Public Service Company of New Hampshire d/b/a Eversource Energy
Docket No. DE 22-030

Date Request Received: August 22, 2022 **Date of Response: August 23, 2022**
Data Request No. TS 2-001 **Page 1 of 2**

Request from: Department of Energy

Witness: Davis, Thomas W, Johnson, Russel D, Plante, David L

Request:

Please provide PAFs and supplements for the following projects:

Project No.	**Project Title**
A20C40	Manchester Network Cable Replacement
A20C24	Install Pad Mount Step Route 3 Dunbarton
A20C46	317 Line ROW section rebuild

Response:

Please refer to Confidential Attachment TS 2-001 (A) for the PAF and partial funding requests for Project No. A20C40 (Manchester Network Cable Replacement). Please note that the initial funding request was limited to the survey of the manholes and ducts. The subsequent "partial" funding request was based on an initial estimate of the cost for the first phase of the project. The funding request was considered partial because it was made prior to receipt of any contractor bids or completion of final design when the true preconstruction costs would become known. The Company did not have any prior similar projects to base the estimate on. The actual construction bids came in well below the estimate and the project was completed well below the authorized amount.

Please refer to Attachment TS 2-001(B) for the PAF and supplement for Project No. A20C24 (Install Pad Mount Step Route 3 Dunbarton). The supplement for this project provides the explanation for changes to original project funding amount that were made following completion of site plans.

Please refer to Attachment TS 2-001(C) for the PAF and supplement for Project A20C46 (371 Line ROW Section Rebuild). The supplement for this project includes an explanation for the greater than expected contractor bid costs.

Attachment TS 2-001(A) provides confidential critical energy infrastructure information. Accordingly, consistent with Puc 203.08(d), Eversource states that it has a good faith basis for confidential treatment of the material

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Data Request No. TS 2-001 **Page 2 of 2**

provided in Attachment TS 2-001(A). The Company will submit a motion for protective treatment prior to the hearing in this proceeding.

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Operations Project Authorization Form

Partial Funding Request

Date Prepared: 03/10/2021	**Project Title:** Manchester Network Cable Replacement
Company: Eversource NH	**Project Number:** A20C40
Organization: Distribution Engineering	**Class(es) of Plant:** D Line
Project Initiator: Bob Krewson	**Project Category:** Lines - UG Cable
Project Manager: Marc Pilotte	**Project Type:** Specific
Project Sponsor: Russel Johnson	**Project Purpose:** Replace PILC Network Primary Cables
Estimated in service date: 12/15/21	**Capital Investment part of original Oper. Plan:** Yes
Eng./Constr. Resources Budgeted? Yes	**O&M Expenses part of original Oper. Plan:** Yes
Authorization Type: Partial Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request: $3.733M	

Executive Summary

While the network has historically been a highly reliable distribution system due to its inherent redundancy, it has recently experienced a significant number of primary circuit outages. Since December 2018 there have been ten instances of cable or splice failures. The cabling on the four 13.8 kV circuits is primarily PILC (paper insulated lead covered) cable dating to the 1950s.

This initial PAF requests funding for the replacement of all four primary circuit cables (13A/B/C/D) in the Nutfield Lane area (Zone 1). It is the first of four zones identified for complete primary circuit reconductoring of the Manchester network. The $79k cost for a survey in this area, completed in 2020, is included in this request.

Work to reconductor the entire network will take place over four years, beginning in 2021. Additional PAFs will be submitted annually for the subsequent three years of surveys and cable replacement in the remaining three zones.

Work in 2021 is estimated at $3.654M, full project cost is estimated at $8.554 million (this last figure will be revised based on experience as the project proceeds). The work in 2021 is expected to be the most expensive of the four years, as it involves 15 of the 33 transformer vaults and difficult, crowded working conditions.

This request is a partial funding request because contractor bids have not yet been received and design is not complete at this time, but funding is required in order to develop the knowledge required to obtain a firm cost of the work.

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Project Costs Summary *Note: Dollar values are in thousands*

Line item Category	Prior Authorized	Actuals to Date	2020 to Go	2021	2022	2023	2024	2025	Total
1. ROW / Easements / Land Acquisition	$0	$0	$0	$0	$0	$0	$0	$0	$0
2. Environmental Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0	$0
3. Outreach	$0	$0	$0	$0	$0	$0	$0	$0	$0
4. Siting Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0	$0
5. Engineering / Design	$0	$0	$0	$0	$0	$0	$0	$0	$0
6. Materials (Eversource purchased)	$0	$0	$0	$625	$0	$0	$0	$0	$625
7. Construction (incl matl's by contractors)	$0	$0	$33	$1,150	$0	$0	$0	$0	$1,183
8. Testing / Commissioning	$0	$0	$0	$0	$0	$0	$0	$0	$0
9. Project Mgmt Team	$0	$0	$0	$0	$0	$0	$0	$0	$0
10. Removals	$0	$0	$0	$315	$0	$0	$0	$0	$315
11. Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
12. Risks	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBTOTAL DIRECTS W/ RISKS	$0	$0	$33	$2,090	$0	$0	$0	$0	$2,123
13. Indirects/Overhead	$0	$0	$46	$1,527	$0	$0	$0	$0	$1,573
14. AFUDC	$0	$0	$0	$37	$0	$0	$0	$0	$37
PROJECT TOTAL – BASELINE BUDGET	$0	$0	$79	$3,654	$0	$0	$0	$0	$3,733
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	$0	$0	$79	$3,654	$0	$0	$0	$0	$3,733
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	$0	$0	$79	$3,654	$0	$0	$0	$0	$3,733
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	$0	$0	$79	$3,654	$0	$0	$0	$0	$3,733

Note: Explain unique payment provisions, if applicable: *Provide a detailed breakdown of Other costs here.*

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Breakout Costs

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2020	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$22	$210	$0	$0	$0	$0	$232
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$11	$940	$0	$0	$0	$0	$951
Materials*	$0	$0	$0	$625	$0	$0	$0	$0	$625
Removals	$0	$0	$0	$315	$0	$0	$0	$0	$315
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$46	$1,527	$0	$0	$0	$0	$1,573
AFUDC	$0	$0	$0	$37	$0	$0	$0	$0	$37
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	$0	$0	$79	$3,654	$0	$0	$0	$0	$3,733

*All materials including Eversource purchased and outside service purchased. Note that outside service purchased material included in construction in project cost summary above.

2021 Outside Services includes $200,000 for Clean Harbors to dispose of the liquid pumped from the vaults ($8,000 per vault times 25 vaults) plus $740,000 for the cable work.

2021 Eversource Labor includes $75,000 for Contractor Oversight, $30,000 for a Project Manager, plus $105,000 for switching.

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Project Authorization Form

Future Financial Impacts:

Provide below the estimated future costs that will result from the project:
Note: Dollar values are in thousands

Future Costs	Year 2021	Year 2022	Year 2023	Year 2024+	Total Future Project Costs
Capital	$ 3,654	$ 1,650	$ 1,650	$ 1,600	$ 8,554
O&M	-	-	-	-	-
Other	-	-	-	-	-
TOTAL	**$ 3,654**	**$ 1,650**	**$ 1,650**	**$ 1,600**	**$ 8,554**

Describe the estimated future Capital, O&M, and/or Other costs noted above: Continuation of the reconductoring of the 13A/B/C/D cables on the entire Manchester network system.

What functional area(s) will these future costs be funded in?_____
A representative from the respective functional area is required to be included as a project approver.

Provide below the estimated future financial benefits that will result from the project:
Note: Dollar values are in thousands

Future Benefits	Year 20__	Year 20__	Year 20__	Year 20__+	Total Future Project Benefits
Capital	$ -	$ -	$ -	$ -	$ -
O&M	-	-	-	-	-
Other	-	-	-	-	-
TOTAL	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Describe the estimated future Capital, O&M, and/or Other benefits noted above:

What functional area(s) will these benefits be reflected in?_____
A representative from the respective functional area is required to be included as a project approver.

Asset Retirement Obligation (ARO) and/ or Environmental Cleanup Costs (Environmental Liabilities):

Is there an ARO associated with this project? No, but see attachments section.

Are there other environmental cleanup costs associated with this project? No

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Project Authorization Form

Technical Justification

Project Need Statement
While the network remains a highly reliable distribution system due to its inherent redundancy, there has been an uptick in the number of recent outages on the primary circuits. Since December 2018, there have been ten cable or splice failures on the network. The cabling on the four 13.8 kV circuits is primarily PILC dating to the 1950s.

Project Objectives
Replace the 13A, 13B, 13C, and 13D network primary cables over a four-year period, one zone per year.

Project Scope
In 2021, replace approximately 7,000 feet of 350 MCM PILC mainline cable on the four network circuits in zone one. Also replace approximately 2,600 feet of 1/0 PILC tap cable feeding the fifteen network transformers on Nutfield Lane. Additionally, installation of modular "H-body" splices in manhole 32A (1000 Elm St, Hampshire Plaza) and the cable sections feeding this location have been added to the job scope. The modular splices will allow the portion of circuit being reconductored on Nutfield Lane to be disconnected and grounded, while the main line circuit is re-energized from Brook St.

In zones two and three, mainline cables between Brook St and manhole 32A will be replaced with 500 MCM Cu 15 kV EPR cable. Main line cables beyond that point will be replaced with 250 MCM Cu 15 kV EPR. Vault transformer taps will be replaced with 1/0 Cu, but 250 MCM Cu may be used in certain instances based on labor cost savings (avoidance of additional cable reel set-ups).

Money has been included in the estimate for cable switching and pumping of manholes by Clean Harbors as needed (these costs were reviewed with Customer Operations). One circuit at a time will be reconductored on Nutfield Lane until all four are completed.

Background / Justification
The network primary cables are 15 KV oil impregnated PILC cables (paper insulated lead covered) which were installed approximately 60-65 years ago. There are two cable sizes: 350 MCM copper for the mainline, and 1/0 copper for the transformer taps. The PILC type cable is very reliable, with failures occurring only when the lead sheath is compromised, which allows water ingress. The original lead cables require specialized transition splices when connected to plastic replacement cables. Historically there have been a limited number of cable failures, and a system of five fault indicators per circuit (designed specifically for PILC application) has enabled quick fault location. Recently there has been an increased rate of primary cable failure, with ten failures since December 2018.

Business Process and / or Technical Improvements
All network transformers and protectors have been replaced within the last 10-15 years. Major vault-top restoration work has occurred as well. Replacement of the aging, increasingly vulnerable primary cables would bring the network system into the 21st century.

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Project Authorization Form

Re-racking of primary and secondary cables, replacement of broken racks, and other housekeeping needs due to general deterioration would also be accomplished as a result of the primary re-cabling efforts.

Alternatives Considered with Cost Estimates

Address cable failures as they occur, hoping failures do not begin to cascade over time.

Project Schedule

Milestone/Phase Name	Estimated Date
100% Engineering Completion	April 1, 2021
Construction Start	July 15, 2021
In Service Date	December 15, 2021

Regulatory Approvals

Repair of manholes may require permitting by the City of Manchester. There is a moratorium on such construction in the cold weather months and on certain recently paved streets. Such work is not presently anticipated in the area of Nutfield Lane.

Risks and Risk Mitigation Plans

Certain peak loading periods during the summer may need to be avoided if re-conductoring work requires de-energization of circuits.

The manhole and duct system in Manchester is dated, and there will undoubtedly be issues with plugged conduits and failed racking systems. An additional challenge will be removing and installing circuiting around other live circuits and in an environment of tangled cables, which exists in some manholes. Such conditions may escalate the project cost. A survey of Nutfield Lane has been completed in order to anticipate potential difficulties in advance of actual construction work.

Relocation of adjacent PILC cables to aid in the installation of new cabling will need to be done de-energized and with great care to avoid lead sheath damage to cables still in service. Lead sheath damage could lead to premature cable failures on the other circuits.

Contractor pricing has not yet been received so it is possible that additional funding may be required.

Contingency

None.

References

None.

Cost Estimate Backup Details

Costs were estimated on a per foot basis, and for two scenarios:

1. Main line manhole to manhole, 350 MCM Cu, 15 kV cable, with a straight splice in one manhole, re: Storms wr# 3305305

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2. Main line manhole to vault, 1/0 Cu, 15 kV cable, with a T-ops on the transformer end, a 3-way splice on the other, re: Storms wr# 3305301.

REDACTED

Attachments (One-Line Diagrams, Images, etc.)

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REDACTED

Memo Regarding ARO and PILC Cable Removal

To: Accounting Files

From: Plant Accounting

Date: 01-15-2020

Subject: Re-examination of whether there is a legal retirement obligation related to the Lead Cable (i.e. PSNH Distribution)

Background: During 2019 Annual ARO review PSNH Distribution engineering team identified replacement of existing lead cable as a potential ARO. According to the PSNH engineering, the full underground network in Manchester is lead cable and it wasn't in the previous versions of ARO review. The cable is not new, and it's been in place for decades.

Upon follow up with our legal department (meeting 12/12/2019) and further discussions - Mike DiPietro, Bob Bersak, Duncan MacKay, it has been determined that there is no legal obligation related to the replacement of the existing lead cable in PSNH as it falls under our regular cable replacement practice.

Historical Treatment: During the original ARO implementation (2005) the lead cable was identified as no ARO.

Conclusion: Lead Cable does not qualify as an ARO.

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Project Authorization Form

Initial Funding Request Form

Date Prepared: 07/16/2020	**Project Title:** Manchester Network Cable Replacement
Company: Eversource NH	**Project Number:** A20C40
Organization: Asset Management	**Class(es) of Plant:** D Line
Project Initiator: Robert Krewson	**Project Category:** Lines - UG Cable
Project Manager: Marc Pilotte	**Project Type:** Specific
Project Sponsor: Russel Johnson	**Project Purpose:** Replace primary cables in Manchester network
Estimated in service date: 12/31/20	**If Transmission Project** (check all that apply)**:** n/a
Authorization Type: Initial Funding	**PTF** ☐ **Non-PTF** ☐
Total Request: $183,000	

Project Need Statement:

While the network has historically been a highly reliable distribution system due to its inherent redundancy, it has recently experienced a significant number of primary circuit outages. Since December 2018, there have been ten instances of cable or splice failures. The cabling on the four 13.8 kV circuits is primarily Paper Insulated Lead-sheathed Cable (PILC), and dates to the 1950s.

Hooksett Field Engineering is proposing the replacement of the four network primary circuits due to the poor reliability experienced recently. Construction work is expected to take place over a period of four years. Cable sections recently installed as replacements due to failures will not be replaced.

This initial funding request is for surveying the first of four zones identified for the replacement of primary conductor on all four network circuits. The survey is intended to create a pull plan for circuit cable routing as well as identify in advance issues needing to be addressed during construction. Additional PAFs will be submitted for subsequent surveys and cable replacement projects. Full cost of the project is not known at this time but is estimated at approximately $8 million and is planned to be completed over a four-year time frame. Total estimated project cost will be revised based on experience as the project proceeds.

Project Objectives:

Replace the 13A, 13B, 13C, and 13D network primary cables over a four-year period. The project will be broken up into four zones, one per year for the duration of the project, with cable replacements of all four circuits undertaken within each particular zone. The network primary cables are 15 KV oil impregnated PILC cables which were installed approximately 60-65 years ago. There are two cable sizes: 350 MCM copper for the mainline, and 1/0 copper for the transformer taps. The original lead cables require specialized lead (transition) splicing to plastic replacement cables. The PILC type cable is very reliable, with failures occurring only when the lead sheath is compromised, which allows water ingress. Historically there have been a limited number of cable failures, and a system of five fault indicators per circuit (designed specifically for PILC application) has enabled quick fault location. Recently there has been an increased rate of primary cable failure, with ten failures since December 2018.

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Funding Request Explanation (total request, amount per task, deliverables):

Note: Dollar values are in thousands

Direct Capital Costs		
Straight Time Labor	82	Eversource labor required is to develop a pull plan, rod, rope, and mandrel ducts, and to identify manhole issues needing correction in the 23 vaults to be inspected in zone 1 and to develop preliminary engineering plans for replacing the cable in zone 1.
Outside Services	45	Outside Services is contractor labor is for the anticipated work by Clean Harbors to pump and clean the vaults being surveyed.
Total Direct Costs	**127**	
Indirect Capital Costs		
Indirects/Overheads	56	
Total	**183**	

Preliminary Schedule:

Milestone/Phase Name	Estimated Date
Perform survey of Zone 1 (Nutfield Lane)	8/1/2020
Design Complete for Zone 1	9/15/2020
Start of Zone 1 construction	10/15/2020
Zone 1 construction complete	12/15/20

Supplement Request Form

Date Prepared: 01/14/2021	**Project Title**: Install Pad Mount Step Route 13, Goffstown
Company: Eversource NH	**Project Number:** A20C24
Organization: Distribution Engineering	**Class(es) of Plant:** D Line
Project Initiator: Michael Warren	**Project Category:** Lines - General
Project Manager: Natacha Morales	**Project Type:** Specific
Project Sponsor: Marc Pilotte	**Capital Investment Part of Original Oper. Plan:** Yes
Project Manager's Director: Marc Geaumont	**O&M Expenses Part of the Original Oper. Plan:** Yes
Current Authorized Amount: $407K	**Estimated in service date: 2/28/2021**
Supplement Request: $347.5K	**ISO-NE Approvals Required** (check all that apply)**:** ☐ PAC ☐ TCA
Total Request: $754.5K	

Background

The pad-mounted step transformer project in Goffstown was approved by NH PAC and fully authorized in PowerPlan on June 24, 2020 for $407K. This supplement request is for $347.5K for a new total request of $754.5K.

The project consists on the installation of a 5 MVA pad-mounted step transformer to off-load the parallel step transformers feeding the 3271X1 circuit at Route 13 in Goffstown. Two of the three parallel 500 kVA step banks exceed nameplate loading reaching 105% and 114% for summer 2019. The project also includes decommissioning and removal of six (6) existing 500 KVA steps, an easement purchase and installation of two new source-side DA protective devices (NOVA reclosers.)

The project has invested $161K through January 15, 2021. The easement has been purchased, all permits have been secured and construction is ongoing as planned. The project is scheduled to be in service by the end of February 2021 with environmental restoration going through June of 2021.

Supplement Justification Overview

This supplement request is driven by increased direct costs related to construction, surveying, engineering, environmental mitigation and commitments to landowner that were not part of the original estimate. Most of the increase is in the construction line item. The construction proposal used in the full funding PAF did not include all of the changes that took place after the site plans were developed.

Supplement Justification Detail

The reasons for the project authorization supplement of $347.5K are summarized below.

1. **ROW / Easements / Land Acquisition: $0.4K –** Easement purchase charges total $30,440. This included the wiring and title fees.

2. **Environmental Approvals / Permits: $3K –** Environmental and Permitting services charges total $29K, an increase of $3K. The construction phase will be taking longer than what they had proposed for environmental monitoring.

3. **Engineering / Design: $0.6K –** The forecast for internal engineering reviews is $17.7K for the project. A full engineering/site plan development package was developed by a vendor for $8.9K. All these charges total an increase of $0.6K from original estimate.

4. **Materials (by Eversource): $41.1K –** Retention oil system, pre-cast concrete pad and NOVA reclosers were higher than originally estimated.

5. **Construction: $227.5K –** The forecast for the installation of poles, NOVA reclosers, line connections as well as testing of the new transformer is $70K for the project (all internal resources). The construction vendor's proposal to complete the project is $168,554. The proposal from the construction vendor that was used in the original estimate ($58,250) was based on a preliminary sketch and did not fully include all the requirements that were agreed upon with the landowner/stakeholders in order to secure the easement. After the engineered drawings were complete and approved by the various stakeholders including the landowner, the construction scope increased. The increase includes more fill material to comply with Town approved plans including a new driveway, installation of the oil retention system, installation of a heated hut/tent to install the oil retention system due to winter conditions (previously not included), partial pavement of an access road to the easement and spring restorations. The original estimate included $14.5K for tree clearing which is $2K less than what was spent. The original estimate did not include surveying costs, the forecast for surveying costs is $20.4K. The total for all construction tasks is $275,454; an increase of $227,454 from the original PAF.

6. **Project Management Team: $10K –** Costs previously not estimated in the original PAF for construction and siting services, permitting services, real estate services and project management.

7. **Other (property taxes): $1K –** Costs for property taxes were not included in the original PAF. The forecast for property taxed is $1K.

8. **Risk (contingency): ($38K) –** All contingency funds previously approved in the original PAF were utilized to cover for some of the increased actual costs, mainly the construction line item.

9. **Indirects/Overhead: $97.6K –** The indirects are based on directs and the different rates that compose them. There is an increase in directs costs for construction mainly affecting the indirects. Forecast for indirects is $228.6K.

10. **AFUDC: $4.3K –** Small increase on rates, project is forecasting $7.3K.

Total Supplement Request: $347.5K

Please find a copy of the prior authorization document attached as reference.

Supplement Cost Summary

The table below summarizes the line item categories from the original project estimates and the updated project estimates.

Note: Dollar values are in thousands:

Line item Category	Prior Authorized	New Total Request	Variance (Supplemental Request)
1. ROW / Easements / Land Acquisition	$30	$30.4	$0.4
2. Environmental Approvals / Permits	$26	$29	$3
3. Outreach	$0	$0	$0
4. Siting Approvals / Permits	$0	$0	$0
5. Engineering / Design	$26	$26.6	$0.6
6. Materials (Eversource purchased)	$105	$146.1	$41.1
7. Construction (incl matl's by contractors)	$48	$275.5	$227.5
8. Testing / Commissioning	$0	$0	$0
9. Project Mgmt Team	$0	$10	$10
10. Removals	$0	$0	$0
11. Other / Property Taxes	$0	$1	$1
12. Risks (contingency)	$38	$0	($38)
SUBTOTAL DIRECTS W/ RISKS	**$273**	**$518.6**	**$245.6**
13. Indirects/Overhead	$131	$228.6	$97.6
14. AFUDC	$3	$7.3	$4.3
PROJECT TOTAL – BASELINE BUDGET	**$407**	**$754.5**	**$347.5**
15. Contingency	$0	$0	$0
TOTAL CAPITAL REQUEST	**$407**	**$754.5**	**$347.5**
16. Reimbursables/Customer Contribution	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$407**	**$754.5**	**$347.5**

Total Supplement Request by Year
Note: Dollar values are in thousands:

Line item Category	Year 2021	Year 20	Year 20 +	Total
1. ROW / Easements / Land Acquisition	$0.4	$	$	$
2. Environmental Approvals / Permits	$3	$	$	$
3. Outreach	$0	$	$	$
4. Siting Approvals / Permits	$0	$	$	$
5. Engineering / Design	$0.6	$	$	$
6. Materials (Eversource purchased)	$41.1	$	$	$
7. Construction (incl matl's by contractors)	$227.5	$	$	$
8. Testing / Commissioning	$0	$	$	$
9. Project Mgmt Team	$10	$	$	$
10. Removals	$0	$	$	$
11. Other / Property Taxes	$1	$	$	$
12. Risks (contingency)	($38)	$	$	$
SUBTOTAL DIRECTS W/ RISKS	**$245.6**	**$**	**$**	**$**
13. Indirects/Overhead	$97.6	$	$	$
14. AFUDC	$4.3	$	$	$
PROJECT TOTAL – BASELINE BUDGET	**$347.5**	**$**	**$**	**$**
15. Contingency	$0	$	$	$
TOTAL CAPITAL REQUEST	**$347.5**	**$**	**$**	**$**
16. Reimbursables/Customer Contribution	$0	$	$	$
PROJECT TOTAL (LESS REIMBURSABLES)	**$347.5**	**$**	**$**	**$**

Lessons Learned

Engineering must validate existing conditions prior to finalizing scope and launching detailed engineering.

A scope document should be developed as well as conceptual engineering prior to obtaining an accurate estimate for full funding. The Project Manager should be involved in the scope development and estimating process along with engineering.

A statement of work should be developed for contracts purposes. This statement of work will give the contractor(s) better understanding of the scope of work for the project.

Operations Project Authorization Form

Date Prepared: 06/02/2020	**Project Title:** Install Pad Mount Step Route 13, Dunbarton
Company/ies: NH	**Project ID Number:** A20C24
Organization: Field Engineering	**Class(es) of Plant:** Distribution Line
Project Initiator: Michael Warren	**Project Category:** Peak Load/Capacity – Distribution Lines
Project Manager: Marc Pilotte	**Project Type:** Specific
Project Sponsor: Marc Pilotte	**Project Purpose:** Overloaded Parallel 500 kVA Steps
Estimated in service date: 12/15/2020	**If Transmission Project: PTF?** N/A
Eng. /Constr. Resources Budgeted? Y	**Capital Investment Part of Original Operating Plan?** Y
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan?** Y
Total Request: $407,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is to install a 5 MVA pad-mounted step transformer to off-load the parallel step transformers feeding the 3271X1 circuit at Route 13 in Goffstown. Two of the three parallel 500 kVA step banks exceeded nameplate loading reaching 105% and 114% for summer 2019. This project was approved by CPAC in 2019 with an initial budget of $75K for engineering, site evaluation and easement work. This request is for full financial approval.

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2019	2020	20 +	Totals
Capital Additions - Direct	$ -	$ -	$ 273	$ -	$ 273
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage %	-	-	-	-	-
Total - Direct Spending	$ -	$ -	$ 273	$ -	$ 273
Capital Additions - Indirect	-	-	131	-	131
Subtotal Request	$ -	$ -	$ 404	$ -	$ 404
AFUDC	-	-	3	-	3
Total Capital Request	$ -	$ -	$ 407	$ -	$ 407
O&M	-	-	-	-	-
Total Request	$ -	$ -	$ 407	$ -	$ 407

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	26			
Overtime Labor				
Outside Services	104			
Materials	105			
Other, including contingency amounts (describe)	38			
Total Direct Costs	**273**			

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	131			
Capitalized interest or AFUDC, if any	3			
Total Indirect Costs	**134**			
Total Capital Costs	**407**			
Less Total Customer Contribution				
Total Capital Project Costs	**407**			
Total O&M Project Costs				

Note: “Other” category consists of easement costs as well as contingency cost for various additional costs for installing pad-mount step transformer (oil retention and or site work). The above evaluation does not include $66K for the actual purchase of the pad-mount step transformer because it is a precapitalized item.

Future Financial Impacts:

Provide below the estimated future costs that will result from the project:
Note: Dollar values are in thousands:

Future Costs	Year 20__	Year 20__	Year20__	Year 20__+	Total Future Project Costs
Capital	$ -	$ -	$ -	$ -	$ -
O&M	-	-	-	-	-
Other	-	-	-	-	-
TOTAL	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Describe the estimated future Capital, O&M and/or Other costs noted above:

What functional area(s) will these future costs be funded in?_____
A representative from the respective functional area is required to be included as a project approver.

If this is other than a Reliability Project, please complete the section below;

Provide below the estimated financial benefits that will result from the project:
Note: Dollar values are in thousands:

Future Benefits	Year 20__	Year 20__	Year20__	Year 20__+	Total Future Project Benefits
Capital	$ -	$ -	$ -	$ -	$ -
O&M	-	-	-	-	-
Other	-	-	-	-	-
TOTAL	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Describe the estimated future Capital, O&M and/or Other benefits noted above:

What functional area(s) will these benefits be reflected in?_____
A representative from the respective functional area is required to be included as a project approver.

Asset Retirement Obligation (ARO) and/ or Environmental Cleanup Costs (Environmental Liabilities):

Is there an ARO associated with this project? No

Are there other environmental cleanup costs associated with this project? No

Technical Justification

Project Need Statement
This project installs a 5 MVA pad-mounted step transformer to replace the parallel step transformers on the 3271X1 circuit at Route 13 (Pattee Hill Road) in Goffstown. Two of the three parallel banks exceeded nameplate value during the summer of 2019. Phase A reached 105% and Phase C reached 114% of nameplate value.

Project Objectives
Off-load overloaded step transformers on Patte Hill Road by replacing the steps with a 5 MVA pad-mounted step. Solution addresses over loaded step transformers, bringing all phases to less than 70% of nameplate value rating of the padmounted step. This solution addresses loading on the circuit for approximately 7 years when the #2 main line conductor is projected to reach 100% normal rating, using a 2% growth rate.

Project Scope
Install one 19.9/34.5 kV to 7.2/12.47 kV, 5 MVA three phase pad-mounted step transformer and remove the six existing 500 KVA steps. Utilize existing load side 12.47 kV DA SCADA device. An easement or land purchase of $30K to place the new transformer has been included in the cost estimate.

Background / Justification
Eliminate overloaded step transformers on the 3271X1 circuit and attempt to load balance circuit off Route 13 Pattee Hill Road in Goffstown and Dunbarton. Two sets of parallel 500 KVA step transformers exceeded nameplate loading reaching 105% and 114% during summer of 2019. A new DA device installed prior to summer load showed loading as 105%, 72%, 114%. Load balancing to bring the other two phases under 100% was investigated, but loading is sparse along the main line except for a few large side taps. Moving these side taps will simply swap the over load from one phase to another.

The north end of the 3271X1 is single phase (phase B) which is the lowest loaded phase, so pulling off load to the north via an abutting circuit will not aid in off loading the step transformers. To the east is another utility.

Business Process and / or Technical Improvements:
- Addresses overloaded parallel 500 KVA step transformers.
- Addresses future load growth of 2% for 15.5 years based on the step transformers, and 6.5 years based on the existing #2 ACSR main line conductor normal summer ratings (190 amps).
- Leaves capacity for a potential 12 kV tie to the 37W1 circuit to the north.

Alternatives Considered with Cost Estimates
Alternative 1: Reconductor and convert up Route 13 for 3.88 miles just beyond Gorham Pond Road (pole 13/217). Initial assessment by Designer shows having to replace or work on almost half the poles in this section. In addition, current standard is covered wire so the existing #2 ACSR would be replaced with 477 spacer cable. Addresses future loading on 1000 KVA steps for 8 years based on 2% load growth. Step loading (60%,35%,84%). No simple load balancing available. Estimated at $2,412,000

Alternative 2: Reconductor and convert up Route 13 for 2 miles just beyond Paige Hill Road (pole 13/116). Initial assessment by Designer shows having to replace or work on almost half the poles in this section. In addition, current standard is covered wire so the existing #2 ACSR would be replaced with 477 spacer cable. Addresses future loading on 1000 KVA steps for 3 years based on 2% load growth. Step loading (94%, 94%,68%.). All simple load balancing taken into account. Estimated at $1,382,000

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Easement Process	07/01/2020
Engineering/Writing Complete	04/01/2020
Construction Begins	08/15/2020
Estimated In-Service Date	12/15/2020

Regulatory Approvals

None.

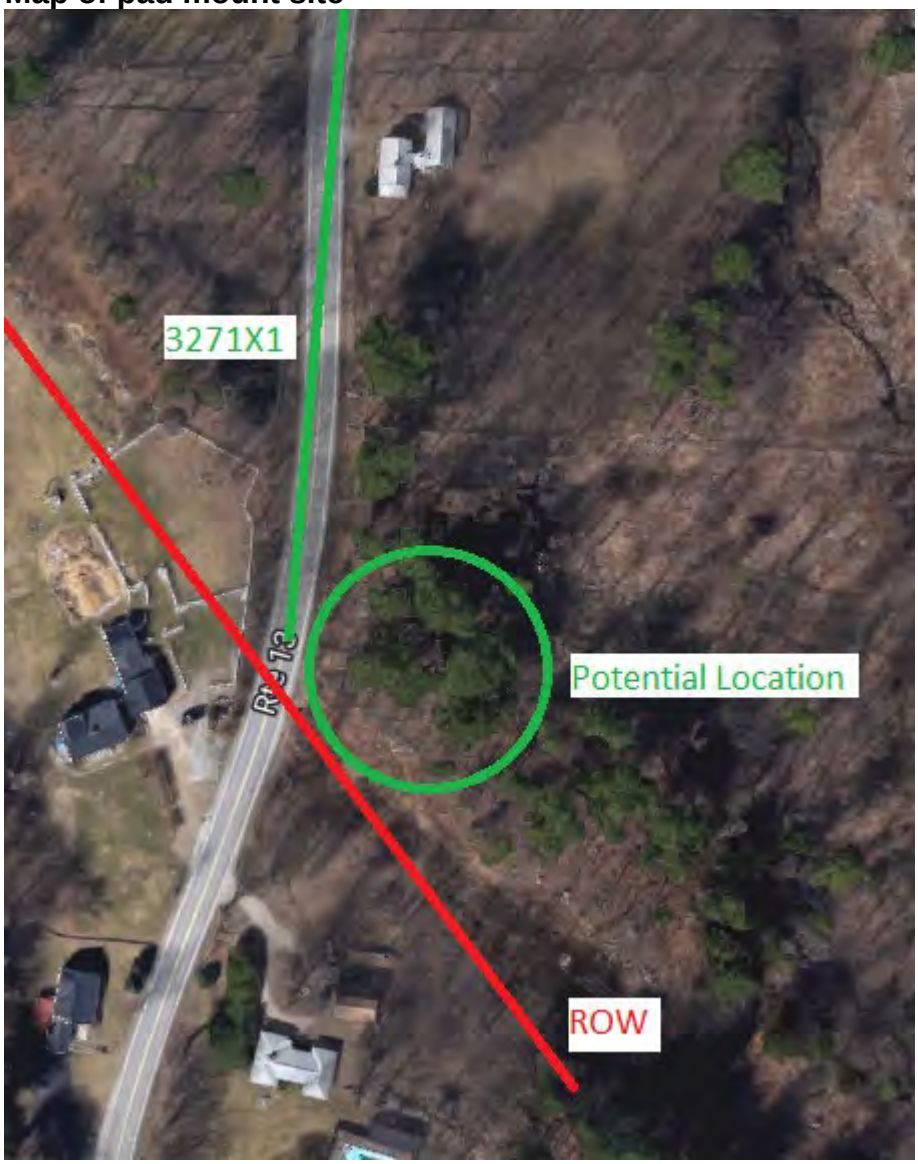
Risks and Risk Mitigation Plans

Padmount step lead time – Anything beyond 7 months normal lead time may push completion time into winter of 2021. This is acceptable as 3271X1 circuit is a summer peaking circuit.
Easement rights – Failure to secure easement rights at the circuit tap will mean looking further down the circuit for potential locations or implementing an alternative solution. The customer has verbally agreed to the easement and the company is preparing the necessary paperwork.

References

Project Overview, 3271X1 pad-mounted step plan

Map of pad mount site



Cost Estimate Backup Details

Cost is based on STORMS estimate, WR number 3399076
Install pad-mounted step transformer – $407K per site per Work Request estimate, which includes:

- Easement Purchase - $30K
- Site Work - $58K
- Environmental Permits - $26K
- Crane - $1300
- Flat Bed Truck - $700

The estimate does not include the 5 MVA padmounted step transformer ($66K) as this is precapitalized material.

Initial Funding Request Form

Date Prepared: 12/24/2019	**Project Title:** Install Pad Mount Step Route 13, Goffstown
Company/ies: NH	**Project ID Number:** A20C24
Organization: Field Engineering	**Class(es) of Plant:** Distribution Line
Project Initiator: Michael Warren	**Project Category:** Peak Load/Capacity – Distribution Lines
Project Sponsor: Paul Renaud	**Project Type:** Specific
Estimated in service date: 12/15/2020	**Project Purpose:** Relieve overloaded parallel steps
Authorization Type: Initial Funding	**If Transmission Project: PTF?** n/a
Total Request: $75,000	

Project Need Statement

This project is to install a 5 MVA padmounted step transformer to replace the parallel step transformers on the 3271X1 circuit at Route 13 (Pattee Hill Road) in Goffstown. Two of the three parallel banks exceeded nameplate value during the summer of 2019. Phase A reached 105% and Phase C reached 114% of nameplate value.

Project Objectives

Off-load overloaded step transformers on Pattee Hill Road by replacing the steps with a 5 MVA padmounted step transformer.

Funding Request Explanation (amount, deliverables, schedule for full funding request):

This request is for initial funding for this project in order to allow for the acquisition of an easement to place a padmounted step transformer, preliminary site design for the unit location, and the development of an accurate estimate of the total project cost. The project will be handed over to the Project Management group to pursue these items. It is anticipated that the easement can be obtained by approximately April 1, 2020, depending on the willingness of the landowner to accommodate the request.

A full funding PAF will be submitted to the NH PAC when the costs of these items are known. Based on previous installations the total project is currently estimated at $675,000, however site costs are still undetermined and are the reason for this Initial Funding Request.

Supplement Request Form

Date Prepared: 11/02/2020	**Project Title:** 317 Line ROW section rebuild
Company: Eversource NH	**Project Number:** A20C46
Organization: Distribution Engineering	**Class(es) of Plant:** D Line
Project Initiator: Josh Letourneau	**Project Category:** Lines - ROW
Project Manager: Tom Davis	**Project Type:** Specific
Project Sponsor: Mark Sandler	**Capital Investment Part of Original Oper. Plan:** No
Project Manager's Director: Mark Sandler	**O&M Expenses Part of the Original Oper. Plan:** No
Current Authorized Amount: $944k	**Estimated in service date: 12/31/2020**
Supplement Request: $449k	**ISO-NE Approvals Required** (check all that apply)**:** ☐ PAC ☐ TCA
Total Request: $1,393k	

Background

This supplemental funding is being requested before the award of work to vendor and before the start of any construction activity. This project was originally approved on Sep 17, 2020 for $944k. The scope of the project involves the line reconstruction of 317 line in right of way between Warner SS and the line crossing at Route 103, approximately 5,000'. The long-term objective of this project is to complete the 317-line reconstruction in order to provide a backup source to the 316 and 3410 circuits out of North Road Substation. This supplement requests approval of an additional $449k, primarily due to greater than expected contractor bid & material costs, for an updated total request of $1,393k.

Supplement Justification Overview

The primary driver for this supplement funding request is due to greater than expected contractor bid costs. The lowest contractor bid of $489k, as well as additional items specified below, increased the total Outside Services amount to **$569k**, which exceeds the authorized amount for Outside Services of $450k by $119k. An additional driver for this supplement funding request is due to greater than expected material costs. In addition, there were minor internal labor increases and proportional increases in indirect charges, which are noted below in the Supplement Justification Detail section.

Revised estimated Outside Services:

Outside Service Item	Original Amount	Revised Amount	Supplement Request
Contractor bid	$385k	$489k	$104k
Leidos engineering	$65k	$70k	$5k
Asplundh mowing/vegetation work	$0	$10k	$10k
TOTAL	**$450k**	**$569k**	**$119k**

Supplement Justification Detail

The reasons for the project authorization supplement of $442k are summarized below.

1. **Environmental Approvals / Permits: $9k** - Increased project oversight activity due to Town of Warner conservation committee deliberations.
2. **Outreach: $1k -** Increased project oversight activity due to Town of Warner conservation committee deliberations.
3. **Siting Approvals/Permits: $2k -** Increased project oversight activity due to Town of Warner conservation committee deliberations.
4. **Engineering / Design: $5k –** The engineering/design increase is due to due to greater than expected costs that were not accounted for in the original estimate.
5. **Materials: $181k** - The materials increase is resulting from greater material needs than were originally identified. This was due to the timing of the receipt of material lists from the design vendor. Conceptual estimate for the original PAF were based on a cost per mile basis of materials used in similar projects previously completed. Detailed engineering revealed that additional materials were required for this line.
6. **Construction: $114k –** The construction increase is due to greater than expected contractor bid costs & additional mowing/vegetation work that were not accounted for in the original estimate.
7. **Project Mgt Team: $6k** - Increased project oversight activity due to Town of Warner conservation committee deliberations.
8. **Indirects/Overhead: $112k –** Indirects are greater than originally estimated due to greater than expected contractor bid & engineering/design costs.
9. **AFUDC: ($1k) –** Slight decrease in AFUDC costs due to current updated projections.
10. **Contingency: $20k –** Increased contingency costs to accurately reflect excavation costs for updated number of pole locations.

Total Supplement Request: $449k

Supplement Cost Summary

The table below summarizes the line item categories from the original project estimates and the updated project estimates.

Note: Dollar values are in thousands:

Line item Category	Prior Authorized	New Total Request	Variance (Supplemental Request)
1. ROW / Easements / Land Acquisition	$	$	$
2. Environmental Approvals / Permits (Jeni)	$2	$11	$9
3. Outreach (Kevin, Connor)	$2	$3	$1
4. Siting Approvals / Permits (?)	$2	$4	$2
5. Engineering / Design	$65	$70	$5
6. Materials (Eversource purchased)	$100	$281	$181
7. Construction (incl matl's by contractors)	$385	$499	$114
8. Testing / Commissioning	$	$	$
9. Project Mgmt Team	$14	$20	$6
10. Removals	$	$	$
11. Other	$	$	$
12. Risks	$	$	$
SUBTOTAL DIRECTS W/ RISKS	**$570**	**$888**	**$318**
13. Indirects/Overhead	$350	$462	$112
14. AFUDC	$4	$3	($1)
PROJECT TOTAL – BASELINE BUDGET	**$924**	**$1,353**	**$429**
15. Contingency	$20	$40	$20
TOTAL CAPITAL REQUEST	**$944**	**$1,393**	**$449**
16. Reimbursables/Customer Contribution	$	$	$
PROJECT TOTAL (LESS REIMBURSABLES)	**$944**	**$1,393**	**$449**

Total Supplement Request by Year

Note: Dollar values are in thousands:

Line item Category	Year 2020	Year 20	Year 20 +	Total
1. ROW / Easements / Land Acquisition	$	$	$	$
2. Environmental Approvals / Permits	$9	$	$	$
3. Outreach	$3	$	$	$
4. Siting Approvals / Permits	$4	$	$	$
5. Engineering / Design	$5	$	$	$
6. Materials (Eversource purchased)	$181	$	$	$
7. Construction (incl matl's by contractors)	$114	$	$	$
8. Testing / Commissioning	$	$	$	$
9. Project Mgmt Team	$6	$	$	$
10. Removals	$	$	$	$
11. Other	$	$	$	$
12. Risks	$	$	$	$
SUBTOTAL DIRECTS W/ RISKS	**$318**	**$**	**$**	**$**
13. Indirects/Overhead	$112	$	$	$
14. AFUDC	($1)	$	$	$
PROJECT TOTAL – BASELINE BUDGET	**$429**	**$**	**$**	**$**
15. Contingency	$20	$	$	$
TOTAL CAPITAL REQUEST	**$449**	**$**	**$**	**$**
16. Reimbursables/Customer Contribution	$	$	$	$
PROJECT TOTAL (LESS REIMBURSABLES)	**$449**	**$**	**$**	**$**

Lessons Learned

This supplemental request is being prepared due to bid prices being higher than anticipated when the project was initially scoped. During the scoping process, estimates were obtained from three NH COC line construction vendors. These costs were factored into the initial PAF for this project. Despite this effort, formal contractor pricing came in approximately 50% higher than anticipated. In accordance with our project approval process, supplemental funding is being sought prior to the start of any construction activities.

An additional unforeseen cost was generated by intervention on behalf of the Town of Warner conservation committee. This involved multiple follow-up meetings to communicate project scope and address project concerns.

Operations Project Authorization Form

Date Prepared: 08/31/2020	**Project Title:** 317 Line ROW section rebuild
Company: Eversource NH	**Project Number:** A20C46
Organization: Distribution Engineering	**Class(es) of Plant:** D Line
Project Initiator: Josh Letourneau	**Project Category:** Lines - ROW
Project Manager: Tom Davis	**Project Type:** Specific
Project Sponsor: Mark Sandler	**Project Purpose:** Replace 5000' of ROW line and structures
Estimated in service date: 12-31-2020	**Capital Investment part of original Oper. Plan:** No
Eng./Constr. Resources Budgeted? Yes	**O&M Expenses part of original Oper. Plan:** No
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:**
Total Request: $944,000	☐ PTF ☐ non-PTF ☒ Distribution

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $944K is requested for the line reconstruction of 317 line in right of way between Warner SS and the line crossing at Route 103, approximately 5,000'. Twenty-seven (27) aged wooden poles and deteriorated crossarms will be replaced with new steel structures. In addition to the pole replacements, this project proposes the replacement of 5,000' of 83-year-old #2 copper conductor with 477 MCM spacer cable.

This replacement project will harden the system and provide for future load transfer capabilities. The long-term objective of this project is to complete the 317-line reconstruction in order to provide a backup source to the 316 and 3410 circuits out of North Road Substation. The 316-line feeds 8,757 customers and the 3410 feeds 3,854 customers. Due to the existing limitations on the 317 line, loss of normal feed to North Road Substation would result in approximately 9,000 customers stranded and without power.

This project will also add a neutral to an existing 3 wire system, providing improved fusing protective margins and the eventual removal of the Warner grounding bank.

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2020	20	20 +	Totals
Capital Additions - Direct	$ -	$590			$590
Less Customer Contribution	$ -	$ -			$0
Removals net of Salvage %	$ -	$ -			$0
Total - Direct Spending	$ -	$590			$590
Capital Additions - Indirect	$ -	$350			$350
Subtotal Request	$ -	$940			$940
AFUDC	$ -	$4			$4
Total Capital Request	$ -	$944			$944
O&M	$ -	$ -			$ -
Total Request	$ -	$944			$944

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	$20			$20
Overtime Labor				$0
Outside Services	$450			$450
Materials	$100			$100
Other, including contingency amounts (detailed below)	$20			$20
Total Direct Costs	$590	$0	$0	$590

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	$350			$350
Capitalized interest or AFUDC, if any	$4			$4
Total Indirect Costs	$354	$0	$0	$354
Total Capital Costs	$944	$0	$0	$944
Less Total Customer Contribution				
Total Capital Project Costs	$944	$0	$0	$944
Total O&M Project Costs				

Note: "Other" includes a $20k contingency for rock excavation for pole setting.

Project Costs Summary

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2020 to Go	2021	2022	2023	2024	2025	Total
1. ROW / Easements / Land Acquisition	$0	$0	$0	$0	$0	$0	$0	$0	$0
2. Environmental Approvals / Permits	$0	$0	$2	$0	$0	$0	$0	$0	$2
3. Outreach	$0	$0	$2	$0	$0	$0	$0	$0	$2
4. Siting Approvals / Permits	$0	$0	$2	$0	$0	$0	$0	$0	$2
5. Engineering / Design	$0	$0	$65	$0	$0	$0	$0	$0	$65
6. Materials (Eversource purchased)	$0	$0	$100	$0	$0	$0	$0	$0	$100
7. Construction (incl matl's by contractors)	$0	$0	$385	$0	$0	$0	$0	$0	$385
8. Testing / Commissioning	$0	$0	$0	$0	$0	$0	$0	$0	$0
9. Project Mgmt Team	$0	$0	$14	$0	$0	$0	$0	$0	$14
10. Removals	$0	$0	$0	$0	$0	$0	$0	$0	$0
11. Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
12. Risks	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBTOTAL DIRECTS W/ RISKS	**$0**	**$0**	**$570**	**$0**	**$0**	**$0**	**$0**	**$0**	**$570**
13. Indirects/Overhead	$0	$0	$350	$0	$0	$0	$0	$0	$350
14. AFUDC	$0	$0	$350	$0	$0	$0	$0	$0	$350
PROJECT TOTAL – BASELINE BUDGET	$0	$0	$4	$0	$0	$0	$0	$0	$4
15. Contingency	**$0**	**$0**	**$924**	**$0**	**$0**	**$0**	**$0**	**$0**	**$924**
TOTAL CAPITAL REQUEST	$0	$0	$20	$0	$0	$0	$0	$0	$20
16. Reimbursables/Customer Contribution									
	$0	**$0**	**$944**	**$0**	**$0**	**$0**	**$0**	**$0**	**$944**
PROJECT TOTAL (LESS REIMBURSABLES)	$0	$0	$0	$0	$0	$0	$0	$0	$0
O&M									
TOTAL REQUEST	**$0**	**$0**	**$944**	**$0**	**$0**	**$0**	**$0**	**$0**	**$944**

Note: Explain unique payment provisions, if applicable: *Provide a detailed breakdown of Other costs here.*

Breakout Costs

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2020 to Go	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$20	$0	$0	$0	$0	$0	$20
OT Labor	$0	$0	$	$0	$0	$0	$0	$0	$
Outside Services Labor	$0	$0	$450	$0	$0	$0	$0	$0	$450
Materials*	$0	$0	$100	$0	$0	$0	$0	$0	$100
Removals	$0	$0	$	$0	$0	$0	$0	$0	$
Other	$0	$0	$20	$0	$0	$0	$0	$0	$20
Indirects	$0	$0	$350	$0	$0	$0	$0	$0	$350
AFUDC	$0	$0	$4	$0	$0	$0	$0	$0	$4
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$944**	**$0**	**$0**	**$0**	**$0**	**$0**	**$944**

*All materials including Eversource purchased and outside service purchased. Note that outside service purchased material included in construction in project cost summary above.

Future Financial Impacts:

Provide below the estimated future costs that will result from the project:
Note: Dollar values are in thousands

Future Costs	Year 20__	Year 20__	Year 20__	Year 20__+	Total Future Project Costs
Capital	$ -	$ -	$ -	$ -	$ -
O&M	-	-	-	-	-
Other	-	-	-	-	-
TOTAL	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Describe the estimated future Capital, O&M, and/or Other costs noted above:

What functional area(s) will these future costs be funded in?_____
A representative from the respective functional area is required to be included as a project approver.

Provide below the estimated future financial benefits that will result from the project:
Note: Dollar values are in thousands

Future Benefits	Year 20__	Year 20__	Year 20__	Year 20__+	Total Future Project Benefits
Capital	$ -	$ -	$ -	$ -	$ -
O&M	-	-	-	-	-
Other	-	-	-	-	-
TOTAL	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Describe the estimated future Capital, O&M, and/or Other benefits noted above:

What functional area(s) will these benefits be reflected in?_____
A representative from the respective functional area is required to be included as a project approver.

Asset Retirement Obligation (ARO) and/ or Environmental Cleanup Costs (Environmental Liabilities):

Is there an ARO associated with this project? If yes, please provide details: No

Are there other environmental cleanup costs associated with this project? If yes, please provide details: None.

Technical Justification

Project Need Statement

NH Operations, has identified structures on the 317 Line (Structure 317/971 and ending at structure 317/945, between West Main St. and School St., Warner, NH) that are in need of replacement through the use of foot and aerial patrols. Proposed is the replacement of twenty-seven (27) structures on this line which consist mostly of original wood structures in the town of Warner. All twenty-seven (27) structures will be replaced with light duty self-weathering steel. The majority of the structures proposed for replacement were constructed in 1937 and are therefore over 83 years old. The structures have one or more of the following deficiencies: deteriorated cross-arms, pole & shell deterioration & bent insulator pins.

In addition to the pole replacements, this project will replace approximately 5,000' of #2 copper conductor with 477 MCM spacer cable. This conductor was installed in 1937 and due to the age and service life is assumed to be annealed and brittle. It cannot be safely handled energized by line crews.

These issues noted above jeopardize the long-term integrity, electrical integrity and the continued reliability of the 317 line. To ensure the continued operability of this line, the structures on this line need to be replaced.

Project Objectives

- Proactive approach to system reliability
- Reduce the occurrence of unplanned outages which may require the need for emergency structure replacement
- Minimize impact to customers and ROW abutters under normal conditions and emergency conditions
- Minimize the duration of unforeseen outages due to establishing access roads.

Project Scope

27 poles to be replaced with self-weathering steel
5,000' of conductor to be replaced with 477 MCM spacer cable
5,000' of 127 AWA messenger to be installed which will add a neutral to an existing 3 wire system

Background / Justification

The 317 line was constructed in 1937 and is 34.5 kV. The line is of a three-wire system of #2 copper conductor with no neutral (See System Operations justification). The #2 copper conductor is original from when the line was constructed in 1937 (see first picture in Attachment A, showing date nail on an existing pole). This conductor has become annealed during its lifespan due to loading and fault currents. In some locations, the wire has been stretched from previous tree impacts and can present challenges when splicing. Much of the pole top construction consists of original build, including crossarms (see Attachment A) & insulators, many of which are the original pin and cap insulators. Recent field inspections show significant deterioration to above ground pole, crossarm, and insulator condition. High resolution photographs of some structures are provided in Attachment A.

The new structures will be light duty self-weathering steel which provides a much greater life expectancy than wood and a higher storm resiliency than wood.

Reliability

This replacement project will harden the system and provide for future load transfer capabilities. The long-term objective of this project is to complete the 317-line reconstruction to provide a backup source to the 316 and 3410 circuits out of North Road Substation. The 316-line feeds 8,757 customers. The 3410 feeds 3,854 customers. This project will also add a neutral to an existing 3 wire system, providing improved fusing protective margins and the eventual removal of the Warner grounding bank.

System operations

This section of 317 line is comprised of #2 solid copper with no system neutral. Engineering burndown curves show that a 30T fuse would be needed to clear the line to prevent conductor burndown. This fuse limitation restricts higher fuse sizes on side taps and eventually results in some P&C coordination issues. Additionally, there is a ground bank located in the Warner section of the line due to the lack of a system neutral. This also limits system protection for line to ground fault protection.

Load transfer capability on this section of line is limited to 16.7 MW in the summer and 20.6 MW in the winter. In reality, before the thermal limit is reached, voltage levels will fall below acceptable levels. Installing standard per phase line regulators and capacitor banks can't be accomplished due to the lack of a system neutral. Currently, we reach thermal and voltage limits when trying to reroute power from North Road 316 & 3140 circuits to the 317 line. The customer impact for these two lines is 12,631 customers.

The completed 317-line full line rebuild will allow for a greater transfer capability into the greater I-89 corridor of circuits and provide better reliability to Eversource customers on these circuits. Additionally, System protection will be enhanced by installing a system neutral which would allow additional protection coordination with larger protective settings and increased protective margins on the downstream circuitry.

Business Process and / or Technical Improvements

Replacement of aged structures and conductor with new materials.

Alternatives Considered with Cost Estimates

1. Do nothing

   This alternative was not chosen because it does not address the condition deficiencies associated with this line portion and the impact on system reliability or resiliency.

2. Replace Only Deteriorated Components

   This will address the concern of individual component reliability but will reuse remaining parts of the structure. Due to the age of these poles (approximately eighty-five years), it is likely that many of these poles will also have to be replaced in the near future. This would result in additional line outages, environmental impact, and repeating the work of removing / installing the crossarm. In addition, replacement of an entire structure is more efficient as the new structure is installed next to the existing, and wires transferred. This reduces the cost of having to temporarily support wires and can result in reduced restoral time. This would also not address the clearance issues. As a result, this alternative was not selected. This option also does not address the lack of a system-neutral or the brittle and annealed #2 copper primary conductor.

3. Replace Only Structures with Deteriorated Components

This alternative will address the concern of near-term reliability but not the line rating evaluation or future reliability. Addressing these issues with independent future projects would involve additional environmental and siting reviews and permitting. As a result, this alternative was not selected. This option also does not address the lack of a system-neutral or the brittle and annealed #2 primary conductor.

Project Schedule

Milestone/Phase Name	Estimated Date
100% Engineering Completion	Sep 22, 2020
Construction Start	Oct 1, 2020
In Service Date	Dec 1, 2020

Regulatory Approvals

None.

Risks and Risk Mitigation Plans

- Although preliminary walkdowns have been conducted, if the project bid prices are higher than anticipated, supplemental authorization will be sought.
- Wetlands mapping has been completed for this line in advance to ensure permitting approval for the start of the construction.
- The majority of this work will be completed in live line conditions minimizing the need for planned outages.
- The improved ROW access and roadways will increase public access to these locations. To minimize risk to the public, gates will be installed at access locations as required.

Contingency

Usage	Amount
Unanticipated rock excavation	$20K
TOTAL	$20K

References

None.

Attachments (One-Line Diagrams, Images, etc.)

Attachment A - 317 Line – Structure Pictures

Attachment A – Structure pictures and conditions

- **Date nail indicating pole install in 1937**

- **Cross arm deteriorated, insulator pin bent**

- **Cross arm deterioration**

- **Cross arm, pole top, pin and cap insulators**

- **Pole, shell deteriorated**

- **Pole, shell deteriorated**

- **Pole deteriorated**