | | | 2200 | | |
| Todd Hill | 13.8 | 6051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6055 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6056 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6057 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Todd Hill | 115 | A Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 115 | A-520-C BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | C Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 13.8 | W - 524 BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Todd Hill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is SEL-351A; Volts |
| Todd Hill | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Todd Hill | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95P is SEL-587 |
| Todd Hill | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |

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Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|----------------|-------------|-------------|--------|----------|--------------------------------|
| Union Ave | | | | | | 2200 | | Volts |
| Union Ave | 115 | B1 | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | RJ Line | SCADA | EM | ----- | ----- | ----- | SEL-351A for BF |
| Union Ave | 115 | RJ-52 BKR. | ----- | EM/uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB Line | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB-51 BKR. | ----- | uP | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UN Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UW Line | SCADA* | EM | ----- | ----- | ----- | |
| Union Ave | 115 | W-1095 BKR. | ----- | EM | ----- | ----- | ----- | |
| Union Ave | 13.8 | B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B3 | SCADA | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B4 | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B3-B2 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B4-B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4041 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4042 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4043 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4044 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4045 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4046 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4047 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4055 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Union Ave | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T2 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T3 | SCADA | uP | ----- | ----- | ----- | |
| Van Wagner | | | | | | NONE | | |
| Van Wagner | 4 | 731 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Van Wagner | 4 | 732 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Vinegar Hill | | | | | | M-4000 | | |
| Vinegar Hill | 34.5 | 2389 Ckt. | MV-90 | ----- | uP | ----- | RVE | 3 phase; oil; hyd |
| West Balmville | | | | | | 2300 | | |
| West Balmville | 115 | B2 | SCADA | EM | ----- | ----- | ----- | Volts |
| West Balmville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Combine Bus Volts to one point |
| West Balmville | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | B Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 13.8 | 4011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | 4012 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4013 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4014 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4015 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| West Balmville | 115 | DB Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DB-875 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DW Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DW-662 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | F Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | R Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | W-478 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | W-855 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | WN Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | | T1 | SCADA | EM | ----- | ----- | ----- | Combine load value |
| West Balmville | | T2 | | EM | ----- | ----- | ----- | |

741

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|--------------------|----------|-------------|-------------|--------|----------|--------------------------------------|
| Westerlo | | | | | | BM | | |
| Westerlo | 13.8 | 1091 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1092 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1093 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Only has one 13.8 bus; T1 = Bus load |
| Westerlo | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | Cap Bank | ----- | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | NW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW-1500-NW BKR. | ----- | uP | ----- | ----- | ----- | |
| Wiccopee | | | | | | L&N | | |
| Wiccopee | 115 | FS Line | None | EM | ----- | ----- | ----- | |
| Wiccopee | 115 | WP Line | None | uP | ----- | ----- | ----- | |
| Wiccopee | 115 | FS - 1652- WP BKR. | ----- | EM | ----- | ----- | ----- | |
| Wiccopee | 13.8 | F1-292 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | F2-280 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-368 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-378 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-632 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-636 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #3) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #9) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B1 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B2 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Wiccopee | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Wiccopee | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Woodstock | | | | | | M-4000 | | |
| Woodstock | 13.8 | 3011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3012 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3013 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3014 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 13.8 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 69/13.8 | T2+SR Line | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 + B2 | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T1 | MV-90 | ----- | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 | MV-90 | ----- | ----- | ----- | ----- | |

Attachment 6

| | Station | Cost |
|------|-----------------|-------------|
| 2012 | Dashville | \$190,000 |
| | East Walden | \$610,000 |
| | Tioronda | \$200,000 |
| 2013 | Coxsackie | \$130,000 |
| | South Cairo | \$160,000 |
| | East Park | \$200,000 |
| | Pleasant Valley | \$360,000 |
| | Todd Hill | \$160,000 |
| 2014 | Sand Dock | \$510,000 |
| | Fishkill Plains | \$480,000 |
| | South Wall St. | \$84,000 |
| 2015 | Manchester | \$340,000 |
| | Forgebrook | \$730,000 |
| 2016 | Rock Tavern | \$1,060,000 |
| | | |
| Subs | | |
| | | |
| | | |

Preliminary
Copy

743

Submission Date: April 11, 2023
Submitted By: Brett Arteta

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Pleasant Valley 115 kV Modernization

Work Order #: 0 7 9 0 - H

Budget Group: Electric

Budget Category: 13

Funding Project Number: 1-1312-98-19

Is this a Specific Project, Program or Blanket?

Specific

Target Schedule - Start: 1/1/2020

In-Service: 12/1/2028

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Much of the equipment at the Pleasant Valley 115 kV Substation has been identified for replacement on the following original programs that have been combined into a single project: Breaker Replacement Program, 115 kV Disconnect Replacement Program, and the ESP Infrastructure Replacement Program.

Describe specific scope exclusions, assumptions and constraints:

The various programs above have been combined into one 115 kV substation modernization project. Two 115 kV circuit breakers will be replaced along with Bus #1 and Bus #2 relays and all associated electromagnetic breaker relays. Twelve 115 kV Disconnect Switches will be replaced on Bus #1 and Bus #2. Lastly, the redundant North Bus will be retired.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

Risk of equipment failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|-------------|----------------|------------------|--------------|
| \$5,965,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 530,100 | 43,100 | 0 | 0 | 0 | 54,000 | 433,000 | 0 |
| | Labor (Monthly Payroll) | 264,550 | 21,550 | 0 | 0 | 0 | 27,000 | 216,000 | 0 |
| | Stock Materials | 264,550 | 21,550 | 0 | 0 | 0 | 27,000 | 216,000 | 0 |
| | Non-Stock Material (A/P taxable) | 1,060,200 | 86,200 | 0 | 0 | 0 | 108,000 | 866,000 | 0 |
| | Contractors (A/P tax exempt) | 372,170 | 30,170 | 0 | 0 | 0 | 38,000 | 304,000 | 0 |
| | Overheads | 2,650,500 | 215,500 | 0 | 0 | 0 | 271,000 | 2,164,000 | 0 |
| | AFUDC* | 158,930 | 12,930 | 0 | 0 | 0 | 16,000 | 130,000 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 5,301,000 | 431,000 | 0 | 0 | 0 | 541,000 | 4,329,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 99,150 | 150 | 0 | 0 | 0 | 16,000 | 83,000 | 0 |
| | Labor (Monthly Payroll) | 199,300 | 300 | 0 | 0 | 0 | 33,000 | 166,000 | 0 |
| | Contractors (A/P tax exempt) | 34,050 | 50 | 0 | 0 | 0 | 6,000 | 28,000 | 0 |
| | Overheads | 331,500 | 500 | 0 | 0 | 0 | 54,000 | 277,000 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 664,000 | 1,000 | 0 | 0 | 0 | 109,000 | 554,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | | |

2021-2023 2024
 Prior years funding;
 not actuals.

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 4,175,500 Maximum (\$): 7,754,500

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

No explanation on confidence level required.

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

1. Relays - The relays protect the electric transmission and distribution systems and can provide oscillography, targets, and phasor data. Electric System Protection (ESP) uses the relays to gather information on faults, including fault characteristics, fault locations, and phasor data. ESP interprets the oscillography data and then communicates our conclusions to: System Operations as an information point of contact; 2) Customer Services (Line Forces) to aid in fault locating and thereby limiting patrol time and area; 3) Operations Services for cases where there may be equipment issues.
2. Meters - The meters provide AC system quantities that are used to operate safely and to plan effectively for future system needs. The Electric Planning & Reliability area uses meter information for day-to-day operations (e.g., switching) and to aid in identifying and addressing locations requiring system reinforcements. System Operations (Sys Ops) uses meter data to monitor and operate the CH transmission system within the ratings of those facilities.
3. Controls and Communications - The RTUs, PLCs, and data concentrators provide status feedback and remote control capability; they also act as a conduit for meter and relay data. Sys Ops relies on the data provided by the RTUs and PLCs to monitor the status of the system from a centralized location, enabling them to respond quickly to system abnormalities. Also, Sys Ops has the ability to perform control operations through the RTUs and PLCs.

Equipment and Functions:

A variety of equipment exists in Central Hudson substations, including protective relays, meters, reclosers, and controls and communications instruments such as Remote Terminal Units (RTUs) and Programmable Logic Controllers (PLCs). Each of these components serves an integral role in contribution to the overall, integrated substation protection, control, and monitoring function. Various departments rely on information from these devices in order to perform their jobs, including Operations Services, Customer Services, line forces, Electric Transmission Planning, Distribution Planning, System Operations, Energy Accounting, and Electric System Protection. Brief summaries of these components are included in **Attachments I through 4**. The intention of this memo is to identify the concerns with continuing to use the identified outdated equipment, detail the benefits of combining functions when replacing equipment, establishing a policy for substation relaying, control, & monitoring functions, and laying out a plan to incorporate these components into a comprehensive substation renovation program.

I. Introduction:

Re: Substation Relays, Meters, Controls and Communications Infrastructure Opportunities

Mr. J.J. Borchert

June 24, 2011

Copy to:

Mr. P.E. Haering
 Mr. H.W. Turner
 Mr. P. Harpols

Mr. J. M. May
 Mr. D. J. Wittmann
 S.R. #2011-07

Waste Reduction:

New equipment can be utilized in an integrated fashion to eliminate or minimize the following tasks and unnecessary equipment (Excerpts are taken from the attached memos):

- Reading chart meters and manually entering data into the Meter Database (MDB).
 - Chart meters cost CH at least \$275,000 annually in labor expense (1130 man-hours), which can be devoted to other work.
- MV-90 circuits not for revenue or interchange metering purposes.
 - MV-90 circuits from Verizon cost CH approximately \$24,000 annually in expense.
- Running fault studies manually to determine fault locations.
 - Manual fault locating costs CH approximately \$15,000 annually in labor expenses.
- Metering transducers, auxiliary relays, timing relays, reclosing relays, and coil monitors.

Supporting the Future State:

New equipment, properly implemented and integrated, will better support current functions and create flexibility for added future functions as follows:

- Provide continuous metering data for the entire system, eliminating information “gaps” as a result of non-continuous and non-contiguous metering.
- Provide for robust planning capabilities and switching operations through use of trending and real-time data.
- Enable more accurate forecasting of area loads to increase risk tolerance, possibly resulting in deferral of substation and distribution projects.
- Offer flexibility for Distribution Automation and Smart Grid initiatives.
- Improve reliability and reduce CAIDI through automated event reporting and fault location.

II. Current State:

This section describes the mix of equipment by component, system wide, and the limitations of the non-digital devices.

1. Relays

There are 3500 active protection relays on the system, excluding LORs, SPRs, Regulator Controls, Recloser Controls, and Communication equipment.

Attachment 1

Copy to: Mr. P.E. Haering
Mr. H.W. Turner

Mr. P. Harpolis
Mr. J. M. May
S.R. #2011-03

June 23, 2011

Mr. J.J. Borchert

Re: Transmission & Distribution Protective Relay Review

Introduction:

Protective Relays represent a vital component for the reliable operation of the Central Hudson Electric Transmission and Distribution Systems. CH substations contain a generational mix of protective relay equipment that differs in capability, ease of use, and reliability. Relay technology has advanced; microprocessor-based (digital) relays not only offer numerous protection functions, but they provide metering capability as well in a compact footprint. This memo summarizes the existing transmission and distribution protective relay equipment, as well as recommendation for replacement options.

Discussion:

Relays perform various functions aimed at timely isolation of faulted areas and rapid restoration once the fault has been cleared. Some of the functions that relays provide include zone distance protection, high-speed pilot protection, overcurrent protection, differential protection, and automatic reclosing.

A. Outdated Devices:

The majority of substations contain a group of single-component electromechanical relays for each protected facility; these relays are responsible for protection functions exclusively. At these locations, metering is performed separately, also often in a single-function fashion. There are also stations that have more recent (but still outdated) types of relays, including solid state and early microprocessor relays. These relays have been failing recently, and a replacement program was created last year to address the concern with these relays. The following is a list (in order of decreasing replacement priority) of common relay types found in substations along with the reason that they have been superseded:

- Electromechanical Relays: These relays are obsolete for the reasons previously described (i.e.; physical size, calibration drift, single-function capabilities, etc).
- Solid State Relays: Like electromechanical relays, the relays on the CH system typically are single function. They have advanced technologically past the electromechanical relays, but not quite to the level of digital relays. They monitor current and voltage waveforms through analog circuits, which then are compared through potentiometers to user defined settings. They generally are unsupported, spare parts are hard to locate, and they contain components that deteriorate over time.

- 1st Generation Microprocessor Relays: Please see the 2010 Budget Memo, **Re: Relay Replacement Program for Upgrade of 1st Generation Microprocessor Relays Remaining on the Central Hudson System**, dated July 1, 2010, for the existing program.
- Schweitzer Engineering Laboratories (SEL) 200 Series Relays (SEL-251/ 267/ 279/ 2BFR): These relays are digital, but they make use of early logic processing methods, in which creating settings isn't as user-friendly as in modern digital relays. SEL has discontinued manufacturing parts for most of these relays, and limited service is provided with them.
- Basler BE1-79M Relays: These relays are multi-shot reclosing relays; they only provide the reclosing function. There are more recently developed relays that provide numerous protection functions and also perform reclosing operations and metering functions.
- Basler BE1-851 (H) Relays: These relays are multifunction, digital relays; however, they only receive current inputs. So, the only meter data available is Amps. Multifunction relays exist that receive current and voltage inputs and provide MW & MVA_r data as well as a much larger variety of protection options.

B. Retrofit/Replacement Options:

Digital relays offer multiple protection functions as well as metering and substation equipment diagnostics. The use of multifunction digital relays greatly reduces the required panel space. Also, with few moving parts, digital relays do not need recalibration to remain accurate. Additionally, digital relays and digital relay controls offer the ability to have longer durations between maintenance cycles due to the combination of their internal error checking and their constantly monitored alarm outputs to SCADA.

Digital relays can be specified to offer equipment diagnostics for the devices they protect. For example, digital transformer relays have the ability to monitor the through-fault history of the transformers and to make determinations on the required maintenance as a result. The same case is true for feeder breakers protected by distribution relays.

- Digital Relays: A collection of proven products exists by a variety of manufacturers. These relays are microprocessor-based, multi-function relays that provide a large variety of protection, metering, and equipment diagnostic capability; they can be used for various protective functions. Some manufactures include SEL, GE, and Basler*. Electric System Design (ESD) has standardized the design to use SEL as primary protection and either GE or Basler relays for backup protection.

* Basler provides a BE1-951 relay, which conveniently fits into electromechanical relay panel cutouts.

memo.

Full integration requires a DNP compatible Remote Terminal Unit described in the "RTU Review"

Eric A. Loeven

- ◆ They have lower maintenance costs because they rarely fail and allow for an increased maintenance cycle (i.e. an increase of 50%; from 4 yrs. to 6 yrs.).
 - ◆ They provide oscillography, targets, and phasor data that can be accessed from a remote location through a modem. This capability assists in timely and accurate fault analysis.
 - ◆ They have a proven track record of good quality and high availability, along with excellent manufacturer support for current models.
 - ◆ The diagnostic capabilities of digital relays should be used to help in the condition assessment of substation equipment.
 - ◆ They provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB/eDNA with little human intervention.
 - ◆ They offer a more compact footprint and much more capability than their large, single-function predecessors.
- Upgrading to digital relays provides the following benefits:

Conclusions:

- Time Synchronization Devices: Various devices exist on the market that provides a means of time synchronization, including satellite clocks. These clocks provide a unified signal based on a sole source located at zero time offset. To avoid confusion between time zones, UTC time is used as a standard. Sequence of events reconstruction truly realizes the value of having all of the station relays linked to a universal source.
- Data Concentrator (SEL-2032): This relay has 16 ports and can act as a data concentrator, a phone switch, and a basic logic processor. The 2032 connects to the RTU, acting as a slave device; it connects to other digital relays, polling them for meter information as master. Once in the 2032, the meter data can be mathematically manipulated to maintain integrity and precision before it is transferred to a compatible RTU. The 2032 also is connected to a phone line to provide dial-in remote access for trained personnel, enabling event retrieval and relay interrogation.

C. Additional Considerations:

Attachment 2

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-04

June 23, 2011

Mr. J.J. Borchert

Re: Substation Metering Review

Introduction:

Substation metering data is used to plan and operate the Central Hudson Transmission and Distribution Systems. These metering data are necessary for the safe operation of existing facilities as well as the cost effective planning and design of new facilities. Many transmission lines, substation transformers, and distribution circuits have their MW & MVA_r flows monitored by the Energy Management System (EMS) and have the resultant data stored in the Meter Data Base (MDB) and Historian (eDNA). Many other circuits either are not metered or utilize local indicating metering, such as graphic charts or drag hands, to register data.

Technology has advanced; there are much more reliable and efficient means of measuring and transmitting metered load data, including by means of digital relays. This memo summarizes the existing meter equipment and the replacement options, as well as provides recommendations on the best option to gain appropriate metering data in the most efficient manner.

Discussion:

A large number of substations contain transducer-based meters, which register and report their data directly to a Remote Terminal Unit (RTU) by means of an analog signal. A handful of other stations contain chart meters, which provide local indication. In the stations that have chart meters, the metering is often registered in single function fashion, with circuit current measured in Amps and transformer load measured in Kilowatts and Kilovars. The meter data that is most useful for planning and operating the system is provided in the form of Watts and Vars. Additionally, the panel space taken up by the charts can be reduced greatly with the installation of digital relays, which offer protection functions as well as metering functions.

Technological advances have led to multi-function, digital relays with the capability to meter accurately. The digital relays can transfer instantaneously metered values to EMS. Once there, the data is stored in the Historian, integrated, and the peak hourly values are calculated and transferred to the MDB with little human intervention.

A. Outdated Devices:

The following is a list of common metering methods used in CH substations along with the reason that they have been superseded:

- Chart Meters: Graphic charts monitor single values such as MW, MVA_r, or circuit Amps. These charts rely on diligent maintenance practices to ensure that they function

as designed. Many of the charts run out of ink between maintenance cycles or fail mechanically, leaving "gaps" in data. Even the charts that record properly pose difficulty in capturing their data. The process of going to the substations to collect the charts, reviewing the charts and interpreting the data, and entering the data manually into the MDB is time consuming. Due to the cumbersome nature of the process, the charts are only interpreted for the annual system peaks, which leaves 2-4 data points in the MDB for that circuit or station element to use in planning.

- Other Local Indication Metering: Charts are not the only method of local metering. There are also substation Ammeters, Voltmeters, etc. that are remnants of a time when stations were manned and operated manually. Many of these devices are unsupported and have limited parts available.
- MV-90: An alternative method to metering by charts is to meter through MV-90. MV-90 is a system that uses a recorder to receive metered data directly from the instrument transformers and relies upon a dedicated telephone line to transmit that data to the master station collector; it is used for revenue metering as well as substation metering. Once the master has the data, it is transferred to the MDB. This method requires a dedicated line and the associated expenses.
- No Metering: Locations exist on the system where there are no methods of capturing load data. Some of these locations rely on grouped metering; they do not provide the granularity of individual circuit load data. At other locations, it hasn't been cost justified to install/repair any metering.
- Transducers: The transducers are wired directly to secondary AC quantities from current transformers and potential transformers. They convert the input quantities into an analog output signal, which is wired to the analog inputs of an RTU.
- Load checks: On a heavily loaded day, load checks are performed on circuits without automatic metering by having a worker physically go to a point on a circuit and manually perform a metering check.

B. Retrofit/Replacement Options:

- Digital Relays: Microprocessor-based relays not only offer protection functions; they provide metering capability as well in a compact footprint. The digital metering data provided by the digital relays is extremely accurate and has the ability to be entered into the MDB through Supervisory Control and Data Acquisition (SCADA) automatically once proper infrastructure is in place. The relays offer the ability to register numerous metering values simultaneously and in comm. format so that individual wires aren't needed for each metered point; rather, a single cable can be used to transmit multiple data points. Also, a separate phone line is not required for this method.
- Bitronics Power Meters: These meters provide bi-directional Watt and Var meter values as well as Volt and Amp values. They are capable of transmitting data through analog signal or through communication protocol to an RTU. They are cheaper alternatives, but do not provide any protection functions.

- Grid Sense: These are clip-on meters that report to a nearby data concentrator via radio. The data concentrator is linked to a POT's line outside of the station (no need for a Positron). The newest models provide directional Watt and Var metering, and they have the ability to report data in selectable time increments to the meter database. They represent a lower cost option and provide limited fault recording capabilities, but they do not provide protection functions.

Conclusions:

- ◆ Reading chart meters takes a great deal of time, and many of the charts are unsupported and are labor intensive to maintain. Data "gaps" exist when using chart meters, and the meters provide only a few, data points to the MDB each year, which need manual entry. The materials to repair and/or replace the charts are in short supply.
- ◆ Digital relays provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB with little human intervention.
- ◆ The AC quantities that the digital relays require for protection can be used for metering as well; therefore, there is no need for additional wiring from the instrument transformers to meters. Additionally, transducer equipment, which is susceptible to drift and requires regular maintenance, is no longer needed.
- ◆ The MV-90 system is a fully functional system, and it is an efficient method of collecting meter data in stations that do not have the relay and/or RTU capability to transmit data. MV-90 metering requires a dedicated phone line to transmit the meter data; this reoccurring expense can be eliminated with digital relaying and a proper RTU.
- ◆ Grid Sense meters can be installed relatively inexpensively and quickly to provide stopgap metering data until upgrades can be completed. They require a phone line and the monthly expenses associated with the line.

Eric A. Loeven

Appendix 1: Estimated Costs of Current Methods and Retrofit Options

| <u>Current Methods</u> | Time (Manhours) | | Cost |
|--|----------------------------|-----|--------------|
| | Field | Eng | TOTAL |
| MV-90 yearly (per station on average) | | | \$1,200 |
| Chart Meter maintenance & data retrieval | 1 | 10 | \$1,250 |

Note 1

Note 1: This cost is to retrieve the circular chart, review it, and enter it into the database. This process takes place on a suspected system peak day. At minimum, there are two times a year that this process is performed (Summer Peak and Winter Peak); however, there may be four or more times depending on when the actual peak occurs.

| <u>Retrofit Options</u> | Time | | | | Cost | | | TOTAL |
|--|--|-------|-------|-----|--------------|---------------------------------|----------|----------------|
| | Manhours | | | | Parts | Labor | | |
| | Tech | Elect | Draft | Eng | Device | Test Sw., Steel, etc. (w/OH) | | |
| Grid Sense Meter W / VAr | Hours are for the EOE and the Linemen. | | | | \$4,775 | | | \$5,700 |
| Data Concentrator 1 for every 4 ckt. | Per installation, each meter takes the lineman and the EOE 15 minutes to install. | | | | \$2,272 | | | \$2,700 |
| POT Line | Each data concentrator requires 20 minutes of lineman time and 15 minutes of EOE time. | | | | \$100 | | | \$110 |
| Labor (including travel time) per Station | Travel to each site has been assumed to be 1 hour. | | | | -waived- | | \$430 | \$430 |
| Site Registration per D/C | | | | | | | | |
| TOTAL GS Installation | | | | | | | | \$9,000 |
| Bitronics (Comm) | 40 | | 40 | 8 | \$2,000 | \$1,000 | \$11,400 | \$15,000 |
| Bitronics (HW-W/VAr/V) | 40 | | 40 | 12 | \$1,100 | \$1,000 | \$12,000 | \$14,500 |

Attachment 3

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-05

June 23, 2011

Mr. J.J. Borchert:

Re: Remote Terminal Unit Review

Introduction:

Real-time control and status feedback are vital components of a properly functioning substation. Without someone at the substation 24/7, a means of providing feedback and control operations is required; that means is a Remote Terminal Unit (RTU). This memo will describe the current state of the RTUs on the system, as well as the opportunity areas for retrofits and justification for the upgrades.

Discussion:

RTUs provide a means of transmitting important data in a substation to a master station via Supervisory Control and Data Acquisition (SCADA). The RTUs collect status and metering data and transmit it to a master station when polled. Also, they perform control operations that are initiated from the master station in a remote location. The RTUs can be dedicated line or dial-up depending on the application. RTUs have evolved with technology; existing CDC RTUs (protocol and provider) have been replaced with new flash ROM RTUs that utilize protocol suites including, but not limited to, CDC and the utility standard, DNP.

A. Outdated Devices:

- CDC 44-500 & CDC 88-90: These are different versions of dedicated line RTUs provided by CDC, a company that no longer exists. Retrofits have been performed to eliminate the CDC RTUs on the system because of the inability to get spare parts and due to their incompatibility with the digital relays. These RTUs utilize CDC protocol, which is an outdated protocol incapable of communicating with digital relays/data concentrators and is unable to receive digital metering data. They rely on analog signals and pulse accumulators sent from transducers to transmit meter information.
- G.E. M-4000: This is a smaller version of the G.E. Harris D20 RTU. It is used mainly in dial-up applications and is polled twice daily for SCADA data. It will report unsolicited if there is a change of status or if a metered point's dead band is exceeded. Based on the frequency that dial-up RTUs are polled, they cannot be used as sources to the meter database. Also, dial-up RTUs are not reliable because they rely on a plain old telephone (POT) line for communication. Due to this lack of reliability, control operations typically are not performed with dial-up RTUs. As a plus, the M-4000 has the capability to communicate through CDC or DNP protocol, and it also can be configured as a dedicated unit.

- G.E. D20: The functionality and hardware of this RTU are consistent with many modern RTUs; however, the configuration software is not user-friendly and uses a complicated, layered architecture. Additionally, with retiring technicians, the available workforce skilled in working with the configuration software is dwindling. This fact is of concern because emergency fixes will take longer to complete.

B. Retrofit/Replacement Options:

- Telvent Sage 2400¹: Telvent offers an RTU that fits into existing CDC RTU cabinets, and it has peripheral cards that resemble the CDC RTU cards. For these reasons, Telvent is the vendor of choice, providing the most seamless retrofit option. Telvent also offers a protocol suite for communications, including DNP and CDC. The DNP Master protocol allows direct communication with SEL-2020/2030/2032 data concentrators to transfer metering data from numerous digital relays in a substation.

C. Additional Considerations:

- Radio linked RTUs: As previously stated, the M-4000 can be polled as a dedicated RTU or as a dial-up unit. If there is a nearby, dedicated RTU, it is sometimes possible to install a radio link between the two stations and poll the M-4000 from the other station. In this configuration, there is access to real-time information and the ability to perform control operations at both stations. The need for the Positron Box at the radio-linked station is eliminated, and there is no extra cost incurred by installing a phone line and a Positron Box. The radio links require a clear line of site from one station to the next in order for the signal to be transmitted clearly. As such, the reliability of the circuits is largely dependent upon the terrain. Radio signals are also susceptible to interference from other mobile devices such as CB Radios.
- Positron Boxes: One major cost associated with RTUs, dedicated or dial-up, is the phone company's requirement of a Positron Box to isolate the outside phone line from the electric substation. This requirement is in place to provide a level of comfort for the phone company technician working in our substations, many of the existing stations have been allowed to function without this isolation in a grandfathered manner. However, any time that RTU retrofits are performed at these stations, the installation of a Positron Box is required. They are an expensive piece of equipment and have long lead times that may impact project schedules. There also is continued reliance on the phone company for maintenance and repairs.

¹ Telvent has been chosen as the preferred RTU for retrofits due to ease of configuration/use and the techs' familiarity with the units. All RTU cost estimates in this report are based on using this RTU.

Conclusions:

Upgrading old CDC, M-4000, and D-20 RTUs to Telvent RTUs provides the following benefits:

- ◆ Telvent RTUs are reliable and parts are available readily.
- ◆ The Telvent configuration software is user-friendly, making configuration and testing faster.
- ◆ DNP RTUs, of which Telvent is one, can receive communication-based metering & status and transmit it to the SCADA master.
- ◆ The Telvent RTU retrofits for the CDC 44-500's utilize the existing RTU cabinet and high powered tripping relays. The Telvent replaces the equipment susceptible to failure and makes use of the existing equipment that is less prone to failure.
- ◆ Using Telvent RTUs provides timesavings through standardization, and the engineers and technicians alike prefer to work with the Telvent for RTU retrofits.

Consideration also should be given to converting dialup RTUs to dedicated line RTUs. Dialup RTUs rely on POT lines, which have notoriously poor reliability; additional steps and equipment are required to perform the control operations safely. In contrast, dedicated line RTUs offer signal reliability, which provides the ability to perform control operations safely without added equipment and procedure steps.

Eric A. Loeven

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. D. J. Dittmann
Mr. J. M. May
S.R. #2011-06

June 23, 2011

Mr. J.J. Borchert

Re: Substation Recloser Review

Introduction:

Substation reclosers provide an alternate method of interrupting fault current on distribution and sub-transmission circuits. They are a convenient way to provide circuit protection in locations where it is not cost effective to install a circuit breaker and associated conduit to a control house. One disadvantage of using a recloser rather than a circuit breaker is that the recloser has reduced interrupting capability.

Recloser technology has advanced; hydraulic, oil-filled devices have given way to vacuum-interrupted, microprocessor-based (digital) recloser controls. This memo summarizes the existing substation recloser equipment, as well as replacement options. Also, this memo provides recommendations on the best retrofit options.

Discussion:

“An automatic circuit recloser is a self-contained device, which can sense and interrupt fault currents as well as reclose automatically in an attempt to re-energize a line.”* The existing hydraulic reclosers, a kin to electromechanical relays, have single component capability with limited flexibility in setting pickup curves, very little intelligence, and minimal ability to report feedback. New, digital recloser controls provide a wide range of pickup curves, are self-monitoring, grant instant notification of operations, offer desired metering capabilities, and require less frequent routine maintenance.

A. **Outdated Devices:**

Reclosers were installed in substations as a cost effective alternative to a distribution (15kV) or sub-transmission (34.5kV) circuit breaker combined with a reclosing relay. They can be single-phase or three-phase, be controlled mechanically (hydraulic) or digitally, and they have interrupting mediums of oil or vacuum. They make use of a series of fast and slow curves, providing coordination versatility and protection flexibility. A brief summary of the outdated reclosers on the CH system, specifically the hydraulically controlled type and the oil-interrupted type, is as follows:

- o Hydraulically controlled reclosers: These reclosers are self-contained and self-controlled; they have oil or vacuum interrupters. They are outdated due to their

* Page 124. Power Distribution Engineering: Fundamentals and Applications. James J. Burke. 1994.

C. Additional Considerations:

- Telemetric Interface: The Telemetric RTM II device can be installed to provide status and control of the SEL-651R DNP3 points. These data travel via cellular network and are displayed via a secure web interface. In addition, data travel to a SCADA Xchange server and then over frame relay to our SCADA system.
- R-Mag Circuit Breakers: As the most direct comparison to the substation recloser, these circuit breakers are a packaged breaker and relay combination. They are relatively inexpensive to install and there is familiarity with them by the techs, electricians, and engineers alike. These breakers provide a higher interrupting capability than the reclosers.

Conclusions:

Upgrading to vacuum interrupted, digitally controlled Viper reclosers provides the following benefits:

- ◆ Vacuum Interruption –
 - The speed of operation on these reclosers is not compromised by temperature.
 - The maintenance on these reclosers is not as labor-intensive as the oil-filled reclosers. They can operate up to 10,000 times before requiring an overhaul, with only the battery requiring simple in-field replacement in the meantime.
- ◆ Digital Control –
 - These recloser controls provide a wide range of pickup curves, which makes coordination easier and much more flexible than the hydraulically controlled reclosers.
 - These recloser controls offer digital metering capability and fault notification. The recloser can transmit its information through SCADA if the proper infrastructure is in place, or through Telemetric in stations with under-developed SCADA infrastructure.
 - These recloser controls can be interrogated to gather oscillography, targets, and phasor data from a remote location through a modem. This capability assists in timely and accurate fault analysis.

Some of the lower cost is lost when the recloser is installed in a substation if it is connected to the RTU in the control house, rather than through the Telemetric Unit. In this case, the added cost of conduit, steel work, and/or foundation needs to be considered. Regardless of the method of reporting to SCADA, installing the recloser in a substation comes with the added costs associated with technician time to commission and test the recloser and digital control over the cost of an installation on a distribution circuit.

Eric A. Loeven

Appendix 1: Estimated Costs of Retrofit Options

| Retrofit Options | Cost | | |
|---|----------|-----------|--------|
| | Parts | TOTAL | |
| Viper Reclosers with control relay and PT (on dist circuit) | \$21,000 | \$33,500 | Note 1 |
| Viper Reclosers with control relay (in a substation - Telemetric communication) | \$20,500 | \$33,000 | Note 1 |
| Viper Reclosers with control relay (in a substation - RTU communication) | \$20,500 | \$86,000* | Note 2 |
| R-Mag Breaker | \$25,000 | \$90,000 | |

Note 1: These represent one-time costs. There are additional annual costs for the SCADA Frame relay and the SCADA X-Change to Telemetric. The SCADA Frame Relay costs \$5200/yr. The SCADA X-Change to Telemetric costs \$2000/yr for 100 devices and \$1500 for each 50 devices after that.

Note 2: This cost is estimated based on proposed work to bring the data through the RTU. No installations exist at this time in this manner.

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|-------|----------|--|
| Accord | 4 | 361 Ckt. | Charts - kW | ----- | EM | NONE | ----- | Retired as part of P/MK Upgrade |
| Ancram | 13.8 | 7085 Ckt. | Grid Sense | ----- | EM | NONE | ----- | Only has a 13.8 Voltage Regulator |
| Balmville | | | | | EM | | | |
| Balmville | 4 | 411 Ckt. | MV-90 | ----- | EM | | | |
| Balmville | 4 | 412 Ckt. | MV-90 | ----- | | C-300 | | |
| Barnegat | | | | | | | | Metering source? |
| Barnegat | 115 | KB Line | Amps | EM | ----- | | | |
| Barnegat | 115 | KC Line | None | EM | ----- | | | |
| Barnegat | 115 | KB-749-KC BKR | | EM | ----- | | | |
| Barnegat | 115/13.8 | T1 | SCADA | ----- | | | | IBM Feeds |
| Barnegat | 115/13.8 | T2 | SCADA | ----- | | | | |
| Barnegat | 13.8 | S1 | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2 | SCADA | ----- | EM | | | |
| Barnegat | 13.8 | S1-706 BKR | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2-734 BKR | SCADA | ----- | EM | | | |
| Beacon | | | | | | D-20 | | |
| Beacon | 13.8 | 8006 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 13.8 | 8015 Ckt. | SCADA | ----- | EM | | | Previously 8087A? |
| Beacon | 4 | 801 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 802 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 803 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | W-414 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | W-463 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | Bus 1 | SCADA | ----- | | | | |
| Beacon | 4 | Bus 2 | SCADA | ----- | | | | |
| Beacon | 13.8/4 | T1 | SCADA | ----- | EM | | | |
| Beacon | 13.8/4 | T2 | SCADA | ----- | EM | | | MDB has an entry with T1+T2 calculated |
| Beacon | 13.8 | BF Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | NM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | CM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 1 | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 2 | SCADA | ----- | EM | | | |
| Bethlehem Rd. | | | | | | 2400 | | |
| Bethlehem Rd. | 13.8 | 4091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4092 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4093 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4094 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4095 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4096 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4097 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4098 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 1 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 2 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 115 | RD Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | UB Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | RD-604-UB BKR | | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T1 | EMS | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T2 | EMS | EM | ----- | | | Metering combined |
| Bethlehem Rd. | 13.8 | W-613 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-619 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-804 BKR | | | EM | | | |
| Bordman Rd. | | | | | | NONE | | |
| Bordman Rd. | 13.8 | 6081A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | 6082A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-203 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-204 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-205 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-206 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-207 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-208 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-209 Ckt. | | ----- | EM | | | |

764

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|---------------|--------------------|-------------|-------------|--------|----------|---|
| Boulevard | | | | | | 2100 | | |
| Boulevard | 69 | OB Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | I Line | SCADA | uP | ----- | ----- | ----- | Line Amps & WVAR |
| Boulevard | 13.8 | KO Line | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | KK Line | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1011 | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1012 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1013 | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1014 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 69 | Bus 1 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Bus 2 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Overall | ----- | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | Metering combined |
| Boulevard | 69/13.8 | T3 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Clinton Ave. | | | | | | M-4000 | | |
| Clinton Ave. | 4 | 395 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 396 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 397 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | Bus | SCADA | ----- | ----- | ----- | ----- | |
| Clinton Ave. | 13.8/4 | T1 | MV-90 | ----- | Fuse | ----- | ----- | |
| Cold Spring | | | | | | NONE | | |
| Cold Spring | 4 | 871 Ckt. | Charts - kW | ----- | EM | ----- | ----- | Install a Grid Sense Package for two (2) circuits. |
| Cold Spring | 4 | 872 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Coldenham | | | | | | D-20 | | |
| Coldenham | 13.8 | 4021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4026 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4027 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4028 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | B1-B2 Tie | ----- | ----- | EM | ----- | ----- | |
| Coldenham | 115 | J Line | SCADA | Gen 1 | ----- | ----- | ----- | 95P is DLP; 95BU is REL-301; part of replacement program already. |
| Coldenham | 115 | CW Line | SCADA | Gen 1 | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115 | J-19-CW BKR | ----- | SS | ----- | ----- | ----- | |
| Converse St. | | | | | | NONE | | |
| Converse St. | 4 | 121 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 122 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 123 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | | | | | | NONE | | |
| Conway Place | 4 | 881 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | 4 | 882 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Coxsackie | | | | | | 8890 | | |
| Coxsackie | 13.8 | 1071 Ckt. | Charts - Amps | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | 1072 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | 1074 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Coxsackie | 13.8 | 1076 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | Bus 1 (T1+G1) | SCADA | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | Bus 2 | ??? | ----- | EM | ----- | ----- | Metering data available through relay, but not configured. |
| Coxsackie | 69 | CN Line | None | uP | ----- | ----- | ----- | |
| Coxsackie | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | 95P is SEL-587 |
| Coxsackie | 69/13.8 | T1 | Charts - Amps | uP/EM | ----- | ----- | ----- | |
| Coxsackie | 13.8 | G1 | SCADA | ----- | ----- | ----- | ----- | |

705

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------------|--------------------|-----------------------|---------------|-------------|-------------|-------|----------|---|
| Danskammer | | | | | | 2100 | | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | AC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DB Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DR Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DW Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | RS Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | W - 323 BKR | ----- | SS | ----- | ----- | ----- | |
| Danskammer | 115 | North Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | Middle Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | South Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | DB-1171 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | DR-1421 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | DW-1061 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | T5&T6 | SCADA | EM | ----- | ----- | ----- | |
| Dashville | | | | | | 2300 | | |
| Dashville | 4 | 345 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single Phase; Vac; Hydr |
| Dashville | 6.6 | Bus | ----- | ----- | EM | ----- | ----- | |
| Dashville | | T1 | ----- | EM | ----- | ----- | ----- | Fused Transformer w/ CR 67 relay |
| Dashville | | G1-G2 | SCADA | ----- | ----- | ----- | ----- | |
| East Fishkill 345kV | | | | | | | | |
| East Fishkill 345kV | 345 | C9751 Breaker A1 BF | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 345 | C9751 Breaker A2 BF | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 1 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 2 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill | | | | | | 8890 | | |
| East Fishkill | 115 | EF Line | SCADA | uP* | ----- | ----- | ----- | 95P is MDAR; 95BU is Optimho - Replacing with 311C & D60. |
| East Fishkill | 115 | HF Line | SCADA | uP* | ----- | ----- | ----- | 95BU is Optimho - Replacing with D60. |
| East Fishkill | 115 | EF-672 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | EF-679 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | W-640 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | T1 | SCADA | see EFB | ----- | ----- | ----- | |
| East Kingston | | | | | | Orion | | |
| East Kingston | 13.8 | Bus 1 | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | Bus 2 | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1021 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1026 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1027 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1028 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 115 | ER Line | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115 | LR Line | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115 | LR-201-ER Breaker | ----- | uP | ----- | ----- | ----- | |
| East Kingston | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| East Kingston | 115/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| East Park | | | | | | 8890 | | |
| East Park | 13.8 | 6073 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6074 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6075 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| East Park | 69 | Q Line | None | EM | ----- | ----- | ----- | 95P is SEL-587 |
| East Park | 69/13.8 | T1 | SCADA | uP/EM | ----- | ----- | ----- | |

706

Electric Substation Upgrades Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|-----------------|-------------|-------------|------|----------|--|
| East Walden | | | | | | 2400 | | |
| East Walden | | | | | EM/uP | | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5041 Ckt. | Grid Sense | ----- | EM/uP | | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5042 Ckt. | Grid Sense | ----- | EM | | | GS not working |
| East Walden | 13.8 | 5043 Ckt. | Grid Sense | ----- | | | | Com |
| East Walden | 13.8 | Com Equipment | | ----- | | | | |
| East Walden | 13.8 | B1 | SCADA | | uP | | | 95P is DLP; part of replacement program already. |
| East Walden | 115 | CW Line | None | Gen1/uP | | | | |
| East Walden | 115 | CW-712 | ----- | EM | | | | |
| East Walden | 115 | D Line | None | EM | | | | |
| East Walden | 115 | D-722 BKR | ----- | EM | | | | |
| East Walden | 115 | DW Line | SCADA | | uP | | | |
| East Walden | 115 | DW-1071 BKR | ----- | uP | | | | |
| East Walden | 115 | EM Line | SCADA | | uP | | | |
| East Walden | 115 | EM-642 BKR | ----- | uP | | | | |
| East Walden | 69 | WM Line | SCADA | | uP | | | Amps & Volts |
| East Walden | 115 | W-644 | ----- | EM | | | | |
| East Walden | 115 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| East Walden | 115 | B2 | ----- | EM | | | | 95P is SEL-587 |
| East Walden | 69/13.8 | T1 | SCADA | | uP/EM | | | 95BU is SEL-587 |
| East Walden | 69/13.8 | T3 | SCADA | | EM/uP | | | |
| Fishkill Plains | | | | | | D-20 | | |
| Fishkill Plains | 13.8 | 8091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Fishkill Plains | 13.8 | 8092 Ckt. | MV-90 | ----- | EM | | | |
| Fishkill Plains | 13.8 | 8093 Ckt. | SCADA | | uP- 200 | | | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8094 Ckt. | SCADA | | uP- 200 | | | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8095 Ckt. | SCADA | | uP | | | |
| Fishkill Plains | 13.8 | 8096 Ckt. | SCADA | | uP | | | |
| Fishkill Plains | 115 | HF Line | SCADA | uP/Gen 1 | | | | 95BU is Optimho; part of replacement program. |
| Fishkill Plains | 115 | HF-703 BKR | ----- | EM | | | | |
| Fishkill Plains | 115 | NF Line | None | EM | | | | |
| Fishkill Plains | 115 | A Line | SCADA | | uP | | | |
| Fishkill Plains | 115 | A-1036-FP | ----- | uP- 200 | | | | 279/2BFR relays |
| Fishkill Plains | 115 | A-1498 | ----- | uP- 200 | | | | 279/2BFR relays |
| Fishkill Plains | 115 | Com Equipment | ----- | | | | | Com |
| Fishkill Plains | 115 | FP Line | SCADA | uP/Gen 1 | | | | 95P is DLP; part of replacement program already; 95BU is SEL-321 |
| Fishkill Plains | 115 | B1 | SCADA | | EM | | | |
| Fishkill Plains | 13.8 | B1 | ----- | | EM | | | Combine Bus Volts to one point |
| Fishkill Plains | 13.8 | B2 | SCADA | | EM | | | |
| Fishkill Plains | 115/13.8 | T1 | ----- | | EM/uP | | | 95BU is SEL-587; metering is combined. |
| Fishkill Plains | 115/13.8 | T2 | SCADA | | EM/uP | | | |
| Forgebrook | | | | | | 2300 | | |
| Forgebrook | 13.8 | Bus #1 | | ----- | EM | | | |
| Forgebrook | 13.8 | Bus #2 | Charts - kW/kVA | ----- | EM | | | |
| Forgebrook | 13.8 | 8011 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8012 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8013 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8014 Ckt. | Charts - kW | ----- | uP/EM | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8015 Ckt. | Charts - kW | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8016 Ckt. | Charts - kW | ----- | EM | | | No Chart Data |
| Forgebrook | 115 | Com Equipment | ----- | | | | | Com |
| Forgebrook | 115 | FO Line | None | EM | | | | |
| Forgebrook | 115 | FO-1430-FT | ----- | EM | | | | |
| Forgebrook | 115 | FT Line | None | EM | | | | |
| Forgebrook | 115 | FT-1432 | ----- | EM | | | | |
| Forgebrook | 115 | FT-882-WF | ----- | EM | | | | |
| Forgebrook | 115 | WF Line | SCADA | | uP | | | |
| Forgebrook | 13.8 | CM Line | None | ----- | EM | | | Amps |
| Forgebrook | 13.8 | BF Line | SCADA | | EM | | | |
| Forgebrook | 13.8 | W-1486 | ----- | | EM | | | |
| Forgebrook | 13.8 | W-994 | ----- | | | | | Metering combined |
| Forgebrook | 115/13.8 | T1 | SCADA | | EM | | | |
| Forgebrook | 115/13.8 | T2 | ----- | | EM | | | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|------------------|-------------|-------------|---------------------------|----------|--|
| Freehold | | | | | | M-4000 | | |
| Freehold | 13.8 | 2061 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | 2071 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | W-1155 BKR | ----- | ----- | ----- | ----- | PR-560M | 3 phase; oil; electronic |
| Freehold | 13.8 | T1 | Charts - kW/kVAr | fuse | ----- | ----- | ----- | |
| Freehold | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | |
| Galeville | | | | | | Orion | | |
| Galeville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5030 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5031 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5032 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5033 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5034 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5035 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Galeville | 69 | MG Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69 | MG-200-MK BKR | ----- | uP | ----- | ----- | ----- | |
| Galeville | 69 | MK Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| Greenfield Rd. | | | | | | M-4000 | | |
| Greenfield Rd. | 13.8 | 3076 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 13.8 | 3078 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 4 | 375-376 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 4 | 377-378 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | W-1608 | ----- | ----- | EM | ----- | ES | 3 phase; oil; electronic |
| Greenfield Rd. | 13.8/4 | T2 | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Greenfield Rd. | 4 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Greenfield Rd. | 4 | B3 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Greenfield Rd. | 4 | B3 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Grimley Rd. | | | | | | NONE-Soon to have DNP RTU | | |
| Grimley Rd. | 4 | 385 Ckt. | Grid Sense | ----- | EM | ----- | Kyle L | Single Phase; Oil; Electronic |
| Grimley Rd. | 4 | 386 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| Hibernia | | | | | | Micro 1C | | |
| Hibernia | 13.8 | 7011 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | 7012 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 69/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | | | | | | D-20 | | |
| High Falls | 13.8 | 3021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 69 | HK Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 69 | HK-696-P BKR. | ----- | ----- | uP- 200 | ----- | ----- | SEL-279 |
| High Falls | 69 | P Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 13.8 | W-998 BKR. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | B1 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | B2 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |
| High Falls | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|--------------------|----------|-------------|-------------|--------|----------|---|
| Highland | | | | | | 2300 | | |
| Highland | | | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5081 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5082 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5083 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | 5084 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | 5085 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 115 | HR Line | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | OR Line | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | OR-761-HR BKR. | ---- | EM | ---- | ---- | ---- | |
| Highland | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | |
| Highland | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Highland | 115/13.8 | T1 | SCADA | uP/EM | ---- | ---- | ---- | 95BU is SEL-587 |
| Highland | 115/13.8 | T2 | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | | | | | | D-20 | | |
| Honk Falls | 13.8 | 3071 Ckt. | SCADA | ---- | EM | ---- | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | 3072 Ckt. | SCADA | ---- | EM | ---- | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | B1 | SCADA | EM | ---- | ---- | ---- | |
| Honk Falls | 69 | GM Line | SCADA | EM/uP | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | HG Line | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | 69 | HK Line | SCADA | uP/EM | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | MK Line | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | 69 | WH Line | SCADA | uP/EM | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | overall diff B1+T1 | SCADA | EM | ---- | ---- | ---- | |
| Honk Falls | 69/13.8 | T1 | ---- | fuse | ---- | ---- | ---- | |
| Hunter | | | | | | M-4000 | | |
| Hunter | 34.5 | Z-666 | | | | | VR-3S | 3 phase; vac; hyd |
| Hunter | 13.8 | 2081 Ckt. | MV-90 | ---- | ---- | ---- | Kyle W | 3 phase; oil; hyd |
| Hunter | 13.8 | Cap Bank | ---- | ---- | EM | ---- | ---- | |
| Hurley Ave. 345kV | | | | | | 2400 | | |
| Hurley Ave. 345kV | 345 | 30151 BKR. | ---- | EM | ---- | ---- | ---- | 79 Relay is EM |
| Hurley Ave. 345kV | 345 | 30151 A1 BF | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30152 A2 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 301 Line A1 | SCADA | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 301 Line A2 | SCADA | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30353 BKR. | ---- | EM* | ---- | ---- | ---- | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30353 A1 BF | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30353 A2 BF | ---- | EM* | ---- | ---- | ---- | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 30354 BKR. | ---- | EM* | ---- | ---- | ---- | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30354 A1 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30354 A2 BF | ---- | EM* | ---- | ---- | ---- | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 303 Line A1 | SCADA | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 303 Line A2 | SCADA | EM* | ---- | ---- | ---- | In process replacement with GE D90 |
| Hurley Ave. 345kV | 345 | Bus A1 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | Bus A2 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 BKR. | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 A1 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 A2 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A1 Out of Step | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A2 Out of Step | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A1 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A2 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | T1 LS | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | B1 | SCADA | ---- | ---- | ---- | ---- | Volts |

769

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------|--------------------|---------------|----------------------|-------------|-------------|--------|----------|---|
| | | | | | | 2400 | | |
| Hurley Ave. | | | | | | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2091 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2092 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2093 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2094 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Hurley Ave. | 115 | Cap Bank | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. | 115 | HP Line | SCADA | EM | ---- | ---- | ---- | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 69 | I Line | SCADA | Gen1 | ---- | ---- | ---- | |
| Hurley Ave. | 115 | OR Line | SCADA | EM | ---- | ---- | ---- | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 69 | SB Line | SCADA | Gen1 | ---- | ---- | ---- | |
| Hurley Ave. | 115 | HP-1643 BKR. | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. | 115 | OR-1640 BKR. | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. | 69 | W-142 BKR. | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. | 13.8 | W-1575 BKR. | ---- | ---- | EM | ---- | ---- | |
| Hurley Ave. | 115 | W-389 BKR. | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. | 115 | B1 | None | EM | ---- | ---- | ---- | |
| Hurley Ave. | 115 | B2 | SCADA | EM | ---- | ---- | ---- | Volts |
| Hurley Ave. | 69 | B1 | SCADA | EM | ---- | ---- | ---- | Volts |
| Hurley Ave. | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Volts |
| Hurley Ave. | 115/69 | T3 | SCADA | EM | ---- | ---- | ---- | |
| Hurley Ave. | 115/13.8 | T4 | SCADA | EM | ---- | ---- | ---- | |
| Hurley Ave. | 69/13.8 | T5 | ---- | EM | ---- | ---- | ---- | |
| | | | | | | 3030 | | |
| Inwood Ave. | 13.8 | 6061 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6062 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6063 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6064 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6065 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Inwood Ave. | 13.8 | 6066 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Inwood Ave. | 13.8 | 6067 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Inwood Ave. | 13.8 | 6068 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Inwood Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Inwood Ave. | 115 | IR Line | SCADA | uP | ---- | ---- | ---- | |
| Inwood Ave. | 115 | IR-201-X BKR. | ---- | uP | ---- | ---- | ---- | |
| Inwood Ave. | 115 | X Line | SCADA | uP | ---- | ---- | ---- | |
| Inwood Ave. | 13.8 | B1 | SCADA | ---- | uP | ---- | ---- | |
| Inwood Ave. | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| Inwood Ave. | 115/13.8 | T1 | SCADA | uP | ---- | ---- | ---- | |
| Inwood Ave. | 115/13.8 | T2 | SCADA | uP | ---- | ---- | ---- | |
| | | | | | | M-4000 | | |
| Jansen Ave. | 13.8 | 1001 Ckt. | MV-90 | ---- | uP | ---- | ---- | |
| Jansen Ave. | 13.8 | 1002 Ckt. | MV-90 | ---- | EM | ---- | ---- | |
| Jansen Ave. | 13.8 | 1003 Ckt. | MV-90 | ---- | uP | ---- | ---- | |
| Jansen Ave. | 13.8 | 1004 Ckt. | MV-90 | ---- | EM | ---- | ---- | |
| Jansen Ave. | 13.8 | KL Line | MV-90 | ---- | EM | ---- | ---- | |
| Jansen Ave. | 13.8 | KO Line | MV-90 | ---- | EM | ---- | ---- | |
| Jansen Ave. | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | |
| Jansen Ave. | 13.8 | B2 | SCADA | ---- | EM | ---- | ---- | |
| Jansen Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Jansen Ave. | 13.8 | T - Grounding | MV-90 | ---- | uP | ---- | ---- | |
| | | | | | | 8890 | | |
| Kerhonkson | 13.8 | 3081 Ckt. | Grid Sense | ---- | EM | ---- | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 13.8 | 3082 Ckt. | Grid Sense | ---- | EM | ---- | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 69 | MK-929 MOS | ---- | EM | ---- | ---- | ---- | |
| Kerhonkson | 69 | MK-930 MOS | ---- | EM | ---- | ---- | ---- | |
| Kerhonkson | 69/13.8 | T1 | Charts - kW/kVar IGS | fuse | ---- | ---- | ---- | Amps for each Transformer |
| Kerhonkson | 69/13.8 | T2 | | fuse | ---- | ---- | ---- | Volts & Amps |
| Kerhonkson | 69 | HK | SCADA | ---- | ---- | ---- | ---- | Volts & Amps |
| Kerhonkson | 69 | MK | SCADA | ---- | ---- | ---- | ---- | Volts & Amps |

770

Electric Substation Upy. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-----------------|------------------------|-------------|-------------|--------|----------|--------------------------------------|
| Knapps Corners | | | | | | 2100 | | |
| Knapps Corners | | | Charts - Amps/SCADA | | uP | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8021 Ckt. | Charts - Amps | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8022 Ckt. | Charts - Amps | | uP/EM | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8023 Ckt. | Charts - Amps/SCADA | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8024 Ckt. | Charts - kW | | EM | | | |
| Knapps Corners | 13.8 | 8025 Ckt. | Charts - kW | | | | | Com |
| Knapps Corners | 13.8 | Com Equipment | | | | | | |
| Knapps Corners | 115 | KB Line | None | EM | | | | SEL-279 |
| Knapps Corners | 115 | KB-1558-MC BKR. | | uP-200 | | | | |
| Knapps Corners | 115 | SK Line | SCADA | | uP | | | Amps |
| Knapps Corners | 13.8 | KN Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KR Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KS Line | SCADA* | EM | | | | |
| Knapps Corners | 69 | KM Line | SCADA | uP | | | | |
| Knapps Corners | 69 | TR Line | SCADA | EM | | | | |
| Knapps Corners | 69 | G Line | SCADA | uP | | | | |
| Knapps Corners | 13.8 | W-1215 BKR. | | | EM | | | |
| Knapps Corners | 69 | W-1409 BKR. | | | uP | | | |
| Knapps Corners | 13.8 | W-1462 BKR. | | | EM | | | |
| Knapps Corners | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Knapps Corners | 13.8 | B2 | | EM | | | | |
| Knapps Corners | 13.8 | B3 | | EM | | | | |
| Knapps Corners | 69 | 69k Bus | SCADA | EM | | | | Volts |
| Knapps Corners | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Knapps Corners | 115/13.8 | T3 | | EM | | | | |
| Knapps Corners | 115/69 | T2 | | SCADA | uP | | | |
| Lawrenceville | | | | | | M-4000 | | |
| Lawrenceville | 34.5 | 2385 Ckt. | Grid Sense | EM/uP | | | CXE-400A | 3 phase; oil; hyd |
| Lawrenceville | 34.5 | B1 | SCADA* | | | | | Volts |
| Lawrenceville | 69/34.5 | T1 | MV90/Grid Sense/SCADA | EM | | | | Amps. |
| Lincoln Park | | | | | | 2300 | | |
| Lincoln Park | 13.8 | Com Equipment | | | | | | Com |
| Lincoln Park | 13.8 | 2011 Ckt. | Charts - Amps | | EM | | | |
| Lincoln Park | 13.8 | 2012 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2013 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2014 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2015 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2016 Ckt. | Charts - kW | | EM/uP* | | | GE F60 installed HiZ pilot |
| Lincoln Park | 13.8 | 2017 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2018 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 1 | | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 2 | | | EM | | | |
| Lincoln Park | 115 | HP Line | None | EM | | | | Relay Replacement Program in process |
| Lincoln Park | 115 | HP-1318 BKR. | | EM | | | | |
| Lincoln Park | 13.8 | KL Line | Charts - kW/kVar/SCADA | EM | | | | Amps to SCADA |
| Lincoln Park | 115 | LR-1219-HP BKR. | | EM | | | | |
| Lincoln Park | 115 | LR Line | SCADA | uP | | | | |
| Lincoln Park | 13.8 | W-1321 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-45 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-534 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-554 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-206 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-207 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-525 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-528 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Lincoln Park | 13.8 | B2 | | EM | | | | |
| Lincoln Park | 13.8 | B3 | | EM | | | | |
| Lincoln Park | 13.8 | B4 | None | | EM | | | Volts |
| Lincoln Park | 115 | 115k bus | SCADA | | EM | | | Volts |
| Lincoln Park | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Lincoln Park | 115/13.8 | T2 | | EM | | | | |
| Lincoln Park | 115/13.8 | T3 | | SCADA | EM | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|--------|----------|---|
| Manchester | | | | | | 2400 | | |
| Manchester | | | | | | | | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6091 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6092 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6093 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6094 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6095 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6096 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | 6097 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Manchester | 115 | M Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is REL-301; part of replacement program. |
| Manchester | 115 | MC Line | SCADA | uP | ----- | ----- | ----- | |
| Manchester | 13.8 | MS Line | SCADA* | ----- | EM | ----- | ----- | Amps |
| Manchester | 13.8 | W-1456 BKR. | ----- | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | W-650 BKR. | ----- | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Combine Bus Volts to one point |
| Manchester | 13.8 | B2 | ----- | ----- | EM | ----- | ----- | |
| Manchester | 115/13.8 | T1 | SCADA | ----- | EM | ----- | ----- | Combine load value |
| Manchester | 115/13.8 | T2 | ----- | EM | ----- | ----- | ----- | |
| Marlboro | | | | | | 8890 | | ???? |
| Marlboro | 13.8 | 5001 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5002 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5003 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5004 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Marlboro | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Marlboro | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Volts |
| Marlboro | 115/13.8 | T1 | SCADA | uP/EM* | ----- | ----- | ----- | 95P is SEL-587 |
| Marlboro | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| Maryland Ave. | | | | | | M-4000 | | |
| Maryland Ave. | 4 | 621 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | 622 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | 623 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | 624 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | MS Line | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | PH-284 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | PH-286 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | W-1032 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | W-1033 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | W-1034 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Maryland Ave. | 13.8 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Maryland Ave. | 4 | B1 | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Maryland Ave. | 13.8/4 | T1 | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8/4 | T2 | ----- | ----- | EM | ----- | ----- | |
| Maybrook | | | | | | M-4000 | | |
| Maybrook | 13.8 | 5051 Ckt. | MV-90 | ----- | EM | ----- | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | 5052 Ckt. | MV-90 | ----- | uP | ----- | ----- | Previously 5081-83? |
| Maybrook | 13.8 | 5053 Ckt. | MV-90 | ----- | EM | ----- | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Maybrook | 13.8 | B2 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Maybrook | 69/13.8 | T1 | None | ----- | ----- | ----- | ----- | |
| Maybrook | 69/13.8 | T2 | None | ----- | ----- | ----- | ----- | |
| McKinley St. | | | | | | NONE | | |
| McKinley St. | 4 | 845 Ckt. | MV-90 | ----- | EM | ----- | ----- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|----------------|-------------|-------------|-------------|-------|----------|--------------------------------------|
| Merritt Park | | | | | | BM | | |
| Merritt Park | 13.8 | 8061 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8062 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8063 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8064 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8065 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8066 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8067 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8068 Ckt. | SCADA | | uP | | | Com |
| Merritt Park | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | |
| Merritt Park | 115 | WF Line | SCADA | | uP | | | |
| Merritt Park | 115 | WP Line | SCADA | | uP | | | SEL-279 |
| Merritt Park | 115 | WF-439-WP BKR. | ----- | uP-200 | | | | |
| Merritt Park | 13.8 | B1 | SCADA | | uP | | | |
| Merritt Park | 13.8 | B2 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T1 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T2 | SCADA | | uP | | | |
| Milan | | | | | | BM | | |
| Milan | 13.8 | 7061 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | 7062 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Milan | 115 | B-4561 Ckt Sw | ----- | uP | | | | |
| Milan | 115 | MR Line | SCADA | | uP | | | |
| Milan | 115 | MR-501 BKR. | SCADA | | uP | | | |
| Milan | 115 | RT-7 BKR. | ----- | uP | | | | |
| Milan | 115 | R-10 BKR. | ----- | uP | | | | |
| Milan | 115 | T-7 Line | SCADA | | uP | | | |
| Milan | 115 | 10 Line | SCADA | | uP | | | |
| Milan | 115 | B1 | SCADA | | uP | | | |
| Milan | 13.8 | B1 | SCADA | | uP | | | |
| Milan | 115/13.8 | T1 | SCADA | | uP | | | |
| Millerton | | | | | | L&N | | |
| Millerton | 13.8 | 7081 Ckt. | SCADA | | | | | |
| Millerton | 69 | GE-823 MOS | ----- | | EM | | | |
| Millerton | 69/13.8 | T1 | SCADA | | EM | | | Only one feeder; T1 = 7081 load |
| Millerton | 69 | Line to SMI | SCADA | | | | | Volts |
| Millerton | 69 | Line to PUL | SCADA | | | | | Volts |
| Modena 115kV | | | | | | BM | | |
| Modena 115kV | 13.8 | B1 | SCADA | | uP | | | |
| Modena 115kV | 13.8 | C-1651 BKR. | ----- | | uP | | | |
| Modena 115kV | 13.8 | 5011 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5012 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5013 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Modena 115kV | 115 | EM Line | SCADA | | uP | | | |
| Modena 115kV | 115 | EM-201-PX BKR. | ----- | | uP | | | |
| Modena 115kV | 115 | PX Line | SCADA | | uP | | | |
| Modena 115kV | 115/13.8 | T3 | SCADA | | uP | | | Only has one 13.8 bus; T3 = Bus load |
| Modena 69kV | | | | | | 8890 | | volts |
| Modena 69kV | 69 | B1 | SCADA | | EM | | | |
| Modena 69kV | 69 | MG Line | SCADA | | uP | | | |
| Modena 69kV | 69 | W-941 BKR. | ----- | | EM | | | |
| Modena 69kV | 69 | MG-380 BKR. | ----- | | EM | | | |
| Modena 69kV | 115/69 | T1 | SCADA | | EM/uP | | | GE F35 is installed |
| Modena 69kV | 69/13.8 | T2 | None | | Fuse/uP | | | |
| Montgomery | | | | | | NONE | | |
| Montgomery | 4 | 571 Ckt. | Charts - kW | | | | V4L | Single phase; Vac; Hyd |
| Montgomery | 4 | 572 Ckt. | Charts - kW | | | | V4L | Single phase; Vac; Hyd |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|--------------------|-------------|-------------|--------|----------|--------------------------------|
| Montgomery St. | | | | | | M-4000 | | |
| Montgomery St. | | | | | EM | | | volts |
| Montgomery St. | 13.8 | B1 | SCADA | ..... | EM | ..... | ..... | Volts |
| Montgomery St. | 13.8 | B2 | SCADA | ..... | EM | ..... | ..... | volts |
| Montgomery St. | 13.8 | B3 | SCADA | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | B Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | 4001 Ckt. | Charts - kW/kVAr | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | 4002 Ckt. | Charts - kW/kVAr | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | 4003 Ckt. | Charts - kW/kVAr | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 401 Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 402-3 Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 404 Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 406A/B Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 407A/B Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | 410A/B Ckt. | Charts - kW demand | ..... | EM | ..... | ..... |  |
| Montgomery St. | 4 | B1 | SCADA | ..... | EM | ..... | ..... | Volts |
| Montgomery St. | 4 | B2 | SCADA | ..... | EM | ..... | ..... | volts |
| Montgomery St. | 13.8 | F Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | NB Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | NM Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | R Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | W-507 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | W-508 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | W-509 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8 | WN Line | None | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8/4 | T1 |  | ..... | EM | ..... | ..... |  |
| Montgomery St. | 13.8/4 | T2 | Charts - kW/kVAr | ..... | EM | ..... | ..... | Combine load value |
| Myers Corners | | | | | | 44-550 | | |
| Myers Corners | 13.8 | 8041 Ckt. | Charts - kW | ..... | uP | ..... | ..... |  |
| Myers Corners | 13.8 | 8043 Ckt. | Charts - kW | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | 8044 Ckt. | Charts - kW | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | 8045 Ckt. | Charts - kW | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | 8046 Ckt. | SCADA | ..... | uP | ..... | ..... |  |
| Myers Corners | 69 | KM Line | None | EM | ..... | ..... | ..... |  |
| Myers Corners | 69 | TV Line | None | EM | ..... | ..... | ..... |  |
| Myers Corners | 69 | TV-399-KM BKR. | ..... | EM | ..... | ..... | ..... |  |
| Myers Corners | 13.8 | W-63 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | W-66 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | Feeder M1-75 | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | Feeder M2-76 | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | Feeder M3-91 | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | Feeder M4-90 | ..... | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | B1 |  | ..... | EM | ..... | ..... |  |
| Myers Corners | 13.8 | B2 | SCADA | ..... | EM | ..... | ..... | Combine Bus Volts to one point |
| Myers Corners | 69/13.8 | T1 | | EM | ..... | ..... | ..... |  |
| Myers Corners | 69/13.8 | T2 | SCADA | EM | ..... | ..... | ..... | Combine load value |
| Neversink | | | | | | 2200 | | |
| Neversink | 4 | 391 Ckt. | Charts - kW | ..... | EM | ..... | ..... |  |
| Neversink | 13.8 | 3091 Ckt. | Grid Sense | ..... | EM | ..... | Kyle W | 3 phase; Oil; Hyd |
| Neversink | 69 | HG Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Neversink | 69 | WH Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Neversink | 4 | W-1128 BKR. | ..... | ..... | EM | ..... | ..... |  |
| Neversink | 69 | 69k Bus | SCADA | uP/EM | ..... | ..... | ..... | Volts |
| New Baltimore | | | | | | 2300 | | |
| New Baltimore | 13.8 | 1081 Ckt. | SCADA* | ..... | EM | ..... | ..... | kW |
| New Baltimore | 13.8 | 1082 Ckt. | SCADA* | ..... | EM | ..... | ..... | kW |
| New Baltimore | 13.8 | 1083 Ckt. | SCADA* | ..... | EM | ..... | ..... | kW |
| New Baltimore | 69 | Cap Bank | ..... | EM/uP | ..... | ..... | ..... | Com |
| New Baltimore | 13.8 | Com Equipment | ..... | ..... | ..... | ..... | ..... |  |
| New Baltimore | 69 | CN Line | None | uP | ..... | ..... | ..... |  |
| New Baltimore | 69 | NW Line | None | uP | ..... | ..... | ..... |  |
| New Baltimore | 13.8 | B1 | SCADA | ..... | EM | ..... | ..... | Volts |
| New Baltimore | 69/13.8 | T1 | SCADA | EM/uP | ..... | ..... | ..... | 95P is SEL-587 |

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|--------------------|------------------|-------------|-------------|-------|----------|------------------------|
| | | | | | | NONE | | |
| New Windsor | | | | | | | | No DATA |
| New Windsor | 4 | 461 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 462 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 463 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 464 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 13.8 | UN & UW ATC | None | ----- | uP | ----- | ----- | Combine load value |
| New Windsor | 13.8/4 | T1 | Charts - kW/kVAR | ----- | uP | ----- | ----- | |
| New Windsor | 13.8/4 | T2 | | ----- | uP | ----- | ----- | |
| North Catskill | | | | | | D-20 | | |
| North Catskill | 13.8 | 2001A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2002A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2003A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2004 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2005 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2006 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| North Catskill | 115 | 2 Line | SCADA | EM | ----- | ----- | ----- | |
| North Catskill | 115 | R-2 BKR. | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 115 | RT-7 BKR. | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 115 | T-7 Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| North Catskill | 69 | Cap Bank | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 69 | CL Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | H Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | W-1107 BKR. | ----- | EM/uP* | ----- | ----- | ----- | check on TD-5 |
| North Catskill | 69 | W-269 BKR. | ----- | EM/uP* | ----- | ----- | ----- | check on TD-5 |
| North Catskill | 115 | W-791 BKR. | ----- | uP- 200 | ----- | ----- | ----- | SEL-2BFR |
| North Catskill | 69 | W-269 & W-1107 BKR | ----- | ----- | EM | ----- | ----- | IJS |
| North Catskill | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| North Catskill | 69 | B1 | SCADA | EM/uP | ----- | ----- | ----- | Volts |
| North Catskill | 69 | B2 | SCADA | EM/uP | ----- | ----- | ----- | Volts |
| North Catskill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | Volts: 95BU is DFP-100 |
| North Catskill | 13.8 | B2 | SCADA | ----- | EM/uP | ----- | ----- | Volts: 95BU is DFP-100 |
| North Catskill | 115/69 | T4 | SCADA | EM/uP* | ----- | ----- | ----- | Check on 64 relay |
| North Catskill | 115/69 | T5 | SCADA | EM/uP* | ----- | ----- | ----- | Check on 64 relay |
| North Catskill | 115/13.8 | T6 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| North Catskill | 115/13.8 | T7 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|---------------|-------------|-------------|------|----------|-----------------------|
| North Chelsea | | | | | | BM | | |
| North Chelsea | | | | | | | | |
| North Chelsea | 13.8 | 8051 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8052 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8053 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8054 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8055 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8056 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8057 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8058 Ckt. | SCADA | ---- | uP | ---- | ---- | Com |
| North Chelsea | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| North Chelsea | 115 | AC Line | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | AC-1066 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | DC Line | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | DC-1414 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | FO-1482 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | FO Line | SCADA | uP | ---- | ---- | ---- | 95P is LCB-II |
| North Chelsea | 115 | NF Line | SCADA | uP | ---- | ---- | ---- | 95P is LCB-II |
| North Chelsea | 115 | NF-1116 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | SC Line | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | SC-1566 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 69 | TV Line | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | B-2651 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | B-2652 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | B-2653 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | W-1572 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | B1 | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 13.8 | B1 | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 115/69 | T1 | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115/13.8 | T2 | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115/13.8 | T3 | SCADA | uP | ---- | ---- | ---- | Volts |
| Ohioville | | | | | | 2100 | | |
| Ohioville | 13.8 | 5021 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5022 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5023 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5024 Ckt. | Charts - kW | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5025 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Ohioville | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Ohioville | 115 | Cap Bank | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 69 | O Line | None | uP | ---- | ---- | ---- | |
| Ohioville | 69 | OB Line | None | uP | ---- | ---- | ---- | |
| Ohioville | 115 | OR Line | None | EM | ---- | ---- | ---- | |
| Ohioville | 115 | OR-1075 BKR. | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 115 | PX Line | SCADA | EM/uP | ---- | ---- | ---- | |
| Ohioville | 115 | PX - 1659 BKR. | ---- | uP | ---- | ---- | ---- | |
| Ohioville | 69 | W - 1511 BKR. | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 13.8 | W - 1537 BKR. | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 13.8 | W - 1600 BKR. | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 115 | B1 | SCADA | EM | ---- | ---- | ---- | Volts |
| Ohioville | 69 | 69k Bus | SCADA | EM | ---- | ---- | ---- | Volts |
| Ohioville | 13.8 | B1 | None | ---- | EM | ---- | ---- | |
| Ohioville | 13.8 | B2 | None | ---- | EM | ---- | ---- | |
| Ohioville | 115/13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Ohioville | 115/13.8 | T2 | SCADA | EM | ---- | ---- | ---- | |
| Ohioville | 115/69 | T3 | SCADA | EM/uP-200 | ---- | ---- | ---- | 95BU is SEL-251 |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|----------|-------------|-------------|------|----------|--------------------------------------|
| | | | | | | 2300 | | Grid owns Line |
| Pleasant Valley | 115 | 8 Line | SCADA** | uP | | | | |
| Pleasant Valley | 115 | 10 Line | SCADA | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 12 Line | SCADA** | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 13 Line | SCADA** | uP | | | | 95BU is Optimho; in replacement plan |
| Pleasant Valley | 115 | C Line | SCADA | EM/Gen-1 | | | | |
| Pleasant Valley | 115 | M Line | SCADA | EM | | | | |
| Pleasant Valley | 115 | X Line | SCADA | uP | | | | Com |
| Pleasant Valley | 115 | Com Equipment | | | | | | SEL-279 |
| Pleasant Valley | 115 | R-12 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-13 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-8 BKR. | | uP-200 | | | | |
| Pleasant Valley | 115 | RC-6 BKR. | | EM | | | | |
| Pleasant Valley | 115 | RM BKR. | | EM | | | | |
| Pleasant Valley | 115 | RX-4 BKR. | | uP | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-61 BKR. | SCADA** | EM | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-62 BKR. | SCADA** | EM | | | | |
| Pleasant Valley | 115 | R-643 BKR. | | EM | | | | |
| Pleasant Valley | 115 | R-81 BKR. | | EM | | | | |
| Pleasant Valley | 115 | B1 | SCADA | EM | | | | Volts |
| Pleasant Valley | 115 | B2 | SCADA | EM | | | | Volts |
| Pleasant Valley | 69 | E Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | G Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | Q Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | B1 | SCADA | uP | | | | Volts |
| Pleasant Valley | 13.8 | W-387 | | | EM | | | |
| Pleasant Valley | 345/115 | S1 | SCADA | | | | | Con Ed owns bank and protection |
| Pleasant Valley | 115/69 | T10 | SCADA | EM | | | | |
| Pulvers Corners | | | | | | D-20 | | |
| Pulvers Corners | 13.8 | 7091 Ckt. | SCADA | | EM | | V4L | single phase; vac; hyd |
| Pulvers Corners | 13.8 | 7092 Ckt. | SCADA | | EM | | Kyle L | single phase; oil; hyd |
| Pulvers Corners | 34.5 | 7395 Ckt. | SCADA | EM | | | RVE | 3 phase; oil; hyd |
| Pulvers Corners | 13.8 | Com Equipment | | | | | | Com |
| Pulvers Corners | 69 | Cap Bank | | EM | | | | |
| Pulvers Corners | 69 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 34.5 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 13.8 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 69/13.8 | T1 | SCADA | Fuse | | | | |
| Pulvers Corners | 69/34.5 | T2 | None | EM/uP | | | | 95P is SR-745 |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|-------------------|-------------|-------------|------|----------|---------------------------------|
| Reynolds Hill | | | | | | 2100 | | |
| Reynolds Hill | 13.8 | 6001 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Reynolds Hill | 13.8 | 6004 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | 6005 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Reynolds Hill | 13.8 | 6008 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | ----- | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Reynolds Hill | 115 | DR-1418 BKR. | ---- | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | DR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | HR-1285 BKR. | ---- | EM | ---- | ---- | ---- | |
| Reynolds Hill | 115 | HR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 115 | IR Line | SCADA | uP | ---- | ---- | ---- | |
| Reynolds Hill | 13.8 | B Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | W Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PD Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PH Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PK Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PO Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PQ Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PS Line | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 13.8 | PU Cable | SCADA | ---- | uP | ---- | ---- | |
| Reynolds Hill | 115 | T-31 BKR. | ---- | EM | ---- | ---- | ---- | |
| Reynolds Hill | 115 | B1 | SCADA | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 115 | B2 | SCADA | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 13.8 | B1 | SCADA | ---- | EM/uP | ---- | ---- | 95BU is SEL-501 |
| Reynolds Hill | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | Volts |
| Reynolds Hill | 13.8 | B3 | SCADA | ---- | uP | ---- | ---- | Volts |
| Reynolds Hill | 115 | W-1543 BKR. | ---- | EM | ---- | ---- | ---- | Volts |
| Reynolds Hill | 115/13.8 | T3 | SCADA | EM/uP | ---- | ---- | ---- | 95P is SEL-351A |
| Reynolds Hill | 115/13.8 | T4 | SCADA | EM/uP | ---- | ---- | ---- | 95P is SEL-351A |
| Rhinebeck | | | | | | 2300 | | |
| Rhinebeck | 13.8 | 7051 Ckt. | Charts - kW/SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | 13.8 | 7052 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7053 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7054 Ckt. | Charts - Amps | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | 7055 Ckt. | Charts - kW | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Rhinebeck | 13.8 | 7056 Ckt. | SCADA | ---- | uP- 200/ uP | ---- | ---- | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | ----- | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| Rhinebeck | 69 | Cap Bank | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 115 | ER Line | SCADA* | uP | ---- | ---- | ---- | Amps |
| Rhinebeck | 115 | LR-830-MR BKR. | ---- | uP | ---- | ---- | ---- | |
| Rhinebeck | 115 | MR Line | None | uP | ---- | ---- | ---- | |
| Rhinebeck | 69 | Q-1471 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-1017 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-1238 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 69 | W-258 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 13.8 | W-367 BKR. | ---- | EM | ---- | ---- | ---- | |
| Rhinebeck | 69 | Q Line | SCADA* | ---- | EM | ---- | ---- | Volts |
| Rhinebeck | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | |
| Rhinebeck | 13.8 | B2 | none | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Rhinebeck | 69 | 69kV Bus | SCADA | ---- | EM | ---- | ---- | Volts |
| Rhinebeck | 69/13.8 | T1 | SCADA* | EM | ---- | ---- | ---- | Amps & Volts |
| Rhinebeck | 69/13.8 | T2 | SCADA* | EM | ---- | ---- | ---- | Amps & Volts |
| Rhinebeck | 115/13.8 | T4 | SCADA | EM | ---- | ---- | ---- | |
| Rhinebeck | 115/69 | T3 | SCADA | EM | ---- | ---- | ---- | |

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Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|---------------|----------|-------------|-------------|------|----------|----------------|
| | | | | | | 2100 | | |
| Rock Tavern 345kV | | | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 311 Line A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 311 Line A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 3456 BKR. | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 3456 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 3456 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Cap Bank 1 A1 | SCADA* | EM | ---- | | | Combined MVArS |
| Rock Tavern 345kV | 345 | Cap Bank 1 A2 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A1 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A2 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 34 Line A1 | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 34 Line A2 | | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 37751 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 37751 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 37751 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 37752 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 37752 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 37752 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 377 Line A1 | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 377 Line A2 | | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 4255 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 4255 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 4255 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 42 Line A1 | ---- | SS | ---- | | | |
| Rock Tavern 345kV | 345 | 42 Line A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 346 | C3351 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3351 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3351 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3352 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3352 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3352 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | C3353 BKR. | ---- | UP- 200 | ---- | | | |
| Rock Tavern 345kV | 345 | C3353 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | C3353 BF A2 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 31153 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 31153 BF A1 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 31153 BF A2 | ---- | UP | ---- | | | |
| Rock Tavern 345kV | 345 | 31154 BKR. | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 31154 BF A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | 31154 BF A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | Com Equipment | ---- | ---- | ---- | | | Com |
| Rock Tavern 345kV | 345 | B1 A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | B1 A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | B2 A1 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345 | B2 A2 | ---- | EM | ---- | | | |
| Rock Tavern 345kV | 345/115 | T1 A1 | SCADA | EM | ---- | | | |
| Rock Tavern 345kV | 345/115 | T1 A2 | | UP | ---- | | | |
| Rock Tavern 345kV | 345/115 | T3 A1 | SCADA | UP | ---- | | | |
| Rock Tavern 345kV | 345/115 | T3 A2 | | UP | ---- | | | |

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Electric Substation Up. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-----------------|-------------|-------------|-------------|-------|----------|--------------------------------|
| | | | | | | 2400 | | |
| Sand Dock | | | | | | | | |
| Sand Dock | 13.8 | 6011 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | BP-1296 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | BP-1570 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 1 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 2 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 3 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | GB Line | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 115 | KC-1447-SC BKR. | ---- | EM | ---- | ---- | ---- | |
| Sand Dock | 115 | KC Line | None | EM | ---- | ---- | ---- | |
| Sand Dock | 115 | SC Line | None | UP | ---- | ---- | ---- | |
| Sand Dock | 13.8 | SH-886 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | SH-911 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-902 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-909 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-910 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-116 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1449 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1453 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1467 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 115 | B1 | SCADA | ---- | ---- | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 115 | B4 | ---- | ---- | ---- | ---- | ---- | |
| Sand Dock | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 13.8 | B2 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | B4 | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Sand Dock | 13.8 | T3 | ---- | EM | ---- | ---- | ---- | |
| Sand Dock | 13.8 | T4 | SCADA | EM | ---- | ---- | ---- | |
| Saugerties | | | | | | Orion | | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-------------------|-------------|-------------|-------------|------|----------|--------------------------------------|
| Shenandoah | | | | | | 2400 | | |
| Shenandoah | 115 | East Bus | SCADA | EM | ---- | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 115 | West Bus | | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B2 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B4 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B5 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B6 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B7 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B8 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 1 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 2 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 3 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 4 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 5 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 6 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B-4451 BKR. (CB1) | ---- | ---- | UP | ---- | ---- | |
| Shenandoah | 13.8 | 8071 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | 8072 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 115 | EF Line | None | uP/Gen-1 | ---- | ---- | ---- | 95BU is Optimho; in replacement plan |
| Shenandoah | 115 | FS Line | None | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | EF-1514 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-739 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-892-EF BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-959 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S1 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S2 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S3 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S4 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S5 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S6 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S7 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S8 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S9 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S10 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S11 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S12 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S13 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S14 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S15 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 115/13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T2 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T3 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T4 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T5 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T6 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T7 | SCADA | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | W-1266 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1279 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1450 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1593 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-664 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-665 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-802 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-803 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-805 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-807 BKR. | ---- | ---- | EM | ---- | ---- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------------|--------------------|------------------|----------|-------------|-------------|--------|----------|---|
| Rock Tavern 115kV | | | | | | 44-550 | | |
| Rock Tavern 115kV | 115 | B1 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | B2 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | 115-0.48kV SST | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | Com Equipment |  | ..... | ..... | ..... | ..... | Com |
| Rock Tavern 115kV | 115 | D Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | D-448 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | J Line | SCADA* | GEN-1/EM | ..... | ..... | ..... | 95P is a DLP; identified in replacement program; Amps |
| Rock Tavern 115kV | 115 | J-788 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RD Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RD-809 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RJ Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RJ-818 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL Line | SCADA | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL-684 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-467 BKR. | ..... | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-681 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-814 BKR. | ..... | EM/UP | ..... | ..... | ..... | SEL-351 |
| Rock Tavern 115kV | 115 | WM Line | none | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115/69 | T2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | | | | | | 2100 | | |
| Roseton Switchyard | 345 | 30356 (B6) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A2 | SCADA | EM/UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31151 (B1) BKR | ..... | EM | ..... | ..... | ..... | SEL-501 for DBC |
| Roseton Switchyard | 345 | 31152 (B1) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B1) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B2 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U1 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U2 | SCADA | EM | ..... | ..... | ..... |  |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|-------------------|-------------|-------------|-------|----------|---|
| Smith Street | | | | | | 2300 | | Radio to INW |
| Smith Street | 4 | 631 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Smith Street | 4 | 632 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Smith Street | 4 | 633 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Smith Street | 4 | 634 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Smith Street | 13.8 | MS Line | None | ----- | EM | ----- | ----- | |
| Smith Street | 13.8 | PQ Line | None | ----- | EM | ----- | ----- | |
| Smith Street | 13.8 | PS Line | None | ----- | EM | ----- | ----- | |
| Smith Street | 13.8 | W Line | None | ----- | EM | ----- | ----- | Volts |
| Smith Street | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Smith Street | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Smith Street | 4 | B1 | SCADA | ----- | uP | ----- | ----- | Volts |
| Smith Street | 4 | B2 | SCADA | ----- | uP | ----- | ----- | |
| Smith Street | 13.8/4 | T1 | None | ----- | EM | ----- | ----- | |
| Smith Street | 13.8/4 | T2 | None | ----- | EM | ----- | ----- | |
| Smithfield | | | | | | 8890 | | |
| Smithfield | 13.8 | 7095 Ckt. | SCADA | ----- | uP | ----- | ----- | Com |
| Smithfield | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | 95P is SEL-267 |
| Smithfield | 69 | E Line | None | uP- 200/uP | ----- | ----- | ----- | 95P is SEL-267; Volts & Amps |
| Smithfield | 69 | FV Line | SCADA* | uP- 200/uP | ----- | ----- | ----- | Amps |
| Smithfield | 69 | GE Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| Smithfield | 69 | S Line | SCADA* | EM | ----- | ----- | ----- | Volts & Amps |
| Smithfield | 69 | SA Line | SCADA* | EM | ----- | ----- | ----- | Volts |
| Smithfield | 69 | B2 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Smithfield | 69 | B3 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Smithfield | 69/13.8 | T1 | None* | ----- | ----- | ----- | ----- | Only one feeder; T1 = 7095 load |
| South Cairo | | | | | | 8890 | | |
| South Cairo | 13.8 | 2041 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2042 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2043 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| South Cairo | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| South Cairo | 69 | CF Line | None | EM/uP | ----- | ----- | ----- | 79 done with NLR |
| South Cairo | 69 | CL Line | None | uP | ----- | ----- | ----- | |
| South Cairo | 13.8 | B1+G1 | Charts - kW/SCADA | ----- | EM | ----- | ----- | SCADA Volts |
| South Cairo | 69/13.8 | T1 | Charts - Amps | EM/uP | ----- | ----- | ----- | 95P is SEL-587 |
| South Wall St. | | | | | | None | | |
| South Wall St. | 4 | 111 Ckt. | Grid Sense | ----- | EM | ----- | Kyle L | Single Phase; Oil; Hyd |
| South Wall St. | 4 | 112 Ckt. | Grid Sense | ----- | EM | ----- | Kyle L | Single Phase; Oil; Hyd; missing GS data |
| South Wall St. | 13.8/4 | T1 | Charts - kW/kVAr | ----- | EM | ----- | ----- | |
| Spackenkil | | | | | | Orion | | |
| Spackenkil | 13.8 | 6041 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | 6042 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | 6043 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | 6044 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | 6045 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | 6046 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | 6047 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | 6048 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | |
| Spackenkil | 13.8 | KR Line | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | KS Line | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | MC Line | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | MC-200-SK BKR. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 115/13.8 | T1 | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 115/13.8 | T2 | SCADA | ----- | uP | ----- | ----- | |
| Staatsburg | | | | | | BMI | | |
| Staatsburg | 13.8 | 7041 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Staatsburg | 13.8 | 7042 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Staatsburg | 13.8 | 7043 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Staatsburg | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | |
| Staatsburg | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Staatsburg | 69/13.8 | T1 | SCADA | ----- | uP | ----- | ----- | |

783

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-------------------|------------------|-------------|-------------|--------|----------|--------------------------------------|
| Standfordville | | | | | | M-4000 | | |
| Standfordville | 13.8 | 7071 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single phase; vac; hyd |
| Standfordville | 13.8 | 7072 Ckt. | MV-90 | ----- | EM | ----- | ----- | Volts |
| Standfordville | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Standfordville | 69/13.8 | T1 | MV-90 | Fuse | ----- | ----- | ----- | |
| Sturgeon Pool | | | | | | 2100 | | |
| Sturgeon Pool | 4 | 341 Ckt. | Grid Sense | ----- | EM | ----- | Kyle W | 3 phase; oil; hyd; missing data |
| Sturgeon Pool | 4 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Sturgeon Pool | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | O Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | P Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | 69k Bus | SCADA | EM | ----- | ----- | ----- | Volts |
| Sturgeon Pool | 69/13.8 | T5 | None | Fuse | ----- | ----- | ----- | |
| Sugarloaf | | | | | | 44-500 | | |
| Sugarloaf | 115 | SD Line | SCADA | EM | ----- | ----- | ----- | Combine load value |
| Sugarloaf | 115 | SJ Line | SCADA | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | SL Line | None | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| Sugarloaf | 115/69 | O & R Transformer | SCADA | EM | ----- | ----- | ----- | |
| Tinkertown | | | | | | 2300 | | Radio to PVL |
| Tinkertown | 13.8 | 7022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Tinkertown | 69/13.8 | T1 | SCADA | Fuse | ----- | ----- | ----- | |
| Tinkertown | 69/13.8 | T2 | SCADA | Fuse | ----- | ----- | ----- | |
| Tioronda | | | | | | M-4000 | | |
| Tioronda | 13.8 | 8085 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8086 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8087 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 115 | W-566 Ckt. Sw | ----- | EM | ----- | ----- | ----- | Agastat |
| Tioronda | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Tioronda | 115/13.8 | T1 | Charts - kW/kVAr | EM | ----- | ----- | ----- | |
| Todd Hill | | | | | | 2200 | | |
| Todd Hill | 13.8 | 6051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6055 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6056 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6057 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Todd Hill | 115 | A Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 115 | A-520-C BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | C Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 13.8 | W - 524 BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Todd Hill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is SEL-351A; Volts |
| Todd Hill | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Todd Hill | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95P is SEL-587 |
| Todd Hill | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |

784

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|----------------|-------------|-------------|--------|----------|--------------------------------|
| Union Ave | | | | | | 2200 | | Volts |
| Union Ave | 115 | B1 | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | RJ Line | SCADA | EM | ----- | ----- | ----- | SEL-351A for BF |
| Union Ave | 115 | RJ-52 BKR. | ----- | EM/uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB Line | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB-51 BKR. | ----- | uP | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UN Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UW Line | SCADA* | EM | ----- | ----- | ----- | |
| Union Ave | 115 | W-1095 BKR. | ----- | EM | ----- | ----- | ----- | |
| Union Ave | 13.8 | B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B3 | SCADA | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B4 | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B3-B2 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B4-B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4041 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4042 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4043 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4044 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4045 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4046 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4047 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4055 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Union Ave | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T2 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T3 | SCADA | uP | ----- | ----- | ----- | |
| Van Wagner | | | | | | NONE | | |
| Van Wagner | 4 | 731 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Van Wagner | 4 | 732 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Vinegar Hill | | | | | | M-4000 | | |
| Vinegar Hill | 34.5 | 2389 Ckt. | MV-90 | ----- | uP | ----- | RVE | 3 phase; oil; hyd |
| West Balmville | | | | | | 2300 | | |
| West Balmville | 115 | B2 | SCADA | EM | ----- | ----- | ----- | Volts |
| West Balmville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Combine Bus Volts to one point |
| West Balmville | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | B Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 13.8 | 4011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | 4012 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4013 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4014 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4015 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| West Balmville | 115 | DB Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DB-875 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DW Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | DW-662 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | F Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | R Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 115 | W-478 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | W-855 BKR. | ----- | ----- | uP | ----- | ----- | |
| West Balmville | 115 | WN Line | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | | T1 | SCADA | EM | ----- | ----- | ----- | Combine load value |
| West Balmville | | T2 | | EM | ----- | ----- | ----- | |

785

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-------------------|----------|-------------|-------------|--------|----------|--------------------------------------|
| Westerlo | | | | | | BM | | |
| Westerlo | 13.8 | 1091 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1092 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1093 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Only has one 13.8 bus; T1 = Bus load |
| Westerlo | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | Cap Bank | ----- | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | NW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW-1500-NW BKR. | ----- | uP | ----- | ----- | ----- | |
| Wiccopee | | | | | | L&N | | |
| Wiccopee | 115 | FS Line | None | EM | ----- | ----- | ----- | |
| Wiccopee | 115 | WP Line | None | uP | ----- | ----- | ----- | |
| Wiccopee | 115 | FS - 1652-WP BKR. | ----- | EM | ----- | ----- | ----- | |
| Wiccopee | 13.8 | F1-292 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | F2-280 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-368 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-378 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-632 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-636 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #3) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #9) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B1 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B2 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Wiccopee | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Wiccopee | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Woodstock | | | | | | M-4000 | | |
| Woodstock | 13.8 | 3011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3012 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3013 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3014 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 13.8 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 69/13.8 | T2+SR Line | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 + B2 | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T1 | MV-90 | ----- | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 | MV-90 | ----- | ----- | ----- | ----- | |

Attachment 6

| | Station | Cost |
|------|-----------------|-------------|
| 2012 | Dashville | \$190,000 |
| | East Walden | \$610,000 |
| | Tioronda | \$200,000 |
| 2013 | Coxsackie | \$130,000 |
| | South Cairo | \$160,000 |
| | East Park | \$200,000 |
| | Pleasant Valley | \$360,000 |
| | Todd Hill | \$160,000 |
| 2014 | Sand Dock | \$510,000 |
| | Fishkill Plains | \$480,000 |
| | South Wall St. | \$84,000 |
| 2015 | Manchester | \$340,000 |
| | Forgebrook | \$730,000 |
| 2016 | Rock Tavern | \$1,060,000 |
| | | |
| Subs | | |
| | | |
| | | |

Preliminary
Copy

Submission Date: April 11, 2023
Submitted By: Brett Arteta

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Roseton 345 kV Relay Upgrade **Work Order #:**
Budget Group: Electric **Budget Category:** 13 **Funding Project Number:** 1-1312-98-19
Is this a Specific Project, Program or Blanket? Specific **Target Schedule - Start:** 1/1/2027 **In-Service:** 12/1/2029

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

A variety of equipment exists in Central Hudson substations, including protective relays, meters, recloser controls, and other control & communications equipment such as Remote Terminal Units (RTUs). Each of these components serves an integral role in contribution to the overall, integrated substation protection, control, and monitoring function. This equipment is at the end of its useful life and must be upgraded to current standards.

Describe specific scope exclusions, assumptions and constraints:

Part of the original ESP Infrastructure Replacement Program that has been broken out into individual projects. All remaining electromechanical relays at Roseton 345 kV Substation will be upgraded to current microprocessor relay standards.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

Risk of equipment failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$4,161,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 391,000 | 0 | 0 | 0 | 0 | 11,000 | 325,000 | 55,000 |
| | Labor (Monthly Payroll) | 195,000 | 0 | 0 | 0 | 0 | 5,000 | 162,000 | 28,000 |
| | Stock Materials | 195,000 | 0 | 0 | 0 | 0 | 5,000 | 162,000 | 28,000 |
| | Non-Stock Material (A/P taxable) | 781,000 | 0 | 0 | 0 | 0 | 22,000 | 649,000 | 110,000 |
| | Contractors (A/P tax exempt) | 274,000 | 0 | 0 | 0 | 0 | 8,000 | 229,000 | 37,000 |
| | Overheads | 1,953,000 | 0 | 0 | 0 | 0 | 54,000 | 1,623,000 | 276,000 |
| | AFUDC* | 117,000 | 0 | 0 | 0 | 0 | 3,000 | 97,000 | 17,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,906,000 | 0 | 0 | 0 | 0 | 108,000 | 3,247,000 | 551,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 38,000 | 0 | 0 | 0 | 0 | 0 | 8,000 | 30,000 |
| | Labor (Monthly Payroll) | 77,000 | 0 | 0 | 0 | 0 | 0 | 17,000 | 60,000 |
| | Contractors (A/P tax exempt) | 13,000 | 0 | 0 | 0 | 0 | 0 | 3,000 | 10,000 |
| | Overheads | 127,000 | 0 | 0 | 0 | 0 | 0 | 27,000 | 100,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 255,000 | 0 | 0 | 0 | 0 | 0 | 55,000 | 200,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|----------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,912,700 Maximum (\$): 5,409,300

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

1. Relays - The relays protect the electric transmission and distribution systems and can provide oscillography, targets, and phasor data. Electric System Protection (ESP) uses the relays to gather information on faults, including fault characteristics, fault locations, and phasor data. ESP interprets the oscillography data and then communicates our conclusions to: System Operations as an information point of contact; 2) Customer Services (Line Forces) to aid in fault locating and thereby limiting patrol time and area; 3) Operations Services for cases where there may be equipment issues.
2. Meters - The meters provide AC system quantities that are used to operate safely and to plan effectively for future system needs. The Electric Planning & Reliability area uses meter information for day-to-day operations (e.g., switching) and to aid in identifying and addressing locations requiring system reinforcements. System Operations (Sys Ops) uses meter data to monitor and operate the CH transmission system within the ratings of those facilities.
3. Controls and Communications - The RTUs, PLCs, and data concentrators provide status feedback and remote control capability; they also act as a conduit for meter and relay data. Sys Ops relies on the data provided by the RTUs and PLCs to monitor the status of the system from a centralized location, enabling them to respond quickly to system abnormalities. Also, Sys Ops has the ability to perform control operations through the RTUs and PLCs.

Equipment and Functions:

A variety of equipment exists in Central Hudson substations, including protective relays, meters, reclosers, and controls and communications instruments such as Remote Terminal Units (RTUs) and Programmable Logic Controllers (PLCs). Each of these components serves an integral role in contribution to the overall, integrated substation protection, control, and monitoring function. Various departments rely on information from these devices in order to perform their jobs, including Operations Services, Customer Services, line forces, Electric Transmission Planning, Distribution Planning, System Operations, Energy Accounting, and Electric System Protection. Brief summaries of these components are included in **Attachments I through 4**. The intention of this memo is to identify the concerns with continuing to use the identified outdated equipment, detail the benefits of combining functions when replacing equipment, establishing a policy for substation relaying, control, & monitoring functions, and laying out a plan to incorporate these components into a comprehensive substation renovation program.

I. Introduction:

Re: Substation Relays, Meters, Controls and Communications Infrastructure Opportunities

Mr. J.J. Borchert

June 24, 2011

Copy to:

Mr. P.E. Haering
 Mr. H.W. Turner
 Mr. P. Harpols

Mr. J. M. May
 Mr. D. J. Wittmann
 S.R. #2011-07

Waste Reduction:

New equipment can be utilized in an integrated fashion to eliminate or minimize the following tasks and unnecessary equipment (Excerpts are taken from the attached memos):

- Reading chart meters and manually entering data into the Meter Database (MDB).
 - Chart meters cost CH at least \$275,000 annually in labor expense (1130 man-hours), which can be devoted to other work.
- MV-90 circuits not for revenue or interchange metering purposes.
 - MV-90 circuits from Verizon cost CH approximately \$24,000 annually in expense.
- Running fault studies manually to determine fault locations.
 - Manual fault locating costs CH approximately \$15,000 annually in labor expenses.
- Metering transducers, auxiliary relays, timing relays, reclosing relays, and coil monitors.

Supporting the Future State:

New equipment, properly implemented and integrated, will better support current functions and create flexibility for added future functions as follows:

- Provide continuous metering data for the entire system, eliminating information “gaps” as a result of non-continuous and non-contiguous metering.
- Provide for robust planning capabilities and switching operations through use of trending and real-time data.
- Enable more accurate forecasting of area loads to increase risk tolerance, possibly resulting in deferral of substation and distribution projects.
- Offer flexibility for Distribution Automation and Smart Grid initiatives.
- Improve reliability and reduce CAIDI through automated event reporting and fault location.

II. Current State:

This section describes the mix of equipment by component, system wide, and the limitations of the non-digital devices.

1. Relays

There are 3500 active protection relays on the system, excluding LORs, SPRs, Regulator Controls, Recloser Controls, and Communication equipment.

Attachment 1

Copy to: Mr. P.E. Haering
Mr. H.W. Turner

Mr. P. Harpolis
Mr. J. M. May
S.R. #2011-03

June 23, 2011

Mr. J.J. Borchert

Re: Transmission & Distribution Protective Relay Review

Introduction:

Protective Relays represent a vital component for the reliable operation of the Central Hudson Electric Transmission and Distribution Systems. CH substations contain a generational mix of protective relay equipment that differs in capability, ease of use, and reliability. Relay technology has advanced; microprocessor-based (digital) relays not only offer numerous protection functions, but they provide metering capability as well in a compact footprint. This memo summarizes the existing transmission and distribution protective relay equipment, as well as recommendation for replacement options.

Discussion:

Relays perform various functions aimed at timely isolation of faulted areas and rapid restoration once the fault has been cleared. Some of the functions that relays provide include zone distance protection, high-speed pilot protection, overcurrent protection, differential protection, and automatic reclosing.

A. Outdated Devices:

The majority of substations contain a group of single-component electromechanical relays for each protected facility; these relays are responsible for protection functions exclusively. At these locations, metering is performed separately, also often in a single-function fashion. There are also stations that have more recent (but still outdated) types of relays, including solid state and early microprocessor relays. These relays have been failing recently, and a replacement program was created last year to address the concern with these relays. The following is a list (in order of decreasing replacement priority) of common relay types found in substations along with the reason that they have been superseded:

- Electromechanical Relays: These relays are obsolete for the reasons previously described (i.e.; physical size, calibration drift, single-function capabilities, etc).
- Solid State Relays: Like electromechanical relays, the relays on the CH system typically are single function. They have advanced technologically past the electromechanical relays, but not quite to the level of digital relays. They monitor current and voltage waveforms through analog circuits, which then are compared through potentiometers to user defined settings. They generally are unsupported, spare parts are hard to locate, and they contain components that deteriorate over time.

- 1st Generation Microprocessor Relays: Please see the 2010 Budget Memo, **Re: Relay Replacement Program for Upgrade of 1st Generation Microprocessor Relays Remaining on the Central Hudson System**, dated July 1, 2010, for the existing program.
- Schweitzer Engineering Laboratories (SEL) 200 Series Relays (SEL-251/ 267/ 279/ 2BFR): These relays are digital, but they make use of early logic processing methods, in which creating settings isn't as user-friendly as in modern digital relays. SEL has discontinued manufacturing parts for most of these relays, and limited service is provided with them.
- Basler BE1-79M Relays: These relays are multi-shot reclosing relays; they only provide the reclosing function. There are more recently developed relays that provide numerous protection functions and also perform reclosing operations and metering functions.
- Basler BE1-851 (H) Relays: These relays are multifunction, digital relays; however, they only receive current inputs. So, the only meter data available is Amps. Multifunction relays exist that receive current and voltage inputs and provide MW & MVA_r data as well as a much larger variety of protection options.

B. Retrofit/Replacement Options:

Digital relays offer multiple protection functions as well as metering and substation equipment diagnostics. The use of multifunction digital relays greatly reduces the required panel space. Also, with few moving parts, digital relays do not need recalibration to remain accurate. Additionally, digital relays and digital relay controls offer the ability to have longer durations between maintenance cycles due to the combination of their internal error checking and their constantly monitored alarm outputs to SCADA.

Digital relays can be specified to offer equipment diagnostics for the devices they protect. For example, digital transformer relays have the ability to monitor the through-fault history of the transformers and to make determinations on the required maintenance as a result. The same case is true for feeder breakers protected by distribution relays.

- Digital Relays: A collection of proven products exists by a variety of manufacturers. These relays are microprocessor-based, multi-function relays that provide a large variety of protection, metering, and equipment diagnostic capability; they can be used for various protective functions. Some manufactures include SEL, GE, and Basler*. Electric System Design (ESD) has standardized the design to use SEL as primary protection and either GE or Basler relays for backup protection.

* Basler provides a BE1-951 relay, which conveniently fits into electromechanical relay panel cutouts.

C. Additional Considerations:

- o Data Concentrator (SEL-2032): This relay has 16 ports and can act as a data concentrator, a phone switch, and a basic logic processor. The 2032 connects to the RTU, acting as a slave device; it connects to other digital relays, polling them for meter information as a master. Once in the 2032, the meter data can be mathematically manipulated to maintain integrity and precision before it is transferred to a compatible RTU. The 2032 also is connected to a phone line to provide dial-in remote access for trained personnel, enabling event retrieval and relay interrogation.
- o Time Synchronization Devices: Various devices exist on the market that provides a means of time synchronization, including satellite clocks. These clocks provide a unified signal based on a sole source located at zero time offset. To avoid confusion between time zones, UTC time is used as a standard. Sequence of events reconstruction truly realizes the value of having all of the station relays linked to a universal source.

Conclusions:

Upgrading to digital relays provides the following benefits:

- ◆ They offer a more compact footprint and much more capability than their large, single-function predecessors.
- ◆ They provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB/eDNA with little human intervention.
- ◆ The diagnostic capabilities of digital relays should be used to help in the condition assessment of substation equipment.
- ◆ They have a proven track record of good quality and high availability, along with excellent manufacturer support for current models.
- ◆ They provide oscillography, targets, and phasor data that can be accessed from a remote location through a modem. This capability assists in timely and accurate fault analysis.
- ◆ They have lower maintenance costs because they rarely fail and allow for an increased maintenance cycle (i.e. an increase of 50%; from 4 yrs. to 6 yrs.).

Eric A. Loeven

Full integration requires a DNP compatible Remote Terminal Unit described in the "RTU Review" memo.

Attachment 2

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-04

June 23, 2011

Mr. J.J. Borchert

Re: Substation Metering Review

Introduction:

Substation metering data is used to plan and operate the Central Hudson Transmission and Distribution Systems. These metering data are necessary for the safe operation of existing facilities as well as the cost effective planning and design of new facilities. Many transmission lines, substation transformers, and distribution circuits have their MW & MVA_r flows monitored by the Energy Management System (EMS) and have the resultant data stored in the Meter Data Base (MDB) and Historian (eDNA). Many other circuits either are not metered or utilize local indicating metering, such as graphic charts or drag hands, to register data.

Technology has advanced; there are much more reliable and efficient means of measuring and transmitting metered load data, including by means of digital relays. This memo summarizes the existing meter equipment and the replacement options, as well as provides recommendations on the best option to gain appropriate metering data in the most efficient manner.

Discussion:

A large number of substations contain transducer-based meters, which register and report their data directly to a Remote Terminal Unit (RTU) by means of an analog signal. A handful of other stations contain chart meters, which provide local indication. In the stations that have chart meters, the metering is often registered in single function fashion, with circuit current measured in Amps and transformer load measured in Kilowatts and Kilovars. The meter data that is most useful for planning and operating the system is provided in the form of Watts and Vars. Additionally, the panel space taken up by the charts can be reduced greatly with the installation of digital relays, which offer protection functions as well as metering functions.

Technological advances have led to multi-function, digital relays with the capability to meter accurately. The digital relays can transfer instantaneously metered values to EMS. Once there, the data is stored in the Historian, integrated, and the peak hourly values are calculated and transferred to the MDB with little human intervention.

A. Outdated Devices:

The following is a list of common metering methods used in CH substations along with the reason that they have been superseded:

- Chart Meters: Graphic charts monitor single values such as MW, MVA_r, or circuit Amps. These charts rely on diligent maintenance practices to ensure that they function

as designed. Many of the charts run out of ink between maintenance cycles or fail mechanically, leaving "gaps" in data. Even the charts that record properly pose difficulty in capturing their data. The process of going to the substations to collect the charts, reviewing the charts and interpreting the data, and entering the data manually into the MDB is time consuming. Due to the cumbersome nature of the process, the charts are only interpreted for the annual system peaks, which leaves 2-4 data points in the MDB for that circuit or station element to use in planning.

- Other Local Indication Metering: Charts are not the only method of local metering. There are also substation Ammeters, Voltmeters, etc. that are remnants of a time when stations were manned and operated manually. Many of these devices are unsupported and have limited parts available.
- MV-90: An alternative method to metering by charts is to meter through MV-90. MV-90 is a system that uses a recorder to receive metered data directly from the instrument transformers and relies upon a dedicated telephone line to transmit that data to the master station collector; it is used for revenue metering as well as substation metering. Once the master has the data, it is transferred to the MDB. This method requires a dedicated line and the associated expenses.
- No Metering: Locations exist on the system where there are no methods of capturing load data. Some of these locations rely on grouped metering; they do not provide the granularity of individual circuit load data. At other locations, it hasn't been cost justified to install/repair any metering.
- Transducers: The transducers are wired directly to secondary AC quantities from current transformers and potential transformers. They convert the input quantities into an analog output signal, which is wired to the analog inputs of an RTU.
- Load checks: On a heavily loaded day, load checks are performed on circuits without automatic metering by having a worker physically go to a point on a circuit and manually perform a metering check.

B. Retrofit/Replacement Options:

- Digital Relays: Microprocessor-based relays not only offer protection functions; they provide metering capability as well in a compact footprint. The digital metering data provided by the digital relays is extremely accurate and has the ability to be entered into the MDB through Supervisory Control and Data Acquisition (SCADA) automatically once proper infrastructure is in place. The relays offer the ability to register numerous metering values simultaneously and in comm. format so that individual wires aren't needed for each metered point; rather, a single cable can be used to transmit multiple data points. Also, a separate phone line is not required for this method.
- Bitronics Power Meters: These meters provide bi-directional Watt and Var meter values as well as Volt and Amp values. They are capable of transmitting data through analog signal or through communication protocol to an RTU. They are cheaper alternatives, but do not provide any protection functions.

- Grid Sense: These are clip-on meters that report to a nearby data concentrator via radio. The data concentrator is linked to a POT's line outside of the station (no need for a Positron). The newest models provide directional Watt and Var metering, and they have the ability to report data in selectable time increments to the meter database. They represent a lower cost option and provide limited fault recording capabilities, but they do not provide protection functions.

Conclusions:

- ◆ Reading chart meters takes a great deal of time, and many of the charts are unsupported and are labor intensive to maintain. Data "gaps" exist when using chart meters, and the meters provide only a few, data points to the MDB each year, which need manual entry. The materials to repair and/or replace the charts are in short supply.
- ◆ Digital relays provide digital metering capability. With proper SCADA infrastructure in place, the digital relays can transfer instantaneously metered values to EMS, and ultimately to the MDB with little human intervention.
- ◆ The AC quantities that the digital relays require for protection can be used for metering as well; therefore, there is no need for additional wiring from the instrument transformers to meters. Additionally, transducer equipment, which is susceptible to drift and requires regular maintenance, is no longer needed.
- ◆ The MV-90 system is a fully functional system, and it is an efficient method of collecting meter data in stations that do not have the relay and/or RTU capability to transmit data. MV-90 metering requires a dedicated phone line to transmit the meter data; this reoccurring expense can be eliminated with digital relaying and a proper RTU.
- ◆ Grid Sense meters can be installed relatively inexpensively and quickly to provide stopgap metering data until upgrades can be completed. They require a phone line and the monthly expenses associated with the line.

Eric A. Loeven

Appendix 1: Estimated Costs of Current Methods and Retrofit Options

| <u>Current Methods</u> | Time (Manhours) | | Cost |
|--|----------------------------|-----|--------------|
| | Field | Eng | TOTAL |
| MV-90 yearly (per station on average) | | | \$1,200 |
| Chart Meter maintenance & data retrieval | 1 | 10 | \$1,250 |

Note 1

Note 1: This cost is to retrieve the circular chart, review it, and enter it into the database. This process takes place on a suspected system peak day. At minimum, there are two times a year that this process is performed (Summer Peak and Winter Peak); however, there may be four or more times depending on when the actual peak occurs.

| <u>Retrofit Options</u> | Time | | | | Cost | | | TOTAL |
|--|--|-------|-------|-----|--------------|---------------------------------|----------|--------------|
| | Manhours | | | | Parts | Labor | | |
| | Tech | Elect | Draft | Eng | Device | Test Sw., Steel, etc. (w/OH) | | |
| Grid Sense Meter W / VAr | Hours are for the EOE and the Linemen. | | | | \$4,775 | | | \$5,700 |
| Data Concentrator 1 for every 4 ckt. | Per installation, each meter takes the lineman and the EOE 15 minutes to install. | | | | \$2,272 | | | \$2,700 |
| POT Line | Each data concentrator requires 20 minutes of lineman time and 15 minutes of EOE time. | | | | \$100 | | | \$110 |
| Labor (including travel time) per Station | Travel to each site has been assumed to be 1 hour. | | | | -waived- | | \$430 | \$430 |
| Site Registration per D/C | | | | | | | | |
| TOTAL GS Installation | | | | | | | | \$9,000 |
| Bitronics (Comm) | 40 | | 40 | 8 | \$2,000 | \$1,000 | \$11,400 | \$15,000 |
| Bitronics (HW-W/VAr/V) | 40 | | 40 | 12 | \$1,100 | \$1,000 | \$12,000 | \$14,500 |

Attachment 3

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. J. M. May
Mr. D. J. Dittmann
S.R. #2011-05

June 23, 2011

Mr. J.J. Borchert:

Re: Remote Terminal Unit Review

Introduction:

Real-time control and status feedback are vital components of a properly functioning substation. Without someone at the substation 24/7, a means of providing feedback and control operations is required; that means is a Remote Terminal Unit (RTU). This memo will describe the current state of the RTUs on the system, as well as the opportunity areas for retrofits and justification for the upgrades.

Discussion:

RTUs provide a means of transmitting important data in a substation to a master station via Supervisory Control and Data Acquisition (SCADA). The RTUs collect status and metering data and transmit it to a master station when polled. Also, they perform control operations that are initiated from the master station in a remote location. The RTUs can be dedicated line or dial-up depending on the application. RTUs have evolved with technology; existing CDC RTUs (protocol and provider) have been replaced with new flash ROM RTUs that utilize protocol suites including, but not limited to, CDC and the utility standard, DNP.

A. Outdated Devices:

- CDC 44-500 & CDC 88-90: These are different versions of dedicated line RTUs provided by CDC, a company that no longer exists. Retrofits have been performed to eliminate the CDC RTUs on the system because of the inability to get spare parts and due to their incompatibility with the digital relays. These RTUs utilize CDC protocol, which is an outdated protocol incapable of communicating with digital relays/data concentrators and is unable to receive digital metering data. They rely on analog signals and pulse accumulators sent from transducers to transmit meter information.
- G.E. M-4000: This is a smaller version of the G.E. Harris D20 RTU. It is used mainly in dial-up applications and is polled twice daily for SCADA data. It will report unsolicited if there is a change of status or if a metered point's dead band is exceeded. Based on the frequency that dial-up RTUs are polled, they cannot be used as sources to the meter database. Also, dial-up RTUs are not reliable because they rely on a plain old telephone (POT) line for communication. Due to this lack of reliability, control operations typically are not performed with dial-up RTUs. As a plus, the M-4000 has the capability to communicate through CDC or DNP protocol, and it also can be configured as a dedicated unit.

- G.E. D20: The functionality and hardware of this RTU are consistent with many modern RTUs; however, the configuration software is not user-friendly and uses a complicated, layered architecture. Additionally, with retiring technicians, the available workforce skilled in working with the configuration software is dwindling. This fact is of concern because emergency fixes will take longer to complete.

B. Retrofit/Replacement Options:

- Telvent Sage 2400¹: Telvent offers an RTU that fits into existing CDC RTU cabinets, and it has peripheral cards that resemble the CDC RTU cards. For these reasons, Telvent is the vendor of choice, providing the most seamless retrofit option. Telvent also offers a protocol suite for communications, including DNP and CDC. The DNP Master protocol allows direct communication with SEL-2020/2030/2032 data concentrators to transfer metering data from numerous digital relays in a substation.

C. Additional Considerations:

- Radio linked RTUs: As previously stated, the M-4000 can be polled as a dedicated RTU or as a dial-up unit. If there is a nearby, dedicated RTU, it is sometimes possible to install a radio link between the two stations and poll the M-4000 from the other station. In this configuration, there is access to real-time information and the ability to perform control operations at both stations. The need for the Positron Box at the radio-linked station is eliminated, and there is no extra cost incurred by installing a phone line and a Positron Box. The radio links require a clear line of site from one station to the next in order for the signal to be transmitted clearly. As such, the reliability of the circuits is largely dependent upon the terrain. Radio signals are also susceptible to interference from other mobile devices such as CB Radios.
- Positron Boxes: One major cost associated with RTUs, dedicated or dial-up, is the phone company's requirement of a Positron Box to isolate the outside phone line from the electric substation. This requirement is in place to provide a level of comfort for the phone company technician working in our substations, many of the existing stations have been allowed to function without this isolation in a grandfathered manner. However, any time that RTU retrofits are performed at these stations, the installation of a Positron Box is required. They are an expensive piece of equipment and have long lead times that may impact project schedules. There also is continued reliance on the phone company for maintenance and repairs.

¹ Telvent has been chosen as the preferred RTU for retrofits due to ease of configuration/use and the techs' familiarity with the units. All RTU cost estimates in this report are based on using this RTU.

Conclusions:

Upgrading old CDC, M-4000, and D-20 RTUs to Telvent RTUs provides the following benefits:

- ◆ Telvent RTUs are reliable and parts are available readily.
- ◆ The Telvent configuration software is user-friendly, making configuration and testing faster.
- ◆ DNP RTUs, of which Telvent is one, can receive communication-based metering & status and transmit it to the SCADA master.
- ◆ The Telvent RTU retrofits for the CDC 44-500's utilize the existing RTU cabinet and high powered tripping relays. The Telvent replaces the equipment susceptible to failure and makes use of the existing equipment that is less prone to failure.
- ◆ Using Telvent RTUs provides timesavings through standardization, and the engineers and technicians alike prefer to work with the Telvent for RTU retrofits.

Consideration also should be given to converting dialup RTUs to dedicated line RTUs. Dialup RTUs rely on POT lines, which have notoriously poor reliability; additional steps and equipment are required to perform the control operations safely. In contrast, dedicated line RTUs offer signal reliability, which provides the ability to perform control operations safely without added equipment and procedure steps.

Eric A. Loeven

Copy to: Mr. P.E. Haering
Mr. H.W. Turner
Mr. P. Harpolis

Mr. D. J. Dittmann
Mr. J. M. May
S.R. #2011-06

June 23, 2011

Mr. J.J. Borchert

Re: Substation Recloser Review

Introduction:

Substation reclosers provide an alternate method of interrupting fault current on distribution and sub-transmission circuits. They are a convenient way to provide circuit protection in locations where it is not cost effective to install a circuit breaker and associated conduit to a control house. One disadvantage of using a recloser rather than a circuit breaker is that the recloser has reduced interrupting capability.

Recloser technology has advanced; hydraulic, oil-filled devices have given way to vacuum-interrupted, microprocessor-based (digital) recloser controls. This memo summarizes the existing substation recloser equipment, as well as replacement options. Also, this memo provides recommendations on the best retrofit options.

Discussion:

“An automatic circuit recloser is a self-contained device, which can sense and interrupt fault currents as well as reclose automatically in an attempt to re-energize a line.”* The existing hydraulic reclosers, a kin to electromechanical relays, have single component capability with limited flexibility in setting pickup curves, very little intelligence, and minimal ability to report feedback. New, digital recloser controls provide a wide range of pickup curves, are self-monitoring, grant instant notification of operations, offer desired metering capabilities, and require less frequent routine maintenance.

A. **Outdated Devices:**

Reclosers were installed in substations as a cost effective alternative to a distribution (15kV) or sub-transmission (34.5kV) circuit breaker combined with a reclosing relay. They can be single-phase or three-phase, be controlled mechanically (hydraulic) or digitally, and they have interrupting mediums of oil or vacuum. They make use of a series of fast and slow curves, providing coordination versatility and protection flexibility. A brief summary of the outdated reclosers on the CH system, specifically the hydraulically controlled type and the oil-interrupted type, is as follows:

- o Hydraulically controlled reclosers: These reclosers are self-contained and self-controlled; they have oil or vacuum interrupters. They are outdated due to their

* Page 124. Power Distribution Engineering: Fundamentals and Applications. James J. Burke. 1994.

C. Additional Considerations:

- Telemetric Interface: The Telemetric RTM II device can be installed to provide status and control of the SEL-651R DNP3 points. These data travel via cellular network and are displayed via a secure web interface. In addition, data travel to a SCADA Xchange server and then over frame relay to our SCADA system.
- R-Mag Circuit Breakers: As the most direct comparison to the substation recloser, these circuit breakers are a packaged breaker and relay combination. They are relatively inexpensive to install and there is familiarity with them by the techs, electricians, and engineers alike. These breakers provide a higher interrupting capability than the reclosers.

Conclusions:

Upgrading to vacuum interrupted, digitally controlled Viper reclosers provides the following benefits:

- ◆ Vacuum Interruption –
 - The speed of operation on these reclosers is not compromised by temperature.
 - The maintenance on these reclosers is not as labor-intensive as the oil-filled reclosers. They can operate up to 10,000 times before requiring an overhaul, with only the battery requiring simple in-field replacement in the meantime.
- ◆ Digital Control –
 - These recloser controls provide a wide range of pickup curves, which makes coordination easier and much more flexible than the hydraulically controlled reclosers.
 - These recloser controls offer digital metering capability and fault notification. The recloser can transmit its information through SCADA if the proper infrastructure is in place, or through Telemetric in stations with under-developed SCADA infrastructure.
 - These recloser controls can be interrogated to gather oscillography, targets, and phasor data from a remote location through a modem. This capability assists in timely and accurate fault analysis.

Some of the lower cost is lost when the recloser is installed in a substation if it is connected to the RTU in the control house, rather than through the Telemetric Unit. In this case, the added cost of conduit, steel work, and/or foundation needs to be considered. Regardless of the method of reporting to SCADA, installing the recloser in a substation comes with the added costs associated with technician time to commission and test the recloser and digital control over the cost of an installation on a distribution circuit.

Eric A. Loeven

Appendix 1: Estimated Costs of Retrofit Options

| Retrofit Options | Cost | | |
|---|----------|-----------|--------|
| | Parts | TOTAL | |
| Viper Reclosers with control relay and PT (on dist circuit) | \$21,000 | \$33,500 | Note 1 |
| Viper Reclosers with control relay (in a substation - Telemetric communication) | \$20,500 | \$33,000 | Note 1 |
| Viper Reclosers with control relay (in a substation - RTU communication) | \$20,500 | \$86,000* | Note 2 |
| R-Mag Breaker | \$25,000 | \$90,000 | |

Note 1: These represent one-time costs. There are additional annual costs for the SCADA Frame relay and the SCADA X-Change to Telemetric. The SCADA Frame Relay costs \$5200/yr. The SCADA X-Change to Telemetric costs \$2000/yr for 100 devices and \$1500 for each 50 devices after that.

Note 2: This cost is estimated based on proposed work to bring the data through the RTU. No installations exist at this time in this manner.

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|-------|----------|--|
| Accord | 4 | 361 Ckt. | Charts - kW | ----- | EM | NONE | ----- | Retired as part of P/MK Upgrade |
| Ancram | 13.8 | 7085 Ckt. | Grid Sense | ----- | EM | NONE | ----- | Only has a 13.8 Voltage Regulator |
| Balmville | | | | | EM | | | |
| Balmville | 4 | 411 Ckt. | MV-90 | ----- | EM | | | |
| Balmville | 4 | 412 Ckt. | MV-90 | ----- | | C-300 | | |
| Barnegat | | | | | | | | Metering source? |
| Barnegat | 115 | KB Line | Amps | EM | ----- | | | |
| Barnegat | 115 | KC Line | None | EM | ----- | | | |
| Barnegat | 115 | KB-749-KC BKR | | EM | ----- | | | |
| Barnegat | 115/13.8 | T1 | SCADA | ----- | | | | IBM Feeds |
| Barnegat | 115/13.8 | T2 | SCADA | ----- | | | | |
| Barnegat | 13.8 | S1 | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2 | SCADA | ----- | EM | | | |
| Barnegat | 13.8 | S1-706 BKR | SCADA | ----- | EM | | | IBM Feeds |
| Barnegat | 13.8 | S2-734 BKR | SCADA | ----- | EM | | | |
| Beacon | | | | | | D-20 | | |
| Beacon | 13.8 | 8006 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 13.8 | 8015 Ckt. | SCADA | ----- | EM | | | Previously 8087A? |
| Beacon | 4 | 801 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 802 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | 803 Ckt. | SCADA | ----- | EM | | | |
| Beacon | 4 | W-414 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | W-463 BKR | SCADA | ----- | EM | | | |
| Beacon | 4 | Bus 1 | SCADA | ----- | | | | |
| Beacon | 4 | Bus 2 | SCADA | ----- | | | | |
| Beacon | 13.8/4 | T1 | SCADA | ----- | EM | | | |
| Beacon | 13.8/4 | T2 | SCADA | ----- | EM | | | MDB has an entry with T1+T2 calculated |
| Beacon | 13.8 | BF Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | NM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | CM Cable | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 1 | SCADA | ----- | EM | | | |
| Beacon | 13.8 | Bus 2 | SCADA | ----- | EM | | | |
| Bethlehem Rd. | | | | | | 2400 | | |
| Bethlehem Rd. | 13.8 | 4091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4092 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4093 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4094 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Bethlehem Rd. | 13.8 | 4095 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4096 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4097 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | 4098 Ckt. | MV-90 | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 1 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 13.8 | Bus 2 | EMS | ----- | EM | | | |
| Bethlehem Rd. | 115 | RD Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | UB Line | None | EM | ----- | | | |
| Bethlehem Rd. | 115 | RD-604-UB BKR | | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T1 | EMS | EM | ----- | | | |
| Bethlehem Rd. | 115/13.8 | T2 | EMS | EM | ----- | | | Metering combined |
| Bethlehem Rd. | 13.8 | W-613 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-619 BKR | | | EM | | | |
| Bethlehem Rd. | 13.8 | W-804 BKR | | | EM | | | |
| Bordman Rd. | | | | | | NONE | | |
| Bordman Rd. | 13.8 | 6081A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | 6082A Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-203 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-204 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-205 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-206 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-207 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-208 Ckt. | | ----- | EM | | | |
| Bordman Rd. | 13.8 | Z-209 Ckt. | | ----- | EM | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|---------------|--------------------|-------------|-------------|--------|----------|---|
| Boulevard | | | | | | 2100 | | |
| Boulevard | 69 | OB Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Boulevard | 69 | I Line | SCADA | uP | ----- | ----- | ----- | Line Amps & WVAR |
| Boulevard | 13.8 | KO Line | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | KK Line | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1011 | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Boulevard | 13.8 | Ckt. 1012 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1013 | SCADA | ----- | uP | ----- | ----- | |
| Boulevard | 13.8 | Ckt. 1014 | SCADA | ----- | EM/uP | ----- | ----- | |
| Boulevard | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Boulevard | 69 | Bus 1 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Bus 2 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69 | Overall | ----- | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | Metering combined |
| Boulevard | 69/13.8 | T3 | SCADA | EM | ----- | ----- | ----- | |
| Boulevard | 69/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Clinton Ave. | | | | | | M-4000 | | |
| Clinton Ave. | 4 | 395 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 396 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | 397 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Clinton Ave. | 4 | Bus | SCADA | ----- | ----- | ----- | ----- | |
| Clinton Ave. | 13.8/4 | T1 | MV-90 | ----- | Fuse | ----- | ----- | |
| Cold Spring | | | | | | NONE | | |
| Cold Spring | 4 | 871 Ckt. | Charts - kW | ----- | EM | ----- | ----- | Install a Grid Sense Package for two (2) circuits. |
| Cold Spring | 4 | 872 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Coldenham | | | | | | D-20 | | |
| Coldenham | 13.8 | 4021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4026 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4027 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | 4028 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| Coldenham | 13.8 | Bus 1 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | Bus 2 | SCADA | ----- | EM | ----- | ----- | |
| Coldenham | 13.8 | B1-B2 Tie | ----- | ----- | EM | ----- | ----- | |
| Coldenham | 115 | J Line | SCADA | Gen 1 | ----- | ----- | ----- | 95P is DLP; 95BU is REL-301; part of replacement program already. |
| Coldenham | 115 | CW Line | SCADA | Gen 1 | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Coldenham | 115 | J-19-CW BKR | ----- | SS | ----- | ----- | ----- | |
| Converse St. | | | | | | NONE | | |
| Converse St. | 4 | 121 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 122 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Converse St. | 4 | 123 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | | | | | | NONE | | |
| Conway Place | 4 | 881 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Conway Place | 4 | 882 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Coxsackie | | | | | | 8890 | | |
| Coxsackie | 13.8 | 1071 Ckt. | Charts - Amps | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | 1072 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | 1074 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Coxsackie | 13.8 | 1076 Ckt. | SCADA/ Charts - kW | ----- | EM | ----- | ----- | Bitronics for the SCADA portion |
| Coxsackie | 13.8 | Bus 1 (T1+G1) | SCADA | ----- | EM | ----- | ----- | |
| Coxsackie | 13.8 | Bus 2 | ??? | ----- | EM | ----- | ----- | Metering data available through relay, but not configured. |
| Coxsackie | 69 | CN Line | None | uP | ----- | ----- | ----- | |
| Coxsackie | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | 95P is SEL-587 |
| Coxsackie | 69/13.8 | T1 | Charts - Amps | uP/EM | ----- | ----- | ----- | |
| Coxsackie | 13.8 | G1 | SCADA | ----- | ----- | ----- | ----- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------------|--------------------|-----------------------|---------------|-------------|-------------|-------|----------|---|
| Danskammer | | | | | | 2100 | | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | AC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DC Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DB Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DR Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | DW Line | SCADA - Amps | uP | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | RS Line | SCADA - Amps | EM | ----- | ----- | ----- | Siemens meters 485 to RTU AJ |
| Danskammer | 115 | W - 323 BKR | ----- | SS | ----- | ----- | ----- | |
| Danskammer | 115 | North Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | Middle Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | South Bus | SCADA - Volts | EM | ----- | ----- | ----- | |
| Danskammer | 115 | DB-1171 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | DR-1421 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | DW-1061 BKR | ----- | uP | ----- | ----- | ----- | |
| Danskammer | 115 | T5&T6 | SCADA | EM | ----- | ----- | ----- | |
| Dashville | | | | | | 2300 | | |
| Dashville | 4 | 345 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single Phase; Vac; Hydr |
| Dashville | 6.6 | Bus | ----- | ----- | EM | ----- | ----- | |
| Dashville | | T1 | ----- | EM | ----- | ----- | ----- | Fused Transformer w/ CR 67 relay |
| Dashville | | G1-G2 | SCADA | ----- | ----- | ----- | ----- | |
| East Fishkill 345kV | | | | | | | | |
| East Fishkill 345kV | 345 | C9751 Breaker A1 BR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 345 | C9751 Breaker A2 BR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 1 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill 345kV | 115 | Transformer #1 Alt. 2 | SCADA | EM | ----- | ----- | ----- | |
| East Fishkill | | | | | | 8890 | | |
| East Fishkill | 115 | EF Line | SCADA | uP* | ----- | ----- | ----- | 95P is MDAR; 95BU is Optimho - Replacing with 311C & D60. |
| East Fishkill | 115 | HF Line | SCADA | uP* | ----- | ----- | ----- | 95BU is Optimho - Replacing with D60. |
| East Fishkill | 115 | EF-672 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | EF-679 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | W-640 BKR | ----- | EM | ----- | ----- | ----- | |
| East Fishkill | 115 | T1 | SCADA | see EFB | ----- | ----- | ----- | |
| East Kingston | | | | | | Orion | | |
| East Kingston | 13.8 | Bus 1 | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | Bus 2 | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1021 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1026 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1027 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 13.8 | 1028 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| East Kingston | 115 | ER Line | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115 | LR Line | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115 | LR-201-ER Breaker | ----- | uP | ----- | ----- | ----- | |
| East Kingston | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| East Kingston | 115/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| East Kingston | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| East Park | | | | | | 8890 | | |
| East Park | 13.8 | 6073 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6074 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| East Park | 13.8 | 6075 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| East Park | 69 | Q Line | None | EM | ----- | ----- | ----- | 95P is SEL-587 |
| East Park | 69/13.8 | T1 | SCADA | uP/EM | ----- | ----- | ----- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|------------------|-------------|-------------|------|----------|--|
| East Walden | | | | | | 2400 | | |
| East Walden | | | | | EM/uP | | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5041 Ckt. | Grid Sense | ----- | EM/uP | | ES | 3 phase; oil; electronic; GS not working |
| East Walden | 13.8 | 5042 Ckt. | Grid Sense | ----- | EM | | | GS not working |
| East Walden | 13.8 | 5043 Ckt. | Grid Sense | ----- | | | | Com |
| East Walden | 13.8 | Com Equipment | | ----- | uP | | | |
| East Walden | 13.8 | B1 | SCADA | | | | | 95P is DLP; part of replacement program already. |
| East Walden | 115 | CW Line | None | Gen1/uP | | | | |
| East Walden | 115 | CW-712 | ----- | EM | | | | |
| East Walden | 115 | D Line | None | EM | | | | |
| East Walden | 115 | D-722 BKR | ----- | EM | | | | |
| East Walden | 115 | DW Line | SCADA | | uP | | | |
| East Walden | 115 | DW-1071 BKR | ----- | uP | | | | |
| East Walden | 115 | EM Line | SCADA | | uP | | | |
| East Walden | 115 | EM-642 BKR | ----- | uP | | | | |
| East Walden | 69 | WM Line | SCADA | | uP | | | Amps & Volts |
| East Walden | 115 | W-644 | ----- | EM | | | | |
| East Walden | 115 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| East Walden | 115 | B2 | ----- | EM | | | | 95P is SEL-587 |
| East Walden | 69/13.8 | T1 | SCADA | | uP/EM | | | 95BU is SEL-587 |
| East Walden | 69/13.8 | T3 | SCADA | | EM/uP | | | |
| Fishkill Plains | | | | | | D-20 | | |
| Fishkill Plains | 13.8 | 8091 Ckt. | MV-90 | ----- | EM/uP | | | BE1-851H as BU and 79 |
| Fishkill Plains | 13.8 | 8092 Ckt. | MV-90 | ----- | EM | | | |
| Fishkill Plains | 13.8 | 8093 Ckt. | SCADA | | uP-200 | | | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8094 Ckt. | SCADA | | uP-200 | | | SEL-251 Relay; 95BU is SEL-501 |
| Fishkill Plains | 13.8 | 8095 Ckt. | SCADA | | uP | | | |
| Fishkill Plains | 13.8 | 8096 Ckt. | SCADA | | uP | | | |
| Fishkill Plains | 115 | HF Line | SCADA | uP/Gen 1 | | | | 95BU is Optimho; part of replacement program. |
| Fishkill Plains | 115 | HF-703 BKR | ----- | EM | | | | |
| Fishkill Plains | 115 | NF Line | None | EM | | | | |
| Fishkill Plains | 115 | A Line | SCADA | | uP | | | |
| Fishkill Plains | 115 | A-1036-FP | ----- | uP-200 | | | | 279/2BFR relays |
| Fishkill Plains | 115 | A-1498 | ----- | uP-200 | | | | 279/2BFR relays |
| Fishkill Plains | 115 | Com Equipment | ----- | | | | | Com |
| Fishkill Plains | 115 | FP Line | SCADA | uP/Gen 1 | | | | 95P is DLP; part of replacement program already; 95BU is SEL-321 |
| Fishkill Plains | 115 | B1 | SCADA | | EM | | | |
| Fishkill Plains | 13.8 | B1 | ----- | | EM | | | Combine Bus Volts to one point |
| Fishkill Plains | 13.8 | B2 | SCADA | | EM | | | |
| Fishkill Plains | 115/13.8 | T1 | ----- | | EM/uP | | | 95BU is SEL-587; metering is combined. |
| Fishkill Plains | 115/13.8 | T2 | SCADA | | EM/uP | | | |
| Forgebrook | | | | | | 2300 | | |
| Forgebrook | 13.8 | Bus #1 | | ----- | EM | | | |
| Forgebrook | 13.8 | Bus #2 | Charts - kW/kVAR | ----- | EM | | | |
| Forgebrook | 13.8 | 8011 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8012 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8013 Ckt. | Charts - Amps | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8014 Ckt. | Charts - kW | ----- | uP/EM | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8015 Ckt. | Charts - kW | ----- | EM/uP | | | BE1-851H as BU and 79; No chart data |
| Forgebrook | 13.8 | 8016 Ckt. | Charts - kW | ----- | EM | | | No Chart Data |
| Forgebrook | 115 | Com Equipment | ----- | | | | | Com |
| Forgebrook | 115 | FO Line | None | EM | | | | |
| Forgebrook | 115 | FO-1430-FT | ----- | EM | | | | |
| Forgebrook | 115 | FT Line | None | EM | | | | |
| Forgebrook | 115 | FT-1432 | ----- | EM | | | | |
| Forgebrook | 115 | FT-882-WF | ----- | EM | | | | |
| Forgebrook | 115 | WF Line | SCADA | | uP | | | |
| Forgebrook | 13.8 | CM Line | None | ----- | EM | | | Amps |
| Forgebrook | 13.8 | BF Line | SCADA | | EM | | | |
| Forgebrook | 13.8 | W-1486 | ----- | | EM | | | |
| Forgebrook | 13.8 | W-994 | ----- | | | | | Metering combined |
| Forgebrook | 115/13.8 | T1 | SCADA | | EM | | | |
| Forgebrook | 115/13.8 | T2 | ----- | | EM | | | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|------------------|-------------|-------------|---------------------------|----------|--|
| Freehold | | | | | | M-4000 | | |
| Freehold | 13.8 | 2061 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | 2071 Ckt. | Grid Sense | ----- | EM/uP | ----- | PR-560M | 3 phase; oil; electronic; 95BU is BE1-851H; GS not working |
| Freehold | 13.8 | W-1155 BKR | ----- | ----- | ----- | ----- | PR-560M | 3 phase; oil; electronic |
| Freehold | 13.8 | T1 | Charts - kW/kVAr | fuse | ----- | ----- | ----- | |
| Freehold | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | |
| Galeville | | | | | | Orion | | |
| Galeville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5030 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5031 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5032 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5033 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5034 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | 13.8 | 5035 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Galeville | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Galeville | 69 | MG Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69 | MG-200-MK BKR | ----- | uP | ----- | ----- | ----- | |
| Galeville | 69 | MK Line | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Galeville | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| Greenfield Rd. | | | | | | M-4000 | | |
| Greenfield Rd. | 13.8 | 3076 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 13.8 | 3078 Ckt. | Grid Sense | ----- | EM/uP | ----- | ES | 3 phase; oil; electronic; 95BU is BE1-851 |
| Greenfield Rd. | 4 | 375-376 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 4 | 377-378 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | W-1608 | ----- | ----- | EM | ----- | ES | 3 phase; oil; electronic |
| Greenfield Rd. | 13.8/4 | T2 | Charts - kW | ----- | EM | ----- | ----- | |
| Greenfield Rd. | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Greenfield Rd. | 4 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Greenfield Rd. | 4 | B3 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Greenfield Rd. | 4 | | | | | | | Volts |
| Grimley Rd. | | | | | | NONE-Soon to have DNP RTU | | |
| Grimley Rd. | 4 | 385 Ckt. | Grid Sense | ----- | EM | ----- | Kyle L | Single Phase; Oil; Electronic |
| Grimley Rd. | 4 | 386 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| Hibernia | | | | | | Micro 1C | | |
| Hibernia | 13.8 | 7011 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | 7012 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Hibernia | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 69/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| Hibernia | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | | | | | | D-20 | | |
| High Falls | 13.8 | 3021 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3022 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3023 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3024 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | 3025 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 69 | HK Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 69 | HK-696-P BKR. | ----- | ----- | uP- 200 | ----- | ----- | SEL-279 |
| High Falls | 69 | P Line | SCADA | ----- | uP | ----- | ----- | 95P is DLP |
| High Falls | 13.8 | W-998 BKR. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| High Falls | 13.8 | B1 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | B2 | SCADA | ----- | uP/ uP- 200 | ----- | ----- | 95BU is SEL-251 |
| High Falls | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| High Falls | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |
| High Falls | 69/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | 95P is SR-745 & 95BU is SEL-587; Volts |

812

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|--------------------|----------|-------------|-------------|--------|----------|---|
| Highland | | | | | | 2300 | | |
| Highland | | | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5081 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5082 Ckt. | SCADA | ---- | EM/uP | ---- | ---- | 95BU is BE1-IPS-100 |
| Highland | 13.8 | 5083 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | 5084 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | 5085 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Highland | 115 | HR Line | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | OR Line | SCADA | uP | ---- | ---- | ---- | |
| Highland | 115 | OR-761-HR BKR. | ---- | EM | ---- | ---- | ---- | |
| Highland | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | |
| Highland | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| Highland | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Highland | 115/13.8 | T1 | SCADA | uP/EM | ---- | ---- | ---- | 95BU is SEL-587 |
| Highland | 115/13.8 | T2 | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | | | | | | D-20 | | |
| Honk Falls | 13.8 | 3071 Ckt. | SCADA | ---- | EM | ---- | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | 3072 Ckt. | SCADA | ---- | EM | ---- | WE | 3 phase; oil; electronic |
| Honk Falls | 13.8 | B1 | SCADA | EM | ---- | ---- | ---- | |
| Honk Falls | 69 | GM Line | SCADA | EM/uP | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | HG Line | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | 69 | HK Line | SCADA | uP/EM | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | MK Line | SCADA | uP | ---- | ---- | ---- | |
| Honk Falls | 69 | WH Line | SCADA | uP/EM | ---- | ---- | ---- | 79 Relay is EM |
| Honk Falls | 69 | overall diff B1+T1 | SCADA | EM | ---- | ---- | ---- | |
| Honk Falls | 69/13.8 | T1 | ---- | fuse | ---- | ---- | ---- | |
| Hunter | | | | | | M-4000 | | |
| Hunter | 34.5 | Z-666 | | | | | VR-3S | 3 phase; vac; hyd |
| Hunter | 13.8 | 2081 Ckt. | MV-90 | ---- | ---- | ---- | Kyle W | 3 phase; oil; hyd |
| Hunter | 13.8 | Cap Bank | ---- | ---- | EM | ---- | ---- | |
| Hurley Ave. 345kV | | | | | | 2400 | | |
| Hurley Ave. 345kV | 345 | 30151 BKR. | ---- | EM | ---- | ---- | ---- | 79 Relay is EM |
| Hurley Ave. 345kV | 345 | 30151 A1 BF | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30152 A2 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 301 Line A1 | SCADA | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 301 Line A2 | SCADA | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30353 BKR. | ---- | EM* | ---- | ---- | ---- | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30353 A1 BF | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30353 A2 BF | ---- | EM* | ---- | ---- | ---- | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 30354 BKR. | ---- | EM* | ---- | ---- | ---- | 79 Relay is EM; In process replacement with SEL-451 |
| Hurley Ave. 345kV | 345 | 30354 A1 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 30354 A2 BF | ---- | EM* | ---- | ---- | ---- | In process replacement with GE C70 |
| Hurley Ave. 345kV | 345 | 303 Line A1 | SCADA | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | 303 Line A2 | SCADA | EM* | ---- | ---- | ---- | In process replacement with GE D90 |
| Hurley Ave. 345kV | 345 | Bus A1 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | Bus A2 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 BKR. | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 A1 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | A2451 A2 BF | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A1 Out of Step | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A2 Out of Step | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A1 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 345 | T1 A2 | ---- | EM | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | T1 LS | ---- | uP | ---- | ---- | ---- | |
| Hurley Ave. 345kV | 115 | B1 | SCADA | ---- | ---- | ---- | ---- | Volts |

813

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------|--------------------|---------------|----------------------|-------------|-------------|--------|----------|---|
| Hurley Ave. | | | | | | 2400 | | |
| Hurley Ave. | | | | | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2091 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2092 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2093 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 13.8 | 2094 Ckt. | Charts - Amps | ---- | EM/uP | | | BE1-851H as BU and 79 |
| Hurley Ave. | 115 | Cap Bank | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | HP Line | SCADA | EM | ---- | | | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 69 | I Line | SCADA | Gen1 | ---- | | | |
| Hurley Ave. | 115 | OR Line | SCADA | EM | ---- | | | Quadramho part of the package; metering is Amp value only |
| Hurley Ave. | 69 | SB Line | SCADA | Gen1 | ---- | | | |
| Hurley Ave. | 115 | HP-1643 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | OR-1640 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 69 | W-142 BKR. | ---- | uP | ---- | | | |
| Hurley Ave. | 13.8 | W-1575 BKR. | ---- | ---- | EM | | | |
| Hurley Ave. | 115 | W-389 BKR. | ---- | EM | ---- | | | |
| Hurley Ave. | 115 | B1 | None | EM | ---- | | | |
| Hurley Ave. | 115 | B2 | SCADA | EM | ---- | | | Volts |
| Hurley Ave. | 69 | B1 | SCADA | EM | ---- | | | Volts |
| Hurley Ave. | 13.8 | B1 | SCADA | ---- | EM | | | Volts |
| Hurley Ave. | 115/69 | T3 | SCADA | EM | ---- | | | |
| Hurley Ave. | 115/13.8 | T4 | SCADA | EM | ---- | | | |
| Hurley Ave. | 69/13.8 | T5 | ---- | EM | ---- | | | |
| Inwood Ave. | | | | | | 3030 | | |
| Inwood Ave. | 13.8 | 6061 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6062 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6063 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6064 Ckt. | SCADA | ---- | EM/uP | | | BE1-IPS100 as BU and 79 |
| Inwood Ave. | 13.8 | 6065 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6066 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6067 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | 6068 Ckt. | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Inwood Ave. | 115 | IR Line | SCADA | uP | ---- | | | |
| Inwood Ave. | 115 | IR-201-X BKR. | ---- | uP | ---- | | | |
| Inwood Ave. | 115 | X Line | SCADA | uP | ---- | | | |
| Inwood Ave. | 13.8 | B1 | SCADA | ---- | uP | | | |
| Inwood Ave. | 13.8 | B2 | SCADA | ---- | uP | | | |
| Inwood Ave. | 115/13.8 | T1 | SCADA | uP | ---- | | | |
| Inwood Ave. | 115/13.8 | T2 | SCADA | uP | ---- | | | |
| Jansen Ave. | | | | | | M-4000 | | |
| Jansen Ave. | 13.8 | 1001 Ckt. | MV-90 | ---- | uP | | | |
| Jansen Ave. | 13.8 | 1002 Ckt. | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | 1003 Ckt. | MV-90 | ---- | uP | | | |
| Jansen Ave. | 13.8 | 1004 Ckt. | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | KL Line | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | KO Line | MV-90 | ---- | EM | | | |
| Jansen Ave. | 13.8 | B1 | SCADA | ---- | EM | | | |
| Jansen Ave. | 13.8 | B2 | SCADA | ---- | EM | | | |
| Jansen Ave. | 13.8 | Com Equipment | ---- | ---- | ---- | | | Com |
| Jansen Ave. | 13.8 | T - Grounding | MV-90 | ---- | uP | | | |
| Kerhonkson | | | | | | 8890 | | |
| Kerhonkson | 13.8 | 3081 Ckt. | Grid Sense | ---- | EM | | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 13.8 | 3082 Ckt. | Grid Sense | ---- | EM | | Kyle D | Single phase; oil; hyd; No GS Data |
| Kerhonkson | 69 | MK-929 MOS | ---- | EM | ---- | | | |
| Kerhonkson | 69 | MK-930 MOS | ---- | EM | ---- | | | |
| Kerhonkson | 69/13.8 | T1 | Charts - kW/kVar IGS | fuse | ---- | | | Amps for each Transformer |
| Kerhonkson | 69/13.8 | T2 | | fuse | ---- | | | Volts & Amps |
| Kerhonkson | 69 | HK | SCADA | ---- | ---- | | | Volts & Amps |
| Kerhonkson | 69 | MK | SCADA | ---- | ---- | | | Volts & Amps |

814

Electric Substation Upy. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-----------------|------------------------|-------------|-------------|--------|----------|--------------------------------------|
| Knapps Corners | | | | | | 2100 | | |
| Knapps Corners | | | Charts - Amps/SCADA | | uP | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8021 Ckt. | Charts - Amps | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8022 Ckt. | Charts - Amps | | uP/EM | | | Not sure if charts were removed |
| Knapps Corners | 13.8 | 8023 Ckt. | Charts - Amps/SCADA | | EM/uP | | | BE1-851H as BU and 79 |
| Knapps Corners | 13.8 | 8024 Ckt. | Charts - kW | | EM | | | |
| Knapps Corners | 13.8 | 8025 Ckt. | Charts - kW | | | | | Com |
| Knapps Corners | 13.8 | Com Equipment | | | | | | |
| Knapps Corners | 115 | KB Line | None | EM | | | | SEL-279 |
| Knapps Corners | 115 | KB-1558-MC BKR. | | uP-200 | | | | |
| Knapps Corners | 115 | SK Line | SCADA | | uP | | | Amps |
| Knapps Corners | 13.8 | KN Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KR Line | SCADA* | EM | | | | Amps |
| Knapps Corners | 13.8 | KS Line | SCADA* | EM | | | | |
| Knapps Corners | 69 | KM Line | SCADA | uP | | | | |
| Knapps Corners | 69 | TR Line | SCADA | EM | | | | |
| Knapps Corners | 69 | G Line | SCADA | uP | | | | |
| Knapps Corners | 13.8 | W-1215 BKR. | | | EM | | | |
| Knapps Corners | 69 | W-1409 BKR. | | | uP | | | |
| Knapps Corners | 13.8 | W-1462 BKR. | | | EM | | | |
| Knapps Corners | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Knapps Corners | 13.8 | B2 | | EM | | | | |
| Knapps Corners | 13.8 | B3 | | EM | | | | |
| Knapps Corners | 69 | 69k Bus | SCADA | EM | | | | Volts |
| Knapps Corners | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Knapps Corners | 115/13.8 | T3 | | EM | | | | |
| Knapps Corners | 115/69 | T2 | | SCADA | uP | | | |
| Lawrenceville | | | | | | M-4000 | | |
| Lawrenceville | 34.5 | 2385 Ckt. | Grid Sense | EM/uP | | | CXE-400A | 3 phase; oil; hyd |
| Lawrenceville | 34.5 | B1 | SCADA* | | | | | Volts |
| Lawrenceville | 69/34.5 | T1 | MV90/Grid Sense/SCADA | EM | | | | Amps. |
| Lincoln Park | | | | | | 2300 | | |
| Lincoln Park | 13.8 | Com Equipment | | | | | | Com |
| Lincoln Park | 13.8 | 2011 Ckt. | Charts - Amps | | EM | | | |
| Lincoln Park | 13.8 | 2012 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2013 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2014 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2015 Ckt. | Charts - kW | | EM/uP | | | BE1-851H as BU and 79 |
| Lincoln Park | 13.8 | 2016 Ckt. | Charts - kW | | EM/uP* | | | GE F60 installed HiZ pilot |
| Lincoln Park | 13.8 | 2017 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | 2018 Ckt. | Charts - kW | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 1 | | | EM | | | |
| Lincoln Park | 13.8 | Cap Bank 2 | | | EM | | | |
| Lincoln Park | 115 | HP Line | None | EM | | | | Relay Replacement Program in process |
| Lincoln Park | 115 | HP-1318 BKR. | | EM | | | | |
| Lincoln Park | 13.8 | KL Line | Charts - kW/kVar/SCADA | EM | | | | Amps to SCADA |
| Lincoln Park | 115 | LR-1219-HP BKR. | | EM | | | | |
| Lincoln Park | 115 | LR Line | SCADA | uP | | | | |
| Lincoln Park | 13.8 | W-1321 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-45 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-534 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | W-554 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-206 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-207 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-525 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | WT-528 BKR. | | | EM | | | |
| Lincoln Park | 13.8 | B1 | SCADA | | EM | | | Combine Bus Volts to one point |
| Lincoln Park | 13.8 | B2 | | EM | | | | |
| Lincoln Park | 13.8 | B3 | | EM | | | | |
| Lincoln Park | 13.8 | B4 | None | | EM | | | Volts |
| Lincoln Park | 115 | 115k bus | SCADA | | EM | | | Volts |
| Lincoln Park | 115/13.8 | T1 | SCADA | EM | | | | Combine load value |
| Lincoln Park | 115/13.8 | T2 | | EM | | | | |
| Lincoln Park | 115/13.8 | T3 | | SCADA | EM | | | |

018

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|---------------|-------------|-------------|-------------|--------|----------|---|
| Manchester | | | | | | 2400 | | |
| Manchester | 13.8 | 6091 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6092 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6093 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6094 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6095 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Manchester | 13.8 | 6096 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | 6097 Ckt. | MV-90 | ----- | EM | ----- | ----- | Com |
| Manchester | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | 95BU is REL-301; part of replacement program. |
| Manchester | 115 | M Line | None | EM/Gen-1 | ----- | ----- | ----- | |
| Manchester | 115 | MC Line | SCADA | uP | ----- | ----- | ----- | Amps |
| Manchester | 13.8 | MS Line | SCADA* | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | W-1456 BKR. | ----- | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | W-650 BKR. | ----- | ----- | EM | ----- | ----- | |
| Manchester | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Combine Bus Volts to one point |
| Manchester | 13.8 | B2 | ----- | ----- | EM | ----- | ----- | |
| Manchester | 115/13.8 | T1 | SCADA | ----- | EM | ----- | ----- | Combine load value |
| Manchester | 115/13.8 | T2 | ----- | EM | ----- | ----- | ----- | |
| Marlboro | | | | | | 8890 | | ???? |
| Marlboro | 13.8 | 5001 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5002 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5003 Ckt. | SCADA | ----- | EM/uP | ----- | ----- | BE1-IPS100 as BU and 79 |
| Marlboro | 13.8 | 5004 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Marlboro | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Marlboro | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Volts |
| Marlboro | 115/13.8 | T1 | SCADA | uP/EM* | ----- | ----- | ----- | 95P is SEL-587 |
| Marlboro | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |
| Maryland Ave. | | | | | | M-4000 | | |
| Maryland Ave. | 4 | 621 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | 622 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | 623 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | 624 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | MS Line | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | PH-284 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | PH-286 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | W-1032 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | W-1033 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | W-1034 BKR. | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Maryland Ave. | 13.8 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Maryland Ave. | 4 | B1 | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 4 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Maryland Ave. | 13.8/4 | T1 | ----- | ----- | EM | ----- | ----- | |
| Maryland Ave. | 13.8/4 | T2 | ----- | ----- | EM | ----- | ----- | |
| Maybrook | | | | | | M-4000 | | |
| Maybrook | 13.8 | 5051 Ckt. | MV-90 | ----- | EM | ----- | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | 5052 Ckt. | MV-90 | ----- | uP | ----- | ----- | Previously 5081-83? |
| Maybrook | 13.8 | 5053 Ckt. | MV-90 | ----- | EM | ----- | RXE | 3 phase; oil; electronic |
| Maybrook | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Maybrook | 13.8 | B2 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Maybrook | 69/13.8 | T1 | None | ----- | ----- | ----- | ----- | |
| Maybrook | 69/13.8 | T2 | None | ----- | ----- | ----- | ----- | |
| McKinley St. | | | | | | NONE | | |
| McKinley St. | 4 | 845 Ckt. | MV-90 | ----- | EM | ----- | ----- | |

018

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------|--------------------|----------------|-------------|-------------|-------------|-------|----------|--------------------------------------|
| Merritt Park | | | | | | BM | | |
| Merritt Park | 13.8 | 8061 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8062 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8063 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8064 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8065 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8066 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8067 Ckt. | SCADA | | uP | | | |
| Merritt Park | 13.8 | 8068 Ckt. | SCADA | | uP | | | Com |
| Merritt Park | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | |
| Merritt Park | 115 | WF Line | SCADA | | uP | | | |
| Merritt Park | 115 | WP Line | SCADA | | uP | | | SEL-279 |
| Merritt Park | 115 | WF-439-WP BKR. | ----- | uP-200 | | | | |
| Merritt Park | 13.8 | B1 | SCADA | | uP | | | |
| Merritt Park | 13.8 | B2 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T1 | SCADA | | uP | | | |
| Merritt Park | 115/13.8 | T2 | SCADA | | uP | | | |
| Merritt Park | | | | | | BM | | |
| Milan | | | | | | | | |
| Milan | 13.8 | 7061 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | 7062 Ckt. | SCADA | | uP | | | |
| Milan | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Milan | 115 | B-4561 Ckt Sw | ----- | uP | | | | |
| Milan | 115 | MR Line | SCADA | | uP | | | |
| Milan | 115 | MR-501 BKR. | SCADA | | uP | | | |
| Milan | 115 | RT-7 BKR. | ----- | uP | | | | |
| Milan | 115 | R-10 BKR. | ----- | uP | | | | |
| Milan | 115 | T-7 Line | SCADA | | uP | | | |
| Milan | 115 | 10 Line | SCADA | | uP | | | |
| Milan | 115 | B1 | SCADA | | uP | | | |
| Milan | 13.8 | B1 | SCADA | | uP | | | |
| Milan | 115/13.8 | T1 | SCADA | | uP | | | |
| Millerton | | | | | | L&N | | |
| Millerton | 13.8 | 7081 Ckt. | SCADA | | | | | |
| Millerton | 69 | GE-823 MOS | ----- | EM | | | | |
| Millerton | 69/13.8 | T1 | SCADA | | EM | | | Only one feeder; T1 = 7081 load |
| Millerton | 69 | Line to SMI | SCADA | | | | | Volts |
| Millerton | 69 | Line to PUL | SCADA | | | | | Volts |
| Modena 115kV | | | | | | BM | | |
| Modena 115kV | 13.8 | B1 | SCADA | | uP | | | |
| Modena 115kV | 13.8 | C-1651 BKR. | ----- | ----- | uP | | | |
| Modena 115kV | 13.8 | 5011 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5012 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | 5013 Ckt. | SCADA | | uP | | | |
| Modena 115kV | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Modena 115kV | 115 | EM Line | SCADA | | uP | | | |
| Modena 115kV | 115 | EM-201-PX BKR. | ----- | uP | | | | |
| Modena 115kV | 115 | PX Line | SCADA | | uP | | | |
| Modena 115kV | 115/13.8 | T3 | SCADA | | uP | | | Only has one 13.8 bus; T3 = Bus load |
| Modena 69kV | | | | | | 8890 | | |
| Modena 69kV | 69 | B1 | SCADA | | EM | | | volts |
| Modena 69kV | 69 | MG Line | SCADA | | uP | | | |
| Modena 69kV | 69 | W-941 BKR. | ----- | EM | | | | |
| Modena 69kV | 69 | MG-380 BKR. | ----- | EM | | | | |
| Modena 69kV | 115/69 | T1 | SCADA | | EM/uP | | | |
| Modena 69kV | 69/13.8 | T2 | None | | Fuse/uP | | | GE F35 is installed |
| Montgomery | | | | | | NONE | | |
| Montgomery | 4 | 571 Ckt. | Charts - kW | | EM | | V4L | Single phase; Vac; Hyd |
| Montgomery | 4 | 572 Ckt. | Charts - kW | | EM | | V4L | Single phase; Vac; Hyd |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|--------------------|-------------|-------------|--------|----------|--------------------------------|
| Montgomery St. | | | | | | M-4000 | | |
| Montgomery St. | | | | | EM | | | volts |
| Montgomery St. | 13.8 | B1 | SCADA | ---- | EM | | | Volts |
| Montgomery St. | 13.8 | B2 | SCADA | ---- | EM | | | volts |
| Montgomery St. | 13.8 | B3 | SCADA | ---- | EM | | | |
| Montgomery St. | 13.8 | B Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | 4001 Ckt. | Charts - kW/kVAr | ---- | EM | | | |
| Montgomery St. | 13.8 | 4002 Ckt. | Charts - kW/kVAr | ---- | EM | | | |
| Montgomery St. | 13.8 | 4003 Ckt. | Charts - kW/kVAr | ---- | EM | | | |
| Montgomery St. | 4 | 401 Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 402-3 Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 404 Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 406A/B Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 407A/B Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | 410A/B Ckt. | Charts - kW demand | ---- | EM | | | |
| Montgomery St. | 4 | B1 | SCADA | ---- | EM | | | Volts |
| Montgomery St. | 4 | B2 | SCADA | ---- | EM | | | volts |
| Montgomery St. | 13.8 | F Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | NB Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | NM Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | R Line | None | ---- | EM | | | |
| Montgomery St. | 13.8 | W-507 BKR. | ---- | ---- | EM | | | |
| Montgomery St. | 13.8 | W-508 BKR. | ---- | ---- | EM | | | |
| Montgomery St. | 13.8 | W-509 BKR. | ---- | ---- | EM | | | |
| Montgomery St. | 13.8 | WN Line | None | ---- | EM | | | |
| Montgomery St. | 13.8/4 | T1 | | ---- | EM | | | |
| Montgomery St. | 13.8/4 | T2 | Charts - kW/kVAr | ---- | EM | | | Combine load value |
| Myers Corners | | | | | | 44-550 | | |
| Myers Corners | 13.8 | 8041 Ckt. | Charts - kW | ---- | uP | | | |
| Myers Corners | 13.8 | 8043 Ckt. | Charts - kW | ---- | EM | | | |
| Myers Corners | 13.8 | 8044 Ckt. | Charts - kW | ---- | EM | | | |
| Myers Corners | 13.8 | 8045 Ckt. | Charts - kW | ---- | EM | | | |
| Myers Corners | 13.8 | 8046 Ckt. | SCADA | ---- | uP | | | |
| Myers Corners | 69 | KM Line | None | EM | ---- | | | |
| Myers Corners | 69 | TV Line | None | EM | ---- | | | |
| Myers Corners | 69 | TV-399-KM BKR. | ---- | EM | ---- | | | |
| Myers Corners | 13.8 | W-63 BKR. | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | W-66 BKR. | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | Feeder M1-75 | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | Feeder M2-76 | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | Feeder M3-91 | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | Feeder M4-90 | ---- | ---- | EM | | | |
| Myers Corners | 13.8 | B1 | | ---- | EM | | | |
| Myers Corners | 13.8 | B2 | SCADA | ---- | EM | | | Combine Bus Volts to one point |
| Myers Corners | 69/13.8 | T1 | | EM | ---- | | | |
| Myers Corners | 69/13.8 | T2 | SCADA | EM | ---- | | | Combine load value |
| Neversink | | | | | | 2200 | | |
| Neversink | 4 | 391 Ckt. | Charts - kW | ---- | EM | | | |
| Neversink | 13.8 | 3091 Ckt. | Grid Sense | ---- | EM | | Kyle W | 3 phase; Oil; Hyd |
| Neversink | 69 | HG Line | SCADA* | EM | ---- | | | Amps |
| Neversink | 69 | WH Line | SCADA* | EM | ---- | | | Amps |
| Neversink | 4 | W-1128 BKR. | ---- | ---- | EM | | | |
| Neversink | 69 | 69k Bus | SCADA | uP/EM | ---- | | | Volts |
| New Baltimore | | | | | | 2300 | | |
| New Baltimore | 13.8 | 1081 Ckt. | SCADA* | ---- | EM | | | kW |
| New Baltimore | 13.8 | 1082 Ckt. | SCADA* | ---- | EM | | | kW |
| New Baltimore | 13.8 | 1083 Ckt. | SCADA* | ---- | EM | | | kW |
| New Baltimore | 69 | Cap Bank | ---- | EM/uP | ---- | | | Com |
| New Baltimore | 13.8 | Com Equipment | ---- | ---- | ---- | | | |
| New Baltimore | 69 | CN Line | None | uP | ---- | | | |
| New Baltimore | 69 | NW Line | None | uP | ---- | | | |
| New Baltimore | 13.8 | B1 | SCADA | ---- | EM | | | Volts |
| New Baltimore | 69/13.8 | T1 | SCADA | EM/uP | ---- | | | 95P is SEL-587 |

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|--------------------|------------------|-------------|-------------|-------|----------|------------------------|
| New Windsor | | | | | | NONE | | |
| New Windsor | 4 | 461 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 462 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 463 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 4 | 464 Ckt. | Grid Sense | ----- | EM | ----- | ----- | No DATA |
| New Windsor | 13.8 | UN & UW ATC | None | ----- | uP | ----- | ----- | Combine load value |
| New Windsor | 13.8/4 | T1 | Charts - kW/kVAR | ----- | uP | ----- | ----- | |
| New Windsor | 13.8/4 | T2 | | ----- | uP | ----- | ----- | |
| North Catskill | | | | | | D-20 | | |
| North Catskill | 13.8 | 2001A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2002A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2003A Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2004 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2005 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | 2006 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251 |
| North Catskill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| North Catskill | 115 | 2 Line | SCADA | EM | ----- | ----- | ----- | |
| North Catskill | 115 | R-2 BKR. | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 115 | RT-7 BKR. | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 115 | T-7 Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| North Catskill | 69 | Cap Bank | ----- | EM | ----- | ----- | ----- | |
| North Catskill | 69 | CL Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | H Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | NC Line | SCADA | uP | ----- | ----- | ----- | |
| North Catskill | 69 | W-1107 BKR. | ----- | EM/uP* | ----- | ----- | ----- | check on TD-5 |
| North Catskill | 69 | W-269 BKR. | ----- | EM/uP* | ----- | ----- | ----- | check on TD-5 |
| North Catskill | 115 | W-791 BKR. | ----- | uP- 200 | ----- | ----- | ----- | SEL-2BFR |
| North Catskill | 69 | W-269 & W-1107 BKR | ----- | ----- | EM | ----- | ----- | IJS |
| North Catskill | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| North Catskill | 69 | B1 | SCADA | EM/uP | ----- | ----- | ----- | Volts |
| North Catskill | 69 | B2 | SCADA | EM/uP | ----- | ----- | ----- | Volts |
| North Catskill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | Volts: 95BU is DFP-100 |
| North Catskill | 13.8 | B2 | SCADA | ----- | EM/uP | ----- | ----- | Volts: 95BU is DFP-100 |
| North Catskill | 115/69 | T4 | SCADA | EM/uP* | ----- | ----- | ----- | Check on 64 relay |
| North Catskill | 115/69 | T5 | SCADA | EM/uP* | ----- | ----- | ----- | Check on 64 relay |
| North Catskill | 115/13.8 | T6 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |
| North Catskill | 115/13.8 | T7 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is DFP-100 |

819

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|---------------|-------------|-------------|------|----------|-----------------------|
| North Chelsea | | | | | | BM | | |
| North Chelsea | | | | | | | | |
| North Chelsea | 13.8 | 8051 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8052 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8053 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8054 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8055 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8056 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8057 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | 8058 Ckt. | SCADA | ---- | uP | ---- | ---- | Com |
| North Chelsea | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | |
| North Chelsea | 115 | AC Line | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | AC-1066 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | DC Line | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | DC-1414 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | FO-1482 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | FO Line | SCADA | uP | ---- | ---- | ---- | 95P is LCB-II |
| North Chelsea | 115 | NF Line | SCADA | uP | ---- | ---- | ---- | 95P is LCB-II |
| North Chelsea | 115 | NF-1116 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | SC Line | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | SC-1566 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 69 | TV Line | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | B-2651 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | B-2652 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | B-2653 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | W-1572 BKR. | ---- | uP | ---- | ---- | ---- | |
| North Chelsea | 115 | B1 | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 13.8 | B1 | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 13.8 | B2 | SCADA | ---- | uP | ---- | ---- | |
| North Chelsea | 115/69 | T1 | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115/13.8 | T2 | SCADA | uP | ---- | ---- | ---- | |
| North Chelsea | 115/13.8 | T3 | SCADA | uP | ---- | ---- | ---- | Volts |
| Ohioville | | | | | | 2100 | | |
| Ohioville | 13.8 | 5021 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5022 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5023 Ckt. | Charts - Amps | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5024 Ckt. | Charts - kW | ---- | EM/uP | ---- | ---- | BE1-851H as BU and 79 |
| Ohioville | 13.8 | 5025 Ckt. | SCADA | ---- | uP | ---- | ---- | |
| Ohioville | 13.8 | Com Equipment | ---- | ---- | ---- | ---- | ---- | Com |
| Ohioville | 115 | Cap Bank | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 69 | O Line | None | uP | ---- | ---- | ---- | |
| Ohioville | 69 | OB Line | None | uP | ---- | ---- | ---- | |
| Ohioville | 115 | OR Line | None | EM | ---- | ---- | ---- | |
| Ohioville | 115 | OR-1075 BKR. | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 115 | PX Line | SCADA | EM/uP | ---- | ---- | ---- | |
| Ohioville | 115 | PX - 1659 BKR. | ---- | uP | ---- | ---- | ---- | |
| Ohioville | 69 | W - 1511 BKR. | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 13.8 | W - 1537 BKR. | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 13.8 | W - 1600 BKR. | ---- | EM | ---- | ---- | ---- | |
| Ohioville | 115 | B1 | SCADA | EM | ---- | ---- | ---- | Volts |
| Ohioville | 69 | 69k Bus | SCADA | EM | ---- | ---- | ---- | Volts |
| Ohioville | 13.8 | B1 | None | ---- | EM | ---- | ---- | |
| Ohioville | 13.8 | B2 | None | ---- | EM | ---- | ---- | |
| Ohioville | 115/13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Ohioville | 115/13.8 | T2 | SCADA | EM | ---- | ---- | ---- | 95BU is SEL-251 |
| Ohioville | 115/69 | T3 | SCADA | EM/uP-200 | ---- | ---- | ---- | |

820

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-----------------|--------------------|---------------|----------|-------------|-------------|------|----------|--------------------------------------|
| | | | | | | 2300 | | Grid owns Line |
| Pleasant Valley | 115 | 8 Line | SCADA** | uP | | | | |
| Pleasant Valley | 115 | 10 Line | SCADA | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 12 Line | SCADA** | uP | | | | Grid owns Line |
| Pleasant Valley | 115 | 13 Line | SCADA** | uP | | | | 95BU is Optimho; in replacement plan |
| Pleasant Valley | 115 | C Line | SCADA | EM/Gen-1 | | | | |
| Pleasant Valley | 115 | M Line | SCADA | EM | | | | |
| Pleasant Valley | 115 | X Line | SCADA | uP | | | | Com |
| Pleasant Valley | 115 | Com Equipment | | | | | | SEL-279 |
| Pleasant Valley | 115 | R-12 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-13 BKR. | | uP-200 | | | | SEL-279 |
| Pleasant Valley | 115 | R-8 BKR. | | uP-200 | | | | |
| Pleasant Valley | 115 | RC-6 BKR. | | EM | | | | |
| Pleasant Valley | 115 | RM BKR. | | EM | | | | |
| Pleasant Valley | 115 | RX-4 BKR. | | uP | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-61 BKR. | SCADA** | EM | | | | Con Ed owns the Bkr |
| Pleasant Valley | 115 | R-62 BKR. | SCADA** | EM | | | | |
| Pleasant Valley | 115 | R-643 BKR. | | EM | | | | |
| Pleasant Valley | 115 | R-81 BKR. | | EM | | | | |
| Pleasant Valley | 115 | B1 | SCADA | EM | | | | Volts |
| Pleasant Valley | 115 | B2 | SCADA | EM | | | | Volts |
| Pleasant Valley | 69 | E Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | G Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | Q Line | SCADA* | uP | | | | kW |
| Pleasant Valley | 69 | B1 | SCADA | uP | | | | Volts |
| Pleasant Valley | 13.8 | W-387 | | | EM | | | |
| Pleasant Valley | 345/115 | S1 | SCADA | | | | | Con Ed owns bank and protection |
| Pleasant Valley | 115/69 | T10 | SCADA | EM | | | | |
| Pulvers Corners | | | | | | D-20 | | |
| Pulvers Corners | 13.8 | 7091 Ckt. | SCADA | | EM | | V4L | single phase; vac; hyd |
| Pulvers Corners | 13.8 | 7092 Ckt. | SCADA | | EM | | Kyle L | single phase; oil; hyd |
| Pulvers Corners | 34.5 | 7395 Ckt. | SCADA | EM | | | RVE | 3 phase; oil; hyd |
| Pulvers Corners | 13.8 | Com Equipment | | | | | | Com |
| Pulvers Corners | 69 | Cap Bank | | EM | | | | |
| Pulvers Corners | 69 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 34.5 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 13.8 | B1 | SCADA | | | | | Volts |
| Pulvers Corners | 69/13.8 | T1 | SCADA | Fuse | | | | |
| Pulvers Corners | 69/34.5 | T2 | None | EM/uP | | | | 95P is SR-745 |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|---------------|--------------------|----------------|-------------------|-------------|-------------|-------|----------|---------------------------------|
| Reynolds Hill | | | | | | 2100 | | |
| Reynolds Hill | 13.8 | 6001 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Reynolds Hill | 13.8 | 6004 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Reynolds Hill | 13.8 | 6005 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Reynolds Hill | 13.8 | 6008 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Reynolds Hill | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Reynolds Hill | 115 | DR-1418 BKR. | ----- | ----- | uP | ----- | ----- | |
| Reynolds Hill | 115 | DR Line | SCADA | ----- | uP | ----- | ----- | |
| Reynolds Hill | 115 | HR-1285 BKR. | ----- | EM | ----- | ----- | ----- | |
| Reynolds Hill | 115 | HR Line | SCADA | ----- | uP | ----- | ----- | |
| Reynolds Hill | 115 | IR Line | SCADA | ----- | uP | ----- | ----- | |
| Reynolds Hill | 13.8 | B Cable | SCADA | ----- | uP | ----- | ----- | |
| Reynolds Hill | 13.8 | W Cable | SCADA | ----- | uP | ----- | ----- | |
| Reynolds Hill | 13.8 | PD Cable | SCADA | ----- | uP | ----- | ----- | |
| Reynolds Hill | 13.8 | PH Line | SCADA | ----- | uP | ----- | ----- | |
| Reynolds Hill | 13.8 | PK Line | SCADA | ----- | uP | ----- | ----- | |
| Reynolds Hill | 13.8 | PO Line | SCADA | ----- | uP | ----- | ----- | |
| Reynolds Hill | 13.8 | PQ Line | SCADA | ----- | uP | ----- | ----- | |
| Reynolds Hill | 13.8 | PS Line | SCADA | ----- | uP | ----- | ----- | |
| Reynolds Hill | 13.8 | PU Cable | SCADA | ----- | uP | ----- | ----- | |
| Reynolds Hill | 115 | T-31 BKR. | ----- | EM | ----- | ----- | ----- | |
| Reynolds Hill | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| Reynolds Hill | 115 | B2 | SCADA | EM | ----- | ----- | ----- | Volts |
| Reynolds Hill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is SEL-501 |
| Reynolds Hill | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | Volts |
| Reynolds Hill | 13.8 | B3 | SCADA | ----- | uP | ----- | ----- | Volts |
| Reynolds Hill | 115 | W-1543 BKR. | ----- | EM | ----- | ----- | ----- | Volts |
| Reynolds Hill | 115/13.8 | T3 | SCADA | EM/uP | ----- | ----- | ----- | 95P is SEL-351A |
| Reynolds Hill | 115/13.8 | T4 | SCADA | EM/uP | ----- | ----- | ----- | 95P is SEL-351A |
| Rhinebeck | | | | | | 2300 | | |
| Rhinebeck | 13.8 | 7051 Ckt. | Charts - kW/SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | 13.8 | 7052 Ckt. | Charts - Amps | ----- | EM | ----- | ----- | |
| Rhinebeck | 13.8 | 7053 Ckt. | Charts - Amps | ----- | EM | ----- | ----- | |
| Rhinebeck | 13.8 | 7054 Ckt. | Charts - Amps | ----- | EM | ----- | ----- | |
| Rhinebeck | 13.8 | 7055 Ckt. | Charts - kW | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Rhinebeck | 13.8 | 7056 Ckt. | SCADA | ----- | uP- 200/ uP | ----- | ----- | 95P is SEL-251; 95BU is SEL-501 |
| Rhinebeck | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | |
| Rhinebeck | 69 | Cap Bank | ----- | EM | ----- | ----- | ----- | |
| Rhinebeck | 115 | ER Line | SCADA* | uP | ----- | ----- | ----- | Amps |
| Rhinebeck | 115 | LR-830-MR BKR. | ----- | uP | ----- | ----- | ----- | |
| Rhinebeck | 115 | MR Line | None | uP | ----- | ----- | ----- | |
| Rhinebeck | 69 | Q-1471 BKR. | ----- | EM | ----- | ----- | ----- | |
| Rhinebeck | 13.8 | W-1017 BKR. | ----- | ----- | EM | ----- | ----- | |
| Rhinebeck | 13.8 | W-1238 BKR. | ----- | ----- | EM | ----- | ----- | |
| Rhinebeck | 69 | W-258 BKR. | ----- | EM | ----- | ----- | ----- | |
| Rhinebeck | 13.8 | W-367 BKR. | ----- | ----- | EM | ----- | ----- | |
| Rhinebeck | 69 | Q Line | SCADA* | ----- | ----- | ----- | ----- | Volts |
| Rhinebeck | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | |
| Rhinebeck | 13.8 | B2 | none | ----- | EM | ----- | ----- | Combine Bus Volts to one point |
| Rhinebeck | 69 | 69kV Bus | SCADA | ----- | ----- | ----- | ----- | Volts |
| Rhinebeck | 69/13.8 | T1 | SCADA* | EM | ----- | ----- | ----- | Amps & Volts |
| Rhinebeck | 69/13.8 | T2 | SCADA* | EM | ----- | ----- | ----- | Amps & Volts |
| Rhinebeck | 115/13.8 | T4 | SCADA | EM | ----- | ----- | ----- | |
| Rhinebeck | 115/69 | T3 | SCADA | EM | ----- | ----- | ----- | |

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|-------------------|--------------------|---------------|----------|-------------|-------------|------|----------|----------------|
| | | | | | | 2100 | | |
| Rock Tavern 345kV | | | | UP | | | | |
| Rock Tavern 345kV | 345 | 311 Line A1 | SCADA | EM | | | | |
| Rock Tavern 345kV | 345 | 311 Line A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 3456 BKR. | | UP | | | | |
| Rock Tavern 345kV | 345 | 3456 BF A1 | | UP | | | | |
| Rock Tavern 345kV | 345 | 3456 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | Cap Bank 1 A1 | | EM | | | | Combined MVArS |
| Rock Tavern 345kV | 345 | Cap Bank 1 A2 | SCADA* | EM | | | | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | Cap Bank 2 A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 34 Line A1 | SCADA | UP | | | | |
| Rock Tavern 345kV | 345 | 34 Line A2 | | UP | | | | |
| Rock Tavern 345kV | 345 | 37751 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | 37751 BF A1 | | UP | | | | |
| Rock Tavern 345kV | 345 | 37751 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 37752 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | 37752 BF A1 | | UP | | | | |
| Rock Tavern 345kV | 345 | 37752 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 377 Line A1 | SCADA | UP | | | | |
| Rock Tavern 345kV | 345 | 377 Line A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 4255 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | 4255 BF A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | 4255 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | 42 Line A1 | | SS | | | | |
| Rock Tavern 345kV | 345 | 42 Line A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | C3351 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | C3351 BF A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | C3351 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | C3352 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | C3352 BF A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | C3352 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | C3353 BKR. | | UP-200 | | | | |
| Rock Tavern 345kV | 345 | C3353 BF A1 | | UP | | | | |
| Rock Tavern 345kV | 345 | C3353 BF A2 | | UP | | | | |
| Rock Tavern 345kV | 345 | 31153 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | 31153 BF A1 | | UP | | | | |
| Rock Tavern 345kV | 345 | 31153 BF A2 | | UP | | | | |
| Rock Tavern 345kV | 345 | 31154 BKR. | | EM | | | | |
| Rock Tavern 345kV | 345 | 31154 BF A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | 31154 BF A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | Com Equipment | | | | | | Com |
| Rock Tavern 345kV | 345 | B1 A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | B1 A2 | | EM | | | | |
| Rock Tavern 345kV | 345 | B2 A1 | | EM | | | | |
| Rock Tavern 345kV | 345 | B2 A2 | | EM | | | | |
| Rock Tavern 345kV | 345/115 | T1 A1 | | EM | | | | |
| Rock Tavern 345kV | 345/115 | T1 A2 | SCADA | UP | | | | |
| Rock Tavern 345kV | 345/115 | T3 A1 | | EM | | | | |
| Rock Tavern 345kV | 345/115 | T3 A2 | SCADA | UP | | | | |

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Electric Substation Up. Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-----------------|-------------|-------------|-------------|-------|----------|--------------------------------|
| | | | | | | 2400 | | |
| Sand Dock | | | | | | | | |
| Sand Dock | 13.8 | 6011 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | BP-1296 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | BP-1570 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 1 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 2 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | Cap Bank 3 | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | GB Line | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 115 | KC-1447-SC BKR. | ---- | EM | ---- | ---- | ---- | |
| Sand Dock | 115 | KC Line | None | EM | ---- | ---- | ---- | |
| Sand Dock | 115 | SC Line | None | UP | ---- | ---- | ---- | |
| Sand Dock | 13.8 | SH-886 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | SH-911 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-902 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-909 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | TW-910 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-116 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1449 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1453 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | W-1467 BKR. | ---- | ---- | EM | ---- | ---- | |
| Sand Dock | 115 | B1 | SCADA | ---- | ---- | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 115 | B4 | SCADA | ---- | ---- | ---- | ---- | |
| Sand Dock | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Sand Dock | 13.8 | B2 | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | B4 | SCADA | ---- | EM | ---- | ---- | |
| Sand Dock | 13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Sand Dock | 13.8 | T3 | SCADA | EM | ---- | ---- | ---- | |
| Sand Dock | 13.8 | T4 | SCADA | EM | ---- | ---- | ---- | |
| Saugerties | | | | | | Orion | | |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-------------------|-------------|-------------|-------------|------|----------|--------------------------------------|
| Shenandoah | | | | | | 2400 | | |
| Shenandoah | 115 | East Bus | SCADA | EM | ---- | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 115 | West Bus | | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | B1 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B2 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B3 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B4 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B5 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B6 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B7 | SCADA | ---- | EM | ---- | ---- | Combine Bus Volts to one point |
| Shenandoah | 13.8 | B8 | | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 1 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 2 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 3 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 4 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 5 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Cap Bank 6 | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | B-4451 BKR. (CB1) | ---- | ---- | UP | ---- | ---- | |
| Shenandoah | 13.8 | 8071 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | 8072 Ckt. | Charts - kW | ---- | EM | ---- | ---- | |
| Shenandoah | 115 | EF Line | None | uP/Gen-1 | ---- | ---- | ---- | 95BU is Optimho; in replacement plan |
| Shenandoah | 115 | FS Line | None | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | EF-1514 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-739 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-892-EF BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 115 | FS-959 BKR. | ---- | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S1 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S2 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S3 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S4 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S5 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S6 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S7 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S8 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S9 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S10 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S11 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S12 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S13 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S14 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | Feeder S15 | None | ---- | EM | ---- | ---- | |
| Shenandoah | 115/13.8 | T1 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T2 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T3 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T4 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T5 | SCADA | EM | ---- | ---- | ---- | Combine load value |
| Shenandoah | 115/13.8 | T6 | | EM | ---- | ---- | ---- | |
| Shenandoah | 115/13.8 | T7 | SCADA | EM | ---- | ---- | ---- | |
| Shenandoah | 13.8 | W-1266 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1279 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1450 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-1593 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-664 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-665 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-802 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-803 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-805 BKR. | ---- | ---- | EM | ---- | ---- | |
| Shenandoah | 13.8 | W-807 BKR. | ---- | ---- | EM | ---- | ---- | |

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Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|--------------------|--------------------|------------------|----------|-------------|-------------|--------|----------|---|
| Rock Tavern 115kV | | | | | | 44-550 | | |
| Rock Tavern 115kV | 115 | B1 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | B2 | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | 115-0.48kV SST | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | Com Equipment |  | ..... | ..... | ..... | ..... | Com |
| Rock Tavern 115kV | 115 | D Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | D-448 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | J Line | SCADA* | GEN-1/EM | ..... | ..... | ..... | 95P is a DLP; identified in replacement program; Amps |
| Rock Tavern 115kV | 115 | J-788 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RD Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RD-809 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | RJ Line | SCADA* | EM | ..... | ..... | ..... | Amps |
| Rock Tavern 115kV | 115 | RJ-818 BKR. | | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL Line | SCADA | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | SL-684 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-467 BKR. | ..... | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-681 BKR. | ..... | EM | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115 | W-814 BKR. | ..... | EM/UP | ..... | ..... | ..... | SEL-351 |
| Rock Tavern 115kV | 115 | WM Line | none | UP | ..... | ..... | ..... |  |
| Rock Tavern 115kV | 115/69 | T2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | | | | | | 2100 | | |
| Roseton Switchyard | 345 | 30356 (B6) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30356 (B6) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 303 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30551 (B7) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 30553 (B3) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 305 Line A2 | SCADA | EM/UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31151 (B1) BKR | ..... | EM | ..... | ..... | ..... | SEL-501 for DBC |
| Roseton Switchyard | 345 | 31152 (B1) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B1) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BKR | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A1 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 31152 (B4) BF A2 | ..... | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A1 | | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | 311 Line A2 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B1 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | B2 | ..... | UP | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U1 | SCADA | EM | ..... | ..... | ..... |  |
| Roseton Switchyard | 345 | U2 | SCADA | EM | ..... | ..... | ..... |  |

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|----------------|-------------------|-------------|-------------|-------|----------|---|
| Smith Street | | | | | | 2300 | | Radio to INW |
| Smith Street | 4 | 631 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Smith Street | 4 | 632 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Smith Street | 4 | 633 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Smith Street | 4 | 634 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| Smith Street | 13.8 | MS Line | None | ----- | EM | ----- | ----- | |
| Smith Street | 13.8 | PQ Line | None | ----- | EM | ----- | ----- | |
| Smith Street | 13.8 | PS Line | None | ----- | EM | ----- | ----- | |
| Smith Street | 13.8 | W Line | None | ----- | EM | ----- | ----- | Volts |
| Smith Street | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Smith Street | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Smith Street | 4 | B1 | SCADA | ----- | uP | ----- | ----- | Volts |
| Smith Street | 4 | B2 | SCADA | ----- | uP | ----- | ----- | |
| Smith Street | 13.8/4 | T1 | None | ----- | EM | ----- | ----- | |
| Smith Street | 13.8/4 | T2 | None | ----- | EM | ----- | ----- | |
| Smithfield | | | | | | 8890 | | |
| Smithfield | 13.8 | 7095 Ckt. | SCADA | ----- | uP | ----- | ----- | Com |
| Smithfield | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | 95P is SEL-267 |
| Smithfield | 69 | E Line | None | uP- 200/uP | ----- | ----- | ----- | 95P is SEL-267; Volts & Amps |
| Smithfield | 69 | FV Line | SCADA* | uP- 200/uP | ----- | ----- | ----- | Amps |
| Smithfield | 69 | GE Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| Smithfield | 69 | S Line | SCADA* | EM | ----- | ----- | ----- | Volts & Amps |
| Smithfield | 69 | SA Line | SCADA* | EM | ----- | ----- | ----- | Volts |
| Smithfield | 69 | B2 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Smithfield | 69 | B3 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Smithfield | 69/13.8 | T1 | None* | ----- | ----- | ----- | ----- | Only one feeder; T1 = 7095 load |
| South Cairo | | | | | | 8890 | | |
| South Cairo | 13.8 | 2041 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2042 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| South Cairo | 13.8 | 2043 Ckt. | Charts - kW | ----- | EM | ----- | ----- | |
| South Cairo | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| South Cairo | 69 | CF Line | None | EM/uP | ----- | ----- | ----- | 79 done with NLR |
| South Cairo | 69 | CL Line | None | uP | ----- | ----- | ----- | |
| South Cairo | 13.8 | B1+G1 | Charts - kW/SCADA | ----- | EM | ----- | ----- | SCADA Volts |
| South Cairo | 69/13.8 | T1 | Charts - Amps | EM/uP | ----- | ----- | ----- | 95P is SEL-587 |
| South Wall St. | | | | | | None | | |
| South Wall St. | 4 | 111 Ckt. | Grid Sense | ----- | EM | ----- | Kyle L | Single Phase; Oil; Hyd |
| South Wall St. | 4 | 112 Ckt. | Grid Sense | ----- | EM | ----- | Kyle L | Single Phase; Oil; Hyd; missing GS data |
| South Wall St. | 13.8/4 | T1 | Charts - kW/kVAr | ----- | EM | ----- | ----- | |
| Spackenkil | | | | | | Orion | | |
| Spackenkil | 13.8 | 6041 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | 6042 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | 6043 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | 6044 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | 6045 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | 6046 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | 6047 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | 6048 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | |
| Spackenkil | 13.8 | KR Line | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | KS Line | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | MC Line | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | MC-200-SK BKR. | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 13.8 | B2 | ----- | ----- | ----- | ----- | ----- | |
| Spackenkil | 115/13.8 | T1 | SCADA | ----- | uP | ----- | ----- | |
| Spackenkil | 115/13.8 | T2 | ----- | ----- | ----- | ----- | ----- | |
| Staatsburg | | | | | | BM | | |
| Staatsburg | 13.8 | 7041 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Staatsburg | 13.8 | 7042 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Staatsburg | 13.8 | 7043 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Staatsburg | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | |
| Staatsburg | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Staatsburg | 69/13.8 | T1 | SCADA | ----- | uP | ----- | ----- | |

827

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|-------------------|------------------|-------------|-------------|--------|----------|--------------------------------------|
| Standfordville | | | | | | M-4000 | | |
| Standfordville | 13.8 | 7071 Ckt. | MV-90 | ----- | EM | ----- | V4L | Single phase; vac; hyd |
| Standfordville | 13.8 | 7072 Ckt. | MV-90 | ----- | EM | ----- | ----- | Volts |
| Standfordville | 13.8 | B1 | SCADA | ----- | ----- | ----- | ----- | |
| Standfordville | 69/13.8 | T1 | MV-90 | Fuse | ----- | ----- | ----- | |
| Sturgeon Pool | | | | | | 2100 | | |
| Sturgeon Pool | 4 | 341 Ckt. | Grid Sense | ----- | EM | ----- | Kyle W | 3 phase; oil; hyd; missing data |
| Sturgeon Pool | 4 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Sturgeon Pool | 69 | N Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | O Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | P Line | SCADA | uP | ----- | ----- | ----- | |
| Sturgeon Pool | 69 | 69k Bus | SCADA | EM | ----- | ----- | ----- | Volts |
| Sturgeon Pool | | T5 | None | Fuse | ----- | ----- | ----- | |
| Sugarloaf | | | | | | 44-500 | | |
| Sugarloaf | 115 | SD Line | SCADA | EM | ----- | ----- | ----- | Combine load value |
| Sugarloaf | 115 | SJ Line | ----- | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | SL Line | None | EM | ----- | ----- | ----- | |
| Sugarloaf | 115 | B1 | SCADA | EM | ----- | ----- | ----- | Volts |
| Sugarloaf | 115/69 | O & R Transformer | SCADA | EM | ----- | ----- | ----- | |
| Tinkertown | | | | | | 2300 | | Radio to PVL |
| Tinkertown | 13.8 | 7022 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7023 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7024 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | 7025 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Tinkertown | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Tinkertown | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Tinkertown | 69/13.8 | T1 | SCADA | Fuse | ----- | ----- | ----- | |
| Tinkertown | 69/13.8 | T2 | SCADA | Fuse | ----- | ----- | ----- | |
| Tioronda | | | | | | M-4000 | | |
| Tioronda | 13.8 | 8085 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8086 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 13.8 | 8087 Ckt. | Charts - Amps | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Tioronda | 115 | W-566 Ckt. Sw | ----- | EM | ----- | ----- | ----- | Agastat |
| Tioronda | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Tioronda | 115/13.8 | T1 | Charts - kW/kVAr | EM | ----- | ----- | ----- | |
| Todd Hill | | | | | | 2200 | | |
| Todd Hill | 13.8 | 6051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Todd Hill | 13.8 | 6055 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6056 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | 6057 Ckt. | SCADA | ----- | EM | ----- | ----- | |
| Todd Hill | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Todd Hill | 115 | A Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 115 | A-520-C BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | C Line | None | EM/Gen-1 | ----- | ----- | ----- | 95BU is Optimho; in replacement plan |
| Todd Hill | 13.8 | W - 524 BKR. | ----- | EM | ----- | ----- | ----- | |
| Todd Hill | 115 | B1 | SCADA | ----- | ----- | ----- | ----- | Volts |
| Todd Hill | 13.8 | B1 | SCADA | ----- | EM/uP | ----- | ----- | 95BU is SEL-351A; Volts |
| Todd Hill | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Volts |
| Todd Hill | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95P is SEL-587 |
| Todd Hill | 115/13.8 | T2 | SCADA | uP | ----- | ----- | ----- | |

803

Electric Substation Up Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|----------------|--------------------|---------------|----------------|-------------|-------------|--------|----------|--------------------------------|
| Union Ave | | | | | | 2200 | | Volts |
| Union Ave | 115 | B1 | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | RJ Line | SCADA | EM | ----- | ----- | ----- | SEL-351A for BF |
| Union Ave | 115 | RJ-52 BKR. | ----- | EM/uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB Line | SCADA | uP | ----- | ----- | ----- | |
| Union Ave | 115 | UB-51 BKR. | ----- | uP | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UN Line | SCADA* | EM | ----- | ----- | ----- | Amps |
| Union Ave | 115 | UW Line | SCADA* | EM | ----- | ----- | ----- | |
| Union Ave | 115 | W-1095 BKR. | ----- | EM | ----- | ----- | ----- | |
| Union Ave | 13.8 | B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B2 | ----- | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B3 | SCADA | ----- | uP | ----- | ----- | Volts |
| Union Ave | 13.8 | B4 | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B3-B2 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | B4-B1 | ----- | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4041 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4042 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4043 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4044 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4045 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4046 Ckt. | MV-90 | ----- | EM/uP | ----- | ----- | BE1-851H as BU and 79 |
| Union Ave | 13.8 | 4047 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4051 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4052 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4053 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4054 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | 4055 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Union Ave | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Union Ave | 115/13.8 | T1 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T2 | SCADA | EM/uP | ----- | ----- | ----- | 95BU is SEL-387E |
| Union Ave | 115/13.8 | T3 | SCADA | uP | ----- | ----- | ----- | |
| Van Wagner | | | | | | NONE | | |
| Van Wagner | 4 | 731 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Van Wagner | 4 | 732 Ckt. | Charts - kW/GS | ----- | ----- | ----- | Kyle L | Single phase; oil; hyd |
| Vinegar Hill | | | | | | M-4000 | | |
| Vinegar Hill | 34.5 | 2389 Ckt. | MV-90 | ----- | uP | ----- | RVE | 3 phase; oil; hyd |
| West Balmville | | | | | | 2300 | | |
| West Balmville | 115 | B2 | SCADA | EM | ----- | ----- | ----- | Volts |
| West Balmville | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| West Balmville | 13.8 | B2 | SCADA | ----- | uP | ----- | ----- | Combine Bus Volts to one point |
| West Balmville | 115 | B Line | SCADA | uP | ----- | ----- | ----- | |
| West Balmville | 13.8 | 4011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | 4012 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4013 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4014 Ckt. | SCADA | ----- | uP | ----- | ----- | MV-90 still? |
| West Balmville | 13.8 | 4015 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| West Balmville | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| West Balmville | 115 | DB Line | SCADA | uP | ----- | ----- | ----- | |
| West Balmville | 115 | DB-875 BKR. | ----- | uP | ----- | ----- | ----- | |
| West Balmville | 115 | DW Line | SCADA | uP | ----- | ----- | ----- | |
| West Balmville | 115 | DW-662 BKR. | ----- | uP | ----- | ----- | ----- | |
| West Balmville | 115 | F Line | SCADA | uP | ----- | ----- | ----- | |
| West Balmville | 115 | R Line | SCADA | uP | ----- | ----- | ----- | |
| West Balmville | 115 | W-478 BKR. | ----- | uP | ----- | ----- | ----- | |
| West Balmville | 115 | W-855 BKR. | ----- | uP | ----- | ----- | ----- | |
| West Balmville | 115 | WN Line | SCADA | uP | ----- | ----- | ----- | |
| West Balmville | | T1 | SCADA | EM | ----- | ----- | ----- | Combine load value |
| West Balmville | | T2 | SCADA | EM | ----- | ----- | ----- | |

003

Electric Substation Upgrade Needs Assessment

| Substation | Voltage Class (kV) | Line/Ckt. | Metering | T. Relaying | D. Relaying | RTU | Recloser | Comment |
|------------|--------------------|-------------------|----------|-------------|-------------|--------|----------|--------------------------------------|
| Westerlo | | | | | | BM | | |
| Westerlo | 13.8 | 1091 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1092 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | 1093 Ckt. | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | 13.8 | B1 | SCADA | ----- | uP | ----- | ----- | |
| Westerlo | ----- | Com Equipment | ----- | ----- | ----- | ----- | ----- | Only has one 13.8 bus; T1 = Bus load |
| Westerlo | 69/13.8 | T1 | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | Cap Bank | ----- | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | NW Line | SCADA | uP | ----- | ----- | ----- | |
| Westerlo | 69 | FW-1500-NW BKR. | ----- | uP | ----- | ----- | ----- | |
| Wiccopee | | | | | | L&N | | |
| Wiccopee | 115 | FS Line | None | EM | ----- | ----- | ----- | |
| Wiccopee | 115 | WP Line | None | uP | ----- | ----- | ----- | |
| Wiccopee | 115 | FS - 1652-WP BKR. | ----- | EM | ----- | ----- | ----- | |
| Wiccopee | 13.8 | F1-292 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | F2-280 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-368 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-378 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-632 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | W-636 BKR. | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #3) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Future (Unit #9) | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B1 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | B2 | ----- | ----- | EM | ----- | ----- | |
| Wiccopee | 13.8 | Com Equipment | ----- | ----- | ----- | ----- | ----- | Com |
| Wiccopee | 115/13.8 | T1 | SCADA | EM | ----- | ----- | ----- | |
| Wiccopee | 115/13.8 | T2 | SCADA | EM | ----- | ----- | ----- | |
| Woodstock | | | | | | M-4000 | | |
| Woodstock | 13.8 | 3011 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3012 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3013 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | 3014 Ckt. | MV-90 | ----- | EM | ----- | ----- | |
| Woodstock | 13.8 | B1 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 13.8 | B2 | SCADA | ----- | EM | ----- | ----- | Volts |
| Woodstock | 69/13.8 | T2+SR Line | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 + B2 | ----- | EM | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T1 | MV-90 | ----- | ----- | ----- | ----- | |
| Woodstock | 69/13.8 | T2 | MV-90 | ----- | ----- | ----- | ----- | |

Attachment 6

| | Station | Cost |
|------|-----------------|-------------|
| 2012 | Dashville | \$190,000 |
| | East Walden | \$610,000 |
| | Tioronda | \$200,000 |
| 2013 | Coxsackie | \$130,000 |
| | South Cairo | \$160,000 |
| | East Park | \$200,000 |
| | Pleasant Valley | \$360,000 |
| | Todd Hill | \$160,000 |
| 2014 | Sand Dock | \$510,000 |
| | Fishkill Plains | \$480,000 |
| | South Wall St. | \$84,000 |
| 2015 | Manchester | \$340,000 |
| | Forgebrook | \$730,000 |
| 2016 | Rock Tavern | \$1,060,000 |
| | | |
| Subs | | |
| | | |
| | | |

Preliminary
Copy

Submission Date: April 11, 2023
Submitted By: Brett Arteta

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Woodstock Switchgear Upgrade

Work Order #: 1 3 6 1 - F

Budget Group: Electric **Budget Category:** 13

Funding Project Number: 1-1312-31-15

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2015

In-Service: 12/1/2025

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The existing external switchgear and control house switchgear has reached the end of its useful life and replacement parts are difficult to obtain or no longer available. Maintenance issues have been experienced with racking the 1947 vintage breakers in the external switchgear. Replacement parts for the racking mechanisms are no longer available. The external switchgear and control house switchgear have separate DC voltage supplies, a 24 volt and a 48 volt battery system, respectively. There is no room to upgrade either battery system, and maintenance of the system is problematic.

Describe specific scope exclusions, assumptions and constraints:

It is recommended that the external switchgear and control house switchgear be replaced with a new Power Control Center (PCC). The PCC will contain two bus's with a normally open tie breaker, 15kV breakers rated 2000A and 1200A, protective relaying, interconnection cabinet, PT's, station service transformers, RTU, and DC battery system. The PCC will contain provisions for future expansion.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

Risk of equipment failure possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|-----------------------------------|--|------------------|-------------|-------------|-------------|--------------|
| \$3,539,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 335,700 | 20,700 | 10,000 | 305,000 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 167,350 | 10,350 | 5,000 | 152,000 | 0 | 0 | 0 | 0 |
| | Stock Materials | 167,350 | 10,350 | 5,000 | 152,000 | 0 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 671,400 | 41,400 | 21,000 | 609,000 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 236,490 | 14,490 | 8,000 | 214,000 | 0 | 0 | 0 | 0 |
| | Overheads | 1,677,500 | 103,500 | 51,000 | 1,523,000 | 0 | 0 | 0 | 0 |
| | AFUDC* | 100,210 | 6,210 | 3,000 | 91,000 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,356,000 | 207,000 | 103,000 | 3,046,000 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 27,000 | 0 | 0 | 27,000 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 55,000 | 0 | 0 | 55,000 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 10,000 | 0 | 0 | 10,000 | 0 | 0 | 0 | 0 |
| | Overheads | 91,000 | 0 | 0 | 91,000 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 183,000 | 0 | 0 | 183,000 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|--------------|--------------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 1,516 | 1,516 | 0 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,477,300 Maximum (\$): 4,600,700

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: April 11, 2023
Submitted By: Brett Arteta

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Modena Complete Ring Bus

Work Order #: 2 4 9 2 - G

Budget Group: Electric

Budget Category: 13

Funding Project Number: 1-1312-52-17

Is this a Specific Project, Program or Blanket?

Specific

Target Schedule - Start: 1/1/2017

In-Service: 12/1/2026

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Based on a review of the Ellenville Transmission Area, following the retirement of the Modena 115kV/69 kV autotransformers, new autotransformers must be installed at Kerhonkson Substation. This work will need to be completed in conjunction with the upgrade of the P & MK Lines to 115 kV operation. To meet our current protection standards, remaining work for the upgrade of the P & MK Lines to 115 kV will include protection upgrades, including pilot protection (high speed coverage of 100% of the line) and direct transfer trip for the lines upgrading to 115 kV operation.

Describe specific scope exclusions, assumptions and constraints:

Install a third 115 kV breaker at Modena Substation to complete the ring bus. Install relay pilot schemes at Modena Substation for primary line protection and direct transfer trip. Retire the old 115/69 kV Modena transformer and substation after conversion to 115 kV.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Project aligns with the 115 kV conversion of the Kerhonkson loop.

What are the risks and consequences of not completing this project?

Lack of a ring bus at Modena would result in lower reliability during maintenance or faults possibly increasing SAIFI or CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|---|--|------------------|------------------|----------------|----------------|--------------|
| \$3,527,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 319,300 | 2,300 | 40,000 | 120,000 | 157,000 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 159,150 | 1,150 | 20,000 | 60,000 | 78,000 | 0 | 0 | 0 |
| | Stock Materials | 159,150 | 1,150 | 20,000 | 60,000 | 78,000 | 0 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 638,600 | 4,600 | 80,000 | 240,000 | 314,000 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 225,610 | 1,610 | 29,000 | 84,000 | 111,000 | 0 | 0 | 0 |
| | Overheads | 1,596,500 | 11,500 | 201,000 | 600,000 | 784,000 | 0 | 0 | 0 |
| | AFUDC* | 94,690 | 690 | 12,000 | 35,000 | 47,000 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,193,000 | 23,000 | 402,000 | 1,199,000 | 1,569,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 50,150 | 150 | 0 | 24,000 | 26,000 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 100,300 | 300 | 0 | 47,000 | 53,000 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 17,050 | 50 | 0 | 8,000 | 9,000 | 0 | 0 | 0 |
| | Overheads | 166,500 | 500 | 0 | 78,000 | 88,000 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 334,000 | 1,000 | 0 | 157,000 | 176,000 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|------------|------------|----------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 222 | 222 | 0 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,468,900 Maximum (\$): 4,585,100

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: April 11, 2023
Submitted By: Brett Arteta

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Tilcon - Tap Station

Work Order #: 4 8 1 4 - F

Budget Group: Electric

Budget Category: 13

Funding Project Number: 1-1312-52-16

Is this a Specific Project, Program or Blanket?

Specific

Target Schedule - Start: 1/1/2016

In-Service: 12/1/2027

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Installation of a new 115 kV breaker at the Sand Dock Substation to limit exposure to IBM resulting from a fault at the new tap on the SC Line.

Describe the project objective and scope of work:

Based on infrastructure issues determined by inspections and a condition based assessment, the 69 kV TR Line needs to be rebuilt. This line is the sole supply to a quarry limiting the ability to obtain outages during a rebuild of the line. A review has determined that the most economical solution is to build a new substation tapped off of the 115 kV SC Line to supply the quarry and to retire the TR Line.

Describe specific scope exclusions, assumptions and constraints:

Install a new 115/69 kV Substation to serve Tilcon. Additionally, install a new 115 kV breaker at the Sand Dock Substation to limit exposure to IBM resulting from a fault at the new tap on the SC Line.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

An alternative considered was to rebuild the TR Line in kind. Construction would be costly and lengthy due to the restrictions from the quarry on the allowable outage durations to perform the work.

Why was the proposed project scope chosen over other alternatives?

More cost effective solution.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A: Infrastructure Replacements

What are the risks and consequences of not completing this project?

N/A: Infrastructure Replacements

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$6,542,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 654,600 | 23,600 | 6,000 | 51,000 | 314,000 | 260,000 | 0 | 0 |
| | Labor (Monthly Payroll) | 326,800 | 11,800 | 3,000 | 25,000 | 157,000 | 130,000 | 0 | 0 |
| | Stock Materials | 326,800 | 11,800 | 3,000 | 25,000 | 157,000 | 130,000 | 0 | 0 |
| | Non-Stock Material (A/P taxable) | 1,308,200 | 47,200 | 12,000 | 102,000 | 627,000 | 520,000 | 0 | 0 |
| | Contractors (A/P tax exempt) | 459,520 | 16,520 | 5,000 | 36,000 | 220,000 | 182,000 | 0 | 0 |
| | Overheads | 3,271,000 | 118,000 | 31,000 | 254,000 | 1,569,000 | 1,299,000 | 0 | 0 |
| | AFUDC* | 195,080 | 7,080 | 2,000 | 15,000 | 93,000 | 78,000 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 6,542,000 | 236,000 | 62,000 | 508,000 | 3,137,000 | 2,599,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Labor (Monthly Payroll) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Contractors (A/P tax exempt) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Overheads | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|--------------|--------------|--------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 4,210 | 1,004 | 3,206 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 4,579,400 Maximum (\$): 8,504,600

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical Proforma Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: June 1, 2023
Submitted By: Victor Narkaj

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Category 14 Electric New Business

Work Order #: -

Budget Group: Electric Budget Category: 14

Funding Project Number: N/A

Is this a Specific Project, Program or Blanket? Program Target Schedule - Start: 1/1/2024 In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Overall Budget Planning for Category 14

Describe the project objective and scope of work:

All electric new business

Describe specific scope exclusions, assumptions and constraints:

Tariff obligation to provide electric service

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

None. Category 14 is non-discretionary

Why was the proposed project scope chosen over other alternatives?

Obligation to serve is non-discretionary

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

New customer service must be provided in a timely manner

What are the risks and consequences of not completing this project?

Customer complaints

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|-----------------------------------|--|-------------------|-------------------|-------------------|-------------------|--------------|
| \$70,754,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 6,963,000 | | 1,289,000 | 1,355,000 | 1,375,000 | 1,435,000 | 1,509,000 | |
| | Labor (Monthly Payroll) | 11,608,000 | | 2,149,000 | 2,259,000 | 2,292,000 | 2,393,000 | 2,515,000 | |
| | Stock Materials | 24,765,000 | | 4,586,000 | 4,819,000 | 4,889,000 | 5,105,000 | 5,366,000 | |
| | Non-Stock Material (A/P taxable) | 3,511,000 | | 650,000 | 683,000 | 693,000 | 724,000 | 761,000 | |
| | Contractors (A/P tax exempt) | 5,556,000 | | 1,029,000 | 1,081,000 | 1,097,000 | 1,145,000 | 1,204,000 | |
| | Overheads | 7,892,000 | | 1,461,000 | 1,536,000 | 1,558,000 | 1,627,000 | 1,710,000 | |
| | AFUDC* | 9,042,000 | | 1,524,000 | 1,568,000 | 1,862,000 | 1,997,000 | 2,091,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 69,337,000 | 0 | 12,688,000 | 13,301,000 | 13,766,000 | 14,426,000 | 15,156,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 530,000 | | 100,000 | 103,000 | 106,000 | 109,000 | 112,000 | |
| | Labor (Monthly Payroll) | 530,000 | | 100,000 | 103,000 | 106,000 | 109,000 | 112,000 | |
| | Contractors (A/P tax exempt) | 133,000 | | 25,000 | 26,000 | 27,000 | 27,000 | 28,000 | |
| | Overheads | 224,000 | | 31,000 | 37,000 | 44,000 | 52,000 | 60,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 1,417,000 | 0 | 256,000 | 269,000 | 283,000 | 297,000 | 312,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|---------------|---------------|--------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 28,449 | 20,057 | 8,392 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 56,603,200 Maximum (\$): 84,904,800

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

The Category 14 - Electric New Business budget is established using historic customer additions and spending run rates. Budget dollars are allocated to specific and blanket categories, but can be reallocated within the category as actual spending varies from projections.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: January 30, 2023
Submitted By: Joseph Kisch

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Distribution Improvement Blankets (15BL-01)

Work Order #:

Budget Group: Electric **Budget Category:** 15

Funding Project Number: 1-151L-01-08

Is this a Specific Project, Program or Blanket?

Blanket

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Development of work orders to address emerging operational work.

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To allow for the completion of emergent operational work and compliance related issues.

What are the risks and consequences of not completing this project?

Increased impacts on SAIFI and CAIDI

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$251,600,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 167,300,000 | | 14,700,000 | 18,900,000 | 18,900,000 | 18,900,000 | 18,900,000 | 77,000,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 71,700,000 | | 6,300,000 | 8,100,000 | 8,100,000 | 8,100,000 | 8,100,000 | 33,000,000 |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 239,000,000 | 0 | 21,000,000 | 27,000,000 | 27,000,000 | 27,000,000 | 27,000,000 | 110,000,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 12,600,000 | | 2,100,000 | 2,100,000 | 2,100,000 | 2,100,000 | 2,100,000 | 2,100,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 12,600,000 | 0 | 2,100,000 | 2,100,000 | 2,100,000 | 2,100,000 | 2,100,000 | 2,100,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|-------------------|-------------------|------------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 36,595,000 | 26,862,000 | 9,733,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Increasing material costs for non-discretionary work could result in overages for this program.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Annual Estimates developed based off Rate Case Settlement.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Cases often arise where Central Hudson is required to relocate our facilities in a timely manner.

What are the risks and consequences of not completing this project?

Customer needs will not be met and compliance will not be adhered to

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$2,310,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 1,470,000 | | 147,000 | 147,000 | 147,000 | 147,000 | 147,000 | 735,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 630,000 | | 63,000 | 63,000 | 63,000 | 63,000 | 63,000 | 315,000 |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,100,000 | 0 | 210,000 | 210,000 | 210,000 | 210,000 | 210,000 | 1,050,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 210,000 | | 21,000 | 21,000 | 21,000 | 21,000 | 21,000 | 105,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 210,000 | 0 | 21,000 | 21,000 | 21,000 | 21,000 | 21,000 | 105,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------------|----------------|----------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 833,000 | 617,000 | 216,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Increased material costs and the number of requests for infrastructure relocations drive the expenditures within this blanket.

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Annual estimates developed based off Rate Case Settlement

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This program supports efforts to eliminate legacy infrastructure and rebuild circuitry to modern-day construction, reliability, and operational flexibility standards.

What are the risks and consequences of not completing this project?

Increased impacts on SAIFI, CAIDI and power quality.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|------------------------|------------------------|------------------------|------------------------|---------------------|
| \$3,564,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 2,268,000 | | 226,800 | 226,800 | 226,800 | 226,800 | 226,800 | 1,134,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 972,000 | | 97,200 | 97,200 | 97,200 | 97,200 | 97,200 | 486,000 |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,240,000 | 0 | 324,000 | 324,000 | 324,000 | 324,000 | 324,000 | 1,620,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 324,000 | | 32,400 | 32,400 | 32,400 | 32,400 | 32,400 | 162,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 324,000 | 0 | 32,400 | 32,400 | 32,400 | 32,400 | 32,400 | 162,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|------------------|----------------|----------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 1,248,000 | 924,000 | 324,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Increasing material costs could result in overages for this program.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: January 31, 2023
Submitted By: J. Kisch

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Road/Bridge Rebuild Relocation Projects (1531-0X)

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Electric

Budget Category: 15

Funding Project Number: 1-1531-00-18

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Central Hudson coordinates with the local municipalities and the Department of Transportation for highway rebuild and road paving projects. The highway rebuilds and road paving projects usually consist of relocation and replacement of existing infrastructure. The infrastructure is optimally designed for both present and projected use through engineering studies.

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Scenarios arise in which Central Hudson is required to relocate infrastructure to accommodate road/bridge construction or relocation.

What are the risks and consequences of not completing this project?

Customer needs will not be met and compliance will not be adhered to.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|----------------|--|----------------|----------------|----------------|------------------|
| \$3,645,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 2,268,000 | | 378,000 | 378,000 | 189,000 | 189,000 | 189,000 | 945,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 972,000 | | 162,000 | 162,000 | 81,000 | 81,000 | 81,000 | 405,000 |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,240,000 | 0 | 540,000 | 540,000 | 270,000 | 270,000 | 270,000 | 1,350,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 405,000 | | 54,000 | 54,000 | 54,000 | 54,000 | 54,000 | 135,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 405,000 | 0 | 54,000 | 54,000 | 54,000 | 54,000 | 54,000 | 135,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|------------------|------------------|----------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 3,435,000 | 2,516,000 | 919,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Material costs and the number of requests for infrastructure relocations drive the expenditures within this program.

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Annual estimates developed based off Rate Case Settlement.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: January 30, 2023
Submitted By: Joseph Kisch

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: CATV Make-ready

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Electric

Budget Category: 15

Funding Project Number: 1-1551-01-18

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Develop work orders to address any emerging CATV work.

Describe specific scope exclusions, assumptions and constraints:

N/A

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Distribution Sustaining
Discretion Level: Non-Discretionary **Investment Type:** Compliance
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): **Is there an Innovation Component?** No
Needs Assessment: Risk Reduction; Regulatory
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? Yes

Describe the justification for this project. Include attachments or links to planning studies if applicable:

As the communication companies continue to expand their infrastructure, the proper NESC clearances between communication and electric facilities must be maintained and the poles must have sufficient capability to carry the additional facilities. If the infrastructure is aged, the utility is responsible for the cost of the upgrades. With the governor's broadband initiative, the volume of these projects is increasing significantly.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

N/A

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve system performance and resilience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? PSC CAIDI Outage Duration

Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44):

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates? Yes

** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

Miscellaneous (wetlands; highway; SWPPP)

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: Yes **Environmental Component:** Yes
Social Component: Yes
Governance Component: No

Is complete Sustainability status achieved by this project?* No

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

In order to maintain the proper NESC clearances between communication and electric facilities, infrastructure must be upgraded continuously.

What are the risks and consequences of not completing this project?

Failure to be in compliance with NESC code.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|----------------|--|----------------|----------------|----------------|------------------|
| \$6,600,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 4,200,000 | | 420,000 | 420,000 | 420,000 | 420,000 | 420,000 | 2,100,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 1,800,000 | | 180,000 | 180,000 | 180,000 | 180,000 | 180,000 | 900,000 |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 6,000,000 | 0 | 600,000 | 600,000 | 600,000 | 600,000 | 600,000 | 3,000,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 600,000 | | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 300,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 600,000 | 0 | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 300,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|---|------------------|------------------|----------------|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
| Current Approved Rate Case Funding (\$): | 2,588,000 | 2,047,000 | 541,000 | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Material Costs and number of CATV make-ready requests drive the expenditures for this program.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: January 31, 2023
Submitted By: J. Kisch

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Overhead Secondary Replacement Program

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Electric **Budget Category:** 15

Funding Project Number: 1-1551-04-19

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The overhead secondary replacement program was developed to begin to phase out all of the antiquated, open wire secondary. The wire is typically replaced with new, triplex cable. The conductors are stronger, more resistant to contact faults and can handle additional loading.

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This program supports efforts to eliminate legacy infrastructure and rebuild circuitry to modern-day construction, reliability, and operational flexibility standards.

What are the risks and consequences of not completing this project?

Increased impacts on SAIFI and CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|----------------|--|----------------|----------------|----------------|------------------|
| \$2,415,600 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 1,537,200 | | 151,200 | 154,000 | 154,000 | 154,000 | 154,000 | 770,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 658,800 | | 64,800 | 66,000 | 66,000 | 66,000 | 66,000 | 330,000 |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,196,000 | 0 | 216,000 | 220,000 | 220,000 | 220,000 | 220,000 | 1,100,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 219,600 | | 21,600 | 22,000 | 22,000 | 22,000 | 22,000 | 110,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 219,600 | 0 | 21,600 | 22,000 | 22,000 | 22,000 | 22,000 | 110,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------------|----------------|----------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 833,000 | 617,000 | 216,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Potential project deferrals & re-prioritization; material shortages

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: January 30, 2023
Submitted By: Joseph Kisch

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Distribution Pole Replacement Program

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Electric **Budget Category:** 15

Funding Project Number: 1-1551-08-18

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The facility inspections program helps determine if poles are in need of replacement due to conditions such as broken poles, severe pole lean, pole rot, wash out, evidence of flashover and woodpecker holes. Recent improvements in Central Hudson's testing procedures helped identify over four times as many defective poles from years past.

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

As aged/at-risk poles are discovered within the infrastructure, they must be replaced as soon as possible to mitigate any potential safety & reliability risks.

What are the risks and consequences of not completing this project?

Increased impacts on SAIFI and CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|------------------|--|------------------|------------------|------------------|------------------|
| \$11,000,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 7,000,000 | | 700,000 | 700,000 | 700,000 | 700,000 | 700,000 | 3,500,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 3,000,000 | | 300,000 | 300,000 | 300,000 | 300,000 | 300,000 | 1,500,000 |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 10,000,000 | 0 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 5,000,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 1,000,000 | | 100,000 | 100,000 | 100,000 | 100,000 | 100,000 | 500,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 1,000,000 | 0 | 100,000 | 100,000 | 100,000 | 100,000 | 100,000 | 500,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|-------------------|-------------------|------------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 34,939,000 | 26,088,000 | 8,851,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Increased material costs could result in overages within the program.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: January 30, 2023
Submitted By: Joseph Kisch

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Distribution Automation - Other **Work Order #:**

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

Budget Group: Electric **Budget Category:** 15 **Funding Project Number:** 10461

Is this a Specific Project, Program or Blanket? Program **Target Schedule - Start:** 1/1/2024 **In-Service:** 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

There is a small annual allowance for new locations that were not identified as part of the Grid Modernization plan (DA-Major Program) and replacement equipment as it arises.

Describe specific scope exclusions, assumptions and constraints:

Funding for this program has already been accounted for as part of the 2022-2024 Category 15 Budget. Once approved, funds will be re-allocated from Funding Project # 1-1551-19-18 (Distribution Automation - Major Program).

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This program supports efforts to eliminate legacy infrastructure and rebuild circuitry to modern-day construction, reliability, and operational flexibility standards.

What are the risks and consequences of not completing this project?

Increased impacts on SAIFI and CAIDI; Increased risk of power quality issues

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|----------------|--|----------------|----------------|----------------|------------------|
| \$5,500,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 3,500,000 | | 350,000 | 350,000 | 350,000 | 350,000 | 350,000 | 1,750,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 1,500,000 | | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 750,000 |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 5,000,000 | 0 | 500,000 | 500,000 | 500,000 | 500,000 | 500,000 | 2,500,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 500,000 | | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 250,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 500,000 | 0 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 250,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|---|------------------|------------------|----------------|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
| Current Approved Rate Case Funding (\$): | 1,975,000 | 1,434,000 | 541,000 | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 3,850,000 Maximum (\$): 7,150,000

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Annual estimates developed based off Rate Case Settlement

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: January 30, 2023
Submitted By: Joseph Kisch

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Distribution Automation - Major Program

Work Order #: -

Budget Group: Electric **Budget Category:** 15

Funding Project Number: 1-1551-19-18

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The Electric Distribution Automation program was developed in order to address these growing concerns. Through the implementation of a Distribution Management System (DMS), Central Hudson will be able to implement programs such as Volt-Var optimization (VVO), Conservation Voltage Reduction (CVR), and Fault Location Isolation and Service Restoration (FLISR). Programs such as these are aimed to lower customer energy usage, defer transmission investments, replace aging assets, incorporate modern technology, improve customer reliability, and facilitate integration of

Describe specific scope exclusions, assumptions and constraints:

All expenditures within this program derive from recommendations in DA E.P. Memos. All incremental DA devices installed along with expenditures for repairs to existing DA equipment are considered part of the "Distribution Automation - Other" Program (Funding Project #10461)

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This program coincides with the Grid Mod Program

What are the risks and consequences of not completing this project?

Elevated risks on overall SAIFI and CAIDI performance; Increased risk of power quality issues; Failure to adhere to Grid Mod Program milestones

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$5,948,800 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 3,785,600 | | 3,449,600 | 336,000 | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 1,622,400 | | 1,478,400 | 144,000 | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 5,408,000 | 0 | 4,928,000 | 480,000 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 540,800 | | 492,800 | 48,000 | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 540,800 | 0 | 492,800 | 48,000 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|-------------------|-------------------|------------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 18,652,000 | 13,875,000 | 4,777,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Increases in material costs could result in overages within this program

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: January 30, 2023
Submitted By: Joseph Kisch

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Distribution Improvement - Reliability (1551-0X)

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Electric Budget Category: 15

Funding Project Number: 1-1551-10-18

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Projects are developed and prioritized according to a 5 year historical average \$/COA (customer outage avoided), but ancillary benefits to customer satisfaction and resiliency also are considered. Examples of improvement projects include relocating circuitry from off-road to on-road, closing gaps (i.e., new circuit ties), installing electronic reclosers, and replacing failure prone equipment.

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This program supports efforts to eliminate legacy infrastructure and rebuild circuitry to modern-day construction, reliability, and operational flexibility standards.

What are the risks and consequences of not completing this project?

Elevated risks to SAIFI and CAIDI performance.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|-----------------------------------|--|------------------|------------------|------------------|------------------|--------------|
| \$6,820,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 4,340,000 | | 756,000 | 892,500 | 962,500 | 752,500 | 976,500 | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 1,860,000 | | 324,000 | 382,500 | 412,500 | 322,500 | 418,500 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 6,200,000 | 0 | 1,080,000 | 1,275,000 | 1,375,000 | 1,075,000 | 1,395,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 620,000 | | 108,000 | 127,500 | 137,500 | 107,500 | 139,500 | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 620,000 | 0 | 108,000 | 127,500 | 137,500 | 107,500 | 139,500 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|------------------|------------------|------------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 4,590,000 | 3,407,000 | 1,183,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Increased material costs could result in overages within the program.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: January 30, 2023
Submitted By: Joseph Kisch

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: CEMI-Worst Circuit Reliability Program

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Electric Budget Category: 15

Funding Project Number: 1-1551-18-18

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The CEMI (customers experiencing multiple interruptions) and Worst Performing Circuits program have been designed to help identify and develop reliability improvements for these customers. Projects are similar to projects identified in the Reliability program. The customers experiencing the poorest of reliability are identified, and improvement projects are developed annually.

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This program supports efforts to eliminate legacy infrastructure and rebuild circuitry to modern-day construction, reliability, and operational flexibility standards.

What are the risks and consequences of not completing this project?

Elevated risks on SAIFI and CAIDI performance; Unfavorable customer satisfaction results due to repeated outages.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$6,862,900 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 4,367,300 | | 792,400 | 753,900 | 710,500 | 858,200 | 762,300 | 490,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 1,871,700 | | 339,600 | 323,100 | 304,500 | 367,800 | 326,700 | 210,000 |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 6,239,000 | 0 | 1,132,000 | 1,077,000 | 1,015,000 | 1,226,000 | 1,089,000 | 700,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 623,900 | | 113,200 | 107,700 | 101,500 | 122,600 | 108,900 | 70,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 623,900 | 0 | 113,200 | 107,700 | 101,500 | 122,600 | 108,900 | 70,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|------------------|------------------|------------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 7,109,000 | 5,609,000 | 1,500,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Increased material costs could result in overages within the program.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Budget Submittal Form

Version 3.0 12/9/2022

Submission Date: January 31, 2023

First Year of 5-Year Budget Period: 2024

Submitted By: J. Kisch

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Resiliency Program

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Electric

Budget Category: 15

Funding Project Number: 10404

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Examples of projects which would fit into this program may include any of the following:

- Use of technology: Microgrids, R&D, resiliency studies, weather early-warning systems

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This program supports efforts to eliminate legacy infrastructure and rebuild circuitry to modern-day construction, reliability, and operational flexibility standards.

What are the risks and consequences of not completing this project?

Elevated risks to SAIFI and CAIDI

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|------------------|-------------|-------------|------------------|
| \$3,528,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 2,352,000 | | | | 1,176,000 | | | 1,176,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 1,008,000 | | | | 504,000 | | | 504,000 |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,360,000 | 0 | 0 | 0 | 1,680,000 | 0 | 0 | 1,680,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 168,000 | | | | 168,000 | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 168,000 | 0 | 0 | 0 | 168,000 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|------------------|------------------|----------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 1,749,000 | 1,100,000 | 649,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Increased material costs could result in overages within the program.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: January 31, 2023
Submitted By: Joseph Kisch

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|----------------------|
| Project/Program Name: Distribution Improvement (1551-0X) - Operating/ Infrastructure Condition | | Work Order #: | <input type="text"/> |
| Budget Group: Electric | Budget Category: 15 | Funding Project Number: | 1-1551-03-18 |
| Is this a Specific Project, Program or Blanket? Program | Target Schedule - Start: 1/1/2024 | In-Service: | 12/31/2028 |

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Operating projects are developed with the primary goal of reducing the duration of outages. Typical projects involve developing a tie between feeders, or reconductoring the lines to make the tie stronger so more load can be reenergized through switching. Many of these projects also address failing infrastructure that does not fall under a specific program.

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This program supports efforts to eliminate legacy infrastructure and rebuild circuitry to modern-day construction, reliability, and operational flexibility standards.

What are the risks and consequences of not completing this project?

Elevated risks to SAIFI and CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$18,341,400 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 11,671,800 | | 1,965,600 | 1,298,500 | 1,050,000 | 2,668,400 | 2,802,800 | 1,886,500 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 5,002,200 | | 842,400 | 556,500 | 450,000 | 1,143,600 | 1,201,200 | 808,500 |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 16,674,000 | 0 | 2,808,000 | 1,855,000 | 1,500,000 | 3,812,000 | 4,004,000 | 2,695,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 1,667,400 | | 280,800 | 185,500 | 150,000 | 381,200 | 400,400 | 269,500 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 1,667,400 | 0 | 280,800 | 185,500 | 150,000 | 381,200 | 400,400 | 269,500 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|------------------|------------------|------------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 9,000,000 | 6,500,000 | 2,500,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Increased material costs could result in overages within the program.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: January 30, 2023
Submitted By: Joseph Kisch

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Copper Wire Replacement Program

Work Order #:

Budget Group: Electric **Budget Category:** 15

Funding Project Number: 1-1551-11-18

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The copper wire replacement program was developed to begin to phase out all of the undersized, antiquated, copper conductors. The wire is typically replaced with new, higher capacity ACSR wire. The new conductors are rated for 13.2kV operation, are stronger, and can handle additional loading.

Describe specific scope exclusions, assumptions and constraints:

N/A

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure
Growth/Sustaining/Retirement: Distribution Sustaining
Discretion Level: Maintain System Standards
Investment Type: Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Is there an Innovation Component? No
Needs Assessment: Infrastructure
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:

There is a proliferation of primary copper wire on Central Hudson's distribution system. These conductors are not only antiquated and prone to failure; they are frequently undersized (#4 and #6) for modern operational needs, such as CVR and FLISR. They are also susceptible to burndown during reclose operations.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

Improved SAIFI & CAIDI performance

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve system performance and resilience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? PSC SAIFI Outage Frequency

Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44):

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates? Yes

** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

Miscellaneous (wetlands; highway; SWPPP)

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: Yes **Environmental Component:** Yes
Social Component: Yes
Governance Component: No

Is complete Sustainability status achieved by this project?* No

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This program supports efforts to eliminate legacy infrastructure and rebuild circuitry to modern-day construction, reliability, and operational flexibility standards.

What are the risks and consequences of not completing this project?

Increased impacts on SAIFI and CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|----------------|----------------|-------------|------------------|
| \$3,300,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 2,100,000 | | | | 612,500 | 437,500 | | 1,050,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 900,000 | | | | 262,500 | 187,500 | | 450,000 |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,000,000 | 0 | 0 | 0 | 875,000 | 625,000 | 0 | 1,500,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 300,000 | | | | 87,500 | 62,500 | | 150,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 300,000 | 0 | 0 | 0 | 87,500 | 62,500 | 0 | 150,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|---|------------------|------------------|----------------|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
| Current Approved Rate Case Funding (\$): | 2,975,000 | 2,326,000 | 649,000 | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Potential project deferrals & re-prioritization; material shortages.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: January 30, 2023
Submitted By: Joseph Kisch

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: 4800 V Conversion/Infrastructure Program **Work Order #:**
Budget Group: Electric **Budget Category:** 15 **Funding Project Number:** 1-1551-12-18
Is this a Specific Project, Program or Blanket? Program **Target Schedule - Start:** 1/1/2024 **In-Service:** 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

A conversion program was developed to the eliminate 4800V aging infrastructure. The program focuses on upgrading 4800V mainline circuitry to 13.2kV operational voltage. A particular focus is placed on developing projects that eliminate overloaded step-down transformer banks in order to mitigate thermal and infrastructure concerns, as well as remove any of the other potential hazards associated with 4800V circuitry.

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This program supports efforts to eliminate legacy infrastructure and rebuild circuitry to modern-day construction, reliability, and operational flexibility standards.

What are the risks and consequences of not completing this project?

Elevated risks on SAIFI and CAIDI performance

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$14,900,900 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 9,482,500 | | 2,826,600 | 1,916,600 | 1,743,300 | 1,526,000 | 1,470,000 | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 4,063,800 | | 1,211,400 | 821,400 | 747,000 | 654,000 | 630,000 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 13,546,300 | 0 | 4,038,000 | 2,738,000 | 2,490,300 | 2,180,000 | 2,100,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 1,354,600 | | 403,800 | 273,800 | 249,000 | 218,000 | 210,000 | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 1,354,600 | 0 | 403,800 | 273,800 | 249,000 | 218,000 | 210,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|-------------------|------------------|------------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 12,197,000 | 8,412,000 | 3,785,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Potential project deferrals & re-prioritization; material shortages

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: January 31, 2023
Submitted By: J. Kisch

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Network Cable and Equipment **Work Order #:**
Budget Group: Electric **Budget Category:** 15 **Funding Project Number:** 1-1551-15-18
Is this a Specific Project, Program or Blanket? Program **Target Schedule - Start:** 1/1/2024 **In-Service:** 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Eliminate paper-insulated lead covered (PILC) cables on network feeders by installing new rubber insulated (EPR) cables for underground facilities. EPR cable, spacer cable, or open-wire construction can be utilized in overhead applications to eliminate PILC self-supporting aerial cable. Inspection-related repairs, oil switch replacement, and the replacement of the legacy CE Mesh monitoring system with network protector relays are included as part of this program as well.

Describe specific scope exclusions, assumptions and constraints:

All secondary network upgrades and inspection-related repairs are excluded from this program (see Secondary Network Upgrade Program Budget Form for more details).

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This program supports efforts to eliminate legacy infrastructure and rebuild circuitry to modern-day construction, reliability, and operational flexibility standards.

What are the risks and consequences of not completing this project?

Increased impacts on SAIFI and CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|-----------------------------------|--|------------------|------------------|----------------|----------------|----------------|
| \$7,611,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 4,571,000 | | 1,263,500 | 1,435,000 | 1,382,500 | 245,000 | 245,000 | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 1,959,000 | | 541,500 | 615,000 | 592,500 | 105,000 | 105,000 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 6,530,000 | 0 | 1,805,000 | 2,050,000 | 1,975,000 | 350,000 | 350,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 1,081,000 | | 180,500 | 205,000 | 197,500 | 35,000 | 35,000 | 428,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 1,081,000 | 0 | 180,500 | 205,000 | 197,500 | 35,000 | 35,000 | 428,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | |
|---|------------------|------------------|------------------|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | |
| Current Approved Rate Case Funding (\$): | 7,432,000 | 5,356,000 | 2,076,000 | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Potential project deferrals & re-prioritization; material shortages

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: January 31, 2023
Submitted By: J. Kisch

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Secondary Network Upgrade Program

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Electric Budget Category: 15

Funding Project Number: 10462

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Annual inspection-related repairs of the secondary network underground cables and associated infrastructure, including duct banks, pull boxes and manholes identify projects requiring immediate upgrades. In addition, project portfolios have been developed for each network system.

Describe specific scope exclusions, assumptions and constraints:

N/A

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Distribution Sustaining
Discretion Level: Maintain System Standards **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): **Is there an Innovation Component?** No
Needs Assessment: Risk Reduction
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:

The secondary network infrastructure in Poughkeepsie, Kingston, and Newburgh is nearly 100 years old. Many of the ducts in the secondary network system have either collapsed or have been abandoned. Pull box and manholes are in poor condition and are in need of new roofs and in some cases, need to be completely rebuilt.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

Improved SAIFI and CAIDI performance; Reduction of emergent-based repairs.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve system performance and resilience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? PSC CAIDI Outage Duration

Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44):

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates? Yes

** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

Local municipality (1)

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: Yes **Environmental Component:** Yes
Social Component: Yes
Governance Component: No

Is complete Sustainability status achieved by this project?* No

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This program supports efforts to eliminate legacy infrastructure and rebuild circuitry to modern-day construction, reliability, and operational flexibility standards.

What are the risks and consequences of not completing this project?

Elevated risks to SAIFI and CAIDI performance.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|-----------------------------------|--|------------------|------------------|------------------|----------------|--------------|
| \$7,326,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 4,662,000 | | 1,004,500 | 913,500 | 1,239,000 | 1,225,000 | 280,000 | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 1,998,000 | | 430,500 | 391,500 | 531,000 | 525,000 | 120,000 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 6,660,000 | 0 | 1,435,000 | 1,305,000 | 1,770,000 | 1,750,000 | 400,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 666,000 | | 143,500 | 130,500 | 177,000 | 175,000 | 40,000 | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 666,000 | 0 | 143,500 | 130,500 | 177,000 | 175,000 | 40,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|------------------|------------------|----------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 1,989,000 | 1,286,000 | 703,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 5,128,200 Maximum (\$): 9,523,800

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Annual estimates developed based off Rate Case Settlement.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This program supports efforts to eliminate legacy infrastructure and rebuild circuitry to modern-day construction, reliability, and operational flexibility standards.

What are the risks and consequences of not completing this project?

Increased impacts on SAIFI and CAIDI; Unfavorable customer satisfaction results due to repeated outages.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|------------------|--|------------------|------------------|------------------|-------------------|
| \$57,779,700 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 36,768,900 | | 920,500 | 4,558,400 | 3,675,000 | 3,850,000 | 4,375,000 | 19,390,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 15,758,100 | | 394,500 | 1,953,600 | 1,575,000 | 1,650,000 | 1,875,000 | 8,310,000 |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 52,527,000 | 0 | 1,315,000 | 6,512,000 | 5,250,000 | 5,500,000 | 6,250,000 | 27,700,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 5,252,700 | | 131,500 | 651,200 | 525,000 | 550,000 | 625,000 | 2,770,000 |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 5,252,700 | 0 | 131,500 | 651,200 | 525,000 | 550,000 | 625,000 | 2,770,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|------------------|------------------|------------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 3,039,000 | 1,958,000 | 1,081,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Increased material costs could result in overages within the program.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: January 31, 2023
Submitted By: J. Kisch

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Storm Hardening

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Electric

Budget Category: 15

Funding Project Number: 10403

Is this a Specific Project, Program or Blanket?

Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Circuit Hardening - Harden mainline zones of protection that impact 500 customers or more and are identified on the 25 Worst Performing circuits list when storm-related interruptions are considered by performing additional vegetation management, replacing failure-prone equipment, ensuring proper fusing/animal/lightning protection and verifying that all equipment is built to the current Electric Construction Standards.

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This program supports efforts to eliminate legacy infrastructure and rebuild circuitry to modern-day construction, reliability, and operational flexibility standards.

What are the risks and consequences of not completing this project?

Elevated risks to SAIFI and CAIDI.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|-----------------------------------|--|------------------|------------------|------------------|------------------|--------------|
| \$28,689,100 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 18,256,700 | | 5,586,700 | 2,747,500 | 2,625,000 | 3,335,500 | 3,962,000 | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 7,824,300 | | 2,394,300 | 1,177,500 | 1,125,000 | 1,429,500 | 1,698,000 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 26,081,000 | 0 | 7,981,000 | 3,925,000 | 3,750,000 | 4,765,000 | 5,660,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 2,608,100 | | 798,100 | 392,500 | 375,000 | 476,500 | 566,000 | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 2,608,100 | 0 | 798,100 | 392,500 | 375,000 | 476,500 | 566,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|-------------------|------------------|------------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 13,500,000 | 9,000,000 | 4,500,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Increased material costs could result in overages within the program

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: June 7, 2023

First Year of 5-Year Budget Period: 2024

Submitted By: Domenick D'Addona

Current Life-Cycle Phase: 4 Construction

A. GENERAL

Project/Program Name: Transformer Budget (Category 16)

Work Order #:

Budget Group: Electric **Budget Category:** 16

Funding Project Number: NA

Is this a Specific Project, Program or Blanket?

Blanket

Target Schedule - Start: 1/1/2024

In-Service: 1/1/2024

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

To purchase Transformers, Capacitors, Regulators, and Network Protectors to ensure an adequate stock of operational inventories to facilitate planned field work, smart grid components and emergency restoration operations.

Describe specific scope exclusions, assumptions and constraints:

None

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A

What are the risks and consequences of not completing this project?

N/A

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------------|--|-------------------|-------------------|-------------------|--------------|
| \$83,781,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 83,781,000 | | 17,640,000 | 16,443,000 | 16,255,000 | 16,564,000 | 16,879,000 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 83,781,000 | 0 | 17,640,000 | 16,443,000 | 16,255,000 | 16,564,000 | 16,879,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|-------------------|-------------------|-------------------|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 36,347,000 | 18,707,000 | 17,640,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 58,646,700 Maximum (\$): 108,915,300

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Vendor Generated Cost Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Projections based on current unit pricing and OEM and Vendor Estimates for future unit costs.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: June 5, 2023
Submitted By: David McGowan

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 4 Implementation (IT/OT)

A. GENERAL

Project/Program Name: Electric Meters **Work Order #:**

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Electric **Budget Category:** 17 **Funding Project Number:**

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

Is this a Specific Project, Program or Blanket? Blanket **Target Schedule - Start:**

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

 In-Service:

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
 X041A, X042A, X043A

Describe the project objective and scope of work:

Meter Services is required to purchase and install metering equipment to support regulatory requirements, as well as new business initiatives.

Describe specific scope exclusions, assumptions and constraints:

Meters and related material are required to support regulatory and new business requirements.

B. JUSTIFICATION

| | | | |
|---|-------------------|--|-------------------------|
| Load Based/Infrastructure: | Infrastructure | Growth/Sustaining/Retirement: | Distribution Sustaining |
| Discretion Level: | Non-Discretionary | Investment Type: | Compliance |
| Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): | | Is there an Innovation Component? | No |
| Needs Assessment: | Compliance | | |
| If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? | | | Yes |
| Describe the justification for this project. Include attachments or links to planning studies if applicable: | | | |
| Regulatory and new business | | | |

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 Maintaining accurate metering.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

| | |
|--|---|
| Which <u>Strategic Theme</u> does project most align with? | Business Modernization |
| Which <u>Strategic Objective</u> does project most align with? | Improve system performance and resilience |
| Which <u>Strategic Initiative</u> does project most align with? | Business & Operations Modernization |
| Which <u>Team Goal</u> does project most align with? | Group Expense |
| Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44): | |

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates? Yes

** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

| | | | |
|-----------------------------------|-----|---------------------------------|----|
| Checklist Fully Completed: | Yes | Environmental Component: | No |
| | | Social Component: | No |
| | | Governance Component: | No |

Is complete Sustainability status achieved by this project?* No

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Requirements are yearly

What are the risks and consequences of not completing this project?

Variations in the number of new installs, equipment failure, cost increases, and material lead times.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|--------------|--|--------------|--------------|--------------|--------------|
| \$17,314 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 17,261 | 2,842 | 2,768 | 2,827 | 2,886 | 2,941 | 2,997 | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 17,261 | 2,842 | 2,768 | 2,827 | 2,886 | 2,941 | 2,997 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 53 | | 10 | 10 | 11 | 11 | 11 | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 53 | 0 | 10 | 10 | 11 | 11 | 11 | 0 |
| * AFUDC may require adjustment after Finance Department review. | | | | | | | | | |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 11,025 | 8,183 | 2,842 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 12,120 Maximum (\$): 22,508

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

No explanation on confidence level required.

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Previous material costs and trending needs.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

GAS PROGRAM INDIVIDUAL PROJECT SUBMITTAL

Submission Date: May 12, 2023
Submitted By: S. Spehalski

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 2 Design

A. GENERAL

Project/Program Name: Class Location Line Valves

Work Order #: -

Budget Group: Gas

Budget Category: 22

Funding Project Number: 2-2212-00-18

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 11/30/2024

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Install additional transmission line valves.

Describe specific scope exclusions, assumptions and constraints:

Outage duration on the transmission main must be kept to a minimum.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Reclassification/assessment of High Consequence Areas along the pipe corridor in order to make existing valve spacing acceptable. But this was not successful.

Why was the proposed project scope chosen over other alternatives?

N/A.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Compliance with TIMP program.

What are the risks and consequences of not completing this project?

N/A.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|--|----------------------------------|--|---|----------------|--|----------------|----------------|------------------|--------------|
| \$3,912,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 3,220,000 | | 609,000 | 634,000 | 645,000 | 665,000 | 667,000 | |
| | Overheads | 667,000 | | | | | | 667,000 | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,887,000 | 0 | 609,000 | 634,000 | 645,000 | 665,000 | 1,334,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 25,000 | | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 25,000 | 0 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 3,129,600 Maximum (\$): 4,694,400

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Used actual labor and material costs for completing project of similar scope on the same property the year prior. Used historical pricing for piping, equipment, and peripherals.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 12, 2023
Submitted By: S. Spehalski

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 2 Design

A. GENERAL

Project/Program Name: Remote Operated Valves

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Gas

Budget Category: 22

Funding Project Number: 2-2212-00-18

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 11/30/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Install remotely operated gear operators on gas transmission main line valves.

Describe specific scope exclusions, assumptions and constraints:

Assumption - the valves being installed will accept a remotely capable gear operator.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Remote operation of valves requires hardware and software installation, no alternatives were explored.

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To minimize impacts to the transmission system and also to maximize the capability of the newly constructed transmission line valves.

What are the risks and consequences of not completing this project?

Increased risk of longer response to incidents.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|------------------------|--|------------------------|------------------------|------------------------|---------------------|
| \$3,440,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 3,340,000 | | 209,000 | 742,000 | 761,000 | 854,000 | 774,000 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,340,000 | 0 | 209,000 | 742,000 | 761,000 | 854,000 | 774,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 100,000 | | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 100,000 | 0 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 0 |
| * AFUDC may require adjustment after Finance Department review. | | | | | | | | | |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 414,000 | 0 | 414,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,752,000 Maximum (\$): 4,128,000

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Used actual labor and material costs for completing project of similar scope on the same property the year prior. Used historical pricing for piping, equipment, and peripherals.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 12, 2023
Submitted By: S. Spehalski

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 2 Design

A. GENERAL

Project/Program Name: AH Line Valve Replacements

Work Order #: -

Budget Group: Gas

Budget Category: 22

Funding Project Number: 2-2212-00-18

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 11/30/2024

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Remove and replace the existing gas transmission line valves on the 10" steel AH Line. New installations shall allow for passage of internal inspection tools and be easily operable by field crews.

Describe specific scope exclusions, assumptions and constraints:

Outage duration on the transmission main must be minimized. Assumes available parcel/property for installation.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

None, in order to allow for the passage of internal inspection tools and be easily operable by a mechanic, the valves must be replaced.

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Central Hudson performs an annual inspection of all gas transmission line valves. The replacement schedule for line valves may change in priority due to the annual inspection findings. AH Line valves have been identified for scheduled replacement due to service design as well as age. Also to

What are the risks and consequences of not completing this project?

Failure or inoperability of a line valve, leading to safety concerns and/or regulatory liabilities and violations.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|--|----------------------------------|--|---|----------------|--|----------------|----------------|----------------|--------------|
| \$4,057,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 3,807,000 | | 523,000 | 814,000 | 829,000 | 784,000 | 857,000 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | 3,807,000 | 0 | 523,000 | 814,000 | 829,000 | 784,000 | 857,000 | 0 | |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 250,000 | | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | 250,000 | 0 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 0 | |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|------------------|--|----------------|
| Current Approved Rate Case Funding (\$): | 382,000 | | 382,000 |
| | 2021-2023 | | 2024 |

Prior years funding;
not actuals.



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,839,900 Maximum (\$): 5,274,100

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

No explanation on confidence level required.

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Used actual labor and material costs for completing project of similar scope on the same property the year prior. Used historical pricing for piping, equipment, and peripherals.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 12, 2023
Submitted By: S. Spehalski

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 2 Design

A. GENERAL

Project/Program Name: Poughkeepsie Receival MP-TP Interconnect

Work Order #: -

Budget Group: Gas

Budget Category: 22

Funding Project Number: 2-2212-00-18

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2024

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Replace the existing piping, valves, and peripherals that function as the interconnect between the TP and MP gas transmission systems. The new installation shall add functionality and system reliability by allowing the supply to the Poughkeepsie Receival Regulator Station to be sourced from either the TP or MP system. The new project shall incorporate a new R5-24 control valve, PLC/RTU electronics, and an overpressure protection monitor valve.

Describe specific scope exclusions, assumptions and constraints:

Assumption - replacement of the Poughkeepsie Receival Regulator station has been completed prior to beginning this project. Constraint - as this project is directly on the route of gas capacity delivery to electric generators and is the main source of capacity for the City of Poughkeepsie, the outage duration must be minimized.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure

Growth/Sustaining/Retirement: Transmission Sustaining

Discretion Level: Maintain System Standards

Investment Type: Infrastructure

Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44)

Is there an Innovation Component? No

Needs Assessment: Infrastructure

If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:

The MP-TP gas transmission interconnect is a primary source of gas capacity for the PN, PMP, and PLP gas distribution systems. The existing piping and equipment is antiquated, some with over 70yrs in service. The replacement of this infrastructure will increase reliability while adding additional operational flexibility by allowing the three distribution systems to be fed from either the TP or the MP transmission system.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

N/A

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document:

[CLICK HERE](#)

Which Strategic Theme does project most align with?

Operational Excellence

Which Strategic Objective does project most align with?

Improve system performance and resilience

Which Strategic Initiative does project most align with?

Business & Operations Modernization

Which Team Goal does project most align with?

PSC Gas Safety

Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44,

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimate? Yes

** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: Yes **Environmental Component:** Yes

Social Component: Yes

Governance Component: Yes

Is complete Sustainability status achieved by this project?* Yes

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Partial replacements, such as piping only, or equipment only. Deferment of the electrical/PLC/RTU work was considered. Also replacement in kind versus the recommended upgrades to provide for operational flexibility.

Why was the proposed project scope chosen over other alternatives?

This interconnect is located at a critical location in the gas transmission system on the East side of the Hudson River Crossing of the TP Line, the interconnect with the MP line, and at the source of gas for the City of Poughkeepsie's three distribution systems. The proposed scope was chosen because of the criticality of the station, the need to minimize outage duration (multiple year projects), and also to improve safety and reliability by adding redundancy to the inlet of the regulator station.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To minimize impacts to the transmission system and also to maximize the capability of the newly constructed Poughkeepsie Receiving Regulator Station the year prior.

What are the risks and consequences of not completing this project?

Increased risk of losing functionality of the remote operated valve that controls the flow of gas between MP and TP, due to the obsolescence of some of the PLC/RTU components that are recommended to be replaced during this project.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|---|------------------|--|----------------|----------------|----------------|--------------|
| \$1,556,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 205,000 | | 205,000 | | | | | |
| | Labor (Monthly Payroll) | 23,000 | | 23,000 | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 458,000 | | 458,000 | | | | | |
| | Contractors (A/P tax exempt) | 102,000 | | 102,000 | | | | | |
| | Overheads | 718,000 | | 718,000 | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,506,000 | 0 | 1,506,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 50,000 | | 50,000 | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 50,000 | 0 | 50,000 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|

| | | | |
|---|---|---|---|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|---|---|---|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,244,800 Maximum (\$): 1,867,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Used actual labor and material costs for completing project of similar scope on the same property the year prior. Used historical pricing for piping, equipment, and peripherals.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 12, 2023
Submitted By: S. Spehalski

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 2 Design

A. GENERAL

Project/Program Name: Pig Launching Stations for Internal Line Inspection

Work Order #: -

Budget Group: Gas

Budget Category: 22

Funding Project Number: 2-2212-00-18

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Install site(s) where internal inspection tools can be inserted into the pipeline.

Describe specific scope exclusions, assumptions and constraints:

Scope may vary greatly for work considering factors such as ROW accessibility, specialized service pricing, length and size of piping affected.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Installing in-situ specialized tap points on the transmission mains. These are costly and cannot always be re-used due to variations in ROW conditions.

Why was the proposed project scope chosen over other alternatives?

These installations will allow for efficient installation and removal of inspection tools using above grade piping and valves, typical for the task. Repeatability and re-use is an important advantage due to their permanent installations.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To maintain access points for the inspection needs of the Transmission Integrity Department schedules and compliance requirements.

What are the risks and consequences of not completing this project?

Compliance violations, if no other inspection method other than internal inspection is possible.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|--|----------------------------------|--|---|----------------|--|----------------|----------------|----------------|--------------|
| \$1,954,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,929,000 | | 240,000 | 619,000 | 349,000 | 360,000 | 361,000 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,929,000 | 0 | 240,000 | 619,000 | 349,000 | 360,000 | 361,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 25,000 | | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 25,000 | 0 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 0 |
| * AFUDC may require adjustment after Finance Department review. | | | | | | | | | |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 205,000 | 0 | 205,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,563,200 Maximum (\$): 2,344,800

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Used actual labor and material costs for completing project of similar scope on the same property the year prior. Used historical pricing for piping, equipment, and peripherals.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 12, 2023
Submitted By: S. Spehalski

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: TP Line Identified Segment 1 Replacement **Work Order #:**
Budget Group: Gas **Budget Category:** 22 **Funding Project Number:** 2-2212-00-18
Is this a Specific Project, Program or Blanket? Specific **Target Schedule - Start:** 1/1/2024 **In-Service:** 12/31/2026

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Replace 4800ft, 2528ft, and 967ft (total 1.571mi) of the 10" steel TP Gas Transmission main over multiple projects in order to comply with the requirements of 49 CFR 192.624. This project represents Segment 5.1, 5.2, and 6 that has been identified for replacement on the TP Line, and accounts for 92% of the total identified footage requiring replacement on the TP Line. Please reference "Plan to Address Testing/Replacement Requirements of 49 CFR 192.624" document.

Describe specific scope exclusions, assumptions and constraints:

In order to minimize customer impact, this project will be done in two steps. Step 1 would be to replace Segment 5.1 in 2024 and 2025. Step 2 would be to replace Segment 5.2 and 6 in 2026. Additional detailed scoping and schedule to be determined to project commencement.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Previously, a plan was put forward to re-pressure test the existing mains rather than replace them. Since that time, for various reasons, this proposal has been dismissed in favor of full replacement.

Why was the proposed project scope chosen over other alternatives?

Overall, replacement is the much more realistic and feasible option. Not only does it make project planning and logistics easier, but also decreases downtime, eliminates derating, avoids unknown cost and risk associated with pre/post assessments and pressure testing, and satisfies all material and pressure requirements (traceable, verifiable, and complete records for all newly installed pipe). For these reasons, method 4 (replacement) will be implemented to comply with the Mega Rule.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Code requires 50% of the total identified footage to be replaced by July 3, 2028. The replacement of this section is the only possible way for Central Hudson to meet this regulatory requirement.

What are the risks and consequences of not completing this project?

Compliance violations.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Compliance requirements.

What other factor were considered during the prioritization process?

N/A.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|------------------------|--|------------------------|------------------------|------------------------|---------------------|
| \$7,699,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 240,000 | | 20,000 | 100,000 | 120,000 | | | |
| | Labor (Monthly Payroll) | 260,000 | | 30,000 | 200,000 | 30,000 | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 1,200,000 | | 100,000 | 500,000 | 600,000 | | | |
| | Contractors (A/P tax exempt) | 4,700,000 | | 500,000 | 2,000,000 | 2,200,000 | | | |
| | Overheads | 1,199,000 | | 334,000 | 316,000 | 549,000 | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | 0 | 0 | 0 | | | |
| TOTAL ADDITIONS: | | 7,599,000 | 0 | 984,000 | 3,116,000 | 3,499,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 100,000 | | | | 100,000 | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 100,000 | 0 | 0 | 0 | 100,000 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 5,389,300 Maximum (\$): 10,008,700

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

No explanation on confidence level required.

Basis for estimate: Historical Proforma Pricing; Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

[https://centralhudson.sharepoint.com/:b:/r/sites/GasMech/Budgets/Capital/5%20Year%20Forecast/2024-2028%20Capital%20Budget/supporting%20docs/Plan%20to%20Replace%20Transmission%20Lines%20in%20Accordance%20with%2049CFR192.624%20\(1\).pdf?csf=1&web=1&e=R3jqC5](https://centralhudson.sharepoint.com/:b:/r/sites/GasMech/Budgets/Capital/5%20Year%20Forecast/2024-2028%20Capital%20Budget/supporting%20docs/Plan%20to%20Replace%20Transmission%20Lines%20in%20Accordance%20with%2049CFR192.624%20(1).pdf?csf=1&web=1&e=R3jqC5)

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

[Empty text area for additional information]

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Previously, a plan was put forward to re-pressure test the existing mains rather than replace them. Since that time, for various reasons, this proposal has been dismissed in favor of full replacement.

Why was the proposed project scope chosen over other alternatives?

Overall, replacement is the much more realistic and feasible option. Not only does it make project planning and logistics easier, but also decreases downtime, eliminates derating, avoids unknown cost and risk associated with pre/post assessments and pressure testing, and satisfies all material and pressure requirements (traceable, verifiable, and complete records for all newly installed pipe). For these reasons, method 4 (replacement) will be implemented to comply with the Mega Rule.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Code requires 50% of the total identified footage to be replaced by July 3, 2028, with the balance by July 2, 2035. The replacement of these TP sections on the TP Line must happen right after Segment 1 project so that the remaining replacements in our territory can be completed by 2035.

What are the risks and consequences of not completing this project?

Compliance violations.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Compliance requirements.

What other factor were considered during the prioritization process?

N/A.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$2,721,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 250,000 | | | | | 100,000 | 150,000 | |
| | Labor (Monthly Payroll) | 55,000 | | | | | 30,000 | 25,000 | |
| | Stock Materials | 35,000 | | | | | 20,000 | 15,000 | |
| | Non-Stock Material (A/P taxable) | 1,005,000 | | | | | 455,000 | 550,000 | |
| | Contractors (A/P tax exempt) | 916,000 | | | | | 270,000 | 646,000 | |
| | Overheads | 400,000 | | | | | 200,000 | 200,000 | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL ADDITIONS: | | 2,661,000 | 0 | 0 | 0 | 0 | 1,075,000 | 1,586,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 60,000 | | | | | 30,000 | 30,000 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 60,000 | 0 | 0 | 0 | 0 | 30,000 | 30,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024
Prior years funding; not actuals.

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,904,700 Maximum (\$): 3,537,300

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing; Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

[https://centralhudson.sharepoint.com/:b:/r/sites/GasMech/Budgets/Capital/5%20Year%20Forecast/2024-2028%20Capital%20Budget/supporting%20docs/Plan%20to%20Replace%20Transmission%20Lines%20in%20Accordance%20with%2049CFR192.624%20\(1\).pdf?csf=1&web=1&e=R3jqC5](https://centralhudson.sharepoint.com/:b:/r/sites/GasMech/Budgets/Capital/5%20Year%20Forecast/2024-2028%20Capital%20Budget/supporting%20docs/Plan%20to%20Replace%20Transmission%20Lines%20in%20Accordance%20with%2049CFR192.624%20(1).pdf?csf=1&web=1&e=R3jqC5)

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 12, 2023
Submitted By: S. Spehalski

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 2 Design

A. GENERAL

Project/Program Name: Gate Station PLC Replacement
Budget Group: Gas Budget Category: 22
Is this a Specific Project, Program or Blanket? Program
Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Funding Project Number: 2-2212-00-18
Target Schedule - Start: 1/1/2024 In-Service: 11/30/2024

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

[Empty text area for work orders]

Describe the project objective and scope of work:
Replace the existing PLC/RTU SCADA systems at each gate station.

Describe specific scope exclusions, assumptions and constraints:
Assumption - outage at the gate station is available during the proposed construction window.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Obtain new old stock replacement parts. This method was dismissed since it would only prolong the project and increase risk.

Why was the proposed project scope chosen over other alternatives?

Lowest risk option

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To reduce the risk of losing remote control functionality of 1 or more gate stations due to component failure.

What are the risks and consequences of not completing this project?

Increased risk of losing functionality of the gate station.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|--|----------------------------------|--|---|----------------|--|----------------|----------------|----------------|--------------|
| \$2,316,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 2,236,000 | | | 543,000 | 553,000 | 569,000 | 571,000 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | 2,236,000 | 0 | 0 | 543,000 | 553,000 | 569,000 | 571,000 | 0 | |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 80,000 | | | 20,000 | 20,000 | 20,000 | 20,000 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | 80,000 | 0 | 0 | 20,000 | 20,000 | 20,000 | 20,000 | 0 | |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|

| | | | |
|---|---|---|---|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|---|---|---|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,852,800 Maximum (\$): 2,779,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments; Vendor Generated Cost Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

During the planning process, met with vendors who provided high level estimates for their solutions. Used pro-forma pricing for labor and ancillary materials.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 12, 2023
Submitted By: S. Spehalski

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Pressure Control Improvements

Work Order #:

Budget Group: Gas

Budget Category: 23

Funding Project Number: 2-2312-00-18

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 11/30/2024

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Possible solutions vary greatly as each situation is unique. Common solutions have been to adjust the regulator's travel stop, cage, or throttle plate. A different model of regulator might be required as different models of regulators are better suited to control in some situations than others. Sense lines might need to be lengthened to a non-turbulent zone. Sense line sizes might need to be increased. A filter may need to be installed to remove grit, fines, and liquids affecting diaphragm performance.

Describe specific scope exclusions, assumptions and constraints:

The performance of all natural gas regulator stations is constantly being monitored. Should a station be exhibiting signs of great outlet pressure variations and field technicians cannot correct the problem, the station's capacity load is analyzed, equipment selection is studied and possible solutions are evaluated.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Depending on the situation, alternatives are numerous.

Why was the proposed project scope chosen over other alternatives?

Most cost effective and reliable solution is chosen for each situation/location.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To maintain system reliability and code compliance at poor performing stations.

What are the risks and consequences of not completing this project?

Risk of slower response to incidents, risk of compliance violations, inability to analyze system performance.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|------------------------|--|------------------------|------------------------|------------------------|---------------------|
| \$1,166,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,141,000 | | 227,000 | 286,000 | 291,000 | 168,000 | 169,000 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | 1,141,000 | 0 | 227,000 | 286,000 | 291,000 | 168,000 | 169,000 | 0 | |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 25,000 | | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | 25,000 | 0 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 0 | |
| * AFUDC may require adjustment after Finance Department review. | | | | | | | | | |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 164,000 | 0 | 164,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 932,800 Maximum (\$): 1,399,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historic data from different situations and issues throughout the service territory on varying types of equipment. Some projects are small, others are more significant and costly.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 12, 2023
Submitted By: S. Spehalski

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Pressure Recording Chart Replacements

Work Order #: -

Budget Group: Gas

Budget Category: 23

Funding Project Number: 2-2312-00-18

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Install electronic pressure recording charts at gas regulator stations to replace unreliable, unsupported, or outdated units.

Describe specific scope exclusions, assumptions and constraints:

Does not include funding for gate station SCADA or regulator station SCADA electronic installations.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

None. Code required.

Why was the proposed project scope chosen over other alternatives?

Most cost effective and reliable solution.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Due to the termination of connections by Verizon and others, we must stay ahead of their schedule in order to maintain compliance with code.

What are the risks and consequences of not completing this project?

Risk of slower response to incidents, risk of compliance violations, inability to analyze system performance.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|----------------|--|----------------|----------------|----------------|--------------|
| \$1,056,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,031,000 | | 154,000 | 212,000 | 216,000 | 224,000 | 225,000 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,031,000 | 0 | 154,000 | 212,000 | 216,000 | 224,000 | 225,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 25,000 | | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 25,000 | 0 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 0 |
| * AFUDC may require adjustment after Finance Department review. | | | | | | | | | |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 164,000 | 0 | 164,000 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 844,800 Maximum (\$): 1,267,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Contractor/Vendor Bids For Certain Work

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical pricing for same work scope in the year prior.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Full or partial replacement of the identified transmission regulator stations.

Why was the proposed project scope chosen over other alternatives?

Cost avoidance, ability to redirect capital investments to other initiatives.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Due to the age of existing infrastructure, the coatings program is needed in order to avoid imminent and costly replacement projects.

What are the risks and consequences of not completing this project?

Continued deterioration of above grade transmission assets, higher cost of replacement and repair.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

This program would offset planned projects and allow for significant cost savings to direct funding to other initiatives.

What other factor were considered during the prioritization process?

Age, condition, criticality to the transmission system.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|------------------------|--|------------------------|------------------------|------------------------|---------------------|
| \$1,223,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,198,000 | | 103,000 | 265,000 | 269,000 | 279,000 | 282,000 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,198,000 | 0 | 103,000 | 265,000 | 269,000 | 279,000 | 282,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 25,000 | | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 25,000 | 0 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 978,400 Maximum (\$): 1,467,600

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Contractor/Vendor Bids For Certain Work

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Prices were obtained from capable contractors for a typical sized transmission regulator station.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Budget Submittal Form

Version 3.0 12/9/2022

Is complete Sustainability status achieved by this project?* **Yes**

governance.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Partial rebuild and/or relocation was considered.

Why was the proposed project scope chosen over other alternatives?

Due to the criticality of the station to the reliability of the system, the station shall be fully replaced.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To minimize the risk to the system.

What are the risks and consequences of not completing this project?

Poor pressure control, equipment failure, increase costs of maintenance.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|------------------------|--|------------------------|------------------------|------------------------|---------------------|
| \$1,207,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 1,157,000 | | 1,157,000 | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,157,000 | 0 | 1,157,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 50,000 | | 50,000 | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 50,000 | 0 | 50,000 | 0 | 0 | 0 | 0 | 0 |
| * AFUDC may require adjustment after Finance Department review. | | | | | | | | | |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 515,000 | 515,000 | 0 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 965,600 Maximum (\$): 1,448,400

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Recent project completion of similar scope and schedule offers relatively reliable insight into costs.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Partial rebuild was considered.

Why was the proposed project scope chosen over other alternatives?

Due to the criticality of the station to the reliability of the system, the station shall be fully replaced.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To minimize the risk to the system.

What are the risks and consequences of not completing this project?

Poor pressure control, equipment failure, increase costs of maintenance.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$1,236,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,186,000 | | | 1,186,000 | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,186,000 | 0 | 0 | 1,186,000 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 50,000 | | | 50,000 | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 50,000 | 0 | 0 | 50,000 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 988,800 Maximum (\$): 1,483,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Recent project completion of similar scope and schedule offers relatively reliable insight into costs.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

[Empty text area for additional information]

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Partial rebuild and/or relocation was considered.

Why was the proposed project scope chosen over other alternatives?

Due to the criticality of the station to the reliability of the system, the station shall be fully replaced.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To minimize the risk to the system.

What are the risks and consequences of not completing this project?

Poor pressure control, equipment failure, increase costs of maintenance.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

This is considered a planned project that replaces an unidentified project that was previously approved in the 5 year forecast.

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|---|----------------|--|----------------|------------------|----------------|--------------|
| \$1,292,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,242,000 | | | | | 1,242,000 | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,242,000 | 0 | 0 | 0 | 0 | 1,242,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 50,000 | | | | | 50,000 | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 50,000 | 0 | 0 | 0 | 0 | 50,000 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|

| | | | |
|---|---|---|---|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|---|---|---|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,033,600 Maximum (\$): 1,550,400

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Recent project completion of similar scope and schedule offers relatively reliable insight into costs.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Partial rebuild and/or relocation was considered.

Why was the proposed project scope chosen over other alternatives?

Due to the criticality of the station to the reliability of the system, the station shall be fully replaced.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To minimize the risk to the system.

What are the risks and consequences of not completing this project?

Poor pressure control, equipment failure, increase costs of maintenance.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

This is considered a planned project that replaces an unidentified project that was previously approved in the 5 year forecast.

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|-------------|------------------|-------------|--------------|
| \$1,056,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,006,000 | | | | | 1,006,000 | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,006,000 | 0 | 0 | 0 | 0 | 1,006,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 50,000 | | | | | 50,000 | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 50,000 | 0 | 0 | 0 | 0 | 50,000 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 844,800 Maximum (\$): 1,267,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Recent project completion of similar scope and schedule offers relatively reliable insight into costs.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Partial rebuild and/or relocation was considered.

Why was the proposed project scope chosen over other alternatives?

Due to the criticality of the station to the reliability of the system, the station shall be fully replaced.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To minimize the risk to the system.

What are the risks and consequences of not completing this project?

Poor pressure control, equipment failure, increase costs of maintenance.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

This is considered a planned project that replaces an unidentified project that was previously approved in the 5 year forecast.

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------|--|-------------|------------------|-------------|--------------|
| \$1,369,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,319,000 | | | | | 1,319,000 | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,319,000 | 0 | 0 | 0 | 0 | 1,319,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 50,000 | | | | | 50,000 | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 50,000 | 0 | 0 | 0 | 0 | 50,000 | 0 | 0 |
| * AFUDC may require adjustment after Finance Department review. | | | | | | | | | |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 0 | 0 | 0 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,095,200 Maximum (\$): 1,642,800

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Recent project completion of similar scope and schedule offers relatively reliable insight into costs.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Partial rebuild and/or relocation was considered.

Why was the proposed project scope chosen over other alternatives?

Due to the criticality of the station to the reliability of the system, the station shall be fully replaced.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To minimize the risk to the system.

What are the risks and consequences of not completing this project?

Poor pressure control, equipment failure, increase costs of maintenance.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

This is considered a planned project, as it is a new project in 2028, as 2028 was not included in previous forecasts.

What other factor were considered during the prioritization process?

The plan to uprate the GLP system was changed significantly, originally this station would be retired. Now that it is not the case, it has a high priority for replacement.

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|--|----------------------------------|--|---|----------------|--|----------------|----------------|------------------|--------------|
| \$1,065,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,015,000 | | | | | | 1,015,000 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,015,000 | 0 | 0 | 0 | 0 | 0 | 1,015,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 50,000 | | | | | | 50,000 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 50,000 | 0 | 0 | 0 | 0 | 0 | 50,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|

| | | | |
|---|---|---|---|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|---|---|---|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 852,000 Maximum (\$): 1,278,000

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Recent project completion of similar scope and schedule offers relatively reliable insight into costs.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: June 1, 2023
Submitted By: Victor Narkaj

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Category 24 Gas New Business

Work Order #: -

Budget Group: Gas

Budget Category: 24

Funding Project Number: N/A

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Overall Budget Planning for Category 24

Describe the project objective and scope of work:

All Gas New Business

Describe specific scope exclusions, assumptions and constraints:

Tariff obligation to provide electric service

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

None. Category 24 is non-discretionary

Why was the proposed project scope chosen over other alternatives?

Obligation to serve is non-discretionary

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

New customer service must be provided in a timely manner

What are the risks and consequences of not completing this project?

Customer Complaints

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

None

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|------------------------|--|------------------------|------------------------|------------------------|---------------------|
| \$45,420,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 4,436,000 | | 1,038,000 | 1,042,000 | 776,000 | 778,000 | 802,000 | |
| | Labor (Monthly Payroll) | 7,396,000 | | 1,731,000 | 1,736,000 | 1,294,000 | 1,298,000 | 1,337,000 | |
| | Stock Materials | 15,780,000 | | 3,693,000 | 3,705,000 | 2,761,000 | 2,769,000 | 2,852,000 | |
| | Non-Stock Material (A/P taxable) | 2,235,000 | | 524,000 | 525,000 | 391,000 | 391,000 | 404,000 | |
| | Contractors (A/P tax exempt) | 3,539,000 | | 828,000 | 831,000 | 619,000 | 621,000 | 640,000 | |
| | Overheads | 5,029,000 | | 1,177,000 | 1,181,000 | 880,000 | 882,000 | 909,000 | |
| | AFUDC* | 5,872,000 | | 964,000 | 1,353,000 | 1,017,000 | 1,169,000 | 1,369,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 44,287,000 | 0 | 9,955,000 | 10,373,000 | 7,738,000 | 7,908,000 | 8,313,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 424,000 | | 80,000 | 82,000 | 85,000 | 87,000 | 90,000 | |
| | Labor (Monthly Payroll) | 434,000 | | 80,000 | 82,000 | 85,000 | 87,000 | 100,000 | |
| | Contractors (A/P tax exempt) | 121,000 | | 20,000 | 21,000 | 21,000 | 32,000 | 27,000 | |
| | Overheads | 154,000 | | 25,000 | 30,000 | 35,000 | 32,000 | 32,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 1,133,000 | 0 | 205,000 | 215,000 | 226,000 | 238,000 | 249,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|------------------|---------------|---------------|
| Current Approved Rate Case Funding (\$): | 39,343 | 29,260 | 10,083 |
| | 2021-2023 | | 2024 |

Prior years funding;
not actuals.



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 36,336,000 Maximum (\$): 54,504,000

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

The Category 24 - Gas New Business budget is established using historic customer additions and spending run rates. Budget dollars are allocated to specific and blanket categories, but can be reallocated within the category as actual spending varies from projections.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Budget Submittal Form

Version 3.0 12/9/2022

Submission Date: May 12, 2023
Submitted By: J. Mead

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Gas Distribution Improvement - Locals

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Gas

Budget Category: 25

Funding Project Number:

| | | | | | |
|--|--|--|--|--|--|
| | | | | | |
|--|--|--|--|--|--|

Is this a Specific Project, Program or Blanket? Blanket

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Various local WO's that occur in the district for service and main work; planned and emergent.

Describe specific scope exclusions, assumptions and constraints:

Local WO's only.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Operational need of the district.

What are the risks and consequences of not completing this project?

Safety, customer satisfaction, growth, etc.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$1,943,870 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 97,180 | | 18,630 | 18,990 | 19,440 | 19,820 | 20,300 | |
| | Labor (Monthly Payroll) | 58,310 | | 11,180 | 11,400 | 11,660 | 11,890 | 12,180 | |
| | Stock Materials | 155,510 | | 29,810 | 30,390 | 31,100 | 31,720 | 32,490 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,555,110 | | 298,120 | 303,910 | 311,040 | 317,170 | 324,870 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,866,110 | 0 | 357,740 | 364,690 | 373,240 | 380,600 | 389,840 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 77,760 | | 14,910 | 15,200 | 15,550 | 15,860 | 16,240 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 77,760 | 0 | 14,910 | 15,200 | 15,550 | 15,860 | 16,240 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|--|--|
| Current Approved Rate Case Funding (\$): | 0 | | |
|---|----------|--|--|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,360,709 Maximum (\$): 2,527,031

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Used historical spends and proforma pricing to extrapolate and calculate need for new budget estimates.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Alternatives such as rerouting in different areas, or retiring all together, where applicable.

Why was the proposed project scope chosen over other alternatives?

Requirement of downstream systems to operate properly generally dictate that the replacement must be completed.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Maintain gas service where it has already been established.

What are the risks and consequences of not completing this project?

Hinders municipality work, and exposes the company to higher risk of dig in and or damage.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$5,384,760 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 269,240 | | 51,610 | 52,620 | 53,850 | 54,910 | 56,250 | |
| | Labor (Monthly Payroll) | 161,550 | | 30,970 | 31,570 | 32,310 | 32,950 | 33,750 | |
| | Stock Materials | 430,780 | | 82,580 | 84,190 | 86,160 | 87,860 | 89,990 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 4,307,800 | | 825,810 | 841,870 | 861,590 | 878,600 | 899,930 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 5,169,370 | 0 | 990,970 | 1,010,250 | 1,033,910 | 1,054,320 | 1,079,920 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 215,390 | | 41,290 | 42,090 | 43,080 | 43,930 | 45,000 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 215,390 | 0 | 41,290 | 42,090 | 43,080 | 43,930 | 45,000 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | |
|---|----------|--|
| Current Approved Rate Case Funding (\$): | 0 | |
|---|----------|--|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 3,769,332 Maximum (\$): 7,000,188

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical project actuals are extrapolated to determine future budget needs.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 12, 2023
Submitted By: J. Mead

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: West Point and Highland Falls Gas Reinforcement

Work Order #: -

Budget Group: Gas

Budget Category: 25

Funding Project Number: 10360

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2027

In-Service: 12/1/2028

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The village of Highland Falls currently receives natural gas from the 60 PSIG WP line at the Homestead Avenue regulator station via a connection through West Point Military Academy (West Point). The 60 PSIG gas pipeline within the federal owned property is owned and operated by West Point. This limits Central Hudson's ability to mitigate outage risk and reliability to the Village of Highland Falls gas system. The purpose of this project is to provide an alternate source supplying Highland Falls is the West Point system goes offline and/or is locked down. The goal is to mitigate

Describe specific scope exclusions, assumptions and constraints:

Install a new 120 PSIG 6" plastic gas distribution line which reroutes from the north beginning at Crows Nest regulator station extending around West Point campus to serve Highland Falls. This alternative would largely follow NYS road/highway taking on federal land, such as Route 218 and/or portions of Route 9W.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Please see the link to the alternative analysis.

<https://centralhudson.sharepoint.com/:w:/r/sites/EngPMO/Construction%20%20Rebuild%20Projects/Active/West%20Point/West%20Point%20and%20Highland%20Falls%20Gas%20Reinforcement%20Alternatives%20Analysis.doc?d=w4bd311d592794e4cb34c2d3a4bbb6908&csf=1&web=1&e=p>

Why was the proposed project scope chosen over other alternatives?

Please see the link to the alternative analysis.

<https://centralhudson.sharepoint.com/:w:/r/sites/EngPMO/Construction%20%20Rebuild%20Projects/Active/West%20Point/West%20Point%20and%20Highland%20Falls%20Gas%20Reinforcement%20Alternatives%20Analysis.doc?d=w>

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Please see the link to the alternative analysis.

<https://centralhudson.sharepoint.com/:w:/r/sites/EngPMO/Construction%20%20Rebuild%20Projects/Active/West%20Point/West%20Point%20and%20Highland%20Falls%20Gas%20Reinforcement%20Alternatives%20Analysis.doc?d=w>

What are the risks and consequences of not completing this project?

Please see the link to the alternative analysis.

<https://centralhudson.sharepoint.com/:w:/r/sites/EngPMO/Construction%20%20Rebuild%20Projects/Active/West%20Point/West%20Point%20and%20Highland%20Falls%20Gas%20Reinforcement%20Alternatives%20Analysis.doc?d=w>

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

What other factor were considered during the prioritization process?

Please see the link to the alternative analysis.

<https://centralhudson.sharepoint.com/:w:/r/sites/EngPMO/Construction%20%20Rebuild%20Projects/Active/West%20Point/West%20Point%20and%20Highland%20Falls%20Gas%20Reinforcement%20Alternatives%20Analysis.doc?d=w>

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|----------------|--|----------------|------------------|------------------|--------------|
| \$10,473,830 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 503,550 | | | | | 109,830 | 393,720 | |
| | Labor (Monthly Payroll) | 302,130 | | | | | 65,900 | 236,230 | |
| | Stock Materials | 805,670 | | | | | 175,720 | 629,950 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 8,459,650 | | | | | 1,845,550 | 6,614,100 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 10,071,000 | 0 | 0 | 0 | 0 | 2,197,000 | 7,874,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 402,830 | | | | | 87,860 | 314,970 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 402,830 | 0 | 0 | 0 | 0 | 87,860 | 314,970 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|--|--|
| Current Approved Rate Case Funding (\$): | 0 | | |
|---|----------|--|--|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 7,331,681 Maximum (\$): 13,615,979

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Please see the alternative analysis link attached.

<https://centralhudson.sharepoint.com/:w:/r/sites/EngPMO/Construction%20%20Rebuild%20Projects/Active/West%20Point/West%20Point%20and%20Highland%20Falls%20Gas%20Reinforcement%20Alternatives%20Analysis.doc?d=w4bd311d592794e4cb34c2d3a4bbb6908&csf=1&web=1&e=p>

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 12, 2023
Submitted By: J.Mead

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Compression Coupling Neighborhood Replacements

Work Order #: -

Budget Group: Gas

Budget Category: 25

Funding Project Number: N/A

Is this a Specific Project, Program or Blanket?

Program

Target Schedule - Start: 7/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

W/O and/or funding project not created yet, new incremental rate case project

Describe the project objective and scope of work:

Replace all mains and services in areas known to have had compression couplings installed during construction.

Describe specific scope exclusions, assumptions and constraints:

Replacing only known areas that contain compression couplings and/or areas that have had an extensive history of compression coupling leaks.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

No other options are available other than repairing the leaks, which Central Hudson has been doing. The only permanent repair to a compression coupling is full replacement with plastic distribution piping.

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Will allow the company to reduce overall risk by reducing leak inventory, and any chance of future leaks due to the couplings.

What are the risks and consequences of not completing this project?

Possible consequences are more leaks, more repairs, more expense money spent, and potential for an incident.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$9,697,990 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 3,925,550 | | | 559,060 | 876,270 | 1,214,060 | 1,276,160 | |
| | Labor (Monthly Payroll) | 279,750 | | | 39,930 | 62,590 | 86,720 | 90,510 | |
| | Stock Materials | 746,010 | | | 106,490 | 166,910 | 231,250 | 241,360 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 4,373,690 | | | 625,520 | 980,230 | 1,358,970 | 1,408,970 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 9,325,000 | 0 | 0 | 1,331,000 | 2,086,000 | 2,891,000 | 3,017,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 372,990 | | | 53,240 | 83,450 | 115,620 | 120,680 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 372,990 | 0 | 0 | 53,240 | 83,450 | 115,620 | 120,680 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|--|--|
| Current Approved Rate Case Funding (\$): | 0 | | |
|---|----------|--|--|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 6,788,593 Maximum (\$): 12,607,387

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical install prices for replacements were analyzed and extrapolated to determine required budgets.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Budget Submittal Form

Version 3.0 12/9/2022

Submission Date: May 12, 2023
Submitted By: J. Mead

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Transmission Service to Distribution

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Gas

Budget Category: 25

Funding Project Number:

| | | | | | |
|--|--|--|--|--|--|
| | | | | | |
|--|--|--|--|--|--|

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2025

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

This program will run distribution main to areas containing transmission pressure services, to be able to remove them from the transmission system.

Describe specific scope exclusions, assumptions and constraints:

Areas addressed first will be those that are most risky (higher density areas) and are close to distribution main.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To effectively manage the risk associated with high pressure transmission services.

What are the risks and consequences of not completing this project?

Reduce the likelihood of an incident resulting from high pressure transmission service. Reducing and/or eliminating this inventory is the most effective way of accomplishing this.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Reduce risk and increase safety and reliability.

What other factor were considered during the prioritization process?

Safety

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|--|----------------------------------|--|---|----------------|--|------------------|------------------|------------------|--------------|
| \$6,499,980 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 2,624,900 | | | 418,340 | 577,010 | 681,350 | 948,200 | |
| | Labor (Monthly Payroll) | 187,500 | | | 29,880 | 41,220 | 48,670 | 67,730 | |
| | Stock Materials | 564,610 | | | 79,680 | 109,910 | 194,410 | 180,610 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 2,872,990 | | | 468,100 | 645,860 | 697,570 | 1,061,460 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 6,250,000 | 0 | 0 | 996,000 | 1,374,000 | 1,622,000 | 2,258,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 249,980 | | | 39,840 | 54,950 | 64,890 | 90,300 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 249,980 | 0 | 0 | 39,840 | 54,950 | 64,890 | 90,300 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|--|--|
| Current Approved Rate Case Funding (\$): | 0 | | |
|---|----------|--|--|

2021-2023 2024

Prior years funding;
not actuals.



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 4,549,986 Maximum (\$): 8,449,974

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

No explanation on confidence level required.

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical proforma install costs extrapolated and adjusted for future install costs.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 12, 2023
Submitted By: J. Mead

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Leak Prone Pipe Services Replacement

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Common: Non-I.T./O.T. Budget Category: 25

Funding Project Number:

| | | | | | |
|--|--|--|--|--|--|
| | | | | | |
|--|--|--|--|--|--|

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 7/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Replace all of the isolated and cathodically unprotected services that will not be addressed with the Leak Prone Pipe Elimination Program.

Describe specific scope exclusions, assumptions and constraints:

Includes all isolated services that fall outside of the scope of any DIP that is a part of the LPP program.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To replace all remaining leak prone services to get the distribution system to a completely plastic or protected steel system.

What are the risks and consequences of not completing this project?

Not replacing the leak prone pipe will increase the likelihood of a leak, especially over time, which could lead to more releases of gas and potential incidents.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

To align with the current LPP elimination program goal of getting rid of all leak prone pipe.

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|------------------|--|------------------|------------------|------------------|--------------|
| \$9,468,200 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 3,824,150 | | 733,090 | 747,350 | 764,860 | 779,960 | 798,890 | |
| | Labor (Monthly Payroll) | 273,140 | | 52,360 | 53,380 | 54,630 | 55,710 | 57,060 | |
| | Stock Materials | 728,410 | | 139,640 | 142,350 | 145,690 | 148,560 | 152,170 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 4,278,300 | | 819,910 | 835,920 | 855,820 | 872,770 | 893,880 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 9,104,000 | 0 | 1,745,000 | 1,779,000 | 1,821,000 | 1,857,000 | 1,902,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 364,200 | | 69,820 | 71,180 | 72,840 | 74,280 | 76,080 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 364,200 | 0 | 69,820 | 71,180 | 72,840 | 74,280 | 76,080 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|--|--|
| Current Approved Rate Case Funding (\$): | 0 | | |
|---|----------|--|--|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 6,627,740 Maximum (\$): 12,308,660

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing; Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Use historical unit pricing for service replacements and adjust for future budget requirements.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 12, 2023
Submitted By: J. Mead

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: River/Creek Crossing Remediation

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Gas

Budget Category: 25

Funding Project Number:

| | | | | | |
|--|--|--|--|--|--|
| | | | | | |
|--|--|--|--|--|--|

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2025

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Remediate or reinforce any water crossing that may be subject to damage due to natural forces during extreme weather events (ex. Erosion due to heavy water flow in stream/creeks).

Describe specific scope exclusions, assumptions and constraints:

This program will include approximately the top 100 areas where transmission and/or distribution main crosses a water way and could be subject to damage with heavy rain, snow, flooding, etc.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

With weather event becoming more frequent and more extreme in nature, this will mitigate the risk of a potential gas incident as a result.

What are the risks and consequences of not completing this project?

Potential gas leak and/or release of gas leading to an incident.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

This should not displace any planned project and should happen concurrently

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|--|----------------------------------|--|---|----------------|--|------------------|------------------|------------------|--------------|
| \$6,237,140 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 2,619,600 | | | 417,490 | 575,850 | 679,970 | 946,290 | |
| | Labor (Monthly Payroll) | 187,110 | | | 29,820 | 41,130 | 48,570 | 67,590 | |
| | Stock Materials | 498,980 | | | 79,520 | 109,690 | 129,520 | 180,250 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 2,681,970 | | | 427,430 | 589,560 | 696,160 | 968,820 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 5,987,660 | 0 | 0 | 954,260 | 1,316,230 | 1,554,220 | 2,162,950 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 249,480 | | | 39,760 | 54,840 | 64,760 | 90,120 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 249,480 | 0 | 0 | 39,760 | 54,840 | 64,760 | 90,120 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | |
|---|----------|--|
| Current Approved Rate Case Funding (\$): | 0 | |
|---|----------|--|

2021-2023 2024

Prior years funding;
not actuals.



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 4,365,998 Maximum (\$): 8,108,282

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Used historical unit pricing for similar work and extrapolated to adjust for future budget estimates.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Completed as required. This is an unidentified timeline as they cannot be anticipated, but come in arbitrarily throughout the year.

What are the risks and consequences of not completing this project?

Major leaks, potentially leading to a gas incident.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|---|----------------------------------|--|---|----------------|--|----------------|----------------|----------------|--------------|
| \$841,300 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 686,560 | | 131,610 | 134,170 | 137,320 | 140,030 | 143,430 | |
| | Labor (Monthly Payroll) | 57,820 | | 11,000 | 11,200 | 11,760 | 11,790 | 12,070 | |
| | Stock Materials | 64,620 | | 12,390 | 12,630 | 12,920 | 13,180 | 13,500 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 809,000 | 0 | 155,000 | 158,000 | 162,000 | 165,000 | 169,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 32,300 | | 6,190 | 6,310 | 6,460 | 6,590 | 6,750 | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 32,300 | 0 | 6,190 | 6,310 | 6,460 | 6,590 | 6,750 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|--|--|
| Current Approved Rate Case Funding (\$): | 0 | | |
|---|----------|--|--|

2021-2023 2024

Prior years funding;
not actuals.



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 588,910 Maximum (\$): 1,093,690

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historic spends are quantified by year and extrapolated to determine future budget need.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Empty text area for additional information.



Submission Date: May 12, 2023
Submitted By: J. Mead

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 0 Identified; Not Started

A. GENERAL

Project/Program Name: Leak Prone Pipe Main Replacements
Budget Group: Gas Budget Category: 25 Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Is this a Specific Project, Program or Blanket? Program Funding Project Number: 2-2580-00
Target Schedule - Start: 1/1/3024 In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
Gas distribution main replacements in accordance with the LPP replacement, see Capital Input File for project listings.

Describe the project objective and scope of work:

Central Hudson has established a program to replace all of its leak prone pipe, at a minimum of 15 miles of main per year, as it is the single largest threat to the Central Hudson distribution system as identified by the DIMP program.

Describe specific scope exclusions, assumptions and constraints:

Project selections for each year are prioritized by a Central Hudson SME committee in conjunction with Central Hudson's main segment risk model (Main Replacement Prioritization). This is done in accordance with the 2021 Rate Order which states "for the avoidance of doubt, not all pipe sections will be replaced in strict adherence to their risk ranking established by the Company's main segment risk model. The Company expressly retains the right to prioritize projects based on factors other than risk..." The scope, prioritization, and cost of individual projects may vary year to

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To meet PSC compliance with regards to the leak prone pipe elimination program and gas safety.

What are the risks and consequences of not completing this project?

If the minimum mileage of 15 miles of replacement is not achieved every year, the company incurs 15 BP NRA.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|-------------------|--|-------------------|-------------------|-------------------|--------------|
| \$206,338,210 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 10,316,910 | | 1,877,400 | 2,052,760 | 2,024,280 | 2,216,290 | 2,146,180 | |
| | Labor (Monthly Payroll) | 6,190,150 | | 1,126,440 | 1,231,660 | 1,214,570 | 1,329,770 | 1,287,710 | |
| | Stock Materials | 16,507,050 | | 3,003,840 | 3,284,420 | 3,238,840 | 3,546,060 | 3,433,890 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 165,070,580 | | 30,038,450 | 32,844,160 | 32,388,450 | 35,460,630 | 34,338,890 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 198,084,690 | 0 | 36,046,130 | 39,413,000 | 38,866,140 | 42,552,750 | 41,206,670 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 8,253,520 | | 1,501,920 | 1,642,210 | 1,619,420 | 1,773,030 | 1,716,940 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 8,253,520 | 0 | 1,501,920 | 1,642,210 | 1,619,420 | 1,773,030 | 1,716,940 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|--|--|
| Current Approved Rate Case Funding (\$): | 0 | | |
|---|----------|--|--|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 165,070,568 Maximum (\$): 247,605,852

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical unit pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Budget estimates are based on yearly average install cost and applied to each project specifically. Variance to the average yearly costs are subject to change based on individual projects scope, contractor pricing, and material costs. Overhear and AFUDC are based on 2022 actuals.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):
This budget submittal form also includes all service service work that would be associated with leak prone pipe replacement under funding project 2-251L-01.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Load shifting, changing of regulator station equipment, looping mains, and NPA's are always considered prior to reinforcement.

Why was the proposed project scope chosen over other alternatives?

To maintain the system reliability and resiliency, while maintaining gas service to the current customer base.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Some of these projects coincide with the LPP program, and others are to improve operational reliability.

What are the risks and consequences of not completing this project?

Would not contribute to LPP where applicable, and would require denial of service to many customers due to capacity constraints.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|------------------|--|------------------|----------------|----------------|--------------|
| \$5,915,700 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 295,790 | | 149,370 | | 146,420 | | | |
| | Labor (Monthly Payroll) | 177,470 | | 89,620 | | 87,850 | | | |
| | Stock Materials | 473,260 | | 238,990 | | 234,270 | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 4,732,560 | | 2,389,890 | | 2,342,670 | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 5,679,080 | 0 | 2,867,870 | 0 | 2,811,210 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 236,620 | | 119,490 | | 117,130 | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 236,620 | 0 | 119,490 | 0 | 117,130 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|--|--|
| Current Approved Rate Case Funding (\$): | 0 | | |
|---|----------|--|--|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 4,140,990 Maximum (\$): 7,690,410

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Budget estimates are based on project scope and historic project spends to extrapolate for new updated proforma pricing.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Empty text area for additional information.

Submission Date: May 12, 2023
Submitted By: J. Mead

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Unidentified LPP Main Relocation

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Gas

Budget Category: 25

Funding Project Number: 2-2551-02

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

This program addresses LPP main relocations due to municipal work, such as paving, municipal infrastructure work, or interference. This program takes advantage of reduced capital cost by leveraging relationships with the municipalities where they may be doing paving work (or the like),

Describe the project objective and scope of work:

Individual project scopes are determined on an annual basis by working with the municipalities and determining where work (paving, beautification projects, road rebuilds, etc.) will be done.

Describe specific scope exclusions, assumptions and constraints:

This program is part of the LPP program and is required to meet a total LPP mileage reduction of 15 miles per year.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To meet PSC compliance with regards to gas safety via the LPP program.

What are the risks and consequences of not completing this project?

Increases the likelihood of leaks on the system, and prompts the Company to receive a 15 BP NRA per year.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$21,596,800 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 1,079,840 | | 180,650 | 197,310 | 215,400 | 233,380 | 253,100 | |
| | Labor (Monthly Payroll) | 647,910 | | 108,390 | 118,390 | 129,240 | 140,030 | 151,860 | |
| | Stock Materials | 1,727,750 | | 289,030 | 315,700 | 344,640 | 373,410 | 404,970 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 17,277,430 | | 2,890,330 | 3,157,000 | 3,446,380 | 3,734,050 | 4,049,670 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 20,732,930 | 0 | 3,468,400 | 3,788,400 | 4,135,660 | 4,480,870 | 4,859,600 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 863,870 | | 144,520 | 157,850 | 172,320 | 186,700 | 202,480 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 863,870 | 0 | 144,520 | 157,850 | 172,320 | 186,700 | 202,480 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|--|--|
| Current Approved Rate Case Funding (\$): | 0 | | |
|---|----------|--|--|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 17,277,440 Maximum (\$): 25,916,160

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

No explanation on confidence level required.

Basis for estimate: FOS-Generated Estimate; Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Estimates are based on historical project actuals which are used to analyze proforma pricing every year and adjust accordingly. FOS estimates are not used, it cannot be deleted from the list above.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

[Empty text area for additional information]



Submission Date: May 12, 2023
Submitted By: J. Mead

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Unidentified Leaking Mains
Budget Group: Gas Budget Category: 25
Is this a Specific Project, Program or Blanket? Program
Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Funding Project Number: 2-2551-04
Target Schedule - Start: 1/1/2024 In-Service: 12/31/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

This program will replace distribution main that has been identified as leaking, having water intrusion, or active corrosion, within each calendar year.

Describe the project objective and scope of work:

Individual project scopes are determined based on the emergent need, as found by either leak survey or gas operations.

Describe specific scope exclusions, assumptions and constraints:

This program is part of the LPP program and is required to contribute to the mileage target of 15 miles of LPP per year.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To meet PSC compliance with regards to gas safety and the LPP program.

What are the risks and consequences of not completing this project?

Leaking mains leading to an incident, and the Company incurring NRA BP's if LPP target is not met.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|------------------------|--|------------------------|------------------------|------------------------|---------------------|
| \$4,038,510 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 1,716,380 | | 329,030 | 335,430 | 343,290 | 350,070 | 358,560 | |
| | Labor (Monthly Payroll) | 121,160 | | 23,230 | 23,680 | 24,230 | 24,710 | 25,310 | |
| | Stock Materials | 323,090 | | 61,940 | 63,140 | 64,620 | 65,900 | 67,490 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,716,380 | | 329,030 | 335,430 | 343,290 | 350,070 | 358,560 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,877,010 | 0 | 743,230 | 757,680 | 775,430 | 790,750 | 809,920 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 80,750 | | 15,480 | 15,780 | 16,150 | 16,470 | 16,870 | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 80,750 | | 15,480 | 15,780 | 16,150 | 16,470 | 16,870 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 161,500 | 0 | 30,960 | 31,560 | 32,300 | 32,940 | 33,740 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|--|--|
| Current Approved Rate Case Funding (\$): | 0 | | |
|---|----------|--|--|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 3,230,808 Maximum (\$): 4,846,212

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical project quantities and actual spends are extrapolated to determine future budget need.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 12, 2023
Submitted By: J. Mead

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Large Diameter Pre-1930 Steel Replacement Program

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Gas

Budget Category: 25

Funding Project Number: 2-2581-00

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2027

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Detailed project descriptions, schedule, and project costs are found below.

Describe the project objective and scope of work:

Central Hudson has an inventory of approximately 5 miles of large diameter (8"+) steel pipe operating at 60 PSIG that is located in or near high consequence areas and which was joined using gas welding. Welds of this vintage and type are susceptible to circumferential cracks as identified through DIMP. This replacement program has been established to replace this pipe and remove that threat.

Describe specific scope exclusions, assumptions and constraints:

Constraints for large diameter steel pipe replacements are usually constrained by the paving scopes of the municipality/state.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

There are no other options for this as the PN line is needed to support multiple downstream systems.

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Completing these replacements in line with the LPP program will mitigate the risk of circumferential cracks due to gas welds and will help increase system reliability and capacity.

What are the risks and consequences of not completing this project?

The risk of the pipeline cracking and leading to an event (e.g. Marple Road).

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

PN line planning study

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$13,310,700 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 665,530 | | 152,160 | 178,840 | 162,460 | 85,000 | 87,070 | |
| | Labor (Monthly Payroll) | 399,320 | | 91,290 | 107,310 | 97,480 | 51,000 | 52,240 | |
| | Stock Materials | 1,064,860 | | 243,450 | 286,150 | 259,940 | 136,010 | 139,310 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 10,648,570 | | 2,434,480 | 2,861,500 | 2,599,430 | 1,360,070 | 1,393,090 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 12,778,280 | 0 | 2,921,380 | 3,433,800 | 3,119,310 | 1,632,080 | 1,671,710 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 532,420 | | 121,720 | 143,080 | 129,970 | 68,000 | 69,650 | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 532,420 | 0 | 121,720 | 143,080 | 129,970 | 68,000 | 69,650 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|--|--|
| Current Approved Rate Case Funding (\$): | 0 | | |
|---|----------|--|--|

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 9,317,490 Maximum (\$): 17,303,910

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

No explanation on confidence level required.

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historic unit pricing. Project estimates are based on yearly average install rates derived from historical project actual spends. Variance to the average yearly costs are subject to change based on individual project scopes. Overhead and AFUDC percentages are based on 2022 actuals.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Requirements are yearly.

What are the risks and consequences of not completing this project?

Variations in the number of installs, equipment failures, cost increases, and material lead times.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$18,752 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 18,752 | 2,569 | 2,926 | 3,028 | 3,213 | 3,405 | 3,611 | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 18,752 | 2,569 | 2,926 | 3,028 | 3,213 | 3,405 | 3,611 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|---------------|--------------|--------------|
| Current Approved Rate Case Funding (\$): | 10,389 | 7,711 | 2,678 |
|---|---------------|--------------|--------------|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 13,126 Maximum (\$): 24,378

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Previous material costs and trending needs.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

COMMON PROGRAM INDIVIDUAL PROJECT SUBMITTAL



Submission Date: June 8, 2023
Submitted By: David Schultz

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 4 Construction

A. GENERAL

Project/Program Name: Tools Budget

Work Order #:

| | | | | | |
|--|--|--|--|---|--|
| | | | | - | |
|--|--|--|--|---|--|

Budget Group: Common: Non-I.T./O.T.

Budget Category: 43

Funding Project Number:

| | | | | | |
|--|--|--|--|--|--|
| | | | | | |
|--|--|--|--|--|--|

Is this a Specific Project, Program or Blanket? Program

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2024

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

[Empty text area for summarizing other work orders]

Describe the project objective and scope of work:

The "Tools" Capital Forecast provides for both the normal replacement of tools and instruments as well as the addition of any new and/or incremental tooling needs throughout the Company to allow our employees to complete their daily work.

Describe specific scope exclusions, assumptions and constraints:

None

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A

What are the risks and consequences of not completing this project?

N/A

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|-----------------------------------|--------------|--|--------------|--------------|--------------|--------------|
| \$9,018 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 9,018 | | 1,605 | 1,639 | 1,781 | 2,144 | 1,849 | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 9,018 | 0 | 1,605 | 1,639 | 1,781 | 2,144 | 1,849 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| Joint Utility Payments CREDIT | 0 | | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>* AFUDC may require adjustment after Finance Department review.</i> | | | | | | | | | |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 705 | | 705 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 7,214 Maximum (\$): 10,822

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A

What are the risks and consequences of not completing this project?

N/A

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|-----------------------------------|--|---------------|---------------|---------------|---------------|--------------|
| \$71,999 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 71,999 | | 13,824 | 14,115 | 14,411 | 14,685 | 14,964 | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 71,999 | 0 | 13,824 | 14,115 | 14,411 | 14,685 | 14,964 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| Joint Utility Payments CREDIT | 0 | | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| * AFUDC may require adjustment after Finance Department review. | | | | | | | | | |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 2,904 | | 2,904 | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 57,599 Maximum (\$): 86,399

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Budget Submittal Form

Version 3.0 12/9/2022

Submission Date: May 2, 2023
Submitted By: R.J.Scandariato

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Daily Operations- Unidentified

Work Order #: -

Budget Group: Common: Non-I.T./O.T. **Budget Category:** 41

Funding Project Number: 4-4112-02-18

Is this a Specific Project, Program or Blanket? Blanket

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2028

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Funding allocated to facilitate the emergent needs of the organization.

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Emergent needs.

What are the risks and consequences of not completing this project?

Increased maintenance costs and less reliable equipment

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|--|----------------------------------|--|---|----------------|--|----------------|----------------|----------------|--------------|
| \$2,962,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 375,000 | | 75,000 | 75,000 | 75,000 | 75,000 | 75,000 | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 2,587,000 | | 623,000 | 461,000 | 482,000 | 481,000 | 540,000 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,962,000 | 0 | 698,000 | 536,000 | 557,000 | 556,000 | 615,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|------------------|--|----------------|
| Current Approved Rate Case Funding (\$): | 698,000 | | 698,000 |
| | 2021-2023 | | 2024 |

Prior years funding;
not actuals.



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,369,600 Maximum (\$): 3,554,400

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

No explanation on confidence level required.

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Replacement of similar scope projects.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 2, 2023
Submitted By: R.J.Scandariato

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|--|--|--------------------------------|----------------------|
| Project/Program Name: EV Charging Infrastructure | | Work Order #: | <input type="text"/> |
| Budget Group: Common: Non-I.T./O.T. | Budget Category: 41 | Funding Project Number: | 4-4112-02-18 |
| Is this a Specific Project, Program or Blanket? Blanket | Target Schedule - Start: 1/1/2024 | In-Service: | 12/31/2028 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
Addition of electric vehicles to the Central Hudson fleet.

Describe the project objective and scope of work:
Install charging infrastructure at Central Hudson facilities to support the electric vehicles that are being added to the company fleet.

Describe specific scope exclusions, assumptions and constraints:
Coordination with Transportation, Engineering, and Facilities is underway to determine location and type of charging infrastructure that is needed.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: System Enhancements **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): **Is there an Innovation Component?** No

Needs Assessment: Strategic Goal
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:
 NYS and Central Hudson have goals to transition the fleet to more electric vehicles. In order for this to be successful charging infrastructure will need to be installed to support the needs.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 Support of a corporate goal.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Increase awareness as community and industry leader
Which Strategic Initiative does project most align with? Beneficial Electrification
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL

Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44):

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates?* N/A

* Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.

Do you anticipate the project to require significant jurisdictional approvals?

Local municipality (1)

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: Yes **Environmental Component:** Yes
Social Component: Maybe - Requires further scope development
Governance Component: No

Is complete Sustainability status achieved by this project?* No

* Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To support the introduction of electric vehicles.

What are the risks and consequences of not completing this project?

Electric vehicles that are purchased would not be able to be effectively utilized.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|---|--|----------------|----------------|----------------|----------------|--------------|
| \$1,480,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,480,000 | | 349,000 | 268,000 | 278,000 | 278,000 | 307,000 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,480,000 | 0 | 349,000 | 268,000 | 278,000 | 278,000 | 307,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|------------------|--|----------------|
| Current Approved Rate Case Funding (\$): | 349,000 | | 349,000 |
| | 2021-2023 | | 2024 |

*Prior years funding; not
actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,184,000 Maximum (\$): 1,776,000

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Installation of similar scope projects.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Budget Submittal Form

Version 3.0 12/9/2022

Submission Date: May 2, 2023
Submitted By: R.J.Scandariato

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|--|--|--------------------------------|-------------------------------|
| Project/Program Name: Solar Systems on Company Facilities | | Work Order #: | <input type="text" value=""/> |
| Budget Group: Common: Non-I.T./O.T. | Budget Category: 41 | Funding Project Number: | 4-4112-02-18 |
| Is this a Specific Project, Program or Blanket? Blanket | Target Schedule - Start: 1/1/2024 | In-Service: | 12/31/2028 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Funding allocated to facilitate the installation of solar generation infrastructure at Central Hudson facilities.

Describe specific scope exclusions, assumptions and constraints:

N/A

B. JUSTIFICATION

Load Based/Infrastructure: Other
Discretion Level: System Enhancements
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44):
Needs Assessment: Reliability
Growth/Sustaining/Retirement: Distribution Growth
Investment Type: Infrastructure
Is there an Innovation Component? No
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:
 Installation of local solar generation at Central Hudson facilities will decrease the dependence on the grid, lowering costs for customers as well as supporting NYS renewable generation goals.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 All electricity generated would offset the need to purchase that amount of energy improving capacity of the grid.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document:

[CLICK HERE](#)

Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Increase commitment to sustainability in planning/performance processes
Which Strategic Initiative does project most align with? Energy Policy Driven Investments
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44):

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates?* N/A

** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

Local municipality (1)

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: Yes
Environmental Component: Yes
Social Component: Maybe - Requires further scope development
Governance Component: Yes

Is complete Sustainability status achieved by this project?* Maybe - Requires further scope development

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To support clean energy policy.

What are the risks and consequences of not completing this project?

Operations will continue as they are today.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|---|----------------------------------|--|---|----------------|--|------------------|----------------|----------------|--------------|
| \$3,050,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 3,050,000 | | 30,000 | 180,000 | 1,994,000 | 657,000 | 189,000 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,050,000 | 0 | 30,000 | 180,000 | 1,994,000 | 657,000 | 189,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|--|

| | | | |
|---|---|---|---|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|---|---|---|

2021-2023 2024
*Prior years funding; not
actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

The market price of materials and supplies.

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Basis for estimate: Vendor Generated Cost Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Solar developer assisted in cost estimate.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Budget Submittal Form

Version 3.0 12/9/2022

Submission Date: June 6, 2023
Submitted By: R.J. Scandariato

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|--|--|--------------------------------|----------------------|
| Project/Program Name: Architectural/Engineering Design | | Work Order #: | <input type="text"/> |
| Budget Group: Common: Non-I.T./O.T. | Budget Category: 41 | Funding Project Number: | 4-4111-00-18 |
| Is this a Specific Project, Program or Blanket? Blanket | Target Schedule - Start: 1/1/2024 | In-Service: | 12/31/2028 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Funding allocated to facilitate design work for projects that require longer time and/or to complete design to allow construction schedules to be met.

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A

What are the risks and consequences of not completing this project?

Not being in compliance with codes and not meeting net plant targets by missing construction windows.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$1,480,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,480,000 | | 349,000 | 268,000 | 278,000 | 278,000 | 307,000 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,480,000 | 0 | 349,000 | 268,000 | 278,000 | 278,000 | 307,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024
Prior years funding; not actuals.

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,184,000 Maximum (\$): 1,776,000

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Budget Submittal Form

Version 3.0 12/9/2022

Submission Date: June 6, 2023
Submitted By: R.J. Scandariato

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 2 Design

A. GENERAL

| | | |
|--|--|---|
| Project/Program Name: Paving | Work Order #: <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> | |
| Budget Group: Common: Non-I.T./O.T. | Budget Category: 41 | Funding Project Number: 4-4112-02-18 |
| Is this a Specific Project, Program or Blanket? Blanket | Target Schedule - Start: 1/1/2024 | In-Service: 12/31/2028 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:
Funding allocated to facilitate necessary paving projects at all Central Hudson facilities as needed to maintain safe and functional parking lots and roadways.

Describe specific scope exclusions, assumptions and constraints:
N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

N/A

What are the risks and consequences of not completing this project?

Having deteriorated asphalt at compnay properties.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | All future year cost estimates should include applicable adjustments for inflation. | | | | | |
|---|----------------------------------|--|---|--|----------------|----------------|----------------|----------------|--------------|
| \$2,962,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 2,962,000 | | 698,000 | 536,000 | 557,000 | 556,000 | 615,000 | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,962,000 | 0 | 698,000 | 536,000 | 557,000 | 556,000 | 615,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------------|------------------|----------------|
| Current Approved Rate Case Funding (\$): | 319,000 | | 319,000 |
| | | 2021-2023 | 2024 |

Prior years funding;
not actuals.

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,369,600 Maximum (\$): 3,554,400

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Paving of several projects each year, more paving in 2024, 2025, and 2026 to allow for repaving of Kingston to align with PCC/Training Academy Projects.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: R.J. Scandariato

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 4 Construction

A. GENERAL

Project/Program Name: Primary Control Center

Work Order #: 6 2 2 6 - H

Budget Group: Common: Non-I.T./O.T.

Budget Category: 41

Funding Project Number: 4-4112-04-19

Is this a Specific Project, Program or Blanket?

Specific

Target Schedule - Start: 5/1/2021

In-Service: 12/31/2024

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

WO 6227-H: Training Academy - Site Development, IT/OT work orders for equipment

Describe the project objective and scope of work:

Construct a Primary Control Center for both Transmission and Distribution System Operations. This new facility will ensure all safety and security protocols are in place for real-time operation of our gas and electric systems. The Primary Control Center will provide a modern space cohabited for transmission and distribution functions and emergency preparedness; equipped with the technology and space to operate over the next 50 years. All regulatory policies and COVID-19 lessons learned will be incorporated within the new

Describe specific scope exclusions, assumptions and constraints:

The project is under construction and on track for an in-service date of 12/31/2024.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Modify the current Primary Control Center.

Why was the proposed project scope chosen over other alternatives?

New construction allows for all modern needs of a Primary Control Center to be incorporated and the current Primary Control Center to remain as a backup.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This project is under construction and needs to continue so its gets completed, allowing for fuctional testing and be in-service to support Grid Modernization.

What are the risks and consequences of not completing this project?

Not being in compliance with NYS energy policy.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

The training academy project was deferred until after the Primary Control Center.

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | All future year cost estimates should include applicable adjustments for inflation. | | | | | |
|---|----------------------------------|--|---|--|----------------|----------------|----------------|----------------|--------------|
| \$44,323,759 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 160,000 | 85,000 | 75,000 | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 41,000,000 | 38,000,000 | 3,000,000 | | | | | |
| | Overheads | 288,759 | 213,759 | 75,000 | | | | | |
| | AFUDC* | 2,875,000 | 1,150,000 | 1,725,000 | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 44,323,759 | 39,448,759 | 4,875,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|

| | | | |
|---|-----------|---|-----------|
| Current Approved Rate Case Funding (\$): | 4,628,000 | 0 | 4,628,000 |
|---|-----------|---|-----------|

2021-2023 2024

Prior years funding; not
actuals.



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Bid

Cost Estimate Confidence: (that final cost will be within +/-5% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 42,107,571 Maximum (\$): 46,539,947

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Contractor/Vendor Bids For Entire Project

For your definitive/bid estimate, provide link(s) to applicable cost estimating files.

Available if needed.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: R.J. Scandariato

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 4 Construction

A. GENERAL

Project/Program Name: Training Academy- Site Development

Work Order #: 6 2 2 7 - H

Budget Group: Common: Non-I.T./O.T.

Budget Category: 41

Funding Project Number: 4-4112-04-19

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 5/1/2021

In-Service: 6/30/2024

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Develop the land and install infrastructure for the site that will house the new Gas Village, Pole Yard, Primary Control Center, and Training Academy.

Describe specific scope exclusions, assumptions and constraints:

The project is under construction and on track for an in-service date of 6/30/2024.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Other sites were considered, but this site was selected.

Why was the proposed project scope chosen over other alternatives?

The scope of this project was developed to meet operational needs, FERC/NERC standards, town codes, and NYS DEC stormwater management requirements.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This project is underway and needs to continue until completion.

What are the risks and consequences of not completing this project?

Not fulfilling permit requirements and jeopardizing use of the Primary Control Center.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | All future year cost estimates should include applicable adjustments for inflation. | | | | | |
|---|----------------------------------|--|---|--|----------------|----------------|----------------|----------------|--------------|
| \$12,074,772 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 4,859 | 4,859 | | | | | | |
| | Labor (Monthly Payroll) | 31,332 | 6,332 | 25,000 | | | | | |
| | Stock Materials | 11,339 | 11,339 | | | | | | |
| | Non-Stock Material (A/P taxable) | 77,589 | 77,589 | | | | | | |
| | Contractors (A/P tax exempt) | 10,063,521 | 9,063,521 | 1,000,000 | | | | | |
| | Overheads | 24,804 | 9,304 | 15,500 | | | | | |
| | AFUDC* | 1,045,958 | 803,922 | 242,036 | | | | | |
| | Journal Vouchers (JVs) | 815,370 | 815,370 | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 12,074,772 | 10,792,236 | 1,282,536 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|--|

| | | | |
|---|---|---|---|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|---|---|---|

2021-2023 2024
*Prior years funding; not
actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Bid

Cost Estimate Confidence: (that final cost will be within +/-5% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 11,471,033 Maximum (\$): 12,678,511

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Contractor/Vendor Bids For Entire Project

For your definitive/bid estimate, provide link(s) to applicable cost estimating files.

N/A

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Empty text area for additional information.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

This current project scope was developed with operating group's subject matter experts to identify what is necessary to improve training and development of employees.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

The number of new employees entering Central Hudson is very high so having a facility to complete training is essential.

What are the risks and consequences of not completing this project?

Training of employees will continue the way it is currently completed. In addition, site plan approval from the Town of Ulster may expire if the project is delayed.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$31,185,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 310,000 | | | | | 100,000 | 120,000 | 90,000 |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 30,875,000 | | | | | 8,284,000 | 16,470,000 | 6,121,000 |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 31,185,000 | 0 | 0 | 0 | 0 | 8,384,000 | 16,590,000 | 6,211,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|

| | | | |
|---|---|---|---|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|---|---|---|

2021-2023 2024
Prior years funding; not actuals.

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

The timing of construction and the impact that will have on the market pricing of material and labor could impact project cost.

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Basis for estimate: Vendor Generated Cost Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

See attached work paper.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A

Why was the proposed project scope chosen over other alternatives?

This current project scope was developed with operating group's SME's to identify what is necessary to improve training and development of employees.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

The number of new employees entering Central Hudson is very high so having a facility to complete training is essential.

What are the risks and consequences of not completing this project?

The training of employees will continue the way it is currently completed. In addition, site plan approval from the Town of Ulster may expire if the project is delayed.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$20,177,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 427,000 | | 79,000 | 88,000 | 260,000 | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 19,750,000 | | 500,000 | 9,000,000 | 10,250,000 | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 20,177,000 | 0 | 579,000 | 9,088,000 | 10,510,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

The timing of construction and the impact that will have on the market pricing of material and labor could impact project cost.

Basis for estimate: Vendor Generated Cost Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Work paper attached.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: June 6, 2023
Submitted By: R.J. Scandariato

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|--------------------|
| Project/Program Name: Newburgh- New Facility | | Work Order #: | 8 4 2 7 - G |
| Budget Group: Common: Non-I.T./O.T. | Budget Category: 41 | Funding Project Number: | 10080 |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 1/1/2020 | In-Service: | 12/31/2030 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Construct a new facility specifically suited to meet the operational needs of a district headquarters. This new facility will be sited on a larger parcel of property located in an area that will allow for safer access for both employees and customers.

Describe specific scope exclusions, assumptions and constraints:

Alternate parcel evaluations are ongoing. How to divest the current Newburgh facility is not included in this project.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Rehabilitating the current facility.

Why was the proposed project scope chosen over other alternatives?

The report demonstrated multiple deficiencies of the current location and one of the major issues is being immediately downstream of the Washington Lake dam if it were to fail.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This project has been deferred to later in the 5 year plan but is a necessary project to maintain quality long-term service in the Newburgh area.

What are the risks and consequences of not completing this project?

Increasing O&M costs, accidents on property due to space limitations, major damage to the facility, vehicles, material, and people if catastrophic failure of dam were to occur.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | All future year cost estimates should include applicable adjustments for inflation. | | | | | |
|---|----------------------------------|--|---|--|----------------|----------------|----------------|------------------|-------------------|
| \$27,424,607 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 3,429 | 3,429 | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 27,395,486 | 185,486 | | | | 524,000 | 1,936,000 | 24,750,000 |
| | Overheads | 2,145 | 2,145 | | | | | | |
| | AFUDC* | 23,659 | 23,659 | | | | | | |
| | Journal Vouchers (JVs) | (112) | (112) | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 27,424,607 | 214,607 | 0 | 0 | 0 | 524,000 | 1,936,000 | 24,750,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|

| | | | |
|---|---|---|---|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|---|---|---|

2021-2023 2024

*Prior years funding; not
actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

The scope is not defined, the location to build a new facility is not secured and the plan is so far into the future the market could be impacted greatly.

Basis for estimate: Vendor Generated Cost Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

A construction estimate was provided in the property assessment completed by LMV architects.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: June 6, 2023
Submitted By: R.J. Scandariato

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: EC Transportation Building

Work Order #:

Budget Group: Common: Non-I.T./O.T. **Budget Category:** 41

Funding Project Number: 4-4111-00-18

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2025

In-Service: 12/31/2026

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Convert the current transportation shop to garage storage for larger vehicles used by Operations Services.

Build a new transportation shop at the EC facility that is more appropriately sized for the work that is done there and provides a better layout for the employees to work safer and more efficiently.

Describe specific scope exclusions, assumptions and constraints:

Programming for specific project needs has not yet been completed but a schematic narrative by an architect is complete.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

None.

Why was the proposed project scope chosen over other alternatives?

Get the right size transportation shop for the current work volume at EC while still utilizing the existing structure to allow indoor storage of large and expensive equipment.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Improvement of the means to house equipment.

What are the risks and consequences of not completing this project?

Higher O&M costs to large equipment and under utilization of the existing garage.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|---|----------------------------------|--|---|----------------|--|------------------|----------------|----------------|--------------|
| \$4,709,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 4,709,000 | | | 505,000 | 4,204,000 | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 4,709,000 | 0 | 0 | 505,000 | 4,204,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|

| | | | |
|---|---|---|---|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|---|---|---|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 3,296,300 Maximum (\$): 6,121,700

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Vendor Generated Cost Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

An architect provided a schematic narrative and a construction manager provided a corresponding construction estimate.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: June 6, 2023
Submitted By: R.J. Scandariato

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Fishkill Butler Building

Work Order #:

Budget Group: Common: Non-I.T./O.T.

Budget Category: 41

Funding Project Number: 4-4111-00-18

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2025

In-Service: 12/31/2026

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Rebuild this building that better meets the needs of the organization and operating groups. Design the Transportation Shop to provide the necessary space for vehicles, parts, tools, and equipment.
 -Add a restroom so the employees in this building has more convenient access to it and provides more flexibility to keep crews separated (but on site) in the event of another pandemic
 -Improve ventilation and pipe storage for the gas welding shop.
 -Increase the depth of the garage space to allow for a dump truck and trailer with an excavator to fit. Also consider overhead doors on opposite ends to allow drive in, drive out for the bay where a truck/trailer combination will park.

Describe specific scope exclusions, assumptions and constraints:

Programming for specific project needs has not yet been completed but a schematic narrative by an architect is complete.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Repair specific parts of the building as failures occur.

Why was the proposed project scope chosen over other alternatives?

Rebuilding allows for reconfiguration of the building and layout to meet the needs of the operating group and completes the project as a whole instead of piece by piece.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To allow the employees in the operating area a safe and functional facility to complete their jobs.

What are the risks and consequences of not completing this project?

Higher O&M costs and larger trucks not fitting in the mechanic's shop for service.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|---|----------------------------------|--|---|----------------|--|------------------|----------------|----------------|--------------|
| \$4,709,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 4,709,000 | | | 505,000 | 4,204,000 | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 4,709,000 | 0 | 0 | 505,000 | 4,204,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|

| | | | |
|---|---|---|---|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|---|---|---|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 3,296,300 Maximum (\$): 6,121,700

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Vendor Generated Cost Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

An architect provided a schematic narrative and a construction manager provided a corresponding construction estimate.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: June 6, 2023
Submitted By: R.J. Scandariato

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Tannersville- New Facility

Work Order #:

Budget Group: Common: Non-I.T./O.T. **Budget Category:** 41

Funding Project Number: 4-4111-00-18

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 1/1/2024

In-Service: 12/31/2025

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:
6649-H (4-4111-00-18) Land purchase for new facility. Projected in-service 2023.

Describe the project objective and scope of work:

The current Tannersville Office is 1 rented bay at the Tannersville Fire House and a small office area. Construct a new facility owned by Central Hudson that meets the operating needs for that area.

Describe specific scope exclusions, assumptions and constraints:

New facility to include indoor material storage, vehicle parking, and an office.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure

Growth/Sustaining/Retirement: Growth Sustaining

Discretion Level: System Enhancements

Investment Type: Daily Operations

Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44)

Is there an Innovation Component? No

Needs Assessment: Service

If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:

The current situation only allows for 1 bucket truck to be parked inside. In addition, the current standard truck is too large for this garage bay. In addition to the limitations of the fire house for the Central Hudson Operation, the fire department has indicated to local supervision they are not interested in extending the lease past the current term. The current lease terms allow Central Hudson to be in the fire house through 2025.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

Improved efficiency (not digging through snow to get to trucks and material), safety, potential for allowing sleeping bunk for those who may need to stay over in a snow event.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Operational Excellence

Which Strategic Objective does project most align with? Improve productivity and efficiency

Which Strategic Initiative does project most align with? Business & Operations Modernization

Which Team Goal does project most align with? Employee Engagement LEQ & PEQ

Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44)

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimate? Yes

** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

Miscellaneous (wetlands; highway; SWPPP)

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: Yes **Environmental Component:** Maybe - Requires further scope development

Social Component: Yes

Governance Component: Maybe - Requires further scope development

Is complete Sustainability status achieved by this project?* **Maybe - Requires further scope development**

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Existing facilities that would meet the operational needs in that area are being explored as well.

Why was the proposed project scope chosen over other alternatives?

Construction of a new facility would ensure the needs of the operational team are met.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To align with the termination of the lease.

What are the risks and consequences of not completing this project?

Not having a location for the Tannersville Crew to work out of.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|---|----------------------------------|--|---|------------------|--|----------------|----------------|----------------|--------------|
| \$4,186,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 4,186,000 | | 1,157,000 | 3,029,000 | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 4,186,000 | 0 | 1,157,000 | 3,029,000 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|

| | | | |
|---|---|---|---|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|---|---|---|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

The property has not been purchased yet and there are concerns about the challenges the site would have for construction.

Basis for estimate: Vendor Generated Cost Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

An architect provided a schematic narrative and a construction manager provided a corresponding construction estimate.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Repairing/replacing parts of the existing building as needed.

Why was the proposed project scope chosen over other alternatives?

New construction allows for reconfiguration of the building and layout to meet the needs of the operating group and completes the project as a whole instead of piece by piece. Relocation could reduce capacity constraints too.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To allow the employees in the operating area a safe and functional facility to complete their jobs.

What are the risks and consequences of not completing this project?

Higher O&M costs and space constraints.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|--|----------------------------------|--|---|----------------|--|----------------|------------------|----------------|-------------------|
| \$21,548,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 21,048,000 | | | | | 1,048,000 | | 20,000,000 |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 21,048,000 | 0 | 0 | 0 | 0 | 1,048,000 | 0 | 20,000,000 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 500,000 | | | | | | | 500,000 |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 500,000 | 0 | 0 | 0 | 0 | 0 | 0 | 500,000 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Full scope has not yet been developed. Market impact on cost and schedule is unknown multiple years into the future.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Estimate based on recently completed projects.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Budget Submittal Form

Version 3.0 12/9/2022

Submission Date: June 6, 2023
Submitted By: R.J. Scandariato

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Ellenville Office Renovation

Work Order #:

Budget Group: Common: Non-I.T./O.T. **Budget Category:** 41

Funding Project Number: 4-4111-00-18

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 6/1/2025

In-Service: 12/31/2026

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The office area in the Ellenville facility is dated, showing signs of wear and does not fit the employees working in the area. Renovate and reconfigure the foreman, crew, and storekeeper office area to meet the current needs and upgrade the building systems.

Describe specific scope exclusions, assumptions and constraints:

Programming for specific project needs has not yet been completed.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Repairing/replacing parts of the existing building as needed.

Why was the proposed project scope chosen over other alternatives?

Implementation of the full scope at once rather than in stages that would impact the operations for a longer overall time.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To allow the employees in the operating area a safe and functional facility to complete their jobs.

What are the risks and consequences of not completing this project?

Higher O&M costs.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|------------------------|--|------------------------|------------------------|------------------------|---------------------|
| \$1,232,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,232,000 | | | 76,000 | 1,156,000 | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,232,000 | 0 | 0 | 76,000 | 1,156,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|----------|--|--|--|--|--|--|--|

| | | | |
|---|----------|----------|----------|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|----------|----------|----------|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Full scope has not yet been developed and market impact on cost and schedule is unknown multiple years into the future.

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Estimate based on recently completed projects.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: June 6, 2023
Submitted By: R.J. Scandariato

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 2 Design

A. GENERAL

Project/Program Name: Kingston Retaining Wall Replacement (Rear) Work Order #: 0 4 9 1 - K
Budget Group: Common: Non-I.T./O.T. Budget Category: 41 Funding Project Number: 4-4111-00-18
Is this a Specific Project, Program or Blanket? Specific Target Schedule - Start: 12/31/2022 In-Service: 12/31/2024

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:
The retaining wall along Katrine Ln in the rear of the Kingston office has been evaluated by an engineer and is showing signs of deterioration and has been recommended for replacement.

Describe specific scope exclusions, assumptions and constraints:
Engineering is underway.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

None.

Why was the proposed project scope chosen over other alternatives?

The wall is showing signs that it is beyond repair.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

So the wall is replaced before it fails.

What are the risks and consequences of not completing this project?

Employee or public injury, damage to equipment and loss of physical security to the Central Hudson side in that area.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | Year 1 = 1st year of the 5-year budget plan | | | All future year cost estimates should include applicable adjustments for inflation. | | | | |
|---|----------------------------------|--|---|------------------|--|----------------|----------------|----------------|--------------|
| \$1,430,452 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 15,000 | 5,000 | 10,000 | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,271,728 | 21,728 | 1,250,000 | | | | | |
| | Overheads | 28,210 | 3,210 | 25,000 | | | | | |
| | AFUDC* | 15,514 | 514 | 15,000 | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,330,452 | 30,452 | 1,300,000 | 0 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 100,000 | | 100,000 | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 100,000 | 0 | 100,000 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|

| | | | |
|---|---|---|---|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|---|---|---|

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

The cost estimate was provided by the design engineer so there may be construction considerations that he did not account for.

Basis for estimate: Vendor Generated Cost Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

The design engineer provided a construction cost estimate.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: June 6, 2023
Submitted By: R.J. Scandariato

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 2 Design

A. GENERAL

Project/Program Name: Kingston Retaining Wall Replacement (Front)

Work Order #:

Budget Group: Common: Non-I.T./O.T.

Budget Category: 41

Funding Project Number: 4-4111-00-18

Is this a Specific Project, Program or Blanket? Specific

Target Schedule - Start: 12/31/2022

In-Service: 12/31/2024

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The retaining wall along Katrine Ln in the front of the Kingston Office has been evaluated by an engineer and is showing signs of deterioration and has been recommended for replacement.

Describe specific scope exclusions, assumptions and constraints:

Engineering has not yet begun so full scope is undefined.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

None.

Why was the proposed project scope chosen over other alternatives?

The wall is showing signs that it is beyond repair.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

So the wall is replaced before it fails.

What are the risks and consequences of not completing this project?

Employee or public injury, damage to equipment, and loss of physical security to the Central Hudson site in that area.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

N/A

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$2,143,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 2,043,000 | | | 2,043,000 | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,043,000 | 0 | 0 | 2,043,000 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 100,000 | | | 100,000 | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 100,000 | 0 | 0 | 100,000 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|

| | | | |
|---|---|---|---|
| Current Approved Rate Case Funding (\$): | 0 | 0 | 0 |
|---|---|---|---|

2021-2023 2024
Prior years funding; not actuals.

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

The design has not yet been completed so the full scope of work is unknown.

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

The estimate for the rear wall was increased due to the larger size of the front wall.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Budget Submittal Form

Version 3.0 12/9/2022

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|----------------------|
| Project/Program Name: 3 Year Term License Renewal - Feb 2025 - (ArcGIS Portal) | | Work Order #: | <input type="text"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 4220 | Funding Project Number: | 4-4220-35-18 |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 2/1/2025 | In-Service: 2/1/2025 | |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

ArcGIS 3 year License Renewal

Describe specific scope exclusions, assumptions and constraints:

ArcGIS 3 year License Renewal

B. JUSTIFICATION

Load Based/Infrastructure: Other **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: Maintain System Standards **Investment Type:** Daily Operations
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Foundational - Implementation **Is there an Innovation Component?** No
Needs Assessment: Infrastructure
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A
Describe the justification for this project. Include attachments or links to planning studies if applicable:
 ArcGIS 3 year License Renewal

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 N/A

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)


Which Strategic Theme does project most align with? Operational Excellence
Which Strategic Objective does project most align with? Leverage information and operating technologies
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? PSC Complaint Rate
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A
** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?
 No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: No **Environmental Component:** *Checklist is incomplete*
 **Social Component:** *Checklist is incomplete*
 Governance Component: *Checklist is incomplete*

Is complete Sustainability status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do not renew licenses and be out of compliance.

Why was the proposed project scope chosen over other alternatives?

To stay in compliance with our licensing agreement and keep using ArcGIS.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Without License renewal, we will not be able to use ArcGIS.

What are the risks and consequences of not completing this project?

Without License renewal, we will not be able to use ArcGIS.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

Need to continue to use ArcGIS.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$1,132,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 1,132,000 | | | 538,000 | | | 594,000 | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,132,000 | 0 | 0 | 538,000 | 0 | 0 | 594,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Submittal Form

Version 3.0 12/9/2022

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 792,400 Maximum (\$): 1,471,600

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Previous Licensing costs

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

[Empty text area for additional information]

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Application Upgrades **Work Order #:**

Budget Group: Common: I.T./O.T. **Budget Category:** 4220 **Funding Project Number:** 10185

Is this a Specific Project, Program or Blanket? Program **Target Schedule - Start:** 1/1/2023 **In-Service:** 12/1/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The Technology organization must also ensure the continued operations of 350 business software platforms over the next 5-years, requiring a capital investment of \$2.8M. These upgrade and enhancement projects are required to ensure the software solutions continue to receive vendor support, cybersecurity-related updates, and are optimized (enhanced) in alignment with evolving business needs. The portfolio of software applications supports all business functions within the organization, including Human Resources, Engineering & Operations, Finance, Accounting, Customer Service, Regulatory, and New Business. The upgrade and enhancement initiatives align to all five technology strategic drivers.

Describe specific scope exclusions, assumptions and constraints:

Assumption: We get approval in the 2023 Rate Case.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: System Enhancements **Investment Type:** Growth
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Foundational - Upgrade **Is there an Innovation Component?** No
Needs Assessment: Infrastructure

If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:

the Technology organization must also ensure the continued operations of 350 business software platforms over the next 5-years, requiring a capital investment of \$\$\$\$. These upgrade and enhancement projects. are required to ensure the software solutions continue to receive vendor support, cybersecurity-related updates, and are optimized (enhanced) in alignment with evolving business needs. The portfolio of software applications supports all business functions within the organization, including Human Resources, Engineering & Operations, Finance, Accounting, Customer Service, Regulatory, and New Business. The upgrade and enhancement initiatives align to all five technology strategic drivers.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

We anticipate that future Application Upgrades would have cost savings/avoidance, Customer Experience and Risk Reduction benefits.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve productivity and efficiency
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A


** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: No **Environmental Component:** *Checklist is incomplete*
 **Social Component:** *Checklist is incomplete*
Governance Component: *Checklist is incomplete*

Is complete Sustainability status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do nothing.

Why was the proposed project scope chosen over other alternatives?

We would increase technical debt and risk by not upgrading technology.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

These requests are for future Application upgrades based on historic data.

What are the risks and consequences of not completing this project?

We would increase technical debt and risk by not upgrading technology.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

Business prioritization and resource availability

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$2,784,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 1,256,000 | | 200,000 | 236,000 | 256,000 | 270,000 | 294,000 | |
| | Stock Materials | 1,528,000 | | 328,000 | 300,000 | 300,000 | 300,000 | 300,000 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,784,000 | 0 | 528,000 | 536,000 | 556,000 | 570,000 | 594,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

cost estimate were based off of historical spend to upgrade applications with some adjustments from learnings

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

cost estimate were based off of historical spend to upgrade applications with some adjustments from learnings.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Unsupported and potential security vulnerabilities in end-of-life devices on corporate network

Why was the proposed project scope chosen over other alternatives?

Unsupported and potential security vulnerabilities in end-of-life devices on corporate network

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

We have an obligation to provide tools for users to perform their jobs whether onsite, at home or in the field. We are becoming more reliant on electronic processes versus legacy paper, etc.

What are the risks and consequences of not completing this project?

By not updating our HW, which comes with SW, we risk security gaps, lack of vendor support and poor cyber scores from a Fortis corporate perspective.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

Business prioritization and resource availability

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$5,442,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 5,442,000 | | 1,081,000 | 1,063,000 | 1,073,000 | 1,100,000 | 1,125,000 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 5,442,000 | 0 | 1,081,000 | 1,063,000 | 1,073,000 | 1,100,000 | 1,125,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

estimates were estimates based off of historic pricing with some adjustments

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

estimates were estimates based off of historic pricing with some adjustments

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|----------------------|
| Project/Program Name: Aviat Router Replacement Program | | Work Order #: | <input type="text"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 44 | Funding Project Number: | <input type="text"/> |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 1/1/2024 | In-Service: 12/1/2028 | |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Replace Aviat routers with Cisco routers. This project consists of design, installation, configuration, and troubleshooting components.

Describe specific scope exclusions, assumptions and constraints:

- Assumption: Materials are readily available
- Assumption: Internal resources are available for implementation
- Assumption: Material costs remain steady

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: Maintain System Standards **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Foundational - Upgrade **Is there an Innovation Component?** No
Needs Assessment: Reliability
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A
Describe the justification for this project. Include attachments or links to planning studies if applicable:
 The manufacturer of network routers announced an end of sale of November 2022 with an end of life for November 2027.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 None.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)


Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve system performance and resilience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A
** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?
 No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: No **Environmental Component:** Checklist is incomplete
 **Social Component:** Checklist is incomplete
 Governance Component: Checklist is incomplete

Is complete Sustainability status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

The manufacturer of network routers announced an end of sale of November 2022 with an end of life for November 2027. A new manufacturer of network routers and models has been determined.

Why was the proposed project scope chosen over other alternatives?

The manufacturer of network routers announced an end of sale of November 2022 with an end of life for November 2027. A new manufacturer of network routers and models has been determined. Cisco routers provide an array of flexible options, strong customer support, training with multiple proven use concepts.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

CHGE understands certain communication circuits and predominately older copper based technology owned and maintained by AT&T and Verizon, may be retired in the coming years. CHGE must be pro active avoiding risk of communication loss to remote sites. Network routers are part of the CHGE's solution to construction, maintain, and operate its own communication network.

What are the risks and consequences of not completing this project?

Not completing this project prolongs CHGE dependance on third party carriers with the associated costs, physical and cyber security oversight, and service levels issues.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

Resource availability

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|------------------------|------------------------|------------------------|------------------------|---------------------|
| \$9,706,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 1,848,000 | | 345,000 | 300,000 | 400,000 | 479,000 | 324,000 | |
| | Stock Materials | 7,858,000 | | 1,600,000 | 66,000 | 192,000 | 3,000,000 | 3,000,000 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 9,706,000 | 0 | 1,945,000 | 366,000 | 592,000 | 3,479,000 | 3,324,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:
historic pricing

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: FOS-Generated Estimate; Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

historic pricing adjusted

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Microwave and Fiber Backhaul **Work Order #:** 

Budget Group: Common: I.T./O.T. **Budget Category:** 44 **Funding Project Number:** 4-4412-00-18

Is this a Specific Project, Program or Blanket? Specific **Target Schedule - Start:** 1/1/2024 **In-Service:** 12/1/2026

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

CHGE's intent is to provide a fiber backhaul network connecting all electric substations, gas gate stations, NS Junction Boxes, and office locations. Redundant paths are preferred to reduce outages although terrain may prevent this. Backhaul options are analyzed for the most cost-effective solution. CHGE constructed 440 miles of OPGW, distribution fiber, or IRUs with an additional 231 future miles. CHGE must upgrade six microwave radio backhaul links. The FCC opened the 5.925 to 7.125 GHz range for unlicensed use, and links should avoid this.

Describe specific scope exclusions, assumptions and constraints:

- Constraint: Terrain in some areas may not allow for redundant paths within the network.
- Assumption: Timely receipt of materials with no delays / materials are readily available
- Assumption: Feasible approach to substation control houses
- Assumption: No delays for permitting
- Assumption: No delays for make ready work
- Assumption: NRC and MRC based on historical pricing from various vendors

B. JUSTIFICATION

Load Based/Infrastructure: Other **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: Maintain System Standards **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Transformational - Enhancement **Is there an Innovation Component?** No
Needs Assessment: Reliability
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? Yes
Describe the justification for this project. Include attachments or links to planning studies if applicable:
 CHGE's intent is to provide a fiber backhaul network connecting substations, gate stations, NS Junction Boxes, and offices.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 Build more resilient network to OT field assets and to reduce outages.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)


Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve system performance and resilience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates No
** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?
 No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: No **Environmental Component:** Checklist is incomplete
 **Social Component:** Checklist is incomplete
 Governance Component: Checklist is incomplete

Is complete Sustainability status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

N/A - This project is a multi-phased project, which was approved in a previous year.

Why was the proposed project scope chosen over other alternatives?

N/A - This project is a multi-phased project, which was approved in a previous year.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

CHGE understands certain communication circuits predominately older copper based technology maintained by third parties may be retired. CHGE must be pro active avoiding risk of communication loss to remote sites.

What are the risks and consequences of not completing this project?

The risk is loss of communication to substations, gate stations, data centers.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Keeping network up to date to provide reliable service to our customers.

What other factor were considered during the prioritization process?

Resource availability.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$4,981,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 550,000 | | 200,000 | 150,000 | 200,000 | | | |
| | Stock Materials | 321,000 | | 156,000 | 7,000 | 158,000 | | | |
| | Non-Stock Material (A/P taxable) | 3,000,000 | | 1,500,000 | | 1,500,000 | | | |
| | Contractors (A/P tax exempt) | 900,000 | | 500,000 | | 400,000 | | | |
| | Overheads | 105,000 | | 50,000 | 5,000 | 50,000 | | | |
| | AFUDC* | 105,000 | | 50,000 | 5,000 | 50,000 | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 4,981,000 | 0 | 2,456,000 | 167,000 | 2,358,000 | 0 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 3,486,700 Maximum (\$): 6,475,300

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: FOS-Generated Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

historic costs adjusted

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | | | | | |
|---|--|--------------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|--------------------------|
| Project/Program Name: ERP Phase 3 Assessment | Work Order #: | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 4220 | Funding Project Number: | | 10184 | | | |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 1/1/2026 | In-Service: 6/30/2026 | | | | | |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

This assessment would include: as-is process mapping, to-be process mapping, fit-gap analysis, general ledger design, data analysis and cleanup, integration evaluation, and planning of the implementation of SAP S/4 Hana as a replacement to our Finance/EAM ERP mainframe solutions and ancillary business process applications which are integrated with our mainframe.

Describe specific scope exclusions, assumptions and constraints:

Assumption: We receive Rate Case Approval to move forward with this assessment and then the implementation.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do nothing; continue to leverage legacy processes and decentralized software

Why was the proposed project scope chosen over other alternatives?

High risk of unknowns, poor cost estimating, insufficient resourcing, and high risk of inaccuracy in 2027 rate projections for the ERP Phase III project

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

This assessment needs to be completed by 2026 in order for us to be able to make good estimation and documentation around the ERP implementation into our next rate case filing.

What are the risks and consequences of not completing this project?

High risk of unknowns, poor cost estimating, insufficient resourcing, and high risk of inaccuracy in 2027 rate projections for the ERP Phase III project.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

Yes

What other factor were considered during the prioritization process?

Business priority and Urgency of ERP Project Kick Off.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$2,574,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 200,000 | | | | 200,000 | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 2,200,000 | | | | 2,200,000 | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 174,000 | | | | 174,000 | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,574,000 | 0 | 0 | 0 | 2,574,000 | 0 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Submittal Form

Version 3.0 12/9/2022

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,059,200 Maximum (\$): 3,088,800

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Contractor/Vendor Bids For Certain Work

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Vendor RFI for Assessment

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

[Empty text area for additional information]

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: ERP Transformation **Work Order #:**

Budget Group: Common: I.T./O.T. **Budget Category:** 4220 **Funding Project Number:** 10184

Is this a Specific Project, Program or Blanket? Specific **Target Schedule - Start:** 1/1/2027 **In-Service:** 12/1/2029

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

This final phase will migrate remaining functions to SAP solution thus allowing for the Mainframe ERP retirement, and further leveraging our Phase II Investment. This will allow the Company to leverage economies of scale of the SAP system and benefit from the single ERP solution. The inherent integration within the system will greatly transform the current business processes by enabling real-time processing and more in-depth data analytics.

Describe specific scope exclusions, assumptions and constraints:

Assumption: We receive Rate Case Approval to move forward with this assessment and then the implementation.

B. JUSTIFICATION

Load Based/Infrastructure: Other Growth/Sustaining/Retirement: Growth Sustaining
 Discretion Level: System Enhancements Investment Type: Daily Operations
 Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Transformational - Implementation Is there an Innovation Component? No

Needs Assessment: Infrastructure; Regulatory; Productivity

If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:

ERP is the backbone system in our technology landscape and will provide for superior process automation for customer fulfilment and service
 ERP will provide substantially improved business processes via automation and data analytics that improve supply chain metrics, working capital and resource allocation.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

Hard Benefits: 1) Net Present Value (AT) = \$12M; IRR = 21%; TTV = 5.5 years

Soft Benefits: 1) Improved financial Close 2) Increased Client Satisfaction 3) Increased process automation 4) System performance

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which **Strategic Theme** does project most align with? Business Modernization
 Which **Strategic Objective** does project most align with? Improve productivity and efficiency
 Which **Strategic Initiative** does project most align with? Business & Operations Modernization
 Which **Team Goal** does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL

Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Transformation: New systems / Enhancements that enable NEW business processes

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A


** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: **No** Environmental Component: **Checklist is incomplete**
 Social Component: **Checklist is incomplete**
 Governance Component: **Checklist is incomplete**

Is complete **Sustainability** status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

1. Status Quo – do nothing
2. Defer project for 12-24 months

Why was the proposed project scope chosen over other alternatives?

1. Support for the current system is ending and the cost of the status quo versus the project is substantial
2. Will not allow the organization to meet its strategic objectives in the current timelines as agreed with the Board

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To align with Rate Case; will fall after ERP assessment project has completed in 2026.

What are the risks and consequences of not completing this project?

Out of compliance with Rate Case.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

Business prioritization and resource availability.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$49,881,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 4,300,000 | | | | | 1,800,000 | 2,500,000 | |
| | Stock Materials | 4,300,000 | | | | | 2,000,000 | 2,300,000 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 40,081,000 | | | | | 10,054,000 | 30,027,000 | |
| | Overheads | 600,000 | | | | | 200,000 | 400,000 | |
| | AFUDC* | 600,000 | | | | | 200,000 | 400,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 49,881,000 | 0 | 0 | 0 | 0 | 14,254,000 | 35,627,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|---|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

We have an assement planned for 2026 to assist with scope, cost and timing estimates

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Contractor/Vendor Bids For Certain Work

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Assessmentproject to determine the scope, cost and timeline for the ERP transformation will be completed in 2026

F. ADDITONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Distribution Growth
Discretion Level: System Enhancements **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Transformational - Enhancement **Is there an Innovation Component?** No
Needs Assessment: New Business
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A
Describe the justification for this project. Include attachments or links to planning studies if applicable:
 The software is beyond its vendor supported end of life, migration is mandatory to maintain continuity of regulated business services.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 Eliminating the need to update multiple circuit models, as the GIS model can then source our OMS, and DMS, as well as online mapping tools.
 Streamline the process for work order upgrades and circuit map processing O&M savings.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)


Which Strategic Theme does project most align with? Operational Excellence
Which Strategic Objective does project most align with? Improved regulatory outcomes
Which Strategic Initiative does project most align with? Seamless Customer Experience
Which Team Goal does project most align with? PSC CAIDI Outage Duration
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Digital Workplace: Digitization of existing business processes

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A
** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?
 No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: No **Environmental Component:** Checklist is incomplete
 **Social Component:** Checklist is incomplete
 Governance Component: Checklist is incomplete

Is complete **Sustainability** status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Extending the life of the system, and comparisons of other vendor solutions in 2020.

Why was the proposed project scope chosen over other alternatives?

Better O&M Cost Reductions than the alternatives considered.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

"Grid Modernization supports all four Corporate Strategic Themes:

1. Modernizing our business through electric and natural gas system investments and process improvements.
2. Continuously improving our performance while maintaining cost effective, efficient, and secure operations.
3. Investing in programs and employee development to position the organization for continued success in the future.
4. Advocating on behalf of customers and other stakeholders.

Central Hudson's strategy for fulfilling its mission is summed up in four important themes below in Figure 1. As identified in the Corporate Strategic Outlook, Grid Modernization plays an important function amongst these themes"

What are the risks and consequences of not completing this project?

Increased CAIDI and SAIFI due to inaccurate predictive repair response times.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

Yes

What other factor were considered during the prioritization process?

Business Prioritization and Urgency.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$4,367,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 525,000 | | | 300,000 | 225,000 | | | |
| | Stock Materials | 1,600,000 | | | 800,000 | 800,000 | | | |
| | Non-Stock Material (A/P taxable) | 2,200,000 | | | 1,000,000 | 1,200,000 | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 42,000 | | | 42,000 | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 4,367,000 | 0 | 0 | 2,142,000 | 2,225,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Submittal Form

Version 3.0 12/9/2022

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 3,493,600 Maximum (\$): 5,240,400

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

High Level estimated from vendor

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: ADMS Modeling and Enhancements West of River **Work Order #:** 

Budget Group: Common: I.T./O.T. **Budget Category:** 4230 **Funding Project Number:** 4-4235-02-18

Is this a Specific Project, Program or Blanket? Specific **Target Schedule - Start:** 1/1/2024 **In-Service:** 6/1/2025

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

As part of the Grid Modernization Program this is the next phase of the ADMS Project that concentrates on the west side of the river. This phase focuses on the testing of ADMS in terms of the remaining models in the organization’s service territory, the partial imports from GE along with the associated internal labor of the End-to-End Testing of the IEDs in the field to meet the 2023 and 2024 West of River Grid Modernization milestones, and any enhancements that arise during the regression testing of the models.

Describe specific scope exclusions, assumptions and constraints:

- Assumption: Import models & feeders and be VVO and FLISR ready for West of River
- Assumption: Enhancements to Block 4 Tagging and other features
- Assumption: Complete the one line displays for the service territory, Assist and fine tune the modeling process for the CH

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

This project is a continuation of the model import project taking place on the East side of the river.

Why was the proposed project scope chosen over other alternatives?

This project is in line with Central Hudson's Grid Modernization strategy.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

In order to keep on schedule with the Grid Modernization project timeline.

What are the risks and consequences of not completing this project?

It would prevent the Grid Modernization Program from achieving its milestone and operational goal.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

Part of the grid mod program.

What other factor were considered during the prioritization process?

Business prioritization and resource availability.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|------------------------|------------------------|------------------------|------------------------|---------------------|
| \$1,164,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 300,000 | | 200,000 | 100,000 | | | | |
| | Stock Materials | 500,000 | | 500,000 | | | | | |
| | Non-Stock Material (A/P taxable) | 300,000 | | 300,000 | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 64,000 | | 56,000 | 8,000 | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,164,000 | 0 | 1,056,000 | 108,000 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 931.200 Maximum (\$): 1.396.800

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing; Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Based estimate on what was done for ADMS East of River project, then adjusted

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|----------------------|
| Project/Program Name: Grid Mod Communications - Catskill/Kingston/Newburgh | | Work Order #: | <input type="text"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 44 | Funding Project Number: | <input type="text"/> |
| Is this a Specific Project, Program or Blanket? Program | Target Schedule - Start: 1/1/2024 | In-Service: 12/1/2026 | |

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Network Strategy ("NS") - Corporate two-way communication network system employed with Tier 1 fiber/microwave and Tier 2 WIFI mesh technologies. Critical network systems tying each field device (substation/IED) to the applicable energy control system EMS & ADMS.

Describe specific scope exclusions, assumptions and constraints:

Assumption: Sufficient Corporate funding exists to support the build out of the network in the timeframe needed.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Distribution Growth
Discretion Level: System Enhancements **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Transformational - Enhancement **Is there an Innovation Component?** No
Needs Assessment: New Business

If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:

Capital projects for the transmission and distribution systems may be deferred as load pockets serviced by lateral feeders can be reserved with automated switching.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

The application of Conservation Voltage Reduction (“CVR”) with Volt-VAR Optimization (“VVO”) techniques on the electric distribution system improves efficiency and has the potential benefit of providing approximately 2% in

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Energy Leadership
Which Strategic Objective does project most align with? Improve planning and performance management
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? PSC CAIDI Outage Duration
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Transformation: New systems / Enhancements that enable NEW business processes

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A


** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: **No** **Environmental Component:** **Checklist is incomplete**
 **Social Component:** **Checklist is incomplete**
 Governance Component: **Checklist is incomplete**

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

Is complete Sustainability status achieved by this project?*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Improved reliability through automated restoration.

Customer energy savings of approximately 2% from VVO and CVR applications.

Deferment of earmarked Cap-Ex dollars for system upgrades (such as secondary transmission feeds to

Why was the proposed project scope chosen over other alternatives?

Better O&M Cost Reductions than the alternatives considered.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

"Grid Modernization supports all four Corporate Strategic Themes:

1. Modernizing our business through electric and natural gas system investments and process improvements.
2. Continuously improving our performance while maintaining cost effective, efficient, and secure operations.
3. Investing in programs and employee development to position the organization for continued success in the future.
4. Advocating on behalf of customers and other stakeholders.

Central Hudson's strategy for fulfilling its mission is summed up in four important themes below in Figure 1. As identified in the Corporate Strategic Outlook, Grid Modernization plays an important function amongst these themes"

What are the risks and consequences of not completing this project?

Network Strategy – Tier 2 Gateway and Helper Node Issue: Gateway and Helper Node Location Installation are unable to transport the telemetry at speeds sufficient for operations. Engineering Studies Issue: Defined testing/integration plan for E2E testing and cutover, and were a best effort, knowing there will be IEDs needed in locations additional to those identified at the beginning of the program in 2020.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

Resource availability.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|------------------------|------------------------|------------------------|------------------------|---------------------|
| \$9,731,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 353,000 | | 53,000 | 150,000 | 150,000 | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 4,500,000 | | 500,000 | 2,000,000 | 2,000,000 | | | |
| | Contractors (A/P tax exempt) | 4,200,000 | | 550,000 | 1,650,000 | 2,000,000 | | | |
| | Overheads | 178,000 | | 25,000 | 75,000 | 78,000 | | | |
| | AFUDC* | 500,000 | | 100,000 | 200,000 | 200,000 | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 9,731,000 | 0 | 1,228,000 | 4,075,000 | 4,428,000 | 0 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|---|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Submittal Form

Version 3.0 12/9/2022

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 7,784,800 Maximum (\$): 11,677,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historic pricing with adjustments

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: GTS Upgrades and Enhancements
Budget Group: Common: I.T./O.T. **Budget Category:** 4220
Is this a Specific Project, Program or Blanke Specific: Specific

Work Order #:  - 
Fundin Project Number: 10183
Target Schedule - Start: 9/1/2023 **In-Service:** 7/1/2024

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Continuously Upgrade and Enhance GTS. GTS, or the Gas Tracking Systems, is a portal that serves the Retail Access program for Central Hudson and is used to support key gas related business processes. Central Hudson has around 7,000 customers within its service territory that rely on gas marketers for natural gas. This portal helps gas marketers to nominate gas into the system and allows gas buyers to understand how much gas is coming into the Central Hudson system via the marketers. The GTS portal also plays a vital role in supporting the Energy Resources group to perform their day-to-day business operations which include the daily and monthly cash out processes. GTS is supported by Convergence LLC.

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Doing nothing and not upgrading.

Why was the proposed project scope chosen over other alternatives?

We want to keep as up to date as we can to minimize any risks.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Vendor suggested upgrade timeframes.

What are the risks and consequences of not completing this project?

We will not be up to date and will be open to vulnerabilities.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

New project identified due to end of life of existing application, by vendor.

What other factor were considered during the prioritization process?

Business priority and resource availability (including vendor.)

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|---|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$1,030,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 150,000 | | 100,000 | | | | 50,000 | 0 |
| | Stock Materials | 710,000 | | 542,000 | | | | 168,000 | 0 |
| | Non-Stock Material (A/P taxable) | 50,000 | | 50,000 | | | | | |
| | Contractors (A/P tax exempt) | 50,000 | | 50,000 | | | | | |
| | Overheads | 60,000 | | 50,000 | | | | 10,000 | 0 |
| | AFUDC* | 10,000 | | | | | | 10,000 | 0 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,030,000 | 0 | 792,000 | 0 | 0 | 0 | 238,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|--|---|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| urrent Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 721,000 **Maximum (\$):** 1,339,000

No explanation on confidence level required.

*Formulas give standard
← ranges per estimate level, but
may be overwritten if desired.*

Basis for estimate: Vendor Generated Cost Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Based on historical vendor cost for upgrades

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

B. JUSTIFICATION

Load Based/Infrastructure: Other **Growth/Sustaining/Retirement:** Distribution Sustaining
Discretion Level: Maintain System Standards **Investment Type:** Daily Operations
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Transformational - Enhancement **Is there an Innovation Component?** No
Needs Assessment: Compliance; Regulatory

If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? Yes

Describe the justification for this project. Include attachments or links to planning studies if applicable:

This project will support Central Hudsons strategy to get off the Mainframe to avoid the risk of continuing on legacy applications. If we do not replace the gas functionality in IEA it will impact natural gas reliability by not be able to provide System Operators the natural gas supply.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

See BCA tab of Cost Estimate & Benefit-Cost Analysis Template

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve productivity and efficiency
Which Strategic Initiative does project most align with? Data & Analytics
Which Team Goal does project most align with? Group Expense
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Transformation: New systems / Enhancements that enable NEW business processes

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A


* Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.

Do you anticipate the project to require significant jurisdictional approvals?

No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: **No** **Environmental Component:** **Checklist is incomplete**
 **Social Component:** **Checklist is incomplete**
 Governance Component: **Checklist is incomplete**

* Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.

Is complete **Sustainability** status achieved by this project?*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Continue to look at solutions other NY utilities have implemented for Gas and Electric as well as demo other industry leaders.

Why was the proposed project scope chosen over other alternatives?

IEA was able to be customized and meet both Gas and Electric needs. Solutions that lead the industry today do not have the capability for meeting both Gas and Electric needs. This is why Central Hudson is plans to implement two new solutions, one for Gas and one for Electric.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Both solutions may take up to three years to implement. With the goal of getting off of mainframe the project should start sooner than later to meet that deadline.

What are the risks and consequences of not completing this project?

This project is in line with Central Hudsons strategy to get off of the mainframe. With the population of resources able to support and enhance mainframe getting smaller, it is for Central Hudson's best interest to investigate modern solutions that can be supported and enhanced.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

Yes

What other factor were considered during the prioritization process?

Business priority and urgency.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$1,335,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 300,000 | | | | 300,000 | | | |
| | Stock Materials | 500,000 | | | | 500,000 | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 500,000 | | | | 500,000 | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 35,000 | | | | 35,000 | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,335,000 | 0 | 0 | 0 | 1,335,000 | 0 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,068,000 Maximum (\$): 1,602,000

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Integrated Energy Data Resource (IEDR) Work Order #: 8 4 0 6 - J
Budget Group: Common: I.T./O.T. Budget Category: 4220 Funding Project Number: 10304
Is this a Specific Project, Program or Blanket? Program Target Schedule - Start: 1/1/2024 In-Service: 12/1/2028

Please attach a list of the projects making up this Program including their associated cost estimates.

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Implementation of the technology to support the requirements and use cases ordered by the commission related to IEDR Phases I and II.

Describe specific scope exclusions, assumptions and constraints:

Exclusion: Does not include the Netezza mitigation project

Exclusion: Does not include the migration from Netezza to the data lake

Assumption: Resource availability will be provided both internally and externally

Assumption: Cost associated to this project will be available per the commission order

Constraint: The use cases and timeline are dependent on NYSERDA program management and DPS staff

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Alternative is to not comply with PSC Order regarding IEDR

Why was the proposed project scope chosen over other alternatives?

Compliance with PSC Order - IEDR

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

PSC Commission Order - IEDR

What are the risks and consequences of not completing this project?

PSC Commission Order - IEDR

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

regulatory requirement

What other factor were considered during the prioritization process?

None; regulatory requirement

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | |
|--|----------------------------------|--|--|--------------------|--|--------------------|--------------------|--------------------|---------------------|
| \$32,817,703 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 18,064,902 | 5,186,496 | 4,399,406 | 1,200,000 | 1,299,000 | 1,138,000 | 1,242,000 | 3,600,000 |
| | Stock Materials | 3,272,000 | | | 500,000 | 500,000 | 500,000 | 500,000 | 1,272,000 |
| | Non-Stock Material (A/P taxable) | 3,134,909 | 909,562 | 475,347 | 250,000 | 250,000 | 250,000 | 250,000 | 750,000 |
| | Contractors (A/P tax exempt) | 870,899 | 267,266 | 133,633 | 50,000 | 50,000 | 50,000 | 50,000 | 270,000 |
| | Overheads | 3,500,000 | | | 500,000 | 500,000 | 500,000 | 500,000 | 1,500,000 |
| | AFUDC* | 3,974,993 | 2,206,379 | 1,084,614 | 71,000 | 71,000 | 71,000 | 71,000 | 400,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 32,817,703 | 8,569,703 | 6,093,000 | 2,571,000 | 2,670,000 | 2,509,000 | 2,613,000 | 7,792,000 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Rough order of magnitude estimate due to lack of requirements and historical costs

← Formulas give standard ranges per estimate level, but may be overwritten if desired.

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Rough order of magnitude estimate due to lack of requirements and historical costs

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: Maintain System Standards **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Foundational - Upgrade **Is there an Innovation Component?** No
Needs Assessment: Infrastructure
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A
Describe the justification for this project. Include attachments or links to planning studies if applicable:
 Need to keep our infrastructure current to limit risks.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 Risk reduction.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve system performance and resilience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A


** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: No **Environmental Component:** Checklist is incomplete
 **Social Component:** Checklist is incomplete
 Governance Component: Checklist is incomplete

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

Is complete **Sustainability** status achieved by this project?*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Extend usage of existing hardware after vendor support expires.

Why was the proposed project scope chosen over other alternatives?

Risk reduction.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To keep technology up to date and reduce risk.

What are the risks and consequences of not completing this project?

Limited vendor support and/or non compliance for deployed hardware. Potential service disruptions.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

Business prioritization and resource availability.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$5,871,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 270,000 | | 50,000 | 50,000 | 50,000 | 60,000 | 60,000 | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 4,400,000 | | 1,000,000 | 1,000,000 | 800,000 | 800,000 | 800,000 | |
| | Contractors (A/P tax exempt) | 775,000 | | 150,000 | 150,000 | 150,000 | 150,000 | 175,000 | |
| | Overheads | 180,000 | | 40,000 | 30,000 | 30,000 | 40,000 | 40,000 | |
| | AFUDC* | 246,000 | | 57,000 | 46,000 | 43,000 | 50,000 | 50,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 5,871,000 | 0 | 1,297,000 | 1,276,000 | 1,073,000 | 1,100,000 | 1,125,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Submittal Form

Version 3.0 12/9/2022

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 4,696,800 Maximum (\$): 7,045,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historic pricing adjusted.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: IVR Modernization **Work Order #:** 

Budget Group: Common: I.T./O.T. **Budget Category:** 4220 **Funding Project Number:** 10182

Is this a Specific Project, Program or Blanket? Specific **Target Schedule - Start:** 6/1/2024 **In-Service:** 12/1/2025

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The objective of the project is to upgrade IVR and Contact Center Solution from on-prem to a cloud solution. Genesys Cloud CX tier 2 would replace the current on-prem Genesys Voice Platform v9.0 and on-prem OSCC v9.3 Tier 3 would include a Workflow Management solution which would replace Calabrio. Voice Recognition, Voice bots and Visual IVR

Describe specific scope exclusions, assumptions and constraints:

Constraint: SAP Integration & timing of implementation related to Fortis required 4th quarter blackout (SOX).
 Assumption: Resources will be available and aligned to meet the projected go-live date.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Find short-term maintenance contractor.

Completing small upgrades to the current on-prem solution to stay within support. Completion of two separate TSC projects to enhance functionality of the on-prem solution.

Why was the proposed project scope chosen over other alternatives?

Cloud enhancement eliminates the need for service pack upgrades and the two separate TSC projects to enhance functionality of the on-prem solution. The cloud migration offers even more functionality and flexibility to make changes without dependency on a third party vendor.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

It has been overlooked for the past several years.

What are the risks and consequences of not completing this project?

No enhanced functionality, technology limitations, tied to current limiting vendor, current IVR on prem which poses risk to natural disaster interruption or other interruption. Wouldn't be able to identify problems before they become customer pain points.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Business prioritization of increasing customer experience.

What other factor were considered during the prioritization process?

Resource availability (including vendor).

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$3,044,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 400,000 | | 200,000 | 200,000 | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 2,300,000 | | 300,000 | 2,000,000 | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 344,000 | | 28,000 | 316,000 | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,044,000 | 0 | 528,000 | 2,516,000 | 0 | 0 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,435,200 Maximum (\$): 3,652,800

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Vendor Generated Cost Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

RFP was done in 2022 to gather requirements and costs

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

[Empty text area for additional information]



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Payment Experience Vendor & eBill, Bill Presentment and Bill Print Work Order #:
Budget Group: Common: I.T./O.T. Budget Category: 4220 Funding Project Number: 10182
Is this a Specific Project, Program or Blanket? Specific Target Schedule - Start: 1/1/2025 In-Service: 12/1/2026

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:
Direct payment options through payment provider replacing Kubra.

Describe specific scope exclusions, assumptions and constraints:
Constraint: WEB & Mobile development resources availability
Constraint: SAP changes will be needed
Assumption: IVR updates needed as well
Assumption: CSR Training would be needed
Assumption: Chatbot and Notif changes needed

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Remain status quo with current Kubra functionality for payments & billing.

Why was the proposed project scope chosen over other alternatives?

Kubra experience is not a seamless experience for our customers.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

It has been overlooked for the past several years.

What are the risks and consequences of not completing this project?

A segmented experience for our customers where they are faced with information delays, lengthy transaction processes, and a disjointed user experience as they navigate between CH and Kubra pages on web and mobile

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

In order to continue to enhance our billing for our customers, we need to find a replacement for our current system/service provider.

What other factor were considered during the prioritization process?

Business priority and urgency.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|------------------------|------------------------|------------------------|------------------------|---------------------|
| \$3,296,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 250,000 | | | 100,000 | 150,000 | | | |
| | Stock Materials | 146,000 | | | 71,000 | 75,000 | | | |
| | Non-Stock Material (A/P taxable) | 1,900,000 | | | 700,000 | 1,200,000 | | | |
| | Contractors (A/P tax exempt) | 700,000 | | | 100,000 | 600,000 | | | |
| | Overheads | 150,000 | | | 50,000 | 100,000 | | | |
| | AFUDC* | 150,000 | | | 50,000 | 100,000 | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,296,000 | 0 | 0 | 1,071,000 | 2,225,000 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Rough estimate as a place holder for future implementation

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

some historical costs

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Land Mobile Radio Replacement with DMR
Budget Group: Common: I.T./O.T. Budget Category: 44 Work Order #: [Progress Bar]
Is this a Specific Project, Program or Blanket? Specific Funding Project Number: [Yellow Bar]
Target Schedule - Start: 6/1/2024 In-Service: 12/1/2028

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

[Empty text box for other work orders]

Describe the project objective and scope of work:

CHGE must upgrade the existing LMR System. Modern systems now use Digital Mobile Radio (DMR) technology. The project objective is to replace Central Hudson's LMR system with a DMR system.

Describe specific scope exclusions, assumptions and constraints:

Assumption: Number of company vehicles
Assumption: Materials are readily available

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: Maintain System Standards **Investment Type:** Daily Operations
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Foundational - Enhancement **Is there an Innovation Component?** No
Needs Assessment: Reliability
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:
 The end of life for base radio equipment was in 2014. CHGE's LMR equipment reached full depreciation in 2015. Portable radios are no longer available. Mobile radios are on a made to order basis with extensive lead times over 1 year.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 None

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)


Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve safety and security culture
Which Strategic Initiative does project most align with? Transform Safety Culture
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates No
** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?
 No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: No **Environmental Component:** Checklist is incomplete
 **Social Component:** Checklist is incomplete
 Governance Component: Checklist is incomplete

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

Is complete Sustainability status achieved by this project?*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Three vendors demonstrated their products and networks in 2022. An array of solutions and services were offered. CHGE has determined a DMR system will best serve the company.

Why was the proposed project scope chosen over other alternatives?

Overall, a DMR system is superior to an LMR system through audio quality, speed, configuration flexibility, power usage, safety features, network monitoring, and other functions. These demonstrations enabled stakeholders to identify features required of portable and mobile radios needed, required talk groups, and equipment quantities.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

The end of life for base radio equipment was in 2014. CHGE's LMR equipment reached full depreciation in 2015. Portable radios are no longer available. Mobile radios are on a made to order basis with extensive lead times over 1 year.

What are the risks and consequences of not completing this project?

As first responders, it is important for CHGE to have a radio network. A radio network provides mission critical reliable communication. A simple push to talk method is far easier for emergency and stressful situations. Some areas within CHGE's territory have poor cellular coverage, and crews currently rely upon the LMR System. There is direct communication between Dispatch and crews.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Aged Technology needs to be replaced for safety purposes.

What other factors were considered during the prioritization process?

Safety and risk reduction.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$5,688,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 350,000 | | 100,000 | 100,000 | 50,000 | 50,000 | 50,000 | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 2,250,000 | | 1,000,000 | 1,000,000 | 250,000 | | | |
| | Contractors (A/P tax exempt) | 2,557,000 | | 1,000,000 | 1,207,000 | 250,000 | 50,000 | 50,000 | |
| | Overheads | 133,000 | | 50,000 | 50,000 | 11,000 | 10,000 | 12,000 | |
| | AFUDC* | 398,000 | | 143,000 | 150,000 | 85,000 | 10,000 | 10,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 5,688,000 | 0 | 2,293,000 | 2,507,000 | 646,000 | 120,000 | 122,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 4,550,400 Maximum (\$): 6,825,600

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing; Historical Data + Job Specific Adjustments; FOS-Generated Estimate; Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

historical Pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Patrick Garvey

First Year of 5-Year Budget Period: 2024

Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Middleware SOA Upgrade

Work Order #:

Budget Group: Common: I.T./O.T.

Budget Category: 4220

Funding Project Number:

Is this a Specific Project, Program or Blanket? Blanket

Target Schedule - Start: 1/1/2024

In-Service: 12/1/2028

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

To simplify integration by unifying disparate requirements for the latest integration challenges of mobile, cloud, and IoT into one standards-based integration platform.

Describe specific scope exclusions, assumptions and constraints:

Constraint: When moving to cloud, how do we move the developed API's with minimal impact?

B. JUSTIFICATION

Load Based/Infrastructure: Other **Growth/Sustaining/Retirement:** Not Applicable
Discretion Level: Maintain System Standards **Investment Type:** Daily Operations
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 4 **Is there an Innovation Component?** No
Needs Assessment: Reliability; Resilience; Compliance; Risk Reduction; Service
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? No

Describe the justification for this project. Include attachments or links to planning studies if applicable:
 Oracle will no longer be supporting the on-prem solution starting 2027 and 2025 is the end date of software updates. Going forward the enterprise cloud solution (OCI) will be the only version supported.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 N/A

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)


Which Strategic Theme does project most align with? Operational Excellence
Which Strategic Objective does project most align with? Improve system performance and resilience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule esti N/A
** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approva
 No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown bel

Checklist Fully Completed: No **Environmental Component:** *Checklist is incomplete*
 **Social Component:** *Checklist is incomplete*
Governance Component: *Checklist is incomplete*

Is complete Sustainability status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Considering SAP and Oracle solutions

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Premier support ends in December 2025 and Extended support ends in December of 2027.

What are the risks and consequences of not completing this project?

Falling out of Oracle support and security updates.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

N?A

What other factor were considered during the prioritization process?

Risk reduction/vulnerabilities and additional functionality.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$1,157,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 250,000 | | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 500,000 | | 100,000 | 100,000 | 100,000 | 100,000 | 100,000 | |
| | Contractors (A/P tax exempt) | 287,000 | | 50,000 | 87,000 | 50,000 | 50,000 | 50,000 | |
| | Overheads | 45,000 | | 5,000 | 10,000 | 10,000 | 10,000 | 10,000 | |
| | AFUDC* | 75,000 | | 7,000 | 10,000 | 12,000 | 18,000 | 28,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,157,000 | 0 | 212,000 | 257,000 | 222,000 | 228,000 | 238,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Estimated cost based on previous upgrades

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

historic pricing with adjustments

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional)



Budget Submittal Form

Version 3.0 12/9/2022

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | |
|---|--|--------------------------------|
| Project/Program Name: MWM Replacement | Work Order #: | <input type="text"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 4220 | Funding Project Number: |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 1/1/2024 | In-Service: 6/30/2025 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The scope of this project includes replacing Oracle's Mobile Workforce Management(MWM) application with one or more applications. This will require data migration. The selected solution will include all "must-have" requirements outlined by the Central Hudson business.

Describe specific scope exclusions, assumptions and constraints:

Constraint: Some of the more complex screens in MWM cannot be replicated in one application.

Assumption: SAP will eventually be the home of some of the complicated screens

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Many products and vendors will have demos to review if the services provided meet the requirements needed.

Why was the proposed project scope chosen over other alternatives?

Currently looking at multiple vendors that offer products that can replace Oracles MWM application. Demos are being scheduled with possible vendors to review their products.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

The impact of delaying an MWM upgrade would open up the company to potential cyber security threats given that support from Oracle will be diminished after March of 2025. See attached email to IT.

What are the risks and consequences of not completing this project?

By not replacing MWM support, it will be downgraded to sustaining support. The risk with that is how many other companies will stay on sustaining support. If there are many, support will be limited if an issue arises. If there are only a few vendors left on MWM, Oracle may have very little resources to assist Central Hudson if an issue does arise.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

End of life technology

What other factor were considered during the prioritization process?

Resource availability

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$4,245,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 700,000 | | 500,000 | 200,000 | | | | |
| | Stock Materials | 500,000 | | 500,000 | | | | | |
| | Non-Stock Material (A/P taxable) | 500,000 | | 500,000 | | | | | |
| | Contractors (A/P tax exempt) | 2,300,000 | | 1,500,000 | 800,000 | | | | |
| | Overheads | 245,000 | | 168,000 | 77,000 | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 4,245,000 | 0 | 3,168,000 | 1,077,000 | 0 | 0 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024
*Prior years funding;
 not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

We are doing an assesment to bettter understand the scope and cost in 2023

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: FOS-Generated Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

ROM Estimate - Doing assessment to get better requirements and bottoms up estimation

F. ADDITONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Monthly Meter Reading
Budget Group: Common: I.T./O.T. Budget Category: 4220 Work Order #: [Grid]
Is this a Specific Project, Program or Blanket? Specific Funding Project Number: [Yellow]
Target Schedule - Start: 1/1/2024 In-Service: 6/30/2025

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Adjust billing practices and conduct monthly meter reads, thereby eliminating alternate month bill estimates. Increasing customer satisfaction is the primary motivation for this project.

Describe specific scope exclusions, assumptions and constraints:

Assumption: Will need to increase headcount to support project

Constraint: Availability of IT resources and knowledge to compile information related to SAP code/configuration changes to meet the goal of eliminating bi-monthly billing estimates.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: System Enhancements **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Transformational - Enhancement **Is there an Innovation Component?** No
Needs Assessment: Quality
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? No
Describe the justification for this project. Include attachments or links to planning studies if applicable:
 Adjust billing practices and conduct monthly meter reads, thereby eliminating alternate month bill estimates. Increasing customer satisfaction is the primary motivation for this project.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 Increasing customer satisfaction is the primary motivation for this project.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)


Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve customer experience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Customer Experience: Improve customer experience

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A
** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?
 No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: No **Environmental Component:** Checklist is incomplete
 **Social Component:** Checklist is incomplete
 Governance Component: Checklist is incomplete

Is complete **Sustainability** status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Stay with every other month estimations process and bad customer experience.

Why was the proposed project scope chosen over other alternatives?

Increasing customer satisfaction is the primary motivation for this project.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

In order to improve Customer satisfaction with Monthly Meter Reading and billing.

What are the risks and consequences of not completing this project?

Continue with poor customer satisfaction with every other month meter reading.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Increase customer satisfaction.

What other factor were considered during the prioritization process?

Business priority and resource availability.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|------------------------|------------------------|------------------------|------------------------|---------------------|
| \$1,066,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 400,000 | | 200,000 | 200,000 | | | | |
| | Stock Materials | 600,000 | | 300,000 | 300,000 | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 66,000 | | 28,000 | 38,000 | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,066,000 | 0 | 528,000 | 538,000 | 0 | 0 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:
limited requirements and not bottoms up estimated

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historic costs adjusted

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Microsoft M365 E5 Step-up **Work Order #:** 
Budget Group: Common: I.T./O.T. **Budget Category:** 4222 **Funding Project Number:** 10185
Is this a Specific Project, Program or Blanket? Specific **Target Schedule - Start:** 1/1/2026 **In-Service:** 2/1/2026

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Our current Microsoft licensing is at the M365 E5 level, we aim to take advantage of pricing discounts through the remainder of the year to step up to E5 maintaining compliance with content discovery, and providing foundational capabilities for further projects - 2022 project - Migration from McAfee Endpoint Security to Microsoft Defender, Mobile Device Management policy rebuild, initial deployment of conditional access/DLP. In 2023, Microsoft Teams Telephony integrations and further cybersecurity enhancements including a full DLP project will commence. This work is in support of both the Digital Workspace and Cybersecurity initiatives.

Describe specific scope exclusions, assumptions and constraints:

Assumption: This licensing stepup is to provide the capabilities through remainder of 2022, we will be joining the Fortis enterprise agreement at renewal to take advantage of the aggregate pricing discounts

Exclusion: MS best practice quick wins for DLP/Conditional access will be deployed in 2022, a full project will commence in 2023 to establish a full practice

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

None, aligning to MS as the strategic partner for their services allows us to leverage the market leader in multiple capabilities while streamlining integrations to reduce operational overhead as we are already a ~98% Microsoft based organization.

Why was the proposed project scope chosen over other alternatives?

Microsoft is a market leader for Endpoint Security solutions, integrates holistically with our existing infrastructure and tooling and expands capabilities for further cloud hybridization.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

We need to maintain compliance with licensed features already in use, this licensing will also allow us to initiate the McAfee MS Endpoint Security improving our cybersecurity posture and reducing operational expense by completing the migration prior to the MS renewal. Migration planning will be underway that will allow further reduction/recovery of expense in other solutions in 2023 including our security products, VOIP solution and improvement of corporate content security.

What are the risks and consequences of not completing this project?

We will be at risk of penalization for being out of licensing compliance, the McAfee migration will not be able to initiate until 2023 and will not be completed prior to it's renewal anniversary and we will further sustain unnecessary expense through 2024.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

Business Prioritization.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|------------------------|------------------------|------------------------|------------------------|---------------------|
| \$4,346,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 4,346,000 | | | | 2,146,000 | | | 2,200,000 |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 4,346,000 | 0 | 0 | 0 | 2,146,000 | 0 | 0 | 2,200,000 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Definitive

Cost Estimate Confidence: (that final cost will be within +/-10% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 3.911.400 Maximum (\$): 4.780.600

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Vendor Generated Cost Estimate

For your definitive/bid estimate, provide link(s) to applicable cost estimating files.

Internal labor has been estimated off historical data, SW licensing cost is based off a Microsoft supplied quote that is being re-written for a July purchase timeframe

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Network Infrastructure Lifecycle Upgrades / Replacements **Work Order #:**
Budget Group: Common: I.T./O.T. **Budget Category:** 4222 **Funding Project Number:** 4-4222-00-18
Is this a Specific Project, Program or Blanket? Blanket **Target Schedule - Start:** 1/1/2024 **In-Service:** 12/1/2028

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

The CHGE network infrastructure is being replaced to enable Network Segmentation on over 114 network switches and 4092 network connections. This process includes replacing network switches where required, developing access policies for devices and users and creating the appropriate security controls.

Describe specific scope exclusions, assumptions and constraints:

Assumption: Will continuously keep the Network Infrastructure as up to date as possible by upgrading/replacing the older technology.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: Maintain System Standards **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Foundational - Upgrade **Is there an Innovation Component?** No
Needs Assessment: Infrastructure

If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:

The CHGE network infrastructure is being replaced to enable Network Segmentation on over 114 network switches and 4092 network connections. This process includes replacing network switches where required, developing access policies for devices and users and creating the appropriate security controls.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

Risk reduction from keeping our technology current.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve system performance and resilience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A


** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: **No** **Environmental Component:** **Checklist is incomplete**
 **Social Component:** **Checklist is incomplete**
 Governance Component: **Checklist is incomplete**

Is complete Sustainability status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do nothing and create risk with using older technology.

Why was the proposed project scope chosen over other alternatives?

We can't afford to have our infrastructure to get to the point where the technology is too old and starts failing causing outages.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

We can't afford to have our infrastructure to get to the point where the technology is too old and starts failing causing outages.

What are the risks and consequences of not completing this project?

We will increase our technical debt and introduce more risk with keeping older technology.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

Part of a larger emergent bucket.

What other factor were considered during the prioritization process?

Business area prioritization and resources.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$2,306,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 355,000 | | 50,000 | 50,000 | 50,000 | 100,000 | 105,000 | |
| | Stock Materials | 1,625,000 | | 300,000 | 350,000 | 375,000 | 300,000 | 300,000 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 148,000 | | 7,000 | 10,000 | 16,000 | 40,000 | 75,000 | |
| | AFUDC* | 178,000 | | 10,000 | 15,000 | 15,000 | 55,000 | 83,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,306,000 | 0 | 367,000 | 425,000 | 456,000 | 495,000 | 563,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Historic annual costs

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Look back in history to see how much we've spent on infrastructure upgrades/replacements

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: OT DMS Upgrade SW **Work Order #:**
Budget Group: Common: I.T./O.T. **Funding Project Number:** 4-4230-05-18
Budget Category: 4230 **Target Schedule - Start:** 1/1/2026 **In-Service:** 12/1/2027
Is this a Specific Project, Program or Blanket? Specific

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Upgrade our DMS software to the latest version, along with hardware refresh.

Describe specific scope exclusions, assumptions and constraints:

Assumption: GE will require certain productivity tools/software to be installed in the Development and Test environments in order to perform the necessary work.

Assumption: No incremental requirements (functional, security or performance, etc.) beyond current capabilities of the base product is provided.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: System Enhancements **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Foundational - Upgrade **Is there an Innovation Component?** No
Needs Assessment: Infrastructure

If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:

Having worked closely with CH, the GE team is intimately familiar with the business drivers, past challenges and system requirements of this upgrade; we know exactly how our industry leading GE Reliance product and support services will solve the immediate upgrade needs while building a foundation for future requirements

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

Keeping up to date SW versions will reduce risk and improve efficiencies

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve system performance and resilience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A


** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: **No** **Environmental Component:** **Checklist is incomplete**
 **Social Component:** **Checklist is incomplete**
 Governance Component: **Checklist is incomplete**

Is complete Sustainability status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do Nothing; Extend usage of existing SW after vendor support expires

Why was the proposed project scope chosen over other alternatives?

Risk reduction and the ability to provide workforces the ability to support critical infrastructure that supports safe and reliable service for customers.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To keep our critical SW up to date and in compliance.

What are the risks and consequences of not completing this project?

Limited vendor support and/or non compliance for deployed SW.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Specificly called out IT projects.

What other factor were considered during the prioritization process?

Business prioritization and resource availability.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$3,574,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 200,000 | | | | 50,000 | 150,000 | | |
| | Stock Materials | 424,000 | | | | 23,000 | 401,000 | | |
| | Non-Stock Material (A/P taxable) | 1,000,000 | | | | 400,000 | 600,000 | | |
| | Contractors (A/P tax exempt) | 1,700,000 | | | | 200,000 | 1,500,000 | | |
| | Overheads | 125,000 | | | | 25,000 | 100,000 | | |
| | AFUDC* | 125,000 | | | | 25,000 | 100,000 | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,574,000 | 0 | 0 | 0 | 723,000 | 2,851,000 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Submittal Form

Version 3.0 12/9/2022

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 2,859,200 Maximum (\$): 4,288,800

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

vendor high level estimate

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | |
|---|--|---|
| Project/Program Name: OT EMS Upgrade SW | Work Order #: | <input type="text"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 4230 | Funding Project Number: 4-4235-02-18 |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 5/1/2023 | In-Service: 7/1/2025 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Work with GE to upgrade our EMS SW to Version 2023.2. Reliance EMS software upgrade, along with the installation of the Reliance External User/Office system, and hardware refresh.

Describe specific scope exclusions, assumptions and constraints:

Assumption: GE will require certain productivity tools/software to be installed in the Development and Test environments in order to perform the necessary work.

Assumption: No incremental requirements (functional, security or performance, etc.) beyond current capabilities of the base product is provided.

Assumption: Data and Displays will be migrated and converted from the legacy system by GE in collaboration with Central Hudson. Creation of custom displays will be performed by the customer.

Assumption: The Central Hudson staff responsible for testing will have suitable knowledge of the system and be available prior to beginning testing to maintain the project schedule as planned and agreed.

Assumption: Central Hudson will assume responsibility for executing the cutover/go-live. Assumption: Central Hudson shall provide the appropriate hardware sizing required for GE to carry out the scope defined in this SoW. GE is not responsible for delays caused by slow network, admin access to servers, and insufficient server sizing.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: System Enhancements **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Foundational - Upgrade **Is there an Innovation Component?**
Needs Assessment: Infrastructure

If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:
 Having worked closely with CH, the GE team is intimately familiar with the business drivers, past challenges and system requirements of this upgrade; we know exactly how our industry leading GE Reliance product and support services will solve the immediate upgrade needs while building a foundation for future requirements.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 Keeping up to date SW versions will reduce risk and improve efficiencies.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve system performance and resilience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A

** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: **No** **Environmental Component:** **Checklist is incomplete**
! **Social Component:** **Checklist is incomplete**
 Governance Component: **Checklist is incomplete**

Is complete Sustainability status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do Nothing; Extend usage of existing SW after vendor support expires

Why was the proposed project scope chosen over other alternatives?

Risk reduction and the ability to provide workforces the ability to support critical infrastructure that supports safe and reliable service for customers.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To keep our critical SW up to date and in compliance.

What are the risks and consequences of not completing this project?

Limited vendor support and/or non compliance for deployed SW.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

Business prioritization and resource availability.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$1,056,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 100,000 | | 100,000 | | | | | |
| | Stock Materials | 56,000 | | 56,000 | | | | | |
| | Non-Stock Material (A/P taxable) | 600,000 | | 600,000 | | | | | |
| | Contractors (A/P tax exempt) | 300,000 | | 300,000 | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,056,000 | 0 | 1,056,000 | 0 | 0 | 0 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Submittal Form

Version 3.0 12/9/2022

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 739.200 Maximum (\$): 1.372.800

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: FOS-Generated Estimate; Vendor Generated Cost Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Used vendor estimate from a vendor who knows our systems very well.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|--|
| Project/Program Name: OT Industrial Defender HW Upgrade | | Work Order #: | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 4230 | Funding Project Number: | 4-4230-05-18 |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 6/1/2024 | In-Service: | 12/1/2025 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

We will be upgrading our Industrial Defender system on both the EMS and DMS.

Describe specific scope exclusions, assumptions and constraints:

Assumption: we will be working directly with Industrial Defender, instead of GE.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: Maintain System Standards **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Foundational - Upgrade **Is there an Innovation Component?** No
Needs Assessment: Infrastructure
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A
Describe the justification for this project. Include attachments or links to planning studies if applicable:
 We will be upgrading our Industrial Defender system on both the EMS and DMS to keep on current technology.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 Technology risk reduction.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)


Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve system performance and resilience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A
** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?
 No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: No **Environmental Component:** Checklist is incomplete
 **Social Component:** Checklist is incomplete
 Governance Component: Checklist is incomplete

Is complete **Sustainability** status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do Nothing

Why was the proposed project scope chosen over other alternatives?

Reducing risk by keeping technology up to date

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

HW Life Cycle

What are the risks and consequences of not completing this project?

Risk of using older technology, with higher risk of system failure.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

Included in a bigget bucket, not specifically called out.

What other factor were considered during the prioritization process?

Resource and business prioritization.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|------------------------|------------------------|------------------------|------------------------|---------------------|
| \$1,376,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 200,000 | | 50,000 | 50,000 | | | 100,000 | |
| | Stock Materials | 832,000 | | 200,000 | 200,000 | | | 432,000 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 200,000 | | 50,000 | 50,000 | | | 100,000 | |
| | Overheads | 50,000 | | | | | | 50,000 | |
| | AFUDC* | 94,000 | | 25,000 | 19,000 | | | 50,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,376,000 | 0 | 325,000 | 319,000 | 0 | 0 | 732,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:
need to better understand scope/requirements of the upgrade(s)

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historic costs adjusted

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: OT Infrastructure Upgrades **Work Order #:** 

Budget Group: Common: I.T./O.T. **Budget Category:** 4230 **Funding Project Number:** 4-4230-05-18

Is this a Specific Project, Program or Blanket? Blanket **Target Schedule - Start:** 1/1/2023 **In-Service:** 12/1/2028

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Continuous upgrade/replacement of older infrastructure to keep our infrastructure as up to date as possible.

Describe specific scope exclusions, assumptions and constraints:

Assumption: Will continuously keep the Network Infrastructure as up to date as possible by upgrading/replacing older OT infrastructure to the current standard.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: Maintain System Standards **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Foundational - Upgrade **Is there an Innovation Component?** No
Needs Assessment: Infrastructure
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A
Describe the justification for this project. Include attachments or links to planning studies if applicable:
 Continuous upgrade/replacement of older infrastructure to keep our infrastructure as up to date as possible

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 Risk reduction of older technology being replaced

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)


Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve system performance and resilience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A
** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?
 No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: No **Environmental Component:** Checklist is incomplete
 **Social Component:** Checklist is incomplete
 Governance Component: Checklist is incomplete

Is complete **Sustainability** status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do nothing and create risk with using older technology.

Why was the proposed project scope chosen over other alternatives?

We can't afford to have our infrastructure to get to the point where the technology is too old and starts failing causing outages.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

We can't afford to have our infrastructure to get to the point where the technology is too old and starts failing causing outages.

What are the risks and consequences of not completing this project?

We will increase our technical debt and introduce more risk with keeping older technology.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

These were part of an emergent bucket previously.

What other factor were considered during the prioritization process?

Business prioritization and urgency.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$1,089,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 100,000 | | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | |
| | Stock Materials | 24,000 | | 6,000 | 3,000 | 5,000 | 5,000 | 5,000 | |
| | Non-Stock Material (A/P taxable) | 750,000 | | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | |
| | Contractors (A/P tax exempt) | 100,000 | | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | |
| | Overheads | 55,000 | | 10,000 | 10,000 | 10,000 | 10,000 | 15,000 | |
| | AFUDC* | 60,000 | | 10,000 | 10,000 | 10,000 | 15,000 | 15,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,089,000 | 0 | 216,000 | 213,000 | 215,000 | 220,000 | 225,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:
historic pricing, but holding for upcoming upgrades that we may not know the details of yet.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Look back in history to see how much we've spent on infrastructure upgrades/replacements.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|----------------------|
| Project/Program Name: Primary Control Center - Kingston | | Work Order #: | <input type="text"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 4230 | Funding Project Number: | <input type="text"/> |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 1/1/2023 | In-Service: 1/1/2025 | |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Central Hudson is currently constructing a new Training Academy and Primary Control Center, co-located on the same parcel. Co-location of these facilities was utilized to achieve cost synergies associated with site development and permitting, utility installation, and support staffing. The Kingston PCC supports the Grid Mod Program.

Describe specific scope exclusions, assumptions and constraints:

Assumption: Building construction will be completed and ready for IT/OT to enter by October 2023

Constraint: Lead time on Hardware (Supply Chain Delays)

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Transmission Sustaining
Discretion Level: System Enhancements **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Transformational - Enhancement **Is there an Innovation Component?** No
Needs Assessment: Infrastructure

If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:

Central Hudson is currently constructing a new Training Academy and Primary Control Center, co-located on the same parcel. Co-location of these facilities was utilized to achieve cost synergies associated with site development and permitting, utility installation, and support staffing. The Kingston PCC supports the Grid Mod Program.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

The benefits of an integrated solution include operating off of a single electric data model, thus reducing the amount of maintenance required.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document:

[CLICK HERE](#)

Which Strategic Theme does project most align with? Energy Leadership
Which Strategic Objective does project most align with? Improve system performance and resilience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Transformation: New systems / Enhancements that enable NEW business processes

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A


** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: **No** **Environmental Component:** **Checklist is incomplete**
 **Social Component:** **Checklist is incomplete**
 Governance Component: **Checklist is incomplete**

Is complete Sustainability status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Will be sending out an RFP for the AV Wall.

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Rate Case have cliff Date of 2025.

What are the risks and consequences of not completing this project?

The newly constructed PCC will not have the latest and greatest software/functionality.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

Part of the PCC.

What other factor were considered during the prioritization process?

Business prioritization and resource availability.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$2,180,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 1,078,000 | 550,000 | 528,000 | 0 | | | | |
| | Stock Materials | 1,102,000 | 574,000 | 528,000 | 0 | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | 0 | 0 | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,180,000 | 1,124,000 | 1,056,000 | 0 | 0 | 0 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,526,000 Maximum (\$): 2,834,000

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

vendor high level estimate

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Budget Submittal Form

Version 3.0 12/9/2022

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|--|--|--------------------------------|----------------------|
| Project/Program Name: PowerPlan Upgrades and Enhancements | | Work Order #: | <input type="text"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 4220 | Funding Project Number: | <input type="text"/> |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 6/1/2025 | In-Service: 6/1/2027 | |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Upgrade and Enhancements to PowerPlan system in order to have a version the vendor supports. This will also include any enhancements the business see fit for requests from PowerPlan users.

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Not upgrading and losing application support.

Why was the proposed project scope chosen over other alternatives?

PowerPlan is a critical Application and NEEDS to be working properly.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To keep the critical application up to date and working.

What are the risks and consequences of not completing this project?

The critical application will no longer be supported and will now be an unsupported application.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

Resource availability and other business priorities.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|------------------------|------------------------|------------------------|------------------------|---------------------|
| \$2,895,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 250,000 | | | 50,000 | 100,000 | 100,000 | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 1,800,000 | | | 200,000 | 1,200,000 | 400,000 | | |
| | Contractors (A/P tax exempt) | 720,000 | | | 50,000 | 551,000 | 119,000 | | |
| | Overheads | 35,000 | | | 5,000 | 15,000 | 15,000 | | |
| | AFUDC* | 90,000 | | | 15,000 | 25,000 | 50,000 | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,895,000 | 0 | 0 | 320,000 | 1,891,000 | 684,000 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Historic cost, but not sure of all the requirements for the upgrade

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historic pricing with adjustments

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|---|--|
| Project/Program Name: SAP Dunning | | Work Order #: <input type="text"/> | |
| Budget Group: Common: I.T./O.T. | Budget Category: 4220 | Funding Project Number: <input type="text"/> | |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 1/1/2023 | In-Service: 12/1/2024 | |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Turn on end to end collections functionality in SAP using a phased approach in order to significantly reduce financial risk to the company and rate payers.

Describe specific scope exclusions, assumptions and constraints:

- Constraint: Resource availability
- Constraint: Availability of key IT Contracted resources - Rowan, BRF+ Developer, DM Functional, TCS
- Constraint: Blackout window as per Fortis Q4 policy
- Assumption: Approx. 10-12 weeks of training time required for training material creation and delivery of the training
- Assumption: Support available from Alorica to manage increase in call volume
- Assumption: Stable Billing and Payment Processing

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do nothing.

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

In order to reduce financial risk to the company and rate payers, and to stay in alignment with other New York state utilities collections processes.

What are the risks and consequences of not completing this project?

High Financial Risk - Arrears growth directly impacts the need to increase the write off reserve.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

This is part of the CIS Modernization Project.

What other factor were considered during the prioritization process?

Stabalize SAP.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|------------------------|------------------------|------------------------|------------------------|---------------------|
| \$2,006,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 500,000 | | 500,000 | | | | | |
| | Stock Materials | 56,000 | | 56,000 | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 1,000,000 | | 1,000,000 | | | | | |
| | Overheads | 250,000 | | 250,000 | | | | | |
| | AFUDC* | 200,000 | | 200,000 | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,006,000 | 0 | 2,006,000 | 0 | 0 | 0 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Status: Included in current PSC-approved budget plan as a SPECIFIC PROJECT

Cost Estimate Level: Definitive

Cost Estimate Confidence: (that final cost will be within +/-10% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,805,400 Maximum (\$): 2,206,600

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: FOS-Generated Estimate; Historical Proforma Pricing; Historical Data + Job Specific Adjustments

For your definitive/bid estimate, provide link(s) to applicable cost estimating files.

<https://centralhudson.sharepoint.com/:x:/r/sites/ProjectPhoenix/Project%20Phoenix%20Library/07.Support%20-%20Post%20Implementation/Production%20Issues%20-%20Dunning/Dunning%20Cutover%20Plan.xlsx?d=w97803ea0648d4e2da537b8c8b040f39a&csf=1&web=1&e=GF6bjD>

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

[Empty text area for additional information]



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|--|
| Project/Program Name: SAP Major System Upgrades & Enhancements | | Work Order #: | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 4220 | Funding Project Number: | 4-4220-27-18 |
| Is this a Specific Project, Program or Blanket? Blanket | Target Schedule - Start: 1/1/2024 | In-Service: | 12/1/2028 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Upgrade SAP S/4 1909 to 2209

Describe specific scope exclusions, assumptions and constraints:

N/A

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

No alternatives

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

In order to continue to receive support from SAP, the product must be upgraded.

What are the risks and consequences of not completing this project?

We will be out of support and no longer have SAP available to assist.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Need to keep up to date with technology and functionality, reducing risks.

What other factor were considered during the prioritization process?

Business prioritization and resource availability.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$6,230,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 1,601,000 | | 500,000 | 500,000 | 200,000 | 200,000 | 201,000 | |
| | Stock Materials | 1,090,000 | | 223,000 | 299,000 | 179,000 | 179,000 | 210,000 | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 2,600,000 | | 1,200,000 | 500,000 | 300,000 | 300,000 | 300,000 | |
| | Overheads | 470,000 | | 200,000 | 100,000 | 50,000 | 60,000 | 60,000 | |
| | AFUDC* | 469,000 | | 200,000 | 100,000 | 50,000 | 59,000 | 60,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 6,230,000 | 0 | 2,323,000 | 1,499,000 | 779,000 | 798,000 | 831,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:
unknown requirements on upgrades

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historical costs adjusted

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Budget Submittal Form

Version 3.0 12/9/2022

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|---|
| Project/Program Name: SAP S4 Hana System Licenses | | Work Order #: | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 4220 | Funding Project Number: | 4-4220-27-18 |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 8/1/2025 | In-Service: | 10/1/2025 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Renewal of SAP S/4 licenses.

Describe specific scope exclusions, assumptions and constraints:

None

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

No alternatives

Why was the proposed project scope chosen over other alternatives?

N/A

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

In order to continue to receive support from SAP, the licenses must be renewed

What are the risks and consequences of not completing this project?

We will be out of support and could be charged fees or being out of compliance

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Need to keep licensing up to date to keep SAP functionality

What other factor were considered during the prioritization process?

Business prioritization

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$8,451,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 8,451,000 | | | 8,451,000 | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 8,451,000 | 0 | 0 | 8,451,000 | 0 | 0 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Conceptual

Cost Estimate Confidence: (that final cost will be within +/-30% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Reviewed last renewal and increased 10%

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historic pricing adjusted

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: Maintain System Standards **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Foundational - Enhancement **Is there an Innovation Component?** No
Needs Assessment: Infrastructure; Safety; Risk Reduction
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A
Describe the justification for this project. Include attachments or links to planning studies if applicable:
 This project was created to update/upgrade any security hardware that is coming to end of life and/or needs to be replaces to limit risks

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 This project was created to update/upgrade any security hardware that is coming to end of life and/or needs to be replaces to limit Security risks, and increasing Safety

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)


Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve safety and security culture
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates? N/A
** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?
 No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: No **Environmental Component:** Checklist is incomplete
 **Social Component:** Checklist is incomplete
 Governance Component: Checklist is incomplete

Is complete Sustainability status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do nothing and not keep Security HW up to date, increasing security/safety risks.

Why was the proposed project scope chosen over other alternatives?

Safety is a corporate goal

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

We will need to update/upgrade aged technology to keep up to date and secure

What are the risks and consequences of not completing this project?

Increased security/safety risks - limited vendor support and/or non compliance for deployed hardware. Potential service disruptions.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

We need to reduce Safety/security Risks

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$2,722,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 299,000 | | | 25,000 | 50,000 | 87,000 | 87,000 | 50,000 |
| | Stock Materials | 0 | | | | | | 0 | |
| | Non-Stock Material (A/P taxable) | 2,190,000 | | | 175,000 | 350,000 | 375,000 | 440,000 | 850,000 |
| | Contractors (A/P tax exempt) | 0 | | | | | 0 | 0 | 0 |
| | Overheads | 75,000 | | | 4,000 | 7,000 | 7,000 | 7,000 | 50,000 |
| | AFUDC* | 158,000 | | | 5,000 | 20,000 | 20,000 | 20,000 | 93,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,722,000 | 0 | 0 | 209,000 | 427,000 | 489,000 | 554,000 | 1,043,000 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Included in current PSC-approved budget plan under a PROGRAM

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

We don't know the scope of future upgrades at the moment

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: FOS-Generated Estimate; Historical Unit Pricing; Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

historic annual cost for HW upgrades/replacement

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Annual version upgrades are required to stay in support with the vendor.

Why was the proposed project scope chosen over other alternatives?

ServiceNow is part of the Technology parties long term strategy to modernize.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Each year there a two version updates required for Central Hudson to make.

What are the risks and consequences of not completing this project?

Possibility of losing support rights by not updating to current versions of ServiceNow.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

We are limiting emergent buckets.

What other factor were considered during the prioritization process?

Other project Prioritization and resource constraints.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|-----------------------------------|--|----------------|----------------|----------------|----------------|--------------|
| \$1,459,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 450,000 | | 50,000 | 100,000 | 100,000 | 100,000 | 100,000 | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 650,000 | | 50,000 | 150,000 | 150,000 | 150,000 | 150,000 | |
| | Contractors (A/P tax exempt) | 200,000 | | | 50,000 | 50,000 | 50,000 | 50,000 | |
| | Overheads | 60,000 | | | 10,000 | 15,000 | 15,000 | 20,000 | |
| | AFUDC* | 99,000 | | 6,000 | 11,000 | 19,000 | 27,000 | 36,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,459,000 | 0 | 106,000 | 321,000 | 334,000 | 342,000 | 356,000 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|---|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Ongoing upgrades/updates, but we don't currently know detailed requirements/functionality of future upgrades

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historic annual cost spent

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | |
|---|--|--------------------------------|
| Project/Program Name: SLA Improvements | Work Order #: | <input type="text"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 44 | Funding Project Number: |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 1/1/2026 | In-Service: 12/1/2029 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Inability to maximize grid mod efficiencies due to discontinuations of copper lines, slower protocols and lack of redundancies within Network. Provides workforces the ability to support critical infrastructure that supports safe and reliable service for customers.

Describe specific scope exclusions, assumptions and constraints:

Extend usage of existing hardware after vendor support expires.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: Maintain System Standards **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Foundational - Enhancement **Is there an Innovation Component?** No
Needs Assessment: Infrastructure

If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A

Describe the justification for this project. Include attachments or links to planning studies if applicable:

Inability to maximize grid mod efficiencies due to discontinuations of copper lines, slower protocols and lack of redundancies within Network. Provides workforces the ability to support critical infrastructure that supports safe and reliable service for customers.

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)

Provides workforces the ability to support critical infrastructure that supports safe and reliable service for customers.

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve productivity and efficiency
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A


** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

Local municipalities (>1)

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: No **Environmental Component:** Checklist is incomplete
 **Social Component:** Checklist is incomplete
Governance Component: Checklist is incomplete

Is complete Sustainability status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Extend usage of existing hardware after vendor support expires.

Why was the proposed project scope chosen over other alternatives?

Alternatives were not a viable option. inability to maximize grid mod efficiencies due to discontinuations of copper lines, slower protocols and lack of redundancies within Network.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Inability to maximize grid mod efficiencies due to discontinuations of copper lines, slower protocols and lack of redundancies within Network. Provides workforces the ability to support critical infrastructure that supports safe and reliable service for customers.

What are the risks and consequences of not completing this project?

Inability to maximize grid mod efficiencies due to discontinuations of copper lines, slower protocols and lack of redundancies within Network.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

Business prioritization and resource availability.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$2,131,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 85,000 | | | | 20,000 | 20,000 | 25,000 | 20,000 |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 1,950,000 | | | | 500,000 | 500,000 | 500,000 | 450,000 |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 30,000 | | | | 5,000 | 5,000 | 10,000 | 10,000 |
| | AFUDC* | 66,000 | | | | 8,000 | 19,000 | 19,000 | 20,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 2,131,000 | 0 | 0 | 0 | 533,000 | 544,000 | 554,000 | 500,000 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 1,704,800 Maximum (\$): 2,557,200

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing; Historical Data + Job Specific Adjustments; Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historic pricing adjusted

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | |
|--|-----------------------------------|--|
| Project/Program Name: Substation Upgrades | Work Order #: | <input type="text"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 44 | Funding Project Number: <input type="text"/> |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 6/1/2024 | In-Service: 12/1/2028 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Upgrade substations Networking to keep them up to date and eliminate risks. Provides workforces the ability to support critical infrastructure that supports safe and reliable service for customers.

Describe specific scope exclusions, assumptions and constraints:

Provides workforces the ability to support critical infrastructure that supports safe and reliable service for customers.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: Maintain System Standards **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Foundational - Enhancement **Is there an Innovation Component?** No
Needs Assessment: Infrastructure
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? N/A
Describe the justification for this project. Include attachments or links to planning studies if applicable:
 Upgrade substations Networking to keep them up to date and eliminate risks

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 Upgrade substations Networking to keep them up to date and eliminate risks

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve system performance and resilience
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Sustainment: Upgrade / Optimization of existing systems

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A


** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

Local municipalities (>1)

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: No **Environmental Component:** Checklist is incomplete
 **Social Component:** Checklist is incomplete
 Governance Component: Checklist is incomplete

Is complete Sustainability status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Extend usage of existing hardware after vendor support expires.

Why was the proposed project scope chosen over other alternatives?

Provides workforces the ability to support critical infrastructure that supports safe and reliable service for customers.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Provides workforces the ability to support critical infrastructure that supports safe and reliable service for customers.

What are the risks and consequences of not completing this project?

Limited vendor support and/or non compliance for deployed hardware. Potential service disruptions.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

N/A

What other factor were considered during the prioritization process?

Business prioritization and resource availability

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$3,635,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 214,000 | | 9,000 | 20,000 | 50,000 | 35,000 | 50,000 | 50,000 |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 2,900,000 | | 400,000 | 1,000,000 | 1,000,000 | 100,000 | 200,000 | 200,000 |
| | Overheads | 107,000 | | | 9,000 | 50,000 | 7,000 | 20,000 | 21,000 |
| | AFUDC* | 414,000 | | | 100,000 | 180,000 | 10,000 | 62,000 | 62,000 |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,635,000 | 0 | 409,000 | 1,129,000 | 1,280,000 | 152,000 | 332,000 | 333,000 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

This estimate was created from historical costing with some adjustments

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing; Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

This estimate was created from historical costing with some adjustments

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: UN - Digital Circuit Mapping - Licenses and Upgrades
Budget Group: Common: I.T./O.T. Budget Category: 4220 Work Order #: [Grid]
Is this a Specific Project, Program or Blanket? Specific Funding Project Number: [Yellow]
Target Schedule - Start: 6/1/2024 In-Service: 12/1/2027

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

[Empty text area for other work orders]

Describe the project objective and scope of work:

In order to use the new electric utility network model, Central Hudson will have to upgrade the ArcGIS web environment servers and rebuild/remap all field based and back office mapping applications.

Describe specific scope exclusions, assumptions and constraints:

Assumption: Proceed with electric UN migration and that it is completed.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Alternative is to seek extended support from ESRI for the ArcGIS/ArcFM model and associated mapping software.

Why was the proposed project scope chosen over other alternatives?

To maintain vendor support and stay current with the other utility industry companies.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Sunset date is February of 2026...<https://support.esri.com/en-us/products/arcmap/life-cycle>.

What are the risks and consequences of not completing this project?

Reduced or non availability for technical support for the company's ESRI GIS system.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Called out as a specific project, to be prioritized.

What other factor were considered during the prioritization process?

Business prioritization and resource availability.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|------------------------|------------------------|------------------------|------------------------|---------------------|
| \$1,045,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 1,045,000 | | 475,000 | | | 570,000 | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,045,000 | 0 | 475,000 | 0 | 0 | 570,000 | 0 | 0 |
| R E M O V E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:
historic cast with adjustments, but not sure the scope of the upgrades at this point

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing; Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historic cast with adjustments.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Budget Submittal Form

Version 3.0 12/9/2022

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|----------------------|
| Project/Program Name: UN - Estimating Design SBS AUD Upgrade & Enhancement | | Work Order #: | <input type="text"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 4220 | Funding Project Number: | <input type="text"/> |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 1/1/2025 | In-Service: 12/1/2025 | |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

This implementation will result in More accurate estimates for customer distribution work

Describe specific scope exclusions, assumptions and constraints:

None.

B. JUSTIFICATION

Load Based/Infrastructure: Infrastructure **Growth/Sustaining/Retirement:** Growth Sustaining
Discretion Level: System Enhancements **Investment Type:** Infrastructure
Technology Investment Type (CATS-4220, 4222, 4230, 4235, 44): Foundational - Enhancement **Is there an Innovation Component?** No
Needs Assessment: Infrastructure
If need is Safety, Regulatory or Compliance have we considered options, validated the need and challenged the value? No
Describe the justification for this project. Include attachments or links to planning studies if applicable:
 This implementation will result in More accurate estimates for customer distribution work

Describe any quantifiable benefits (such as monetary benefits/business case, operational cost savings, cost avoidance, etc.)
 increases customer satisfaction

For the following strategic alignment questions, reference CHG&E's current Strategic Outlook document: [CLICK HERE](#)

Which Strategic Theme does project most align with? Business Modernization
Which Strategic Objective does project most align with? Improve productivity and efficiency
Which Strategic Initiative does project most align with? Business & Operations Modernization
Which Team Goal does project most align with? DOES NOT ALIGN WITH ANY TEAM GOAL
Technology Strategic Alignment (CATS-4220, 4222, 4230, 4235, 44) Customer Experience: Improve customer experience

Have you taken into account potential environmental impacts that would need to be considered for cost and schedule estimates N/A


** Environmental impacts must be taken into consideration to the extent that you are able considering current phase, maturity of scope and knowledge of field conditions.*

Do you anticipate the project to require significant jurisdictional approvals?

No

ESG (Environmental, Social and Governance) and Sustainability:

Complete the ESG Checklist on the separate worksheet (tab). Results of your answers will be automatically shown below:

Checklist Fully Completed: No **Environmental Component:** Checklist is incomplete
 **Social Component:** Checklist is incomplete
 Governance Component: Checklist is incomplete

Is complete Sustainability status achieved by this project?*

** Sustainability status is achieved for the project if the ESG checklist shows that there is at least one component each for environmental, social and governance.*

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do nothing and keep current system with inefficiencies.

Why was the proposed project scope chosen over other alternatives?

Need to improve system and processes.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

Improve inefficient processes and increase customer satisfaction.

What are the risks and consequences of not completing this project?

Continuation of inefficient processes.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Business priority.

What other factor were considered during the prioritization process?

Business prioritization and resource availability.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|-----------------------------------|--|----------------|-------------|-------------|-------------|--------------|
| \$535,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 200,000 | | | 200,000 | | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 200,000 | | | 200,000 | | | | |
| | Contractors (A/P tax exempt) | 100,000 | | | 100,000 | | | | |
| | Overheads | 15,000 | | | 15,000 | | | | |
| | AFUDC* | 20,000 | | | 20,000 | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 535,000 | 0 | 0 | 535,000 | 0 | 0 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|---|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*



Budget Submittal Form

Version 3.0 12/9/2022

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): High Confidence

No further estimate range is required.

Cost Estimate Range: Minimum (\$): 428.000 Maximum (\$): 642.000

No explanation on confidence level required.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

historic casts with adjustments

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

[Empty text area for additional information]



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: UN - Underground Network Management GIS Implementation
Budget Group: Common: I.T./O.T. Budget Category: 4220 Work Order #: [Grid]
Is this a Specific Project, Program or Blanket? Specific Funding Project Number: [Yellow]
Target Schedule - Start: 1/1/2027 In-Service: 12/1/2028

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

[Empty text area for other work orders]

Describe the project objective and scope of work:

Model in detail Central Hudsons underground network systems. Will require digitization of the company's manhole and pull box CAD records.

Describe specific scope exclusions, assumptions and constraints:

Assumption: electric model is migrated to ESRI utility network model
Assumption: company requires the availability of these records within GIS.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Continue to maintain CAD and paper-based records.

Why was the proposed project scope chosen over other alternatives?

Would be a requirement for grid modernization to have this equipment modelled digitally in GIS.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

In order to meet future grid modernization goals for the underground network systems this period was chosen.

What are the risks and consequences of not completing this project?

Potential inability to model smart grid equipment and support company's initiatives for grid modernization

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Business priority

What other factor were considered during the prioritization process?

Business priority and resource availability

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$1,164,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 204,000 | | | | | 100,000 | 104,000 | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 600,000 | | | | | 300,000 | 300,000 | |
| | Contractors (A/P tax exempt) | 200,000 | | | | | 100,000 | 100,000 | |
| | Overheads | 70,000 | | | | | 30,000 | 40,000 | |
| | AFUDC* | 90,000 | | | | | 40,000 | 50,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,164,000 | 0 | 0 | 0 | 0 | 570,000 | 594,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

need ti do better requirements gathering to be able to do a bottoms up estimate

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: FOS-Generated Estimate

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

historic costs adjusted

F. ADDITONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|--|--|--------------------------------|--|
| Project/Program Name: ArcGIS Pro Upgrade and Enhancements | | Work Order #: | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 4220 | Funding Project Number: | 4-4220-35-18 |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 1/1/2024 | In-Service: | 12/1/2026 |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Migrate to ESRI's new data model, ArcGIS Pro. This will include 3 phases, Gas, Electric, and Fiber. Central Hudson will require a third party vendor to assist in migrating the data from ArcGIS Desktop to the new data model. Setting up new servers and databases will be done by Central Hudson IT.

Describe specific scope exclusions, assumptions and constraints:

Constraint: Applications currently integrated with ArcGIS Desktop may not be compatible with the ArcGIS Pro.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Stay on existing version with limited ability to support or resolve issues with GIS and integrated applications.

Why was the proposed project scope chosen over other alternatives?

ArcGIS is a foundational application we use. To not move to a supported new version of it we mean we have to change our strategy and a new application.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

ESRI will stop supporting ArcGIS Desktop in March of 2026.

What are the risks and consequences of not completing this project?

If an issue arises and support ends, Central Hudson will no longer be able to have questions answered by ESRI, vulnerabilities may be left unpatched, incompatibilities may occur, and new functionality will not be added.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

newly identified project, Core application needed to ensure the modernization of out distribution grid, gas safety/compliance, gas transformation in alignment with NYS regulatory updates.

What other factor were considered during the prioritization process?

Regulatory updates.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|------------------------|------------------------|------------------------|------------------------|---------------------|
| \$3,362,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 500,000 | | 100,000 | 200,000 | 200,000 | | | |
| | Stock Materials | 0 | | | | | | | |
| | Non-Stock Material (A/P taxable) | 2,000,000 | | 400,000 | 800,000 | 800,000 | | | |
| | Contractors (A/P tax exempt) | 500,000 | | 100,000 | 200,000 | 200,000 | | | |
| | Overheads | 84,000 | | 10,000 | 37,000 | 37,000 | | | |
| | AFUDC* | 278,000 | | 24,000 | 100,000 | 154,000 | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 3,362,000 | 0 | 634,000 | 1,337,000 | 1,391,000 | 0 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Havent gathered all requirements/scope to be able to have higher confidence

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: FOS-Generated Estimate; Historical Data + Job Specific Adjustments

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

Historic pricing

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

Project/Program Name: Warehouse Labeling, Hardware, and Barcoding
Budget Group: Common: I.T./O.T. **Budget Category:** 4220
Is this a Specific Project, Program or Blanket? Specific
Work Order #:  -
Funding Project Number: 10183
Target Schedule - Start: 1/1/2026 **In-Service:** 12/1/2026

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Project scope includes the labeling and hardware procurement for the Eltings Corner store room. Organizing and optimizing the warehouse, indentifying and selecting the right labels and their locations, procuring hardware, testing the hardware, designing the database for printing the labels, and training are included in this phase. The barcoding phase will also include requirements to document the process, lab test the printers, labels and devices, write test scripts for testing, load the master data, and user and integration testing for the MMS system.

Describe specific scope exclusions, assumptions and constraints:

Constraints - Need proper Wifi Coverage and weather conditions for labeling outdoor areas
 Assumptions - CH Team will need to manage the labeling Team, build interface to MMS, supervise and apply labels and designate a Project Manager to be the primary point of contact.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Only one vendor has been identified.

Why was the proposed project scope chosen over other alternatives?

Implementing warehouse barcoding in the main warehouse first will allow us to document lessons learned. Documenting the lessons learned will assist with estimates and more seamless roll out of the 8 other district store rooms.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

There will be an immediate cost savings by implementing this solution sooner than later.

What are the risks and consequences of not completing this project?

Completing the labeling and barcoding project prior to the EWAM implementation allows Supply Chain to become proficient with the barcoding functionality from a change management perspective and should result in realizing efficiency and productivity savings sufficient to justify the project.

Was this project included in a prior 5-year forecast?

No

If No, why should this project be completed instead of a planned project?

Will be in 2024 Rate Case.

What other factor were considered during the prioritization process?

Time, Resources, Urgency and business prioritization.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$1,224,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | 0 | | | |
| | Labor (Monthly Payroll) | 530,000 | | | | 530,000 | | | |
| | Stock Materials | 204,000 | | | | 204,000 | | | |
| | Non-Stock Material (A/P taxable) | 435,000 | | | | 435,000 | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | AFUDC* | 55,000 | | | | 55,000 | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,224,000 | 0 | 0 | 0 | 1,224,000 | 0 | 0 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>* AFUDC may require adjustment after Finance Department review.</i> | | | | | | | | | |
| Expense \$ (if applicable): | | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | | 0 | 0 | 0 | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Medium Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Preliminary cost for a project scheduled for 3 years from now

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Proforma Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

used historical estimates from similar projects

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):



Submission Date: May 1, 2023
Submitted By: Doug Ondreyko

First Year of 5-Year Budget Period: 2024
Current Life-Cycle Phase: 1 Planning

A. GENERAL

| | | | |
|---|--|--------------------------------|--|
| Project/Program Name: Workday Upgrades and Enhancements | | Work Order #: | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> |
| Budget Group: Common: I.T./O.T. | Budget Category: 4220 | Funding Project Number: | 10184 |
| Is this a Specific Project, Program or Blanket? Specific | Target Schedule - Start: 1/1/2026 | In-Service: 12/31/2028 | |

Indicate and summarize any other work orders associated with the overall project, including those of other budget categories:

Describe the project objective and scope of work:

Upgrade and Enhance Workday to keep the functionality and version as current as possible.

Describe specific scope exclusions, assumptions and constraints:

Ongoing upgrades and enhancements to keep Workday up to date.

C. ALTERNATIVES

What other options were considered to the proposed project to meet the objective?

Do nothing, Workday platform remains I static current state and does not evolve as business needs change.

Why was the proposed project scope chosen over other alternatives?

We don't want to risk inefficiencies or cyber risks.

D. PRIORITIZATION

Why do we need to complete this project in the period requested?

To keep the workday platform up to date with vulnerabilities and functionality.

What are the risks and consequences of not completing this project?

Workday platform remains in static current state and does not evolve as business needs change. We don't want to risk inefficiencies or cyber risks.

Was this project included in a prior 5-year forecast?

Yes

If No, why should this project be completed instead of a planned project?

This project was a part of Emergent bucket, but is now specially called out.

What other factor were considered during the prioritization process?

Business prioritization and urgency, along with IT input on Technical Debt.

E. COST ESTIMATE

| Capital Estimate Summary | | <i>Year 1 = 1st year of the 5-year budget plan</i> | | <i>All future year cost estimates should include applicable adjustments for inflation.</i> | | | | | |
|--|----------------------------------|--|--|--|--------------------|--------------------|--------------------|--------------------|---------------------|
| \$1,032,000 | | TOTAL | Prior Years Actuals + Projections | Year 1 2024 | Year 2 2025 | Year 3 2026 | Year 4 2027 | Year 5 2028 | Future Years |
| A D D I T I O N S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 162,000 | | | | 50,000 | 50,000 | 62,000 | |
| | Stock Materials | 42,000 | | | | 14,000 | 14,000 | 14,000 | |
| | Non-Stock Material (A/P taxable) | 600,000 | | | | 200,000 | 200,000 | 200,000 | |
| | Contractors (A/P tax exempt) | 150,000 | | | | 50,000 | 50,000 | 50,000 | |
| | Overheads | 39,000 | | | | 10,000 | 14,000 | 15,000 | |
| | AFUDC* | 39,000 | | | | 10,000 | 14,000 | 15,000 | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL ADDITIONS: | | 1,032,000 | 0 | 0 | 0 | 334,000 | 342,000 | 356,000 | 0 |
| R E T I R E M E N T S | Labor (Weekly Payroll) | 0 | | | | | | | |
| | Labor (Monthly Payroll) | 0 | | | | | | | |
| | Contractors (A/P tax exempt) | 0 | | | | | | | |
| | Overheads | 0 | | | | | | | |
| | Journal Vouchers (JVs) | 0 | | --- | --- | --- | --- | --- | --- |
| | Salvage CREDIT | 0 | | | | | | | |
| | CIAC Payments CREDIT | 0 | | | | | | | |
| | Joint Utility Payments CREDIT | 0 | | | | | | | |
| TOTAL REMOVALS: | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* AFUDC may require adjustment after Finance Department review.

| | | | | | | | | |
|---|----------|--|--|--|--|--|--|--|
| Expense \$ (if applicable): | 0 | | | | | | | |
| Current Approved Rate Case Funding (\$): | 0 | | | | | | | |

2021-2023 2024

*Prior years funding;
not actuals.*

Budget Status: Not included in current PSC-approved budget plan

Cost Estimate Level: Preliminary

Cost Estimate Confidence: (that final cost will be within +/-20% of the estimate): Low Confidence

Cost estimate confidence is not ideal, so please indicate minimum and maximum estimates:

Cost Estimate Range: Minimum (\$): _____ Maximum (\$): _____

Cost estimate confidence is not ideal, so please describe the risks that could significantly impact cost:

Not sure of future upgrade scope, but know there will ne to be updates to the Workday platform.

← *Formulas give standard ranges per estimate level, but may be overwritten if desired.*

Basis for estimate: Historical Unit Pricing

For your conceptual/preliminary estimate provide description or details for how your cost estimate was derived. You may add link(s) to applicable cost estimating files as appropriate.

We based the estimate on previous upgrades and enhancements to the system.

F. ADDITIONAL INFORMATION

If there is any additional information that you would like to add that is not covered elsewhere in this form, you may add it here (optional):

DETAIL SCHEDULES 2024-2028 FORECAST

| ELECTRIC ADDITIONS | | | W/ AP/DC, Inflation & OH Adjustments | | | | | |
|------------------------------|---|---------------------------|--------------------------------------|---------------|---------------|---------------|---------------|----------------|
| CAT. | Description | Discretion Level | 2024 | 2025 | 2026 | 2027 | 2028 | 5-Year Total |
| Electric Production | Dashville Rubber Gate Replacement & Headgates | Maintain System Standards | 1,903 | - | - | - | - | 1,903 |
| Electric Production | Dashville Concrete Reinforcement on Spillway | Maintain System Standards | 409 | - | - | - | - | 409 |
| Electric Production | Dashville Pond Control System | System Enhancements | 104 | - | - | - | - | 104 |
| Electric Production | Dashville Staircase to Bottom Door | System Enhancements | - | - | 108 | - | - | 108 |
| Electric Production | Dashville Walkway over Tailrace | System Enhancements | - | - | 164 | - | - | 164 |
| Electric Production | High Falls Concrete Cap Replacement | Maintain System Standards | - | - | - | - | - | - |
| Electric Production | High Falls Trash Rack Upgrade | System Enhancements | 356 | - | - | - | - | 356 |
| Electric Production | Sturgeon Pool Dam Camera System | System Enhancements | 664 | - | - | - | - | 664 |
| Electric Production | Dashville Major Overhaul #1 | Maintain System Standards | 523 | 4,583 | - | - | - | 5,106 |
| Electric Production | Dashville Major Overhaul #2 | Maintain System Standards | 26 | 537 | 4,713 | - | - | 5,276 |
| Electric Production | Dashville Facility Camera System | System Enhancements | - | 521 | - | - | - | 521 |
| Electric Production | Hydro SCADA - New Com Link | Maintain System Standards | - | 155 | - | - | - | 155 |
| Electric Production | Sturgeon Pool Remote Start | System Enhancements | - | 39 | 31 | 1,145 | - | 1,214 |
| Electric Production | High Falls Rubber Sluice Gate | Maintain System Standards | - | - | - | - | - | - |
| Electric Production | Dashville Remote Start | System Enhancements | - | - | - | 85 | 471 | 555 |
| Electric Production | Sturgeon Pool Tailrace Gates | System Enhancements | - | - | - | - | - | - |
| Electric Production | Sturgeon Pool Southern Wall Foundation Reinforcement | Maintain System Standards | - | - | - | 1,105 | - | 1,105 |
| Electric Production | Sturgeon Pool Replace Toe of Dam | Maintain System Standards | - | - | - | - | 1,150 | 1,150 |
| Electric Production | Sturgeon Pool Relay Protection / Breakers | Maintain System Standards | - | - | - | 981 | 690 | 1,670 |
| Electric Production | High Falls Facility Camera System | System Enhancements | - | - | - | - | 999 | 999 |
| Electric Production | Sturgeon Pool Window Replacements | Maintain System Standards | - | - | - | - | - | - |
| Electric Production | Sturgeon Pool Retaining Wall Penstock | Maintain System Standards | - | - | - | - | 1,691 | 1,691 |
| Electric Production | Upgrade Excitation Systems at all Sites | Maintain System Standards | - | - | - | - | 334 | 334 |
| Electric Production | Miscellaneous Minor Hydro projects | Maintain System Standards | 63 | 161 | 162 | 218 | 226 | 831 |
| Electric Production | Emergent Projects | Maintain System Standards | 319 | - | - | - | - | 319 |
| Electric Production | Retirement of S. Cairo | Non Discretionary | - | 211 | - | - | - | 211 |
| Electric Production | Retirement of Coxsackie | Non Discretionary | - | 211 | - | - | - | 211 |
| Electric Production | Subtotal - Electric Production | | 4,367 | 6,417 | 5,178 | 3,633 | 5,560 | 25,055 |
| Electric Transmission | High Priority Replacements (Various) | Non Discretionary | 5,302 | 5,493 | 5,748 | 5,836 | 6,112 | 28,491 |
| Electric Transmission | FV Line Indian Lake Crossing - Eversource | Non Discretionary | 100 | 2,547 | - | - | - | 2,648 |
| Electric Transmission | 115kV DW Line - West Balmville WN / 4012 Underbuild | Non Discretionary | - | 64 | 1,741 | - | - | 1,805 |
| Electric Transmission | Transmission Minor Projects | Non Discretionary | 196 | 204 | 213 | 217 | 227 | 1,056 |
| Electric Transmission | Electric Transmission Structure Coating Program | Maintain System Standards | 1,501 | 1,561 | 1,635 | 2,124 | 1,432 | 8,253 |
| Electric Transmission | MG and GK Line 115kV Upgrade (Modena - Kerhonkson) | Maintain System Standards | 421 | - | - | - | - | 421 |
| Electric Transmission | PK Line 115kV Upgrade (Kerhonkson - High Falls) | Maintain System Standards | 863 | - | - | - | - | 863 |
| Electric Transmission | P Line 115kV Upgrade (High Falls - Sturgeon Pool) | Maintain System Standards | 390 | - | - | - | - | 390 |
| Electric Transmission | ROW Repair Project (Deficiencies) | Maintain System Standards | 400 | 416 | 435 | 442 | 463 | 2,156 |
| Electric Transmission | Honk Falls Substation Tie-in (Kerhonkson Autotransformers) | Maintain System Standards | - | - | - | - | - | - |
| Electric Transmission | ACSR Conductor Replacement Program, FV - Part 102C | Maintain System Standards | - | - | - | - | - | - |
| Electric Transmission | Knapcs Corners Substation Tie-in (115kV KB & SK Lines) | Maintain System Standards | - | - | - | - | - | - |
| Electric Transmission | Trap Rock Substation Tie-in and TR Line retirement | Maintain System Standards | - | - | - | 959 | - | 959 |
| Electric Transmission | 69kV KM Line Rebuild - Knaps to Myers - 102C | Maintain System Standards | 2,879 | - | - | - | - | 2,879 |
| Electric Transmission | SB Line: New 115kV Line - Hurley Ave. to Saugerties - Article VII: 11.11 miles | Maintain System Standards | 9,260 | - | - | - | - | 9,260 |
| Electric Transmission | H Line: New 115kV Line - Saugerties to N.Catskill - Article VII: 12.25 miles | Maintain System Standards | 6,497 | 12,477 | 3,587 | - | - | 24,562 |
| Electric Transmission | HG Line: New 69kV Line - Honk Falls to Neversink - Part 102C | Maintain System Standards | 250 | 4,991 | 11,968 | 12,152 | 7,017 | 36,378 |
| Electric Transmission | Retirement of O & OB Line Section from Dashville Tap to Ohioville | Maintain System Standards | - | - | - | - | - | - |
| Electric Transmission | Q Line: New 115kV Line - Pleasant Valley - Rhinebeck | Maintain System Standards | 600 | 624 | 1,088 | 8,838 | 17,353 | 28,503 |
| Electric Transmission | Removal of SD / SJ and WM Tap Lines | Maintain System Standards | - | - | - | - | - | - |
| Electric Transmission | 69kV GM Line Retirement of Clinton Avenue Tap Section | Maintain System Standards | - | - | - | - | - | - |
| Electric Transmission | 115kV SK Line Rebuild | Maintain System Standards | - | - | 109 | 221 | 231 | 561 |
| Electric Transmission | 115kV S Line Rebuild | Maintain System Standards | 250 | 416 | 2,538 | 5,524 | - | 8,728 |
| Electric Transmission | 115kV CN Line Rebuild | System Enhancements | - | - | - | - | - | - |
| Electric Transmission | NW Line 345/115/69 Station Connection & 1.2 Mile NW Line 115kV Rebuild | System Enhancements | - | - | - | - | - | - |
| Electric Transmission | Subtotal - Electric Transmission | | 31,010 | 28,794 | 29,063 | 36,312 | 32,835 | 158,013 |
| Electric Substation | Substation Minor Projects (1-1311-00-19) | Non Discretionary | 560 | 559 | 575 | 596 | 595 | 2,985 |
| Electric Substation | Substation Battery Replacement Program (1-1312-05-18) | Maintain System Standards | 100 | 203 | 105 | 217 | 108 | 732 |
| Electric Substation | Greenfield Rd. - Substation Upgrade (Reuse Kerhonkson & Modena Transformers) (1-1312-99-19) | Maintain System Standards | 1,009 | - | - | - | - | 1,009 |
| Electric Substation | Bethlehem Road - UB Line Relay Upgrade & Breaker Replacement (1-1312-99-19) | Maintain System Standards | 809 | - | - | - | - | 809 |
| Electric Substation | Union Avenue - UB Line Relay Upgrade (1-1312-99-19) | Maintain System Standards | 151 | - | - | - | - | 151 |
| Electric Substation | Rock Tavern - 345 kV Disconnect Replacement (RTB-4483 & RTB-31194) (1-1312-99-19) | Maintain System Standards | 199 | - | - | - | - | 199 |
| Electric Substation | New Baltimore Upgrade (New 12MVA Transformer, relays, and 15kV breakers) (1-1312-99-19) | Maintain System Standards | 3,051 | - | - | - | - | 3,051 |
| Electric Substation | Lincoln Park - Relay Upgrade & BRP (115 kV - LR-1219-HP, HP-1318) (1-1312-99-19) | Maintain System Standards | 604 | - | - | - | - | 604 |
| Electric Substation | Forgebrook 115kV Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | 202 | - | - | - | - | 202 |
| Electric Substation | South Cairo (15 kV - W-1658) (1-1312-99-19) BRP | Maintain System Standards | 222 | - | - | - | - | 222 |
| Electric Substation | Terminal Upgrade Work for 115kV Loop (High Falls) (1-1312-99-19) | Maintain System Standards | 126 | - | - | - | - | 126 |
| Electric Substation | P Line Moved to 115kV Bus (Sturgeon Pool) (1-1312-99-19) | Maintain System Standards | 126 | - | - | - | - | 126 |
| Electric Substation | Coxsackie - DEC Peaker Regulation Project (Transformer Only) (1-1312-99-19) | Maintain System Standards | 2,024 | - | - | - | - | 2,024 |
| Electric Substation | South Cairo - DEC Peaker Regulation Project (D-VAR & Transformer) (1-1312-99-19) | Maintain System Standards | 7,108 | - | - | - | - | 7,108 |
| Electric Substation | New Baltimore (FKA Freshford) - DEC Peaker Regulation Project (D-VAR Only) (1-1312-99-19) | Maintain System Standards | 2,117 | - | - | - | - | 2,117 |
| Electric Substation | Grid Med - Multiple Substations (1-1312-99-19) | Maintain System Standards | 1,849 | - | 157 | - | - | 2,006 |
| Electric Substation | Maybrook Transformer Upgrades (1-1312-99-19) | Maintain System Standards | 1,000 | 5,077 | - | - | - | 6,077 |
| Electric Substation | Milan PLC Replacement (1-1312-99-19) | Maintain System Standards | - | 914 | - | - | - | 914 |
| Electric Substation | Fishkill Plains Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | 609 | - | - | - | 609 |
| Electric Substation | Sand Dock - Add Breaker For Tilton (1-1312-99-19) | Maintain System Standards | 21 | 812 | - | - | - | 833 |
| Electric Substation | Highland Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | 183 | - | - | - | 183 |
| Electric Substation | Millerton Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | 162 | - | - | - | 162 |
| Electric Substation | Todd Hill Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | 264 | - | - | - | 264 |
| Electric Substation | East Walden Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | 305 | - | - | - | 305 |
| Electric Substation | Reynolds Hill Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | 366 | - | - | - | 366 |
| Electric Substation | East Kingston PLC Replacement (1-1312-99-19) | Maintain System Standards | 103 | 1,929 | - | - | - | 2,032 |
| Electric Substation | Hibernia (69 kV - E-972) (1-1312-99-19) BRP | Maintain System Standards | - | 223 | - | - | - | 223 |
| Electric Substation | Reynolds Hill (15 kV - TD-6001, TD-6005) - Evaluate Switchgear Purchase (1-1312-99-19) BRP | Maintain System Standards | - | 203 | - | - | - | 203 |
| Electric Substation | Neversink (15 kV - W-1128, CKT-391) (1-1312-99-19) BRP | Maintain System Standards | - | 203 | - | - | - | 203 |
| Electric Substation | Mobile Switchgear (1-1312-99-19) | Maintain System Standards | - | 1,015 | - | - | - | 1,015 |
| Electric Substation | Clinton Ave. - Retire Substation (1-1312-99-19) | Retirement | - | - | - | - | - | - |
| Electric Substation | South Wall Street - Retire Substation (1-1312-99-19) | Retirement | - | - | - | - | - | - |
| Electric Substation | Montgomery St. 14kV Switchgear Upgrade (1-1312-99-19) | Maintain System Standards | - | 203 | 3,137 | - | - | 3,340 |
| Electric Substation | Lawrenceville Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | 105 | - | - | 105 |
| Electric Substation | Dashville Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | 157 | - | - | 157 |
| Electric Substation | Barneat Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | 889 | - | - | 889 |

| ELECTRIC ADDITIONS | | | W/ AP/DC, Inflation & CH Adjustments | | | | | |
|------------------------------|--|---------------------------|--------------------------------------|---------------|---------------|---------------|---------------|----------------|
| CAT. | Description | Discretion Level | 2024 | 2025 | 2026 | 2027 | 2028 | 5-Year Total |
| Electric Substation | Hunter Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | 105 | - | - | 105 |
| Electric Substation | Neversink Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | 167 | - | - | 167 |
| Electric Substation | Wiccopee Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | 1,226 | - | - | - | - | 1,226 |
| Electric Substation | Sturgeon Pool 4kV Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | 418 | - | - | 418 |
| Electric Substation | North Chelsea PLC Replacement (1-1312-99-19) | Maintain System Standards | - | - | 837 | - | - | 837 |
| Electric Substation | Sturgeon Pool (15 kV - OS-1, OS-2, OS-3) (1-1312-99-19) BRP | Maintain System Standards | - | - | 357 | - | - | 357 |
| Electric Substation | Pulvers T41 69.3kV Replacement (1-1312-99-19) | Maintain System Standards | - | 203 | 2,196 | - | - | 2,399 |
| Electric Substation | Myers Corners Switchgear Upgrade & 69kV Breaker TV-399-KM Repl (1-1312-99-19) | Maintain System Standards | - | 102 | 3,137 | - | - | 3,239 |
| Electric Substation | Balmville - Retire Substation (1-1312-99-19) | Retirement | - | - | - | - | - | - |
| Electric Substation | Smithfield Relay Modernization (1-1312-99-19) | Maintain System Standards | - | - | 105 | 1,976 | - | 2,081 |
| Electric Substation | Sand Dock Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | 105 | 974 | - | 1,079 |
| Electric Substation | Staatsburg BM85 RTU Replacement (1-1312-99-19) | Maintain System Standards | - | - | - | 650 | - | 650 |
| Electric Substation | Merritt Park PLC Replacement (1-1312-99-19) | Maintain System Standards | - | - | - | 1,083 | - | 1,083 |
| Electric Substation | Sand Dock (15 kV - 10 Breakers) (1-1312-99-19) BRP | Maintain System Standards | - | - | - | 1,083 | - | 1,083 |
| Electric Substation | Tioronda (15 kV - W-567, TD-8086, TD-8086, TD-8087) (1-1312-99-19) BRP | Maintain System Standards | - | - | - | - | 476 | 476 |
| Electric Substation | Converse Street Relay Upgrade, Switchgear, Transformer, RTU Replacements (1-1312-99-19) | Maintain System Standards | - | - | 209 | 2,111 | - | 2,321 |
| Electric Substation | Shenandoah Relay Upgrade, BRP (15 kV - 25 Breakers) (1-1312-99-19) | Maintain System Standards | - | 609 | 1,882 | 4,072 | - | 6,564 |
| Electric Substation | Angram Replacement from EC Spare, Replace EC Spare (1 Phase 34.5/13.8kV) (1-1312-99-19) | Maintain System Standards | - | - | 837 | 2,274 | - | 3,110 |
| Electric Substation | Smithfield Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | - | - | 866 | 866 |
| Electric Substation | Westerlo BM85 RTU Replacement (1-1312-99-19) | Maintain System Standards | - | - | - | - | 541 | 541 |
| Electric Substation | Spackerville PLC Replacement (1-1312-99-19) | Maintain System Standards | - | - | - | - | 887 | 887 |
| Electric Substation | Galeville PLC Replacement (1-1312-99-19) | Maintain System Standards | - | - | - | 108 | 974 | 1,082 |
| Electric Substation | Saugerties PLC Replacement (1-1312-99-19) | Maintain System Standards | - | - | - | - | 1,082 | 1,082 |
| Electric Substation | Hurley Avenue (15 kV - W-252, W-1575, CKT-2091, CKT-2092, CKT-2093, CKT-2094) (1-1312-99-19) BRP | Maintain System Standards | - | - | - | - | 509 | 509 |
| Electric Substation | Tioronda Switchgear Replacement (1-1312-99-19) | Maintain System Standards | - | - | - | 108 | 2,164 | 2,273 |
| Electric Substation | Jansen Avenue Substation Upgrade, GE Harris RTU Replacement, BRP (15 kV - 9 Breakers) (1-1312-99-19) | Maintain System Standards | - | - | - | 108 | 3,046 | 3,155 |
| Electric Substation | Hurley Avenue - 115-13.8 kV 13.4/17.9/22.4 MVA Transformer & Switchgear (1-1312-99-19) | Maintain System Standards | - | - | - | - | 2,164 | 2,164 |
| Electric Substation | Rock Tavern 115 kV Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | - | - | 216 | 216 |
| Electric Substation | 345kV Switch Replacement Program (1-1312-98-19) | Maintain System Standards | 607 | 508 | 523 | 541 | 541 | 2,917 |
| Electric Substation | 115kV Switch Replacement Program (1-1312-98-19) | Maintain System Standards | 106 | 812 | 837 | 866 | 866 | 3,467 |
| Electric Substation | Pot Heads - East (1-1312-98-19) | Maintain System Standards | 634 | - | - | - | - | 634 |
| Electric Substation | Kerhonkson 115/69kV Autotransformers Phase 2 (1 - 56MVA) (Remove 61850) (1-1312-98-19) | Maintain System Standards | 1,525 | - | - | - | - | 1,525 |
| Electric Substation | Rock Tavern 345kV 311 Line A2 Relay Upgrade (1-1312-98-19) ESPIP | Maintain System Standards | 242 | - | - | - | - | 242 |
| Electric Substation | Roseton 345kV 311 Line A2 Relay Upgrade (1-1312-98-19) ESPIP | Maintain System Standards | 242 | - | - | - | - | 242 |
| Electric Substation | Hurley Ave. 345kV Relay Upgrade (1-1312-98-19) ESPIP | Maintain System Standards | - | - | 1,046 | - | - | 1,046 |
| Electric Substation | Rock Tavern 345kV Relay Upgrade (1-1312-98-19) ESPIP | Maintain System Standards | - | - | - | 2,382 | 595 | 2,977 |
| Electric Substation | Pleasant Valley 115kV Modernization (Package Sub & Relays) (1-1312-98-19) | Maintain System Standards | - | - | - | 541 | 4,329 | 4,870 |
| Electric Substation | Roseton 345kV Relay Upgrade (1-1312-98-19) ESPIP | Maintain System Standards | - | - | - | 108 | 3,247 | 3,355 |
| Electric Substation | Woodstock - Switchgear Replacement (1-1312-31-15) | Maintain System Standards | 103 | 3,046 | - | - | - | 3,149 |
| Electric Substation | Modena - Add 3rd Bkr to Complete 115kV Ring Bus (see P&MK memo) (1-1312-52-17) | Maintain System Standards | 402 | 1,199 | 1,569 | - | - | 3,170 |
| Electric Substation | Tilcon - Tap Station (1-1312-52-16) | System Enhancements | 62 | 508 | 3,137 | 2,599 | - | 6,305 |
| Electric Substation | Subtotal - Electric Substation | | 26,230 | 20,219 | 22,589 | 22,874 | 22,731 | 114,644 |
| Electric New Business | New Business | Non Discretionary | 2,704 | 3,082 | 3,430 | 2,590 | 2,856 | 14,662 |
| Electric New Business | Beliefield | Non Discretionary | 1,550 | 373 | - | - | - | 1,923 |
| Electric New Business | PharmaCann | Non Discretionary | 1,033 | - | - | - | - | 1,033 |
| Electric New Business | Cresco | Non Discretionary | - | 852 | - | - | - | 852 |
| Electric New Business | Hudson Heritage | Non Discretionary | 517 | 319 | - | - | - | 836 |
| Electric New Business | Coeymans Industrial Park | Non Discretionary | - | 1,065 | 1,625 | - | - | 2,690 |
| Electric New Business | Unidentified warehouse, production | Non Discretionary | 517 | 852 | 1,625 | 4,410 | 4,498 | 11,903 |
| Electric New Business | ELEC. N.B. OVERHEAD - BLANKET | Non Discretionary | 5,313 | 5,641 | 5,913 | 6,197 | 6,510 | 29,574 |
| Electric New Business | ELEC. & GAS COMB. URD - BLANKET | Non Discretionary | 567 | 602 | 631 | 661 | 695 | 3,155 |
| Electric New Business | ELEC. URD - BLANKET | Non Discretionary | 487 | 516 | 542 | 568 | 597 | 2,710 |
| Electric New Business | Subtotal - Electric New Business | | 12,688 | 13,301 | 13,766 | 14,426 | 15,156 | 69,338 |
| Electric Distribution | Distribution Improvement Blankets (15BL-01) | Maintain System Standards | 7,204 | 7,333 | 7,501 | 7,646 | 7,799 | 37,483 |
| Electric Distribution | Relocation Blankets (15BL-02) | Non Discretionary | 216 | 220 | 225 | 229 | 234 | 1,124 |
| Electric Distribution | Distribution Improvement Minors (1511-0X) | Maintain System Standards | 58 | 59 | 60 | 61 | 62 | 300 |
| Electric Distribution | Distribution Improvement Conversions (1521-0X) | Maintain System Standards | 333 | 339 | 347 | 354 | 361 | 1,735 |
| Electric Distribution | Road/Bridge Rebuild Relocation Projects (1531-0X) | Non Discretionary | 556 | 566 | 289 | 295 | 301 | 2,006 |
| Electric Distribution | CATV Make-ready | Non Discretionary | 617 | 629 | 643 | 655 | 668 | 3,213 |
| Electric Distribution | Overhead Secondary Replacement Program | Maintain System Standards | 222 | 230 | 236 | 240 | 245 | 1,174 |
| Electric Distribution | Distribution Pole Replacement Program | System Enhancements | 15,437 | 21,998 | 22,504 | 22,938 | 22,979 | 105,856 |
| Electric Distribution | Distribution Automation - Other | System Enhancements | 515 | 524 | 536 | 546 | 557 | 2,677 |
| Electric Distribution | Distribution Automation - Major Program (\$2.7M carriover) | System Enhancements | 5,071 | 503 | - | - | - | 5,574 |
| Electric Distribution | Distribution Improvement (1551-0X) - Thermal / Voltage | System Enhancements | - | 629 | - | - | - | 629 |
| Electric Distribution | Distribution Improvement (1551-0X) - Reliability | System Enhancements | 1,111 | 1,336 | 1,473 | 1,174 | 1,554 | 6,649 |
| Electric Distribution | CEMI/Worst Circuit Reliability Program | System Enhancements | 1,164 | 1,128 | 1,088 | 1,339 | 1,213 | 5,931 |
| Electric Distribution | Resiliency Program | System Enhancements | - | - | 1,800 | - | - | 1,800 |
| Electric Distribution | Distribution Improvement (1551-0X) - Operating/ Infrastructure Condition | Maintain System Standards | 2,890 | 1,943 | 1,607 | 4,164 | 4,461 | 15,065 |
| Electric Distribution | 5kV Aerial Cable Replacement Program | Maintain System Standards | - | 105 | - | - | - | 105 |
| Electric Distribution | Copper Wire Replacement Program | Maintain System Standards | - | - | 938 | 683 | - | 1,620 |
| Electric Distribution | 4800 V Conversion/Infrastructure Program | Maintain System Standards | 4,155 | 2,868 | 2,668 | 2,381 | 2,340 | 14,412 |
| Electric Distribution | Network Cable and Equipment | Maintain System Standards | 1,858 | 2,147 | 2,116 | 382 | 390 | 6,894 |
| Electric Distribution | Secondary Network Upgrade Program (All Districts) | Maintain System Standards | 1,476 | 1,367 | 1,897 | 1,912 | 446 | 7,097 |
| Electric Distribution | URD replacement | Maintain System Standards | 1,353 | 6,822 | 5,626 | 6,008 | 6,963 | 26,771 |
| Electric Distribution | CAT 15 - Sub Circuit Exits | Maintain System Standards | - | 1,467 | 1,875 | 546 | 334 | 4,222 |
| Electric Distribution | Storm Hardening | System Enhancements | 8,211 | 4,112 | 4,019 | 5,205 | 6,306 | 27,852 |
| Electric Distribution | Subtotal - Electric Distribution | | 52,447 | 56,322 | 57,449 | 56,759 | 57,213 | 280,191 |
| Electric Transformers | Transformers - New Business | Non Discretionary | 14,112 | 14,408 | 14,711 | 14,991 | 15,275 | 73,497 |
| Electric Transformers | Capacitors | Non Discretionary | 176 | 180 | 184 | 187 | 191 | 919 |
| Electric Transformers | Regulators | Non Discretionary | 3,352 | 1,855 | 1,360 | 1,386 | 1,413 | 9,366 |
| Electric Transformers | Network Protectors | Non Discretionary | - | - | - | - | - | - |
| Electric Transformers | Subtotal - Electric Transformers | | 17,640 | 16,443 | 16,255 | 16,564 | 16,879 | 83,782 |
| Electric Meters | X041A - Special Meter Installations | Non Discretionary | 199 | 203 | 207 | 211 | 215 | 1,036 |
| Electric Meters | X042A - Instrument Transformers | Non Discretionary | 415 | 423 | 432 | 440 | 449 | 2,159 |
| Electric Meters | X043A - Electric Meters | Non Discretionary | 2,155 | 2,200 | 2,246 | 2,289 | 2,333 | 11,223 |
| Electric Meters | AMI Pilot | Non Discretionary | - | - | - | - | - | - |

| ELECTRIC ADDITIONS | | | W/ APUDC, Interest & OH Adjustments | | | | | |
|--------------------|----------------------------------|-------------------|-------------------------------------|---------|---------|---------|---------|--------------|
| CAT. | Description | Discretion Level | 2024 | 2025 | 2026 | 2027 | 2028 | 5-Year Total |
| Electric Meters | Subtotal - Electric Meters | | 2,768 | 2,827 | 2,886 | 2,941 | 2,997 | 14,418 |
| Storm Capital | Subtotal - Storm Capital | Non Discretionary | 1,681 | 1,712 | 1,751 | 1,785 | 1,820 | 8,749 |
| | Total - Electric Capital Program | | 148,833 | 146,035 | 148,938 | 155,194 | 155,191 | 754,191 |

| ELECTRIC RETIREMENTS | | | | | | | | | |
|------------------------------|---|---------------------------|--------------|--------------|--------------|--------------|--------------|---------------|---|
| CAT. | Description | Discretion Level | 2024 | 2025 | 2026 | 2027 | 2028 | 5-Year Total | |
| Electric Production | Dashville Rubber Gate Replacement & Headgates | Maintain System Standards | - | 124 | - | - | - | 124 | - |
| Electric Production | Dashville Concrete Reinforcement on Spillway | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Production | Dashville Pond Control System | System Enhancements | - | - | - | - | - | - | - |
| Electric Production | Dashville Staircase to Bottom Door | System Enhancements | - | - | - | - | - | - | - |
| Electric Production | Dashville Walkway over Tailrace | System Enhancements | - | - | - | - | - | - | - |
| Electric Production | High Falls Concrete Cap Replacement | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Production | High Falls Trash Rake Upgrade | System Enhancements | 5 | - | 5 | - | - | 10 | - |
| Electric Production | Sturgeon Pool Dam Camera System | System Enhancements | - | - | - | - | - | - | - |
| Electric Production | Dashville Major Overhaul #1 | Maintain System Standards | - | 87 | - | - | - | 87 | - |
| Electric Production | Dashville Major Overhaul #2 | Maintain System Standards | - | - | 89 | - | - | 89 | - |
| Electric Production | Dashville Facility Camera System | System Enhancements | - | - | - | - | - | - | - |
| Electric Production | Hydro SCADA - New Com Link | Maintain System Standards | - | 2 | - | - | - | 2 | - |
| Electric Production | Sturgeon Pool Remote Start | System Enhancements | - | - | - | - | - | - | - |
| Electric Production | High Falls Rubber Sluice Gate | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Production | Dashville Remote Start | System Enhancements | - | - | - | - | - | - | - |
| Electric Production | Sturgeon Pool Tailrace Gates | System Enhancements | - | - | - | - | - | - | - |
| Electric Production | Sturgeon Pool Southern Wall Foundation Reinforcement | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Production | Sturgeon Pool Replace Toe of Dam | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Production | Sturgeon Pool Relay Protection / Breakers | Maintain System Standards | - | - | - | 54 | - | 54 | - |
| Electric Production | High Falls Facility Camera System | System Enhancements | - | - | - | - | - | - | - |
| Electric Production | Sturgeon Pool Window Replacements | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Production | Sturgeon Pool Retaining Wall Penstock | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Production | Upgrade Excitation Systems at all Sites | Maintain System Standards | - | - | - | - | 33 | 33 | - |
| Electric Production | Miscellaneous Minor Hydro projects | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Production | Emergent Projects | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Production | Retirement of S. Caro | Non Discretionary | - | 522 | - | - | - | 522 | - |
| Electric Production | Retirement of Coxsackie | Non Discretionary | - | 522 | - | - | - | 522 | - |
| Electric Production | Subtotal - Electric Production | | 5 | 1,258 | 94 | 54 | 33 | 1,445 | |
| Electric Transmission | High Priority Replacements (Various) | Non Discretionary | 1,215 | 1,045 | 1,067 | 1,087 | 1,108 | 5,522 | |
| Electric Transmission | FV Line Indian Lake Crossing - Eversource | Non Discretionary | - | 993 | - | - | - | 993 | |
| Electric Transmission | 115kV DW Line - West Balmville WN / 4012 Underbuild | Non Discretionary | - | - | 86 | - | - | 86 | |
| Electric Transmission | Transmission Minor Projects | Non Discretionary | 67 | 68 | 69 | 71 | 72 | 346 | |
| Electric Transmission | Electric Transmission Structure Coating Program | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Transmission | MG and GK Line 115kV Upgrade (Modena - Kerhonkson) | Maintain System Standards | 20 | - | - | - | - | 20 | |
| Electric Transmission | FK Line 115kV Upgrade (Kerhonkson - High Falls) | Maintain System Standards | 133 | - | - | - | - | 133 | |
| Electric Transmission | P Line 115kV Upgrade (High Falls - Sturgeon Pool) | Maintain System Standards | 36 | - | - | - | - | 36 | |
| Electric Transmission | ROW Repair Project (Deficiencies) | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Transmission | Honk Falls Substation Tie-in (Kerhonkson Autotransformers) | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Transmission | ACSR Conductor Replacement Program, FV - Part 102C | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Transmission | Knapps Corners Substation Tie-in (115kV KB & SK Lines) | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Transmission | Trap Rock Substation Tie-in and TR Line retirement | Maintain System Standards | - | - | - | 798 | - | 798 | |
| Electric Transmission | 69kV KM Line Rebuild - Knapps to Myers - 102C | Maintain System Standards | 308 | - | - | - | - | 308 | |
| Electric Transmission | SB Line: New 115kV Line - Hurley Ave. to Saugerties - Article VII: 11.11 miles | Maintain System Standards | 1,400 | - | - | - | - | 1,400 | |
| Electric Transmission | H Line: New 115kV Line - Saugerties to N. Catskill - Article VII: 12.25 miles | Maintain System Standards | 1,430 | 1,658 | 1,814 | - | - | 4,902 | |
| Electric Transmission | HG Line: New 69kV Line - Honk Falls to Neversink - Part 102C | Maintain System Standards | - | 261 | 1,440 | 1,467 | 404 | 3,573 | |
| Electric Transmission | Retirement of O & OB Line Section from Dashville Tap to Ohioville | Maintain System Standards | 332 | 372 | - | - | - | 704 | |
| Electric Transmission | Q Line: New 115kV Line - Pleasant Valley - Rhinebeck | Maintain System Standards | - | - | - | 544 | 2,216 | 2,759 | |
| Electric Transmission | Removal of SD 1 SJ and WM Tap Lines | Maintain System Standards | 1,325 | 1,260 | - | - | - | 2,586 | |
| Electric Transmission | 69kV GM Line: Retirement of Clinton Avenue Tap Section | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Transmission | 115kV SK Line Rebuild | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Transmission | 115kV 5 Line Rebuild | Maintain System Standards | - | - | 200 | 978 | - | 1,178 | |
| Electric Transmission | 115kV CN Line Rebuild | System Enhancements | - | - | - | - | - | - | - |
| Electric Transmission | NW Line 345/115/69 Station Connection & 1.2 Mile NW Line 115kV Rebuild | System Enhancements | - | - | - | - | - | - | - |
| Electric Transmission | Subtotal - Electric Transmission | | 6,266 | 5,658 | 4,676 | 4,945 | 3,800 | 25,344 | |
| Electric Substation | Substation Minor Projects (1-1311-00-18) | Non Discretionary | 229 | 206 | 255 | 217 | 216 | 1,124 | |
| Electric Substation | Substation Battery Replacement Program (1-1312-05-18) | Maintain System Standards | 20 | 42 | 21 | 43 | 22 | 149 | |
| Electric Substation | Greenfield Rd. - Substation Upgrade (Reuse Kerhonkson & Modena Transformers) (1-1312-99-19) | Maintain System Standards | 102 | - | - | - | - | 102 | |
| Electric Substation | Bethlehem Road - UB Line Relay Upgrade & Breaker Replacement (1-1312-99-19) | Maintain System Standards | 102 | - | - | - | - | 102 | |
| Electric Substation | Union Avenue - UB Line Relay Upgrade (1-1312-99-19) | Maintain System Standards | 51 | - | - | - | - | 51 | |
| Electric Substation | Rock Tavern - 345 kV Disconnect Replacement (RTB-4483 & RTB-31194) (1-1312-99-19) | Maintain System Standards | 51 | - | - | - | - | 51 | |
| Electric Substation | New Baltimore Upgrade (New 12MVA Transformer, relays, and 15kV breakers) (1-1312-99-19) | Maintain System Standards | 154 | - | - | - | - | 154 | |
| Electric Substation | Lincoln Park - Relay Upgrade & BRP (115 kV - LR-1219-HP, HP-1318) (1-1312-99-19) | Maintain System Standards | 51 | - | - | - | - | 51 | |
| Electric Substation | Forgebrook 115kV Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | 51 | - | - | - | - | 51 | |
| Electric Substation | South Cairo (15 kV - W-1658) (1-1312-99-19) BRP | Maintain System Standards | 51 | - | - | - | - | 51 | |
| Electric Substation | Terminal Upgrade Work for 115kV Loop (High Falls) (1-1312-99-19) | Maintain System Standards | 51 | - | - | - | - | 51 | |
| Electric Substation | P Line Moved to 115kV Bus (Sturgeon Pool) (1-1312-99-19) | Maintain System Standards | 51 | - | - | - | - | 51 | |
| Electric Substation | Coxsackie - DEC Peaker Regulation Project (Transformer Only) (1-1312-99-19) | Maintain System Standards | 102 | - | - | - | - | 102 | |
| Electric Substation | South Cairo - DEC Peaker Regulation Project (D-VAR & Transformer) (1-1312-99-19) | Maintain System Standards | 102 | - | - | - | - | 102 | |
| Electric Substation | New Baltimore (FKA Freehold) - DEC Peaker Regulation Project (D-VAR Only) (1-1312-99-19) | Maintain System Standards | 102 | - | - | - | - | 102 | |
| Electric Substation | Grid Mod - Multiple Substations (1-1312-99-19) | Maintain System Standards | 522 | - | 53 | - | - | 575 | |
| Electric Substation | Maybrook Transformer Upgrades (1-1312-99-19) | Maintain System Standards | 102 | 178 | - | - | - | 280 | |
| Electric Substation | Milan PLC Replacement (1-1312-99-19) | Maintain System Standards | - | 104 | - | - | - | 104 | |
| Electric Substation | Fishkill Plains Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | 26 | - | - | - | 26 | |
| Electric Substation | Sand Dock - Add Breaker For Tilton (1-1312-99-19) | Maintain System Standards | - | 26 | - | - | - | 26 | |
| Electric Substation | Highland Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | 26 | - | - | - | 26 | |
| Electric Substation | Millerton Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | 26 | - | - | - | 26 | |
| Electric Substation | Todd Hill Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | 26 | - | - | - | 26 | |
| Electric Substation | East Walden Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | 26 | - | - | - | 26 | |
| Electric Substation | Reynolds Hill Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | 26 | - | - | - | 26 | |
| Electric Substation | East Kingston PLC Replacement (1-1312-99-19) | Maintain System Standards | 51 | 209 | - | - | - | 260 | |
| Electric Substation | Hibemia (69 kV - E-972) (1-1312-99-19) BRP | Maintain System Standards | - | 52 | - | - | - | 52 | |
| Electric Substation | Reynolds Hill (15 kV - TD-6001, TD-6005) - Evaluate Switchgear Purchase (1-1312-99-19) BRP | Maintain System Standards | - | 52 | - | - | - | 52 | |

| ELECTRIC RETIREMENTS | | | | | | | | | |
|-----------------------|--|---------------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| CAT. | Description | Discretion Level | 2024 | 2025 | 2026 | 2027 | 2028 | 5-Year Total | |
| Electric Substation | Neversink (15 kV - W-1128, CKT-391) (1-1312-99-19) BRP | Maintain System Standards | - | 52 | - | - | - | - | 52 |
| Electric Substation | Mobile Switchgear (1-1312-99-19) | Maintain System Standards | - | - | - | - | - | - | - |
| Electric Substation | Clinton Ave. - Retire Substation (1-1312-99-19) | Retirement | - | 157 | - | - | - | - | 157 |
| Electric Substation | South Wall Street - Retire Substation (1-1312-99-19) | Retirement | - | 157 | - | - | - | - | 157 |
| Electric Substation | Montgomery St. 14kV Switchgear Upgrade (1-1312-99-19) | Maintain System Standards | - | - | 320 | - | - | - | 320 |
| Electric Substation | Lawrenceville Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | 53 | - | - | - | 53 |
| Electric Substation | Dashville Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | 53 | - | - | - | 53 |
| Electric Substation | Barnegat Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | 53 | - | - | - | 53 |
| Electric Substation | Hunter Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | 53 | - | - | - | 53 |
| Electric Substation | Neversink Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | 53 | - | - | - | 53 |
| Electric Substation | Wicopee Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | 53 | - | - | - | 53 |
| Electric Substation | Sturgeon Pool 4kV Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | 53 | - | - | - | 53 |
| Electric Substation | North Chelsea PLC Replacement (1-1312-99-19) | Maintain System Standards | - | - | 107 | - | - | - | 107 |
| Electric Substation | Sturgeon Pool (15 kV - OS-1, OS-2, OS-3) (1-1312-99-19) BRP | Maintain System Standards | - | - | 53 | - | - | - | 53 |
| Electric Substation | Pulvers T#1 69-13.8kV Replacement (1-1312-99-19) | Maintain System Standards | - | - | 160 | - | - | - | 160 |
| Electric Substation | Myers Corners Switchgear Upgrade & 69kV Breaker TV-399-KM Repl (1-1312-99-19) | Maintain System Standards | - | - | 320 | - | - | - | 320 |
| Electric Substation | Balmville - Retire Substation (1-1312-99-19) | Retirement | - | - | 213 | - | - | - | 213 |
| Electric Substation | Smithfield Relay Modernization (1-1312-99-19) | Maintain System Standards | - | - | - | 163 | - | - | 163 |
| Electric Substation | Sand Dock Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | - | 54 | - | - | 54 |
| Electric Substation | Staatsburg BM85 RTU Replacement (1-1312-99-19) | Maintain System Standards | - | - | - | 54 | - | - | 54 |
| Electric Substation | Merritt Park PLC Replacement (1-1312-99-19) | Maintain System Standards | - | - | - | 109 | - | - | 109 |
| Electric Substation | Sand Dock (15 kV - 10 Breakers) (1-1312-99-19) BRP | Maintain System Standards | - | - | - | 109 | - | - | 109 |
| Electric Substation | Tiononda (15 kV - W-567, TD-8085, TD-8086, TD-8087) (1-1312-99-19) BRP | Maintain System Standards | - | - | - | 109 | - | - | 109 |
| Electric Substation | 19) | Maintain System Standards | - | - | 53 | 163 | - | - | 216 |
| Electric Substation | Shenandoah Relay Upgrade, BRP (15 kV - 25 Breakers) (1-1312-99-19) | Maintain System Standards | - | 104 | 107 | 326 | - | - | 537 |
| Electric Substation | Ancram Replacement from EC Spare, Replace EC Spare (1 Phase 34.5/13.8kV) (1-1312-99-19) | Maintain System Standards | - | - | - | 294 | - | - | 294 |
| Electric Substation | Smithfield Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | - | - | 55 | - | 55 |
| Electric Substation | Westerlo BM85 RTU Replacement (1-1312-99-19) | Maintain System Standards | - | - | - | - | 55 | - | 55 |
| Electric Substation | Spackenkill PLC Replacement (1-1312-99-19) | Maintain System Standards | - | - | - | 33 | 89 | - | 121 |
| Electric Substation | Galeville PLC Replacement (1-1312-99-19) | Maintain System Standards | - | - | - | 33 | 89 | - | 121 |
| Electric Substation | Saugerties PLC Replacement (1-1312-99-19) | Maintain System Standards | - | - | - | 33 | 89 | - | 121 |
| Electric Substation | Hurley Avenue (15 kV - W-252, W-1575, CKT-2091, CKT-2092, CKT-2093, CKT-2094) (1-1312-99-19) BRP | Maintain System Standards | - | - | - | - | - | 111 | 111 |
| Electric Substation | Tiononda Switchgear Replacement (1-1312-99-19) | Maintain System Standards | - | - | - | - | - | 222 | 222 |
| Electric Substation | Jansen Avenue Substation Upgrade, GE Harris RTU Replacement, BRP (15 kV - 9 Breakers) (1-1312-99-19) | Maintain System Standards | - | - | - | - | 277 | - | 277 |
| Electric Substation | Hurley Avenue - 115-13.8 kV 13.4/17.9/22.4 MVA Transformer & Switchgear (1-1312-99-19) | Maintain System Standards | - | - | - | - | 28 | - | 28 |
| Electric Substation | Rock Tavern 115 kV Relay Upgrade (1-1312-99-19) ESPIP | Maintain System Standards | - | - | - | - | 22 | - | 22 |
| Electric Substation | 345kV Switch Replacement Program (1-1312-98-19) | Maintain System Standards | 154 | 157 | 160 | 163 | 166 | - | 800 |
| Electric Substation | 115kV Switch Replacement Program (1-1312-98-19) | Maintain System Standards | 102 | 104 | 107 | 109 | 111 | - | 533 |
| Electric Substation | Post Heads - East (1-1312-98-19) | Maintain System Standards | 174 | - | - | - | - | - | 174 |
| Electric Substation | Kertronkon 115/69kV Autotransformers Phase 2 (1 - 56MVA) (Remove 61850) (1-1312-98-19) | Maintain System Standards | 102 | - | - | - | - | - | 102 |
| Electric Substation | Rock Tavern 345kV 311 Line A2 Relay Upgrade (1-1312-98-19) ESPIP | Maintain System Standards | 61 | - | - | - | - | - | 61 |
| Electric Substation | Roseton 345kV 311 Line A2 Relay Upgrade (1-1312-98-19) ESPIP | Maintain System Standards | 61 | - | - | - | - | - | 61 |
| Electric Substation | Hurley Ave. 345kV Relay Upgrade (1-1312-98-19) ESPIP | Maintain System Standards | - | 10 | 107 | - | - | - | 117 |
| Electric Substation | Rock Tavern 345kV Relay Upgrade (1-1312-98-19) ESPIP | Maintain System Standards | - | - | - | 54 | 55 | - | 110 |
| Electric Substation | Pleasant Valley 115kV Modernization (Package Sub & Relays) (1-1312-98-19) | Maintain System Standards | - | - | - | 109 | 554 | - | 663 |
| Electric Substation | Roseton 345kV Relay Upgrade (1-1312-98-19) ESPIP | Maintain System Standards | - | - | - | - | 55 | - | 55 |
| Electric Substation | Woodstock - Switchgear Replacement (1-1312-31-15) | Maintain System Standards | - | 183 | - | - | - | - | 183 |
| Electric Substation | Modena - Add 3rd Bkr to Complete 115kV Ring Bus (see P&MK memo) (1-1312-52-17) | Maintain System Standards | - | 157 | 176 | - | - | - | 333 |
| Electric Substation | Ticon - Tap Station (1-1312-52-16) | System Enhancements | - | - | - | - | - | - | - |
| Electric Substation | Subtotal - Electric Substation | | 2,604 | 2,108 | 2,586 | 2,174 | 2,216 | | 11,688 |
| Electric New Business | New Business | Non Discretionary | 102 | 108 | 113 | 119 | 125 | | 567 |
| Electric New Business | Bellefield | Non Discretionary | - | - | - | - | - | | - |
| Electric New Business | PharmaCann | Non Discretionary | - | - | - | - | - | | - |
| Electric New Business | Cresco | Non Discretionary | - | - | - | - | - | | - |
| Electric New Business | Hudson Heritage | Non Discretionary | - | - | - | - | - | | - |
| Electric New Business | Coeymans Industrial Park | Non Discretionary | - | - | - | - | - | | - |
| Electric New Business | Unidentified warehouse, production | Non Discretionary | - | - | - | - | - | | - |
| Electric New Business | ELEC. N.B. OVERHEAD - BLANKET | Non Discretionary | 92 | 97 | 102 | 107 | 112 | | 510 |
| Electric New Business | ELEC. & GAS COMB. URD - BLANKET | Non Discretionary | 31 | 32 | 34 | 36 | 37 | | 170 |
| Electric New Business | ELEC. URD - BLANKET | Non Discretionary | 31 | 32 | 34 | 36 | 37 | | 170 |
| Electric New Business | Subtotal - Electric New Business | | 256 | 269 | 283 | 297 | 312 | | 1,417 |
| Electric Distribution | Distribution Improvement Blankets (15BL-01) | Maintain System Standards | 788 | 731 | 747 | 761 | 776 | | 3,803 |
| Electric Distribution | Relocation Blankets (15BL-02) | Non Discretionary | 24 | 22 | 22 | 23 | 23 | | 114 |
| Electric Distribution | Distribution Improvement Minors (1511-0X) | Maintain System Standards | 6 | 6 | 6 | 6 | 6 | | 30 |
| Electric Distribution | Distribution Improvement Conversions (1521-0X) | Maintain System Standards | 36 | 34 | 35 | 35 | 36 | | 176 |
| Electric Distribution | Road/Bridge Rebuild Relocation Projects (1531-0X) | Non Discretionary | 61 | 56 | 29 | 29 | 30 | | 205 |
| Electric Distribution | CATV Make-ready | Non Discretionary | 68 | 63 | 64 | 65 | 66 | | 326 |
| Electric Distribution | Overhead Secondary Replacement Program | Maintain System Standards | 24 | 23 | 23 | 24 | 24 | | 119 |
| Electric Distribution | Distribution Pole Replacement Program | System Enhancements | 1,689 | 2,194 | 2,241 | 2,283 | 2,285 | | 10,692 |
| Electric Distribution | Distribution Automation - Other | System Enhancements | 56 | 52 | 53 | 54 | 55 | | 272 |
| Electric Distribution | Distribution Automation - Major Program (\$2.7M carryover) | System Enhancements | 555 | 50 | - | - | - | | 605 |
| Electric Distribution | Distribution Improvement (1551-0X) - Thermal / Voltage | System Enhancements | - | 63 | - | - | - | | 63 |
| Electric Distribution | Distribution Improvement (1551-0X) - Reliability | System Enhancements | 122 | 133 | 147 | 117 | 155 | | 673 |
| Electric Distribution | CEM/Worst Circuit Reliability Program | System Enhancements | 127 | 113 | 108 | 133 | 121 | | 602 |
| Electric Distribution | Resiliency Program | System Enhancements | - | - | 179 | - | - | | 179 |
| Electric Distribution | Distribution Improvement (1551-0X) - Operating/ Infrastructure Condition | Maintain System Standards | 316 | 194 | 160 | 414 | 444 | | 1,528 |
| Electric Distribution | 5kV Aerial Cable Replacement Program | Maintain System Standards | - | 10 | - | - | - | | 10 |
| Electric Distribution | Copper Wire Replacement Program | Maintain System Standards | - | - | 93 | 68 | - | | 161 |
| Electric Distribution | 4800 V Conversion/Infrastructure Program | Maintain System Standards | 455 | 286 | 286 | 237 | 233 | | 1,476 |
| Electric Distribution | Network Cable and Equipment | Maintain System Standards | 203 | 214 | 211 | 38 | 39 | | 705 |
| Electric Distribution | Secondary Network Upgrade Program (All Districts) | Maintain System Standards | 162 | 136 | 189 | 190 | 44 | | 721 |

| ELECTRIC RETIREMENTS | | | | | | | | |
|------------------------------|---|---------------------------|---------------|---------------|---------------|---------------|---------------|---------------------|
| CAT. | Description | Discretion Level | 2024 | 2025 | 2026 | 2027 | 2028 | 5-Year Total |
| Electric Distribution | URD replacement | Maintain System Standards | 148 | 680 | 560 | 598 | 692 | 2,679 |
| Electric Distribution | CAT 15 - Sub Circuit Exits | Maintain System Standards | - | 146 | 187 | 54 | 33 | 421 |
| Electric Distribution | Storm Hardening | System Enhancements | 898 | 410 | 400 | 518 | 627 | 2,854 |
| Electric Distribution | Subtotal - Electric Distribution | | 5,738 | 5,619 | 5,720 | 5,649 | 5,689 | 28,415 |
| Electric Transformers | Transformers - New Business | Non Discretionary | 409 | 418 | 427 | 435 | 443 | 2,132 |
| Electric Transformers | Capacitors | Non Discretionary | - | - | - | - | - | - |
| Electric Transformers | Regulators | Non Discretionary | - | - | - | - | - | - |
| Electric Transformers | Network Protectors | Non Discretionary | - | - | - | - | - | - |
| Electric Transformers | Subtotal - Electric Transformers | | 409 | 418 | 427 | 435 | 443 | 2,132 |
| Electric Meters | X041A - Special Meter Installations | Non Discretionary | 5 | 10 | 11 | 11 | 11 | 48 |
| Electric Meters | X042A - Instrument Transformers | Non Discretionary | - | - | - | - | - | - |
| Electric Meters | X043A - Electric Meters | Non Discretionary | - | - | - | - | - | - |
| Electric Meters | AMI Pilot | Non Discretionary | - | - | - | - | - | - |
| Electric Meters | X043A - GE I-210, GE310I Meter Replacements | Non Discretionary | - | - | - | - | - | - |
| Electric Meters | Subtotal - Electric Meters | | 5 | 10 | 11 | 11 | 11 | 48 |
| | Total - Electric Capital Program | | 15,283 | 15,340 | 13,797 | 13,566 | 12,504 | 70,489 |

| GAS ADDITIONS | | | W/ AFUDC, Inflated & CH Adjustments | | | | | |
|-------------------------|--|---------------------------|-------------------------------------|--------------|--------------|--------------|--------------|---------------|
| CAT. | Description | Discretion Level | 2024 | 2025 | 2026 | 2027 | 2028 | 5-Year Total |
| Gas Transmission | Catholic Test Stations | Maintain System Standards | 42 | - | - | - | - | 42 |
| Gas Transmission | Transmission ROW Capital Improvements | Maintain System Standards | 104 | - | - | - | - | 104 |
| Gas Transmission | Prior Year Projects | Maintain System Standards | 26 | - | - | - | - | 26 |
| Gas Transmission | Class Location Line Valve Program AH9A (Rate Case Proposal) | Non Discretionary | 607 | - | - | - | - | 607 |
| Gas Transmission | Remote Operated Valves | Maintain System Standards | 209 | - | - | - | - | 209 |
| Gas Transmission | AH Line (AH9) Replacement | Maintain System Standards | 523 | - | - | - | - | 523 |
| Gas Transmission | Poughkeepsie Receival MP/TP Interconnect | Maintain System Standards | 1,506 | - | - | - | - | 1,506 |
| Gas Transmission | Pig Launching Station (s) for Internal Line Inspection | Maintain System Standards | 240 | - | - | - | - | 240 |
| Gas Transmission | TP Line Identified Segment 1 Replacement | Non Discretionary | 984 | - | - | - | - | 984 |
| Gas Transmission | Catholic Test Stations | Maintain System Standards | - | 43 | - | - | - | 43 |
| Gas Transmission | Transmission ROW Capital Improvements | Maintain System Standards | - | 108 | - | - | - | 108 |
| Gas Transmission | Prior Year Projects | Maintain System Standards | - | 27 | - | - | - | 27 |
| Gas Transmission | Class Location Line Valve Program AH17A (Rate Case Proposal) | Non Discretionary | - | 634 | - | - | - | 634 |
| Gas Transmission | Remote Operated Valves | Maintain System Standards | - | 742 | - | - | - | 742 |
| Gas Transmission | AH Line (AH6.7) Replacement | Maintain System Standards | - | 814 | - | - | - | 814 |
| Gas Transmission | Pig Launching Station (s) for Internal Line Inspection | Maintain System Standards | - | 619 | - | - | - | 619 |
| Gas Transmission | Gate Station PLC Replacement | Maintain System Standards | - | 543 | - | - | - | 543 |
| Gas Transmission | TP Line Identified Segment 1 Replacement | Non Discretionary | - | 3,116 | - | - | - | 3,116 |
| Gas Transmission | Catholic Test Stations | Maintain System Standards | - | - | 44 | - | - | 44 |
| Gas Transmission | Transmission ROW Capital Improvements | Maintain System Standards | - | - | 111 | - | - | 111 |
| Gas Transmission | Prior Year Projects | Maintain System Standards | - | - | 28 | - | - | 28 |
| Gas Transmission | Class Location Line Valve Program AH20A (Rate Case Proposal) | Non Discretionary | - | - | 645 | - | - | 645 |
| Gas Transmission | Remote Operated Valves | Maintain System Standards | - | - | 761 | - | - | 761 |
| Gas Transmission | AH Line (AH4.5) Replacement | Maintain System Standards | - | - | 829 | - | - | 829 |
| Gas Transmission | Pig Launching Station (s) for Internal Line Inspection | Maintain System Standards | - | - | 349 | - | - | 349 |
| Gas Transmission | Gate Station PLC Replacement | Maintain System Standards | - | - | 553 | - | - | 553 |
| Gas Transmission | TP Line Identified Segment 1 Replacement | Non Discretionary | - | - | 3,499 | - | - | 3,499 |
| Gas Transmission | Catholic Test Stations | Maintain System Standards | - | - | - | 46 | - | 46 |
| Gas Transmission | Transmission ROW Capital Improvements | Maintain System Standards | - | - | - | 114 | - | 114 |
| Gas Transmission | Prior Year Projects | Maintain System Standards | - | - | - | 28 | - | 28 |
| Gas Transmission | Class Location Line Valve Program TP11A (Rate Case Proposal) | Non Discretionary | - | - | - | 665 | - | 665 |
| Gas Transmission | Remote Operated Valves | Maintain System Standards | - | - | - | 854 | - | 854 |
| Gas Transmission | AH Line (AH2.3) Replacement | Maintain System Standards | - | - | - | 784 | - | 784 |
| Gas Transmission | Pig Launching Station (s) for Internal Line Inspection | Maintain System Standards | - | - | - | 360 | - | 360 |
| Gas Transmission | Gate Station PLC Replacement | Maintain System Standards | - | - | - | 569 | - | 569 |
| Gas Transmission | TP Line Identified Segment 2,3,4,5 Replacements | Non Discretionary | - | - | - | 1,075 | - | 1,075 |
| Gas Transmission | Catholic Test Stations | Maintain System Standards | - | - | - | - | 46 | 46 |
| Gas Transmission | Transmission ROW Capital Improvements | Maintain System Standards | - | - | - | - | 114 | 114 |
| Gas Transmission | Prior Year Projects | Maintain System Standards | - | - | - | - | 29 | 29 |
| Gas Transmission | Class Location Line Valve Program AH6B (Rate Case Proposal) | Non Discretionary | - | - | - | - | 667 | 667 |
| Gas Transmission | Class Location Line Valve Program AH7A (Rate Case Proposal) | Non Discretionary | - | - | - | - | 667 | 667 |
| Gas Transmission | Remote Operated Valves | Maintain System Standards | - | - | - | - | 774 | 774 |
| Gas Transmission | AH Line (AH15,16) Replacement | Maintain System Standards | - | - | - | - | 857 | 857 |
| Gas Transmission | Pig Launching Station (s) for Internal Line Inspection | Maintain System Standards | - | - | - | - | 361 | 361 |
| Gas Transmission | Gate Station PLC Replacement | Maintain System Standards | - | - | - | - | 571 | 571 |
| Gas Transmission | TP Line Identified Segment 2,3,4,5 Replacements | Non Discretionary | - | - | - | - | 1,586 | 1,586 |
| Gas Transmission | Subtotal - Gas Transmission | | 4,240 | 6,647 | 6,818 | 4,493 | 5,672 | 27,870 |
| Gas Regulator Stations | Station Retirements | Maintain System Standards | - | - | - | - | - | - |
| Gas Regulator Stations | Pressure Control Improvements | Maintain System Standards | 227 | - | - | - | - | 227 |
| Gas Regulator Stations | Pressure Recording Chart Replacements | Maintain System Standards | 154 | - | - | - | - | 154 |
| Gas Regulator Stations | Regulator Station SCADA Implementation | System Enhancements | 134 | - | - | - | - | 134 |
| Gas Regulator Stations | Prior Year Projects | Maintain System Standards | 26 | - | - | - | - | 26 |
| Gas Regulator Stations | Regulator Station Coating Program (Rate Case Proposal) | Maintain System Standards | 103 | - | - | - | - | 103 |
| Gas Regulator Stations | Mill Street Heater Installation | Maintain System Standards | 412 | - | - | - | - | 412 |
| Gas Regulator Stations | Saugerties Regulator Station Rebuild | Maintain System Standards | 1,157 | - | - | - | - | 1,157 |
| Gas Regulator Stations | Athens Heater Installation | Maintain System Standards | 412 | - | - | - | - | 412 |
| Gas Regulator Stations | Clark St Regulator Station Rebuild | Maintain System Standards | 340 | - | - | - | - | 340 |
| Gas Regulator Stations | Gasco Regulator Station Rebuild | Maintain System Standards | 340 | - | - | - | - | 340 |
| Gas Regulator Stations | Station Retirements | Maintain System Standards | - | - | - | - | - | - |
| Gas Regulator Stations | Pressure Control Improvements | Maintain System Standards | - | 286 | - | - | - | 286 |
| Gas Regulator Stations | Pressure Recording Chart Replacements | Maintain System Standards | - | 212 | - | - | - | 212 |
| Gas Regulator Stations | Regulator Station SCADA Implementation | System Enhancements | - | 106 | - | - | - | 106 |
| Gas Regulator Stations | Prior Year Projects | Maintain System Standards | - | 26 | - | - | - | 26 |
| Gas Regulator Stations | Regulator Station Coating Program (Rate Case Proposal) | Maintain System Standards | - | 265 | - | - | - | 265 |
| Gas Regulator Stations | Barclay Heights Regulator Station Rebuild | Maintain System Standards | - | 349 | - | - | - | 349 |
| Gas Regulator Stations | Catskill Heater Replacement | Maintain System Standards | - | 423 | - | - | - | 423 |
| Gas Regulator Stations | Hopewell Heater Replacement | Maintain System Standards | - | 423 | - | - | - | 423 |
| Gas Regulator Stations | North Cornwall Station Rebuild | Maintain System Standards | - | 1,186 | - | - | - | 1,186 |
| Gas Regulator Stations | South Gate Estates Property Purchase | Maintain System Standards | - | 105 | - | - | - | 105 |
| Gas Regulator Stations | South Street Property Purchase | Maintain System Standards | - | 211 | - | - | - | 211 |
| Gas Regulator Stations | Station Retirements | Maintain System Standards | - | - | - | - | - | - |
| Gas Regulator Stations | Pressure Control Improvements | Maintain System Standards | - | - | 291 | - | - | 291 |
| Gas Regulator Stations | Pressure Recording Chart Replacements | Maintain System Standards | - | - | 216 | - | - | 216 |
| Gas Regulator Stations | Regulator Station SCADA Implementation | System Enhancements | - | - | 108 | - | - | 108 |
| Gas Regulator Stations | Prior Year Projects | Maintain System Standards | - | - | 27 | - | - | 27 |
| Gas Regulator Stations | Regulator Station Coating Program (Rate Case Proposal) | Maintain System Standards | - | - | 269 | - | - | 269 |
| Gas Regulator Stations | Riverside Road Heater Replacement | Maintain System Standards | - | - | 431 | - | - | 431 |
| Gas Regulator Stations | All Angels Hill Road Heater Replacement | Maintain System Standards | - | - | 431 | - | - | 431 |
| Gas Regulator Stations | John Street Regulator Station Rebuild | Maintain System Standards | - | - | 356 | - | - | 356 |

| GAS ADDITIONS | | | W/ AFUDC, Inflated & CH Adjustments | | | | | |
|-------------------------------|---|---------------------------|-------------------------------------|---------------|--------------|--------------|--------------|---------------|
| CAT. | Description | Discretion Level | 2024 | 2025 | 2026 | 2027 | 2028 | 5-Year Total |
| Gas Regulator Stations | South Gate Estates Rebuild | Maintain System Standards | - | - | 356 | - | - | 356 |
| Gas Regulator Stations | Cochecton Heater Installation | Maintain System Standards | - | - | 431 | - | - | 431 |
| Gas Regulator Stations | South Street Regulator Station Replacement | Maintain System Standards | - | - | 905 | - | - | 905 |
| Gas Regulator Stations | Station Retirements | Maintain System Standards | - | - | - | - | - | - |
| Gas Regulator Stations | Pressure Control Improvements | Maintain System Standards | - | - | - | 168 | - | 168 |
| Gas Regulator Stations | Pressure Recording Chart Replacements | Maintain System Standards | - | - | - | 224 | - | 224 |
| Gas Regulator Stations | Regulator Station SCADA Implementation | System Enhancements | - | - | - | 112 | - | 112 |
| Gas Regulator Stations | Prior Year Projects | Maintain System Standards | - | - | - | 28 | - | 28 |
| Gas Regulator Stations | Regulator Station Coating Program (Rate Case Proposal) | Maintain System Standards | - | - | - | 279 | - | 279 |
| Gas Regulator Stations | Titusville Regulator Station Rebuild | Maintain System Standards | - | - | - | 1,242 | - | 1,242 |
| Gas Regulator Stations | Hughsonville Regulator Station Rebuild | Maintain System Standards | - | - | - | 1,006 | - | 1,006 |
| Gas Regulator Stations | Violet Avenue Regulator Station Rebuild | Maintain System Standards | - | - | - | 1,319 | - | 1,319 |
| Gas Regulator Stations | Station Retirements | Maintain System Standards | - | - | - | - | - | - |
| Gas Regulator Stations | Pressure Control Improvements | Maintain System Standards | - | - | - | - | 169 | 169 |
| Gas Regulator Stations | Pressure Recording Chart Replacements | Maintain System Standards | - | - | - | - | 225 | 225 |
| Gas Regulator Stations | Regulator Station SCADA Implementation | System Enhancements | - | - | - | - | 113 | 113 |
| Gas Regulator Stations | Prior Year Projects | Maintain System Standards | - | - | - | - | 28 | 28 |
| Gas Regulator Stations | Regulator Station Coating Program (Rate Case Proposal) | Maintain System Standards | - | - | - | - | 282 | 282 |
| Gas Regulator Stations | Blue Point Heater Installation | Maintain System Standards | - | - | - | - | 451 | 451 |
| Gas Regulator Stations | Vails Gate Regulator Station Rebuild | Maintain System Standards | - | - | - | - | 938 | 938 |
| Gas Regulator Stations | KS Regulator Station Rebuild/Build New Distribution Improvement | Maintain System Standards | - | - | - | - | 372 | 372 |
| Gas Regulator Stations | Fullers Corners Regulator Station Rebuild | Maintain System Standards | - | - | - | - | 1,015 | 1,015 |
| Gas Regulator Stations | Vassar Farms Regulator Station Rebuild | Maintain System Standards | - | - | - | - | 372 | 372 |
| Gas Regulator Stations | Fleetwood Drive Regulator Station Rebuild | Maintain System Standards | - | - | - | - | 372 | 372 |
| Gas Regulator Stations | Subtotal - Gas Regulator Stations | | 3,304 | 3,592 | 3,820 | 4,376 | 4,337 | 19,429 |
| Gas New Business | GAS NB - TRADITIONAL NEW BUSINESS | Non Discretionary | 1,851 | 1,982 | 2,040 | 2,142 | 2,251 | 10,266 |
| Gas New Business | GAS MAINS NEW BUSINESS - SYSTEM | Non Discretionary | 2,513 | 2,591 | 2,566 | 2,586 | 2,718 | 12,974 |
| Gas New Business | GAS NEW BUS LOCALS & SERV BLANKETS | Non Discretionary | 2,511 | 2,591 | 2,566 | 2,586 | 2,718 | 12,972 |
| Gas New Business | GAS NB - COMMERCIAL CONVERSIONS | Non Discretionary | 206 | 220 | 227 | 238 | 250 | 1,141 |
| Gas New Business | GAS NB - SIMPLY BETTER - RES | Non Discretionary | 308 | 330 | 340 | 357 | 375 | 1,711 |
| Gas New Business | Greenhaven Correctional | Non Discretionary | 2,567 | 2,658 | - | - | - | 5,225 |
| Gas New Business | Subtotal - Gas New Business | | 9,955 | 10,373 | 7,738 | 7,908 | 8,313 | 44,288 |
| Gas Distribution | PK Port Ewen | System Enhancements | - | - | - | - | - | - |
| Gas Distribution | PN Line Phoenix Street South | Non Discretionary | 3,043 | - | - | - | - | 3,043 |
| Gas Distribution | PN Line Evergreen South to IBM | Non Discretionary | - | 3,577 | - | - | - | 3,577 |
| Gas Distribution | PN Line - 9D Wappingers North | Non Discretionary | - | - | 3,249 | - | - | 3,249 |
| Gas Distribution | PN Line - Wappingers Creek South | Non Discretionary | - | - | - | 1,700 | 1,741 | 3,441 |
| Gas Distribution | PN Line - New Pipe to IBM | Non Discretionary | - | - | - | - | - | - |
| Gas Distribution | NP - Grand Street North of Broadway | System Enhancements | - | - | - | - | - | - |
| Gas Distribution | Corrosion Control | Non Discretionary | 310 | 316 | 323 | 329 | 337 | 1,615 |
| Gas Distribution | Highway Relocation non LPP | Non Discretionary | 1,032 | 1,052 | 1,077 | 1,098 | 1,125 | 5,385 |
| Gas Distribution | Service Replacement Blankets - Emergent | Non Discretionary | 2,581 | 2,631 | 2,692 | 2,746 | 2,812 | 13,462 |
| Gas Distribution | Isolated Service Replacement Blankets | Non Discretionary | 1,858 | 1,894 | 1,939 | 1,977 | 2,025 | 9,693 |
| Gas Distribution | Local Orders -Operational | Non Discretionary | 373 | 380 | 389 | 396 | 406 | 1,944 |
| Gas Distribution | Gasco Upgrade Finish | Non Discretionary | - | - | - | - | - | - |
| Gas Distribution | Downing 120 PSIG West of Grand | Non Discretionary | 2,987 | - | - | - | - | 2,987 |
| Gas Distribution | Marys Avenue Tie - Reserve for Spring Street - phase 2 | Non Discretionary | - | - | - | - | - | - |
| Gas Distribution | West Point | Maintain System Standards | - | - | - | 2,197 | 7,874 | 10,071 |
| Gas Distribution | KS Line Reinforcement | Maintain System Standards | - | - | 2,928 | - | - | 2,928 |
| Gas Distribution | Farm Tap Elimination Program | Non Discretionary | - | - | - | - | - | - |
| Gas Distribution | South Clinton Reg Station | Non Discretionary | - | - | - | - | - | - |
| Gas Distribution | Compression Coupling Neighborhoods | Maintain System Standards | - | 1,331 | 2,086 | 2,891 | 3,017 | 9,325 |
| Gas Distribution | Transmission Service to Distribution | Maintain System Standards | - | 996 | 1,374 | 1,622 | 2,258 | 6,250 |
| Gas Distribution | Leak Prone Pipe Services | Maintain System Standards | 1,745 | 1,779 | 1,821 | 1,857 | 1,902 | 9,105 |
| Gas Distribution | River/Creek Crossing Reinforcements | System Enhancements | - | 994 | 1,371 | 1,619 | 2,253 | 6,237 |
| Gas Distribution | Road Rebuild - Includes Paving Proj | Non Discretionary | 3,613 | 3,946 | 4,308 | 4,668 | 5,062 | 21,597 |
| Gas Distribution | Cast Iron Undermines | Non Discretionary | 155 | 158 | 162 | 165 | 169 | 808 |
| Gas Distribution | Unident Leaking - Includes Active Corrosion | Non Discretionary | 774 | 789 | 808 | 824 | 844 | 4,039 |
| Gas Distribution | Service Partial/Swing Identified DIPS | Non Discretionary | 6,619 | 7,097 | 8,040 | 7,214 | 6,889 | 35,859 |
| Gas Distribution | Svce Repl Blankets DIPS | Non Discretionary | 6,073 | 8,215 | 6,107 | 5,068 | 6,057 | 31,519 |
| Gas Distribution | South Wall Street Area | Non Discretionary | 2,962 | - | - | - | - | 2,962 |
| Gas Distribution | Northern Catskill | Non Discretionary | 3,017 | - | - | - | - | 3,017 |
| Gas Distribution | E Poughkeepsie College to Hooker | Non Discretionary | 3,768 | - | - | - | - | 3,768 |
| Gas Distribution | Randolph Ferris Beechwood Neighborhood | Non Discretionary | 2,821 | - | - | - | - | 2,821 |
| Gas Distribution | Sharon Drive and Route 9 | Non Discretionary | 1,196 | - | - | - | - | 1,196 |
| Gas Distribution | NLP-South Sv/ N of Fullerton | Non Discretionary | 3,482 | - | - | - | - | 3,482 |
| Gas Distribution | Fairview and Quarry Street | Non Discretionary | 2,229 | - | - | - | - | 2,229 |
| Gas Distribution | Liberty St Paving - 2024 | Non Discretionary | 942 | - | - | - | - | 942 |
| Gas Distribution | NM - South St | Non Discretionary | - | 1,687 | - | - | - | 1,687 |
| Gas Distribution | Garden Smith Foxhall | Non Discretionary | - | 2,573 | - | - | - | 2,573 |
| Gas Distribution | Mid Wall and Fair Street | Non Discretionary | - | 2,191 | - | - | - | 2,191 |
| Gas Distribution | Midtown Kingston | Non Discretionary | - | 2,807 | - | - | - | 2,807 |
| Gas Distribution | Fairview Station Neighborhood | Non Discretionary | - | 2,902 | - | - | - | 2,902 |
| Gas Distribution | PN IBM Area | Non Discretionary | - | 4,213 | - | - | - | 4,213 |
| Gas Distribution | Village of Fishkill - South | Non Discretionary | - | 1,209 | - | - | - | 1,209 |
| Gas Distribution | Nbg Fullerton to West 60 PSIG Swing | Non Discretionary | - | 3,637 | - | - | - | 3,637 |
| Gas Distribution | NLP/ NM- S. Clark St Neighborhood | Non Discretionary | - | - | 2,193 | - | - | 2,193 |
| Gas Distribution | Union Avenue/LNW Neighborhood | Non Discretionary | - | - | 932 | - | - | 932 |

| GAS ADDITIONS | | | W/ AFUDC, Inflated & CH Adjustments | | | | | |
|-------------------------|------------------------------------|---------------------|-------------------------------------|---------------|---------------|---------------|---------------|----------------|
| CAT. | Description | Discretion Level | 2024 | 2025 | 2026 | 2027 | 2028 | 5-Year Total |
| Gas Distribution | Parker Ave | Non Discretionary | - | - | 2,030 | - | - | 2,030 |
| Gas Distribution | Central Kingston | Non Discretionary | - | - | 4,920 | - | - | 4,920 |
| Gas Distribution | Uptown Kingston Neighborhood | Non Discretionary | - | - | 2,413 | - | - | 2,413 |
| Gas Distribution | Mansion Violet Hamilton | Non Discretionary | - | - | 3,192 | - | - | 3,192 |
| Gas Distribution | Central West Poughkeepsie | Non Discretionary | - | - | 2,296 | - | - | 2,296 |
| Gas Distribution | Poughkeepsie Medium Clean-up | Non Discretionary | - | - | 710 | - | - | 710 |
| Gas Distribution | Wappinger's Falls | Non Discretionary | - | - | 1,685 | - | - | 1,685 |
| Gas Distribution | Village of Fishkill - North | Non Discretionary | - | - | 1,338 | - | - | 1,338 |
| Gas Distribution | Marine Drive to Cornwall 60 PSIG | Non Discretionary | - | - | - | 2,861 | - | 2,861 |
| Gas Distribution | MNG South | Non Discretionary | - | - | - | 2,779 | - | 2,779 |
| Gas Distribution | NLP- South St Neighborhood | Non Discretionary | - | - | - | 2,047 | - | 2,047 |
| Gas Distribution | ME Line- Hwy 17K | Non Discretionary | - | - | - | 5,022 | - | 5,022 |
| Gas Distribution | Stewart Avenue System | Non Discretionary | - | - | - | 938 | - | 938 |
| Gas Distribution | Wappinger's Falls Route 9D | Non Discretionary | - | - | - | 2,110 | - | 2,110 |
| Gas Distribution | West Beacon | Non Discretionary | - | - | - | 7,276 | - | 7,276 |
| Gas Distribution | NLP- Newburgh Holder | Non Discretionary | - | - | - | 1,346 | - | 1,346 |
| Gas Distribution | ME Line- Hwy 32 | Non Discretionary | - | - | - | 2,941 | - | 2,941 |
| Gas Distribution | Broome Neighborhood Catskill | Non Discretionary | - | - | - | - | 2,730 | 2,730 |
| Gas Distribution | NLP-Carpenter Ave Phase 2 | Non Discretionary | - | - | - | - | 2,323 | 2,323 |
| Gas Distribution | NM - Creek Run | Non Discretionary | - | - | - | - | 3,228 | 3,228 |
| Gas Distribution | BN Line Replacement | Non Discretionary | - | - | - | - | 2,791 | 2,791 |
| Gas Distribution | North Highland | Non Discretionary | - | - | - | - | 2,841 | 2,841 |
| Gas Distribution | Old Mill Howard | System Enhancements | - | - | - | - | 2,113 | 2,113 |
| Gas Distribution | Malden System | System Enhancements | - | - | - | - | 3,771 | 3,771 |
| Gas Distribution | East Beacon | System Enhancements | - | - | - | - | 5,345 | 5,345 |
| Gas Distribution | Subtotal - Gas Distribution | | 51,581 | 56,374 | 60,382 | 63,691 | 69,912 | 301,940 |
| Gas Meters | X081A - Gas Meters | Non Discretionary | 1,729 | 1,765 | 1,922 | 2,089 | 2,271 | 9,777 |
| Gas Meters | X084A - Special Meter Installation | Non Discretionary | 1,171 | 1,195 | 1,220 | 1,243 | 1,267 | 6,097 |
| Gas Meters | 2712-00-18 - Specific Work Orders | Non Discretionary | 27 | 68 | 70 | 72 | 73 | 310 |
| Gas Meters | Subtotal Gas Meters | | 2,926 | 3,028 | 3,213 | 3,405 | 3,611 | 16,183 |
| | Total - Gas Capital Program | | 72,005 | 80,014 | 81,971 | 83,874 | 91,845 | 409,710 |

| Common Additions | | | W/ AFUDC, Inflated & GH Adjustments | | | | | |
|------------------|--|---------------------------|-------------------------------------|-------|--------|-------|--------|--------------|
| CAT. | Description | Discretion Level | 2024 | 2025 | 2026 | 2027 | 2028 | 5-Year Total |
| Land & Buildings | Daily Operations - Electric | Maintain System Standards | 140 | 107 | 111 | 111 | 123 | 593 |
| Land & Buildings | Daily Operations - Flooring | Maintain System Standards | 140 | 107 | 111 | 111 | 123 | 593 |
| Land & Buildings | Daily Operations - HVAC | Maintain System Standards | 140 | 107 | 111 | 111 | 123 | 593 |
| Land & Buildings | Daily Operations - Unidentified | Maintain System Standards | 698 | 536 | 557 | 556 | 615 | 2,961 |
| Land & Buildings | EV Charging Infrastructure | Maintain System Standards | 349 | 268 | 278 | 278 | 307 | 1,481 |
| Land & Buildings | Exterior Door Replacements | Maintain System Standards | 90 | 80 | 84 | 83 | 88 | 425 |
| Land & Buildings | Solar System on Company Facilities | Maintain System Standards | 30 | 180 | 1,994 | 657 | 189 | 3,050 |
| Land & Buildings | Architectural/Engineering Design | Maintain System Standards | 349 | 268 | 278 | 278 | 307 | 1,481 |
| Land & Buildings | Paving | Maintain System Standards | 698 | 536 | 557 | 556 | 615 | 2,961 |
| Land & Buildings | Primary Control Center | Maintain System Standards | 4,628 | - | - | - | - | 4,628 |
| Land & Buildings | Training Academy, Site Development | Maintain System Standards | 1,157 | - | - | - | - | 1,157 |
| Land & Buildings | Training Academy, Academy | Maintain System Standards | - | - | - | 8,384 | 16,591 | 24,975 |
| Land & Buildings | Training Academy, Annex | Maintain System Standards | 579 | 9,088 | 10,510 | - | - | 20,176 |
| Land & Buildings | Newburgh- New Facility | Maintain System Standards | - | - | - | 524 | 1,936 | 2,460 |
| Land & Buildings | Transportation Building - EC | Maintain System Standards | - | 505 | 4,204 | - | - | 4,709 |
| Land & Buildings | Bulter Building Rebuild | Maintain System Standards | - | 505 | 4,204 | - | - | 4,709 |
| Land & Buildings | Tannersville- New Facility | Maintain System Standards | 1,157 | 3,029 | - | - | - | 4,186 |
| Land & Buildings | Building 805/806 Rebuild | Maintain System Standards | - | - | - | 1,048 | - | 1,048 |
| Land & Buildings | Ellenville Office Renovation | Maintain System Standards | - | 76 | 1,156 | - | - | 1,232 |
| Land & Buildings | KNG- Retaining wall replacement- phase 1 (rear) | Maintain System Standards | 1,400 | - | - | - | - | 1,400 |
| Land & Buildings | POK- outdoor area & retire CNG equipment | Maintain System Standards | 201 | - | - | - | - | 201 |
| Land & Buildings | POK- Facilities Driveway | Maintain System Standards | 37 | - | - | - | - | 37 |
| Land & Buildings | POK- Facilities polebarn | Maintain System Standards | 243 | - | - | - | - | 243 |
| Land & Buildings | POK- Install awning@ Drafting (B802), Auditorium (B807) and Rear of B810 | Maintain System Standards | 134 | - | - | - | - | 134 |
| Land & Buildings | POK- Bldg 801 - Replace Windows Executive wing | Maintain System Standards | 154 | - | - | - | - | 154 |
| Land & Buildings | POK- Operations Pole barn drainage | Maintain System Standards | 237 | - | - | - | - | 237 |
| Land & Buildings | POK- Operations Pole barn concrete floor | Maintain System Standards | 55 | - | - | - | - | 55 |
| Land & Buildings | POK- Replace main building exterior lights with tunable LED | Maintain System Standards | 234 | - | - | - | - | 234 |
| Land & Buildings | POK- Bldg 806 - Expand transformer storage area | Maintain System Standards | 201 | - | - | - | - | 201 |
| Land & Buildings | POK- Record Retention Improvements | Maintain System Standards | 100 | - | - | - | - | 100 |
| Land & Buildings | KNG- Front lot drainage improvements | Maintain System Standards | 536 | - | - | - | - | 536 |
| Land & Buildings | RFN- Install backup Generator for lodge and office | Maintain System Standards | 91 | - | - | - | - | 91 |
| Land & Buildings | NBG- Repave guard shed to line garage | Maintain System Standards | 122 | - | - | - | - | 122 |
| Land & Buildings | FSH- Restroom Renovations | Maintain System Standards | 487 | - | - | - | - | 487 |
| Land & Buildings | CAT- Repave side and rear lot | Maintain System Standards | 365 | - | - | - | - | 365 |
| Land & Buildings | FSH- Replace JCI fire detection system with alternate system | Maintain System Standards | 304 | - | - | - | - | 304 |
| Land & Buildings | POK- Auditorium Renovation | Maintain System Standards | 609 | - | - | - | - | 609 |
| Land & Buildings | POK- Lighting Upgrade - Storeroom | Maintain System Standards | 140 | - | - | - | - | 140 |
| Land & Buildings | POK-Bldg. 800 Freight elevator replacement- design | Maintain System Standards | 61 | - | - | - | - | 61 |
| Land & Buildings | KNG- Transportation Restroom reconfiguration | Maintain System Standards | 213 | - | - | - | - | 213 |
| Land & Buildings | NBG- Replace HVAC Units add dehumidification | Maintain System Standards | 183 | - | - | - | - | 183 |
| Land & Buildings | POK- Bldg 807 2nd floor testing room HVAC replacement | Maintain System Standards | 122 | - | - | - | - | 122 |
| Land & Buildings | POK- Upgrade Electric to 801 2nd floor | Maintain System Standards | 213 | - | - | - | - | 213 |
| Land & Buildings | EC-Water and sewer installation for rigger trailer | Maintain System Standards | 487 | - | - | - | - | 487 |
| Land & Buildings | EC- Install ceiling and lighting in loading dock area | Maintain System Standards | 396 | - | - | - | - | 396 |
| Land & Buildings | GNV- Pole Racks | Maintain System Standards | - | 107 | - | - | - | 107 |
| Land & Buildings | POK- Bldg - 800 mens restroom renovation | Maintain System Standards | - | 204 | - | - | - | 204 |
| Land & Buildings | POK- MultiMedia Studio | Maintain System Standards | - | 589 | - | - | - | 589 |
| Land & Buildings | FSH- Video wall building preparation Fishkill Dispatch | Maintain System Standards | - | 54 | - | - | - | 54 |
| Land & Buildings | POK- Bldg 801 - Replace Windows Second Floor | Maintain System Standards | - | 161 | - | - | - | 161 |
| Land & Buildings | KNG- Front curb & sidewalk | Maintain System Standards | - | 536 | - | - | - | 536 |
| Land & Buildings | POK- Call Center redesign- design | Maintain System Standards | - | 54 | - | - | - | 54 |
| Land & Buildings | POK- New water main and valve Pheonix st | Maintain System Standards | - | 161 | - | - | - | 161 |
| Land & Buildings | POK- Replace Training Room HVAC Unit hook up to new controls | Maintain System Standards | - | 64 | - | - | - | 64 |
| Land & Buildings | POK- Pave Pole & Equipment area | Maintain System Standards | - | 86 | - | - | - | 86 |
| Land & Buildings | POK- Bldg 810 - Replace 1 Leiberts unit in Computer Room | Maintain System Standards | - | 161 | - | - | - | 161 |
| Land & Buildings | KNG- Main level renovation, aud and conf. room | Maintain System Standards | - | 107 | - | - | - | 107 |
| Land & Buildings | POK- Bldg 805 Replace Roof | Maintain System Standards | - | 161 | - | - | - | 161 |
| Land & Buildings | POK- Record Retention study implementation | Maintain System Standards | - | 161 | - | - | - | 161 |
| Land & Buildings | POK- Outdoor picnic patio/Executive lot | Maintain System Standards | - | 80 | - | - | - | 80 |
| Land & Buildings | POK- Corp Com area re-configure | Maintain System Standards | - | 161 | - | - | - | 161 |
| Land & Buildings | GNV- Expand parking lot | Maintain System Standards | - | 161 | - | - | - | 161 |
| Land & Buildings | EC- Pave parking by transformer/transportation shop, replace drainage | Maintain System Standards | - | 321 | - | - | - | 321 |
| Land & Buildings | POK- Building 805 Resurface and Restripe Garage Floors | Maintain System Standards | - | 64 | - | - | - | 64 |
| Land & Buildings | EC- Rehab EC construction maint garage (roof, OHDs, wall) | Maintain System Standards | - | 268 | - | - | - | 268 |
| Land & Buildings | POK- install gas boilers in 803 mechanical room, eliminate steam in 803 | Maintain System Standards | - | 214 | - | - | - | 214 |
| Land & Buildings | POK- Purchase 1/3 of tanks for Sapphire fire protection system | Maintain System Standards | - | 107 | - | - | - | 107 |
| Land & Buildings | EC-Renovate Restrooms in Storeroom | Maintain System Standards | - | 161 | - | - | - | 161 |
| Land & Buildings | KNG- Retaining wall replacement- phase 2 (front) | Maintain System Standards | - | 2,143 | - | - | - | 2,143 |
| Land & Buildings | KNG- Replace JCI system Kingston lower building | Maintain System Standards | - | 268 | - | - | - | 268 |
| Land & Buildings | KNG- Replace Rezner heater in Metershop | Maintain System Standards | - | 54 | - | - | - | 54 |

| Common Additions | | | W/ AFUDC, Inflated & OI Adjustments | | | | | |
|-----------------------------|---|---------------------------|-------------------------------------|---------------|---------------|---------------|---------------|----------------|
| CAT. | Description | Discretion Level | 2024 | 2025 | 2026 | 2027 | 2028 | 5-Year Total |
| Land & Buildings | POK- Exterior lighting upgrades | Maintain System Standards | - | - | 111 | - | - | 111 |
| Land & Buildings | POK-Bldg 806 - Restroom Renovation | Maintain System Standards | - | - | 167 | - | - | 167 |
| Land & Buildings | POK- Bldg. 810 cooling tower upgrade | Maintain System Standards | - | - | 223 | - | - | 223 |
| Land & Buildings | POK- Building 806 - Roof Replacement | Maintain System Standards | - | - | 278 | - | - | 278 |
| Land & Buildings | POK- Replace JCI Poughkeepsie building 810 | Maintain System Standards | - | - | 334 | - | - | 334 |
| Land & Buildings | CAT-Renovate estimating and offices (not breakroom) | Maintain System Standards | - | - | 278 | - | - | 278 |
| Land & Buildings | CAT- Install New HVAC Unit (add zone) | Maintain System Standards | - | - | 111 | - | - | 111 |
| Land & Buildings | FSH- Install New Roof Training Center | Maintain System Standards | - | - | 206 | - | - | 206 |
| Land & Buildings | EC- Replace Storeroom roof | Maintain System Standards | - | - | 446 | - | - | 446 |
| Land & Buildings | KNG-Repave parking lot | Maintain System Standards | - | - | 446 | - | - | 446 |
| Land & Buildings | KNG- Replace Drainage West of rear building | Maintain System Standards | - | - | 251 | - | - | 251 |
| Land & Buildings | POK- Bldg 802 - Replace Windows | Maintain System Standards | - | - | 167 | - | - | 167 |
| Land & Buildings | POK- Renovate Sys Ops Restrooms | Maintain System Standards | - | - | 167 | - | - | 167 |
| Land & Buildings | POK- Replace Window - Bldg 805/806 | Maintain System Standards | - | - | 111 | - | - | 111 |
| Land & Buildings | KNG- Replace JCI system Kingston upper building | Maintain System Standards | - | - | 306 | - | - | 306 |
| Land & Buildings | POK- 810 heat pumps with RTU w/ MERV 13 filter and UV light | Maintain System Standards | - | - | 446 | - | - | 446 |
| Land & Buildings | POK- Call center redesign | Maintain System Standards | - | - | 446 | - | - | 446 |
| Land & Buildings | POK- Bldg 803 - Replace Carpet on S1 level | Maintain System Standards | - | - | 111 | - | - | 111 |
| Land & Buildings | KNG- Replace Windows Front Bldg | Maintain System Standards | - | - | 390 | - | - | 390 |
| Land & Buildings | KNG- Replace Carpet Tiles | Maintain System Standards | - | - | 111 | - | - | 111 |
| Land & Buildings | POK- Building 801 roof replacement | Maintain System Standards | - | - | 223 | - | - | 223 |
| Land & Buildings | POK- Repave roadway behind building 803, 806 and 810 | Maintain System Standards | - | - | 278 | - | - | 278 |
| Land & Buildings | POK- Install RTU or heat pump for bld. 800 to eliminate steam | Maintain System Standards | - | - | 780 | - | - | 780 |
| Land & Buildings | KNG-Build Maintenance Shop | Maintain System Standards | - | - | 84 | - | - | 84 |
| Land & Buildings | EC- Rehab EC electricians garage (roof, OHDs, wall) | Maintain System Standards | - | - | - | 445 | - | 445 |
| Land & Buildings | CAT- Replace Generator | Maintain System Standards | - | - | - | 83 | - | 83 |
| Land & Buildings | POK- Freight Elevator loading dock & Driveway | Maintain System Standards | - | - | - | 167 | - | 167 |
| Land & Buildings | POK- Bldg 807 - Upper & lower Roof Replacement | Maintain System Standards | - | - | - | 195 | - | 195 |
| Land & Buildings | POK- Boiler Room - Build out for Facilities | Maintain System Standards | - | - | - | 222 | - | 222 |
| Land & Buildings | RFN- Replace siding & windows on lodge and office | Maintain System Standards | - | - | - | 278 | - | 278 |
| Land & Buildings | POK- Bldg 803 - Replace HVAC Units S1 & S2 level | Maintain System Standards | - | - | - | 278 | - | 278 |
| Land & Buildings | POK- pole barn for facilities storage | Maintain System Standards | - | - | - | 111 | - | 111 |
| Land & Buildings | POK- Bldg. 805 Replace Gas Garage doors | Maintain System Standards | - | - | - | 61 | - | 61 |
| Land & Buildings | POK- Replace JCI Poughkeepsie building 807/808 | Maintain System Standards | - | - | - | 306 | - | 306 |
| Land & Buildings | POK- Replace watermain on campus (main entry to 807) | Maintain System Standards | - | - | - | 389 | - | 389 |
| Land & Buildings | POK- Renovate corp com mens room | Maintain System Standards | - | - | - | 195 | - | 195 |
| Land & Buildings | POK- Paving, drainage and sidewalk south parking lot | Maintain System Standards | - | - | - | 473 | - | 473 |
| Land & Buildings | KNG- RTU replacement | Maintain System Standards | - | - | - | 278 | - | 278 |
| Land & Buildings | EVL- Repave parking lot | Maintain System Standards | - | - | - | 278 | - | 278 |
| Land & Buildings | KNG- Buildout front annex (gas training area) | Maintain System Standards | - | - | - | 334 | - | 334 |
| Land & Buildings | POK- Replace damaged fence around facility | Maintain System Standards | - | - | - | 389 | - | 389 |
| Land & Buildings | CAT- Upgrade garage lighting to LED | Maintain System Standards | - | - | - | 28 | - | 28 |
| Land & Buildings | CAT- Replace security shed | Maintain System Standards | - | - | - | 83 | - | 83 |
| Land & Buildings | FSH- Replace security shed | Maintain System Standards | - | - | - | 83 | - | 83 |
| Land & Buildings | FSH- Renovate south end of building | Maintain System Standards | - | - | - | 612 | - | 612 |
| Land & Buildings | POK- Renovate S3 Call Center | Maintain System Standards | - | - | - | 306 | - | 306 |
| Land & Buildings | NBG- Rebuild Material Bins | Maintain System Standards | - | - | - | - | 176 | 176 |
| Land & Buildings | NBG- Replace Flooring | Maintain System Standards | - | - | - | - | 88 | 88 |
| Land & Buildings | NBG- Renovate Restrooms | Maintain System Standards | - | - | - | - | 351 | 351 |
| Land & Buildings | NBG- Roof Replacement | Maintain System Standards | - | - | - | - | 469 | 469 |
| Land & Buildings | NBG- Replace Generator | Maintain System Standards | - | - | - | - | 100 | 100 |
| Land & Buildings | POK- building 803 roof replacement | Maintain System Standards | - | - | - | - | 322 | 322 |
| Land & Buildings | KNG- Paving | Maintain System Standards | - | - | - | - | 586 | 586 |
| Land & Buildings | CAT- Renovate breakroom | Maintain System Standards | - | - | - | - | 234 | 234 |
| Land & Buildings | POK- Bldg 803 - Replace Elevator | Maintain System Standards | - | - | - | - | 996 | 996 |
| Land & Buildings | FSH- Hook up to municipal sewer | Maintain System Standards | - | - | - | - | 293 | 293 |
| Land & Buildings | POK- Renovate corp com womens room | Maintain System Standards | - | - | - | - | 205 | 205 |
| Land & Buildings | POK- Replace JCI Poughkeepsie building 800 | Maintain System Standards | - | - | - | - | 351 | 351 |
| Land & Buildings | KNG-Controls System HVAC | Maintain System Standards | - | - | - | - | 59 | 59 |
| Land & Buildings | CAT-Replace HVAC Unit | Maintain System Standards | - | - | - | - | 88 | 88 |
| Land & Buildings | EC- Pave Portion of parking and roadway | Maintain System Standards | - | - | - | - | 293 | 293 |
| Land & Buildings | POK- Bldg 807 - Replace tile flooring basement level | Maintain System Standards | - | - | - | - | 176 | 176 |
| Land & Buildings | Subtotal - Land & Buildings | | 17,479 | 21,996 | 30,628 | 18,293 | 25,802 | 114,199 |
| Office Equipment | Daily Operations- Misc furniture | Maintain System Standards | 171 | 175 | 178 | 182 | 185 | 891 |
| Office Equipment | Office Chair Replacement Program | Maintain System Standards | 32 | 32 | 33 | 34 | 34 | 165 |
| Office Equipment | Revamping space to meet needs of hybrid workforce model | Maintain System Standards | 102 | 104 | 106 | 108 | 110 | 530 |
| Office Equipment | Primary Control Center (42) | Maintain System Standards | 255 | - | - | - | - | 255 |
| Office Equipment | Training Academy, Annex (15) | Maintain System Standards | - | - | 95 | - | - | 95 |
| Office Equipment | Training Academy, Annex (training equipment) | Maintain System Standards | - | 334 | 1,392 | 416 | - | 2,143 |
| Office Equipment | Training Academy, Academy | Maintain System Standards | - | - | - | - | 554 | 554 |
| Office Equipment | Tannersville- New Facility (7) | Maintain System Standards | - | 43 | - | - | - | 43 |

| Common Additions | | | W/ AFUDC, Inflated & OI Adjustments | | | | | |
|-------------------------|---|---------------------------|-------------------------------------|--------------|--------------|--------------|--------------|---------------|
| CAT. | Description | Discretion Level | 2024 | 2025 | 2026 | 2027 | 2028 | 5-Year Total |
| Office Equipment | Transportation Building - EC (3) | Maintain System Standards | - | - | 19 | - | - | 19 |
| Office Equipment | Bulter Building Rebuild (5) | Maintain System Standards | - | - | 32 | - | - | 32 |
| Office Equipment | Ellenville Office Renovation (6) | Maintain System Standards | - | - | 38 | - | - | 38 |
| Office Equipment | Subtotal - Office Equipment | | 560 | 689 | 1,893 | 740 | 884 | 4,765 |
| EMS | GE OMS Implementation | Maintain System Standards | - | 2,142 | 2,225 | - | - | 4,367 |
| EMS | OT EMS Upgrade Hardware | Maintain System Standards | 324 | 319 | - | - | - | 643 |
| EMS | OT Misc Replacements (4230) | Maintain System Standards | 81 | 80 | 80 | 83 | 84 | 408 |
| EMS | OT Infrastructure Upgrades | Maintain System Standards | 216 | 213 | 215 | 220 | 225 | 1,089 |
| EMS | OT DMS Upgrade Hardware | Maintain System Standards | - | - | 215 | 220 | - | 435 |
| EMS | OT Industrial Defender Hardware Upgrade | Maintain System Standards | 325 | 319 | - | - | 732 | 1,375 |
| EMS | OT Ccure Hardware Upgrade | Maintain System Standards | - | - | - | - | 208 | 208 |
| EMS | OT EMS Upgrade Software | Maintain System Standards | 1,056 | - | - | - | - | 1,056 |
| EMS | OT Compliance Automation (CIP-010/CIP-002) | Maintain System Standards | 162 | - | - | - | - | 162 |
| EMS | Grid Mod - ADMS Modeling and Enhancements West of River | System Enhancements | 1,056 | 108 | - | - | - | 1,164 |
| EMS | OT Dragos Neighborhood Watch/Keeper | System Enhancements | - | 106 | - | - | - | 106 |
| EMS | OT Compliance Automation (CIP-007/CIP-005) | Maintain System Standards | - | 186 | 188 | - | - | 374 |
| EMS | OT DMS Upgrade Software | Maintain System Standards | - | - | 723 | 2,851 | - | 3,574 |
| EMS | Primary Control Center - Zetron Implementation (4230-OT SW) | System Enhancements | 1,056 | - | - | - | - | 1,056 |
| EMS | Primary Control Center -- OT SW (4230-OT SW)) | System Enhancements | 634 | 27 | - | - | - | 661 |
| EMS | Primary Control Center -- OT HW (4230-OT HW) | System Enhancements | 973 | 27 | - | - | - | 999 |
| EMS | Subtotal - EMS | | 5,883 | 3,526 | 3,646 | 3,373 | 1,249 | 17,676 |
| Hardware | Asset Mgmt - End User Device HW Lifecycle | Maintain System Standards | 1,081 | 1,063 | 1,073 | 1,100 | 1,125 | 5,443 |
| Hardware | Luminex Virtual Tape Library Devices - PQK | Maintain System Standards | 270 | - | - | - | - | 270 |
| Hardware | Network Infrastructure Lifecycle Upgrades / Replacements | Maintain System Standards | 367 | 425 | 456 | 495 | 563 | 2,307 |
| Hardware | Palo Alto HW Lifecycle | Maintain System Standards | 648 | - | - | - | - | 648 |
| Hardware | Plotter Replacement for Drafting | Maintain System Standards | 65 | - | - | - | - | 65 |
| Hardware | IBM Mainframe Disk Storage | Maintain System Standards | 270 | - | - | - | - | 270 |
| Hardware | IDF Rebuilds 2024 | Maintain System Standards | 162 | - | - | - | - | 162 |
| Hardware | IDF Rebuilds 2025 | Maintain System Standards | - | 160 | - | - | - | 160 |
| Hardware | IDF Rebuilds 2026 | Maintain System Standards | - | - | 161 | - | - | 161 |
| Hardware | IDF Rebuilds 2027 | Maintain System Standards | - | - | - | 165 | - | 165 |
| Hardware | IDF Rebuilds 2028 | Maintain System Standards | - | - | - | - | 169 | 169 |
| Hardware | Luminex Virtual Tape Library Devices - Philadelphia | Maintain System Standards | - | - | 268 | - | - | 268 |
| Hardware | Small Switch Upgrades | Maintain System Standards | - | 159 | 107 | 110 | 113 | 489 |
| Hardware | Ville WAN HW Lifecycle | Maintain System Standards | - | 16 | - | - | - | 16 |
| Hardware | WAN and Internet HW Lifecycle | Maintain System Standards | - | - | 537 | - | - | 537 |
| Hardware | Mobile Site WAN Router Renewal | Maintain System Standards | 151 | - | - | - | - | 151 |
| Hardware | Infrastructure HW Lifecycle (Replacement & Storage Upgrades) | Maintain System Standards | 1,297 | 1,276 | 1,073 | 1,100 | 1,125 | 5,872 |
| Hardware | Primary Control Center -- IT HW (4222-IT HW) | System Enhancements | 108 | 27 | - | - | - | 135 |
| Hardware | Asset Mgmt - End User Device SW Lifecycle | Maintain System Standards | 270 | 266 | 322 | 358 | 394 | 1,609 |
| Hardware | Microsoft Roadmap: License/Contract Renewal - - M365 E5 3-Year Renewal | Maintain System Standards | - | - | 2,146 | - | - | 2,146 |
| Hardware | Project & Portfolio Management Solution (Enterprise Wide) - PPM | System Enhancements | 919 | - | - | - | - | 919 |
| Hardware | Employee Scorecards | System Enhancements | 22 | - | - | - | - | 22 |
| Hardware | MotioCI Upgrade | Maintain System Standards | 22 | - | - | - | - | 22 |
| Hardware | Service Now Phase IV -Corporate Knowledge Base Repository (HR) | System Enhancements | 54 | - | - | - | - | 54 |
| Software | ServiceNow Upgrades & Enhancements - Ongoing Sprints | Maintain System Standards | 106 | 321 | 334 | 342 | 356 | 1,459 |
| Software | M365: Safety Incident Apps & Analytics | System Enhancements | - | 268 | - | - | - | 268 |
| Software | Microsoft Roadmap: Communication & Collaboration (PBX Replacement) | System Enhancements | - | - | 667 | - | - | 667 |
| Software | Annual Bundled Upgrades & Releases of M365 continuous Improvements | Maintain System Standards | 106 | 107 | 117 | 125 | 137 | 592 |
| Software | Middleware Upgrades - SOA | Maintain System Standards | 211 | 257 | 222 | 228 | 238 | 1,156 |
| Software | Chronus Mentoring Upgrade & Enhancements | Maintain System Standards | - | 214 | - | - | - | 214 |
| Software | Datastage Upgrade | Maintain System Standards | - | - | 222 | - | - | 222 |
| Software | DIS Replacement | Maintain System Standards | - | - | 334 | - | - | 334 |
| Software | Episerver UI Upgrade | Maintain System Standards | - | - | 222 | - | - | 222 |
| Software | Microsoft Roadmap: Ops Evolution | System Enhancements | - | 107 | - | - | - | 107 |
| Software | Cygnit Upgrade & Enhancements | Maintain System Standards | 106 | - | 111 | - | 119 | 336 |
| Software | Records Management Tool Enhancements (Gimmel/E5) | Maintain System Standards | - | 214 | - | - | 297 | 511 |
| Software | Application Upgrades | Maintain System Standards | 528 | 536 | 556 | 570 | 594 | 2,784 |
| Software | App Services Emergent | Maintain System Standards | - | 392 | 813 | 1,460 | 1,520 | 4,185 |
| Software | SAP S/4 Hana System Licenses | Maintain System Standards | - | 8,451 | - | - | - | 8,451 |
| Software | SAP Dunning | Maintain System Standards | 2,006 | - | - | - | - | 2,006 |
| Software | Monthly Meter Reading SW Implementation | Maintain System Standards | 528 | 538 | - | - | - | 1,066 |
| Software | Standby Billing Rates (Cost included within SAP Major Systems Upgrade & Enhancements) | Maintain System Standards | - | - | - | - | - | - |
| Software | Unmetered service rate case (Cost included within SAP Major Systems Upgrade & Enhancements) | Maintain System Standards | - | - | - | - | - | - |
| Software | Gas Block Bill display changes(Cost included within SAP Major Systems Upgrade & Enhancements) | Maintain System Standards | - | - | - | - | - | - |
| Software | EV commercial rate design | System Enhancements | - | - | - | - | - | - |
| Software | CX - ADA Assessment (Web/Mobile) | Maintain System Standards | 106 | - | - | - | - | 106 |
| Software | CX - MobileBox (like Session Cam but for Mobile App - a Glassdoor Product) | System Enhancements | 106 | - | - | - | - | 106 |
| Software | CX - Feedback tab on the website | System Enhancements | 79 | - | - | - | - | 79 |
| Software | Muni Portal Upgrade & Enhancements | Maintain System Standards | - | 321 | - | - | - | 321 |

| Common Additions | | | W/ AFUDC, Inflated & OI Adjustments | | | | | |
|------------------|---|---------------------------|-------------------------------------|-------|-------|--------|--------|--------------|
| CAT. | Description | Discretion Level | 2024 | 2025 | 2026 | 2027 | 2028 | 5-Year Total |
| Software | Salesforce Retirement | Maintain System Standards | - | - | 167 | - | - | 167 |
| Software | CX - Mobile App Upgrades - Account Settings / Contact Info | System Enhancements | 63 | - | - | - | - | 63 |
| Software | CX - Mobile App Upgrades - App Tutorial for new users | System Enhancements | 132 | - | - | - | - | 132 |
| Software | IVR Modernization - Including Visual IVR, Voice Recognition and VoiceBots | Maintain System Standards | 528 | 2,516 | - | - | - | 3,044 |
| Software | CX - Centralized Preferences Notifications | System Enhancements | 290 | 296 | - | - | - | 587 |
| Software | CX - Kubra Payment Posting API Phase 2 | System Enhancements | 317 | - | - | - | - | 317 |
| Software | CX - Mobile App Upgrades - Chatbot for App | System Enhancements | - | 134 | - | - | - | 134 |
| Software | CX - Mobile App Upgrades - Delete Profile / Register new | System Enhancements | - | 65 | - | - | - | 65 |
| Software | CX - Mobile App Upgrades - DPA Application | System Enhancements | 106 | 108 | - | - | - | 213 |
| Software | CX - Mobile App Upgrades - EE Promos | System Enhancements | - | 65 | - | - | - | 65 |
| Software | CX - Mobile App Upgrades - Push & Email Notifications | System Enhancements | - | 135 | - | - | - | 135 |
| Software | CX - Mobile App Upgrades - Report Streetlights Out Email form | System Enhancements | - | 107 | - | - | - | 107 |
| Software | CX - Mobile App Upgrades - Web Chat from App | System Enhancements | - | 134 | - | - | - | 134 |
| Software | CX - Web Upgrades - Digital Welcome Kit for new Customers | System Enhancements | - | 134 | - | - | - | 134 |
| Software | CX - Web Upgrades - Email form for updating account owner name | System Enhancements | - | 80 | - | - | - | 80 |
| Software | CX - Web Upgrades - Landlord, Business, Contractor, Developer Experience | System Enhancements | - | 214 | - | - | - | 214 |
| Software | Calabrio/Telopli workforce scheduling software Replacement | Maintain System Standards | 317 | - | - | - | - | 317 |
| Software | CDG Developer Portal | System Enhancements | - | - | 278 | - | - | 278 |
| Software | eBills Biller Direct API Updates | System Enhancements | - | - | 111 | - | - | 111 |
| Software | J Log Auto Creation (Form) | System Enhancements | - | - | 111 | - | - | 111 |
| Software | J Log Portal | System Enhancements | - | - | 111 | - | - | 111 |
| Software | Street Light Out Reporting (GIS Map) | System Enhancements | - | - | 222 | - | - | 222 |
| Software | CIS/CX Emergent | System Enhancements | - | 1,069 | 1,110 | 488 | 508 | 3,175 |
| Software | Customer Bill Redesign | System Enhancements | 158 | - | - | - | - | 158 |
| Software | Spanish Customer Bill | System Enhancements | - | 108 | - | - | - | 108 |
| Software | Spanish Forms and Letters | System Enhancements | - | 107 | - | - | - | 107 |
| Software | More Online Energy calculators | System Enhancements | - | 108 | - | - | - | 108 |
| Software | Website and MyAccount Portal refresh | System Enhancements | - | 108 | - | - | - | 108 |
| Software | Kubra Replacement - Payment Experience vendor. eBill, Bill Presentment and Bill Print | Maintain System Standards | - | 1,071 | 2,225 | - | - | 3,296 |
| Software | SAP Major System Upgrade & Enhancements | Maintain System Standards | 2,323 | 1,499 | 779 | 798 | 831 | 6,231 |
| Software | Identity and Access Management (IDAM) Phase 2 (SAP GRC & ServiceNow) | System Enhancements | - | 352 | - | - | - | 352 |
| Software | ISE Phase III - Cisco ISE Upgrade to 3.0 and Enhancements and/ Rapid 7 Integration) | Maintain System Standards | 106 | - | - | - | - | 106 |
| Software | ServiceNow Phase V - GRC Tool - Policy & Compliance Mgmt | System Enhancements | 544 | - | - | - | - | 544 |
| Software | Cisco ISE VM Updates | Maintain System Standards | - | 135 | - | 228 | - | 363 |
| Software | ISE Phase IV - Cisco Stealth watch Implementation | Maintain System Standards | - | 107 | 111 | - | - | 218 |
| Software | Microsoft Roadmap: Access & Data Protection | Maintain System Standards | - | 213 | 222 | 228 | - | 664 |
| Software | Microsoft Roadmap: Device Management | Maintain System Standards | - | - | 195 | - | - | 195 |
| Software | ServiceNow Phased Cyber investments including Vendor Management & Security | Maintain System Standards | - | - | 222 | 285 | 356 | 864 |
| Software | Web Vulnerability Scanner for Code Dev | System Enhancements | 264 | - | - | - | - | 264 |
| Software | IDAM System Upgrade & Enhancements | Maintain System Standards | - | 85 | 89 | 91 | 95 | 360 |
| Software | Cybersecurity SW Emergent | Maintain System Standards | - | 334 | 347 | 356 | 371 | 1,408 |
| Software | ERP Phase III - Wave 1 Finance Assessment & RFP | System Enhancements | - | - | 2,574 | - | - | 2,574 |
| Software | ERP Transformation | System Enhancements | - | - | - | 14,254 | 35,627 | 49,881 |
| Software | EmpCenter Upgrades and Enhancements | Maintain System Standards | - | - | 334 | - | - | 334 |
| Software | Tagetik Upgrades and Enhancements | Maintain System Standards | - | - | 612 | - | - | 612 |
| Software | Workiva Upgrade and Enhancements | Maintain System Standards | 211 | - | 556 | - | - | 767 |
| Software | Potential Replacement for Maintenance Connection | Maintain System Standards | 106 | - | - | - | - | 106 |
| Software | Office Space Planning SW | System Enhancements | 53 | - | - | - | - | 53 |
| Software | ARCOS Storm Staffing and Enhancements and SSO | System Enhancements | 317 | 53 | 56 | 57 | 59 | 542 |
| Software | Contract Expires 2/22/2024 - Renew contract (Gas Day) | Maintain System Standards | 26 | - | 33 | - | 36 | 95 |
| Software | Electric Bid - to - Bill System (Develop Requirements Document) | System Enhancements | 11 | - | - | - | - | 11 |
| Software | Gas Bid - to - Bill System (Develop Requirements Document) | System Enhancements | 11 | - | - | - | - | 11 |
| Software | Automate recording and notification for safety Recognition awards (replace iAuditor) | Maintain System Standards | 106 | - | - | - | - | 106 |
| Software | Employee Recognition - Achievers | System Enhancements | - | 27 | - | - | - | 27 |
| Software | Employment Recommendations Improvement (TBD, Sharepoint, Workday, other) - for recruiting process | System Enhancements | - | 53 | - | - | - | 53 |
| Software | Incident Reporting Dashboard Enhancements - (Spill report and Dispatch Turnover log Feature) | System Enhancements | - | 54 | 56 | 57 | 59 | 226 |
| Software | Real Property Services Forms DB | System Enhancements | 211 | - | - | - | - | 211 |
| Software | Safety Recognition Program - Webforms | System Enhancements | - | - | 56 | - | - | 56 |
| Software | Taleo Data Archival & SSO | Maintain System Standards | - | 107 | - | - | - | 107 |
| Software | Total HR Data Archival & Process Removal to Retire | Maintain System Standards | - | 107 | 222 | - | - | 329 |
| Software | Training System Rationalization (Workday, HSI, QTS) | Maintain System Standards | 528 | - | - | - | - | 528 |
| Software | Workday Upgrades and Enhancements | Maintain System Standards | - | - | 334 | 342 | 356 | 1,032 |
| Software | Workday Enhancements & HR Process Optimizations (Post & Bid) | Maintain System Standards | 53 | 321 | - | - | - | 374 |
| Software | ERP Emergent | Maintain System Standards | - | 164 | 170 | 174 | 182 | 690 |
| Software | Implement Facilities Ratings module -eliminate need for another software system | System Enhancements | - | 53 | - | - | - | 53 |
| Software | IEA Replacement | Maintain System Standards | - | - | 1,335 | - | - | 1,335 |
| Software | SAMS Software Solution for MV-90 | Maintain System Standards | 21 | - | - | - | - | 21 |
| Software | T/D System operational Dashboard | Maintain System Standards | 53 | - | - | - | - | 53 |
| Software | Develop asset database in Cascade for Distribution Transformers and Cut-outs | System Enhancements | 106 | - | - | - | - | 106 |
| Software | Install Video Wall In Fishkill | Maintain System Standards | 158 | - | - | - | - | 158 |
| Software | Install Video Wall in Newburgh | Maintain System Standards | - | 160 | - | - | - | 160 |
| Software | Fleetwave Upgrades and Enhancements | Maintain System Standards | - | - | - | 171 | - | 171 |

| Common Additions | | | W/ AFUDC, Inflated & GH Adjustments | | | | | |
|---------------------------------------|--|---------------------------|-------------------------------------|---------------|---------------|---------------|----------------|----------------|
| CAT. | Description | Discretion Level | 2024 | 2025 | 2026 | 2027 | 2028 | 5-Year Total |
| Software | Incorporate gas transmission aerial inspections, Cathodic inspections/repairs, Gas vent inspections, QA/QC inspections) | System Enhancements | 211 | - | - | - | - | 211 |
| Software | OMS - Avionics Upgrade and Enhancements | Maintain System Standards | - | 215 | - | - | - | 215 |
| Software | M365 - Paperless Data Capture (Fuse Cards, transformer cards, meter cards, claims, tree issues, temporary repair findings, gas fuse inspections, tailboards, etc.) | System Enhancements | 211 | - | - | - | - | 211 |
| Software | Tesco Enhancements and Upgrade | Maintain System Standards | 106 | - | - | 114 | - | 220 |
| Software | Notifi Upgrade & Enhancement | Maintain System Standards | 106 | - | 133 | - | - | 239 |
| Software | OMS - MyWorld DA Replacement (End Of Support) | Maintain System Standards | 264 | - | - | - | - | 264 |
| Software | Upgrade to Web version of the software - Cascade 4.0 in 2024. | Maintain System Standards | 264 | - | - | - | - | 264 |
| Software | UN - ArcGIS 10.6.1 to 10.8.1 Upgrade - includes map viewer build, GL Essentials Server (extended support ends in January of 2024 per ESR) | Maintain System Standards | 317 | - | - | - | - | 317 |
| Software | New Damage Claim Software | System Enhancements | - | - | 334 | - | - | 334 |
| Software | Emergency Mgmt System Implementation (WebEOC) | System Enhancements | 211 | - | 234 | - | - | 445 |
| Software | UN - GL Essentials Upgrade and Enhancements | Maintain System Standards | - | 643 | - | - | - | 643 |
| Software | EWAM Emergent | Maintain System Standards | - | 178 | 185 | 189 | 197 | 749 |
| Software | 5 year term License Renewal - December 2026 (SBS - AUD Estimating Designer Software) | Maintain System Standards | - | - | 890 | - | - | 890 |
| Software | UN - Digital Circuit Mapping - Licenses and upgrades | Maintain System Standards | 475 | - | - | 570 | - | 1,045 |
| Software | 3 year term License Renewal - February 2025 (ArcGIS Portal) | Maintain System Standards | - | 538 | - | - | 594 | 1,132 |
| Software | Estimating Design SBS AUD Upgrade & Enhancement | Maintain System Standards | - | 536 | - | - | 594 | 1,129 |
| Software | UN - Underground Network Management GIS Implementation | System Enhancements | - | - | - | 570 | 594 | 1,164 |
| Software | Warehouse Barcoding | System Enhancements | - | - | 1,224 | - | - | 1,224 |
| Software | Gas Transmission Integrity Upgrade & Enhancement | Maintain System Standards | 660 | - | - | - | 772 | 1,432 |
| Software | Cygnat Gas Regulator Station Control & System Pressure Monitoring Implementation | System Enhancements | - | - | - | 912 | 950 | 1,862 |
| Software | PowerPlan Upgrades & Enhancement | Maintain System Standards | - | 320 | 1,891 | 684 | - | 2,895 |
| Software | UN - Upgrade and enhance ArcGIS to ArcGIS PRO (for Phase 1 Gas, Phase 2 Electric; Phase 3 Fiber) | Maintain System Standards | 634 | 1,337 | 1,391 | - | - | 3,362 |
| Software | Mobile Workforce Management (MWM) Replacement | Maintain System Standards | 3,168 | 1,077 | - | - | - | 4,245 |
| Software | IEDR Phase I | Non Discretionary | 6,093 | - | - | - | - | 6,093 |
| Software | IEDR Phase II | Non Discretionary | - | 2,571 | 2,670 | 2,509 | 2,613 | 10,362 |
| Software | IT Engineering Inits Emergent | Maintain System Standards | - | 58 | 60 | 62 | 64 | 244 |
| Software | CYME Upgrades and Enhancements | Maintain System Standards | 211 | 215 | - | - | 297 | 723 |
| Software | TOA Upgrades and enhancements | Maintain System Standards | - | 267 | - | - | - | 267 |
| Software | GTS Upgrades and Enhancements | Maintain System Standards | 792 | - | - | - | 238 | 1,029 |
| Software | Primary Control Center - IT SW (4220-Cyber SW) | Maintain System Standards | 422 | - | - | - | - | 422 |
| Software | Learning Annex | Maintain System Standards | - | 213 | 222 | 228 | - | 664 |
| Hardware & Software | Subtotal - Hardware & Software | | 30,851 | 33,666 | 31,617 | 29,421 | 52,142 | 177,696 |
| Security | Avigilon - Catskill District Office (1) 2023, 2022 deferral | System Enhancements | 67 | - | - | - | - | 67 |
| Security | Avigilon - Rock Tavern (3) | System Enhancements | 409 | - | - | - | - | 409 |
| Security | Avigilon - Roseton Substation (2) | System Enhancements | 256 | - | - | - | - | 256 |
| Security | Avigilon - East Fishkill Substation (4) | System Enhancements | - | 266 | - | - | - | 266 |
| Security | Avigilon - Pleasant Valley Substation (5) (4 or 5) | System Enhancements | - | 78 | - | - | - | 78 |
| Security | Security Emergent (HW Lifecycle) | System Enhancements | - | 209 | 427 | 489 | 554 | 1,679 |
| Security | Primary Control Center -- Security (4240-Sec HW) | Maintain System Standards | 174 | - | - | - | - | 174 |
| Security | Subtotal - Security | | 906 | 554 | 427 | 489 | 554 | 2,930 |
| Tools | Tools | Maintain System Standards | 1,605 | 1,639 | 1,781 | 2,144 | 1,849 | 9,018 |
| Tools | Subtotal - Tools | | 1,605 | 1,639 | 1,781 | 2,144 | 1,849 | 9,018 |
| Communications | Land Mobile Radio Replacement with DMR | Maintain System Standards | 2,293 | 2,507 | 646 | 120 | 122 | 5,688 |
| Communications | Grid Mod Communications - Kingston | System Enhancements | - | 2,090 | 4,428 | - | - | 6,518 |
| Communications | Grid Mod Communications - Catskill | System Enhancements | - | 1,985 | - | - | - | 1,985 |
| Communications | IPAM - Infoblox | System Enhancements | 51 | - | - | - | - | 51 |
| Communications | LMR - Minors | Maintain System Standards | 102 | - | - | - | - | 102 |
| Communications | DMR - Minors | Maintain System Standards | - | 104 | 107 | 109 | 111 | 431 |
| Communications | Backhaul Fiber Optic Cable | Maintain System Standards | 2,456 | 167 | 2,358 | - | - | 4,982 |
| Communications | Aviat Router Replacement Program | Maintain System Standards | 1,945 | 366 | 592 | 3,479 | 3,324 | 9,705 |
| Communications | Grid Mod Communications - Newburgh | System Enhancements | 1,228 | - | - | - | - | 1,228 |
| Communications | SLA Improvement Projects | Maintain System Standards | - | - | 533 | 544 | 554 | 1,631 |
| Communications | District Offices | Maintain System Standards | 307 | 313 | 107 | - | - | 727 |
| Communications | Eltings Corners Structured Fiber | Maintain System Standards | 205 | - | - | - | - | 205 |
| Communications | NST1 - SB Line Spur (4412-OT Comm) | Maintain System Standards | 154 | - | - | - | - | 154 |
| Communications | Primary Control Center -- Comm & Network Strategy (4412-OT Comm) | System Enhancements | 409 | - | - | - | - | 409 |
| Communications | Substation Upgrades | Maintain System Standards | 409 | 1,129 | 1,280 | 152 | 332 | 3,303 |
| Communications | Subtotal - Communications | | 9,559 | 8,662 | 10,051 | 4,404 | 4,442 | 37,119 |
| Transportation | Subtotal - Transportation | Maintain System Standards | 13,824 | 14,115 | 14,411 | 14,685 | 14,964 | 71,999 |
| Total - Common Capital Program | | | 80,668 | 84,847 | 94,453 | 73,549 | 101,886 | 435,402 |