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

Date Request Received: May 26, 2022 **Date of Response: June 06, 2022**
Data Request No. DOE 1--001 **Page 1 of 1**

Request from: Department of Energy

Witness: Devereaux, James J

Request:

The following data request are related to the Attachment RDJ/DLP/JJD-1:

Do the Pre-Construction Authorization and the Annual Authorization values include the "Indirect Buren" estimates (non-direct costs)? What are the % adders for Indirect costs?

Response:

Yes, the Pre-Construction Authorization and the Annual Authorization values include the "Indirect Burden" estimates (indirect costs).

Please see Attachment DOE 1-001 for the % adders for indirect costs.

Public Service Company of New Hampshire
d/b/a Eversource Energy
DE 22-030
Attachment DOE 1-1
Page 1 of 1

		2019	2020	2021
06:PSNH - Distribution dba Eversource Energy	Projects OH Rates			
	AS & E Basis	0 - 3%	0 - 3%	0 - 3%
	MDEC Basis	1-3%	2-4%	4-6%
	E&S Basis	50-60%	60-70%	85-95%
	E&S Station Basis	20-30%	35-45%	30-40%
	Stores Expense Basis	10-15%	10-15%	10-15%
	Non-Productive Basis	10-15%	12-18%	12-18%
	Lobby Stock Basis	15-25%	15-25%	15-25%
	Payroll Benefit Basis	35-45%	25-35%	20-30%

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

Date Request Received: May 26, 2022 **Date of Response: June 06, 2022**
Data Request No. DOE 1--002 **Page 1 of 1**

Request from: Department of Energy

Witness: Devereaux, James J

Request:

The following data request are related to the Attachment RDJ/DLP/JJD-1:

What does the value in the "Supplemental Authorization" columns represent (only the value of any approved Supplement or the total Authorized Project estimate including the Supplement)? Please explain.

Response:

The "Supplemental Authorization" value represents the revised total project authorized amount, not the incremental approved amount. The Supplemental Request Form does have fields for current authorized, additional request, and new proposed total.

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

Date Request Received: May 26, 2022 **Date of Response: June 06, 2022**
Data Request No. DOE 1--003 **Page 1 of 1**

Request from: Department of Energy

Witness: Devereaux, James J

Request:

The following data request are related to the Attachment RDJ/DLP/JJD-1:

Were all Supplements made after construction started? Please identify which, if any, were not.

Response:

Yes, all of the supplements (eight on the annuals tab and thirteen on the specifics carryover tab) were made after construction started.

As it relates to the Annuals tab, these annual blanket projects and programs have an Annual Authorization amount that is established as a best estimate. However, during any subsequent year, there could be a number of developments that would increase the costs, including additional spending required, inflation, construction costs, and resource constraints. These would lead to increases necessary to the funding authorization included in the Annual Authorization amount in Col. H, Attachment RDJ/DLP/JJD-1, page 3 of 7.

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

Date Request Received: May 26, 2022 **Date of Response: June 06, 2022**
Data Request No. DOE 1--004 **Page 1 of 1**

Request from: Department of Energy

Witness: Devereaux, James J

Request:

The following data request are related to the Attachment RDJ/DLP/JJD-1:

Please provide the PAFs associated with all the listed Supplements.

Response:

See Attachment DOE 1-004.

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Supplement Request Form

Approved at August 19, 2020 EPAC
Link to Meeting Minutes

Date Prepared: 07/23/2020	**Project Title: Avigilon Intrusion Detection System Security Upgrades**
Company: Eversource NH	**Project Number: 6DCIP**
Organization: Reliability Compliance	**Class(es) of Plant: D SS**
Project Initiator: Sarah Hannigan	**Project Category: Stations - CIP/Security**
Project Manager: Ken Pajer/Natacha Morales	**Project Type: Specific**
Project Sponsor: Scott McKenzie	**Capital Investment Part of Original Oper. Plan: Yes**
Project Manager's Director: Timothy Revellese	**O&M Expenses Part of the Original Oper. Plan: N/A**
Current Authorized Amount: $110K	**Estimated in service date: December 2019**
Supplement Request: $81K	**ISO-NE Approvals Required (check all that apply):**
Total Request: $191K	**☐ PAC ☐ TCA**

Background

This project is part of a program that covered all four (4) regions of Eversource's service territory (CT, EMA, NH and WMA). Its purpose is to update the Intrusion Detection System in multiple locations. There are 39 distribution substations/sites out of the total 50 in NH that have received the upgrades and were placed in service throughout 2019. The current authorized amount is $110K for New Hampshire's distribution portion of the program. Investment to date is $143,753. This supplement is requesting an additional $81K, bringing the total project amount to $191K. The scope of work is essentially unchanged, and this is largely a financial/accounting allocation adjustment and re-allocation of transmission asset costs to distribution asset costs. This Supplemental Funding Request focuses on the Distribution project only. A supplement is not needed for the Transmission portion of the project.

This project (6DCIP (D SS) and T1393A (T SS)) involved replacing video monitoring systems and their accompanying software at 50 distribution and transmission locations in NH. Scobie Pond Substation was inadvertently included twice, bringing the true total to 49. Keeping this technology up to date ensures both system security and ease of use. These video monitors utilize high definition (HD) video analytics, pattern-based algorithms, and machine learning. The installation of Avigilon appliances and Avigilon encoders ensures that the Intrusion Detection System stays up to date.

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Supplement Justification Overview

The original scope of work for the New Hampshire distribution portion of this program was to install 22 appliances and 44 encoders in 22 distribution substations/sites as well as 28 appliances and 28 encoders in 28 transmission substations/sites. The original PAF mentions 28; however, Scobie Pond is included twice and there are only 27.

The original PAF did not correctly allocate the cost of the "shared" T and D substations, which in NH are distribution assets. The original PAF did not specifically identify sites as T, D or shared. Of the 27 sites assumed to be transmission sites in the original estimate, it was determined that only ten (10) substations were in fact transmission-only substations and the remaining 17 substations were "shared" substations for a total of 39 Distribution asset locations. See the breakdown in the table below for the allocation of stations in the original PAF and those installed.

Funding Project	Approved PAF		As Installed	
	No. Locations	Amount	No. Locations	Amount
Transmission – T1393A	27	$126K	10	$120K
Distribution – 6DCIP	22	$110K	39	$191K
Total	49	$236K	49	$311K

The supplement will cover the difference between the approved number of appliances and encoders and the actual number of installed units at distribution locations. The supplement will also cover the development of record drawings, which was not completed after equipment installation, nor specifically included in the original PAF. Engineering has re-iterated the importance of maintaining accurate, up to date record drawings of substation facilities.

Supplement Justification Detail

In NH, shared substation assets (substations that contain both distribution and transmission assets) are considered Distribution assets. General station security like fences, cameras, and intrusion detection fall into that category (Distribution). This was not taken into consideration when the original PAF was created. Consequently, there were more appliances and encoders installed under the distribution project than what was planned for when the project was initially developed. Conversely, the transmission project (T1393A) had fewer appliances installed than expected.

The original PAF did not include enough funding for the development of record drawings. Proposals have been received to complete this work and are included in this funding request.

The Transmission budget will have enough funds available to complete record drawings since only ten (10) substations/sites received the upgrades.

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The reasons for the project authorization supplement of $81K are summarized below:

1. **Engineering / Design: $30K –** Proposals for completing the record drawings have been received and it will add $30K to the project.

2. **Construction and Materials (contractor provided): $43.6K –** The original PAF included $89.5K allocated for materials (appliances and encoders) and installation (construction) as a 'furnish and install" service. The final cost for all distribution substations/sites was $133.1K, the difference of $43.6K will be covered with this supplement.

3. **Project Management Team: $0.7 –** This will cover the resources (cost analyst, project management and project controls) to close the project out.

4. **Escalation: ($0.6K) –** Work was completed in the year planned and there was no escalation.

5. **Indirects/Overhead: $9K –** An increase in indirects/overhead is related to direct costs increase (materials and engineering).

6. **AFUDC: ($1.7K) –** Actual AFUDC is less than estimated.

Total Supplement Request: $81K

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

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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	$0	$0	$0
2. Environmental Approvals / Permits	$0	$0	$0
3. Outreach	$0	$0	$0
4. Siting Approvals / Permits	$0	$0	$0
5. Engineering / Design	$0.6	$30.6	$30
6. Materials (Eversource purchased)	$0	$0	$0
7. Construction (incl matl's by contractors)	$89.5	$133.1	$43.6
8. Testing / Commissioning	$0	$0	$0
9. Project Mgmt Team	$1.4	$2.1	$0.7
10. Removals	$0	$0	$0
11. Escalation	$0.6	$0	($0.6)
12. Risks	$0	$0	$0
SUBTOTAL DIRECTS W/ RISKS	**$92.1**	**$165.8**	**$73.7**
13. Indirects/Overhead	$14.7	$23.7	$9
14. AFUDC	$2.7	$1	($1.7)
PROJECT TOTAL – BASELINE BUDGET	**$109.5**	**$190.5**	**$81**
15. Contingency	$0	$0	$0
TOTAL CAPITAL REQUEST	**$109.5**	**$190.5**	**$81**
16. Reimbursables/Customer Contribution	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$110**	**$191**	**$81**

EVERSOURCE

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	$0	$	$	$0
2. Environmental Approvals / Permits	$0	$	$	$0
3. Outreach	$0	$	$	$0
4. Siting Approvals / Permits	$0	$	$	$0
5. Engineering / Design	$30	$	$	$30
6. Materials (Eversource purchased)	$0	$	$	$0
7. Construction (incl matl's by contractors)	$43.6	$	$	$43.6
8. Testing / Commissioning	$0	$	$	$0
9. Project Mgmt Team	$0.7	$	$	$0.7
10. Removals	$0	$	$	$0
11. Other	($0.6)	$	$	($0.6)
12. Risks	$0	$	$	$0
SUBTOTAL DIRECTS W/ RISKS	**$73.7**	**$**	**$**	**$73.7**
13. Indirects/Overhead	$9	$	$	$9
14. AFUDC	($1.7)	$	$	($1.7)
PROJECT TOTAL – BASELINE BUDGET	**$81**	**$**	**$**	**$81**
15. Contingency	$0	$	$	$0
TOTAL CAPITAL REQUEST	**$81**	**$**	**$**	**$81**
16. Reimbursables/Customer Contribution	$0	$	$	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$81**	**$**	**$**	**$81**

EVERSOURCE
Project Authorization Form

Operations Project Authorization Form

Approved at November 13, 2018 EPAC
Link to Meeting Minutes

Date Prepared: 11/01/2018	**Project Title: Avigilon Intrusion Detection System Security Upgrades**
Company/ies: Eversource CT, MA, NH	**Project ID Number: TBD**
Organization: System Security	**Class(es) of Plant: Transmission & Distribution Substations**
Project Initiator: Sarah Hannigan	**Project Category: Stations - CIP/Security**
Project Manager: Ken Pajer	**Project Type: Specific**
Project Sponsor: Scott McKenzie	**Project Purpose: Improve Substation Security**
Estimated in service date: December 2019	**If Transmission Project: PTF?**
Eng. /Constr. Resources Budgeted? No	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full	**O&M Expenses Part of the Original Operating Plan? No**
Total Request: $701K	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

Funding is being requested in the amount of $701,000 for a project that will update the Intrusion Detection System in multiple locations. This involves replacing video monitoring systems and their accompanying software in 146 locations. Currently these stations use video monitors which are not compatible with Windows 10. Keeping this technology up to date ensures both system security and ease of use. These video monitors utilize high-definition (HD) video analytics, pattern-based algorithms, and machine learning. Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System. Eversource System Security has evaluated alternate technologies for the intrusion detection system and the Avigilon system remains the best option due to competitive pricing and it is a reliable product.

The per state cost breakdown is as follows (dollar values in thousands):

CT		EMA		NH		WMA	
D	T	D	T	D	T	D	T
$149	$101	$103	$72	$110	$126	$7	$33

EVERSOURCE
Project Authorization Form

Connecticut- Distribution

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 92	$ 20	$ -	$ 113
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 92	$ 20	$ -	$ 113
Capital Additions - Indirect	$ -	$ 0	$ 30	$ -	$ 30
Subtotal Request	$ -	$ 93	$ 50	$ -	$ 143
AFUDC	$ -	$ 2	$ 4	$ -	$ 6
Total Capital Request	$ -	$ 95	$ 54	$ -	$ 149
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 95	$ 54	$ -	$ 149

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 9	$ -	$ 9
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 11	$ -	$ 11
Materials	$ -	$ 92	$ -	$ -	$ 92
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 1	$ -	$ 1
Total	$ -	$ 92	$ 20	$ -	$ 113

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 30	$ -	$ 30
Capitalized interest or AFUDC, if any	$ -	$ 2	$ 4	$ -	$ 6
Total	$ -	$ 3	$ 33	$ -	$ 36

Total Capital Costs	$ -	$ 95	$ 54	$ -	$ 149
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 95	$ 54	$ -	$ 149
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
Project Authorization Form

Connecticut- Transmission

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 72	$ 16	$ -	$ 88
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 72	$ 16	$ -	$ 88
Capital Additions - Indirect	$ -	$ 0	$ 8	$ -	$ 8
Subtotal Request	$ -	$ 72	$ 24	$ -	$ 96
AFUDC	$ -	$ 2	$ 3	$ -	$ 5
Total Capital Request	$ -	$ 74	$ 26	$ -	$ 101
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 74	$ 26	$ -	$ 101

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 7	$ -	$ 7
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 8	$ -	$ 8
Materials	$ -	$ 69	$ -	$ -	$ 69
Other – Vehicles, expenses, Contingency	$ -	$ 3	$ 1	$ -	$ 4
Total	$ -	$ 72	$ 16	$ -	$ 88

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 8	$ -	$ 8
Capitalized interest or AFUDC, if any	$ -	$ 2	$ 3	$ -	$ 5
Total	$ -	$ 2	$ 10	$ -	$ 13

Total Capital Costs	$ -	$ 74	$ 26	$ -	$ 101
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 74	$ 26	$ -	$ 101
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
Project Authorization Form

EMA- Distribution

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 63	$ 18	$ -	$ 80
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 63	$ 18	$ -	$ 80
Capital Additions - Indirect	$ -	$ 0	$ 17	$ -	$ 18
Subtotal Request	$ -	$ 63	$ 35	$ -	$ 98
AFUDC	$ -	$ 2	$ 3	$ -	$ 5
Total Capital Request	$ -	$ 65	$ 38	$ -	$ 103
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 65	$ 38	$ -	$ 103

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 10	$ -	$ 10
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 7	$ -	$ 7
Materials	$ -	$ 63	$ -	$ -	$ 63
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 1	$ -	$ 1
Total	$ -	$ 63	$ 18	$ -	$ 80

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 17	$ -	$ 18
Capitalized interest or AFUDC, if any	$ -	$ 2	$ 3	$ -	$ 5
Total	$ -	$ 2	$ 20	$ -	$ 22

Total Capital Costs	$ -	$ 65	$ 38	$ -	$ 103
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 65	$ 38	$ -	$ 103
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
Project Authorization Form

EMA- Transmission

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 45	$ 14	$ -	$ 59
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 45	$ 14	$ -	$ 59
Capital Additions - Indirect	$ -	$ 0	$ 9	$ -	$ 9
Subtotal Request	$ -	$ 45	$ 23	$ -	$ 69
AFUDC	$ -	$ 1	$ 2	$ -	$ 3
Total Capital Request	$ -	$ 47	$ 25	$ -	$ 72
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 47	$ 25	$ -	$ 72

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 8	$ -	$ 8
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 5	$ -	$ 5
Materials	$ -	$ 45	$ -	$ -	$ 45
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 1	$ -	$ 1
Total	$ -	$ 45	$ 14	$ -	$ 59

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 9	$ -	$ 9
Capitalized interest or AFUDC, if any	$ -	$ 1	$ 2	$ -	$ 3
Total	$ -	$ 1	$ 11	$ -	$ 13

Total Capital Costs	$ -	$ 47	$ 25	$ -	$ 72
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 47	$ 25	$ -	$ 72
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
Project Authorization Form

New Hampshire- Distribution

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 72	$ 20	$ -	$ 92
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 72	$ 20	$ -	$ 92
Capital Additions - Indirect	$ -	$ 0	$ 14	$ -	$ 15
Subtotal Request	$ -	$ 72	$ 35	$ -	$ 107
AFUDC	$ -	$ 1	$ 2	$ -	$ 3
Total Capital Request	$ -	$ 73	$ 36	$ -	$ 110
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 73	$ 36	$ -	$ 110

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 11	$ -	$ 11
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 8	$ -	$ 8
Materials	$ -	$ 72	$ -	$ -	$ 72
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 2	$ -	$ 2
Total	$ -	$ 72	$ 20	$ -	$ 92

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 14	$ -	$ 15
Capitalized interest or AFUDC, if any	$ -	$ 1	$ 2	$ -	$ 3
Total	$ -	$ 1	$ 16	$ -	$ 17

Total Capital Costs	$ -	$ 73	$ 36	$ -	$ 110
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 73	$ 36	$ -	$ 110
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
Project Authorization Form

New Hampshire- Transmission

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 85	$ 26	$ -	$ 110
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 85	$ 26	$ -	$ 110
Capital Additions - Indirect	$ -	$ 0	$ 12	$ -	$ 12
Subtotal Request	$ -	$ 85	$ 37	$ -	$ 122
AFUDC	$ -	$ 1	$ 2	$ -	$ 3
Total Capital Request	$ -	$ 86	$ 40	$ -	$ 126
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 86	$ 40	$ -	$ 126

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 14	$ -	$ 14
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 10	$ -	$ 10
Materials	$ -	$ 85	$ -	$ -	$ 85
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 2	$ -	$ 2
Total	$ -	$ 85	$ 26	$ -	$ 110

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 12	$ -	$ 12
Capitalized interest or AFUDC, if any	$ -	$ 1	$ 2	$ -	$ 3
Total	$ -	$ 2	$ 14	$ -	$ 15

Total Capital Costs	$ -	$ 86	$ 40	$ -	$ 126
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 86	$ 40	$ -	$ 126
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
Project Authorization Form

WMA- Distribution

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 4	$ 1	$ -	$ 5
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 4	$ 1	$ -	$ 5
Capital Additions - Indirect	$ -	$ 0	$ 2	$ -	$ 2
Subtotal Request	$ -	$ 4	$ 3	$ -	$ 7
AFUDC	$ -	$ 0	$ 0	$ -	$ 0
Total Capital Request	$ -	$ 4	$ 3	$ -	$ 7
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 4	$ 3	$ -	$ 7

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 1	$ -	$ 1
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 0	$ -	$ 0
Materials	$ -	$ 4	$ -	$ -	$ 4
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 0	$ -	$ 0
Total	$ -	$ 4	$ 1	$ -	$ 5

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 2	$ -	$ 2
Capitalized interest or AFUDC, if any	$ -	$ 0	$ 0	$ -	$ 0
Total	$ -	$ 0	$ 2	$ -	$ 2

Total Capital Costs	$ -	$ 4	$ 3	$ -	$ 7
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 4	$ 3	$ -	$ 7
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
Project Authorization Form

WMA- Transmission

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 24	$ 6	$ -	$ 30
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 24	$ 6	$ -	$ 30
Capital Additions - Indirect	$ -	$ 0	$ 2	$ -	$ 2
Subtotal Request	$ -	$ 24	$ 8	$ -	$ 33
AFUDC	$ -	$ 0	$ 0	$ -	$ 0
Total Capital Request	$ -	$ 24	$ 8	$ -	$ 33
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 24	$ 8	$ -	$ 33

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 3	$ -	$ 3
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 3	$ -	$ 3
Materials	$ -	$ 24	$ -	$ -	$ 24
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 0	$ -	$ 0
Total	$ -	$ 24	$ 6	$ -	$ 30

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 2	$ -	$ 2
Capitalized interest or AFUDC, if any	$ -	$ 0	$ 0	$ -	$ 0
Total	$ -	$ 0	$ 2	$ -	$ 3

Total Capital Costs	$ -	$ 24	$ 8	$ -	$ 33
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 24	$ 8	$ -	$ 33
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

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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: No

What functional area(s) will these future costs be funded in? N/A

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: N/A

What functional area(s) will these benefits be reflected in? N/A

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

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Technical Justification:

Project Need Statement

This project involves updating security video monitors and their accompanying software at 146 locations. Currently these stations use video monitors which are not compatible with windows 10. These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning. Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

The scope includes the installation of Avigilon appliances at 146 locations and 202 Avigilon encoders throughout the 146 locations. This will ensure that the Intrusion Detection System stays up to date.

	CT	EMA	NH	WMA
Locations	**53**	**34**	**50**	**9**
# of Avigilon Encoders	58	53	69	12
Spares	3	3	3	1
Total	61	56	72	13

Programming of the appliances and encoders will be handled by Eversource System Security. Security has also confirmed that there is adequate room in all cabinets for the new appliances.

Background / Justification

Eversource System Security has evaluated all possible technologies for the intrusion detection system. Avigilon remains the best option due to competitive pricing and it is a reliable product. The sites that have recently been updated with Physical Security upgrades have this version of the Avigilon appliances and encoders.

The Avigilon units have the ability to remotely store high amounts of HD video data, and to view live or recorded video from long distances upon demand. This makes it ideal for centralized monitoring of critical infrastructure.

The security units currently in use are not compatible with Windows 10. Updating these units will allow them to be supported for a longer period of time, as well as reducing the amount of training required. Technicians will need to learn only one version of software rather than two. Using outdated software with security monitors is also a security risk.

Business Process and / or Technical Improvements:

Support Eversource system security and reliability.

Alternatives Considered with Cost Estimates

N/A

Project Schedule

Milestone/Phase Name	Estimated Completion Date
EPAC	Q4 2018
Purchase	Q4 2018
Installation	Q3 2019

Regulatory Approvals

N/A

Risks and Risk Mitigation Plans

N/A

References

N/A

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Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name: Avigilon Intrusion Detection System Security Upgrades				**PAF No: TBD**	
Facility Type: ☒ BPS	☒ BES	☒ PTF	☒ non-PTF	☒ CIP	☒ Distribution
PLANNING					
Is a NX-9 required?				No	
Is an ISO-NE PAC presentation required?				No	
Is a PPA required?				No	
Is a TCA Application Required?				No	
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?				No	
OPERATIONS					
Outage Required?	☐ Primary Equipment (Power Transfer)		☐ Secondary Equipment (P&C only)		☒ Outage Not Required
Do SCLL Conditions Exist?				No	
Has an outage schedule been approved?				No	
Are Operations & Maintenance procedures/training required?				No	
STANDARDS					
Does the project include standard equipment and designs?				No	
SUBSTATION ENGINEERING					
Does this impact Revenue Metering				No	
Is preliminary short circuit/ breaker duty analysis required?				No	
Are there any changes to the baseline audible noise?				No	
Is there an impact to the existing ground grid?				No	
Is a Transient Over Voltage (TOV) analysis required?				No	
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?				No	
If BPS, is an NPCC Directory #4 presentation required?				No	

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Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name: Avigilon Intrusion Detection System Security Upgrades	**PAF No: TBD**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	No
SITING & CONSTRUCTION SERVICES (OUTREACH)	
What is the level of outreach expected?	None
INITIATOR	
Has a field constructability review been completed?	No
INVESTMENT RECOVERY	
Does the project require development of an Investment Recovery plan?	No
COST ESTIMATING	
How was the cost estimate prepared?	Estimate was prepared by the Eversource Estimating Team
Who prepared the estimate?	Joe McDonough
Was the estimate reviewed by Eversource Estimating?	Yes

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Attachment 1- Locations

Location	Encoders	State
CT-AWC-BERLIN COMMAND CENTER	1	CT
CT-AWC-BERLIN SOUTH TOC AR	1	CT
CT-AWC-BERLIN WAREHOUSE 1 AR	1	CT
CT-AWC-BERLIN WAREHOUSE 2 ARI	1	CT
CT-AWC-CHESHIRE 1 AR	1	CT
CT-AWC-CHESHIRE 2 AR	1	CT
CT-AWC-DANIELSON 1 AR	1	CT
CT-AWC-DANIELSON 2 AR	1	CT
CT-AWC-EAST-WINDSOR AR	1	CT
CT-AWC-HARTFORD 1	1	CT
CT-AWC-HARTFORD 2 AR	1	CT
CT-AWC-HARTFORD 56P AR	1	CT
CT-AWC-HARTFORD POLEYARD	1	CT
CT-AWC-NEW BRITAIN 1 AR	1	CT
CT-AWC-NEW BRITAIN 2 AR	1	CT
CT-AWC-NORWALK TINDALE AVE AR	1	CT
CT-AWC-STAMFORD AR	1	CT
CT-AWC-TORRINGTON AR	1	CT
CT-SS- BARBOUR HILL 23J AR	1	CT
CT-SS-BLOOMFIELD 3B AR	1	CT
CT-SS-BRANFORD 11J AR	1	CT
CT-SS-BRISTOL 11K AR	1	CT
CT-SS-BUNKER HILL 12B AR	1	CT
CT-SS-CHIPPEN HILL 15U AR	1	CT
CT-SS-COMPO 23K AR	1	CT
CT-SS-DARIEN 13S AR	1	CT
CT-SS-EAST HARTFORD 32G	1	CT
CT-SS-EAST NEW BRITAIN 7L	1	CT
CT-SS-FARMINGTON 1C	1	CT
CT-SS-FLAX HILL 24A	1	CT
CT-SS-FREIGHT STREET 11W AR 1	2	CT
CT-SS-GLENBROOK 1K 115 AR	1	CT
CT-SS-HOPEWELL 22R AR	1	CT
CT-SS-MYSTIC 13K AR	1	CT
CT-SS-NEWINGTON 4A	1	CT

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CT-SS-NORTH BLOOMFIELD 2A-1 (NC)	1	CT
CT-SS-NORTH BLOOMFIELD 2A-2 (NC)	1	CT
CT-SS-NORTHEAST SIMSBURY 43F	1	CT
CT-SS-NORTHWEST HARTFORD 2N AR	1	CT
CT-SS-NORWALK 1 AR	2	CT
CT-SS-NORWALK 2 AR	2	CT
CT-SS-NORWALK YG	1	CT
CT-SS-PEACEABLE 12N AR	1	CT
CT-SS-ROCKY HILL 3R	2	CT
CT-SS-SHAW'S HILL 24H	1	CT
CT-SS-SHUNOCK 32P	1	CT
CT-SS-SOUTH END 1G 1 AR	2	CT
CT-SS-SOUTH MEADOW 1A AR	1	CT
CT-SS-SOUTH WINDSOR 14L AR	1	CT
CT-SS-TOLLAND AWC 2 AR	1	CT
CT-SS-TUNNEL 12S	1	CT
CT-SS-WESTON 21M AR	1	CT
CT-SS- Frostbridge	1	CT
EMA Dorchester AWC - A+B	2	EMA
EMA Dorchester AWC - CDE	3	EMA
EMA Dorchester AWC - F	1	EMA
EMA Dorchester AWC - Lightwell 1=2	2	EMA
EMA-ACUSHNET LNG-1	2	EMA
EMA-ACUSHNET LNG-2	2	EMA
EMA-SS-STATION 330-STOUGHTON-1	2	EMA
EMA-SS-STATION 330-STOUGHTON-2	2	EMA
EMA Hyde Park AWC	1	EMA
EMA New Bedford AWC - A+B	2	EMA
EMA Plymouth AWC - A+B	2	EMA
EMA Somerville AWC - A+B	2	EMA
EMA Southboro AWC - A	1	EMA
EMA Southboro AWC - B	1	EMA
EMA-SS 002 - Hawkins St	1	EMA
EMA-SS 012 - Chatham St	2	EMA
EMA-SS 053 - High St	2	EMA
EMA-SS 071 - Charles St	1	EMA
EMA-SS 148 - Needham	2	EMA
EMA-SS 492 - Scotia St	1	EMA

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EMA-SS 514 - Kingston St	3	EMA
EMA-SS 726 - Carver	2	EMA
EMA-station 150	2	EMA
EMA-Station 410	1	EMA
EMA-station 496	1	EMA
EMA-station 509	1	EMA
EMA-station 980	1	EMA
EMA Walpole AWC	1	EMA
EMA Waltham AWC	1	EMA
Worcester AWC	1	EMA
Yarmouth AWC	1	EMA
Yarmouth ES	1	EMA
EMA New Bedford AWC	1	EMA
EMA-Station 99	2	EMA
NH-AWC-BEDFORD 1 AR	1	NH
NH-AWC-BEDFORD 2 ARI	1	NH
NH-AWC-BERLIN ARI	1	NH
NH-AWC-BOW CENTRAL WH-2	1	NH
NH-AWC-BOW WAREHOUSE 1 AR	1	NH
NH-AWC-CHOCORUA AR	2	NH
NH-AWC-COLEBROOK	1	NH
NH-AWC-DERRY AR	1	NH
NH-AWC-ENERGY PARK AR	1	NH
NH-AWC-EPPING 1 AR	2	NH
NH-AWC-HOOKSETT 1 AR	2	NH
NH-AWC-HOOKSETT 1250 AR	1	NH
NH-AWC-HOOKSETT LEGENDS DR 1 AR	2	NH
NH-AWC-KEENE 1 AR	2	NH
NH-AWC-LANCASTER AR	1	NH
NH-AWC-MILFORD	1	NH
NH-AWC-MONADNOCK	1	NH
NH-AWC-NASHUA AR	1	NH
NH-AWC-NEWPORT 1 AR	2	NH
NH-AWC-PORTSMOUTH AR	1	NH
NH-AWC-ROCHESTER 1 AR	2	NH
NH-AWC-TILTON	1	NH
NH-SS-CANAL STREET AR	1	NH
NH-SS-CHOCURRA AR	2	NH

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NH-SS-COMM TOWER	1	NH
NH-SS-COMMUNITY ST 1 AR	2	NH
NH-SS-DEERFIELD 1 AR	3	NH
NH-SS-EAGLE 2 AR	1	NH
NH-SS-EAGLE 345	1	NH
NH-SS-ELIOT 1	2	NH
NH-SS-FARMWOOD 1	2	NH
NH-SS-HUCKINS HILL	1	NH
NH-SS-LACONIA	1	NH
NH-SS-MESSER STREET	1	NH
NH-SS-MILL POND	1	NH
NH-SS-OAK HILL	1	NH
NH-SS-OCEAN RD	1	NH
NH-SS-PEASLEE	1	NH
NH-SS-PORTLAND STREET	1	NH
NH-SS-PULPIT ROCK	1	NH
NH-SS-RIMMON	1	NH
NH-SS-ROCHESTER	1	NH
NH-SS-SCOBIE 115- 1	2	NH
NH-SS-SCOBIE 345-2	3	NH
NH-SS-SCOBIE 345-2	3	NH
NH-SS-SOMERSWORTH AR	1	NH
NH-SS-SOUTH MANCHESTER AR	1	NH
NH-SS-THORNTON 1 AR	2	NH
NH-SS-WEBSTER AR	1	NH
NH-TOWER HILL- RADIO SITE	1	NH
WMA-AWC-EAST SPRINGFIELD AWC AR	1	WMA
WMA-AWC-EAST SPRINGFIELD SOC	1	WMA
WMA-SS AGAWAM 16C AR 2	1	WMA
WMA-SS-AGAWAM 16C AR 1	1	WMA
WMA-SS-CADWELL 50F 1 AR	2	WMA
WMA-SS-FAIRMONT 16H 1 AR	2	WMA
WMA-SS-INDIAN ORCHARD 27A AR	1	WMA
WMA-SS-LUDLOW 19S 2 AR 1	2	WMA
WMA-SS-TILSON 10P AR	1	WMA
TOTAL	192	

Environmental Systems Corporation
18 Jansen Court
West Hartford, CT 06110
Phone: 860.953.8800
d.mike@esccontrols.com

ES201801150001-4

Intelligent Building Solutions

Avigilon Parts Sale

ESC Job #	0
Purchase Order #	0
Release Line	0
Work Order #	0

Detailed List of Materials

Qty	Part Number	Description	Unit Cost	Extended Cost
146	VMA-RPA-4P4-NA	4TB analytics appliance ***No Warranty Services Included***	$2,774.40	$405,062.40
181	ENC-4P-H264	Avigilon Encoder	$243.80	$44,127 80
	Scope of Work	1. No warranty services included		
		2. Discount based on volume, all 146 appliances and 181 encoders must be ordered on one PO		
		3. Estimate is valid until 6/01/2018		
		Note All Programming by others		
Project Parts Cost			**Total Material W/O Tax**	**$449,190.20**

Detailed List of Labor

Qty	Type	Labor Description	Unit	Total
0	Program	Programming	$118.97	$0.00
438	Security Technician	General Installation	$97 34	$46,187 83
0	Project Management	Project Management, scheduling, coordination	$113.56	$0.00
Labor Cost			**Total Labor**	**$46,187.83**
Total Quote Price			**Total With Tax**	**$495,378.03**

Quote does not include applicable permits or tax

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00

Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #C-18-388D

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$17,340	11.7%			$17,340				
Engineering / Design	$648	0.4%			$648				
Land									
Material	$92,496	62.2%		$92,496					
Project Mgmt. & Sppt.	$1,836	1.2%			$1,836				
Removal									
Test									
Risk / Contingency									
Escalation	$596	0.4%			$596				
Indirects	$29,995	20.2%		$462	$29,533				
AFUDC	$5,881	4.0%		$2,301	$3,580				
Total Cost	**$148,792**	100.0%		**$95,259**	**$53,533**				

Estimate Range	**-25%**	**25%**
	$110,000	**$190,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Distribution

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (30) - thirty Avigilon Appliances
Furnish, Install, and Program (38) - thirty-eight Encoders

Assumptions/Clarifications

Indirect rates based on; 11 - CT , Station work
Installation is by ESC employees
Installer will work alone and have current access previliges for the substation.
Additional supervisory personnel will not be required during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00

Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #C-18-388T

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$13,294	13.2%			$13,294				
Engineering / Design	$648	0.6%			$648				
Land									
Material	$72,118	71.6%		$72,118					
Project Mgmt. & Sppt.	$1,459	1.4%			$1,459				
Removal									
Test									
Risk / Contingency									
Escalation	$463	0.5%			$463				
Indirects	$8,014	8.0%		$361	$7,653				
AFUDC	$4,732	4.7%		$1,986	$2,746				
Total Cost	**$100,728**	100.0%		**$74,465**	**$26,263**				

Estimate Range	**-25%**	**25%**
	$80,000	**$130,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Transmission

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (23) - twenty-three Avigilon Appliances
Furnish, Install, and Program (23) - twenty-three Encoders

Assumptions/Clarifications

Indirect rates based on; 1T - CT , Station work
Installation is by ESC employees
Installer will work alone and have current access previliges for the substation.
Additional supervisory personnel will not be required during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00

Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #E-18-391D

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$15,352	15.0%			$15,352				
Engineering / Design	$648	0.6%			$648				
Land									
Material	$62,710	61.1%		$62,710					
Project Mgmt. & Sppt.	$1,243	1.2%			$1,243				
Removal									
Test									
Risk / Contingency									
Escalation	$518	0.5%			$518				
Indirects	$17,676	17.2%		$314	$17,362				
AFUDC	$4,528	4.4%		$1,755	$2,773				
Total Cost	**$102,675**	100.0%		**$64,779**	**$37,896**				

Estimate Range	**-25%**	**25%**
	$80,000	**$130,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Distribution

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (19) - nineteen Avigilon Appliances
Furnish, Install, and Program (19) - nineteen Encoders

Assumptions/Clarifications

Indirect rates based on; 21D - EMA , Station work
Installation is by ESC employees
Installer will be escorted for access during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming and escorting is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00

Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #E-18-391T

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$12,120	16.8%			$12,120				
Engineering / Design	$648	0.9%			$648				
Land									
Material	$45,273	62.9%		$45,273					
Project Mgmt. & Sppt.	$1,027	1.4%			$1,027				
Removal									
Test									
Risk / Contingency									
Escalation	$414	0.6%			$414				
Indirects	$9,245	12.8%		$226	$9,019				
AFUDC	$3,255	4.5%		$1,267	$1,988				
Total Cost	**$71,982**	100.0%		**$46,766**	**$25,216**				

Estimate Range	**-25%**	**25%**
	$50,000	**$90,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Transmission

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (15) - fifteen Avigilon Appliances
Furnish, Install, and Program (15) - fifteen Encoders

Assumptions/Clarifications
Indirect rates based on; 21 - EMA , Station work
Installation is by ESC employees
Installer will be escorted for access during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming and escorting is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00

Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #P-18-390D

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$17,776	16.2%			$17,776				
Engineering / Design	$648	0.6%			$648				
Land									
Material	$71,764	65.5%		$71,764					
Project Mgmt. & Sppt.	$1,404	1.3%			$1,404				
Removal									
Test									
Risk / Contingency									
Escalation	$595	0.5%			$595				
Indirects	$14,650	13.4%		$359	$14,291				
AFUDC	$2,716	2.5%		$1,097	$1,619				
Total Cost	**$109,553**	100.0%		**$73,220**	**$36,333**				

Estimate Range	**-25%**	**25%**
	$80,000	**$140,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Distribution

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (22) - twenty-two Avigilon Appliances
Furnish, Install, and Program (44) - foty-four Encoders

Assumptions/Clarifications

Indirect rates based on; 6D - NH , Station work
Installation is by ESC employees
Installer will be escorted for access during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming and escorting is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00

Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #P-18-390T

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$22,624	18.0%			$22,624				
Engineering / Design	$648	0.5%			$648				
Land									
Material	$84,509	67.3%		$84,509					
Project Mgmt. & Sppt.	$1,728	1.4%			$1,728				
Removal									
Test									
Risk / Contingency									
Escalation	$751	0.6%			$751				
Indirects	$11,949	9.5%		$211	$11,738				
AFUDC	$3,365	2.7%		$1,352	$2,013				
Total Cost	**$125,574**	100.0%		**$86,072**	**$39,502**				

Estimate Range	**-25%**	**25%**
	$90,000	**$160,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Transmission

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (28) - twenty-eight Avigilon Appliances
Furnish, Install, and Program (28) - twenty-eight Encoders

Assumptions/Clarifications

Indirect rates based on; 6T - NH , Station work
Installation is by ESC employees
Installer will be escorted for access during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming and escorting is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00

Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #W-18-389D

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$578	7.9%			$578				
Engineering / Design	$432	5.9%			$432				
Land									
Material	$3,993	54.5%		$3,993					
Project Mgmt. & Sppt.	$271	3.7%			$271				
Removal									
Test									
Risk / Contingency									
Escalation	$38	0.5%			$38				
Indirects	$1,970	26.9%		$20	$1,950				
AFUDC	$45	0.6%		$16	$29				
Total Cost	**$7,327**	100.0%		**$4,029**	**$3,298**				

Estimate Range	**-25%**	**25%**
	$10,000	**$10,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Distribution

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (1) - one Avigilon Appliance
Furnish, Install, and Program (5) - five Encoders

Assumptions/Clarifications

Indirect rates based on; 41 - WMA , Station work
Installation is by ESC employees
Installer will work alone and have current access previliges for the substation.
Additional supervisory personnel will not be required during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00

Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #W-18-389T

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$4,624	14.1%			$4,624				
Engineering / Design	$648	2.0%			$648				
Land									
Material	$24,145	73.5%		$24,145					
Project Mgmt. & Sppt.	$648	2.0%			$648				
Removal									
Test									
Risk / Contingency									
Escalation	$179	0.5%			$179				
Indirects	$2,359	7.2%		$121	$2,238				
AFUDC	$236	0.7%		$99	$137				
Total Cost	**$32,839**	100.0%		**$24,365**	**$8,474**				

Estimate Range

	-25%	**25%**
	$20,000	**$40,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Transmission

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (8) - eight Avigilon Appliances
Furnish, Install, and Program (8) - eight Encoders

Assumptions/Clarifications

Indirect rates based on; 4T - WMA , Station work
Installation is by ESC employees
Installer will work alone and have current access previliges for the substation.
Additional supervisory personnel will not be required during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

EVERSOURCE
Project Authorization Form

Operations Project Authorization Form

Approved at November 13, 2018 EPAC
Link to Meeting Minutes

Date Prepared: 11/01/2018	**Project Title: Avigilon Intrusion Detection System Security Upgrades**
Company/ies: Eversource CT, MA, NH	**Project ID Number: TBD**
Organization: System Security	**Class(es) of Plant: Transmission & Distribution Substations**
Project Initiator: Sarah Hannigan	**Project Category: Stations - CIP/Security**
Project Manager: Ken Pajer	**Project Type: Specific**
Project Sponsor: Scott McKenzie	**Project Purpose: Improve Substation Security**
Estimated in service date: December 2019	**If Transmission Project: PTF?**
Eng. /Constr. Resources Budgeted? No	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full	**O&M Expenses Part of the Original Operating Plan? No**
Total Request: $701K	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

Funding is being requested in the amount of $701,000 for a project that will update the Intrusion Detection System in multiple locations. This involves replacing video monitoring systems and their accompanying software in 146 locations. Currently these stations use video monitors which are not compatible with Windows 10. Keeping this technology up to date ensures both system security and ease of use. These video monitors utilize high-definition (HD) video analytics, pattern-based algorithms, and machine learning. Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System. Eversource System Security has evaluated alternate technologies for the intrusion detection system and the Avigilon system remains the best option due to competitive pricing and it is a reliable product.

The per state cost breakdown is as follows (dollar values in thousands):

CT		EMA		NH		WMA	
D	T	D	T	D	T	D	T
$149	$101	$103	$72	$110	$126	$7	$33

EVERSOURCE
Project Authorization Form

Connecticut- Distribution

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 92	$ 20	$ -	$ 113
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 92	$ 20	$ -	$ 113
Capital Additions - Indirect	$ -	$ 0	$ 30	$ -	$ 30
Subtotal Request	$ -	$ 93	$ 50	$ -	$ 143
AFUDC	$ -	$ 2	$ 4	$ -	$ 6
Total Capital Request	$ -	$ 95	$ 54	$ -	$ 149
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 95	$ 54	$ -	$ 149

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 9	$ -	$ 9
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 11	$ -	$ 11
Materials	$ -	$ 92	$ -	$ -	$ 92
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 1	$ -	$ 1
Total	$ -	$ 92	$ 20	$ -	$ 113

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 30	$ -	$ 30
Capitalized interest or AFUDC, if any	$ -	$ 2	$ 4	$ -	$ 6
Total	$ -	$ 3	$ 33	$ -	$ 36

Total Capital Costs	$ -	$ 95	$ 54	$ -	$ 149
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 95	$ 54	$ -	$ 149
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
Project Authorization Form

Connecticut- Transmission

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 72	$ 16	$ -	$ 88
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 72	$ 16	$ -	$ 88
Capital Additions - Indirect	$ -	$ 0	$ 8	$ -	$ 8
Subtotal Request	$ -	$ 72	$ 24	$ -	$ 96
AFUDC	$ -	$ 2	$ 3	$ -	$ 5
Total Capital Request	$ -	$ 74	$ 26	$ -	$ 101
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 74	$ 26	$ -	$ 101

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 7	$ -	$ 7
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 8	$ -	$ 8
Materials	$ -	$ 69	$ -	$ -	$ 69
Other – Vehicles, expenses, Contingency	$ -	$ 3	$ 1	$ -	$ 4
Total	$ -	$ 72	$ 16	$ -	$ 88

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 8	$ -	$ 8
Capitalized interest or AFUDC, if any	$ -	$ 2	$ 3	$ -	$ 5
Total	$ -	$ 2	$ 10	$ -	$ 13

Total Capital Costs	$ -	$ 74	$ 26	$ -	$ 101
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 74	$ 26	$ -	$ 101
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
Project Authorization Form

EMA- Distribution

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 63	$ 18	$ -	$ 80
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 63	$ 18	$ -	$ 80
Capital Additions - Indirect	$ -	$ 0	$ 17	$ -	$ 18
Subtotal Request	$ -	$ 63	$ 35	$ -	$ 98
AFUDC	$ -	$ 2	$ 3	$ -	$ 5
Total Capital Request	$ -	$ 65	$ 38	$ -	$ 103
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 65	$ 38	$ -	$ 103

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 10	$ -	$ 10
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 7	$ -	$ 7
Materials	$ -	$ 63	$ -	$ -	$ 63
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 1	$ -	$ 1
Total	$ -	$ 63	$ 18	$ -	$ 80

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 17	$ -	$ 18
Capitalized interest or AFUDC, if any	$ -	$ 2	$ 3	$ -	$ 5
Total	$ -	$ 2	$ 20	$ -	$ 22

Total Capital Costs	$ -	$ 65	$ 38	$ -	$ 103
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 65	$ 38	$ -	$ 103
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
Project Authorization Form

EMA- Transmission

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 45	$ 14	$ -	$ 59
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 45	$ 14	$ -	$ 59
Capital Additions - Indirect	$ -	$ 0	$ 9	$ -	$ 9
Subtotal Request	$ -	$ 45	$ 23	$ -	$ 69
AFUDC	$ -	$ 1	$ 2	$ -	$ 3
Total Capital Request	$ -	$ 47	$ 25	$ -	$ 72
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 47	$ 25	$ -	$ 72

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 8	$ -	$ 8
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 5	$ -	$ 5
Materials	$ -	$ 45	$ -	$ -	$ 45
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 1	$ -	$ 1
Total	$ -	$ 45	$ 14	$ -	$ 59

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 9	$ -	$ 9
Capitalized interest or AFUDC, if any	$ -	$ 1	$ 2	$ -	$ 3
Total	$ -	$ 1	$ 11	$ -	$ 13

Total Capital Costs	$ -	$ 47	$ 25	$ -	$ 72
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 47	$ 25	$ -	$ 72
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
Project Authorization Form

New Hampshire- Distribution

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 72	$ 20	$ -	$ 92
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 72	$ 20	$ -	$ 92
Capital Additions - Indirect	$ -	$ 0	$ 14	$ -	$ 15
Subtotal Request	$ -	$ 72	$ 35	$ -	$ 107
AFUDC	$ -	$ 1	$ 2	$ -	$ 3
Total Capital Request	$ -	$ 73	$ 36	$ -	$ 110
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 73	$ 36	$ -	$ 110

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 11	$ -	$ 11
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 8	$ -	$ 8
Materials	$ -	$ 72	$ -	$ -	$ 72
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 2	$ -	$ 2
Total	$ -	$ 72	$ 20	$ -	$ 92

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 14	$ -	$ 15
Capitalized interest or AFUDC, if any	$ -	$ 1	$ 2	$ -	$ 3
Total	$ -	$ 1	$ 16	$ -	$ 17

Total Capital Costs	$ -	$ 73	$ 36	$ -	$ 110
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 73	$ 36	$ -	$ 110
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
Project Authorization Form

New Hampshire- Transmission

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 85	$ 26	$ -	$ 110
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 85	$ 26	$ -	$ 110
Capital Additions - Indirect	$ -	$ 0	$ 12	$ -	$ 12
Subtotal Request	$ -	$ 85	$ 37	$ -	$ 122
AFUDC	$ -	$ 1	$ 2	$ -	$ 3
Total Capital Request	$ -	$ 86	$ 40	$ -	$ 126
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 86	$ 40	$ -	$ 126

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 14	$ -	$ 14
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 10	$ -	$ 10
Materials	$ -	$ 85	$ -	$ -	$ 85
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 2	$ -	$ 2
Total	$ -	$ 85	$ 26	$ -	$ 110

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 12	$ -	$ 12
Capitalized interest or AFUDC, if any	$ -	$ 1	$ 2	$ -	$ 3
Total	$ -	$ 2	$ 14	$ -	$ 15

Total Capital Costs	$ -	$ 86	$ 40	$ -	$ 126
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 86	$ 40	$ -	$ 126
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
Project Authorization Form

WMA- Distribution

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 4	$ 1	$ -	$ 5
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 4	$ 1	$ -	$ 5
Capital Additions - Indirect	$ -	$ 0	$ 2	$ -	$ 2
Subtotal Request	$ -	$ 4	$ 3	$ -	$ 7
AFUDC	$ -	$ 0	$ 0	$ -	$ 0
Total Capital Request	$ -	$ 4	$ 3	$ -	$ 7
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 4	$ 3	$ -	$ 7

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 1	$ -	$ 1
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 0	$ -	$ 0
Materials	$ -	$ 4	$ -	$ -	$ 4
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 0	$ -	$ 0
Total	$ -	$ 4	$ 1	$ -	$ 5

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 2	$ -	$ 2
Capitalized interest or AFUDC, if any	$ -	$ 0	$ 0	$ -	$ 0
Total	$ -	$ 0	$ 2	$ -	$ 2

Total Capital Costs	$ -	$ 4	$ 3	$ -	$ 7
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 4	$ 3	$ -	$ 7
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
Project Authorization Form

WMA- Transmission

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 24	$ 6	$ -	$ 30
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 24	$ 6	$ -	$ 30
Capital Additions - Indirect	$ -	$ 0	$ 2	$ -	$ 2
Subtotal Request	$ -	$ 24	$ 8	$ -	$ 33
AFUDC	$ -	$ 0	$ 0	$ -	$ 0
Total Capital Request	$ -	$ 24	$ 8	$ -	$ 33
O&M	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 24	$ 8	$ -	$ 33

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Actuals	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ 3	$ -	$ 3
Overtime Labor	$ -	$ -			$ -
Outside Services	$ -	$ -	$ 3	$ -	$ 3
Materials	$ -	$ 24	$ -	$ -	$ 24
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 0	$ -	$ 0
Total	$ -	$ 24	$ 6	$ -	$ 30

Indirect Capital Costs		2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ -	$ 0	$ 2	$ -	$ 2
Capitalized interest or AFUDC, if any	$ -	$ 0	$ 0	$ -	$ 0
Total	$ -	$ 0	$ 2	$ -	$ 3

Total Capital Costs	$ -	$ 24	$ 8	$ -	$ 33
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ -	$ 24	$ 8	$ -	$ 33
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -

Note: Explain unique payment provisions, if applicable

EVERSOURCE
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 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: No

What functional area(s) will these future costs be funded in? N/A

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: N/A

What functional area(s) will these benefits be reflected in? N/A

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

EVERSOURCE
Project Authorization Form

Technical Justification:

Project Need Statement

This project involves updating security video monitors and their accompanying software at 146 locations. Currently these stations use video monitors which are not compatible with windows 10. These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning. Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

The scope includes the installation of Avigilon appliances at 146 locations and 202 Avigilon encoders throughout the 146 locations. This will ensure that the Intrusion Detection System stays up to date.

	CT	EMA	NH	WMA
Locations	**53**	**34**	**50**	**9**
# of Avigilon Encoders	58	53	69	12
Spares	3	3	3	1
Total	61	56	72	13

Programming of the appliances and encoders will be handled by Eversource System Security. Security has also confirmed that there is adequate room in all cabinets for the new appliances.

Background / Justification

Eversource System Security has evaluated all possible technologies for the intrusion detection system. Avigilon remains the best option due to competitive pricing and it is a reliable product. The sites that have recently been updated with Physical Security upgrades have this version of the Avigilon appliances and encoders.

The Avigilon units have the ability to remotely store high amounts of HD video data, and to view live or recorded video from long distances upon demand. This makes it ideal for centralized monitoring of critical infrastructure.

The security units currently in use are not compatible with Windows 10. Updating these units will allow them to be supported for a longer period of time, as well as reducing the amount of training required. Technicians will need to learn only one version of software rather than two. Using outdated software with security monitors is also a security risk.

Business Process and / or Technical Improvements:

Support Eversource system security and reliability.

Alternatives Considered with Cost Estimates

N/A

Project Schedule

Milestone/Phase Name	Estimated Completion Date
EPAC	Q4 2018
Purchase	Q4 2018
Installation	Q3 2019

Regulatory Approvals

N/A

Risks and Risk Mitigation Plans

N/A

References

N/A

EVERSOURCE
Project Authorization Form

Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name: Avigilon Intrusion Detection System Security Upgrades				**PAF No: TBD**	
Facility Type: ☒ BPS	☒ BES	☒ PTF	☒ non-PTF	☒ CIP	☒ Distribution
PLANNING					
Is a NX-9 required?				No	
Is an ISO-NE PAC presentation required?				No	
Is a PPA required?				No	
Is a TCA Application Required?				No	
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?				No	
OPERATIONS					
Outage Required?	☐ Primary Equipment (Power Transfer)		☐ Secondary Equipment (P&C only)		☒ Outage Not Required
Do SCLL Conditions Exist?				No	
Has an outage schedule been approved?				No	
Are Operations & Maintenance procedures/training required?				No	
STANDARDS					
Does the project include standard equipment and designs?				No	
SUBSTATION ENGINEERING					
Does this impact Revenue Metering				No	
Is preliminary short circuit/ breaker duty analysis required?				No	
Are there any changes to the baseline audible noise?				No	
Is there an impact to the existing ground grid?				No	
Is a Transient Over Voltage (TOV) analysis required?				No	
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?				No	
If BPS, is an NPCC Directory #4 presentation required?				No	

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Project Authorization Form

Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name: Avigilon Intrusion Detection System Security Upgrades	**PAF No: TBD**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	No
SITING & CONSTRUCTION SERVICES (OUTREACH)	
What is the level of outreach expected?	None
INITIATOR	
Has a field constructability review been completed?	No
INVESTMENT RECOVERY	
Does the project require development of an Investment Recovery plan?	No
COST ESTIMATING	
How was the cost estimate prepared?	Estimate was prepared by the Eversource Estimating Team
Who prepared the estimate?	Joe McDonough
Was the estimate reviewed by Eversource Estimating?	Yes

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Project Authorization Form

Attachment 1- Locations

Location	Encoders	State
CT-AWC-BERLIN COMMAND CENTER	1	CT
CT-AWC-BERLIN SOUTH TOC AR	1	CT
CT-AWC-BERLIN WAREHOUSE 1 AR	1	CT
CT-AWC-BERLIN WAREHOUSE 2 ARI	1	CT
CT-AWC-CHESHIRE 1 AR	1	CT
CT-AWC-CHESHIRE 2 AR	1	CT
CT-AWC-DANIELSON 1 AR	1	CT
CT-AWC-DANIELSON 2 AR	1	CT
CT-AWC-EAST-WINDSOR AR	1	CT
CT-AWC-HARTFORD 1	1	CT
CT-AWC-HARTFORD 2 AR	1	CT
CT-AWC-HARTFORD 56P AR	1	CT
CT-AWC-HARTFORD POLEYARD	1	CT
CT-AWC-NEW BRITAIN 1 AR	1	CT
CT-AWC-NEW BRITAIN 2 AR	1	CT
CT-AWC-NORWALK TINDALE AVE AR	1	CT
CT-AWC-STAMFORD AR	1	CT
CT-AWC-TORRINGTON AR	1	CT
CT-SS- BARBOUR HILL 23J AR	1	CT
CT-SS-BLOOMFIELD 3B AR	1	CT
CT-SS-BRANFORD 11J AR	1	CT
CT-SS-BRISTOL 11K AR	1	CT
CT-SS-BUNKER HILL 12B AR	1	CT
CT-SS-CHIPPEN HILL 15U AR	1	CT
CT-SS-COMPO 23K AR	1	CT
CT-SS-DARIEN 13S AR	1	CT
CT-SS-EAST HARTFORD 32G	1	CT
CT-SS-EAST NEW BRITAIN 7L	1	CT
CT-SS-FARMINGTON 1C	1	CT
CT-SS-FLAX HILL 24A	1	CT
CT-SS-FREIGHT STREET 11W AR 1	2	CT
CT-SS-GLENBROOK 1K 115 AR	1	CT
CT-SS-HOPEWELL 22R AR	1	CT
CT-SS-MYSTIC 13K AR	1	CT
CT-SS-NEWINGTON 4A	1	CT

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CT-SS-NORTH BLOOMFIELD 2A-1 (NC)	1	CT
CT-SS-NORTH BLOOMFIELD 2A-2 (NC)	1	CT
CT-SS-NORTHEAST SIMSBURY 43F	1	CT
CT-SS-NORTHWEST HARTFORD 2N AR	1	CT
CT-SS-NORWALK 1 AR	2	CT
CT-SS-NORWALK 2 AR	2	CT
CT-SS-NORWALK YG	1	CT
CT-SS-PEACEABLE 12N AR	1	CT
CT-SS-ROCKY HILL 3R	2	CT
CT-SS-SHAW'S HILL 24H	1	CT
CT-SS-SHUNOCK 32P	1	CT
CT-SS-SOUTH END 1G 1 AR	2	CT
CT-SS-SOUTH MEADOW 1A AR	1	CT
CT-SS-SOUTH WINDSOR 14L AR	1	CT
CT-SS-TOLLAND AWC 2 AR	1	CT
CT-SS-TUNNEL 12S	1	CT
CT-SS-WESTON 21M AR	1	CT
CT-SS- Frostbridge	1	CT
EMA Dorchester AWC - A+B	2	EMA
EMA Dorchester AWC - CDE	3	EMA
EMA Dorchester AWC - F	1	EMA
EMA Dorchester AWC - Lightwell 1=2	2	EMA
EMA-ACUSHNET LNG-1	2	EMA
EMA-ACUSHNET LNG-2	2	EMA
EMA-SS-STATION 330-STOUGHTON-1	2	EMA
EMA-SS-STATION 330-STOUGHTON-2	2	EMA
EMA Hyde Park AWC	1	EMA
EMA New Bedford AWC - A+B	2	EMA
EMA Plymouth AWC - A+B	2	EMA
EMA Somerville AWC - A+B	2	EMA
EMA Southboro AWC - A	1	EMA
EMA Southboro AWC - B	1	EMA
EMA-SS 002 - Hawkins St	1	EMA
EMA-SS 012 - Chatham St	2	EMA
EMA-SS 053 - High St	2	EMA
EMA-SS 071 - Charles St	1	EMA
EMA-SS 148 - Needham	2	EMA
EMA-SS 492 - Scotia St	1	EMA

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EMA-SS 514 - Kingston St	3	EMA
EMA-SS 726 - Carver	2	EMA
EMA-station 150	2	EMA
EMA-Station 410	1	EMA
EMA-station 496	1	EMA
EMA-station 509	1	EMA
EMA-station 980	1	EMA
EMA Walpole AWC	1	EMA
EMA Waltham AWC	1	EMA
Worcester AWC	1	EMA
Yarmouth AWC	1	EMA
Yarmouth ES	1	EMA
EMA New Bedford AWC	1	EMA
EMA-Station 99	2	EMA
NH-AWC-BEDFORD 1 AR	1	NH
NH-AWC-BEDFORD 2 ARI	1	NH
NH-AWC-BERLIN ARI	1	NH
NH-AWC-BOW CENTRAL WH-2	1	NH
NH-AWC-BOW WAREHOUSE 1 AR	1	NH
NH-AWC-CHOCORUA AR	2	NH
NH-AWC-COLEBROOK	1	NH
NH-AWC-DERRY AR	1	NH
NH-AWC-ENERGY PARK AR	1	NH
NH-AWC-EPPING 1 AR	2	NH
NH-AWC-HOOKSETT 1 AR	2	NH
NH-AWC-HOOKSETT 1250 AR	1	NH
NH-AWC-HOOKSETT LEGENDS DR 1 AR	2	NH
NH-AWC-KEENE 1 AR	2	NH
NH-AWC-LANCASTER AR	1	NH
NH-AWC-MILFORD	1	NH
NH-AWC-MONADNOCK	1	NH
NH-AWC-NASHUA AR	1	NH
NH-AWC-NEWPORT 1 AR	2	NH
NH-AWC-PORTSMOUTH AR	1	NH
NH-AWC-ROCHESTER 1 AR	2	NH
NH-AWC-TILTON	1	NH
NH-SS-CANAL STREET AR	1	NH
NH-SS-CHOCURRA AR	2	NH

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NH-SS-COMM TOWER	1	NH
NH-SS-COMMUNITY ST 1 AR	2	NH
NH-SS-DEERFIELD 1 AR	3	NH
NH-SS-EAGLE 2 AR	1	NH
NH-SS-EAGLE 345	1	NH
NH-SS-ELIOT 1	2	NH
NH-SS-FARMWOOD 1	2	NH
NH-SS-HUCKINS HILL	1	NH
NH-SS-LACONIA	1	NH
NH-SS-MESSER STREET	1	NH
NH-SS-MILL POND	1	NH
NH-SS-OAK HILL	1	NH
NH-SS-OCEAN RD	1	NH
NH-SS-PEASLEE	1	NH
NH-SS-PORTLAND STREET	1	NH
NH-SS-PULPIT ROCK	1	NH
NH-SS-RIMMON	1	NH
NH-SS-ROCHESTER	1	NH
NH-SS-SCOBIE 115- 1	2	NH
NH-SS-SCOBIE 345-2	3	NH
NH-SS-SCOBIE 345-2	3	NH
NH-SS-SOMERSWORTH AR	1	NH
NH-SS-SOUTH MANCHESTER AR	1	NH
NH-SS-THORNTON 1 AR	2	NH
NH-SS-WEBSTER AR	1	NH
NH-TOWER HILL- RADIO SITE	1	NH
WMA-AWC-EAST SPRINGFIELD AWC AR	1	WMA
WMA-AWC-EAST SPRINGFIELD SOC	1	WMA
WMA-SS AGAWAM 16C AR 2	1	WMA
WMA-SS-AGAWAM 16C AR 1	1	WMA
WMA-SS-CADWELL 50F 1 AR	2	WMA
WMA-SS-FAIRMONT 16H 1 AR	2	WMA
WMA-SS-INDIAN ORCHARD 27A AR	1	WMA
WMA-SS-LUDLOW 19S 2 AR 1	2	WMA
WMA-SS-TILSON 10P AR	1	WMA
TOTAL	192	

Environmental Systems Corporation
18 Jansen Court
West Hartford, CT 06110
Phone: 860.953.8800
d.mike@esccontrols.com

ES201801150001-4

Intelligent Building Solutions

Avigilon Parts Sale

ESC Job #	0
Purchase Order #	0
Release Line	0
Work Order #	0

Detailed List of Materials

Qty	Part Number	Description	Unit Cost	Extended Cost
146	VMA-RPA-4P4-NA	4TB analytics appliance ***No Warranty Services Included***	$2,774.40	$405,062.40
181	ENC-4P-H264	Avigilon Encoder	$243.80	$44,127 80
	Scope of Work	1. No warranty services included		
		2. Discount based on volume, all 146 appliances and 181 encoders must be ordered on one PO		
		3. Estimate is valid until 6/01/2018		
		Note All Programming by others		
Project Parts Cost			**Total Material W/O Tax**	**$449,190.20**

Detailed List of Labor

Qty	Type	Labor Description	Unit	Total
0	Program	Programming	$118.97	$0.00
438	Security Technician	General Installation	$97 34	$46,187 83
0	Project Management	Project Management, scheduling, coordination	$113.56	$0.00
Labor Cost			**Total Labor**	**$46,187.83**
Total Quote Price			**Total With Tax**	**$495,378.03**

Quote does not include applicable permits or tax

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00

Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #C-18-388D

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$17,340	11.7%			$17,340				
Engineering / Design	$648	0.4%			$648				
Land									
Material	$92,496	62.2%		$92,496					
Project Mgmt. & Sppt.	$1,836	1.2%			$1,836				
Removal									
Test									
Risk / Contingency									
Escalation	$596	0.4%			$596				
Indirects	$29,995	20.2%		$462	$29,533				
AFUDC	$5,881	4.0%		$2,301	$3,580				
Total Cost	**$148,792**	100.0%		**$95,259**	**$53,533**				

Estimate Range	**-25%**	**25%**
	$110,000	**$190,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Distribution

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (30) - thirty Avigilon Appliances
Furnish, Install, and Program (38) - thirty-eight Encoders

Assumptions/Clarifications

Indirect rates based on; 11 - CT , Station work
Installation is by ESC employees
Installer will work alone and have current access previliges for the substation.
Additional supervisory personnel will not be required during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00

Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #C-18-388T

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$13,294	13.2%			$13,294				
Engineering / Design	$648	0.6%			$648				
Land									
Material	$72,118	71.6%		$72,118					
Project Mgmt. & Sppt.	$1,459	1.4%			$1,459				
Removal									
Test									
Risk / Contingency									
Escalation	$463	0.5%			$463				
Indirects	$8,014	8.0%		$361	$7,653				
AFUDC	$4,732	4.7%		$1,986	$2,746				
Total Cost	**$100,728**	100.0%		**$74,465**	**$26,263**				

Estimate Range	**-25%**	**25%**
	$80,000	**$130,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Transmission

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (23) - twenty-three Avigilon Appliances
Furnish, Install, and Program (23) - twenty-three Encoders

Assumptions/Clarifications

Indirect rates based on; 1T - CT , Station work
Installation is by ESC employees
Installer will work alone and have current access previliges for the substation.
Additional supervisory personnel will not be required during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00
Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #E-18-391D

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$15,352	15.0%			$15,352				
Engineering / Design	$648	0.6%			$648				
Land									
Material	$62,710	61.1%		$62,710					
Project Mgmt. & Sppt.	$1,243	1.2%			$1,243				
Removal									
Test									
Risk / Contingency									
Escalation	$518	0.5%			$518				
Indirects	$17,676	17.2%		$314	$17,362				
AFUDC	$4,528	4.4%		$1,755	$2,773				
Total Cost	**$102,675**	100.0%		**$64,779**	**$37,896**				

Estimate Range	**-25%**	**25%**
	$80,000	**$130,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Distribution

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (19) - nineteen Avigilon Appliances
Furnish, Install, and Program (19) - nineteen Encoders

Assumptions/Clarifications
Indirect rates based on; 21D - EMA , Station work
Installation is by ESC employees
Installer will be escorted for access during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming and escorting is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00

Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #E-18-391T

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$12,120	16.8%			$12,120				
Engineering / Design	$648	0.9%			$648				
Land									
Material	$45,273	62.9%		$45,273					
Project Mgmt. & Sppt.	$1,027	1.4%			$1,027				
Removal									
Test									
Risk / Contingency									
Escalation	$414	0.6%			$414				
Indirects	$9,245	12.8%		$226	$9,019				
AFUDC	$3,255	4.5%		$1,267	$1,988				
Total Cost	**$71,982**	100.0%		**$46,766**	**$25,216**				

Estimate Range	**-25%**	**25%**
	$50,000	**$90,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Transmission

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (15) - fifteen Avigilon Appliances
Furnish, Install, and Program (15) - fifteen Encoders

Assumptions/Clarifications
Indirect rates based on; 21 - EMA , Station work
Installation is by ESC employees
Installer will be escorted for access during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming and escorting is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00
Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #P-18-390D

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$17,776	16.2%			$17,776				
Engineering / Design	$648	0.6%			$648				
Land									
Material	$71,764	65.5%		$71,764					
Project Mgmt. & Sppt.	$1,404	1.3%			$1,404				
Removal									
Test									
Risk / Contingency									
Escalation	$595	0.5%			$595				
Indirects	$14,650	13.4%		$359	$14,291				
AFUDC	$2,716	2.5%		$1,097	$1,619				
Total Cost	**$109,553**	100.0%		**$73,220**	**$36,333**				

Estimate Range	**-25%**	**25%**
	$80,000	**$140,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Distribution

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (22) - twenty-two Avigilon Appliances
Furnish, Install, and Program (44) - foty-four Encoders

Assumptions/Clarifications

Indirect rates based on; 6D - NH , Station work
Installation is by ESC employees
Installer will be escorted for access during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming and escorting is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00

Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #P-18-390T

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$22,624	18.0%			$22,624				
Engineering / Design	$648	0.5%			$648				
Land									
Material	$84,509	67.3%		$84,509					
Project Mgmt. & Sppt.	$1,728	1.4%			$1,728				
Removal									
Test									
Risk / Contingency									
Escalation	$751	0.6%			$751				
Indirects	$11,949	9.5%		$211	$11,738				
AFUDC	$3,365	2.7%		$1,352	$2,013				
Total Cost	**$125,574**	100.0%		**$86,072**	**$39,502**				

Estimate Range	**-25%**	**25%**
	$90,000	**$160,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Transmission

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (28) - twenty-eight Avigilon Appliances
Furnish, Install, and Program (28) - twenty-eight Encoders

Assumptions/Clarifications
Indirect rates based on; 6T - NH , Station work
Installation is by ESC employees
Installer will be escorted for access during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming and escorting is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00

Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #W-18-389D

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$578	7.9%			$578				
Engineering / Design	$432	5.9%			$432				
Land									
Material	$3,993	54.5%		$3,993					
Project Mgmt. & Sppt.	$271	3.7%			$271				
Removal									
Test									
Risk / Contingency									
Escalation	$38	0.5%			$38				
Indirects	$1,970	26.9%		$20	$1,950				
AFUDC	$45	0.6%		$16	$29				
Total Cost	**$7,327**	100.0%		**$4,029**	**$3,298**				

Estimate Range	**-25%**	**25%**
	$10,000	**$10,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Distribution

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (1) - one Avigilon Appliance
Furnish, Install, and Program (5) - five Encoders

Assumptions/Clarifications

Indirect rates based on; 41 - WMA , Station work
Installation is by ESC employees
Installer will work alone and have current access previliges for the substation.
Additional supervisory personnel will not be required during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

ESTIMATE SUMMARY

Project Title: Avigilon Intrusion Detection System Security Upgrades
Project Mgr/Lead: TBD
Project Number: TBD
Est. Revision # 00

Estimate By: JPM
Date of Estimate: 11-15-18
ISD: 12/31/19
Estimate #W-18-389T

ESTIMATE SUMMARY

Estimate Type Planning

	TOTAL	% of Total	Prior	2018	2019	2020	2021	2022	2023
Construction	$4,624	14.1%			$4,624				
Engineering / Design	$648	2.0%			$648				
Land									
Material	$24,145	73.5%		$24,145					
Project Mgmt. & Sppt.	$648	2.0%			$648				
Removal									
Test									
Risk / Contingency									
Escalation	$179	0.5%			$179				
Indirects	$2,359	7.2%		$121	$2,238				
AFUDC	$236	0.7%		$99	$137				
Total Cost	**$32,839**	100.0%		**$24,365**	**$8,474**				

Estimate Range

	-25%	**25%**
	$20,000	**$40,000**

COMMENTS:

Avigilon Intrusion Detection System Security Upgrades - Transmission

Project Need

This project updates security video monitors and their accompanying software to be compatible with windows 10.
These monitors utilize high-definition video analytics, pattern-based algorithms, and machine learning.
Keeping this software up to date ensures the proper function of a critical element of the Intrusion Detection System.

Project Objectives

Update the current Intrusion Detection System so that all substations are using the same system and remain up to date.

Project Scope

Furnish, Install, and Program (8) - eight Avigilon Appliances
Furnish, Install, and Program (8) - eight Encoders

Assumptions/Clarifications

Indirect rates based on; 4T - WMA , Station work
Installation is by ESC employees
Installer will work alone and have current access previliges for the substation.
Additional supervisory personnel will not be required during installation.
This update stands alone and additional SCADA, automation or P&C work is not required.
Programming is by Eversource employees

RISKS - No anticipated Risks

Potential UG Obstructions	$ -
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Approved at February 14, 2018 EPAC

Link to Meeting Minutes

Date Prepared: February 8, 2018	**Project Title: Jackman Replace Obsolete Equipment**
Company/Companies: Eversource (NH)	**Project ID Number: A16C10 / A07X44B2**
Organization: NH Operations	**Plant Class/(F.P.Type): Distribution Substation**
Project Initiator: Thelma Brown	**Project Type: Specific**
Project Manager: Alan Roe	**Capital Investment Part of Original Operating Plan? Y**
Project Sponsor: James Eilenberger	**O&M Expenses Part of the Original Operating Plan? No**
Current Authorized Amount: $5,400k	**Estimated in service date(s): April 30, 2018**
Supplement Request: $1,755k	**Other:**
Total Request: $7,155k	

Supplement Justification

Background

The original Project Authorization Form ("PAF") for the Jackman Replace Obsolete Equipment project was approved in April 2016. At that time, the project was approved at a cost of $4,557k with an in-service date of June 2017. The project estimate was based on direct costs of $4,228k with indirect costs of $325k and AFUDC of $4k.

A supplemental Project Authorization Form was approved in April 2017 with an expected cost to complete the project of $5,400k (direct costs - $5,027; indirect costs - $369k and AFUDC - $4.5k). At that time the expected in-service date was November 2017.

Project Status

At this point, all 34.5kV circuit breakers have been replaced and all relaying, controls and metering have been transferred over to the new control house. The final installation and commissioning of the capacitor bank and cap-switcher will occur in April 2018 (the first available outage) along with all 'punch list' and site restoration activities.

This supplemental Project Authorization Form requests approval of $1,755K for a total request of $7,155k. Since April 2017, direct costs have increased by $869k and associated increases in Indirect costs are $844k. AFUDC has increased $43k. The reasons for these increases are explained below

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APS 1 - Project Authorization Policy

Supplement Request Form

Cumulative effect of Changes since April 2017

	April 2017 (Current Authorized)	February 2018 (Total Request)	Difference (Supplement Request)
1. Eng./PM/Permitting	$850,007	$900,218	$50,212
2. Construction	$2,326,939	$3,533,898	$1,206,959
3. Testing & Commissioning	$493,000	$577,387	$84,387
4. Internal Labor / Exp.	$291,000	$326,741	$35,741
5. Eversource Supplied Material	$694,618	$304,128	($390,490)
6. Allowances / Contingency	$371,090	$0	($371,090)
7. Property Taxes	$0	$173,753	$173,753
8. Misc. Other	$0	$79,554	$79,554
Total Directs	$5,026,654	$5,895,662	$869,008
9. Indirect	$369,012	$1,212,861	$843,849
10. AFUDC	$4,542	$46,736	$42,194
Total	$5,400,208	$7,155,259	$1,755,051

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Justification for Additional Resources

1. Engineering / Project Management / Permitting

To increase the supplier base of Engineering design vendors, Altran, based in New Jersey, was awarded the contract to design the Jackman project. Unfortunately, Altran were not sufficiently experienced to complete the project to the required quality, they had insufficient experience working with Eversource design standards and they lost several key resources to other vendors during the project.

Because of a lack of confidence in Altran, it was decided by the Project team to request Leidos to complete the as-built drawings for the project, this incurred an additional $48,606 which was not anticipated in April 2017. This plus minor forecasting changes result in an increase in Engineering / Project Management and Permitting of $50,212. The project manager will contact Procurement to discuss the possibility of recovering the additional as-built drawing costs from Altran.

Total Incremental Request for Engineering / Project Management and Permitting: $50,212

2. Construction

Because of Altran's lack of engineering design quality, a large amount of engineering in the field was required to meet the design intent and to comply with Eversource standards. This led to the installation contractor having to do additional work beyond what was included in their original scope. Construction costs also increased due to charges to the project that were not forecasted back in April 2017. Change orders, unforecasted charges and a difference in how materials were recorded resulted in an increase in Construction costs by $1,206,959 (See item #5 below for corresponding decrease in Eversource supplied material costs).

Total Incremental Request for Construction: $1,206,959

3. Testing and Commission

During construction, it was necessary to extend outages on transformer TB33 and to work several weekends because outages of the 34.5k bus were not granted due to loss of customer load concerns. Weekend and overtime working meant the project incurred additional labor costs from the testing contractor, and lead commissioning engineer.

Total Incremental Request for testing and commissioning: $84,387

4. Labor and Expenses

With the project delays, and additional effort needed to resolve issues with the Altran design, additional internal labor for engineering, site supervision and management was incurred. This includes time spent following one safety incident and one unwanted trip during construction.

Total Incremental Request for Labor and Expenses: $35,741

5. Eversource Supplied Material

As noted in #2 above, some of the increases in Construction charges is offset by a reduction in the Eversource supplied materials forecast. Originally the materials were forecast as Eversource supplied at a cost of $694,618 but much of this was supplied by the Construction contractor which is reflected in the increase in Construction costs above and a commensurate reduction in Eversource supplied materials.

Total Incremental Request for Materials: ($390,490)

6. Allowances / Contingency

The April 2017 forecast included allowances of $371,090 for weather related events, design uncertainty, unforeseen ground conditions and final site remediation costs. These allowances were used to offset the construction increases. The project team is now accounting for this spend in the construction category, so contingency amount in updated total forecast is now zero.

Total Incremental Request for Allowances / Contingency: ($371,090)

7. Property Taxes

The original project estimate and the April 2017 forecast did not include an allowance for property taxes. To the end of 2017, the project has incurred $119,753k in property taxes with an additional $54,000 forecast through April 2018.

Total Incremental Request for property taxes: $173,753

8. Miscellaneous Other

To the end of 2017, the project has incurred $76,554 in Miscellaneous Distribution Expenses Capitalized Overheads (“MDEC”). These additional miscellaneous charges were not forecast in April 2017. Based on charges to date and a rate of 0.015 an additional $3,000 is forecast until the end of April 2018.

Total Incremental Request for Miscellaneous Items: $79,554

9. Indirect costs

In the April 2017 forecast, indirect costs were forecast to be $369k based on the previous estimate in the April 2016 PAF of $325k. To date, the project has incurred $1,063k in adders and is expected to incur an additional $150k to the end of the project. Both the original PAF estimate in April 2016 and Supplemental

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APS 1 - Project Authorization Policy

Supplement Request Form

PAF estimate in April 2017 were low. Total increase in indirect costs for this supplement request is $843K

10. AFUDC

in April 2017, AFUDC charges for the project were forecast as $4k. Actual AFUDC charges incurred to date are $35k with an additional $12k forecast for the remainder of the project. Again it is clear that both the original AFUDC estimate and estimate in the April 2017 supplemental PAF were low. Total increase in ADUFC for this supplement request is $42.2k

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplemental Request	Total
Capital Additions – Direct	$5,027	$868	$5,896
Less Customer Contribution	$0	$0	$0
Removals net of Salvage____%	$0	$0	$0
Total Direct Spending	$5,027	$868	$5,896
Capital Additions – Indirect	$369	$843	$1,213
AFUDC	$4.5	$42.5	$47
O&M	$0	$0	$0
Total Request	$5,400	$1,755	$7,155

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	To Date	Year 2018	Year 2019	Total
Capital Additions – Direct	$5,322	$574	$0	$5,896
Less Customer Contribution	$0	$0	$0	$0
Removals net of Salvage %	$0	$0	$0	$0
Total Direct Spending	$5,322	$574	$0	$5,896
Capital Additions – Indirect	$1,063	$150	$0	$1,213
AFUDC	$34	$12	$0	$47
O&M	$0	$0	$0	$0
Total Request	$6,419	$736	$0	$7,155

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Project Authorization Policy
Operations Project Authorization

Date Prepared: **January 31, 2017**	Project Title: **Jackman Replace Obsolete Equipment**
Company/Companies: **Eversource (NH)**	Project ID Number: **A16C10 / A07X44B2**
Organization: **NH Operations**	Plant Class/(F.P.Type): **Distribution**
Project Initiator: **Thelma Brown**	Project Type: ***Specific*** */ Annual / Prelim Project / Parent*
Project Owner/Manager: **Alan Roe**	Capital Investment Part of Original Operating Plan? **Y** / N
Project Sponsor: **James Eilenberger**	O&M Expenses Part of the Original Operating Plan? Y / N
Current Authorized Amount:**$4,557,000**	Estimated in service date(s): **November 30, 2017**
Supplement Request:**$843,154**	Other:
Total Request: **$5,400,154**	

Project Authorization Supplement Justification

The Project Authorization Form (PAF) for the Jackman Replace Obsolete Equipment project was approved in April 2016. At that time, the project was approved at a cost of $4,557,000 with an in-service date of June 2017. The total project cost was based on direct costs of $4,228,000 with indirect costs of $325,000 and AFUDC of $4,000.

The expected cost to complete the project is now $5,400,154 which is $843,154 above the approved project amount.

	PAF Approved Budget	Current Forecast
Direct	$4,228,000	$5,026,654
Indirect	$325,000	$369,012
AFUDC	$4,000	$4,542
Total	$4,557,000	$5,400,154
Difference	$843,154	

At this stage in the project, the majority of Contracts are in place, with only the following contracts to be awarded:

- electrical testing ($249,069 forecast based on best evaluated bid),
- installation and removal of the mobile substation ($75,000 forecast based on a recent similar installation), and
- site security ($82,000 forecast based on Securitas proposal)
- cost to complete includes $85,000 of specific risk allowances e.g. weather, design uncertainty, site remediation.

Justification for Additional Resources

The project moved in to Construction at the beginning of January. Engineering design had a number of challenges (lack of available drawings, re-design of equipment, late changes to scope, etc.). Construction is also expected to be challenging due to the complexity of the project, the potential for buried equipment not shown on drawings, availability of outages, complex cut-over requirements, etc. The current planned in-service date is now November 2017 due to outage unavailability in the summer.

Explanation for Cost Increase

Materials - The main construction contract was awarded to ES Boulos as the best evaluated bidder following a formal bidding process. As is typical, construction pricing was requested based on the 70% design and bill of materials. Once the IFC drawings were issued a large difference between the bill of materials was identified.

Estimated Cost Increase $261,090

Lead Commissioning Engineer - During the development of the project, the project team requested that an independent Lead Commissioning Engineer be brought onboard. The cut-over sequence from the old control house is extremely complex and an experienced commissioning engineer was considered prudent. Commissioning was included in the forecast, but the use of an LCE was not included in the original PAF estimate. After an RFP process, the T&M contract was awarded to EIG as the best evaluated bidder but prices for the LCE services came in much higher than anticipated.

Estimated Cost Increase $150,000

Contaminated Soils - The main construction contract was awarded to ES Boulos as the best evaluated bidder following a formal bidding process. While the contract price was in-line with the anticipated cost an allowance of $25,000 was also included in the PO amount for the removal of contaminated soils. The removal cost for the soils is now estimated to be $40,000 ($35,000 for transportation and $5,000 for disposal).

Estimated Cost Increase $15,000

Site Security - During the previous Transmission project at Jackman, there were three incidents of thefts of material from site. To reduce the risk during this project it was proposed to use a security guard during nights and weekends. This activity was not specifically included in the PAF forecast. Securitas has submitted a proposal for $82,000 for this work. This contract is not yet awarded but is included in the current forecast. The risk of theft will be managed by securing material in locked Conex boxes and by arranging delivery of materials on a just-in-time basis.

Estimated Cost Increase $82,000

Owner's Engineer - During the engineering design process, the P&C Engineering group requested that the services of an Owner's Engineer be contracted to review the P&C drawings due to a lack of internal resources. This work was directly awarded to one of the of-choice vendors (HDR). While the engineering reviews were included in the original direct labor costs the Owner's Engineer T&M contract increased the Outside Services element of the project.

Estimated Cost Increase $50,000

Mobile Substation - During the development of the project, it was realized that the installation and removal of the mobile substation would be required to support the TB61 and TB33 outages. The cost to tap-up and remove the mobile substation was not included in the original PAF estimate and although the contract has yet to be let $75,000 is forecast for this activity based on a similar recent installation at Whitefield. This is anticipated to be a fixed price contract.

Estimated Cost Increase $75,000

Additional Engineering – During the engineering design process, a number of additional owner directed tasks were assigned to the Engineering vendor (Altran). One of the changes related to the provision of new revenue metering to support generation divestiture. This was not included in the original scope of work or the PAF estimate. Additional tasks such as an analysis of the station lighting and lightning protection was also requested as these studies were not available. The two Altran change orders together were $77,150.

Estimated Cost Increase $77,150

Indirects / AFUDC - In addition to the increase in direct costs, Indirect and AFUDC charges have also been estimated to increase by $44,500 based on the ratio of direct and indirect costs in the original PAF estimate.

Estimated Cost Increase $44,500

Summary

Activity	Estimated Cost Increase
Materials	$261,090
Lead Commissioning Engineer	$150,000
Contaminated Soils	$15,000
Site Security	$82,000
Owner's Engineer	$50,000
Mobile Substation	$75,000
Additional Engineering	$77,100
Indirects / AFUDC	$44,500
Total	**$754,690**

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Project Authorization Policy
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The $754,690 increase represents the worst case scenario at this stage. It assumes that:

- all additional materials cost is required;
- site security will be needed for the full duration of construction;
- HDR will charge to the full amount of their PO for design reviews;
- EIG will charge to the full amount of their PO for commissioning support;
- the mobile installation charges will be $75,000; and
- soil removal transportation and disposal costs are capped at 1,000 tons.

Project Authorization Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 4,228,000	$ 798,600	$ 5,026,600
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	-	-
Total Direct Spending	$ 4,228,000	$ 798,600	$ 5,026,600
Capital Additions - Indirect	325,000.00	44,012.00	369,012.00
AFUDC	4,000.00	542.00	4,542.00
Total Capital Request	$ 4,557,000	$ 843,154	$ 5,400,154
O&M	-	-	-
Total Request	**$ 4,557,000**	**$ 843,154**	**$ 5,400,154**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2017	Year 20__	Year 20__+	Total
Capital Additions - Direct	$ 798,600	$ -	$ -	$ 798,600
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	-	-	-	-
Total Direct Spending	$ 798,600	$ -	$ -	$ 798,600
Capital Additions - Indirect	44,012.00	-	-	44,012.00
AFUDC	542.00	-	-	542.00
Total Capital Request	$ 843,154	$ -	$ -	$ 843,154
O&M	-	-	-	-
Total Request	**$ 843,154**	**$ -**	**$ -**	**$ 843,154**

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Accounting Policy Statement No. 2
Operations Project Authorization

Project Authorization Form

General Information

Date Prepared: 02/18/2016	Project Title: Replace Jackman OCB
Company: Eversource NH	Project ID Number: A07X44A
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Thelma Brown	Project Category: Reliability
Project Owner/Manager: Alan Roe	Project Type: Specific
Project Sponsor: James Eilenberger	Project Purpose: part of regulatory tracked program? N
Estimated in service date: 06/1/2017	Capital Investment Part of Original Operating Plan? Y
If Transmission Project: PTF / Non-PTF / N/A	Supplement to Existing Authorization? Y
	O&M Expenses Part of the Original Operating Plan? N

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project addresses the replacement of obsolete equipment programs specifically replacing Oil Circuit Breakers (OCB). A total of ten (10) substation project work orders have been written under this project. Nine of the projects have been completed for $4,030,544. The last work order for this project is for Jackman Substation. When the Jackman work order was initiated in 2014 the plan was to replace four oil circuit breakers, a capacitor switch, and two relays at Jackman for $2,400,000.

In early 2015 the decision was made to divest from generation. Currently all relays and controls for the distribution equipment at Jackman SS is in the generation power house. Once divestiture was announced it was determined that the scope of the work at Jackman should be increased to include the removal of distribution relaying from the generation control house, replacement of electromechanical relays, reconfiguration of substation bus work, and building a new distribution control house.

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Operations Project Authorization

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized*	Prior Spend*	2016	2017+	Totals	Supplemental Authorization*
Capital Additions - Direct	$	$	$3,303	$1,085	$4,388	$*
Customer Contribution	$	$	$0	$0	$0	$0
Removals net of Salvage	$	$	$33	$26	$59	$0
Total - Direct Spending	$	$	$3,337	$1,111	$4,448	$0
Capital Additions - Indirect	$	$	$703	$286	$989	$0
Subtotal Request	$	$	$4,040	$1,397	$5,437	$7,656
AFUDC	$	$	$0	$0	$0	$0
Total Request	$2,250 (1)	$4,469 (2)	$4,040	$1,397	$5,437	$7,656 (3)

(1) Only the total for the Prior Authorized amount is shown. The last approved revision for this project was for $2,250,447 which was the 2015 budget amount authorized on 3/24/15
(2) Only the total for the Prior Spend 2011 - 2015 amount is shown. The previous spending on this project was for ten separate work orders. A total of $4,469,449 has been spent at ten substations to date.
(3) Only the total request for the Supplemental Authorization is shown. This is the amount to complete the Jackman SS work order. The Total Request for the Supplemental Authorization is the amount spent and required for the Jackman work order above the amount approved in Power Plan 3/24/15.It is the amount above the currently authorized amount: $4,469 + $5,437 - $2,250 = $7,656

* to be completed if supplemental authorization is required

Summary Project Description

Circuit Breaker Replacement

At Jackman substation four existing 34.5kV oil circuit breakers (313, 3173, 311 & 3140) will be removed and replaced with Siemens type SDV7 vacuum breakers. The table below shows the ages of the circuit breakers along with their replacement priority out of 127 breakers on the system.

OCB	Age	Rank
Line Breaker 313	60	28
Line Breaker 3173	60	33
Line Breaker 311	45	65
Line Breaker 3140	41	91

To facilitate the future separation of generation and distribution assets, a new 34.5kV bay will be installed adjacent to the 313 line position and the 313 and 3173 line positions will each shift south one position. This shift will generate sufficient space to create a fenced compound for the existing GSU transformer.

Capacitor Switcher Replacement

In addition to the circuit breaker replacement, the existing C22 vacuum capacitor switcher will be removed, relocated and replaced with a new Southern States Cap-switcher along with two sets of new current transformers (CTs). The existing capacitor vacuum switcher outdoor relays and

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outdoor relay cabinet will be removed and new protection equipment will be installed inside a new control house (see below). To provide better access to the site, the existing C22 cap bank will also be removed and relocated so that the existing overhead strain bus that feeds it can be removed. A replacement 5.4MVAR capacitor bank mounted on a 10.8MVAR rack will be installed.

The vacuum capacitor switch is part of a targeted program for replacement. Additionally, to separate the Distribution assets from generation assets the capacitor switch and bank need to be relocated. This relocation has the added benefit of opening up access to the yard on the north side of the substation.

To allow for the installation of a future bus tie breaker, the existing station service transformer will also be relocated to the ends of the 34.5kV bus.

Construction of Control House

With the need to update the control equipment associated with the circuit breaker and capacitor switcher replacements and the need to provide new directional phase and ground overcurrent protection on line positions 313, 3173, 311 and 3140 it was decided that with the impending physical separation of the Eversource distribution and transmission equipment from the generation equipment that a new control house should be constructed.

The protection and control cabinets for the 313, 3713, 311 and 3140 feeder breakers, transformer TB33 & TB61, circuit switchers J33 & J61 and capacitor switcher C22 will be added in the new control house. The GSU transformer breaker TB9 protection and control cabinet will also be added in the new control house.

To accommodate the new control house, the existing TB61 34.5kV strain bus will be relocated using a new underground feed (2-1000kcmil Al).

A new annunciator/communication cabinet, GPS clock, Teletone line sharing switch, dial-up modem and communication processor will also be included in the new control house. A new GE type D20MX RTU cabinet will be installed to control the Distribution equipment, the existing RTU in the hydro control house will remain to control the hydro generation equipment.

Project Authorization

Approver	Approver Name	Approver Signature	Date
Project Initiator	Thelma Brown		
Project Manager	Alan Roe		
Plant Accounting	Frank Errato, Jr.		
Director	James Eilenberger		
Sr. Vice President	Peter Clarke		

Overall Justification

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This project will address the replacement of targeted obsolete equipment – OCBs, electromechanical relays, and capacitor switchers. It is also required to address the divestiture of generation and separation from generation assets.

Project Scope

Replace 4 Oil Circuit Breakers, electromechanical relays and capacitor switcher. Construct a new control house and reconfigure for separation of generation assets. Reconfiguration includes relocating one breaker and capacitor bank, including steel structure additions and removals.

Project Objectives

Replace obsolete equipment, facilitate the segregation of generation assets, maintain reliability to customers. Reduce the amount of oil on site adjacent to the river.

Business Process and / or Technical Improvements:

Targeted obsolete equipment replacement programs. Remove 4 of the 127 34.5kV oil circuit breakers on the system identified to be replaced.
Generation divestiture. Separation of distribution assets from generation assets is targeted to be complete by the completion of divestiture in 2017.

Assumptions

It is assumed that the proposed control house can be constructed by undergrounding the existing strain bus and extending the existing fence line. It is assumed that only local permitting is required and these permits will be readily granted.

Alternatives Considered

There is a transmission control house that was built in 2008. Adding distribution relay and control equipment in the transmission control house was considered but this would require expansion of the control house. The transmission control house is situated alongside the river and there is insufficient room to expand plus the Transmission control house is located inside the 500 year flood zone. For these reasons it was decided to build a new distribution control house outside of the flood zone.

Only replace the OCB as a part of the targeted program. This would leave all relay and control functions in the generation control house. Additionally, the generation control house is small and crowded. Leaving Eversource equipment where it can be operated or damaged by the new generation owner is not preferred.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering RFP	02/01/16
Engineering Award	03/29/16
Engineering Complete	08/29/16
Construction Start	09/01/16
In-service date	06/01/17

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Accounting Policy Statement No. 2
Operations Project Authorization

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	$106	$81	$0	$187
Overtime Labor	$0	$0	$0	$0
Outside Services	$2,501	$1,020	$0	$3,522
Materials	$550	$0	$0	
Other, including contingency amounts (describe)	$179	$10	$0	$186
Total	$3,337	$1,111	$0	$4,448

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	$703	$286	$0	$989
Capitalized interest or AFUDC, if any	0	0	$0	$0
Total	$703	$286	$0	$989

Total Capital Costs	$4,040	$1,397	$0	$5,437
Total O&M Costs	0	0	$0	$0
Total Project Costs	$4,040	$1,397	$0	5,437

Note: Explain unique payment provisions, if applicable

Regulatory Approvals

Anticipated Permits:

- NHDES - Shoreland Permit
- Town of Hillsborough Planning Board - Site Plan Approval
- NH Public Utilities Commission - License to Construct and Maintain Electric Line over Public Waters

Risks and Risk Mitigation Plans

There is a risk that local planning board approval is not forthcoming. To mitigate this risk we have engaged TF Moran to facilitate all of the permitting activities on behalf of Eversource.

The site is congested with little room for establishing site cabins, material laydown areas, etc. It is hoped that existing generation land could be used but in the event this is not available other local property may need to be leased for the duration of the project.

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The project timescales are short, any delays to the engineering design or review cycles may impact on the ability to meet the construction schedule. Regular project team meetings will track progress against milestones and the schedule or resources will be adjusted to meet schedule dates.

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Accounting Policy Statement No. 2
Operations Project Authorization

Project Authorization Form

General Information

Date Prepared: 03/30/2016	Project Title: Jackman – Replace Obsolete Equipment
Company: Eversource NH	Project ID Number: A16C10
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Thelma Brown	Project Category: Reliability
Project Owner/Manager: Alan Roe	Project Type: Specific
Project Sponsor: James Eilenberger	Project Purpose: Part of Regulatory Tracked Program? N
Estimated in service date: 06/1/2017	Capital Investment Part of Original Operating Plan? Y
If Transmission Project: N/A	Supplement to Existing Authorization? Y
	O&M Expenses Part of the Original Operating Plan? N

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project addresses Generation Divestiture issues and the replacement of obsolete equipment at Jackman S/S. When the Jackman S/S work order was originally initiated in 2014, the plan was to replace four oil circuit breakers under the annual OCB Breaker Replacement Project A07X44A for $1,615,000 of direct charges. The replacement of a capacitor switch and two relays was also included as they are part of targeted obsolete equipment programs.

In early 2015 the decision was made to divest from generation. Currently all relays and controls for the distribution equipment at Jackman S/S are in the generation power house. Once divestiture was announced it was determined that the scope of the work at Jackman S/S should be increased to include the removal of distribution relaying from the generation control house, replacement of electromechanical relays, reconfiguration of some substation bus work and building a new distribution control house which will provide the desired physical separation between the generation facilities and distribution facilities. This additional work increased the cost of the project to $4,557,000.

This project is being initiated in order to make the Jackman S/S project a stand-alone project and remove it from the annual OCB Breaker Replacement Project. Spending prior to 2016 ($439K) was for preliminary engineering and materials (Circuit breakers) and was transferred to this new specific Project Number (A16C10).

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Accounting Policy Statement No. 2
Operations Project Authorization

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized*	Prior Spend*	2016	2017+	Totals	Supplemental Authorization*
Capital Additions - Direct	$	$ 372	$2,716	$797	$3,885	$0
Customer Contribution	$	$	$0	$0	$0	$0
Removals net of Salvage	$	$	$266	$77	$343	$0
Total - Direct Spending	$1,615	$ 372	$2,982	$874	$4,228	$3,205
Capital Additions - Indirect	$	$ 63	$183	$79	$325	$0
Subtotal Request	$	$ 435	$3,165	$953	$4,553	$0
AFUDC	$	$ 4	$0	$0	$4	$0
Total Request	$	$439	$3,165	$953	$4,557	$0

* to be completed if supplemental authorization is required

Summary Project Description

Circuit Breaker Replacement
At Jackman S/S four existing 34.5kV oil circuit breakers (313, 3173, 311 & 3140) will be removed and replaced with Siemens type SDV7 vacuum breakers. The table below shows the ages of the circuit breakers along with their replacement priority out of 127 breakers left on the system.

OCB	Age	Rank
Line Breaker 313	60	28
Line Breaker 3173	60	33
Line Breaker 311	45	65
Line Breaker 3140	41	91

To facilitate the future separation of generation and distribution assets, a new 34.5kV bay will be installed adjacent to the 313 line position and the 313 and 3173 line positions will each shift south one position. This shift will generate sufficient space to create a fenced compound for the existing GSU transformer.

Capacitor Switcher Replacement
The vacuum capacitor switch is part of a targeted program for replacement. Additionally, to separate the Distribution assets from generation assets the capacitor switch and bank need to be relocated. This relocation has the added benefit of opening up access to the yard on the north side of the substation. Therefore, the existing C22 vacuum capacitor switcher (Allis Chalmers VSC-34) will be removed, relocated and replaced with a new Southern States Cap-switcher along with two sets of new current transformers (CTs). The existing capacitor vacuum switcher outdoor relays and outdoor relay cabinet will be removed and new protection equipment will be installed inside a new control house (see below). Another reason the existing C22 cap bank needs to be removed and relocated is so that the existing overhead strain bus that feeds it can be removed. A replacement 5.4MVAR capacitor bank will be installed.

To allow for the installation of a future bus tie breaker, the existing station service transformer will also be relocated to the ends of the 34.5kV bus.

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Accounting Policy Statement No. 2
Operations Project Authorization

Construction of Control House
With the need to update the control equipment associated with the circuit breaker, capacitor switcher replacements and the need to provide new directional phase and ground overcurrent protection on line positions 313, 3173, 311 and 3140, it was decided that with the impending physical separation of the Eversource distribution and transmission equipment from the generation equipment that a new control house should be constructed.

The protection and control cabinets for the 313, 3713, 311 and 3140 feeder breakers, transformer TB33 & TB61, circuit switchers J33 & J61 and capacitor switcher C22 will be added in the new control house. The GSU transformer breaker TB9 protection and control cabinet will also be added in the new control house.

To accommodate the new control house, the existing TB61 34.5kV strain bus will be relocated using a new underground feed (2-1000kcmil Al).

A new annunciator/communication cabinet, GPS clock, Teletone line sharing switch, dial-up modem and communication processor will also be included in the new control house. A new GE type D20MX RTU cabinet will be installed to control the Distribution equipment, the existing RTU in the hydro control house will remain to control the hydro generation equipment.

Summary Project Description Table

($000)	Total Project Costs	Amount in Operating Plan	Difference
Capital	$4,557	$5,437	($880)
O&M	$0	$0	$0
Total	$4,557	$5,437	($880)

The $5,437K amount in the operating plan was for project #A07X44A, the annual OCB Breaker Replacement Project. This new project A16C10 reflects the funding for A07X44A being transferred in addition to the $430K that was spent on the Jackman S/S work order prior to 2016.

Project Authorization

Approver	Approver Name	Approver Signature	Date
Project Initiator	Thelma Brown		
Project Manager	Alan Roe		
Plant Accounting	Michele Roncaioli		
Manager- S/S Design	Thelma Brown		
Director	James Eilenberger		
Sr. Vice President	Peter Clarke		

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Accounting Policy Statement No. 2
Operations Project Authorization

Overall Justification

This project addresses the replacement of targeted obsolete equipment including OCBs, electromechanical relays, and capacitor switchers. It is also required to address the divestiture of generation and separation of distribution and generation assets.

Project Scope

Replace 4 Oil Circuit Breakers, electromechanical relays and capacitor switcher. Construct a new control house and reconfigure for separation of generation assets. Reconfiguration includes relocating one breaker and capacitor bank, including steel structure additions and removals.

Project Objectives

Replace obsolete equipment, facilitate the segregation of generation assets, maintain reliability to customers. Reduce the amount of oil on site adjacent to the river.

Business Process and / or Technical Improvements

Targeted obsolete equipment replacement programs- Remove 4 of the 127 34.5kV oil circuit breakers left on the system identified to be replaced and other obsolete equipment such as electro mechanical relays.
Generation divestiture- Separation of distribution assets from generation assets is targeted to be complete by the completion of divestiture in 2017.

Assumptions

It is assumed that only local permitting is required and these permits will be readily granted.

Alternatives Considered

1. There is a transmission control house that was built in 2008. Adding distribution relay and control equipment in the transmission control house was considered but this would require expansion of the control house. The transmission control house is situated alongside the river and there is insufficient room to expand plus the Transmission control house is located inside the 500 year flood zone. For these reasons it was decided to build a new distribution control house outside of the flood zone.

2. Only replace the OCB as a part of the targeted program. This would leave all relay and control functions in the generation control house. Additionally, the generation control house is small and crowded. Leaving Eversource equipment where it can be operated or damaged by the new generation owner is not preferred.

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Accounting Policy Statement No. 2
Operations Project Authorization

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering RFP	03/01/16
Engineering Award	03/29/16
Engineering Complete	08/29/16
Construction Start	09/01/16
In-service date	06/01/17

Financial Evaluation

Direct Capital Costs ($000)	Prior	2016	2017	Total
Straight Time Labor	$21	$192	$89	$302
Overtime Labor	$0	$0	$0	$0
Outside Services	$147	$2,705	$785	$3,637
Materials	$194	$85	$0	$279
Other, including contingency amounts (describe)	$10	$0	$0	$10
Total	$372	$2,982	$874	$4,228

Indirect Capital Costs ($000)	Prior	2016	2017	Total
Indirects/Overheads (including benefits)	$63	$183	$79	$325
Capitalized interest or AFUDC, if any	4	0	$0	$4
Total	$67	$183	$79	$329

Total Capital Costs	$439	$3,165	$953	$4,557
Total O&M Costs	0	0	$0	$0
Total Project Costs	$439	$3,165	$953	4,557

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Regulatory Approvals

Anticipated Permits:

- NHDES - Shoreland Permit
- Town of Hillsborough Planning Board - Site Plan Approval
- NH Public Utilities Commission - License to Construct and Maintain Electric Line over Public Waters

Risks and Risk Mitigation Plans

There is a risk that local planning board approval is not forthcoming. To mitigate this risk we have engaged TF Moran to facilitate all of the permitting activities on behalf of Eversource.

The site is congested with little room for establishing site cabins, material laydown areas, etc. It is hoped that existing generation land could be used but in the event this is not available other local property may need to be leased for the duration of the project.

The project timescales are short, any delays to the engineering design or review cycles may impact on the ability to meet the construction schedule. Regular project team meetings will track progress against milestones and the schedule or resources will be adjusted to meet schedule dates.

Date Prepared: **February 9, 2017**	Project Title: **Jackman Replace Obsolete Equipment**
Company/Companies: **Eversource (NH)**	Project ID Number: **A16C10 / A07X44B2**
Organization: **NH Operations**	Plant Class/(F.P.Type): **Distribution**
Project Initiator: **Thelma Brown**	Project Type: ***Specific*** */ Annual / Prelim Project / Parent*
Project Owner/Manager: **Alan Roe**	Capital Investment Part of Original Operating Plan? **Y** / N
Project Sponsor: **James Eilenberger**	O&M Expenses Part of the Original Operating Plan? Y / N
Current Authorized Amount:**$4,557,000**	Estimated in service date(s): **November 30, 2017**
Supplement Request:**$843,154**	Other:
Total Request: **$5,400,154**	

Project Authorization Supplement Justification

The Project Authorization Form ("PAF") for the Jackman Replace Obsolete Equipment project was approved in April 2016. At that time, the project was approved at a cost of $4,557,000 with an in-service date of June 2017. The project estimate was based on direct costs of $4,228,000 with indirect costs of $325,000 and AFUDC of $4,000.

The expected cost to complete the project is now $5,400,154 which is $843,154 above the approved project amount.

$,000	PAF Approved Budget	Current Forecast
Direct	$4,228	$5,027
Indirect	$325	$369
AFUDC	$4	$4.5
Total	$4,557	$5,400
Difference	$843	

At this stage in the project, the majority of Contracts are in place, with only the following contracts to be awarded:

- electrical testing ($249,069 forecast based on best evaluated bid),
- installation and removal of the mobile substation ($75,000 forecast based on a recent similar installation), and
- site security ($82,000 forecast based on Securitas proposal)

Justification for Additional Resources

The project moved in to Construction at the beginning of January. Engineering design had a number of challenges (lack of available drawings, re-design of equipment, late changes to scope, etc.). Construction is also expected to be challenging due to the complexity of the project, the potential for buried equipment not shown on drawings, availability of outages, complex cut-over requirements, etc. The current planned in-service date is now November 2017 due to outage unavailability in the summer.

Explanation for Cost Increase

Materials & Labor - The main construction contract was awarded to ES Boulos as the best evaluated bidder following a formal bidding process. As is typical, construction pricing was requested based on the 70% design and bill of materials. Once the Issued for Construction ("IFC") drawings were issued a large difference between the bill of materials was identified leading to an increase in both material and installation costs (material $93,454; installation $167,636).

Estimated Cost Increase $261,090

Lead Commissioning Engineer - During the development of the project, the project team requested that an independent Lead Commissioning Engineer be brought onboard. The cut-over sequence from the old control house is extremely complex and an experienced commissioning engineer was considered prudent. Commissioning was included in the forecast, but the use of an LCE was not included in the original PAF estimate. After an RFP process, the T&M contract was awarded to EIG as the best evaluated bidder but prices for the LCE services came in much higher than anticipated.

Estimated Cost Increase $150,000

Contaminated Soils - The main construction contract was awarded to ES Boulos as the best evaluated bidder following a formal bidding process. While the contract price was in-line with the anticipated cost, an allowance of $25,000 was also included in the PO amount for the removal of contaminated soils. The removal cost for the soils is now estimated to be $40,000 ($35,000 for transportation and $5,000 for disposal).

Estimated Cost Increase $15,000

Site Security - During the previous Transmission project at Jackman, there were three incidents of thefts of material from site. To reduce the risk during this project it was proposed to use a security guard during nights and weekends. This activity was not specifically included in the PAF forecast. Securitas has submitted a proposal for $82,000 for this work. This contract is not yet awarded but is included in the current forecast. The risk of theft will be managed by securing material in locked Conex boxes and by arranging delivery of materials on a just-in-time basis.

Estimated Cost Increase $82,000

Owner's Engineer - During the engineering design process, the P&C Engineering group requested that the services of an Owner's Engineer be contracted to review the P&C drawings due to a lack of internal resources. This work was directly awarded to one of the of-choice vendors (HDR). While the engineering reviews were included in the original direct labor costs the Owner's Engineer T&M contract increased the Outside Services element of the project.

Estimated Cost Increase $50,000

Mobile Substation - During the development of the project, it was realized that the installation and removal of the mobile substation would be required to support the TB61 and TB33 outages. The cost to tap-up and remove the mobile substation was not included

in the original PAF estimate and although the contract has yet to be let $75,000 is forecast for this activity based on a similar recent installation at Whitefield. This is anticipated to be a fixed price contract.

Estimated Cost Increase $75,000

Additional Engineering – During the engineering design process, a number of additional owner directed tasks were assigned to the Engineering vendor (Altran). One of the changes related to the provision of new revenue metering to support generation divestiture. This was not included in the original scope of work or the PAF estimate. Additional tasks such as an analysis of the station lighting and lightning protection was also requested as these studies were not available. The two Altran change orders together were $77,150

Estimated Cost Increase $77,150

Miscellaneous – A small amount of contingency was included in the electrical / civil installation contract to cover foreseeable risks such as adverse weather, site remediation, design changes, etc.

Estimated Cost Increase $88,454

Indirects / AFUDC - In addition to the increase in direct costs, Indirect and AFUDC charges have also been estimated to increase by $44,500 based on the ratio of direct and indirect costs in the original PAF estimate.

Estimated Cost Increase $44,500

Summary

Activity	Estimated Cost Increase
Materials	$261,090
Lead Commissioning Engineer	$150,000
Contaminated Soils	$15,000
Site Security	$82,000
Owner's Engineer	$50,000
Mobile Substation	$75,000
Additional Engineering	$77,100
Miscellaneous	$88,454
Indirects / AFUDC	$44,500
Total	**$843,154**

The $843,154 increase represents the worst case scenario at this stage. It assumes that:

- all additional material and installation costs are required;
- site security will be needed for the full duration of construction;
- HDR will charge to the full amount of their PO for design reviews;
- EIG will charge to the full amount of their PO for commissioning support;
- the mobile installation charges will be $75,000; and
- soil removal transportation and disposal costs are capped at 1,000 tons.

Project Authorization Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 4,228	$ 799	$ 5,027
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	-	-
Total Direct Spending	$ 4,228	$ 799	$ 5,027
Capital Additions - Indirect	325.00	44.00	369.00
AFUDC	4.00	0.54	4.54
Total Capital Request	$ 4,557	$ 843	$ 5,400
O&M	-	-	-
Total Request	**$ 4,557**	**$ 843**	**$ 5,400**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2017	Year 20__	Year 20__+	Total
Capital Additions - Direct	$ 799	$ -	$ -	$ 799
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	-	-	-	-
Total Direct Spending	$ 799	$ -	$ -	$ 799
Capital Additions - Indirect	44.00	-	-	44.00
AFUDC	0.54	-	-	0.54
Total Capital Request	$ 843	$ -	$ -	$ 843
O&M	-	-	-	-
Total Request	**$ 843**	**$ -**	**$ -**	**$ 843**

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Approved at March 28, 2018 EPAC

Link to Meeting Minutes

Date Prepared: March 29, 2018	**Project Title: Lost Nation 2nd Transformer**
Company/Companies: Eversource (NH)	**Project ID Number: A16N02**
Organization: NH Operations	**Plant Class/(F.P.Type): Distribution Station**
Project Initiator: Thelma Brown	**Project Type: Specific**
Project Manager: Alan Roe	**Capital Investment Part of Original Operating Plan? Y**
Project Sponsor: James Eilenberger	**O&M Expenses Part of the Original Operating Plan? N/A**
Current Authorized Amount: $3,912k	**Estimated in service date(s): November 31, 2018**
Supplement Request: $646k	**Other:**
Total Request: $4,558k	

Supplement Justification

Background

A joint T&D Technical Authorization Form ("TAF") for the Lost Nation 2nd transformer project was approved by the Technical Review Committee on November 11, 2016. At that time, the project was estimated at $2,850k and the approved authorized budget for engineering was $285k (10%).

An initial Project Approval Form ("PAF") was submitted in December 2016, which approved the purchase of the transformer for the project. The initial PAF increased the authorized budget to $1,185k. The overall project estimate was unchanged at $2,850k.

A second PAF was submitted and approved in April 2017 to purchase additional long lead items. At that time, the project was re-estimated at $3,337k and the authorized budget was increased to $1,435k. The increased estimate included revised forecasts for civil and electrical installation costs.

A third PAF was submitted in August 2017 after the 70% design stage. This PAF requested full funding for the project with an estimated cost to complete the project of $3,911k, the currently authorized amount. At that point the estimate included actual costs for construction and estimates for testing and commissioning.

Project Status

At this point, all civil work, apart from the construction of the masonry fire wall, is complete and much of the substation electrical equipment is installed but not wired. Because of minor scope changes (e.g. relocation of a relay and addition of relay test switches), and problems with the quality and accuracy of the P&C engineering drawings, the project is approximately six months behind schedule. The 30% P&C drawings have been reviewed and comments returned to the engineering design vendor (PLM). 70% drawing submission is expected on March 30, 2018 and assuming no additional delays, the P&C drawings will be issued to the field on June 8, 2018. Relay cabinet delivery is forecast on August 6, 2018 with a final in-service date for the project of November 30, 2018.

This supplemental Project Authorization Form requests approval of $646K for a total request of $4,558k. An increase of 17% over the currently authorized amount.

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APS 1 - Project Authorization Policy

Supplement Request Form

Since August 2017, direct costs have increased by $278k and associated increases in Indirect costs are $329k. AFUDC has increased by $39k. The reasons for these increases are explained below.

Cumulative effect of Changes since August 2017

	August 2017 (Current Authorized)	March 2018 (Total Request)	Difference (Supplement Request)
1. Eng./PM/Permitting	$491,344	$695,213	$203,869
2. Construction	$1,106,578	$1,087,955	($18,623)
3. Testing & Commissioning	$200,000	$295,424	$95,424
4. Internal Labor / Exp.	$65,276	$122,304	$57,028
5. Eversource Supplied Material	$1,589,756	$1,439,970	($149,786)
6. Allowances / Contingency	$0	$0	$0
7. Property Taxes	$0	$128,148	$128,148
8. Removals	$55,905	$17,691	($38,214)
Total Directs	$3,508,859	$3,786,705	$277,846
9. Indirect	$379,178	$708,369	$329,191
10. AFUDC	$23,851	$62,742	$38,891
Total	$3,911,888	$4,557,816	$645,928
Total ($k rounded)	$3,912	$4,558	$646

Justification for Additional Resources

1. Engineering / Project Management / Permitting

Because of a shortage of internal P&C resources, an Owner's Engineering was brought on to the project at the 30% P&C design review stage to review and comment on the P&C drawings. This added an additional $117,900 to the project that was not included in the August 2017 estimate. Total Incremental Request for Engineering / Project Management and Permitting: $203,869.

2. Testing and Commission

Testing and commissioning contracts were higher than forecast back in August 2017. Total Incremental Request for testing and commissioning: $95,424

3. Labor and Expenses

With the project delays, and additional effort needed to resolve issues with the PLM's design, additional internal labor for engineering, site supervision and management was incurred. Total Incremental Request for Labor and Expenses: $57,028

4. Property Taxes

The original project estimate and the August 2017 forecast did not include an allowance for property taxes. To the end of February 2018, the project has incurred $38,148 in property taxes with an additional $90,000 forecast through November 2018. Total Incremental Request for property taxes: $128,148

5. Indirect costs

In the August 2017 PAF, indirect costs were forecast to be $379,178. To date, the project has incurred $427,118 in adders and is expected to incur an additional $281,251 to the end of the project. Total increase in indirect costs for this supplement request is $329,191.

6. AFUDC

In August 2017, AFUDC charges for the project were forecast as $23,851. Actual AFUDC charges incurred to date are $10,242 with an additional $52,000 forecast for the remainder of the project. Total increase in AFUDC for this supplement request is $38,891

These increases together with reductions in estimated materials costs and lower than forecast costs for construction and removals result in an overall Incremental Request of $645,928

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplemental Request	Total
Capital Additions – Direct	$3,509	$3,787	$278
Less Customer Contribution	$0	$0	$0
Removals net of Salvage %	$0	$0	$0
Total Direct Spending	$3,509	$3,787	$278
Capital Additions – Indirect	$379	$708	$329
AFUDC	$24	$63	$39
O&M	$0	$0	$0
Total Request	$3,912	$4,558	$646

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	To Date	Year 2018	Year 2019	Total
Capital Additions – Direct	$2,745	$1,044	$0	$3,787
Less Customer Contribution	$0	$0	$0	$0
Removals net of Salvage %	$0	$0	$0	$0
Total Direct Spending	$2,745	$1,044	$0	$3,787
Capital Additions – Indirect	$427	$281	$0	$708
AFUDC	$10	$52	$0	$63
O&M	$0	$0	$0	$0
Total Request	$3,182	$1,377	$0	$4,558

Operations Project Authorization Form

Date Prepared: **8/10/17**	Project Title: **Lost Nation 2nd Transformer**
Company/ies: **Eversource NH**	Project ID Number: **A16N02 (D) & T1346A (T)**
Organization: **NH Operations**	Class(es) of Plant: **Distribution & Transmission**
Project Initiator: **Charles Christensen, PE**	Project Category: **Substation**
Project Manager: **Alan Roe**	Project Type: ***Specific***
Project Sponsor: **James Eilenberger**	Project Purpose: **Add second 115/34.5kV transformer**
Estimated in service date: **03/31/2018**	If Transmission Project: **Non-PTF**
Eng. /Constr. Resources Budgeted? **Yes**	Capital Investment Part of Original Operating Plan? **Yes**
	O&M Expenses Part of the Original Operating Plan? **No**

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Subsidiary Board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project is for the installation of a second 115-34kV 44.8MVA transformer at Lost Nation substation. The project includes the installation of a new 115kV breaker and 115kV bus rework to install the second transformer.

The joint T&D TAF for this project was approved at the 11/3/16 Technical Review Committee. Approval was for $550,000 split $285,000 (D) and $265,000 (T) for engineering design only.

An initial PAF document was approved on 12/7/16 for an additional $900,000 to place an order for the transformer against Project A16N02. A second PAF was approved on 4/7/17 which authorized an additional $500,000 for materials (split 50:50 between Transmission and Distribution). The Distribution authorized amount was increased from $1,185,000 to $1,435,000 and the Transmission authorized amount was increased from $265,000 to $515,000.

This PAF requests full funding of $5,800k (T - $1,900k D - $3,900k) for the project based on known commitments for engineering, project management, materials, commissioning and civil construction. It includes estimates for electrical / P&C construction and estimates for Vendor supplied materials. No contingency amounts are included. The $6,900k estimate is inside the +/-25% of the approved TAF of $5,500k.

A number of additional items have been incorporated into the scope as the engineering design has progressed. These include the addition of slip-over CTs on TB033 and the replacement of a number of obsolete and non-standard relays. All scope additions are necessary to ensure that the new TX129 transformer and TB033 can be operated in parallel and are adequately protected.

Due to performance issues with the Engineering design vendor, the in-service date for the transformer has been postponed into early 2018. The Transmission equipment is still scheduled to go into service by the end of 2017 assuming that relay cabinets can be fabricated and wired in time to meet the

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APS 1 - Project Authorization Policy

Operations Project Authorization Form

schedule. Based on the current schedule, bids for electrical / P&C construction will be received on 8/25.

The estimated cost to complete the Distribution portion of the project is $3,000k and $1,663k for Transmission.

Project Costs Summary

See APS3 and APS8 requirements and consult with Plant Accounting for capital/O&M determination. Use published loaders for benefits, materials, and invoices, maintained by the Director, Budget and Internal Reporting.
Note: Dollar values are in thousands

Capital Additions - Direct	$ 1,435	$ 2,897	$ 612	$ 3,509
Less Customer Contribution	$ -	$ -	$ -	$ -
Removals net of Salvage _____%	$ -	$ -	$ -	$ -
Total - Direct Spending	$ 1,435	$ 2,897	$ 612	$ 3,509
Capital Additions - Indirect	$ -	$ 272	$ 108	$ 380
Subtotal Request	$ 1,435	$ 3,169	$ 720	$ 3,889
AFUDC	$ -	$ 8	$ 15	$ 23
Total Capital Request	$ 1,435	$ 3,177	$ 735	$ 3,912
O&M	$ -	$ -	$ -	$ -
Total Request	$ 1,435	$ 3,177	$ 735	$ 3,912

Capital Additions - Direct	$ 515	$ 1,600	$ 117	$ 1,717
Less Customer Contribution	$ -	$ -	$ -	$ -
Removals net of Salvage _____%	$ -	$ -	$ -	$ -
Total - Direct Spending	$ 515	$ 1,600	$ 117	$ 1,717
Capital Additions - Indirect	$ -	$ 175	$ -	$ 175
Subtotal Request	$ 515	$ 1,775	$ 117	$ 1,892
AFUDC	$ 0	$ 6	$ -	$ 6
Total Capital Request	$ 515	$ 1,781	$ 117	$ 1,898
O&M	$ -	$ -	$ -	$ -
Total Request	$ 515	$ 1,781	$ 117	$ 1,898

Prior Distribution authorized amount is for $285k approved at TRC on 11/3/16.
An additional $900k for transformer purchase was approved at CPAC on 12/7/16.
An additional $250k for materials was approved at CPAC on 4/7/16.

Prior Transmission authorized amount is $265k that was approved at TRC on 11/3/16.
An additional $250k for materials was approved at CPAC on 4/7/16.

EVERSOURCE

APS 1 - Project Authorization Policy

Operations Project Authorization Form

Financial Evaluation

Provide the following financial information (attach additional detail if summarized items are significant or additional information is needed). Note: Dollar values are in thousands

Distribution Project (A16N02)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$0	$61	$4	$65
Overtime Labor	$0	$0	$0	$0
Outside Services	$0	$1,190	$608	$1,798
Materials	$0	$1,578	$0	$1,578
Other, including contingency amounts	$0	$67	$0	$67
Total	$0	$2,896	$612	$3,508

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$272	$107	$379
Capitalized interest or AFUDC, if any	$0	$9	$15	$24
Total	$0	$281	$122	$403

Total Capital Costs	$0	$3,177	$734	**$3,911**
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	$0	$3,178	$734	$3,911
Total O&M Project Costs	$0	$0	$0	$0

EVERSOURCE

APS 1 - Project Authorization Policy

Operations Project Authorization Form

Transmission Project (T1346A)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$0	$25	$5	$30
Overtime Labor	$0	$0	$0	$0
Outside Services	$0	$1,052	$75	$1,127
Materials	$0	$509	$37	$546
Other, including contingency amounts	$0	$6	$0	$6
Total	$0	$1,592	$117	$1,709

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$175	$0	$175
Capitalized interest or AFUDC, if any	$0	$7	$0	$7
Total	$0	$182	$0	$182

Total Capital Costs	$0	$1,774	$117	$1,891
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	$0	$1,774	$117	$1,891
Total O&M Project Costs	$0	$0	$0	$0

- Straight time forecast is based on original project estimate.
- Outside services forecast is based on committed contracts (engineering, project management, civil construction and commissioning) plus forecast costs for electrical / P&C construction and testing.
- Material costs are based on $900k for transformer purchase plus $171k for P&C cabinets, Eversource purchased materials and miscellaneous vendor supplied materials.
- $5,802,000 is the total project forecast.
- Due to engineering design issues, some of the project costs a forecast to run into 2018.

Note: Explain unique payment provisions, if applicable

If this is a new business project, is a customer contribution required? If yes, please note the contribution amount. **This is NOT a new customer project**

In addition, for all electric and gas growth / new business projects, please attach the CIAC calculation

Provide other financial documentation as warranted by management and / or regulatory precedent. When performing financial analysis, use appropriate discount rate by company (can be provided by Budgeting and Internal Reporting or Financial Planning and Analysis).

Future Financial Impacts:

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APS 1 - Project Authorization Policy

Operations Project Authorization Form

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	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Minor additional O&M costs will result from the addition of a second transformer and switchgear e.g. additional oil and gas samples, visual inspections, etc.

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; N/A

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):

An ARO is a current legal obligation to remove or retire property, plant or equipment at some point in the future. Please refer to APS8 or contact Plant Accounting for further detail.

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. **No**

EVERSOURCE

Project Authorization Policy
Operations Project Authorization

Technical Authorization Form

Date Prepared: October 31, 2016	Project Title: Lost Nation 2nd Transformer
Company/ies: Eversource, NH	Project ID Number: A16N02 (D) & T1346A (T)
Organization: NH Operations	Class(es) of Plant: Distribution & Transmission
Project Initiator: Charles Christensen, PE	Project Category: Substation
Project Owner/Manager: Thelma Brown	Project Type: *Specific*
Project Sponsor: James Eilenberger	Project Purpose: part of regulatory tracked program? No
Estimated in service date: November 1, 2017	If Transmission Project: *Non-PTF*
Authorization Type: *Conceptual Engineering*	Authorization Amount: $550,000 for Engineering

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Project Need Statement *(Description of Issue)*

The Lost Nation 115-34.5kV transformer TB029 failed and was removed more than 10 years ago. Today the remaining Lost Nation TB033 115-34.5kV transformer and the combustion turbine (CT) provide the system's ground source for the distribution system emanating out of the Lost Nation Substation's 34.5kV bus. When TB033 is removed from service for maintenance the CT's GSU must remain connected to the system or a mobile substation is required. The mobile substation option is costly and the CT GSU will not be under our direct control once divestiture is complete. Mobilization of the 115-34.5kV mobile adds around $30K to a maintenance job and removes it from being available in other locations. The pending sale of the combustion turbine removes the CT ground source from Eversource's direct control and potential availability. In the event of a failure of TB033 after divestiture, there is the potential we will need to isolate load until the mobile can be installed.

This project is for the installation of a second 115-34kV 44.8 MVA transformer at Lost Nation Substation. It includes the installation of a 115kV breaker and 115kV bus rework to install the second transformer.

Project Objectives

The project remedies the System Protection Sensitivity and Ground Current Source issue for 34.5kV circuits 355X, 376X and 384 fed from Lost Nation Substation.

In addition to adding a power transformer and ancillary equipment it will improve the system's ground system sensitivity and improve the system's continuity of service by having a second transformer at the substation.

Project Scope

1. Installation of a second 115-34kV, 44.8 MVA standard power transformer
2. One (1) new 115kV circuit breaker – O154 line Lost Nation to Paris,
3. Remove 115kV switch 154J2,
4. Install two (2) new 115kV circuit breaker disconnect switches, this requires a new steel struss to be installed on the existing take-off structure,
5. Remove the 115kV wire bus that runs around the 115kV structure D142 GCB is installed below,
6. Install six (6) new 115kV CCVTs,
7. Install one (1) new 115kV Circuit Switcher for high-side transformer protection,
8. Install one (1) new low side 34kV transformer circuit breaker,
9. Install one (1) new low side 34kV potential transformer,
10. Alternate AC station service source must be changed. The station service is open delta, 240 volts, fed from two 50kVA transformers (86kVA maximum). The alternate station service is supplied from two – distribution pole mounted transformers (2-15kVA) tapped off the 4 kV circuit (25.8kVA maximum).

Background / Justification

Today the Lost Nation TB033 115-34.5kV transformer and the combustion turbine (CT) provide the system's ground source for the distribution system emanating out of the Lost Nation Substation's 34.5kV bus. When TB033 is removed from service for maintenance the CT's GSU must remain connected to the system or a mobile substation is required. The mobile substation option is costly and the CT GSU will not be under our direct control once divestiture is complete. Mobilization of the 115-34.5kV mobile adds around $30K to a maintenance job and removes it from being available in other locations. The pending sale of the combustion turbine removes the CT ground source from Eversource's direct control and potential availability. In the event of a failure of TB033 after divestiture, there is the potential we will need to isolate load until the mobile can be installed.

This project is for the installation of a second 115-34kV 44.8 MVA transformer at Lost Nation Substation. It includes the installation of a 115kV breaker and 115kV bus rework to install the second transformer.

Business Process and / or Technical Improvements:

This project will improve the operation of the system, address generation divestiture, and provide a more reliable system with two transformers at the station.

Cost Estimate and Assumptions

The total price of this project is estimated to cost:

Distribution:	2,850,000
Transmission:	2,650,000
Total:	$5,500,000

($4,125,000 - $6,875,000) (-25% +25%)

Alternatives Considered with Cost Estimates

1. Do nothing. This leaves the risk to **isolate customers** for a failure of transformer TB033 if the CT is not available under new ownership. If the CT is available to dispatch, this emergency power source will have to be paid for by Eversource customers which may be significantly above the market rate. The generation divestiture effort will remove this CT from Eversource's direct control. In addition to the customer outage risk the lack of an adequate ground source results in problematic protection and control system design issues that may result in a lower continuity of service to all the customer fed from Lost Nation Substation.

   Estimated capital cost to do nothing is $0.

2. Install a grounding transformer. As with option 1, this option leaves the risk to **isolate customers** for a failure of transformer TB033 (N-1) if the CT is not available when under new ownership. The installation of a grounding bank only addresses the technical issue of the lack of a system ground source. If the CT is available to dispatch, this emergency power source will have to be paid for by Eversource customers which may be significantly above the market rate.

   The total price of the Alternative 2 project is estimated to cost:
   Distribution: 2,000,000
   Total: $2,000,000
   ($1,500,000 - $2,500,000) (-25% +25%)

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Project Approval	11/3/16
Engineering	8/1/17
Construction	11/1/17
In-Service date	11/1/17

Regulatory Approvals

ISO-NE Level 2 approval for the distribution transformer and 115kV circuit breaker addition may be required.

Permitting required by the Town of Northumberland, the State of New Hampshire or US Regulatory Departments

Risks and Risk Mitigation Plans

The loading during construction may require the use of the mobile substation.

- Delay in construction while waiting for the mobile to be available.
- Run the CT

Outage cancelled due to unplanned events on the system resulting in schedule delay and potential labor cost to remobilize.

- Mitigation Plan - Establish and manage outages using proven coordination teams; 1) Construction Management 2) Coordination Meetings 3) Outage Planning Meeting

Internal and external resource availability for engineering.

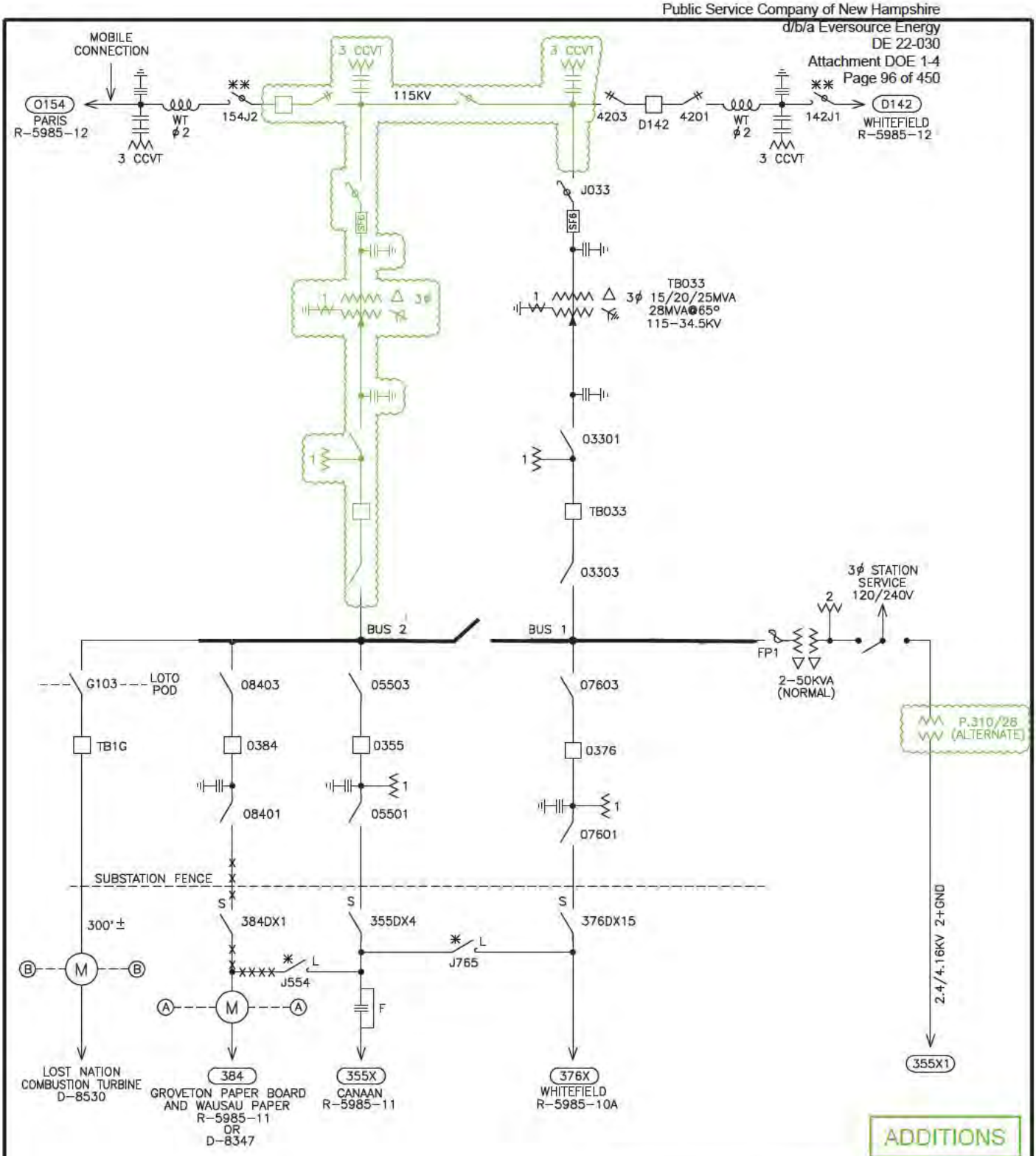
- Effort is being exerted to balance engineering and review work between internal resources and external resources.

- Lack of sufficient, qualified, local construction labor results in the need to import labor which potentially increases costs or lengthen the schedule which will result in project delays.
    - Develop overall strategy for construction allocation.

References

Go to **N:\Temp60Day\NH Transmission P&C and Sub\Lost Nation - 2nd Tx and other items**
For pictures of the Substation go to folders:
Yard-Control Blding Mar 30 2016
Control House P&C Mar 30 2016

One-Line Diagrams, Attachments, and Images



LAST REVISION DETAIL

** – SEE SWITCHING PRECAUTIONS IN OPERATING PROCEDURES.

LOTO POD – LOCK OUT, TAG OUT–POINT OF DEMARCATION

EVERSOURCE ENERGY
NEW HAMPSHIRE

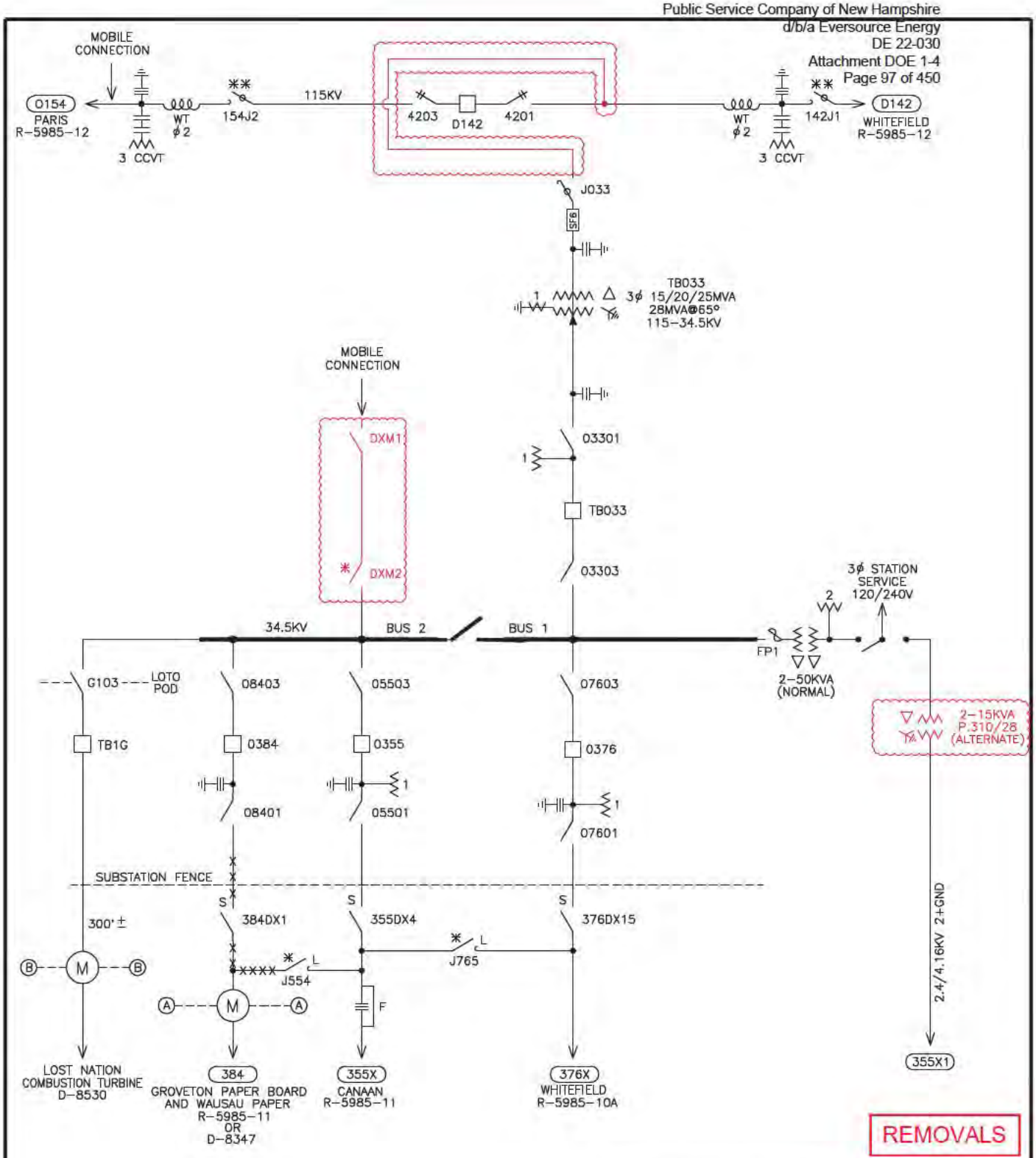
NORTHERN

LOST NATION

LOST NATION ROAD, NORTHUMBERLAND, NH
PRELIMINARY MAR. 2016 CEC

DRN.	CHKD.	APPR.		
LJG			5/3/16	SKT-LSTNAT-2016

Public Service Company of New Hampshire
d/b/a Eversource Energy
DE 22-030
Attachment DOE 1-4
Page 97 of 450



REMOVALS

LAST REVISION DETAIL

** - SEE SWITCHING PRECAUTIONS IN OPERATING PROCEDURES.

LOTO POD - LOCK OUT, TAG OUT-POINT OF DEMARCATION

EVERSOURCE ENERGY
NEW HAMPSHIRE

NORTHERN

LOST NATION

LOST NATION ROAD, NORTHUMBERLAND, NH
PRELIMINARY MAR. 2016 CEC

DRN.	CHKD.	APPR.		
LJG			5/3/16	SKT-LSTNAT-2016

Operations Project Authorization Form

Date Prepared: **8/10/17**	Project Title: **Lost Nation 2nd Transformer**
Company/ies: **Eversource NH**	Project ID Number: **A16N02 (D) & T1346A (T)**
Organization: **NH Operations**	Class(es) of Plant: **Distribution & Transmission**
Project Initiator: **Charles Christensen, PE**	Project Category: **Substation**
Project Manager: **Alan Roe**	Project Type: ***Specific***
Project Sponsor: **James Eilenberger**	Project Purpose: **Add second 115/34.5kV transformer**
Estimated in service date: **03/31/2018**	If Transmission Project: **Non-PTF**
Eng. /Constr. Resources Budgeted? **Yes**	Capital Investment Part of Original Operating Plan? **Yes**
	O&M Expenses Part of the Original Operating Plan? **No**

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Subsidiary Board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project is for the installation of a second 115-34kV 44.8MVA transformer at Lost Nation substation. The project includes the installation of a new 115kV breaker and 115kV bus rework to install the second transformer.

The joint T&D TAF for this project was approved at the 11/3/16 Technical Review Committee. Approval was for $550,000 split $285,000 (D) and $265,000 (T) for engineering design only.

An initial PAF document was approved on 12/7/16 for an additional $900,000 to place an order for the transformer against Project A16N02. A second PAF was approved on 4/7/17 which authorized an additional $500,000 for materials (split 50:50 between Transmission and Distribution). The Distribution authorized amount was increased from $1,185,000 to $1,435,000 and the Transmission authorized amount was increased from $265,000 to $515,000.

This PAF requests full funding of $5,800k (T - $1,900k D - $3,900k) for the project based on known commitments for engineering, project management, materials, commissioning and civil construction. It includes estimates for electrical / P&C construction and estimates for Vendor supplied materials. No contingency amounts are included. The $6,900k estimate is inside the +/-25% of the approved TAF of $5,500k.

A number of additional items have been incorporated into the scope as the engineering design has progressed. These include the addition of slip-over CTs on TB033 and the replacement of a number of obsolete and non-standard relays. All scope additions are necessary to ensure that the new TX129 transformer and TB033 can be operated in parallel and are adequately protected.

Due to performance issues with the Engineering design vendor, the in-service date for the transformer has been postponed into early 2018. The Transmission equipment is still scheduled to go into service by the end of 2017 assuming that relay cabinets can be fabricated and wired in time to meet the

schedule. Based on the current schedule, bids for electrical / P&C construction will be received on 8/25.

The estimated cost to complete the Distribution portion of the project is $3,000k and $1,663k for Transmission.

Project Costs Summary

See APS3 and APS8 requirements and consult with Plant Accounting for capital/O&M determination. Use published loaders for benefits, materials, and invoices, maintained by the Director, Budget and Internal Reporting.
Note: Dollar values are in thousands

	Prior Authorized	2017	2018	Totals
Capital Additions - Direct	$ 1,435	$ 2,897	$ 612	$ 3,509
Less Customer Contribution	$ -	$ -	$ -	$ -
Removals net of Salvage _____%	$ -	$ -	$ -	$ -
Total - Direct Spending	$ 1,435	$ 2,897	$ 612	$ 3,509
Capital Additions - Indirect	$ -	$ 272	$ 108	$ 380
Subtotal Request	$ 1,435	$ 3,169	$ 720	$ 3,889
AFUDC	$ -	$ 8	$ 15	$ 23
Total Capital Request	$ 1,435	$ 3,177	$ 735	$ 3,912
O&M	$ -	$ -	$ -	$ -
Total Request	$ 1,435	$ 3,177	$ 735	$ 3,912

Capital Additions - Direct	$ 515	$ 1,600	$ 117	$ 1,717
Less Customer Contribution	$ -	$ -	$ -	$ -
Removals net of Salvage _____%	$ -	$ -	$ -	$ -
Total - Direct Spending	$ 515	$ 1,600	$ 117	$ 1,717
Capital Additions - Indirect	$ -	$ 175	$ -	$ 175
Subtotal Request	$ 515	$ 1,775	$ 117	$ 1,892
AFUDC	$ 0	$ 6	$ -	$ 6
Total Capital Request	$ 515	$ 1,781	$ 117	$ 1,898
O&M	$ -	$ -	$ -	$ -
Total Request	$ 515	$ 1,781	$ 117	$ 1,898

Prior Distribution authorized amount is for $285k approved at TRC on 11/3/16.
An additional $900k for transformer purchase was approved at CPAC on 12/7/16.
An additional $250k for materials was approved at CPAC on 4/7/16.

Prior Transmission authorized amount is $265k that was approved at TRC on 11/3/16.
An additional $250k for materials was approved at CPAC on 4/7/16.

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APS 1 - Project Authorization Policy

Operations Project Authorization Form

Financial Evaluation

Provide the following financial information (attach additional detail if summarized items are significant or additional information is needed). Note: Dollar values are in thousands

Distribution Project (A16N02)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$0	$61	$4	$65
Overtime Labor	$0	$0	$0	$0
Outside Services	$0	$1,190	$608	$1,798
Materials	$0	$1,578	$0	$1,578
Other, including contingency amounts	$0	$67	$0	$67
Total	$0	$2,896	$612	$3,508

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$272	$107	$379
Capitalized interest or AFUDC, if any	$0	$9	$15	$24
Total	$0	$281	$122	$403

Total Capital Costs	$0	$3,177	$734	**$3,911**
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	$0	$3,178	$734	$3,911
Total O&M Project Costs	$0	$0	$0	$0

EVERSOURCE

APS 1 - Project Authorization Policy

Operations Project Authorization Form

Transmission Project (T1346A)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$0	$25	$5	$30
Overtime Labor	$0	$0	$0	$0
Outside Services	$0	$1,052	$75	$1,127
Materials	$0	$509	$37	$546
Other, including contingency amounts	$0	$6	$0	$6
Total	$0	$1,592	$117	$1,709

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$175	$0	$175
Capitalized interest or AFUDC, if any	$0	$7	$0	$7
Total	$0	$182	$0	$182

Total Capital Costs	$0	$1,774	$117	$1,891
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	$0	$1,774	$117	$1,891
Total O&M Project Costs	$0	$0	$0	$0

- Straight time forecast is based on original project estimate.
- Outside services forecast is based on committed contracts (engineering, project management, civil construction and commissioning) plus forecast costs for electrical / P&C construction and testing.
- Material costs are based on $900k for transformer purchase plus $171k for P&C cabinets, Eversource purchased materials and miscellaneous vendor supplied materials.
- $5,802,000 is the total project forecast.
- Due to engineering design issues, some of the project costs a forecast to run into 2018.

Note: Explain unique payment provisions, if applicable

If this is a new business project, is a customer contribution required? If yes, please note the contribution amount. **This is NOT a new customer project**

In addition, for all electric and gas growth / new business projects, please attach the CIAC calculation

Provide other financial documentation as warranted by management and / or regulatory precedent. When performing financial analysis, use appropriate discount rate by company (can be provided by Budgeting and Internal Reporting or Financial Planning and Analysis).

Future Financial Impacts:

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APS 1 - Project Authorization Policy

Operations Project Authorization Form

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	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Minor additional O&M costs will result from the addition of a second transformer and switchgear e.g. additional oil and gas samples, visual inspections, etc.

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; N/A

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):

An ARO is a current legal obligation to remove or retire property, plant or equipment at some point in the future. Please refer to APS8 or contact Plant Accounting for further detail.

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. **No**

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APS 1 - Project Authorization Policy

Operations Project Authorization Form

Adobe Acrobat Document

Lost Nation PAF – 12/6/16

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Project Authorization Form

General Information

Date Prepared: 03/16/2016	Project Title: CAIDI Improvement
Company: Eversource NH	Project ID Number: A16X04
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Russel Johnson	Project Category: Reliability
Project Owner/Manager: Marc Geaumont	Project Type: Specific
Project Sponsor: Joseph Purington	Project Purpose: part of regulatory tracked program? N
Estimated in service date: 12/31/2016	Capital Investment Part of Original Operating Plan? Y
If Transmission Project: N/A	Supplement to Existing Authorization? N
	O&M Expenses Part of the Original Operating Plan? Y

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project will support the completion of work to address situations that have the potential to negatively impact CAIDI. The objective of the identified projects is the reduction of restoration times based on operational circumstances. This will include locations that are difficult to access, patrol, and/or repair resulting in extended outages.

Project Costs Summary

Note: Dollar values are in thousands

	2016	2017	2018	Totals
Capital Additions - Direct	$1,000	$0	$0	$1,000
Customer Contribution	$0	$0	$0	$0
Removals net of Salvage	$0	$0	$0	$0
Total - Direct Spending	$1,000	$0	$0	$1,000
Capital Additions - Indirect	$0.00	$0	$0	$0
Subtotal Request	$1,000	$0	$0	$1,000
AFUDC (half-year convention)	$11	$0	$0	$11
Total Request	$1,011	$0	$0	$1,011

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Summary Project Description

This project will support the completion of work to address situations that have the potential to negatively impact CAIDI. This will include locations that are difficult to access, patrol, and/or repair resulting in extended outages. Typical jobs include relocating narrow off-road shunts to the roadway.

Projects have been identified for the 377X7, 360X2, 14X126A, 313, 3615x2 and 32W3 circuits to relocate approximately 14,000 feet of three-phase primary conductor from off-road shunts to accessible, roadside locations. There are greater than 1,200 total customers that are at risk of being impacted by long duration outages associated with any repairs needed in the difficult to access off-road locations on these six circuits.

The 377X7 tap has a section that is off road near the beginning of the tap off of Ladd's Lane, Epping. Outages in this section are problematic because crews cannot access this portion of the circuit with standard equipment. This project would move off road shunt onto Rte 27. The length of new span would be 2000 feet and the project cost would be $315,000. There are 643 customers beyond these off-road sections. The total cost of this project is estimated to be $215,000

The 360X2 circuit has 1,250 feet of copper primary in a shunt off of Greer Road, Goffstown that feeds 33 customers, including the Goffstown Police Department and the State Prison for Woman. Outages in this section are problematic because crews cannot access this portion of the circuit with standard equipment. This project would move this off-road shunt onto Mast Road. The total cost of this project is estimated to be $100,000.

The 14X126A circuit has 2,000 feet of primary conductor in a shunt off of Karatzas Avenue, Manchester that feeds 11 customers. Outages in this section are problematic because crews cannot access this portion of the circuit with standard equipment. This project would move this off-road shunt onto Karatzas Avenue. The total cost of this project is estimated to be $25,000.

The 313 circuit has 17 sections of overhead primary conductor in a shunt which feeds Monadnock Paper. Outages in this section are problematic because crews cannot access this portion of the circuit with standard equipment. This project would install approximately 900' of new underground conductor to retire the move this off-road shunt. The total cost of this project is estimated to be $150,000.

The 3615x2 circuit has 7 sections of overhead primary conductor in a shunt off of Old Candia Road in Auburn. Recent outages have been difficult to find and repair and abbuters are not allowing adequate tree trimming. The total cost of this project is estimated to be $170,000.

The 32W3 circuits main line runs through a wetland shunt and it is problematic to access. This project would relocate portions of this circuit along the roadside (includes 4,260' of new main line construction), relocate the 32W3J1 from A Street to Franklin Street Ext for DA purposes. Recent outages have been difficult to find and repair and abbuters are not allowing adequate tree trimming. The total cost of this project is estimated to be $340,000.

Note: Dollar values are in thousands

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Accounting Policy Statement No. 2
Operations Project Authorization

	Total Project Costs	Amount in Operating Plan	Difference
Capital	$1,011	$1,011	$0
O&M	$0	$0	$0
Total	$1,011	$1,011	$0

Project Authorization

Approver	Approver Name	Approver Signature	Date
Project Initiator	Russel Johnson		
Project Manager	Marc Geaumont		
Manager	Eric Sutton		
Plant Accounting	Michele Roncaioli		
Director	Marc Geaumont		
Vice President	Joseph Purington		
President	William Quinlan		

Overall Justification

Typically cost per saved customer minute is used to evaluate proposed reliability projects. For some projects this measure does not justify the project based on the number of customers impacted or the frequency at which events occur, however, the difficulty to access and make repairs results in extended outages impacting customer satisfaction and CAIDI metrics.

Project Scope

This project will include relocating narrow off-road shunts to road-side as well as other projects which address events that negatively impact CAIDI.

Project Objectives

Eliminate situations that result in extended outages to customers that generally don't meet the cost per saved customer minute criteria.

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Business Process and / or Technical Improvements:

Improve CAIDI, customer satisfaction. Moving span to roadside would allow line crews access without having to call in off-road crews.

Assumptions

Assumes licenses for poles are granted.

Alternatives Considered

Significant ETT needed.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Various projects designed and completed throughout the year.	12/31/16

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	**2016**	**2017**	**2018**	**Totals**
Straight Time Labor	$0	$0	$0	$0
Overtime	$0	$0	$0	$0
Outside Services	$0	$0	$0	$0
Materials	$0	$0	$0	$0
Other, including contingency amounts (describe)	$1,000	$0	$0	$1,000
Total	$1,000	$0	$0	$1,000
Indirect Capital Costs	**2016**	**2017**	**2018**	**Totals**
Benefits/Loaders	$0	$0	$0	$0
Capitalized interest or AFUDC, if any	$11	$0	$0	$11
Total	$11	$0	$0	$11
Total Capital Costs	$1,011	$0	$0	$1,011
Total O&M Costs	$0	$0	$0	$0

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Total Project Costs	$1,011	$0	$0	$1,011

Regulatory Approvals

N/A

Risks and Risk Mitigation Plans

None

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Date Prepared: 2/8/18	**Project Title: CAIDI Improvement Projects**
Company/Companies: Eversource NH	**Project ID Number: A16X04**
Organization: NH Operations	**Plant Class/(F.P.Type): Distribution Line**
Project Initiator: Russel Johnson	**Project Type: Specific**
Project Manager: Marc Geaumont	**Capital Investment Part of Original Operating Plan? Yes**
Project Sponsor: Joseph Purington	**O&M Expenses Part of the Original Operating Plan? Yes**
Current Authorized Amount: $ 1,011,363	**Estimated in service date(s): 1/8/18**
Supplement Request: $948,000	**Other:**
Total Request: $ 1,959,363	

Supplement Justification

Justification for Additional Resources

This project was initially authorized in 2016 to complete the work shown on the attached Project Authorization Form. All work was completed in 2016 and 2017, with the exception of the 32W3 which was cancelled. Total expended on the completed projects was $596,000.

In an effort to address poor reliability results for the company in 2016, two additional CAIDI Improvement Project jobs, on the 336X circuit in Chocorua and the 3133X circuit in Derry, were proposed by NH Field Operations and completed in 2017. Both jobs were completed under this project but a supplemental request was not submitted at that time. In total, $1,959,363 was spent under this project so this request is for an additional $948,000 in funding. No additional work is planned under this project.

The 336X work was to rebuild 65 sections of bare conductor single phase line in ROW in Chatham NH with new pole plant and 1/0 ACSR tree wire. Work was completed in March, 2017 for a total of $623,000.

The 3133X work was to replace approximately one mile of 336 MCM open wire three phase line along North Lowell Rd. in Windham, NH with 477 MCM spacer cable. This area has a history of tree and limb-related outages even after completing Enhanced Tree Trimming. Work was completed December 29, 2017 for a total of $701,000. Some charges on this job rolled over into 2018 so this request includes funds in 2018.

Descriptions of all other work can be found in the attached Project Authorization Form.

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 1,000	$ 400	$ 1,400
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	-	-
Total Direct Spending	$ 1,000	$ 400	$ 1,400
Capital Additions - Indirect	-	539	-
AFUDC	11	-	11
Total Capital Request	$ 1,011	$ 939	$ 1,950
O&M	-	9	9
Total Request	**$ 1,011**	**$ 948**	**$ 1,959**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2017	Year 2018	Year 20__+	Total
Capital Additions - Direct	$ 325	$ 75	$ -	$ 400
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	-	-	-	-
Total Direct Spending	$ 325	$ 75	$ -	$ 400
Capital Additions - Indirect	439	100	-	539
AFUDC	-	-	-	-
Total Capital Request	$ 939	$ 175	$ -	$ 939
O&M	9	-	-	9
Total Request	**$ 948**	**$ 175**	**$ -**	**$ 948**

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APS 1 - Project Authorization Policy

Supplement Request Form

Original Project Authorization Form attached:

Project Authorization Form

General Information

Date Prepared: 03/16/2016	Project Title: CAIDI Improvement
Company: Eversource NH	Project ID Number: A16X04
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Russel Johnson	Project Category: Reliability
Project Owner/Manager: Marc Geaumont	Project Type: Specific
Project Sponsor: Joseph Purington	Project Purpose: part of regulatory tracked program? N
Estimated in service date: 12/31/2016	Capital Investment Part of Original Operating Plan? Y
If Transmission Project: N/A	Supplement to Existing Authorization? N
	O&M Expenses Part of the Original Operating Plan? Y

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project will support the completion of work to address situations that have the potential to negatively impact CAIDI. The objective of the identified projects is the reduction of restoration times based on operational circumstances. This will include locations that are difficult to access, patrol, and/or repair resulting in extended outages.

Project Costs Summary

Note: Dollar values are in thousands

	2016	2017	2018	Totals
Capital Additions - Direct	$1,000	$0	$0	$1,000
Customer Contribution	$0	$0	$0	$0
Removals net of Salvage	$0	$0	$0	$0
Total - Direct Spending	$1,000	$0	$0	$1,000
Capital Additions - Indirect	$0.00	$0	$0	$0
Subtotal Request	$1,000	$0	$0	$1,000
AFUDC (half-year convention)	$11	$0	$0	$11

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APS 1 - Project Authorization Policy

Supplement Request Form

Total Request	$1,011	$0	$0	$1,011

Summary Project Description

This project will support the completion of work to address situations that have the potential to negatively impact CAIDI. This will include locations that are difficult to access, patrol, and/or repair resulting in extended outages. Typical jobs include relocating narrow off-road shunts to the roadway.

Projects have been identified for the 377X7, 360X2, 14X126A, 313, 3615x2 and 32W3 circuits to relocate approximately 14,000 feet of three-phase primary conductor from off-road shunts to accessible, roadside locations. There are greater than 1,200 total customers that are at risk of being impacted by long duration outages associated with any repairs needed in the difficult to access off-road locations on these six circuits.

The 377X7 tap has a section that is off road near the beginning of the tap off of Ladd's Lane, Epping. Outages in this section are problematic because crews cannot access this portion of the circuit with standard equipment. This project would move off road shunt onto Rte 27. The length of new span would be 2000 feet and the project cost would be $315,000. There are 643 customers beyond these off-road sections. The total cost of this project is estimated to be $215,000

The 360X2 circuit has 1,250 feet of copper primary in a shunt off of Greer Road, Goffstown that feeds 33 customers, including the Goffstown Police Department and the State Prison for Woman. Outages in this section are problematic because crews cannot access this portion of the circuit with standard equipment. This project would move this off-road shunt onto Mast Road. The total cost of this project is estimated to be $100,000.

The 14X126A circuit has 2,000 feet of primary conductor in a shunt off of Karatzas Avenue, Manchester that feeds 11 customers. Outages in this section are problematic because crews cannot access this portion of the circuit with standard equipment. This project would move this off-road shunt onto Karatzas Avenue. The total cost of this project is estimated to be $25,000.

The 313 circuit has 17 sections of overhead primary conductor in a shunt which feeds Monadnock Paper. Outages in this section are problematic because crews cannot access this portion of the circuit with standard equipment. This project would install approximately 900' of new underground conductor to retire the move this off-road shunt. The total cost of this project is estimated to be $150,000.

The 3615x2 circuit has 7 sections of overhead primary conductor in a shunt off of Old Candia Road in Auburn. Recent outages have been difficult to find and repair and abbuters are not allowing adequate tree trimming. The total cost of this project is estimated to be $170,000.

The 32W3 circuits main line runs through a wetland shunt and it is problematic to access. This project would relocate portions of this circuit along the roadside (includes 4,260' of new main line construction), relocate the 32W3J1 from A Street to Franklin Street Ext for DA purposes. Recent outages have been difficult to find and repair and abbuters are not allowing adequate tree trimming. The total cost of this project is estimated to be $340,000.

Note: Dollar values are in thousands

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APS 1 - Project Authorization Policy

Supplement Request Form

	Total Project Costs	Amount in Operating Plan	Difference
Capital	$1,011	$1,011	$0
O&M	$0	$0	$0
Total	$1,011	$1,011	$0

Project Authorization

Approver	Approver Name	Approver Signature	Date
Project Initiator	Russel Johnson		
Project Manager	Marc Geaumont		
Manager	Eric Sutton		
Plant Accounting	Michele Roncaioli		
Director	Marc Geaumont		
Vice President	Joseph Purington		
President	William Quinlan		

Overall Justification

Typically cost per saved customer minute is used to evaluate proposed reliability projects. For some projects this measure does not justify the project based on the number of customers impacted or the frequency at which events occur, however, the difficulty to access and make repairs results in extended outages impacting customer satisfaction and CAIDI metrics.

Project Scope

This project will include relocating narrow off-road shunts to road-side as well as other projects which address events that negatively impact CAIDI.

Project Objectives

Eliminate situations that result in extended outages to customers that generally don't meet the cost per saved customer minute criteria.

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APS 1 - Project Authorization Policy

Supplement Request Form

Business Process and / or Technical Improvements:

Improve CAIDI, customer satisfaction. Moving span to roadside would allow line crews access without having to call in off-road crews.

Assumptions

Assumes licenses for poles are granted.

Alternatives Considered

Significant ETT needed.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Various projects designed and completed throughout the year.	12/31/16

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	2016	2017	2018	Totals
Straight Time Labor	$0	$0	$0	$0
Overtime	$0	$0	$0	$0
Outside Services	$0	$0	$0	$0
Materials	$0	$0	$0	$0
Other, including contingency amounts (describe)	$1,000	$0	$0	$1,000
Total	$1,000	$0	$0	$1,000
Indirect Capital Costs	**2016**	**2017**	**2018**	**Totals**
Benefits/Loaders	$0	$0	$0	$0
Capitalized interest or AFUDC, if any	$11	$0	$0	$11
Total	$11	$0	$0	$11
Total Capital Costs	$1,011	$0	$0	$1,011
Total O&M Costs	$0	$0	$0	$0
Total Project Costs	$1,011	$0	$0	$1,011

Regulatory Approvals

N/A

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APS 1 - Project Authorization Policy

Supplement Request Form

Risks and Risk Mitigation Plans

None

EVERSOURCE
Project Authorization Form

Supplement Request Form

Date Prepared: April 04, 2018	**Project Title: Line 328 Reconstruction**
Company/ies: Eversource, NH	**Project ID Number: A17C26**
Organization: Distribution	**Class(es) of Plant: Distribution**
Project Initiator: Russel Johnson	**Project Category: Substation / Distribution Lines**
Project Manager: Natacha Morales	**Project Type: Specific**
Project Sponsor: Jim Eilenberger	**Project Purpose: Update required to meet expected line loads**
Estimated in service date: December 31, 2019	**If Transmission Project: PTF? Non-PTF**
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan? No**
Total Request: $4,264,778	

Supplement Justification

Justification for Additional Resources

This request is for full funding for this project. Previously approved amount was for detailed engineering only. The original TAF, approved in May of 2017, is attached below.

This project is requesting full funding of $4,264,778 to reconstruct 3.65 miles of the existing 328 Line (34.5 kV) in ROW between Rimmon S/S and the J9428 Recloser. The work performed will consist of final engineering, permitting, survey, clearing, materials purchasing and construction required to remove 3.65 miles of bare 266 ACSR conductor and reconstruct the line with 477 Spacer Cable. This also includes installation of fiber cable from Rimmon SS to the J9428 Recloser. The fiber optic cable will primarily be ADSS cable except where OPGW is needed due to span lengths. The fiber is being installed at the request of Telecom Engineering. Another, separate, project will be requested to bring the fiber into Greggs SS on the J114 or O161 Lines. Preliminary engineering for this project was completed in 2017 NH Distribution Planning determined this project is needed to allow the retirement of the Greggs S/S transformer and oil circuit breaker without resulting in a negative impact to reliability. The Greggs S/S transformer condition is very poor and a transformer differential operation clears the 115kV bus until the high side switch is manually opened and the lockout relay is reset.

The project estimate is based on aggregated information from the 3271, 334/335, 61W2 and 3891 line projects which were all partial rebuild projects using spacer cable construction. It also has been updated to include structure counts based on the current engineering design.

A portion of the work was completed in 2017 under Work Order A17C2601 for $100,000. An additional $4,164,778 is needed to complete the work.

Engineering was the only activity performed in 2017. Final engineering, surveying, wetland and DHR review, materials procurement, construction services, wetlands oversight and final survey will be completed in 2018.

EVERSOURCE
Project Authorization Form

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	2018	2019	20__+	Totals
Capital Additions - Direct	$ 100	$ 1,094	$ 1,527	$ -	$ 2,721
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage 10%	-		-	-	-
Total - Direct Spending	$ 100	$ 1,094	$ 1,527	$ -	$ 2,721
Capital Additions - Indirect	-	600	901	-	1,501
Subtotal Request	$ 100	$ 1,694	$ 2,428	$ -	$ 4,222
AFUDC	-	15	27	-	42
Total Capital Request	$ 100	$ 1,709	$ 2,455	$ -	$ 4,264
O&M	-	-	-	-	-
Total Request	$ 100	$ 1,709	$ 2,455	$ -	$ 4,264

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2018	Year 2019	Year 20__+	Total
Capital Additions - Direct	$ 1,094	$ 1,527	$ -	$ 2,621
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	-	-	-	-
Total Direct Spending	$ 1,094	$ 1,527	$ -	$ 2,621
Capital Additions - Indirect	600	901.00	-	1,501
AFUDC	15	25.00	-	40
Total Capital Request	$ 1,709	$ 2,455	$ -	$ 4,164
O&M	-	-	-	-
Total Request	**$ 1,709**	**$ 2,455**	**$ -**	**$ 4,164**

EVERSOURCE
Project Authorization Form

Technical Authorization Form

Date Prepared: May, 2017	Project Title: 328 Line Reconductor
Company/ies: Eversource, NH	Project ID Number: A17C26
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Robert Mission	Project Category: Substation / Distribution Lines
Project Owner/Manager: Russel Johnson	Project Type: *Specific*
Project Sponsor: Jim Eilenberger	Project Purpose: part of regulatory tracked program? No
Estimated in service date: June 30, 2019	If Transmission Project: *NA*
Authorization Type: *Detailed Engineering*	Authorization Amount: $100,000 for Engineering

Project Need Statement *(Description of Issue)*
This requested authorization is for engineering design and permitting to reconductor 3.65 miles of 266 ACSR with 477 Al Spacer Cable on the 328 Line. The line reconductoring is needed to allow the retirement of the Greggs S/S transformer and oil circuit breaker without resulting in a negative impact to reliability. The Greggs S/S transformer condition is very poor and a transformer differential operation clears the 115kV bus until the high side switch is manually opened and the lockout relay is reset.

Project description
- The electric system in the Goffstown / Weare area is served from three 115-34.5 kV substations
  - Weare substation – 1-44.5 MVA transformer, 9 years old, loaded to 34% nameplate, located in the western part of the area.
  - Greggs substation – 20 MVA transformer, 67 years old, loaded to 63% nameplate, located in the center of the area. This transformer is planned to be retired.
  - Rimmon substation – 2-44.8 MVA transformers, 2 years old, loaded 57% nameplate.
- The area is served by 2 circuits fed from Weare substation, 2 circuits fed from Greggs substation (only one breaker) and 1 circuit fed from Rimmon substation.
- The load carrying capability of the 328 line from Rimmon to J9428 is limited to 20 MW by 3.65 miles of 266 ACSR conductor

(see figure 1 in the one-line attachment section of this TAF for a one-line of the existing system)

Project Objectives
With the planned retirement of the Greggs transformer and associated substation equipment, the 328 circuit from Rimmon will be upgraded in order to be able to supply the area during a contingent loss of the Weare transformer or the 3271 Line from Weare S/S. (see figure 2 in the one-line attachment section of this TAF for a one-line of the proposed system)

Project Scope
- Reconductor 3.65 miles of the 328 line. Replace the existing 266 ACSR conductor with 477 AL Spacer Cable.
- Configure the distribution system to be fed from Weare and Rimmon substations.
- Retire the Greggs transformer and associated substation equipment.

Background / Justification

- The Greggs transformer was built in 1950. The unit has main tank and bushing oil leaks on which repairs have been attempted many times including gasket replacement, welding, and The Colt Group's patented injection method. There are also leaks in the LTC control cabinet and the oil temperature gauge no longer functions. In addition there is an oil leak on the transformer breaker and concrete foundations are deteriorated. The equipment is beyond its useful life and is planned to be retired.
- Greggs S/S has been on the ESCC top 10 list for many years. The transformer protection scheme clears the 115kV bus until the high side switch is opened and the lockout relay reset. No measures have been taken to address this condition since the substation is to be retired.
- The 328 line is built with 266 ACSR conductor. During a contingency, this line limits the ability to restore load. With the Greggs distribution S/S retired, there would be 13.6 MW isolated with the 328 line loaded to 116% of its normal rating and 100% of its LTE rating. This line will be replaced with 477 AL spacer cable. The original steel towers (circa 1930) were mostly replaced in the 1990's.

Business Process and / or Technical Improvements:

This project improves the reliability of the distribution system in the Goffstown/Weare area. Lack of line capability to serve the load during a contingent loss of the Weare transformer or the 3271 line will be eliminated.

Cost Estimate and Assumptions

Reconductor 328 line	$2,500,000
Retire Greggs substation	$100,000

Alternatives Considered with Cost Estimates

1)	Replace Greggs transformer and associated equipment	$10,100,000
2)	Add second transformer at Weare substation	$7,100,000

For discussion of the options and the decision matrix, refer to the Greggs Area Distribution System Study – May 2017 (see reference section of this TAF for the location of this report) The study finds that the best ultimate solution is to rebuild Greggs with a larger transformer and proper high and low side protection, however, the 328 line reconductoring is recommended at this time.

Project Schedule

Describe the project schedule and milestones. Include estimated start and end dates.

Milestone/Phase Name	Estimated Completion Date
Project Approval	06/01/17
Engineering	09/01/17
Rebuild the 328 line	06/30/19
In-Service date	06/30/19

Regulatory Approvals

Permitting as required for the reconstruction of the 328 line

Risks and Risk Mitigation Plans

Transformer failure at Weare during construction may require the use of a mobile substation.

References

For a detailed description of this project, refer to the 'Greggs Area Distribution System Study – May 2017'. This study is located in: **N:\Temp60Day\NH Distribution\Greggs Area Distribution System Study**

EVERSOURCE
Project Authorization Form

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

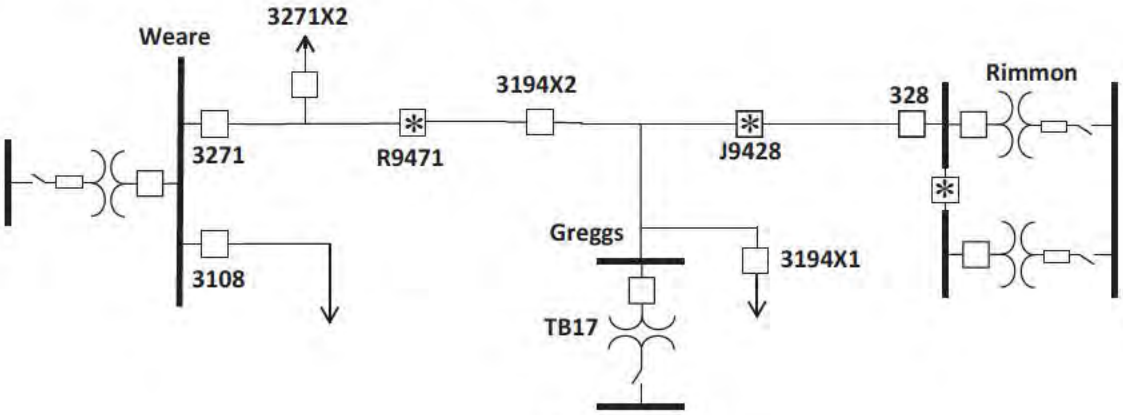

Figure 1
Existing System One-line

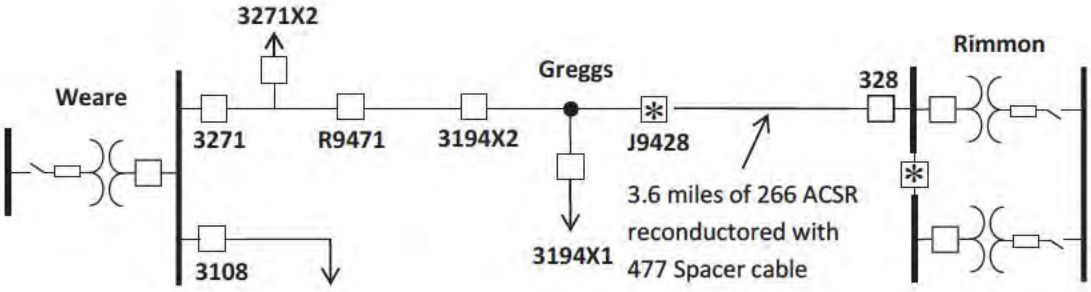

Figure 2
Proposed System One-line

EVERSOURCE
Project Authorization Form

Project Checklist – Transmission and Substation

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name : 328 Line Reconstruction					**PAF No:**
Facility Type: ☐ BPS	☐ BES	☐ PTF	☐ non-PTF	☐ CIP	☒ Distribution
PLANNING					
Is a NX-9 required?					Yes
Is an ISO-NE PAC presentation required?					No
Is a PPA required?					No
Is a TCA Application Required?					No
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?					No
OPERATIONS					
Outage Required?	☒ Primary Equipment (Power Transfer)		☐ Secondary Equipment (P&C only)		☐ Outage Not Required
Do SCLL Conditions Exist?					No
Has an outage schedule been approved?					No
Are Operations & Maintenance procedures/training required?					No
STANDARDS					
Does the project include standard equipment and designs?					Yes
SUBSTATION ENGINEERING					
Does this impact Revenue Metering					No
Is preliminary short circuit/ breaker duty analysis required?					No
Are there any changes to the baseline audible noise?					No
Is there an impact to the existing ground grid?					No
Is a Transient Over Voltage (TOV) analysis required?					No
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?					No
If BPS, is an NPCC Directory #4 presentation required?					No

EVERSOURCE
Project Authorization Form

Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : 328 Line Reconstruction	**PAF No:**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
Is there an impact to the existing ground grid?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
Siting & Construction Services (Outreach)	
What is the level of outreach expected?	Medium
INITIATOR	
Has a field constructability review been completed?	Yes

EVERSOURCE
Project Authorization Form

Cost Estimate Backup Details

See attached estimate P-18-268 Line 328 Reconstruct for direct costs only.

ESTIMATE SUMMARY
PSNH

Project Title: Line 328 Reconstruction — **Estimate By: MPD**
Project Mgr/Lead: Natacha Morales — **Date of Estimate: 05/14/18**
Project Number: A18S14 — **ISD: 12/01/18**
TAF # NA — **Estimate # P 18-268**

ESTIMATE SUMMARY

ESTIMATE TYPE: Conceptual

	TOTAL	Prior	2018	2019	2020	2021	2022 and FUTURE
CONSTRUCTION	$1,591,332	$0	$1,591,332	$0	$0	$0	$0
ENGINEERING/DESIGN	$143,545	$0	$143,545	$0	$0	$0	$0
LAND	$0	$0	$0	$0	$0	$0	$0
MATERIAL	$775,569	$0	$775,569	$0	$0	$0	$0
PROJECT MGR & SUPPORT	$86,047	$0	$86,047	$0	$0	$0	$0
REMOVAL	$124,500	$0	$124,500	$0	$0	$0	$0
TEST	$0	$0	$0	$0	$0	$0	$0
CONTINGENCY	$0	$0	$0	$0	$0	$0	$0
ESCALATION	$0	$0	$0	$0	$0	$0	$0
INDIRECTS	$1,501,018	$0	$1,501,018	$0	$0	$0	$0
AFUDC	$42,767	$0	$42,767	$0	$0	$0	$0
Total Cost	**$4,264,778**	**$0**	**$4,264,778**	**$0**	**$0**	**$0**	**$0**

	-25%	-	50%
Conceptual Range	**$3,198,584**	-	########

COMMENTS:

Project Scope:

Reconstruct 3.65 Miles of existing Distribution Line 328 in existing ROW.

Estimate includes all triming matting and permittting.
Estimate includes removal and replacement of the existing line poles and croossarms
Estimate includes survey work
Estimate assumes construction using 34.5 kV Hendrix standards.
Estimate includes fiber optic cable installation to Rimmon SS

Assumptions:
Engineering to be outsourced with in-house review, construction to be outsourced.
This estimate is based on actual prior costs, bid estimates and material costs from stock.
All new equipment will be installed within the confines of the existing fenced yard or ROW
No additional allowances have been added for aggressive outage recall times.
Estimate includes an average of 0% contingency on Construction direct costs which equates to 0% contingency of total cost.

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Date Prepared: August 9, 2019	**Project Title: Line 328 Reconstruction**
Company/Companies: Eversource, NH	**Project ID Number: A17C26**
Organization: Distribution	**Plant Class/(F.P. Type): Distribution**
Project Initiator: Russell Johnson	**Project Type: Specific**
Project Manager: Natacha Morales	**Capital Investment Part of Original Operating Plan? Yes**
Project Sponsor: James Eilenberger	**O&M Expenses Part of the Original Operating Plan? No**
Current Authorized Amount: $4,264K	**Estimated in service date(s): In service 7/31/2019**
Supplement Request: $473K	**Other:**
Total Request: $4,737K	

Supplement Justification

Background

The Full Funding PAF (see attached) for this project was approved in PowerPlan in October 9th, 2018 for $4,263,999.92. This supplemental request is for $473K which increases the total project cost to $4,737K. As of end of June 2019, the new line has been put in service. As of end of July, the decommissioning and restoration of the Right-of-Way (ROW) as well as abutter's properties are still ongoing. As of August 2019, the total spend is $4,224,209. The restoration of all properties will be complete by the end of September 2019.

The purpose of this project, as stated in the original PAF is to reconstruct 3.65 miles of the existing 328 line (34.5kV) in ROW between Rimmon Substation and the J9428 Recloser. This requires the removal of 3.65 miles of bare 266 ACSR conductor and reconstruction of the line with 477 Spacer Cable. This also includes installation of fiber optic cable from Rimmon Substation to J9428 Recloser. Since then, the original scope has changed and will be explained further in the Justification for Additional Resources section of this Supplement Request Form (SRF)

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Supplement Request Form

Justification for Additional Resources

Most of the increase is due to costs associated with engineering, project support vendors, and construction. There were increases associated with additional scope of work (tap, SCADA design), environmental monitoring and archeological services as well as unplanned lawn mitigations and stakeholders' requirements for temporary access agreements.

The following describes in detail the contributing factors for the $473K increase in total project cost.

1. **Construction & Removal: ($180K)**

The construction bid documentation included the additional scope of work which was competitively bid and awarded. The actual cost for the construction of this project was less than what was anticipated.

2. **Engineering and Survey: +$234K**

The cost increase in engineering is mainly due to additional scope of work for the project that was added after the original design proposal. The original scope of work for the engineering firm did not include the design of line taps and incorporation of automated switches design along the new line. The original scope of work stated that cutovers of taps and preparation of the line for automation would be completed by Eversource after the new line was completed. Due to outage coordination along the line this was not possible. There were several iterations of the design from both Eversource Operations and Engineering that required additional, unanticipated design revisions. The Bedford Area Work Center and Transmission's engineers had to work together to make sure that the design for taps and Scadamates would not affect or cause any disruption in the operations during construction and that the line could be worked with available equipment at the work centers after construction was complete. Finally, the originally engineering scope of work did not include designing the 328 line in STORMS work management system. Adding this to the scope of work added approximately $10k to the project cost. The total additional engineering cost was approximately $140K to the project. This includes internal engineering associated with additional design reviews, field meetings and construction support.

Another increase to the project was due to surveying and monumentation for engineering. The original scope of work included in the estimate included only construction layout using internal Eversource survey crews. Due to the complexity of the right-of way easements with various widths and locations an external survey firm was required to perform right-of-way research, stake the edges of the right of way, perform monumentation and complete the as-built survey. The survey firm also provided additional support for off right-of way access routes which were not included in the original scope. The additional survey scope added an additional cost of $94K.

3. Material: +$91K

To support the cutover of the line taps and prepare the line for distribution automation additional poles were purchased for the taps and all associated materials to relocate/install taps. These poles were not included in the original scope of work or estimated. Also, the spacer cable cost increased about 20% from the original estimate. The original project estimate was created approximately18 months prior to ordering the cable which was purchased under the new price value.

4. PM/Project Support: $144K

- Siting and construction services (outreach) $34K - Stakeholder negotiations were more extensive and time consuming than planned for. These negotiations included but were not limited to temporary access agreements and lawn mitigations.
- Landscaping and access gates (property mitigation) $59K - After consulting with several abutters for temporary access and lawn mitigations, the project team was required to fulfill agreements for gates, landscaping and stump grinding to mitigate the effects of the construction on different properties. This was not anticipated nor covered in original cost and scope of the project.
- Extra monitoring and archeological Phase 1B study (permitting and environmental) $51K– Archeological Phase 1A study determined that a Phase 1B study needed to be completed in a specific area of the 328 R.O.W. Also, the duration of construction was longer than the original proposal from the environmental vendor, adding more manhours to the project.

5. Property Taxes: $47K

These charges were not included in the previous estimate. The increase of $47K consists of actuals up to end of June.

6. Indirects: $99K

This increase is directly related to the increase of direct costs for construction, engineering vendor and materials.

7. AFUDC: $38K

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Supplement Request Form

Summary:

Discipline	Original Estimate $K	New Forecast/Actuals $K	Delta $K
Construction/Removal	$1,716	$1,536	($180)
Engineering	$143	$377	$234
Material	$776	$867	$91
PM/Project Support	$86	$230	$144
Property Taxes	$0	$47	$47
Subtotal Direct Costs	$2,721	$3,057	$336
Indirects	$1,501	$1,600	$99
AFUDC	$42	$80	$38
Total	**$4,264**	**$4,737**	**$473**

Supplement Cost Summary

Note: Dollar values are in thousands

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$2,720	$337	$3,057
Less Customer Contribution	-	-	-
Removals Net of Salvage ___%	-	-	-
Total Direct Spending	$2,720	$337	$3,057
Capital Additions - Indirect	$1,501	$99	$1,600
AFUDC	$43	$37	$80
Total Capital Request	$4,264	$473	$4,737
O&M	-	-	-
Total Request	$4,264	$473	$4,737

Total Supplement Request by year view:

Note: Dollar values are in thousands

	Year 2018	Year 2019	Total
Capital Additions Direct	$ -	$337	$337
Less Customer Contribution	$ -	$ -	$ -
Removals Net of Salvage ___%	$ -	$ -	$ -
Total Direct Spending	$ -	$337	$337
Capital Additions - Indirect	$ -	$99	$99
AFUDC	$ -	$37	$37
Subtotal Request	$ -	$473	$473
O&M	$ -	$ -	$ -
Total Request	$ -	$473	$473

Lessons Learned

- Project management and engineering – Cost increases are all linked to insufficient scope detail at the start of the project which impacts both scope and schedule. Minor design changes are inevitable as the project develops, but the more conceptual engineering that can be done prior to full funding approval, the fewer the cost increases or schedule overruns will occur. This also includes the Area Work Center and distribution engineering personnel.
- Materials – Cost of materials should be updated in the estimating tool frequently. This will yield better estimates as well as handling costs.

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Date Prepared: April 04, 2018	**Project Title: Line 328 Reconstruction**
Company/ies: Eversource, NH	**Project ID Number: A17C26**
Organization: Distribution	**Class(es) of Plant: Distribution**
Project Initiator: Russel Johnson	**Project Category: Substation / Distribution Lines**
Project Manager: Natacha Morales	**Project Type: Specific**
Project Sponsor: Jim Eilenberger	**Project Purpose: Update required to meet expected line loads**
Estimated in service date: December 31, 2019	**If Transmission Project: PTF? Non-PTF**
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan? No**
Total Request: $4,264,778	

Supplement Justification

Justification for Additional Resources

This request is for full funding for this project. Previously approved amount was for detailed engineering only. The original TAF, approved in May of 2017, is attached below.
This project is requesting full funding of $4,264,778 to reconstruct 3.65 miles of the existing 328 Line (34.5 kV) in ROW between Rimmon S/S and the J9428 Recloser. The work performed will consist of final engineering, permitting, survey, clearing, materials purchasing and construction required to remove 3.65 miles of bare 266 ACSR conductor and reconstruct the line with 477 Spacer Cable. This also includes installation of fiber cable from Rimmon SS to the J9428 Recloser. The fiber optic cable will primarily be ADSS cable except where OPGW is needed due to span lengths. The fiber is being installed at the request of Telecom Engineering. Another, separate, project will be requested to bring the fiber into Greggs SS on the J114 or O161 Lines. Preliminary engineering for this project was completed in 2017 NH Distribution Planning determined this project is needed to allow the retirement of the Greggs S/S transformer and oil circuit breaker without resulting in a negative impact to reliability. The Greggs S/S transformer condition is very poor and a transformer differential operation clears the 115kV bus until the high side switch is manually opened and the lockout relay is reset.

The project estimate is based on aggregated information from the 3271, 334/335, 61W2 and 3891 line projects which were all partial rebuild projects using spacer cable construction. It also has been updated to include structure counts based on the current engineering design.

A portion of the work was completed in 2017 under Work Order A17C2601 for $100,000. An additional $4,164,778 is needed to complete the work.

Engineering was the only activity performed in 2017. Final engineering, surveying, wetland and DHR review, materials procurement, construction services, wetlands oversight and final survey will be completed in 2018.

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	2018	2019	20__+	Totals
Capital Additions - Direct	$ 100	$ 1,094	$ 1,527	$ -	$ 2,721
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage 10%	-		-	-	-
Total - Direct Spending	$ 100	$ 1,094	$ 1,527	$ -	$ 2,721
Capital Additions - Indirect	-	600	901	-	1,501
Subtotal Request	$ 100	$ 1,694	$ 2,428	$ -	$ 4,222
AFUDC	-	15	27	-	42
Total Capital Request	$ 100	$ 1,709	$ 2,455	$ -	$ 4,264
O&M	-	-	-	-	-
Total Request	$ 100	$ 1,709	$ 2,455	$ -	$ 4,264

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2018	Year 2019	Year 20__+	Total
Capital Additions - Direct	$ 1,094	$ 1,527	$ -	$ 2,621
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	-	-	-	-
Total Direct Spending	$ 1,094	$ 1,527	$ -	$ 2,621
Capital Additions - Indirect	600	901.00	-	1,501
AFUDC	15	25.00	-	40
Total Capital Request	$ 1,709	$ 2,455	$ -	$ 4,164
O&M	-	-	-	-
Total Request	**$ 1,709**	**$ 2,455**	**$ -**	**$ 4,164**

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Supplement Request Form

Technical Authorization Form

Date Prepared: May, 2017	Project Title: 328 Line Reconductor
Company/ies: Eversource, NH	Project ID Number: A17C26
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Robert Mission	Project Category: Substation / Distribution Lines
Project Owner/Manager: Russel Johnson	Project Type: *Specific*
Project Sponsor: Jim Eilenberger	Project Purpose: part of regulatory tracked program? No
Estimated in service date: June 30, 2019	If Transmission Project: *NA*
Authorization Type: *Detailed Engineering*	Authorization Amount: $100,000 for Engineering

Project Need Statement *(Description of Issue)*

This requested authorization is for engineering design and permitting to reconductor 3.65 miles of 266 ACSR with 477 Al Spacer Cable on the 328 Line. The line reconductoring is needed to allow the retirement of the Greggs S/S transformer and oil circuit breaker without resulting in a negative impact to reliability. The Greggs S/S transformer condition is very poor and a transformer differential operation clears the 115kV bus until the high side switch is manually opened and the lockout relay is reset.

Project description

- The electric system in the Goffstown / Weare area is served from three 115-34.5 kV substations
  - Weare substation – 1-44.5 MVA transformer, 9 years old, loaded to 34% nameplate, located in the western part of the area.
  - Greggs substation – 20 MVA transformer, 67 years old, loaded to 63% nameplate, located in the center of the area. This transformer is planned to be retired.
  - Rimmon substation – 2-44.8 MVA transformers, 2 years old, loaded 57% nameplate.
- The area is served by 2 circuits fed from Weare substation, 2 circuits fed from Greggs substation (only one breaker) and 1 circuit fed from Rimmon substation.
- The load carrying capability of the 328 line from Rimmon to J9428 is limited to 20 MW by 3.65 miles of 266 ACSR conductor

(see figure 1 in the one-line attachment section of this TAF for a one-line of the existing system)

Project Objectives

With the planned retirement of the Greggs transformer and associated substation equipment, the 328 circuit from Rimmon will be upgraded in order to be able to supply the area during a contingent loss of the Weare transformer or the 3271 Line from Weare S/S. (see figure 2 in the one-line attachment section of this TAF for a one-line of the proposed system)

Project Scope

- Reconductor 3.65 miles of the 328 line. Replace the existing 266 ACSR conductor with 477 AL Spacer Cable.
- Configure the distribution system to be fed from Weare and Rimmon substations.
- Retire the Greggs transformer and associated substation equipment.

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Supplement Request Form

Background / Justification

- The Greggs transformer was built in 1950. The unit has main tank and bushing oil leaks on which repairs have been attempted many times including gasket replacement, welding, and The Colt Group's patented injection method. There are also leaks in the LTC control cabinet and the oil temperature gauge no longer functions. In addition there is an oil leak on the transformer breaker and concrete foundations are deteriorated. The equipment is beyond its useful life and is planned to be retired.
- Greggs S/S has been on the ESCC top 10 list for many years. The transformer protection scheme clears the 115kV bus until the high side switch is opened and the lockout relay reset. No measures have been taken to address this condition since the substation is to be retired.
- The 328 line is built with 266 ACSR conductor. During a contingency, this line limits the ability to restore load. With the Greggs distribution S/S retired, there would be 13.6 MW isolated with the 328 line loaded to 116% of its normal rating and 100% of its LTE rating. This line will be replaced with 477 AL spacer cable. The original steel towers (circa 1930) were mostly replaced in the 1990's.

Business Process and / or Technical Improvements:

This project improves the reliability of the distribution system in the Goffstown/Weare area. Lack of line capability to serve the load during a contingent loss of the Weare transformer or the 3271 line will be eliminated.

Cost Estimate and Assumptions

Reconductor 328 line	$2,500,000
Retire Greggs substation	$100,000

Alternatives Considered with Cost Estimates

1)	Replace Greggs transformer and associated equipment	$10,100,000
2)	Add second transformer at Weare substation	$7,100,000

For discussion of the options and the decision matrix, refer to the Greggs Area Distribution System Study – May 2017 (see reference section of this TAF for the location of this report) The study finds that the best ultimate solution is to rebuild Greggs with a larger transformer and proper high and low side protection, however, the 328 line reconductoring is recommended at this time.

Project Schedule

Describe the project schedule and milestones. Include estimated start and end dates.

Milestone/Phase Name	Estimated Completion Date
Project Approval	06/01/17
Engineering	09/01/17
Rebuild the 328 line	06/30/19
In-Service date	06/30/19

Regulatory Approvals

Permitting as required for the reconstruction of the 328 line

Risks and Risk Mitigation Plans

Transformer failure at Weare during construction may require the use of a mobile substation.

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Supplement Request Form

References

For a detailed description of this project, refer to the 'Greggs Area Distribution System Study – May 2017'.
This study is located in: **N:\Temp60Day\NH Distribution\Greggs Area Distribution System Study**

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

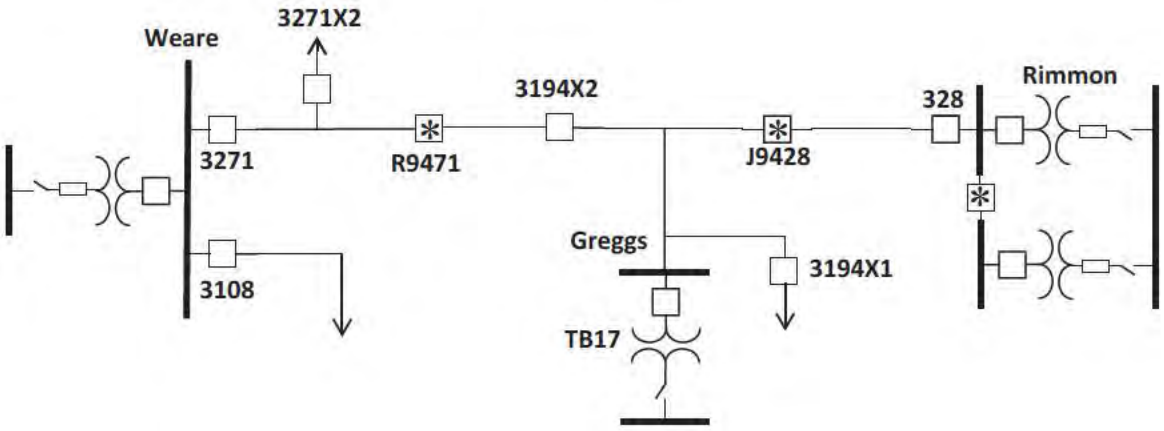

Figure 1
Existing System One-line

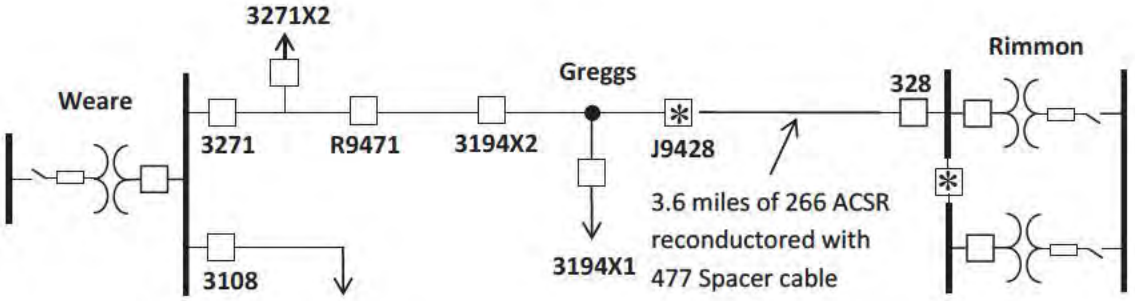

Figure 2
Proposed System One-line

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Supplement Request Form

Project Checklist – Transmission and Substation

Checklist for Studies and Processes of a Transmission & Substation Capital Project						
Project Name : 328 Line Reconstruction					PAF No:	
Facility Type: ☐ BPS	☐ BES	☐ PTF	☐ non-PTF	☐ CIP	☒ Distribution	
PLANNING						
Is a NX-9 required?					Yes	
Is an ISO-NE PAC presentation required?					No	
Is a PPA required?					No	
Is a TCA Application Required?					No	
PLANNING/PROTECTION & CONTROLS						
Are RAS/SPS/UVLs affected?					No	
OPERATIONS						
Outage Required?	☒ Primary Equipment (Power Transfer)		☐ Secondary Equipment (P&C only)		☐ Outage Not Required	
Do SCLL Conditions Exist?					No	
Has an outage schedule been approved?					No	
Are Operations & Maintenance procedures/training required?					No	
STANDARDS						
Does the project include standard equipment and designs?					Yes	
SUBSTATION ENGINEERING						
Does this impact Revenue Metering					No	
Is preliminary short circuit/ breaker duty analysis required?					No	
Are there any changes to the baseline audible noise?					No	
Is there an impact to the existing ground grid?					No	
Is a Transient Over Voltage (TOV) analysis required?					No	
P&C ENGINEERING						
OP-22 - Are PMUs and DDR required?					No	
If BPS, is an NPCC Directory #4 presentation required?					No	

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Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : 328 Line Reconstruction	**PAF No:**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
Is there an impact to the existing ground grid?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
Siting & Construction Services (Outreach)	
What is the level of outreach expected?	Medium
INITIATOR	
Has a field constructability review been completed?	Yes

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Supplement Request Form

Cost Estimate Backup Details

See attached estimate P-18-268 Line 328 Reconstruct for direct costs only.

ESTIMATE SUMMARY
PSNH

Project Title: Line 328 Reconstruction | **Estimate By: MPD**
Project Mgr/Lead: Natacha Morales | **Date of Estimate: 05/14/18**
Project Number: A18S14 | **ISD: 12/01/18**
TAF # NA | **Estimate # P 18-268**

ESTIMATE SUMMARY

ESTIMATE TYPE: Conceptual

	TOTAL	Prior	2018	2019	2020	2021	2022 and FUTURE
CONSTRUCTION	$1,591,332	$0	$1,591,332	$0	$0	$0	$0
ENGINEERING/DESIGN	$143,545	$0	$143,545	$0	$0	$0	$0
LAND	$0	$0	$0	$0	$0	$0	$0
MATERIAL	$775,569	$0	$775,569	$0	$0	$0	$0
PROJECT MGR & SUPPORT	$86,047	$0	$86,047	$0	$0	$0	$0
REMOVAL	$124,500	$0	$124,500	$0	$0	$0	$0
TEST	$0	$0	$0	$0	$0	$0	$0
CONTINGENCY	$0	$0	$0	$0	$0	$0	$0
ESCALATION	$0	$0	$0	$0	$0	$0	$0
INDIRECTS	$1,501,018	$0	$1,501,018	$0	$0	$0	$0
AFUDC	$42,767	$0	$42,767	$0	$0	$0	$0
Total Cost	**$4,264,778**	**$0**	**$4,264,778**	**$0**	**$0**	**$0**	**$0**
	-25%	50%					
Conceptual Range	**$3,198,584**	########					

COMMENTS:

Project Scope:

Reconstruct 3 65 Miles of existing Distribution Line 328 in existing ROW.

Estimate includes all triming matting and permittting.
Estimate includes removal and replacement of the existing line poles and croossarms
Estimate includes survey work
Estimate assumes construction using 34.5 kV Hendrix standards.
Estimate includes fiber optic cable installation to Rimmon SS

Assumptions:
Engineering to be outsourced with in-house review, construction to be outsourced.
This estimate is based on actual prior costs, bid estimates and material costs from stock.
All new equipment will be installed within the confines of the existing fenced yard or ROW
No additional allowances have been added for aggressive outage recall times.
Estimate includes an average of 0% contingency on Construction direct costs which equates to 0% contingency of total cost.

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Project Authorization Form

Operations Project Authorization Form

Date Prepared: 8/1/18	**Project Title:** : Rye Area 4kV Study
Company/ies: Eversource (NH)	**Project ID Number:** A17E01
Organization: Field Engineering	**Class(es) of Plant:** Distribution
Project Initiator: Michael J Busby	**Project Category:** Reliability- Distribution Lines
Project Manager: Michael J Busby	**Project Type:** Specific
Project Sponsor: James C. Eilenberger	**Project Purpose:** Support Load Growth, Improve Reliability
Estimated in service date: 12/1/19	**If Transmission Project: PTF?** N/A
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Construction	**O&M Expenses Part of the Original Operating Plan?** Yes
Total Request: $1,911,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project will convert all 4kV load fed from Foyes Corner #2 1950's vintage 4kV metal clad substations. It is the final project in a siuite of projects recommended by the Rye Area 4kV study. This multiyear project will eliminate two 1950's vintage 4 kV substations with metal clad switchgear and replaces them with a modern fully automated 12 kV substation. The new 12 kV circuits will significantly increase capacity, address all voltage and fuse coordination issues, and allow for distribution automation to be implemented. See attached TAF below for full details of the other projects completed in support of the Rye Area 4kV study.

Project Costs Summary

	Prior Authorized	2018	2019	20__+	Totals
Capital Additions - Direct	$ -	$ 726	$ 523	$ -	$ 1,249
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage ____%	-	44	32	-	76
Total - Direct Spending	$ -	$ 770	$ 555	$ -	$ 1,325
Capital Additions - Indirect	-	299	215	-	514
Subtotal Request	$ -	$ 1,069	$ 770	$ -	$ 1,839
AFUDC	-	10	10	-	20
Total Capital Request	$ -	$ 1,079	$ 780	$ -	$ 1,859
O&M	-	32	20	-	52
Total Request	$ -	$ 1,111	$ 800	$ -	1,911

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Project Authorization Form

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor				
Overtime Labor				
Outside Services	599	431		1030
Materials	171	123		295
Other, including contingency amounts (describe)				
Total	770	555		1324

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	299	215		514
Capitalized interest or AFUDC, if any	10	10		20
Total	309	225		534

Total Capital Costs	1079	780		1859
Less Total Customer Contribution				
Total Capital Project Costs	1079	780		1859
Total O&M Project Costs	32	20		52

Note: Explain unique payment provisions, if applicable

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.

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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? If yes, please provide details: **No**

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

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Project Authorization Form

Technical Authorization Form

Date Prepared: 9/27/16	Project Title: Rye Area 4kV Study
Company/ies: Eversource	Project ID Number:
Organization: Field Engineering	Class(es) of Plant:
Project Initiator: Mike Busby	Project Category:
Project Owner/Manager: Mike Busby	Project Type: *Annual / Specific / Prelim-Phase1*
Project Sponsor: Jim Eilenberger	Project Purpose: part of regulatory tracked program?
Estimated in service date: 12/1/18	If Transmission Project: *PTF / Non-PTF / NA*

Project Need Statement *(Description of Issue)*

The Rye area 4kV metal clad substations were built and installed in the late 1950s. Foyes #2 (1956) West Rye #70 (1956) and Rye # 5 (1957) are over 55 years old and have exceeded their normal life expectancy with replacement parts no longer available. Currently the 70H1 LTC transformer is gassing and needs to be repaired or retired. In addition, area load growth has exceeded the capacity of the 4kV system to efficiently serve. Load centers have shifted away from the existing substations making it difficult to maintain voltages within PUC limits. Pole mounted regulators and capacitors have been utilized in the attempt to resolve low voltage issue during peak periods. Protection and sensitivity criteria between protective devices must be sacrificed in order to serve customers at the tail end of the 4kV system. In numerous locations coordination between protective devices must be sacrificed and same sized fuses in series are required to supply larger loads located at the tail end of the circuits. The Rye area 4kV system has numerous tie points between circuits and substations but few can be utilized due to a lack of capacity and voltages issues.

Project Objectives

Engineering recommended a multiyear project to retire West Rye #70 and Foyes Corner #2 1950's vintage 4kV metal clad substations and installing a new 34.5 to 12kV substations at West Rye. It includes converting as much of the 4kV to 12kV as possible. Numerous 12 to 4kV stepdown transformers will be utilized where it is not practical or economically feasible to convert at this time. This project resolves 70H1 transformer gassing issues and substation transformer loading issues (> 85% of TFRAT rating) for both Rye #5 and West Rye #70 substations. The project also significantly increase capacity and resolve voltage and protection issue currently plaguing the 4kV system.

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Project Scope

2013 - Relieve 70H1& 5H1 TFRAT issues – Install 6-500KVA, 19.9 to 7.2kV transformers (Lang Rd.) and Convert approximately 3.2 miles from 4.16/2.4 to 12.47/7.2 kV – **Approved Project A13N01- $515,050 - Completed 2014.**

2016 - Convert the remainder of 70H1 (1.9 miles) and approximately 0.4 miles of 70H2 (Rte. 1) to 12 kV and temporarily transferred load to the Lang Rd stepdown transformers. The remainder of West Rye's 4kV load will be transferred to 6H2 – **Approved Project A16E01 – $1,261,100 - Completed 2016.**

2017 – Remove West Rye 4kV substation and install new 12kV substation with 10/12MVA transformer with two 12kV circuit positions **– Approved Project A16E06 - $1,303,800 – Completed 2017.**

2018 – Convert 2H2 (Sagamore & Wallis Rd- Rye) and Install approximately 2.5 Miles of 477 SPCA to create a 12kV tie between new West Rye SS and Foyes Corner SS –**Project A17E01 Needs Approval – $1,100,000**

2019 – Convert 2H1 (Pioneer Rd & Brackett Rd) and Install approximately 1.6 miles of 1/0 SPCA and install numerous 12 to 4kV stepdown transformers where it is not practical or economically feasible to convert. Remove and Retire Foyes Corner 4 kV transformer, 4 kV metal clad switchgear, getaway cables, and associated equipment – **Project A17E01 Needs Approval – $800,000**

Background / Justification

Area Load growth caused the Rye #5 substation transformer and the 70H1 transformer to reach 96% and 92% of TFRAT, respectively. During peak periods, both transformers have exceeded Eversource's threshold of 85% of TFRAT. In addition, the 5H1 current transformers (CT's) reached 128% of their nameplate rating. Most of the Rye load growth has occurred at the tail-end of long 4kV circuits (4-6 miles), resulting in low voltages. In an attempt to maintain acceptable voltage levels, pole top regulators, capacitors banks, and adding additional phases have been utilized. Another concern is the inability to utilize existing 4kV circuit ties due to lack of capacity and voltage issues. Most recently the 70H1 LTC has started gassing and will need major repairs or needs to be retired.

Business Process and / or Technical Improvements:

This multiyear project will eliminate two 1950's vintage 4 kV substations with metal clad switchgear and replaces them with a modern fully automated 12 kV substation. The new 12 kV circuits will significantly increase capacity, address all voltage and fuse coordination issues, and allow for distribution automation to be implemented.

Cost Estimate and Assumptions

Alternatives Considered with Cost Estimates

A second option to convert the 4 kV to 34.5 kV was explored. Option II also recommended retiring the two 1950's vintage 4kV metal clad substations (West Rye #70 and Foyes Corner #2) but recommends installing a new 34.5kV recloser (3105X3) at West Rye. Option II extends the 34.5kV system into the 4kV area by re-conductoring the existing open wire with 35kV Spacer Cable (SPCA) and converting as much of the 4kV to 34kV as possible. Similar to option I, numerous 34.5 to 4kV stepdown transformers will be utilized where it is not practical or economically feasible to convert to 34.5kV. Option II's estimated net present value (NPV) in 2013 dollars was approximately $700,000 more expensive then Option I. In addition, option II was not selected because Engineering would like to limit the expansion of 34.5 kV into heavily treed rural areas due to its inherent sensitivity to tree outages and historically 34.5 kV is more expensive to operate and maintain on a long term basis.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Install 6-500KVA, 19.9 to 7.2kV transformers (Lang Rd.) and Convert approximately 3.2 miles from 4.16/2.4 to 12.47/7.2 kV	Approved Project A13N01 Completed 2014.
Convert the remainder of 70H1 (1.9 miles) and approx. 0.4 miles of 70H2 (Rte. 1) to 12 kV and temporarily transferred load to the Lang Rd stepdown transformers. The remainder of West Rye's 4kV load will be transferred to 6H2 so West Rye substation can be de-energized and rebuilt at 12 kV	Approved Project A16E01 Completed 2016
Remove West Rye 4kV substation and install new 12kV substation with 10/12MVA transformer with two 12kV circuit positions –	Approved Project A16E06 Completed 2017
Convert 2H2 (Sagamore & Wallis Rd- Rye) and Install approximately 2.5 Miles of 477 SPCA to create a 12kV tie between new West Rye SS and Foyes Corner SS	Project A17E01 – $1,100,000 Start date 9/1/18 Planned completion date 12/1/18.
Convert 2H1 (Pioneer Rd & Brackett Rd) and Install approximately 1.6 miles of 1/0 SPCA and install numerous 12 to 4kV stepdown transformers where it is not practical or economically feasible to convert. Remove and Retire Foyes Corner 4 kV transformer, 4 kV metal clad switchgear, getaway cables, and associated 4 kV equipment.	Project A17E01 – $800,000 Start date 3/1/19 Planned Completion date 12/1/19

Regulatory Approvals - N/A

Risks and Risk Mitigation Plans

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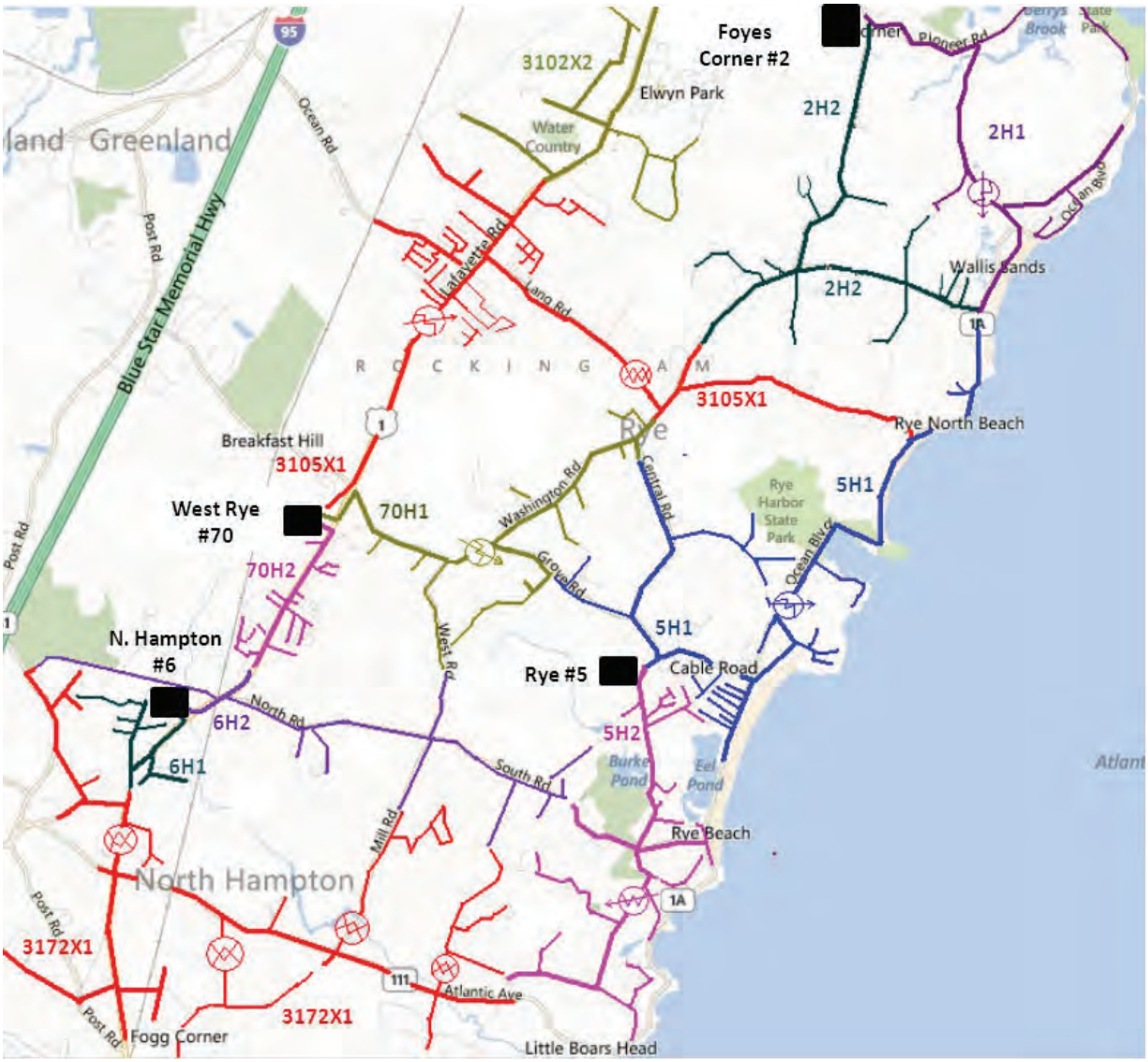
Project Authorization Form

References

Rye Area 4kV Distribution Study – March 1st 2013

One-Line Diagrams, Attachments, and Images

Rye Area 4 kV (before)



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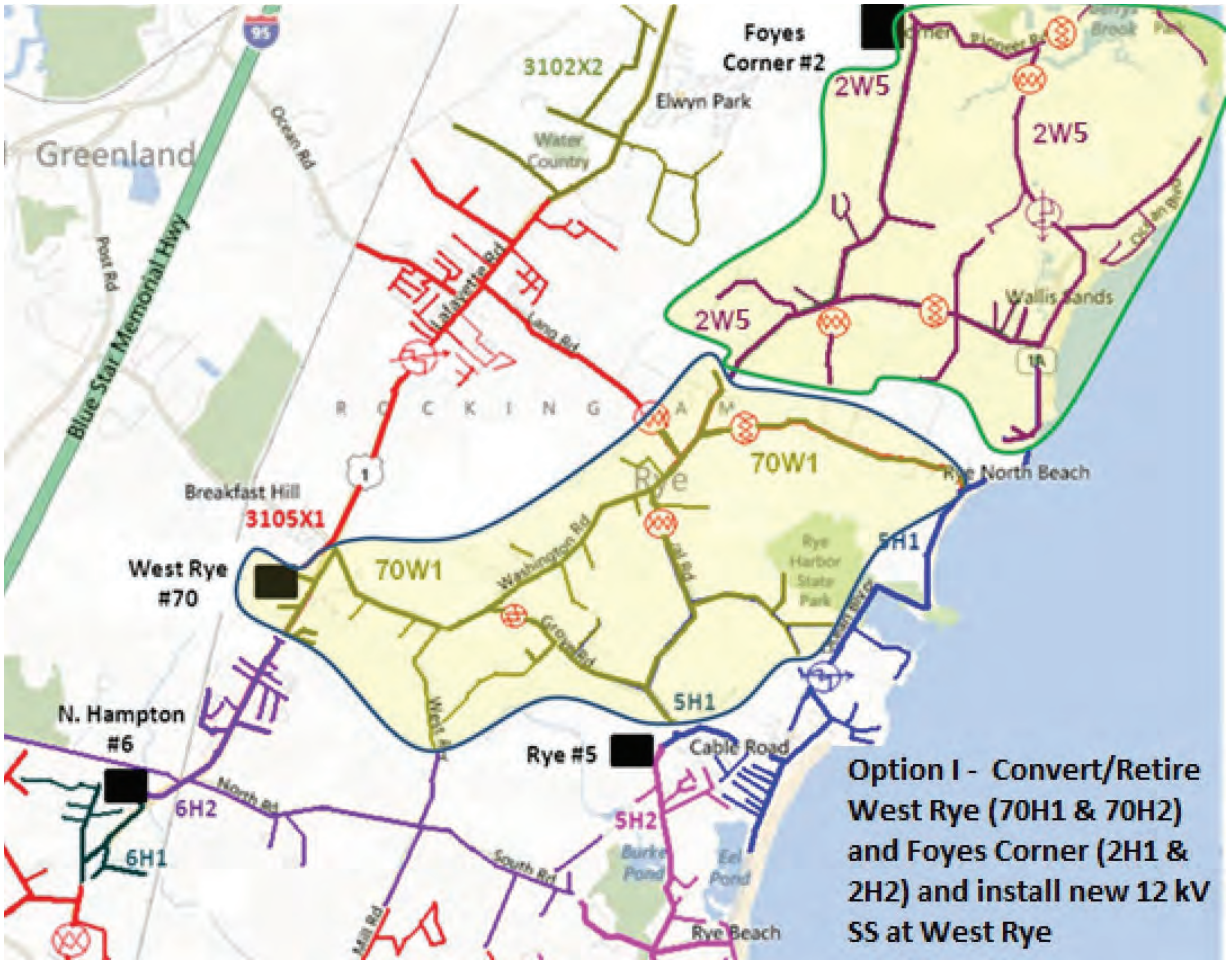
Rye Area 4 kV (After Option I is completed)



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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Date Prepared: 04/16/2020	**Project Title:** Rye Area 4kV Study
Company/Companies: Eversource NH	**Project ID Number:** A17E01
Organization: Operations	**Plant Class/(F.P.Type):** Distribution Line
Project Initiator: Michael Busby	**Project Type:** Specific
Project Manager: Thomas Davis	**Capital Investment Part of Original Operating Plan?** Yes
Project Sponsor: James C. Eilenberger	**O&M Expenses Part of the Original Operating Plan?** Yes
Current Authorized Amount: $1,859,000	**Estimated in service date(s):** 9/1/20
Supplement Request: $2,813,000	**Other:**
Total Request: $4,672,000	

Supplement Justification

Justification for Additional Resources

A request of $2,813,000 supplemental dollars is being requested to account for multiple project changes. A breakdown of total project charges are as follows:

Direct Costs
Bolded figures represent direct charges for the project from inception to completion.

Internal Labor **$108,485.** Approved funding for Internal Labor was $0. Break down of cost increases are as follows:

- Two work requests not part of the original PAF were written for Eversource crews to remove 2W5 open wire and to switch 2W4 and 2W5 to their final configuration outside Foyes Corner substation. $31,460
- A Construction Representative was assigned to the project and the local AWC provided supplemental project oversight = $77,025

Outside Service **$2,289,512.** Approved funding for outside services was $1,030,000.
Break down of cost increases are as follows:

- Change orders on the 2H1 totaling $159,358 (See Appendix)
- Change orders on the 2H2 totaling $356,766 (See Appendix)
- The original STORMS jobs assumed Consolidated Communications, as custodian, would replace approximately 100 poles and anchors which they failed to do. These poles were eventually set by Eversource's contractor at a unit price as solely owned poles. Many poles required ledge sets which are costlier than an excavation set: $163,320
- Tree trimming for these poles not set by Consolidated Communications: $339,806
- Conversion of 2H1 was not part of the contractor's bid due to various unknowns and was performed as T&M (work not completed): $28,436
- Police detail costs were not included in the original estimate. These were billed directly to the project and not applied through the spreader: $163,650
- Property Taxes: $44,110
- Lease of storage trailer to protect Eversource materials on site: $4,066

Materials **$378,780**. Approved funding for materials was $295,000. Break down of cost increases are as follows:

- Due to the changes in the scope work from project inception to completion, material costs were higher than authorized amount: $83,780

Remaining Direct Costs **$200,000.** Estimated direct capital remaining, including Internal Labor, Outside Services, Materials, & Other.

Indirect Costs = **$1,694,985** Approved funding for indirect costs was $534,000. Indirect costs increased with the increase in Direct costs. Supplemental request is for $1,160,000

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 1,249	$ 1,367	$ 2,616
Less Customer Contribution	-	-	
Removals net of Salvage ____%	76	286	362
Total Direct Spending	$ 1,325	$ 1,653	$ 2,978
Capital Additions - Indirect	514	1,110	1,624
AFUDC	20	50	70
Total Capital Request	$ 1,859	$ 2,813	$ 4,672
O&M			
Total Request	**$ 1,859**	**$ 2,813**	**$ 4,672**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2019	Year 2020	Year 20__+	Total
Capital Additions - Direct	$ 708	$ 659	$ -	$ 1,367
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	239	47	-	286
Total Direct Spending	$ 947	$ 706	$ -	$ 1,653
Capital Additions - Indirect	637	473	-	1,110
AFUDC	50	-	-	50
Total Capital Request	$ 1,634	$ 1,179	$ -	$ 2,813
O&M	-	-	-	-
Total Request	**$ 1,634**	**$ 1,179**	**$ -**	**$ 2,813**

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APS 1 - Project Authorization Policy

Supplement Request Form

Appendix to Supplemental Request

2H1 Change Orders

Change Order #	Amount	Out of Scope Work Notes
CO1	$2,949	Cover and make-ready for ledge pole set by others
CO2	$28,307	Multiple setup changes due to heavy tree growth which prevented temporary primary relocations until trees were removed
CO3	$24,768	Lost time due to close quarters on this job with tree crews on site
CO4	$4,718	Installation of cover for crane used for tree removals
CO5	$4,428	Circuit patrol in response to outage on 2H1
CO6	$11,794	Delays in rigging due to ledge pole sets being delayed
CO7	$13,564	Pole relocations/reframing due to landowner disputes with locations
CO8	$24,768	Delays due to labor shortage and support provided for other priority jobs
CO9	$4,423	Circuit patrols after major storm events
CO10	$14,743	Change in schedule from 4-10 hour days to 5-8 hours days
CO11	$5,897	Several safety stand downs due to events on the Eversource system
CO12	$19,000	Installation of Tripsavers, which was not part of original bid package
Total	$159,358	

2H2 Change Orders

Change Order #	Week Ending Date	Amount	Out of Scope Work Notes
CO1	11/15/2018	$140,736	Poles and anchors that were not set by telephone company, and labor dollars associated with the work.
CO2	06/19/2019	$54,052	Poles and anchors that were not set by the telephone company; material costs: additional triplex replacements; service replacements, concrete transformer pad installation; metal plate installation
CO3 & CO6 Combined	07/11/2019	$72,596	Underground services that needed to be dug up and spliced; loam and seeding; traffic control; phone company pole set replacements
CO4	07/11/2019	$5,466	Primary cables spliced out and re-terminated; 1-day outage
CO5	07/11/2019	$45,063	Pole structures changed from tangent to corner framing; tree trimming; traffic control
CO7	07/11/2019	$18,572	Out of scope work resulted from Control Center requesting circuit patrol before clearance on the line could be issued.
CO9	07/31/2019	$20,281	Three phase flat construction installation was needed due to trimming restrictions, and property owner permissions for anchor placement.
Total Direct Charges		$356,766	

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APS 1 - Project Authorization Policy

Supplement Request Form

Operations Project Authorization Form

Date Prepared: 8/1/18	**Project Title:** Rye Area 4kV Study
Company/ies: Eversource (NH)	**Project ID Number:** A17E01
Organization: Field Engineering	**Class(es) of Plant:** Distribution
Project Initiator: Michael J Busby	**Project Category:** Reliability- Distribution Lines
Project Manager: Michael J Busby	**Project Type:** Specific
Project Sponsor: James C. Eilenberger	**Project Purpose:** Support Load Growth, Improve Reliability
Estimated in service date: 12/1/19	**If Transmission Project: PTF?** N/A
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Construction	**O&M Expenses Part of the Original Operating Plan?** Yes
Total Request: $1,911,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project will convert all 4kV load fed from Foyes Corner #2 1950's vintage 4kV metal clad substations. It is the final project in a suite of projects recommended by the Rye Area 4kV study. This multiyear project will eliminate two 1950's vintage 4 kV substations with metal clad switchgear and replaces them with a modern fully automated 12 kV substation. The new 12 kV circuits will significantly increase capacity, address all voltage and fuse coordination issues, and allow for distribution automation to be implemented. See attached TAF below for full details of the other projects completed in support of the Rye Area 4kV study.

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APS 1 - Project Authorization Policy

Supplement Request Form

Project Costs Summary

	Prior Authorized	2018	2019	20__+	Totals
Capital Additions - Direct	$ -	$ 726	$ 523	$ -	$ 1,249
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage ____%	-	44	32	-	76
Total - Direct Spending	$ -	$ 770	$ 555	$ -	$ 1,325
Capital Additions - Indirect	-	299	215	-	514
Subtotal Request	$ -	$ 1,069	$ 770	$ -	$ 1,839
AFUDC	-	10	10	-	20
Total Capital Request	$ -	$ 1,079	$ 780	$ -	$ 1,859
O&M	-			-	-
Total Request	$ -	$ 1,079	$ 780	$ -	1,859

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor				
Overtime Labor				
Outside Services	599	431		1030
Materials	171	123		295
Other, including contingency amounts (describe)				
Total	770	555		1324

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	299	215		514
Capitalized interest or AFUDC, if any	10	10		20
Total	309	225		534

Total Capital Costs	1079	780		1859
Less Total Customer Contribution				
Total Capital Project Costs	1079	780		1859
Total O&M Project Costs	32	20		52

Note: Explain unique payment provisions, if applicable

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APS 1 - Project Authorization Policy

Supplement Request 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 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? If yes, please provide details: **No**

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

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APS 1 - Project Authorization Policy

Supplement Request Form

Technical Authorization Form

Date Prepared: 9/27/16	Project Title: Rye Area 4kV Study
Company/ies: Eversource	Project ID Number:
Organization: Field Engineering	Class(es) of Plant:
Project Initiator: Mike Busby	Project Category:
Project Owner/Manager: Mike Busby	Project Type: *Annual / Specific / Prelim-Phase1*
Project Sponsor: Jim Eilenberger	Project Purpose: part of regulatory tracked program
Estimated in service date: 12/1/18	If Transmission Project: *PTF / Non-PTF / NA*

Project Need Statement *(Description of Issue)*
The Rye area 4kV metal clad substations were built and installed in the late 1950s. Foyes #2 (1956) West Rye #70 (1956) and Rye # 5 (1957) are over 55 years old and have exceeded their normal life expectancy with replacement parts no longer available. Currently the 70H1 LTC transformer is gassing and needs to be repaired or retired. In addition, area load growth has exceeded the capacity of the 4kV system to efficiently serve. Load centers have shifted away from the existing substations making it difficult to maintain voltages within PUC limits. Pole mounted regulators and capacitors have been utilized in the attempt to resolve low voltage issue during peak periods. Protection and sensitivity criteria between protective devices must be sacrificed in order to serve customers at the tail end of the 4kV system. In numerous locations coordination between protective devices must be sacrificed and same sized fuses in series are required to supply larger loads located at the tail end of the circuits. The Rye area 4kV system has numerous tie points between circuits and substations but few can be utilized due to a lack of capacity and voltages issues.

Project Objectives
Engineering recommended a multiyear project to retire West Rye #70 and Foyes Corner #2 1950's vintage 4kV metal clad substations and installing a new 34.5 to 12kV substations at West Rye. It includes converting as much of the 4kV to 12kV as possible. Numerous 12 to 4kV stepdown transformers will be utilized where it is not practical or economically feasible to convert at this time. This project resolves 70H1 transformer gassing issues and substation transformer loading issues (> 85% of TFRAT rating) for both Rye #5 and West Rye #70 substations. The project also significantly increase capacity and resolve voltage and protection issue currently plaguing the 4kV system.

Project Scope
2013 - Relieve 70H1& 5H1 TFRAT issues – Install 6-500KVA, 19.9 to 7.2kV transformers (Lang Rd.) and Convert approximately 3.2 miles from 4.16/2.4 to 12.47/7.2 kV – **Approved Project A13N01- $515,050 - Completed 2014.**
2016 - Convert the remainder of 70H1 (1.9 miles) and approximately 0.4 miles of 70H2 (Rte. 1) to 12 kV and temporarily transferred load to the Lang Rd stepdown transformers. The remainder of West Rye's 4kV load will be transferred to 6H2 – **Approved Project A16E01 – $1,261,100 - Completed 2016.**

2017 – Remove West Rye 4kV substation and install new 12kV substation with 10/12MVA transformer with two 12kV circuit positions **– Approved Project A16E06 - $1,303,800 – Completed 2017.**

2018 – Convert 2H2 (Sagamore & Wallis Rd- Rye) and Install approximately 2.5 Miles of 477 SPCA to create a 12kV tie between new West Rye SS and Foyes Corner SS –**Project A17E01 Needs Approval – $1,100,000**

2019 – Convert 2H1 (Pioneer Rd & Brackett Rd) and Install approximately 1.6 miles of 1/0 SPCA and install numerous 12 to 4kV stepdown transformers where it is not practical or economically feasible to convert. Remove and Retire Foyes Corner 4 kV transformer, 4 kV metal clad switchgear, getaway cables, and associated equipment – **Project A17E01 Needs Approval – $800,000**

Background / Justification
Area Load growth caused the Rye #5 substation transformer and the 70H1 transformer to reach 96% and 92% of TFRAT, respectively. During peak periods, both transformers have exceeded Eversource's threshold of 85% of TFRAT. In addition, the 5H1 current transformers (CT's) reached 128% of their nameplate rating. Most of the Rye load growth has occurred at the tail-end of long 4kV circuits (4-6 miles), resulting in low voltages. In an attempt to maintain acceptable voltage levels, pole top regulators, capacitors banks, and adding additional phases have been utilized. Another concern is the inability to utilize existing 4kV circuit ties due to lack of capacity and voltage issues. Most recently the 70H1 LTC has started gassing and will need major repairs or needs to be retired.

Business Process and / or Technical Improvements:
This multiyear project will eliminate two 1950's vintage 4 kV substations with metal clad switchgear and replaces them with a modern fully automated 12 kV substation. The new 12 kV circuits will significantly increase capacity, address all voltage and fuse coordination issues, and allow for distribution automation to be implemented.

Cost Estimate and Assumptions

Alternatives Considered with Cost Estimates
A second option to convert the 4 kV to 34.5 kV was explored. Option II also recommended retiring the two 1950's vintage 4kV metal clad substations (West Rye #70 and Foyes Corner #2) but recommends installing a new 34.5kV recloser (3105X3) at West Rye. Option II extends the 34.5kV system into the 4kV area by re-conductoring the existing open wire with 35kV Spacer Cable (SPCA) and converting as much of the 4kV to 34kV as possible. Similar to option I, numerous 34.5 to 4kV stepdown transformers will be utilized where it is not practical or economically feasible to convert to 34.5kV. Option II's estimated net present value (NPV) in 2013 dollars was approximately $700,000 more expensive then Option I. In addition, option II

was not selected because Engineering would like to limit the expansion of 34.5 kV into heavily treed rural areas due to its inherent sensitivity to tree outages and historically 34.5 kV is more expensive to operate and maintain on a long term basis.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Install 6-500KVA, 19.9 to 7.2kV transformers (Lang Rd.) and Convert approximately 3.2 miles from 4.16/2.4 to 12.47/7.2 kV	Approved Project A13N01 Completed 2014.
Convert the remainder of 70H1 (1.9 miles) and approx. 0.4 miles of 70H2 (Rte. 1) to 12 kV and temporarily transferred load to the Lang Rd stepdown transformers. The remainder of West Rye's 4kV load will be transferred to 6H2 so West Rye substation can be de-energized and rebuilt at 12 kV	Approved Project A16E01 Completed 2016
Remove West Rye 4kV substation and install new 12kV substation with 10/12MVA transformer with two 12kV circuit positions –	Approved Project A16E06 Completed 2017
Convert 2H2 (Sagamore & Wallis Rd- Rye) and Install approximately 2.5 Miles of 477 SPCA to create a 12kV tie between new West Rye SS and Foyes Corner SS	Project A17E01 – $1,100,000 Start date 9/1/18 Planned completion date 12/1/18.
Convert 2H1 (Pioneer Rd & Brackett Rd) and Install approximately 1.6 miles of 1/0 SPCA and install numerous 12 to 4kV stepdown transformers where it is not practical or economically feasible to convert. Remove and Retire Foyes Corner 4 kV transformer, 4 kV metal clad switchgear, getaway cables, and associated 4 kV equipment.	Project A17E01 – $800,000 Start date 3/1/19 Planned Completion date 12/1/19

Regulatory Approvals - N/A
Risks and Risk Mitigation Plans
References
Rye Area 4kV Distribution Study – March 1st 2013
One-Line Diagrams, Attachments, and Images

Rye Area 4 kV (before)

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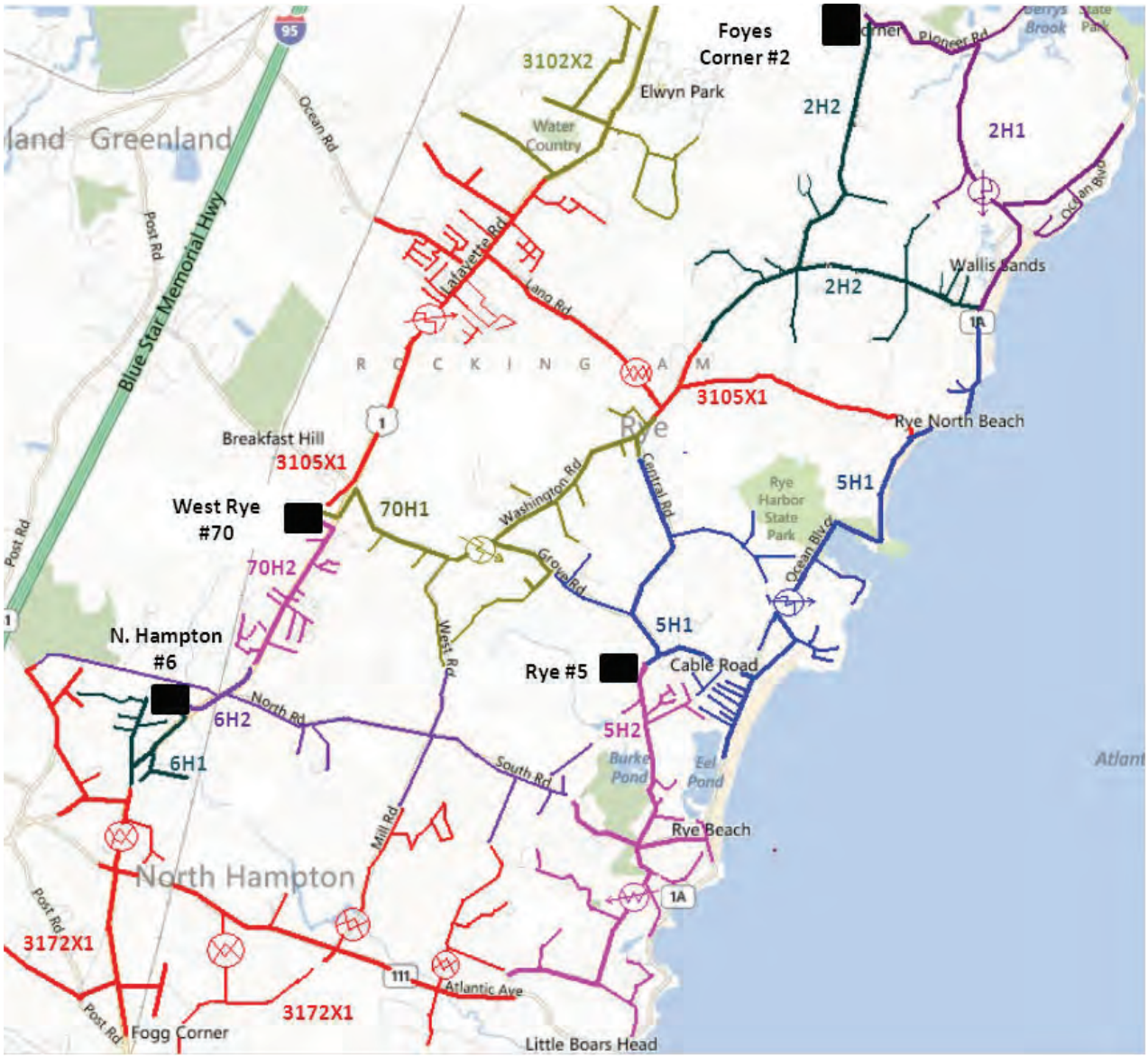
APS 1 - Project Authorization Policy

Supplement Request Form



Rye Area 4 kV (After Option I is completed)

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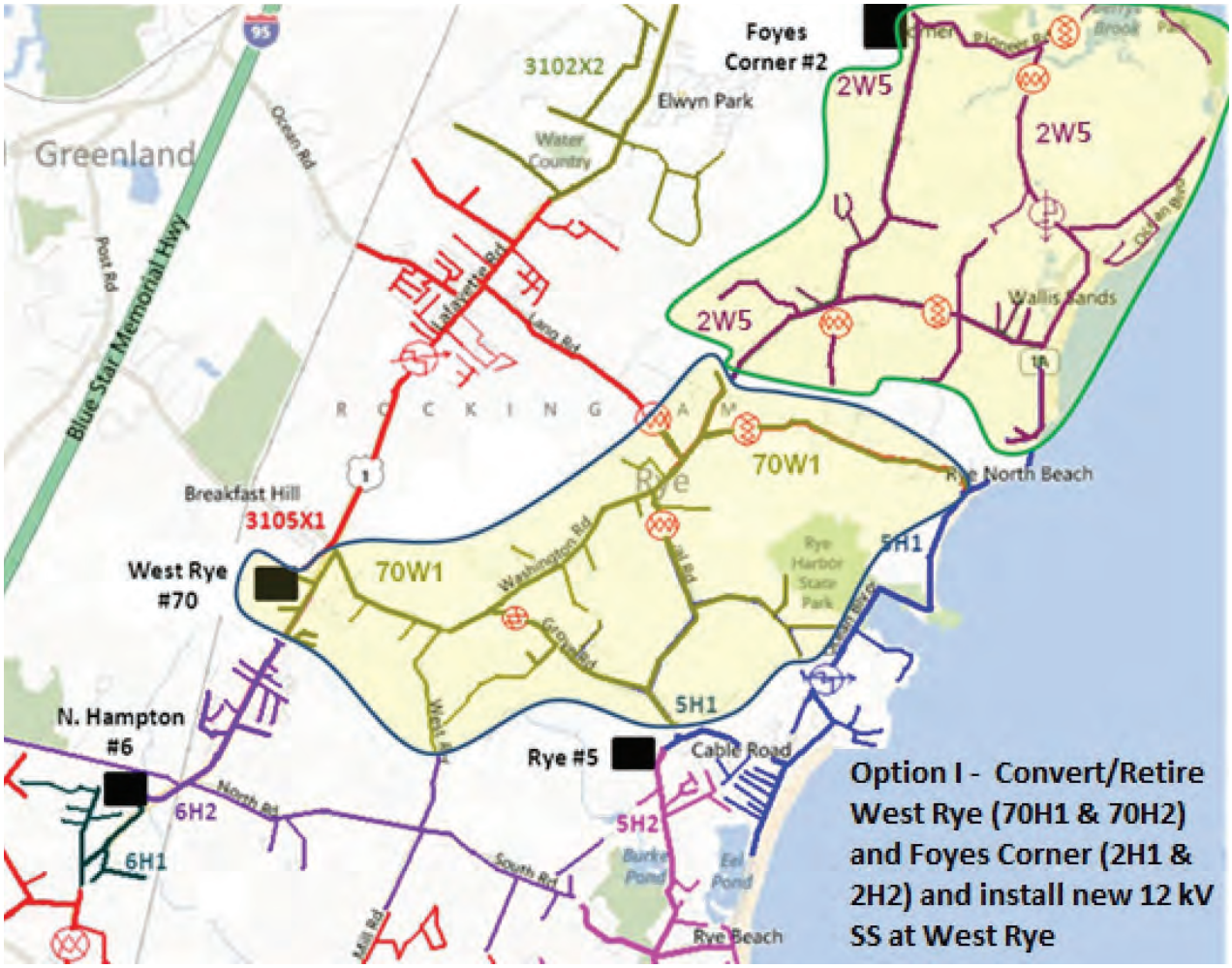
Supplement Request Form



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Project Authorization Form

Operations Project Authorization Form

Approved at August 1, 2018 EPAC

Link to Meeting Minutes

Date Prepared: August 1, 2018	**Project Title:** Messer St SS Replace Transformer TB70
Company/ies: Eversource NH	**Project ID Number:** A17N02
Organization: NH Operations	**Class(es) of Plant:** Distribution Substation
Project Initiator: Sam Bosse	**Project Category:** Reliability
Project Manager: Pat Pinault	**Project Type:** Specific
Project Sponsor: James Eilenberger	**Project Purpose:** Replace Aging Equipment
Estimated in service date: 5/31/2019	**If Transmission Project: PTF?** No
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan?** NA
Total Request: $5,329,200	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

The goal of this project is to implement the next phase in the Laconia area study by proactively removing obsolete 4 kV equipment and adding 12 kV capacity. Messer Street substation contains 4 kV equipment from the 1930s and the 49-year-old 12 kV transformer TB70.

The scope of this project is to remove the obsolete 4 kV transformer and install a high side breaker for the new 12 kV transformer in that location. Replace 12 kV unit transformer TB70 with a new 12.5 MVA unit. Remove obsolete 4 kV circuit breakers and install a new 12 kV transformer breaker and two 12 kV feeder breakers in those substation bays. Modify existing substation steel to create a 34.5 kV bus to feed the new 12 kV transformer high side breaker. Re-insulate and reconstruct the existing 4 kV bus to create a new 12 kV bus. All 4kV in this area of Laconia is being converted.

The project received a prior funding authorization of $870,000 approved by CPAC in NH on 3/9/17 and in Powerplan on 4/12/17. Engineering was started on this project in 2017. It is currently at 70% Engineering, major equipment (transformers, switches, breakers, battery system) is on order, and construction contractor(s) will be bid within the next couple months. This is a request for full funding of the project for $5,329,200.

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Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2017	2018	2019+	Totals
Capital Additions - Direct	$ 820	$ 222	$ 1,949	$ 1,903	$ 4,074
Less Customer Contribution	$ -				
Removals net of Salvage ____%	$ -				
Total - Direct Spending	$ 820	$ 222	$ 1,949	$ 1,903	$ 4,074
Capital Additions - Indirect	$ 48	$ 72	$ 792	$ 368	$ 1,232
Subtotal Request	$ 868	$ 294	$ 2,741	$ 2,271	$ 5,306
AFUDC	$ 2		$ 8	$ 15	$ 23
Total Capital Request	$ 870	$ 294	$ 2,749	$ 2,286	$ 5,329
O&M					
Total Request	**$ 870**	**$ 294**	**$ 2,749**	**$ 2,286**	**$ 5,329**

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 2017	Year 2018	Year 2019+	Total
Straight Time Labor	$ 22	$ 100	$ 100	$ 222
Overtime Labor				$ -
Outside Services	$ 199	$ 1,437	$ 512	$ 2,148
Materials		$ 367	$ 1,141	$ 1,508
Other, including contingency amounts (describe)	$ 1	$ 45	$ 150	$ 196
Total Direct Costs	**$ 222**	**$ 1,949**	**$ 1,903**	**$ 4,074**
Indirect Capital Costs	**Year 2017**	**Year 2018**	**Year 2019+**	**Total**
Indirects/Overheads (including benefits)	$ 72	$ 792	$ 368	$ 1,232
Capitalized interest or AFUDC, if any	$ -	$ 8	$ 15	$ 23
Total Indirect Costs	**$ 72**	**$ 800**	**$ 383**	**$ 1,255**
Total Capital Costs	**$ 296**	**$ 2,749**	**$ 2,286**	**$ 5,329**
Less Total Customer Contribution	**$ -**	**$ -**	**$ -**	**$ -**
Total Capital Project Costs	**$ 296**	**$ 2,749**	**$ 2,286**	**$ 5,329**
Total O&M Project Costs	**$ -**	**$ -**	**$ -**	**$ -**

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Note: Explain unique payment provisions, if applicable

Other/Contingency includes:

1. Extended construction schedules for unknown factors with this brownfield site. This site was built in the 1930s and may have below grade unknowns e.g. foundation degradation, direct buried cabling, etc. - $100,000
2. Test and commissioning more extensive than anticipated. - $47,000
3. $3,000 previously spent for vehicles which is part of the Indirects category.

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.

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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: Yes.

This project is located at a former MPG site and handling of the subsurface materials during construction will need to be monitored. Formal cleanup of the site is complete. Disposal of soils has been budgeted.

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Technical Justification:

Project Need Statement

The goal of this project is to implement the next phase in the Laconia area study by proactively removing obsolete 4 kV equipment and adding 12 kV capacity. Messer Street substation contains 4 kV equipment from the 1930s and the 49-year-old 12 kV transformer TB70.

A Laconia area study was completed by the planning and field engineering teams, and recommended the following projects to address load, reliability, and aging infrastructure. Complete Study is attached.

1. Replace Messer St. TB68 with a larger unit (Unit coincidently failed 7/11/14, and expedited the replacement with 12.5MVA unit going in-service 5/21/15)
2. Replace Messer St. TB70 with 12.5MVA unit (This PAF)
3. Convert 4kV circuits out of Messer Street and retire 4kV substation equipment (Completed in 2017, ahead of TB70 replacement to facilitate creating room in substation for new equipment)
4. Construct Weirs S/S with 2 12kV circuit (Land purchased in 2017, budgeted to be in-service 2021)
5. Upgrade Lochmere S/S transformers with larger units
6. Upgrade Opechee S/S transformers with larger units
7. Reconductor portions of circuits to allow for contingent loading with the new capacity at the substations.

As part of the Laconia Area Study, it was identified and approved to convert the 4kV circuits in Laconia to 12kV. This was necessary to facilitate the removal of all 4kV equipment in Messer St., creating the needed space for a new 12kV transformer and breakers. The conversion consisted of the 38H1, 38H2, 38H3, 38H4 circuits totaling 4.75MVA of load. The load was transferred onto the 68W6 and 70W1 circuits out of Messer St. substation. The existing 49-year-old TB70 transformer was loaded to 105% of nameplate, 5.5 MVA, on a 5.25 MVA, prior to 4kV conversions. With the additional loads from completing the conversion of the 38H1 and a portion of the 38H3 circuit onto the 70W1, the loading on the 70W1 was brought to 6.26MVA (119% transformer nameplate). At that point, Field Engineering was able to offload approx. 9% of the load onto the 2W2 circuit as a summer contingency. It is predicted loads in summer of 2018 will reach 6.89 MVA (131% transformer nameplate), but with circuits switched into summer contingency on 6/21/18, predicted peak of 6.27MVA (119% transformer nameplate) could be seen. Replacing TB70 with 12.5 MVA unit, installing the associated breakers, and completing substation structural work will provide loading capacity in the downtown area of Laconia. It relieves the 12 kV transformer overload, as well as providing capacity to back up the 68W6, 10W1, ad 2W2 circuits, which surround the 70W1.

A new control house will be constructed at Messer Street SS. The existing control house is too small to add the necessary breaker cabinets and future 34.5kV relays and controls.

Project Objectives

This work will resolve overload issue on the existing transformer, provide capacity to backup surrounding circuits, replace aging infrastructure which is beyond its depreciated life, and fulfill the long term goal of creating a central substation hub for the Laconia NH area.

Project Scope

Major Equipment to be Installed

Substation

1. One (1) – 34.5-12.47kV, 10/12.5MVA Power Transformer

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2. One (1) – 34.5kV Vacuum Circuit Breaker type Siemens SDV7, 1200A
3. Three (3) – 12.47kV Vacuum Circuit Breaker type Siemens SDV7-SE, 1200A and associated isolation and bypass switches.
4. Cable Trench and Conduits to meet project requirements.
5. Control House and associated equipment as listed above.

P&C

1. Transformer TX70 Primary & Secondary Relaying
   a. SEL-387E (87/TP-TX70)
   b. SEL-587 (67H/TS-TX70)
   c. Lockout, auxiliary relays, control switches and test switches
2. Breakers TB70H & TB70L Control and Relaying
   a. SEL-351 (50/62/BF-TB70L)
   b. Lockout, auxiliary relays, control switches and test switches
3. 12.47kV Bus #1 Relaying
   a. SEL-587Z (87/B1P-12)
   b. Lockout, auxiliary relays, control switches and test switches
4. 12.47 Breaker 70W1 Control and Relaying
   a. SEL-351-7 (67/LP-70W1)
   b. SEL-451 (67/50BF/LS-70W1)
   c. Lockout, auxiliary relays, control switches and test switches
5. 12.47 Breaker 70W2 Control and Relaying
   a. SEL-351-7 (67/LP-70W2)
   b. SEL-451 (67/50BF/LS-70W2)
   c. Lockout, auxiliary relays, control switches and test switches

Civil

1. One (1) 34.5-12.47kV power transformer foundation slab (If required pending evaluation)
2. One (1) 34.5kV vacuum circuit breaker foundation slab
3. Three (3) 12.47kV vacuum circuit breaker foundation slabs
4. One (1) control house and associated foundation
5. Cable trenches to new equipment from the control house
6. New fencing per latest ES Standards
7. One (1) secondary oil containment OWS tank

Major Equipment to be Removed

Substation

1. 34.5-4.7kV, Power Transformer, TB70
2. 34.5-4.7kV, Power Transformer, TB38 (Retired in place)
3. Capacitor Bank C19
4. 4.16kV Feeder 38H1 breaker and regulator (Retired in place)
5. 4.16kV Feeder 38H2 breaker and regulator (Retired in place)
6. 4.16kV Feeder 38H3 breaker and regulator (Retired in place)
7. 4.16kV Feeder 38H4 breaker and regulator (Retired in place)

P&C

1. No Activity Required.

Civil

1. Transformer foundation TB38 (If required pending evaluation)
2. Capacitor Bank and switch stand foundations
3. Feeder breaker and regulator foundations
4. Existing misc. abandoned foundations will be chipped below grade or removed to support the project

Engineering is at 70% on this project. The Project Scope Document is attached.

Background / Justification

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The Laconia Area Study identified growth areas around the NH Lakes Region, affecting Messer St, Black Brook, Opechee, Lochmere, and Weirs substations. These are all 34-12 kV substations with varying degrees of circuit ties between them but limited substation capacity, making them unusable except at extremely low load levels. The equipment in these substations ranges in age from 11 years to 80 years, with an average age of around 50 years. The entire area is served via eight 12kV circuits, four 4kV circuits, one stepdown circuit off the 310 line, and one 34.5kV circuit, serving a total of 14,812 customers. Each of the (4) 4kV circuits has been converted to 12kV, and the 4kV substation equipment has been retired, but remains in the yard. The conversions helped create more ties between the 12kV circuits, with the 70W1 and 68W6 circuits out of Messer Street substation being the central hub of the 12kV circuits. This project will bolster this substation and circuits to create capacity in the area to help with reliability. Building at Messer Street substation continues the process of increasing capacity for general load growth, providing reliability in increasing capacity to transfer load on both a planned and emergency basis, lays the foundation to utilize SCADA devices, and retires aging infrastructure.

Business Process and / or Technical Improvements:

Benefits include a reduced risk of a substation failure, which reduces risk of significant outage impacts to customers. Increased capacity allows for customers to be switched to alternate sources during a contingency, which can significantly reduce the number of customers affected by an outage. This project also aids in the retirement of the 1937 vintage 4 kV substation equipment at Messer Street substation.

Alternatives Considered with Cost Estimates

Continue running existing equipment to failure and replace upon feedback from maintenance and sampling results or replace upon failure. Continue to operate without ability to backup customers during contingencies. Continue to complete maintenance with mobile substation being required to offload load. The status quo option was rejected due to the potential reliability, customer satisfaction, and environmental impacts associated with substation equipment failures.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering	Civil/Elect 6/18 P&C 7/18
Permitting	Complete 4/18
Construction Start	8/18
Mobile Installation	9/18
In Service Date	5/19

Regulatory Approvals

Permitting required by the City, the State of New Hampshire or US Regulatory Departments. This will require a Shoreland Protection permit.

- DES Soil management plan approval - Approved
- DES Soil Characterization plan approval - Approved
- DES Shoreland Permit by notification - Approved
- Laconia Minor Site Plan Review - Approved
- Building permit pending. Construction contractor's responsibility. Scheduled for July 2018.

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Risks and Risk Mitigation Plans
This is the site of a manufactured gas plant (MGP).

- Bring a qualified environmental consulting firm on-board to help identify issues with the site.
- Initiate all permitting to make sure construction can start by July 2018.
- Identify restrictions for site work and develop a plan.

The loading during construction requires the use of the mobile substation.

- The mobile has been scheduled to be installed in August.
- Make sure projects are engineered and ready so construction can be scheduled around the best times for loading.

Outage cancelled due to unplanned events on the system resulting in schedule delay and potential labor cost to remobilize.

- Mitigation Plan - Establish and manage outages using proven coordination teams; 1) Construction Management 2) Coordination Meetings 3) Outage Planning Meeting

Unknown conditions as this is a brownfield site.

- Effort has been made to develop a thorough Scope Document and complete 100% electrical substation and civil design prior to going out for construction bids.

Lack of sufficient, qualified, local construction and testing & commissioning labor results in the need to import labor which potentially increases costs or lengthen the schedule which will result in project delays. The length of time for construction, cutover, testing & commissioning each device in series is extensive.

- Develop overall strategy for construction allocation.

References
Scope Doc - Messer St - Rev 0 052918.doc

Attachments (One-Line Diagrams, Images, etc.)
Removals and Additions One line Diagrams

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Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name : Messer St SS Replace Transformer TB70					**PAF No: A17N02**
Facility Type: ☐ BPS	☐ BES	☐ PTF	☐ non-PTF	☐ CIP	☒ Distribution
PLANNING					
Is a NX-9 required?					No
Is an ISO-NE PAC presentation required?					No
Is a PPA required?					No
Is a TCA Application Required?					No
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?					No
OPERATIONS					
Outage Required?	☒ Primary Equipment (Power Transfer)		☒ Secondary Equipment (P&C only)		☐ Outage Not Required
Do SCLL Conditions Exist?					No
Has an outage schedule been approved?					Yes
Are Operations & Maintenance procedures/training required?					No
STANDARDS					
Does the project include standard equipment and designs?					Yes
SUBSTATION ENGINEERING					
Does this impact Revenue Metering					No
Is preliminary short circuit/ breaker duty analysis required?					No
Are there any changes to the baseline audible noise?					Yes
Is there an impact to the existing ground grid?					Yes
Is a Transient Over Voltage (TOV) analysis required?					No
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?					No
If BPS, is an NPCC Directory #4 presentation required?					No

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Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : Messer St SS Replace Transformer TB70	**PAF No: A17N02**

TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
SITING & CONSTRUCTION SERVICES (OUTREACH)	
What is the level of outreach expected?	Medium
INITIATOR	
Has a field constructability review been completed?	Yes
INVESTMENT RECOVERY	
Does the project require development of an Investment Recovery plan?	Yes
COST ESTIMATING	
How was the cost estimate prepared?	Other (specify below)
Who prepared the estimate?	Project Management
Was the estimate reviewed by Eversource Estimating?	Yes

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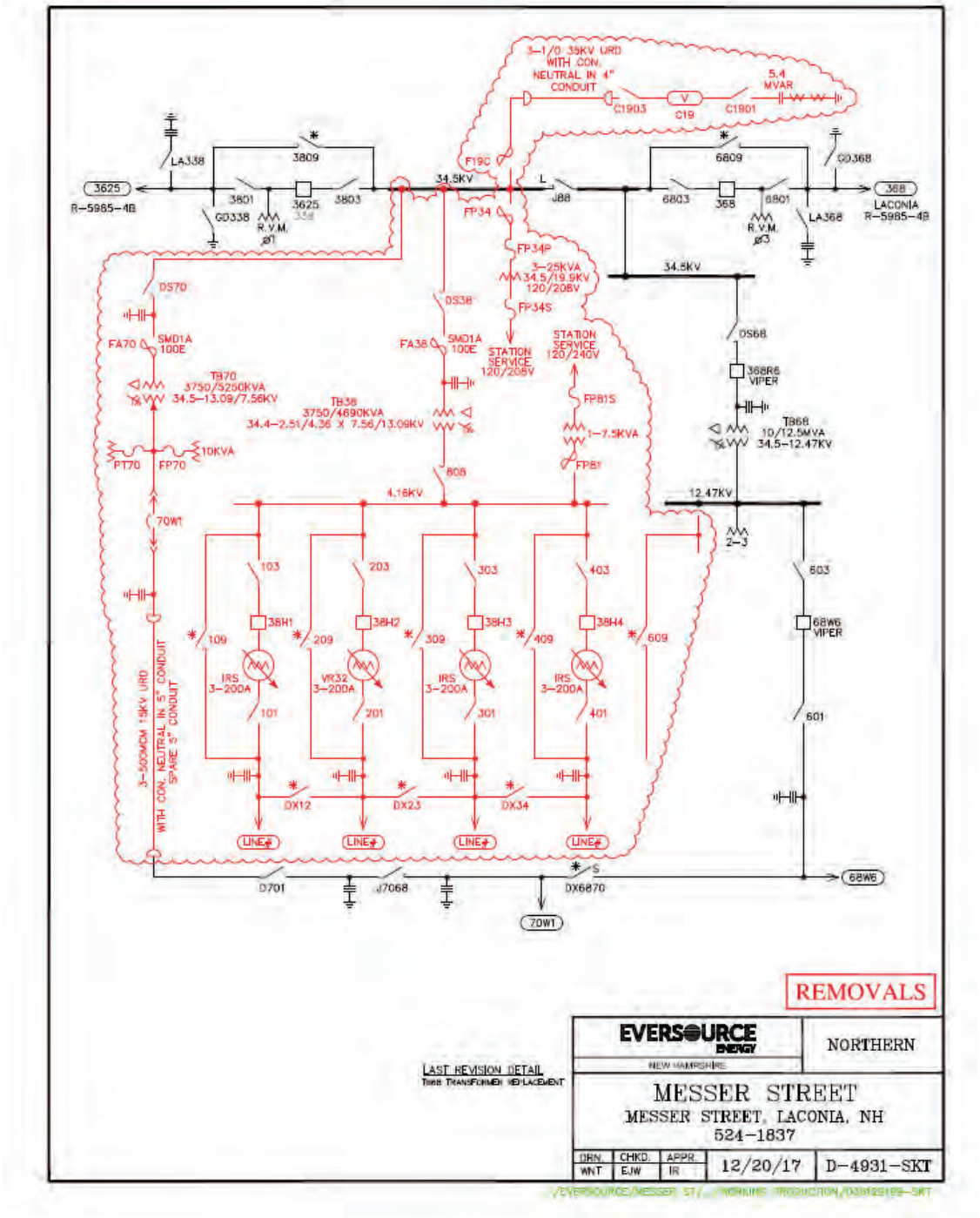

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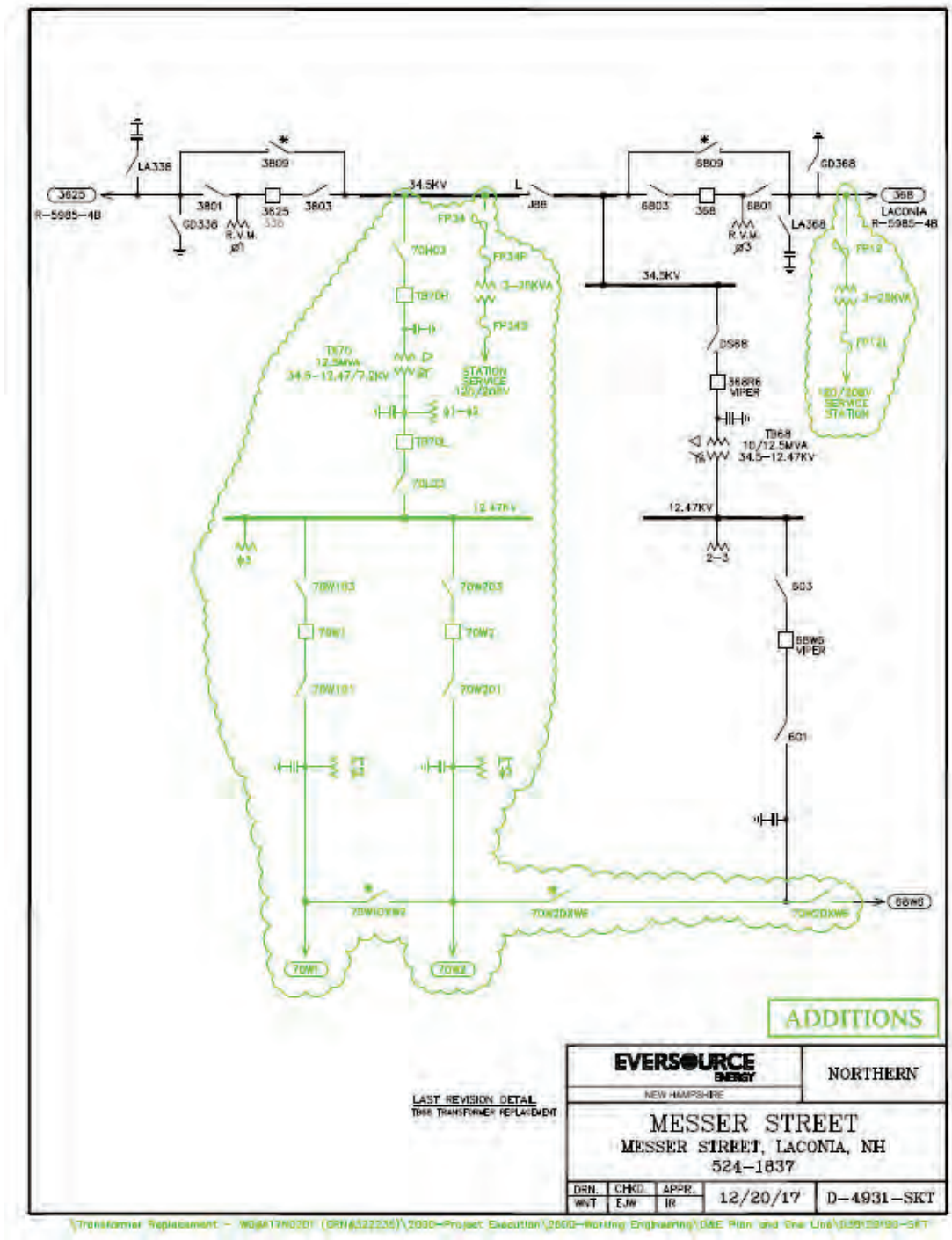

Messer St. A17N02		Transmission	Distribution		Transmission	Distribution	Transmission	Distr bution	Transmission	Distribution
		TOTAL		Prior	Prior /2017		2018		2019	
ES LABOR			$222,000			$22,000		$100,000		$100,000
CONSTRUCTION		$0	$980,000	$0	$0	$0	$0	$540,000	$0	$440,000
ENGINEERING/DESIGN		$0	$617,700	$0	$0	$199,000	$0	$418,700	$0	$0
LAND		$0	$0	$0	$0	$0	$0	$0	$0	$0
MATERIAL		$0	$1,508,000	$0	$0	$0	$0	$367,000	$0	$1,141,000
PROJECT MGR & SUPPORT		$0	$56,500	$0	$0		$0	$49,300	$0	$7,200
REMOVAL		$0	$50,000	$0	$0	$0	$0	$50,000	$0	
TEST		$0	$444,000	$0	$0	$0	$0	$379,000	$0	$65,000
CONTINGENCY		$0	$150,000	$0	$0		$0		$0	$150,000
OTHER			$46,000		$0	$1,000		$45,000		
ESCALATION		$0	$0	$0	$0	$0	$0	$0	$0	$0
INDIRECTS		$0	$1,232,000	$0	$0	$72,000	$0	$792,000	$0	$368,000
AFUDC		$0	$23,000	$0	$0	$0	$0	$8,000	$0	$15,000
Total Cost		**$0**	**$5,329,200**	**$0**	**$0**	**$294,000**	**$0**	**$2,749,000**	**$0**	**$2,286,200**

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APS 1 - Project Authorization Policy

Supplement Request Form

Approved at May 15, 2019 EPAC

Link to Meeting Minutes

Date Prepared: April 26, 2019	**Project Title: Messer St SS Replace Transformer TB70**
Company/Companies: Eversource NH	**Project ID Number: A17N02**
Organization: NH Operations	**Plant Class/(F.P. Type): Distribution Substation**
Project Initiator: Sam Bosse	**Project Type: Specific**
Project Manager: Samuel Harris	**Capital Investment Part of Original Operating Plan? Yes**
Project Sponsor: John Zicko	**O&M Expenses Part of the Original Operating Plan? NA**
Current Authorized Amount: $5,329K	**Estimated in service date(s): May 3, 2019**
Supplement Request: $663K	**PAC: N/A**
Total Request: $5,992K	**TCA: N/A**

Supplement Justification

A Project Authorization Form (PAF) for the Messer Street TB70 Replacement project was approved at EPAC on August 1, 2018 requesting full funding in the amount of $5,329K and in Power Plan on September 5, 2018. The scope of this project was to remove the obsolete 4 kV transformer and install a high side breaker for the new 12 kV transformer in that location; replace 12 kV unit transformer TB70 with a new 12.5 MVA unit; remove obsolete 4 kV circuit breakers and install a new 12 kV transformer breaker and two 12 kV feeder breakers in those substation bays; modify existing substation steel to create a 34.5 kV bus to feed the new 12 kV transformer high side breaker; and re-insulate and reconstruct the existing 4 kV bus to create a new 12 kV bus. This project supports the Laconia 4kV conversion.

Through the end of April, the project has invested $5,640K. The Messer Street project was put in-service on May 3, 2019, energizing the new transformer (TX70) and associated 12kV equipment upgrades. Removal of the remaining 4kV bus work, mobile substation unit, restoration of the site and punch-list items are currently being conducted. Contractors and internal crews will be complete with the remaining work scope at the site and be de-mobilized by May 24, 2019.

The forecasted costs to complete the above remaining work and close out the project is $352K beyond the $5,640K invested through April, bringing the total project costs to $5,992K.

This Supplemental Request Form requests approval of $663K for a total request of $5,992K, an increase of 12.4% over the currently authorized amount and 16.9% over the currently authorized direct cost amount. The scope of work for the project has no significant changes.

Justification for Additional Resources

The reasons for the project authorization supplement of $663K are summarized below:

TOTAL SUPPLEMENT REQUEST: $663K

1) Labor $143K:

a) Labor Classifications For Station Coverage $16K:
A full-time station coverage person is required at all NH substations while contractors are performing work within the substation fence-line. Labor rates for station coverage were higher than anticipated.

b) Project Working Hours $15K:
The Messer Street project is utilizing construction contractor resources that are working a 5 x 10 schedule to maintain the project schedule and in-service date. There has also been outage driven weekend work performed at the site. The Messer Street upgrades to the 4kV system, were critical to be put in-service in 2019 and prior to the summer peak loading season, as much of the existing substation equipment on the 4kV system was exceeding nameplate and LTE ratings. The project estimate assumed internal support (station coverage) for the contract crews would be working a 5 x 8 schedule. The construction contractor was awarded a lump sum contract however, internal labor support is required to be on-site full time whenever work is occurring at the substation. The extended hours (2 hours per day) and some weekends have caused for over-runs on the project labor budget.

c) Additional Time and Scope of Internal Performed Work $55K:
Internal crews were utilized to perform the distribution line work upgrades at and near the Messer Street site. These upgrades were directly related to the conversion of the substation from 4kV to 12kV. The increased costs are due to longer than estimated time to install two (2) Capacitor Banks on the roadside distribution system, extra labor costs it took to set-up, install and remove the temporary mobile substation (new temporary setup outside substation fence-line), and a scope change from the Full Funding estimate to upgrade from 477 strain bus outside the station to 795 AAC. The scope change in conductor size was required due to new LTE ratings (over 15MVA).

d) Project Management Support Charged To Labor $57K:
Project Management support was budgeted in its own category in the Project Authorization Form (PAF), however, the costs for PM support have been charged in the Labor section on the project. The separate PM support budget of 57K (item #6 in this document) has been reduced to $0 in this request.

2) Construction $513K:

a) Contractor utilized in Full Funding estimate unable to perform $170K:
The Messer Street project issued the electrical construction RFP in June 2018. Following the bid event and evaluations of the proposals received, a contractor was selected by ES procurement. The selected contractors pricing was utilized in the Full Funding request authorized on August 1, 2018 and in Power Plan on September 5th. Following the Full Funding authorization, the selected contractor notified ES that they

would be unable to perform the work for Messer Street project. The contractor withdrew their bid due to labor constraints; therefore, Eversource was required to utilize the second contractor to perform the work at Messer Street. The increase in costs between the two contractors pricing was $170K.

b) Additional Contaminated Soil Removal $191K:

The Messer Street project site is a known Manufactured Gas Plant (MGP) location. A Soils Management Plan (SMP) was put together on behalf of the project, to handle the soils generated at the site. As part of the SMP, the ES Environmental Remediation group had a contractor perform a soil pre-characterization of the site in July 2018. In the pre-characterization analysis, it had identified that the site contained Polychlorinated Biphenyl (PCB's) that would require remediation by a specialty contractor with oversite by a separate specialty environmental consultant. Additionally, the analysis identified that there were lower level contaminated soils that would be displaced during the below grade work planned at the site. The lower level contaminated soils were able to be handled by the electrical contractor performing the work, with oversite performed by the environmental contractor. A budget was included for the PCB contractor, environmental consultant and electrical contractor for contaminated and PCB soils in the Full Funding authorization.

When construction started in September 2018, the PCB related materials removed were completed within the project budget however, the contaminated soil estimated quantities, were significantly below the actual quantities generated. 135 Tons of contaminated soil removal was included in the project budget for the electrical construction contractor to remediate. Over the course of below grade construction at the site, 934 Tons of contaminated soils were generated and removed from the site. The contaminated soils were hauled off to an approved disposal facility and replaced with clean fill by the electrical contractor. This resulted in 799 additional Tons of material that were reclaimed at the site beyond the project budget. The additional contaminated soils were generated during the installation of a new substation grounding grid, installation of a temporary mobile substation yard (with below grade grounding), cable trench installation, control house and equipment foundation installation and removal of old foundations. The additional cost to the project as result of the contaminated soil quantities exceeding the estimate is $91K or $191K increase to the construction budget (less contingency).

c) Project Bid at 70% Design $55K:

The project was bid in June 2018, with 70% design drawings. When the Issued For Construction (IFC) drawings were issued in September 2018 (after electrical contractor award), a comprehensive analysis was performed with the electrical contractor, to address all additions and credits between the 70% "as bid" and IFC drawing packages. As result of the analysis, it identified that over 50% of BOM line items were changed between the two (2) drawing sets. Significant revisions were made to the grounding grid design and minor revisions to the cable trench design and control house finishes. This overall effort was a true-up of the BOM between as bid and to be constructed.

d) Project Schedule Delay $40K:

When the project was bid in June 2018 the project was planned to start in July 2018 and be complete by December 2018. Full Funding was not authorized until August 1, 2018 and September 5, 2018 in Power Plan. PO's were issued to the contractors in September 2018, after Power Plan approvals, which pushed the construction mobilization date out to September 24, 2018. Additionally, the mobile substation (TB101)

that was planned to be used at Messer Street and put in service on October 5, 2018, that supported all outage driven work was not available to the project, due to a system emergency at Bridge Street. TB101 became available to the project on November 8, 2018 and was put in service on November 14, 2018. This further delayed the construction contractor from starting the bulk of the construction at the site. Due to the construction schedule shifting from July to November, all outage driven civil work (below grade grounding and conduits) along with the control house masonry, required heating. Ground heaters ran to keep the ground from freezing, while below-grade civil work was ongoing between November 15, 2018 and January 7, 2019. Air heaters and tents were also required for the masonry work on the new control house and ran between December 3, 2018 and January 17, 2019. The additional costs for the construction contractor to supply the required heat to perform the work in winter conditions, resulted in additional cost to the project.

e) Outage and Switching Delays $29K:

The construction of the Messer Street project required many scheduled outages to install the mobile substation, remove 4kV bus disconnects, modify substation steel, remove capacitor bank, circuit breakers, transformer and to install and in-service the new 12kV equipment. The construction contractor primarily utilized station electricians to perform the day in, day out, non-outage work at the station, however, during scheduled outages would mobilize their line crews to support the outage related work. Many cases occurred where scheduled switching and line outages were delayed by the ES Control Center due to weather, system conditions and resource availability. The contractor was prepared with their line crews and equipment for each of the scheduled outages however, there were many events where the outages were not granted and/or cases where switching was delayed. During the delays in switching and/or canceled outages the contractor line crews were in many cases on stand-by with no other productive work to perform at the site. There were also instances where outages were re-scheduled for weekend work, which required the contractor to incur additional overtime costs to perform the scheduled work. Additional costs were incurred by the project for ES delayed and canceled switching.

f) Engineering Omissions $28K:

Items were missed in the engineering drawings that were identified during construction. These items include removal of a get-away cable and conduit from TB70, installation of a GPS clock antenna/conduit, cable tray grounding in the control house, inner duct to transformer, steel plates for arrestors, glass door for RTU cabinet, additional power monitor in control house and #22-3 pair control cable. ES Engineering performed reviews on the contractor supplied IFC drawings and accepted the packages prior to issuing them to the field for construction. A pre-field inspection was performed prior to completing the engineering, but not all field conditions were captured in the drawing sets. The increase costs in this section, include the costs for the construction contractor to perform the scope omitted on the drawings.

3) Engineering / Design $56K:

At the beginning of the project, the selected engineering contractor was given a scope of work to provide a complete set of IFC drawings to support the construction of the Messer Street project. Through the development thereof, scheduled design reviews were held with the contractor and ES engineering disciplines. After the project engineering had passed through a series of reviews, ES engineering requested modifications to the design of the substation grounding grid, cable trench design and modifications to the

new proposed control house. The engineering contractor incurred additional costs to revise the design after much of the drafting was complete. Many other engineering revisions were captured in the Full Funding request however, the above mentioned items were made after Full Funding was authorized for the project.

The project site has an active pubic boat launch that is the only boat access point to Lake Opechee in Laconia, NH. In order to maintain the safety of the general public the boat launch was closed Monday through Thursday during daylight hours and before 12PM on Fridays. Many formal publications, signage at the site, and communications with the Town of Laconia were required to communicate the public boat launch closures. Consultants were utilized to generate, issue and publicize the communications. The Full Funding request did not include any budget for these communications or outreach and they have been charged to the Engineering budget on the project.

4) Material $42K:

Animal Protection ($6K), Voltage Monitor ($2K), Battery Covers ($3K), Cable Trench revisions from 70% to IFC ($11K) and new strain bus ($20K) were materials missed during the original funding and estimate for the project.

5) Project Management ($57K):

a) $57K was allocated to the PM support budget in the Full Funding PAF, however, PM support is being captured in the labor budgets on this project. As result, the Project Management budget is reduced by $57K in this request.

6) Test $95K:

a) LCE $67K:
The LCE contractor was awarded a PO for LCE services on February 1, 2018 to support drawing reviews, construction/outage planning and project execution. The PO value assumed a November 1 in-service date for the project. The project experienced a six (6) month delay to the construction start date during the engineering, permitting, and pre-construction phases; which moved the planned in-service date to May 10, 2019. Due to these delays, LCE services were required to be extended the additional six (6) months and resulted in an additional cost of $67K. The project had contingency of $50K so the direct increase to the project budget was $17K. $17K or (67K without contingency).

b) Testing $28K:
The testing PO was issued to the testing contractor on August 16, 2018 and after the project received Full Funding. The Full Funding estimate for Testing was $200K and the PO issued to the contractor was for $228K. This accounts for an increase of $28K.

7) Contingency ($150K):

$150K of contingency was allocated in the original budget. $100K was for soil remediation and $50K was for overruns in Testing and Commissioning. The contingency funds were fully utilized in each of the respective cost sections. This results in a reduction of the contingency funds by $150K.

8) Other ($46K):

Property taxes and employee expenses are being captured on the project in this section. Property tax actuals plus current forecast to complete are $84K. Employee expenses are $8K. The two total $92K in the "other" category. This is $46K beyond what was budgeted for these costs in the Full Funding estimate.

The total incremental request for direct charges is $688K (+16.9% above authorized).

9) Indirect ($61K):

a) Indirects are currently forecasted to be 61K less than the original budget.

10) AFUDC $36K:

a) AFUDC is currently $36K over the original budget.

Supplement Cost Breakdown
Note: Dollar values are in thousands:

Line item Category	Original Estimate ($K)	New Estimate ($K)	Variance ($K)
1) Labor	$222	$365	$143
2) Construction	$1,030	$1,543	$513
3) Engineering / Design	$617	$673	$56
4) Material	$1,508	$1,550	$42
5) Project Management	$57	$0	($57)
6) Test	$444	$539	$95
7) Contingency	$150	$0	($150)
8) Other	$46	$92	$46
Total Directs	**$4,074**	**$4,762**	**$688**
9) Indirect	$1,232	$1,171	($61)
10) AFUDC	$23	$59	$36
Total Indirect	**$1,255**	**$1,230**	**($25)**
Total ($K rounded)	**$5,329**	**$5,992**	**$663**

Please see the original approved document attached. Original funding approval was prior to the PAF authorization process.

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$4,074	$688	$4,762
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	-	-
Total Direct Spending	$4,074	$688	$4,762
Capital Additions - Indirect	$1,232	($61)	$1,171
AFUDC	$23	$36	$59
Total Capital Request	$5,329	$663	$5,992
O&M	-	-	-
Total Request	**$5,329**	**$663**	**$5,992**

Note: Dollar values are in thousands:

Total Supplement Request by year review:

	Year 2019	Year 2020	Total
Capital Additions - Direct	$688	-	$688
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	-	-
Total Direct Spending	$688	-	$688
Capital Additions - Indirect	($61)	-	($61)
AFUDC	$36	-	$36
Total Capital Request	$663	-	$663
O&M	-	-	-
Total Request	**$663**	-	**$663**

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Operations Project Authorization Form

Approved at August 1, 2018 EPAC

Link to Meeting Minutes

Date Prepared: August 1, 2018	**Project Title:** Messer St SS Replace Transformer TB70
Company/ies: Eversource NH	**Project ID Number:** A17N02
Organization: NH Operations	**Class(es) of Plant:** Distribution Substation
Project Initiator: Sam Bosse	**Project Category:** Reliability
Project Manager: Pat Pinault	**Project Type:** Specific
Project Sponsor: James Eilenberger	**Project Purpose:** Replace Aging Equipment
Estimated in service date: 5/31/2019	**If Transmission Project: PTF?** No
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan?** NA
Total Request: $5,329,200	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

The goal of this project is to implement the next phase in the Laconia area study by proactively removing obsolete 4 kV equipment and adding 12 kV capacity. Messer Street substation contains 4 kV equipment from the 1930s and the 49-year-old 12 kV transformer TB70.

The scope of this project is to remove the obsolete 4 kV transformer and install a high side breaker for the new 12 kV transformer in that location. Replace 12 kV unit transformer TB70 with a new 12.5 MVA unit. Remove obsolete 4 kV circuit breakers and install a new 12 kV transformer breaker and two 12 kV feeder breakers in those substation bays. Modify existing substation steel to create a 34.5 kV bus to feed the new 12 kV transformer high side breaker. Re-insulate and reconstruct the existing 4 kV bus to create a new 12 kV bus. All 4kV in this area of Laconia is being converted.

The project received a prior funding authorization of $870,000 approved by CPAC in NH on 3/9/17 and in Powerplan on 4/12/17. Engineering was started on this project in 2017. It is currently at 70% Engineering, major equipment (transformers, switches, breakers, battery system) is on order, and construction contractor(s) will be bid within the next couple months. This is a request for full funding of the project for $5,329,200.

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Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2017	2018	2019+	Totals
Capital Additions - Direct	$ 820	$ 222	$ 1,949	$ 1,903	$ 4,074
Less Customer Contribution	$ -				
Removals net of Salvage ____%	$ -				
Total - Direct Spending	$ 820	$ 222	$ 1,949	$ 1,903	$ 4,074
Capital Additions - Indirect	$ 48	$ 72	$ 792	$ 368	$ 1,232
Subtotal Request	$ 868	$ 294	$ 2,741	$ 2,271	$ 5,306
AFUDC	$ 2		$ 8	$ 15	$ 23
Total Capital Request	$ 870	$ 294	$ 2,749	$ 2,286	$ 5,329
O&M					
Total Request	**$ 870**	**$ 294**	**$ 2,749**	**$ 2,286**	**$ 5,329**

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 2017	Year 2018	Year 2019+	Total
Straight Time Labor	$ 22	$ 100	$ 100	$ 222
Overtime Labor				$ -
Outside Services	$ 199	$ 1,437	$ 512	$ 2,148
Materials		$ 367	$ 1,141	$ 1,508
Other, including contingency amounts (describe)	$ 1	$ 45	$ 150	$ 196
Total Direct Costs	**$ 222**	**$ 1,949**	**$ 1,903**	**$ 4,074**
Indirect Capital Costs	**Year 2017**	**Year 2018**	**Year 2019+**	**Total**
Indirects/Overheads (including benefits)	$ 72	$ 792	$ 368	$ 1,232
Capitalized interest or AFUDC, if any	$ -	$ 8	$ 15	$ 23
Total Indirect Costs	**$ 72**	**$ 800**	**$ 383**	**$ 1,255**
Total Capital Costs	**$ 296**	**$ 2,749**	**$ 2,286**	**$ 5,329**
Less Total Customer Contribution	**$ -**	**$ -**	**$ -**	**$ -**
Total Capital Project Costs	**$ 296**	**$ 2,749**	**$ 2,286**	**$ 5,329**
Total O&M Project Costs	**$ -**	**$ -**	**$ -**	**$ -**

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Note: Explain unique payment provisions, if applicable

Other/Contingency includes:

1. Extended construction schedules for unknown factors with this brownfield site. This site was built in the 1930s and may have below grade unknowns e.g. foundation degradation, direct buried cabling, etc. - $100,000
2. Test and commissioning more extensive than anticipated. - $47,000
3. $3,000 previously spent for vehicles which is part of the Indirects category.

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.

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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: Yes.

This project is located at a former MPG site and handling of the subsurface materials during construction will need to be monitored. Formal cleanup of the site is complete. Disposal of soils has been budgeted.

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Technical Justification:

Project Need Statement

The goal of this project is to implement the next phase in the Laconia area study by proactively removing obsolete 4 kV equipment and adding 12 kV capacity. Messer Street substation contains 4 kV equipment from the 1930s and the 49-year-old 12 kV transformer TB70.

A Laconia area study was completed by the planning and field engineering teams, and recommended the following projects to address load, reliability, and aging infrastructure. Complete Study is attached.

1. Replace Messer St. TB68 with a larger unit (Unit coincidently failed 7/11/14, and expedited the replacement with 12.5MVA unit going in-service 5/21/15)
2. Replace Messer St. TB70 with 12.5MVA unit (This PAF)
3. Convert 4kV circuits out of Messer Street and retire 4kV substation equipment (Completed in 2017, ahead of TB70 replacement to facilitate creating room in substation for new equipment)
4. Construct Weirs S/S with 2 12kV circuit (Land purchased in 2017, budgeted to be in-service 2021)
5. Upgrade Lochmere S/S transformers with larger units
6. Upgrade Opechee S/S transformers with larger units
7. Reconductor portions of circuits to allow for contingent loading with the new capacity at the substations.

As part of the Laconia Area Study, it was identified and approved to convert the 4kV circuits in Laconia to 12kV. This was necessary to facilitate the removal of all 4kV equipment in Messer St., creating the needed space for a new 12kV transformer and breakers. The conversion consisted of the 38H1, 38H2, 38H3, 38H4 circuits totaling 4.75MVA of load. The load was transferred onto the 68W6 and 70W1 circuits out of Messer St. substation. The existing 49-year-old TB70 transformer was loaded to 105% of nameplate, 5.5 MVA, on a 5.25 MVA, prior to 4kV conversions. With the additional loads from completing the conversion of the 38H1 and a portion of the 38H3 circuit onto the 70W1, the loading on the 70W1 was brought to 6.26MVA (119% transformer nameplate). At that point, Field Engineering was able to offload approx. 9% of the load onto the 2W2 circuit as a summer contingency. It is predicted loads in summer of 2018 will reach 6.89 MVA (131% transformer nameplate), but with circuits switched into summer contingency on 6/21/18, predicted peak of 6.27MVA (119% transformer nameplate) could be seen. Replacing TB70 with 12.5 MVA unit, installing the associated breakers, and completing substation structural work will provide loading capacity in the downtown area of Laconia. It relieves the 12 kV transformer overload, as well as providing capacity to back up the 68W6, 10W1, ad 2W2 circuits, which surround the 70W1.

A new control house will be constructed at Messer Street SS. The existing control house is too small to add the necessary breaker cabinets and future 34.5kV relays and controls.

Project Objectives

This work will resolve overload issue on the existing transformer, provide capacity to backup surrounding circuits, replace aging infrastructure which is beyond its depreciated life, and fulfill the long term goal of creating a central substation hub for the Laconia NH area.

Project Scope

Major Equipment to be Installed

Substation

1. One (1) – 34.5-12.47kV, 10/12.5MVA Power Transformer

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2. One (1) – 34.5kV Vacuum Circuit Breaker type Siemens SDV7, 1200A
3. Three (3) – 12.47kV Vacuum Circuit Breaker type Siemens SDV7-SE, 1200A and associated isolation and bypass switches.
4. Cable Trench and Conduits to meet project requirements.
5. Control House and associated equipment as listed above.

P&C

1. Transformer TX70 Primary & Secondary Relaying
   a. SEL-387E (87/TP-TX70)
   b. SEL-587 (67H/TS-TX70)
   c. Lockout, auxiliary relays, control switches and test switches
2. Breakers TB70H & TB70L Control and Relaying
   a. SEL-351 (50/62/BF-TB70L)
   b. Lockout, auxiliary relays, control switches and test switches
3. 12.47kV Bus #1 Relaying
   a. SEL-587Z (87/B1P-12)
   b. Lockout, auxiliary relays, control switches and test switches
4. 12.47 Breaker 70W1 Control and Relaying
   a. SEL-351-7 (67/LP-70W1)
   b. SEL-451 (67/50BF/LS-70W1)
   c. Lockout, auxiliary relays, control switches and test switches
5. 12.47 Breaker 70W2 Control and Relaying
   a. SEL-351-7 (67/LP-70W2)
   b. SEL-451 (67/50BF/LS-70W2)
   c. Lockout, auxiliary relays, control switches and test switches

Civil

1. One (1) 34.5-12.47kV power transformer foundation slab (If required pending evaluation)
2. One (1) 34.5kV vacuum circuit breaker foundation slab
3. Three (3) 12.47kV vacuum circuit breaker foundation slabs
4. One (1) control house and associated foundation
5. Cable trenches to new equipment from the control house
6. New fencing per latest ES Standards
7. One (1) secondary oil containment OWS tank

Major Equipment to be Removed

Substation

1. 34.5-4.7kV, Power Transformer, TB70
2. 34.5-4.7kV, Power Transformer, TB38 (Retired in place)
3. Capacitor Bank C19
4. 4.16kV Feeder 38H1 breaker and regulator (Retired in place)
5. 4.16kV Feeder 38H2 breaker and regulator (Retired in place)
6. 4.16kV Feeder 38H3 breaker and regulator (Retired in place)
7. 4.16kV Feeder 38H4 breaker and regulator (Retired in place)

P&C

1. No Activity Required.

Civil

1. Transformer foundation TB38 (If required pending evaluation)
2. Capacitor Bank and switch stand foundations
3. Feeder breaker and regulator foundations
4. Existing misc. abandoned foundations will be chipped below grade or removed to support the project

Engineering is at 70% on this project. The Project Scope Document is attached.

Background / Justification

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The Laconia Area Study identified growth areas around the NH Lakes Region, affecting Messer St, Black Brook, Opechee, Lochmere, and Weirs substations. These are all 34-12 kV substations with varying degrees of circuit ties between them but limited substation capacity, making them unusable except at extremely low load levels. The equipment in these substations ranges in age from 11 years to 80 years, with an average age of around 50 years. The entire area is served via eight 12kV circuits, four 4kV circuits, one stepdown circuit off the 310 line, and one 34.5kV circuit, serving a total of 14,812 customers. Each of the (4) 4kV circuits has been converted to 12kV, and the 4kV substation equipment has been retired, but remains in the yard. The conversions helped create more ties between the 12kV circuits, with the 70W1 and 68W6 circuits out of Messer Street substation being the central hub of the 12kV circuits. This project will bolster this substation and circuits to create capacity in the area to help with reliability. Building at Messer Street substation continues the process of increasing capacity for general load growth, providing reliability in increasing capacity to transfer load on both a planned and emergency basis, lays the foundation to utilize SCADA devices, and retires aging infrastructure.

Business Process and / or Technical Improvements:

Benefits include a reduced risk of a substation failure, which reduces risk of significant outage impacts to customers. Increased capacity allows for customers to be switched to alternate sources during a contingency, which can significantly reduce the number of customers affected by an outage. This project also aids in the retirement of the 1937 vintage 4 kV substation equipment at Messer Street substation.

Alternatives Considered with Cost Estimates

Continue running existing equipment to failure and replace upon feedback from maintenance and sampling results or replace upon failure. Continue to operate without ability to backup customers during contingencies. Continue to complete maintenance with mobile substation being required to offload load. The status quo option was rejected due to the potential reliability, customer satisfaction, and environmental impacts associated with substation equipment failures.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering	Civil/Elect 6/18 P&C 7/18
Permitting	Complete 4/18
Construction Start	8/18
Mobile Installation	9/18
In Service Date	5/19

Regulatory Approvals

Permitting required by the City, the State of New Hampshire or US Regulatory Departments. This will require a Shoreland Protection permit.

- DES Soil management plan approval - Approved
- DES Soil Characterization plan approval - Approved
- DES Shoreland Permit by notification - Approved
- Laconia Minor Site Plan Review - Approved
- Building permit pending. Construction contractor's responsibility. Scheduled for July 2018.

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Risks and Risk Mitigation Plans
This is the site of a manufactured gas plant (MGP).

- Bring a qualified environmental consulting firm on-board to help identify issues with the site.
- Initiate all permitting to make sure construction can start by July 2018.
- Identify restrictions for site work and develop a plan.

The loading during construction requires the use of the mobile substation.

- The mobile has been scheduled to be installed in August.
- Make sure projects are engineered and ready so construction can be scheduled around the best times for loading.

Outage cancelled due to unplanned events on the system resulting in schedule delay and potential labor cost to remobilize.

- Mitigation Plan - Establish and manage outages using proven coordination teams; 1) Construction Management 2) Coordination Meetings 3) Outage Planning Meeting

Unknown conditions as this is a brownfield site.

- Effort has been made to develop a thorough Scope Document and complete 100% electrical substation and civil design prior to going out for construction bids.

Lack of sufficient, qualified, local construction and testing & commissioning labor results in the need to import labor which potentially increases costs or lengthen the schedule which will result in project delays. The length of time for construction, cutover, testing & commissioning each device in series is extensive.

- Develop overall strategy for construction allocation.

References
Scope Doc - Messer St - Rev 0 052918.doc

Attachments (One-Line Diagrams, Images, etc.)
Removals and Additions One line Diagrams

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Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name : Messer St SS Replace Transformer TB70					**PAF No: A17N02**
Facility Type: ☐ BPS	☐ BES	☐ PTF	☐ non-PTF	☐ CIP	☒ Distribution
PLANNING					
Is a NX-9 required?					No
Is an ISO-NE PAC presentation required?					No
Is a PPA required?					No
Is a TCA Application Required?					No
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?					No
OPERATIONS					
Outage Required?	☒ Primary Equipment (Power Transfer)		☒ Secondary Equipment (P&C only)		☐ Outage Not Required
Do SCLL Conditions Exist?					No
Has an outage schedule been approved?					Yes
Are Operations & Maintenance procedures/training required?					No
STANDARDS					
Does the project include standard equipment and designs?					Yes
SUBSTATION ENGINEERING					
Does this impact Revenue Metering					No
Is preliminary short circuit/ breaker duty analysis required?					No
Are there any changes to the baseline audible noise?					Yes
Is there an impact to the existing ground grid?					Yes
Is a Transient Over Voltage (TOV) analysis required?					No
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?					No
If BPS, is an NPCC Directory #4 presentation required?					No

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Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : Messer St SS Replace Transformer TB70	**PAF No: A17N02**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
SITING & CONSTRUCTION SERVICES (OUTREACH)	
What is the level of outreach expected?	Medium
INITIATOR	
Has a field constructability review been completed?	Yes
INVESTMENT RECOVERY	
Does the project require development of an Investment Recovery plan?	Yes
COST ESTIMATING	
How was the cost estimate prepared?	Other (specify below)
Who prepared the estimate?	Project Management
Was the estimate reviewed by Eversource Estimating?	Yes

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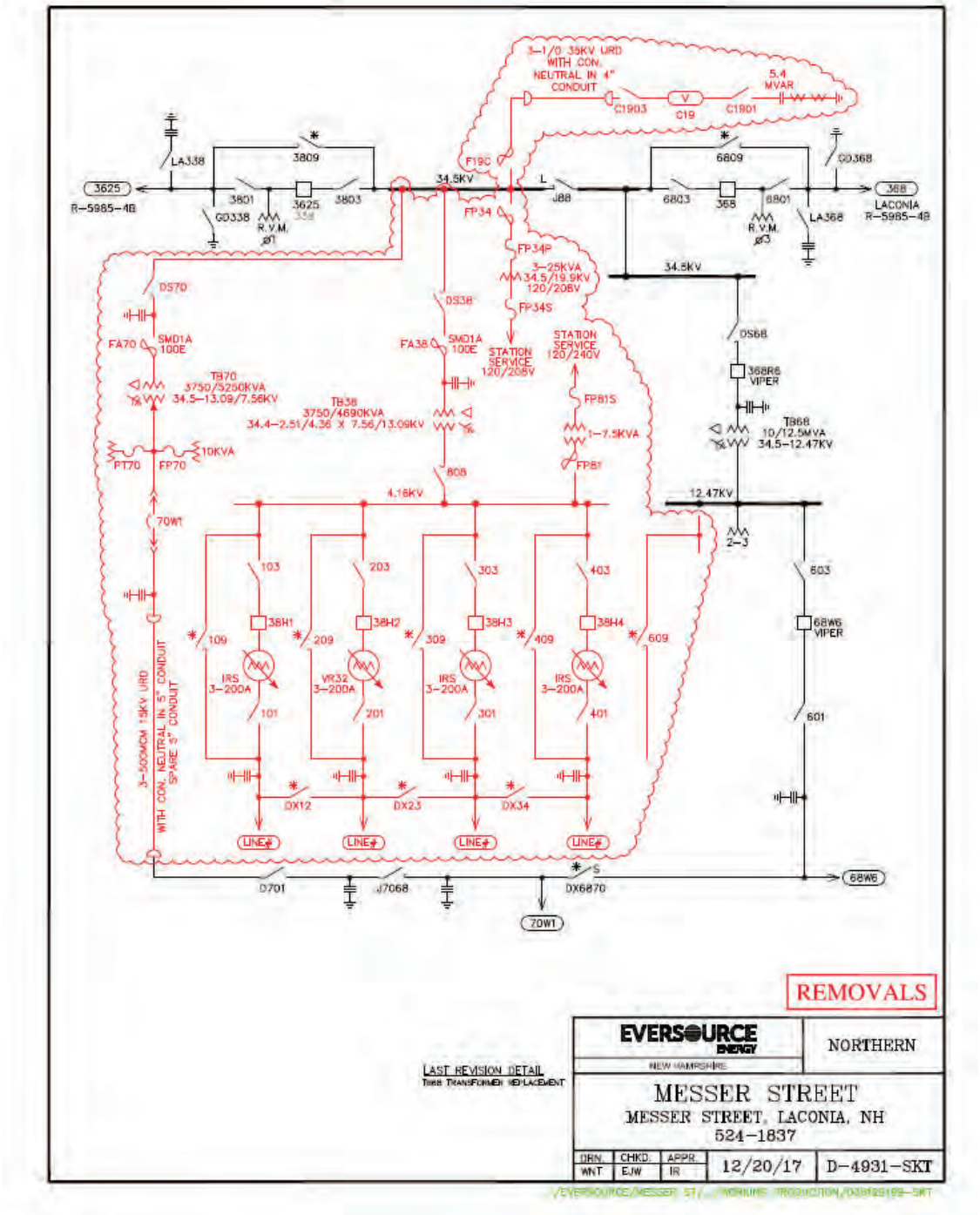

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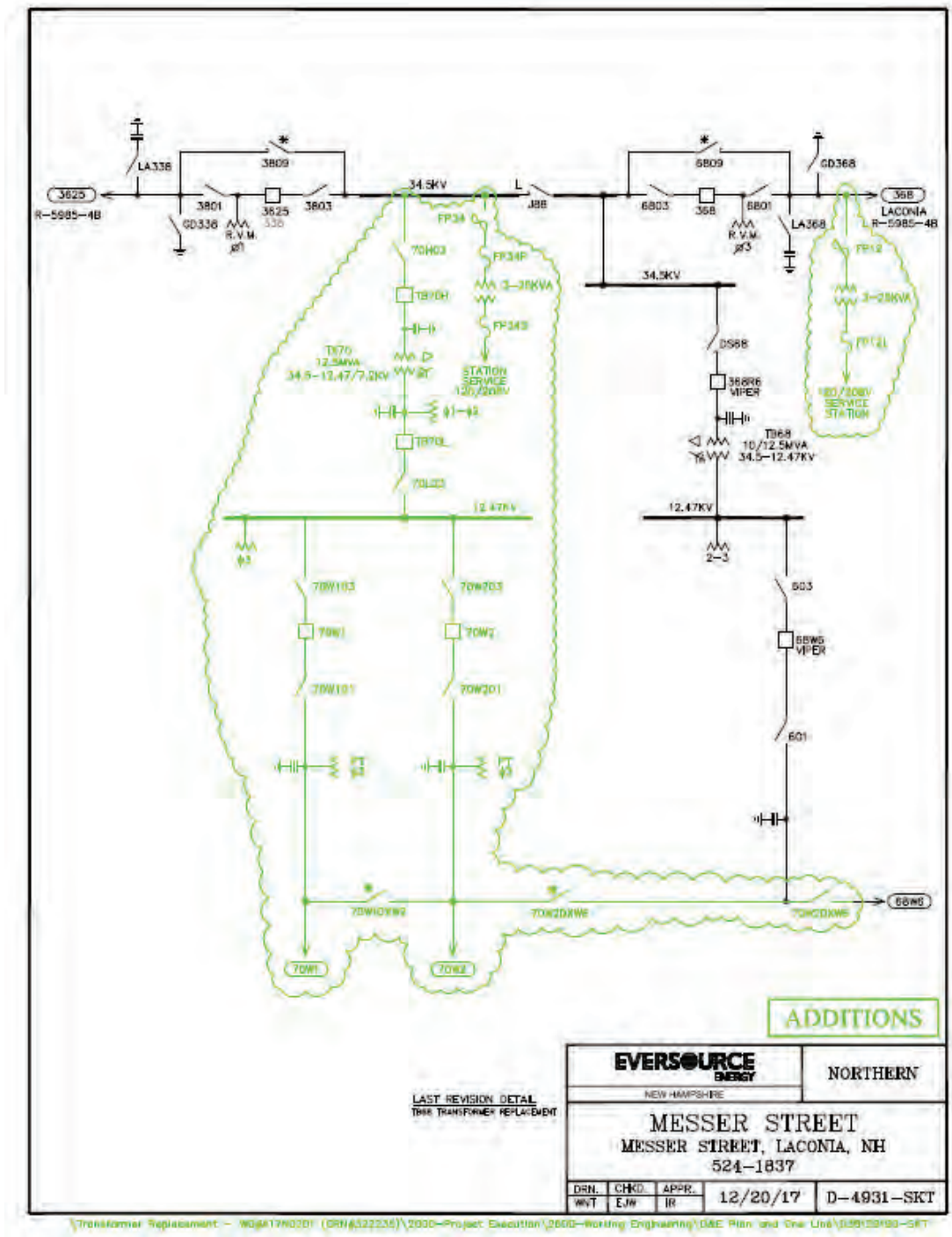

Messer St. A17N02		Transmission	Distribution		Transmission	Distribution	Transmission	Distr bution	Transmission	Distribution
		TOTAL		Prior	Prior /2017		2018		2019	
ES LABOR			$222,000			$22,000		$100,000		$100,000
CONSTRUCTION		$0	$980,000	$0	$0	$0	$0	$540,000	$0	$440,000
ENGINEERING/DESIGN		$0	$617,700	$0	$0	$199,000	$0	$418,700	$0	$0
LAND		$0	$0	$0	$0	$0	$0	$0	$0	$0
MATERIAL		$0	$1,508,000	$0	$0	$0	$0	$367,000	$0	$1,141,000
PROJECT MGR & SUPPORT		$0	$56,500	$0	$0		$0	$49,300	$0	$7,200
REMOVAL		$0	$50,000	$0	$0	$0	$0	$50,000	$0	
TEST		$0	$444,000	$0	$0	$0	$0	$379,000	$0	$65,000
CONTINGENCY		$0	$150,000	$0	$0		$0		$0	$150,000
OTHER			$46,000		$0	$1,000		$45,000		
ESCALATION		$0	$0	$0	$0	$0	$0	$0	$0	$0
INDIRECTS		$0	$1,232,000	$0	$0	$72,000	$0	$792,000	$0	$368,000
AFUDC		$0	$23,000	$0	$0	$0	$0	$8,000	$0	$15,000
Total Cost		**$0**	**$5,329,200**	**$0**	**$0**	**$294,000**	**$0**	**$2,749,000**	**$0**	**$2,286,200**

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Operations Project Authorization Form

Approved at July 18, 2018 EPAC

Link to Meeting Minutes

Date Prepared: July 26, 2018	**Project Title:** North Road SS Breaker Additions
Company/ies: Eversource NH	**Project ID Number:** T1365A (T) & A17W19 (D)
Organization: NH Operations	**Class(es) of Plant:** Transmission and Distribution Substation
Project Initiator: David Cloutier	**Project Category:** T Reliability, Aging Infrastructure
Project Manager: Natacha Morales	**Project Type:** Specific Project
Project Sponsor: Brian Dickie	**Project Purpose:** Replace 115kV line switches with breakers and replace obsolete circuit switcher
Estimated in service date: 12/31/18	**If Transmission Project: PTF?**Yes
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan?** No
Total Request: $2,705,000 (T) & $836,000 (D)	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is to replace transmission line circuit switchers 1J74 and 1J27 with 115kV circuit breakers for reliability purposes. Since the North Road Substation in New Hampshire has 115-kV circuit switchers and not breakers, a fault condition on either the M-127 line or the K-174 line will initially trip both lines. Loss of the M-127 and K-174 lines will remove 115-kV supply to the North Road Substation until sectionalizing actions occur. The load at risk is approximately 15,700 customers, including tripping more than 40MW of generation.

This project is also to replace 115kV distribution equipment at North Road SS as defined by a specific program established to replace transmission S&C type G circuit switchers. At North Road SS, the Project includes adding two new relays for circuit switcher failure. The total project will also require a control house expansion, which is a distribution funded asset, since the existing control house is not large enough for the added relay and control cabinets.

The total funding request of this project is $2,705,000 for the transmission components and $836,000 for the distribution components.

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Project Costs Summary – Transmission T1365A
Note: Dollar values are in thousands

	Prior Authorized	2017	2018	2019+	Totals
Capital Additions - Direct	$370	$40	$2,374	$	$2,414
Less Customer Contribution	$	$	$	$	$
Removals net of Salvage ____%	$	$	$	$	$
Total - Direct Spending	$370	$40	$2,374	$	$2,414
Capital Additions - Indirect	$30	$5	$281	$	$286
Subtotal Request	$400	$45	$2,655	$	$2,700
AFUDC	$10	$0	$5	$	$5
Total Capital Request	$410	$45	$2,660	$	$2,705
O&M	$	$	$	$	$
Total Request	$410	$45	$2,660	$	$2,705

Project Costs Summary – Distribution A17W19
Note: Dollar values are in thousands

	Prior Authorized	2017	2018	2019+	Totals
Capital Additions - Direct	$80	$74	$505	$	$579
Less Customer Contribution	$	$	$	$	$
Removals net of Salvage %	$	$	$	$	$
Total - Direct Spending	$80	$74	$505	$	$579
Capital Additions - Indirect	$20	$20	$235	$	$255
Subtotal Request	$100	$94	$740	$	$834
AFUDC	$	$0	$2	$	$2
Total Capital Request	$100	$94	$742	$	$836
O&M	$	$	$	$	$
Total Request	$100	$94	$742	$	$836

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Financial Evaluation – Transmission T1365A
Note: Dollar values are in thousands

Direct Capital Costs	2017	2018	2019+	Total
Straight Time Labor	$5	$85	$	$90
Overtime Labor	$	$	$	$
Outside Services	$34	$1,740	$	$1,774
Materials	$0	$450	$	$450
Other, including contingency amounts	$1	$99	$	$100
Total Direct Costs	**$40**	**$2,374**	**$**	**$2,414**

Indirect Capital Costs	2017	2018	2019+	Total
Indirects/Overheads (including benefits)	$5	$281	$	$286
Capitalized interest or AFUDC, if any	$0	$5	$	$5
Total Indirect Costs	**$5**	**$286**	**$**	**$291**

Total Capital Costs	**$45**	**$2,660**	**$**	**$2,705**
Less Total Customer Contribution	$	$	$	$
Total Capital Project Costs	**$45**	**$2,660**	**$**	**$2,705**
Total O&M Project Costs	$0	$	$	$

Other/Contingency/Risk Allocation:
Installation of the Mobile - $30,000
Soil removal and disposal $40,000
Potential environmental monitoring - $10,000
Site restoration $20,000

Financial Evaluation – Distribution A17W19
Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	$7	$55	$	$62
Overtime Labor	$	$	$	$
Outside Services	$59	$350	$	$409
Materials	$8	$100	$	$108
Other, including contingency amounts (describe)	$	$	$	$
Total Direct Costs	**$74**	**$505**	**$**	**$579**

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	$20	$235	$	$255
Capitalized interest or AFUDC, if any	$	$2	$	$2
Total Indirect Costs	**$20**	**$237**	**$**	**$257**

Total Capital Costs	**$94**	**$742**	**$**	**$836**
Less Total Customer Contribution	$	$	$	$
Total Capital Project Costs	**$94**	**$742**	**$**	**$836**
Total O&M Project Costs	$	$	$	$

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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:
N/A

What functional area(s) will these future costs be funded in?_____N/A_____
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? If yes, please provide details:

N/A

Are there other environmental cleanup costs associated with this project? **Yes** If yes, please provide details:

Soils Disposal is included in the Risk Allocation/contingency.

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Technical Justification:

Project Need Statement

Transmission: This project is to replace transmission line circuit switchers 1J74 and 1J27 with 115kV circuit breakers for reliability purposes. Since the North Road Substation in New Hampshire has 115-kV circuit switchers and not breakers, a fault condition on either the M-127 line or the K-174 line will initially trip both lines. Loss of the M-127 and K-174 lines will remove 115-kV supply to the North Road Substation until sectionalizing actions occur. These are SCADA devices, so switching can be performed within a matter of a few minutes once the fault location is known. However, in the current configuration, the fault location must be determined by field personnel first, which lengthens the outage time until crews reach the site and locate the fault. There are also protection and operational issues that will be addressed with this project that currently are handled in Station Orders. Because of the lack of line breakers, one of the transformers has to be taken out of service whenever a line is out of service because of coordination issues.

Distribution: This project is proposed to change an obsolete 115kV circuit switcher J49 at North Road SS. The control house will be expanded by 10 X 26 feet (260 sf) to accommodate new relay and control panels. The other circuit switcher J38 was previously replaced and is in good condition.

Project Objectives

1. 115kV Circuit Breaker Installation

To limit the exposure of a fault on the M-127 and K-174 lines from interrupting service to North Road SS.

2. 115kV Circuit Switcher Replacement

Replace the known obsolete S&C type G circuit switcher replacement that was identified in TPS-07-082-NH for targeted replacement. The J49 circuit switcher is a distribution asset and was not replaced at the time of the 2007/2008 transmission program. Note that the J38 circuit switcher failed in 2007 and was replaced at that time.

Project Scope

Major Equipment To Be Removed

Transmission:

1. Two (2) S&C Mark V 115kV Circuit Switchers and associated equipment
2. Six (6) coupling capacitors (CCVT)
3. LAs

Distribution:

4. One (1) S&C type G 115kV circuit switcher and associated equipment

Major Equipment To Be Added

Transmission:

1. Two (2) 115kV SF6 Circuit Breakers
2. Two (2) 115kV Wave Traps
3. Four (4) three phase 115kV disconnect switches
4. Relay and control cabinets including new bus differential scheme, primary and secondary line relay for the new 115kV line breakers.
5. Twelve (12) 115kV CCVT

6. Motor operator for Switch J10
7. LAs
8. Control Cables
9. Conduits, as required
10. Various wire, mounting brackets and connectors
11. Yard lightning study and equipment installations as required.
12. 115kV Breaker foundations
13. Yard lightning evaluation and upgrade as required.
14. Relay and control setting modification at Velco, Webster and North Road Substations.

Distribution:

15. Control House Expansion
16. One (1) S&C Mark V 115kV Circuit Switcher
17. Control Cables
18. Conduits, as required
19. Various wire, mounting brackets and connectors
20. Ground grid upgrades and modifications as required.
21. Two (2) SEL type 351 relays
22. Two (2) lockout relays
23. Station Battery Upgrades, as necessary.

Background / Justification

Transmission: The K-174 line is a 115-kV line that connects the Ascutney Substation in Vermont and the North Road Substation in New Hampshire and is 16.3 miles long. The M-127 line is a 115-kV line that connects the Webster and North Road Substations in New Hampshire and is 25.8 miles long. Customers are exposed to outages from temporary and permanent outages from exposure to a total of 42.1 miles of 115kV lines. This project is on the top 10 ESCC issues list. A history of the lines shows that for a trip of one line, both temporary and permanent, both lines and all of the customers at North Road SS are affected.

Outage History of the M127 and K174 Lines

Outage History on M127 and K174 involving North Road S/S					
DIR	S/S	Line	Type	Root Cause	Comments
06-10-20-09	North Road and Webster Substations	M127	T	Equipment Failure	Webster breaker M127 T/R - Ascutney breaker K174 T/R - North Rd breaker TB38 T/R - North Rd breaker TB49 T/R/T - HP & L Generator T
07-05-27-01	North Road and Webster Substations	M127	T	Unknown	Webster breaker M127 T/R - Ascutney breaker K174 T/R - North Road TB38 & TB49 T/R -

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					Claremont breakers 52 & 59 T/R.
07-07-06-03	North Road and Webster Substations	M127	T	Lightning	Lightning in the area - T/R Found broken crossarms; replaced.
07-07-09-02	North Road and Webster Substations	M127	T	Lightning	Lightning in the area.
07-07-10-01	North Road and Webster Substations	M127	T	Lightning	Three crossarms replaced on K174 - Missed Scada indication on TB39 and TB49. Webster breaker M127 T/R - VE Ascutney breaker K174 T/R - North Rd breakers TB38 and TB49 TR - HempHill breaker G1 T. 12/04/07
08-12-12-20	North Road Substation	K174	T	Ice / Sleet / Snow	This was an operation at Ascutney. The K174 breaker was tripped by some problem in the VELCO systems. There was not a fault on the K174/M127 line. No PSNH equipment operated.
10-02-26-09	Webster Substation	M127	P	Unknown	Webster M127 T/R/T - North Road TB38 T/R - North Road TB49 T - Velco Ascutney K174 T/R - Lempster 260 T.
10-07-19-04	North Road and Webster Substations	M127	T	Lightning	Lightning in the area. Webster M127, VE Ascutney K174 and North RD TB49 T/R. Fault was on VELCO's line beyond North Road.

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11-08-19-06	North Road Substation	K174	T	Lightning	Ascutney K174 Tr/Rx. - Overtrip from V182 operation. Equipment changed out on VELCO system.
11-08-21-02	North Road and Webster Substations	M127	T	Lightning	Webster M127 Tr/Rx, North Road TB38 Tr/Rx, North Road TB49 Tr/Rx, Springfield Power Tr.
12-08-25-01	North Road and Webster Substations	M127	T	Lightning	Additional Lines Affected: K174 North Road TB38 Tr/Rx, North Road TB49 Tr/Rx, Webster M127 Tr/Rx, Ascutney K174 Tr/Rx, Lempster 260 Tr, Springfield P&L Tr. Storm in the area.
13-09-11-04	North Road and Webster Substations	M127	P	Lightning	Webster M127 Tr/Rx, Lempster OCR 260 Tr, North Road TB38 Tr, North Road TB49 Tr/Rx. Transfer trip sent to Lempster.
15-05-27-02	North Road and Webster Substations	M127	P	Lightning	Confirmed lightning strike near North Road Substation.
15-08-15-05	North Road and Webster Substations	M127	T	Lightning	Damaged crossarm at structure 204 was replaced the next day.
17-05-30	North Road Substation	K174	T	Lightning	

Additionally there are protection and operational issues associated with the lack of breakers at North Road SS. Because of the length of this line the Webster relays can detect faults on the 34.5 kV bus at North Road when the K174 is out. There is an operational requirement when feeding North Road SS radially from either Webster SS or Ascutney SS to remove one transformer from service at North Road

SS for relay coordination between the low side feeder breakers and the 115kV source. With the new 115kV breakers this operating restriction can be removed.

Distribution: This project is also to replace distribution equipment targeted at North Road SS as defined by a specific transmission program established to replace S&C type G circuit switches. An expansion to the substation control house is required.

1. The S&C type G circuit switcher replacement program was a Transmission program identified in TPS-07-082-NH. The J49 circuit switcher is old and past expected life. The vendor formally does not support this unit with spare parts. The TPS-07-082-NH is attached to this TAF.

Control House expansion to accommodate new relay and control panels.

Business Process and / or Technical Improvements:

Increase reliability to customers from transmission line faults or lightning strikes. Addresses protection and operational issues associated with the lack of breakers.

Replacement of obsolete equipment prior to failure to improve reliability.

Alternatives Considered with Cost Estimates

The alternative to the transmission project to install breakers for the 115kV M-127 and K-174 lines is to do nothing and continue to expose customers to outages associated with both lines.

The alternative to not replacing the known obsolete circuit switcher is exposure to unplanned bus outages in the event that there is a problem operating the J49 circuit switcher.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering Bid	11/1/17
Start Engineering	3/1/18
Permitting	7/1/18
Construction	9/1/18
In Service Date	12/31/18

Regulatory Approvals

Permitting required by the Town of Sunapee – Building Permit

Risks and Risk Mitigation Plans

Coordination with VELCO is required for the setting, testing & commissioning at their Ascutney SS.

- Delay in testing and commissioning.
- Make sure there are adequate communications with VELCO through the engineering and construction phases to coordinate testing and outages.
- Obtain LCE resources early in the project life cycle.
- Maintain close coordination between Eversource LCE's and VELCO's personnel as well as control centers to ensure safe outages

Maintenance and storm hardening projects

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- Coordinate with other PM's for both maintenance and storm hardening projects to utilize outages the best way possible without causing any interruption to the system.
- Provide the ESCC a detailed outage sequence with zones and durations.
- Request engineering vendor to provide a sequential one – lines.
- Maintain close coordination with the ESCC to ensure all three (3) projects can be successfully completed without any interruption.

The loading during construction may require the use of the mobile substation.

- Delay in construction while waiting for the mobile to be available.
- Make sure projects are engineered and ready so construction can be scheduled around the best times for loading.
- Obtain a detailed outage sequence early in the project life cycle.
- Negotiate with other PMs and the ESCC to ensure that the mobile is used appropriately.
- Coordinate with Maintenance Planner/Scheduler to ensure that a mobile is available for the project early in the project life cycle and reserve it.

- Outage cancelled due to unplanned events on the system resulting in schedule delay and potential labor cost to remobilize. Establish and manage outages using proven coordination teams; 1) Construction Management 2) Coordination Meetings 3) Outage Planning Meeting

Internal and external resource availability for engineering.

- Balance engineering and review work between internal resources and external resources. Implement the use of project schedules.

Lack of sufficient, qualified, local construction and testing & commissioning labor results in the need to import labor which potentially increases costs or lengthen the schedule which will result in project delays.

- Prepare construction bid package with 70%'s for all disciplines.
- RFP's for cabinets to start with 30% P&C.Prepare a thorough scope document to secure LCE's and testing early in the project life cycle.

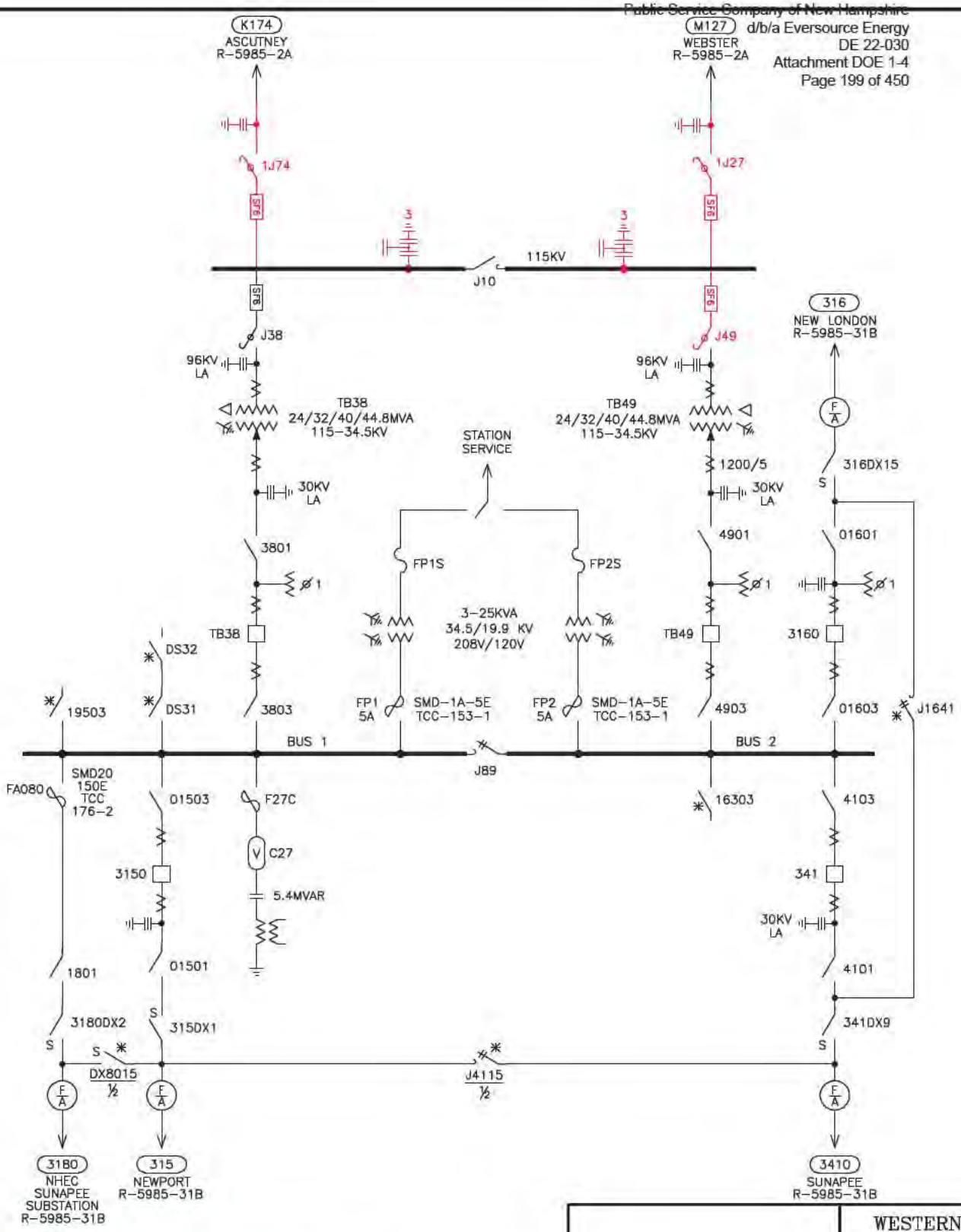
References

TPS-07-082-NH: PSNH Transmission System – Capital Replacement – replacement of old S&C type G circuit switchers-2007/2008.

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

SKT-NORTHRD_20180316 REMOVALS

SKT-NORTHRD_20180316 ADDITIONS

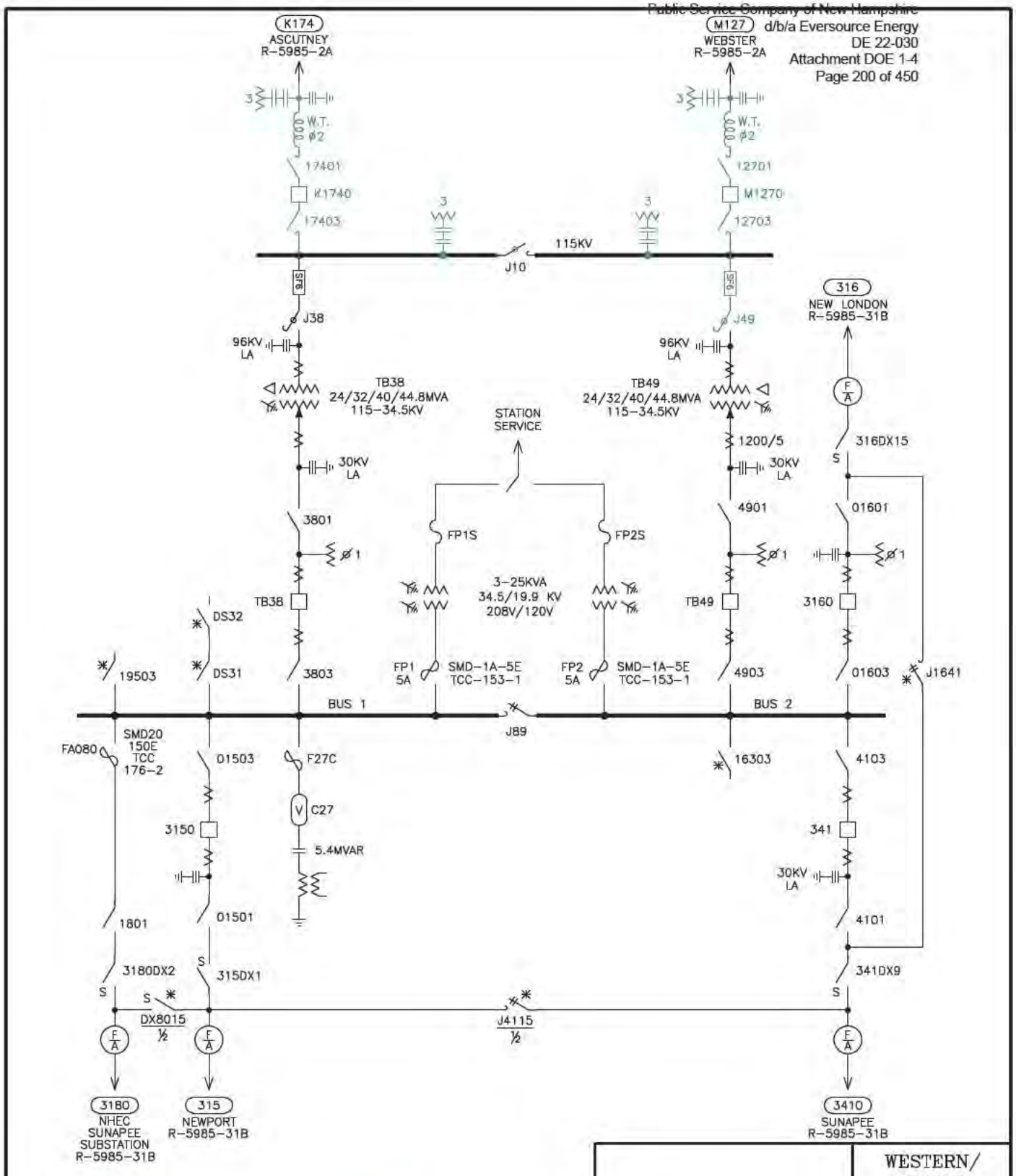


LAST REVISION DETAIL

REMOVALS

	WESTERN/ CENTRAL
NORTH ROAD NORTH ROAD, SUNAPEE, NH 763-5821	

DRN.	CHKD.	APPR.		
LJG			3/16/18	SKT-NORTHRD



LAST REVISION DETAIL

ADDITIONS

	WESTERN/ CENTRAL
NORTH ROAD NORTH ROAD, SUNAPEE, NH 763-5821	

DRN.	CHKD.	APPR.		
LJG			3/16/18	SKT-NORTHRD

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Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name : North Road SS Breaker Additions					**PAF No: T1365A & A17W19**
Facility Type: ☐ BPS	☒ BES	☒ PTF	☐ non-PTF	☐ CIP	☒ Distribution
PLANNING					
Is a NX-9 required?					Yes
Is an ISO-NE PAC presentation required?					Yes
Is a PPA required?					Yes
Is a TCA Application Required?					Yes
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?					No
OPERATIONS					
Outage Required?	☒ Primary Equipment (Power Transfer)		☒ Secondary Equipment (P&C only)		☐ Outage Not Required
Do SCLL Conditions Exist?					Yes
Has an outage schedule been approved?					No
Are Operations & Maintenance procedures/training required?					No
STANDARDS					
Does the project include standard equipment and designs?					Yes
SUBSTATION ENGINEERING					
Does this impact Revenue Metering					No
Is preliminary short circuit/ breaker duty analysis required?					No
Are there any changes to the baseline audible noise?					No
Is there an impact to the existing ground grid?					No
Is a Transient Over Voltage (TOV) analysis required?					No
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?					No
If BPS, is an NPCC Directory #4 presentation required?					No

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Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : North Road SS Breaker Addition	**PAF No: T1365A & A17W19**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
SITING & CONSTRUCTION SERVICES (OUTREACH)	
What is the level of outreach expected?	Medium
INITIATOR	
Has a field constructability review been completed?	No
INVESTMENT RECOVERY	
Does the project require development of an Investment Recovery plan?	No
COST ESTIMATING	
How was the cost estimate prepared?	Other (specify below)
Who prepared the estimate?	Thelma Brown
Was the estimate reviewed by Eversource Estimating?	Yes

North Road SS Project Estimate

Thelma Brown 06/25/18 T1365A A17W19

		Transmission	Distr bution		Transmission	Distr bution	Transmission	Distribution	Transmission	Distribution
		TOTAL		**Prior**	**2017**		**2018**		**2019**	
CONSTRUCTION		$1,124,000	$250,000	$0	$0	$0	$1,124,000	$250,000	$0	$0
ENGINEERING/DESIGN		$450,000	$146,000	$0	$39,000	$66,000	$411,000	$80,000	$0	$0
LAND		$0	$0	$0	$0	$0	$0	$0	$0	$0
MATERIAL		$450,000	$108,000	$0	$0	$8,000	$450,000	$100,000	$0	$0
PROJECT MGR & SUPPORT		$0	$0	$0	$0	$0	$0	$0	$0	$0
REMOVAL		$10,000	$5,000	$0	$0	$0	$10,000	$5,000	$0	$0
TEST		$280,000	$70,000	$0	$0	$0	$280,000	$70,000	$0	$0
CONTINGENCY		$100,000	$0	$0	$1,000	$0	$99,000	$0	$0	$0
ESCALATION		$0	$0	$0	$0	$0	$0	$0	$0	$0
INDIRECTS		$286,000	$255,000	$0	$5,000	$20,000	$281,000	$235,000	$0	$0
AFUDC		$5,000	$2,000	$0	$0	$0	$5,000	$2,000	$0	$0
Total Cost		**$2,705,000**	$836,000	**$0**	**$45,000**	**$94,000**	**$2,660,000**	**$742,000**	**$0**	**$0**
		$3,541,000								
		Transmission					Distribution			
		2017	2018	2019	Total		2017	2018	2019	Total
Straight time labor		5	85	0	90		7	55	0	62
Overtime labor					0					0
Outside Services		34	1,740	-	1,774		59	350	-	409
Materials		$0	$450	$0	450		$8	$100	$0	108
Other		$1	$99	$0	100		$0	$0	$0	0
Total		40	2,374	-	2,414		74	505	-	579
Indirects		$5	$281	$0	$286		$20	$235	$0	$255
AFUDC		$0	$5	$0	$5		$0	$2	$0	$2
Total		$5	$286	$0	$291		$20	$237	$0	$257
Total Capital Costs		45	2,660	-	2,705		$94	742	-	836

Indirects based on T12%E&S, D45% E&S
Outside Services from PM
Materials from PM

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Approved at September 4, 2019 EPAC
Link to Meeting Minutes

Date Prepared: January 9, 2019 (Rev. July 30, 2019)	**Project Title: North Road SS Breaker Additions**
Company/Companies: Eversource NH	**Project ID Number: T1365A (T) & A17W19 (D)**
Organization: NH Operations	**Plant Class/(F.P. Type): Transmission and Distribution Substation**
Project Initiator: David Cloutier	**Project Type: Specific**
Project Manager: Natacha Morales	**Capital Investment Part of Original Operating Plan? Yes**
Project Sponsor: Brian Dickie	**O&M Expenses Part of the Original Operating Plan? No**
Current Authorized Amount: $5,252K $3,493K (T) & $1,759K (D)	**Estimated in service date(s): T1365A in service June 29, 2019. A17W19 in service October 1, 2019**
Supplement Request: $1,024K $681K (T) & $343K (D)	**Other: N/A**
Total Request: $6,276K $4,174K (T) & $2,102K(D)	**PTF? Yes**

Supplement Justification

Background

The Full Funding PAF for this project was approved in PowerPlan in September 5, 2018 and August 7, 2018 for $2,705,000 (T) and $836,000 (D), respectively. The first supplemental request for $788,216 (T1365A) was approved in PowerPlan on May 8, 2019 and for $922,489 (A17W19) was approved in PowerPlan in April 2, 2019. This second supplement request is for $681K (T1365A) and $343K (A17W19) for a new project total of $6,276K ($4,174K: T1365A; $2,102K: A17W19). As of the end of June 2019, the Transmission portion of the project is in service (June 29, 2019) and the Distribution portion of the project is under construction. The spend to date as of July 30, 2019 is $3,700,249 for the Transmission portion (T1365A) and $1,490,000 for the Distribution portion (A17W19). The remaining work consists of installation, test and commissioning of security equipment in the control house, installation of the HVAC unit and the completion of the ground grid.

The purpose of this project, as stated in the original PAF, is to replace 115kV transmission circuit switchers with 115kV circuit breakers for reliability purposes at North Road Substation, replace one (1) 115kV distribution circuit switcher and upgrade relays for circuit breaker failure and expand the control house to accommodate the cabinets that is housing the new equipment to operate the new breakers. All the above installation/construction has been completed. Only the ground grid and installation of HMI, security cabinet and HVAC are ongoing.

This second supplemental request comes after several discrepancies in engineering that were discovered during the construction, testing and commissioning phases of the project. Some of the engineering design (Substation and P&C) was omitted and/or incorrectly designed causing additional costs to cover the revised design and associated construction, test and commissioning. It also covers costs associated with the design and construction at the remote end substation (Webster) as well as property taxes. Additional details are provided below.

The project team, procurement, engineering project controls and the engineering vendor have worked together to finalize an agreement between Eversource and the engineering contractor that was put in place to recover some of the costs incurred due to the engineering contractor's poor performance. As a result of the engineering issues we received a credit of approximately $18K to this specific project; this has been noted in the scorecard.

Justification for Additional Resources

The major contributors to the $1,024K variance of actual spending exceeding the original approved funding include the following:

TOTAL SUPPLEMENT REQUEST: $1,024K

Engineering $73K

This increase is mostly due to the changes and revisions that took place after the project was under construction, several modifications included the Webster remote end design, design of the J10 Switch, design of the bus ring connection for the mobile transformer.

Construction $368K

The construction contract was competitively bid and awarded. The increase is mostly due to design discrepancies from engineering, both external and internal. Eversource engineering created several Engineering Change Notices' that covered the missing scope of work increasing costs for construction and internal labor.

Additional construction also required additional internal resources for coverage and supervision.

Transmission $11K

- Remote work at Webster Substation (missed scope of work, internal engineering). This work was a necessary component of the project to be completed. This scope of work was not part of the scope document for this project. The Webster scope of work consisted of replacing and relocating the wave trap at Webster Substation to Phase 2 to make sure that all line carrier equipment for the K174 was properly communicating with

the new breakers installed at North Road substation. This scope of work was planned to be completed under an internal project utilizing internal resources for engineering and construction.

- Mobile transformer installation, building a temporary strain bus (additional scope of work). This was scope of work was missed during the design phase of the project. Once the field team were under construction, it was determined that a temporary strain bus was needed to accommodate the installation of the mobile transformer.
- J10 switch modifications (design conflict/issue).
- J10 conduits (design conflict/issue).
- P&C cabinet re-wiring (design conflict/issue).

Distribution $357K – After the start of construction, the field crew ran into some missing items that should have been part of the current authorized scope of work or were not designed correctly. Both Eversource and the engineering vendor missed, or did not correct errors for several items as part of the overall design, these include:

- Cabinet relocation (design conflict/issue).
- Coring and trench conduits (design conflict/issue).
- Transformer CT's and junction boxes (design conflict/issue).
- HVAC installation including RTU alarms and status, hydrogen sensing, AC Panel, fire alarm systems, exhaust fans and louvers (missed by Eversource, additional scope of work).
- Ground grid (ledge problems).
- Battery charger installation (design conflict/issue).
- HMI and security cabinets installation (design conflict/issue).

Test and Commissioning $199K

Transmission $179K – The Webster substation scope of work was added after the project was well underway. This required a lead commissioning engineer and test engineers to complete the installation of the wave trap and the line tuner. The ESCC requested that the line outages be returned daily, requiring more time to re-test primary conductors before they can be energized daily.

Also, the re-wiring of some P&C cabinets required more time to commission and re-test.

Distribution $20K – Additional resources were needed to complete test and commissioning after mitigating the different issues that were discovered during the construction phase, as well as the test and commissioning of the installation of the HMI and security cabinets which were not part of the current authorized scope of work.

The above activities also required additional internal resources to be present during the commissioning and testing of the equipment.

Materials $163K

Transmission $127K – These additional costs are associated with the wave trap and line tuner installations that were not part of the current authorized scope of work for the Webster Substation (remote end).

Distribution $36K – These additional costs are related to the mitigation of the different issues that were mentioned above. These include, but are not limited to, cables, bus fittings, terminations, grounding straps, junction boxes, conduits and wires.

This also includes an HMI and security cabinets that were missed in the current authorized scope of work of the project.

Other/Property Taxes $78K

Property taxes were not part of the original estimate (Transmission at $67K and Distribution at $11K. These are also difficult to forecast during the construction phase of the project.

Contingency ($100K)

Contingency funds were moved to another other line items. Contingency funds were utilized.

Indirects $224K

Overheads are directly increased by the additional costs related to construction, internal labor, test and commissioning.

Transmission $159K - These indirect costs are related to construction, test, commissioning and materials.

Distribution $65K – These indirect costs are related to construction costs as well as materials.

AFUDC $19K

This increase is directly related to the duration of the project and it is forecasted through September 2019.

The tables below summarize the line item categories from the current authorized budget and the updated project estimates along with the incremental change.

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Cost Breakdown

Transmission and Distribution

Note: Dollar values are in thousands:

Line item Category	Original Estimate	New Estimate	Delta
Engineering	$674	$747	$73
Environmental and Permitting	$74	$74	$0
Construction	$1,863	$2,231	$368
Testing & Commissioning	$464	$663	$199
Materials	$1,147	$1,310	$163
Removals	$15	$15	$0
Other/Property tax	$39	$117	$78
Contingency	$100	$0	($100)
Subtotal Direct Costs	**$4,376**	**$5,157**	**$781**
Indirects	$813	$1,037	$224
AFUDC	$63	82	$19
Total	**$5,252**	**$6,276**	**$1,024**

Transmission T1365A

Note: Dollar values are in thousands:

Line item Category	Original Estimate	New Estimate	Delta
Engineering	$527	$706	$179
Environmental and Permitting	$74	$68	($6)
Construction	$1,190	$1,201	$11
Testing & Commissioning	$347	$526	$179
Materials	$729	$856	$127
Removals	$10	$10	$0
Other/Property tax	$31	$98	$67
Contingency	$50	$0	($50)
Subtotal Direct Costs	**$2,958**	**$3,465**	**$507**
Indirects/	$487	$646	$159
AFUDC	$48	$63	$15
Total	**$3,493**	**$4,174**	**$681**

Distribution A17W19

Note: Dollar values are in thousands:

Line item Category	Original Estimate	New Estimate	Delta
Engineering	$147	$41	($106)
Environmental and Permitting	$0	$6	$6
Construction	$673	$1,030	$357
Testing & Commissioning	$117	$137	$20
Materials	$418	$454	$36
Removals	$5	$5	$0
Other/Property tax	$8	$19	$11
Contingency	$50	$0	($50)
Subtotal Direct Costs	**$1,418**	**$1,692**	**$274**
Indirects	$326	$391	$65
AFUDC	$15	$19	$4
Total	**$1,759**	**$2,102**	**$343**

Please see the previous authorization documentation attached.

Supplement Cost Summary – Total Project

Note: Dollar values are in thousands

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$4,361	$ 796	$5,157
Less Customer Contribution	$ -	$ -	$ -
Removals Net of Salvage ___%	$15	($15)	$0
Total Direct Spending	$4,376	$781	$5,157
Capital Additions - Indirect	$813	$224	$1,037
AFUDC	$63	$19	$82
Total Capital Request	$5,252	$1,024	$6,276
O&M	$ -	$ -	$ -
Total Request	**$5,252**	**$1,024**	**$6,276**

Total Supplement Request by year view:

	Year 2019	Year 2020	Year 2021	Total
Capital Additions Direct	$796	$ -	$ -	$796
Less Customer Contribution	$0	$ -	$ -	$0
Removals Net of Salvage ___%	($15)	$ -	$ -	($15)
Total Direct Spending	$781	$ -	$ -	$781
Capital Additions - Indirect	$224	$ -	$ -	$ 224
AFUDC	$19	$ -	$ -	$ 19
Subtotal Request	$1,024	$ -	$ -	$1,024
O&M	$0	$ -	$ -	$0
Total Request	**$1,024**	$ -	$ -	**$1,024**

Supplement Cost Summary - Transmission T1365A

Note: Dollar values are in thousands

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$2,948	$517	$3,465
Less Customer Contribution	$ -	$ -	$ -
Removals Net of Salvage ___%	$10	($10)	$ -
Total Direct Spending	$2,958	$507	$3,465
Capital Additions - Indirect	$487	$159	$646
AFUDC	$48	$15	$63
Total Capital Request	$3,493	$681	$4,174
O&M	$ -	$ -	$ -
Total Request	**$3,493**	**$681**	**$4,174**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2019	Year 2020	Year 2021	Total
Capital Additions Direct	$517	$ -	$ -	$517
Less Customer Contribution	$0	$ -	$ -	$0
Removals Net of Salvage ___%	($10)	$ -	$ -	($10)
Total Direct Spending	$507	$ -	$ -	$507
Capital Additions - Indirect	$159	$ -	$ -	$159
AFUDC	$15	$ -	$ -	$15
Subtotal Request	$681	$ -	$ -	$681
O&M	$0	$ -	$ -	$0
Total Request	**$681**	$ -	$ -	**$681**

Supplement Cost Summary - Distribution A17W19

Note: Dollar values are in thousands

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$1,413	$279	$1,692
Less Customer Contribution	$ -	$ -	$ -
Removals Net of Salvage ___%	$5	($5)	$0
Total Direct Spending	$1,418	$274	$1,692
Capital Additions - Indirect	$326	$65	$391
AFUDC	$15	$4	$19
Total Capital Request	$1,759	$343	$2,102
O&M	$ -	$ -	$ -
Total Request	**$1,759**	**$343**	**$2,102**

Total Supplement Request by year view:

	Year 2019	Year 2020	Year 2021	Total
Capital Additions Direct	$279	$ -	$ -	$279
Less Customer Contribution	$0	$ -	$ -	$0
Removals Net of Salvage ___%	($5)	$ -	$ -	($5)
Total Direct Spending	$274	$ -	$ -	$274
Capital Additions - Indirect	$65	$ -	$ -	$65
AFUDC	$4	$ -	$ -	$4
Subtotal Request	$343	$ -	$ -	$343
O&M	$0	$ -	$ -	$0
Total Request	**$343**	$ -	$ -	**$343**

Lessons Learned

1. Engineering design – This cost increase is linked to insufficient scope detail at the start of the project which impacts both scope and schedule. Minor design changes are inevitable as the project develops, but the more conceptual engineering that can be done prior to full funding approval, the fewer cost increases or schedule overruns will occur. Engineering must become familiarized with the existing conditions of the substations and work together with operations to include anything that might affect any changes on the project.
2. Construction – Eversource's cost estimating process should continue to monitor actual outturn costs for items such as construction, to ensure that initial cost estimates used for Project Approval accurately capture the cost of performing these activities. There will always be a risk that construction costs will increase while 70% design drawings are used for bidding purposes. Adjusting the schedule such that the Issued for Construction drawings are used for bidding would minimize the risk, but it is a matter of balancing the risk to the in-service date versus the likelihood of change orders. In the end, the total cost of the project would remain the same.
3. Testing & Commissioning – Eversource's cost estimating process should continue to monitor actual outturn costs for items such as testing and commissioning. To ensure that initial cost estimates used for Project Approval accurately capture the cost of performing these activities.

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Project Authorization Form

Operations Project Authorization Form

Approved at July 18, 2018 EPAC

Link to Meeting Minutes

Date Prepared: July 26, 2018	**Project Title:** North Road SS Breaker Additions
Company/ies: Eversource NH	**Project ID Number:** T1365A (T) & A17W19 (D)
Organization: NH Operations	**Class(es) of Plant:** Transmission and Distribution Substation
Project Initiator: David Cloutier	**Project Category:** T Reliability, Aging Infrastructure
Project Manager: Natacha Morales	**Project Type:** Specific Project
Project Sponsor: Brian Dickie	**Project Purpose:** Replace 115kV line switches with breakers and replace obsolete circuit switcher
Estimated in service date: 12/31/18	**If Transmission Project: PTF?**Yes
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan?** No
Total Request: $2,705,000 (T) & $836,000 (D)	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is to replace transmission line circuit switchers 1J74 and 1J27 with 115kV circuit breakers for reliability purposes. Since the North Road Substation in New Hampshire has 115-kV circuit switchers and not breakers, a fault condition on either the M-127 line or the K-174 line will initially trip both lines. Loss of the M-127 and K-174 lines will remove 115-kV supply to the North Road Substation until sectionalizing actions occur. The load at risk is approximately 15,700 customers, including tripping more than 40MW of generation.

This project is also to replace 115kV distribution equipment at North Road SS as defined by a specific program established to replace transmission S&C type G circuit switchers. At North Road SS, the Project includes adding two new relays for circuit switcher failure. The total project will also require a control house expansion, which is a distribution funded asset, since the existing control house is not large enough for the added relay and control cabinets.

The total funding request of this project is $2,705,000 for the transmission components and $836,000 for the distribution components.

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Project Costs Summary – Transmission T1365A
Note: Dollar values are in thousands

	Prior Authorized	2017	2018	2019+	Totals
Capital Additions - Direct	$370	$40	$2,374	$	$2,414
Less Customer Contribution	$	$	$	$	$
Removals net of Salvage ____%	$	$	$	$	$
Total - Direct Spending	$370	$40	$2,374	$	$2,414
Capital Additions - Indirect	$30	$5	$281	$	$286
Subtotal Request	$400	$45	$2,655	$	$2,700
AFUDC	$10	$0	$5	$	$5
Total Capital Request	$410	$45	$2,660	$	$2,705
O&M	$	$	$	$	$
Total Request	$410	$45	$2,660	$	$2,705

Project Costs Summary – Distribution A17W19
Note: Dollar values are in thousands

	Prior Authorized	2017	2018	2019+	Totals
Capital Additions - Direct	$80	$74	$505	$	$579
Less Customer Contribution	$	$	$	$	$
Removals net of Salvage %	$	$	$	$	$
Total - Direct Spending	$80	$74	$505	$	$579
Capital Additions - Indirect	$20	$20	$235	$	$255
Subtotal Request	$100	$94	$740	$	$834
AFUDC	$	$0	$2	$	$2
Total Capital Request	$100	$94	$742	$	$836
O&M	$	$	$	$	$
Total Request	$100	$94	$742	$	$836

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Project Authorization Form

Financial Evaluation – Transmission T1365A
Note: Dollar values are in thousands

Direct Capital Costs	2017	2018	2019+	Total
Straight Time Labor	$5	$85	$	$90
Overtime Labor	$	$	$	$
Outside Services	$34	$1,740	$	$1,774
Materials	$0	$450	$	$450
Other, including contingency amounts	$1	$99	$	$100
Total Direct Costs	**$40**	**$2,374**	**$**	**$2,414**

Indirect Capital Costs	2017	2018	2019+	Total
Indirects/Overheads (including benefits)	$5	$281	$	$286
Capitalized interest or AFUDC, if any	$0	$5	$	$5
Total Indirect Costs	**$5**	**$286**	**$**	**$291**

Total Capital Costs	**$45**	**$2,660**	**$**	**$2,705**
Less Total Customer Contribution	$	$	$	$
Total Capital Project Costs	**$45**	**$2,660**	**$**	**$2,705**
Total O&M Project Costs	$0	$	$	$

Other/Contingency/Risk Allocation:
Installation of the Mobile - $30,000
Soil removal and disposal $40,000
Potential environmental monitoring - $10,000
Site restoration $20,000

Financial Evaluation – Distribution A17W19
Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	$7	$55	$	$62
Overtime Labor	$	$	$	$
Outside Services	$59	$350	$	$409
Materials	$8	$100	$	$108
Other, including contingency amounts (describe)	$	$	$	$
Total Direct Costs	**$74**	**$505**	**$**	**$579**

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	$20	$235	$	$255
Capitalized interest or AFUDC, if any	$	$2	$	$2
Total Indirect Costs	**$20**	**$237**	**$**	**$257**

Total Capital Costs	**$94**	**$742**	**$**	**$836**
Less Total Customer Contribution	$	$	$	$
Total Capital Project Costs	**$94**	**$742**	**$**	**$836**
Total O&M Project Costs	$	$	$	$

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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:
N/A

What functional area(s) will these future costs be funded in?_____N/A_____
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? If yes, please provide details:

N/A

Are there other environmental cleanup costs associated with this project? **Yes** If yes, please provide details:

Soils Disposal is included in the Risk Allocation/contingency.

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Technical Justification:

Project Need Statement

Transmission: This project is to replace transmission line circuit switchers 1J74 and 1J27 with 115kV circuit breakers for reliability purposes. Since the North Road Substation in New Hampshire has 115-kV circuit switchers and not breakers, a fault condition on either the M-127 line or the K-174 line will initially trip both lines. Loss of the M-127 and K-174 lines will remove 115-kV supply to the North Road Substation until sectionalizing actions occur. These are SCADA devices, so switching can be performed within a matter of a few minutes once the fault location is known. However, in the current configuration, the fault location must be determined by field personnel first, which lengthens the outage time until crews reach the site and locate the fault. There are also protection and operational issues that will be addressed with this project that currently are handled in Station Orders. Because of the lack of line breakers, one of the transformers has to be taken out of service whenever a line is out of service because of coordination issues.

Distribution: This project is proposed to change an obsolete 115kV circuit switcher J49 at North Road SS. The control house will be expanded by 10 X 26 feet (260 sf) to accommodate new relay and control panels. The other circuit switcher J38 was previously replaced and is in good condition.

Project Objectives

1. 115kV Circuit Breaker Installation

To limit the exposure of a fault on the M-127 and K-174 lines from interrupting service to North Road SS.

2. 115kV Circuit Switcher Replacement

Replace the known obsolete S&C type G circuit switcher replacement that was identified in TPS-07-082-NH for targeted replacement. The J49 circuit switcher is a distribution asset and was not replaced at the time of the 2007/2008 transmission program. Note that the J38 circuit switcher failed in 2007 and was replaced at that time.

Project Scope

Major Equipment To Be Removed

Transmission:

1. Two (2) S&C Mark V 115kV Circuit Switchers and associated equipment
2. Six (6) coupling capacitors (CCVT)
3. LAs

Distribution:

4. One (1) S&C type G 115kV circuit switcher and associated equipment

Major Equipment To Be Added

Transmission:

1. Two (2) 115kV SF6 Circuit Breakers
2. Two (2) 115kV Wave Traps
3. Four (4) three phase 115kV disconnect switches
4. Relay and control cabinets including new bus differential scheme, primary and secondary line relay for the new 115kV line breakers.
5. Twelve (12) 115kV CCVT

6. Motor operator for Switch J10
7. LAs
8. Control Cables
9. Conduits, as required
10. Various wire, mounting brackets and connectors
11. Yard lightning study and equipment installations as required.
12. 115kV Breaker foundations
13. Yard lightning evaluation and upgrade as required.
14. Relay and control setting modification at Velco, Webster and North Road Substations.

Distribution:

15. Control House Expansion
16. One (1) S&C Mark V 115kV Circuit Switcher
17. Control Cables
18. Conduits, as required
19. Various wire, mounting brackets and connectors
20. Ground grid upgrades and modifications as required.
21. Two (2) SEL type 351 relays
22. Two (2) lockout relays
23. Station Battery Upgrades, as necessary.

Background / Justification

Transmission: The K-174 line is a 115-kV line that connects the Ascutney Substation in Vermont and the North Road Substation in New Hampshire and is 16.3 miles long. The M-127 line is a 115-kV line that connects the Webster and North Road Substations in New Hampshire and is 25.8 miles long. Customers are exposed to outages from temporary and permanent outages from exposure to a total of 42.1 miles of 115kV lines. This project is on the top 10 ESCC issues list. A history of the lines shows that for a trip of one line, both temporary and permanent, both lines and all of the customers at North Road SS are affected.

Outage History of the M127 and K174 Lines

Outage History on M127 and K174 involving North Road S/S					
DIR	S/S	Line	Type	Root Cause	Comments
06-10-20-09	North Road and Webster Substations	M127	T	Equipment Failure	Webster breaker M127 T/R - Ascutney breaker K174 T/R - North Rd breaker TB38 T/R - North Rd breaker TB49 T/R/T - HP & L Generator T
07-05-27-01	North Road and Webster Substations	M127	T	Unknown	Webster breaker M127 T/R - Ascutney breaker K174 T/R - North Road TB38 & TB49 T/R -

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					Claremont breakers 52 & 59 T/R.
07-07-06-03	North Road and Webster Substations	M127	T	Lightning	Lightning in the area - T/R Found broken crossarms; replaced.
07-07-09-02	North Road and Webster Substations	M127	T	Lightning	Lightning in the area.
07-07-10-01	North Road and Webster Substations	M127	T	Lightning	Three crossarms replaced on K174 - Missed Scada indication on TB39 and TB49. Webster breaker M127 T/R - VE Ascutney breaker K174 T/R - North Rd breakers TB38 and TB49 TR - HempHill breaker G1 T. 12/04/07
08-12-12-20	North Road Substation	K174	T	Ice / Sleet / Snow	This was an operation at Ascutney. The K174 breaker was tripped by some problem in the VELCO systems. There was not a fault on the K174/M127 line. No PSNH equipment operated.
10-02-26-09	Webster Substation	M127	P	Unknown	Webster M127 T/R/T - North Road TB38 T/R - North Road TB49 T - Velco Ascutney K174 T/R - Lempster 260 T.
10-07-19-04	North Road and Webster Substations	M127	T	Lightning	Lightning in the area. Webster M127, VE Ascutney K174 and North RD TB49 T/R. Fault was on VELCO's line beyond North Road.

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11-08-19-06	North Road Substation	K174	T	Lightning	Ascutney K174 Tr/Rx. - Overtrip from V182 operation. Equipment changed out on VELCO system.
11-08-21-02	North Road and Webster Substations	M127	T	Lightning	Webster M127 Tr/Rx, North Road TB38 Tr/Rx, North Road TB49 Tr/Rx, Springfield Power Tr.
12-08-25-01	North Road and Webster Substations	M127	T	Lightning	Additional Lines Affected: K174 North Road TB38 Tr/Rx, North Road TB49 Tr/Rx, Webster M127 Tr/Rx, Ascutney K174 Tr/Rx, Lempster 260 Tr, Springfield P&L Tr. Storm in the area.
13-09-11-04	North Road and Webster Substations	M127	P	Lightning	Webster M127 Tr/Rx, Lempster OCR 260 Tr, North Road TB38 Tr, North Road TB49 Tr/Rx. Transfer trip sent to Lempster.
15-05-27-02	North Road and Webster Substations	M127	P	Lightning	Confirmed lightning strike near North Road Substation.
15-08-15-05	North Road and Webster Substations	M127	T	Lightning	Damaged crossarm at structure 204 was replaced the next day.
17-05-30	North Road Substation	K174	T	Lightning	

Additionally there are protection and operational issues associated with the lack of breakers at North Road SS. Because of the length of this line the Webster relays can detect faults on the 34.5 kV bus at North Road when the K174 is out. There is an operational requirement when feeding North Road SS radially from either Webster SS or Ascutney SS to remove one transformer from service at North Road

SS for relay coordination between the low side feeder breakers and the 115kV source. With the new 115kV breakers this operating restriction can be removed.

Distribution: This project is also to replace distribution equipment targeted at North Road SS as defined by a specific transmission program established to replace S&C type G circuit switches. An expansion to the substation control house is required.

1. The S&C type G circuit switcher replacement program was a Transmission program identified in TPS-07-082-NH. The J49 circuit switcher is old and past expected life. The vendor formally does not support this unit with spare parts. The TPS-07-082-NH is attached to this TAF.

Control House expansion to accommodate new relay and control panels.

Business Process and / or Technical Improvements:

Increase reliability to customers from transmission line faults or lightning strikes. Addresses protection and operational issues associated with the lack of breakers.

Replacement of obsolete equipment prior to failure to improve reliability.

Alternatives Considered with Cost Estimates

The alternative to the transmission project to install breakers for the 115kV M-127 and K-174 lines is to do nothing and continue to expose customers to outages associated with both lines.

The alternative to not replacing the known obsolete circuit switcher is exposure to unplanned bus outages in the event that there is a problem operating the J49 circuit switcher.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering Bid	11/1/17
Start Engineering	3/1/18
Permitting	7/1/18
Construction	9/1/18
In Service Date	12/31/18

Regulatory Approvals

Permitting required by the Town of Sunapee – Building Permit

Risks and Risk Mitigation Plans

Coordination with VELCO is required for the setting, testing & commissioning at their Ascutney SS.

- Delay in testing and commissioning.
- Make sure there are adequate communications with VELCO through the engineering and construction phases to coordinate testing and outages.
- Obtain LCE resources early in the project life cycle.
- Maintain close coordination between Eversource LCE's and VELCO's personnel as well as control centers to ensure safe outages

Maintenance and storm hardening projects

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- Coordinate with other PM's for both maintenance and storm hardening projects to utilize outages the best way possible without causing any interruption to the system.
- Provide the ESCC a detailed outage sequence with zones and durations.
- Request engineering vendor to provide a sequential one – lines.
- Maintain close coordination with the ESCC to ensure all three (3) projects can be successfully completed without any interruption.

The loading during construction may require the use of the mobile substation.

- Delay in construction while waiting for the mobile to be available.
- Make sure projects are engineered and ready so construction can be scheduled around the best times for loading.
- Obtain a detailed outage sequence early in the project life cycle.
- Negotiate with other PMs and the ESCC to ensure that the mobile is used appropriately.
- Coordinate with Maintenance Planner/Scheduler to ensure that a mobile is available for the project early in the project life cycle and reserve it.

- Outage cancelled due to unplanned events on the system resulting in schedule delay and potential labor cost to remobilize. Establish and manage outages using proven coordination teams; 1) Construction Management 2) Coordination Meetings 3) Outage Planning Meeting

Internal and external resource availability for engineering.

- Balance engineering and review work between internal resources and external resources. Implement the use of project schedules.

Lack of sufficient, qualified, local construction and testing & commissioning labor results in the need to import labor which potentially increases costs or lengthen the schedule which will result in project delays.

- Prepare construction bid package with 70%'s for all disciplines.
- RFP's for cabinets to start with 30% P&C.Prepare a thorough scope document to secure LCE's and testing early in the project life cycle.

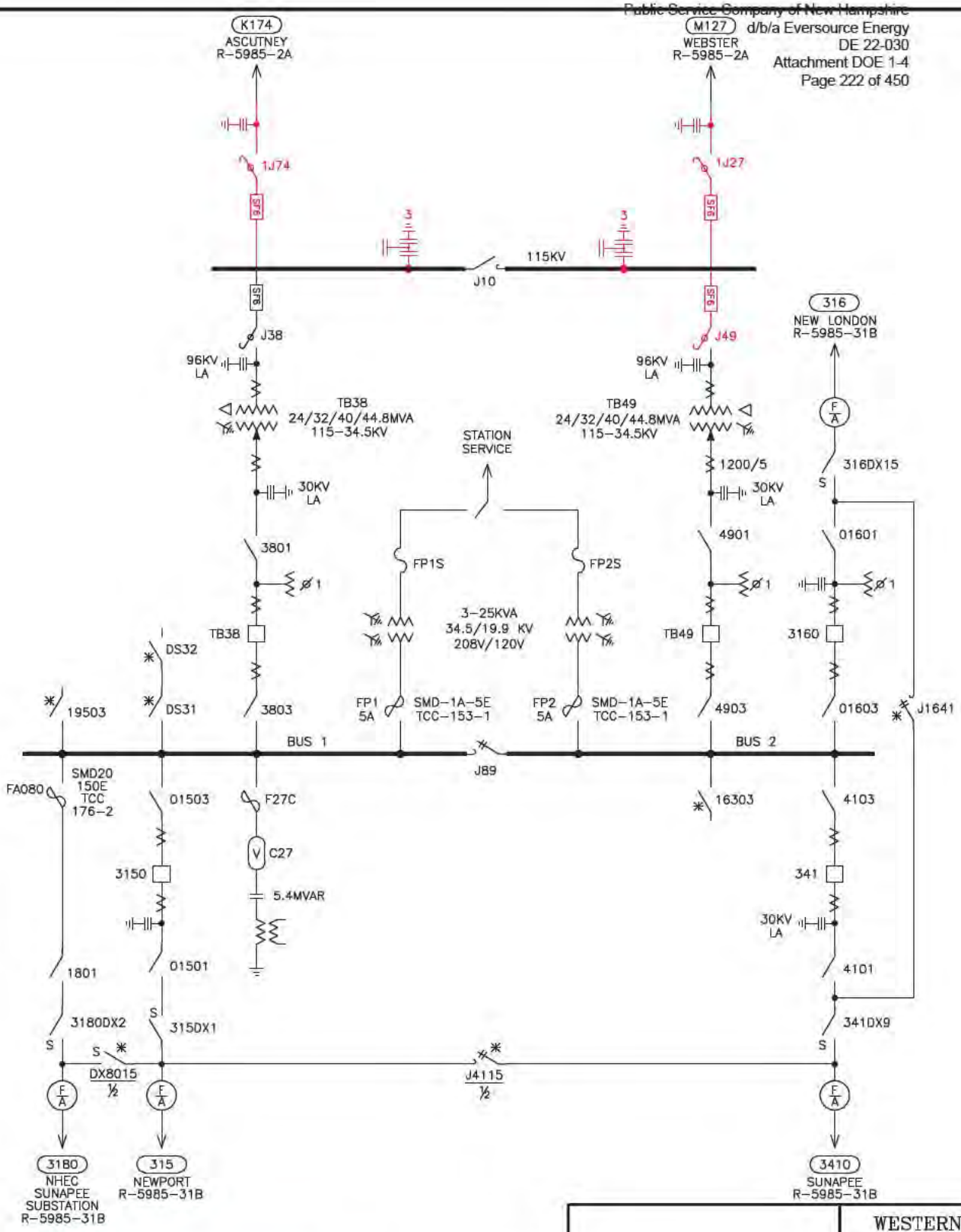
References

TPS-07-082-NH: PSNH Transmission System – Capital Replacement – replacement of old S&C type G circuit switchers-2007/2008.

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

SKT-NORTHRD_20180316 REMOVALS

SKT-NORTHRD_20180316 ADDITIONS

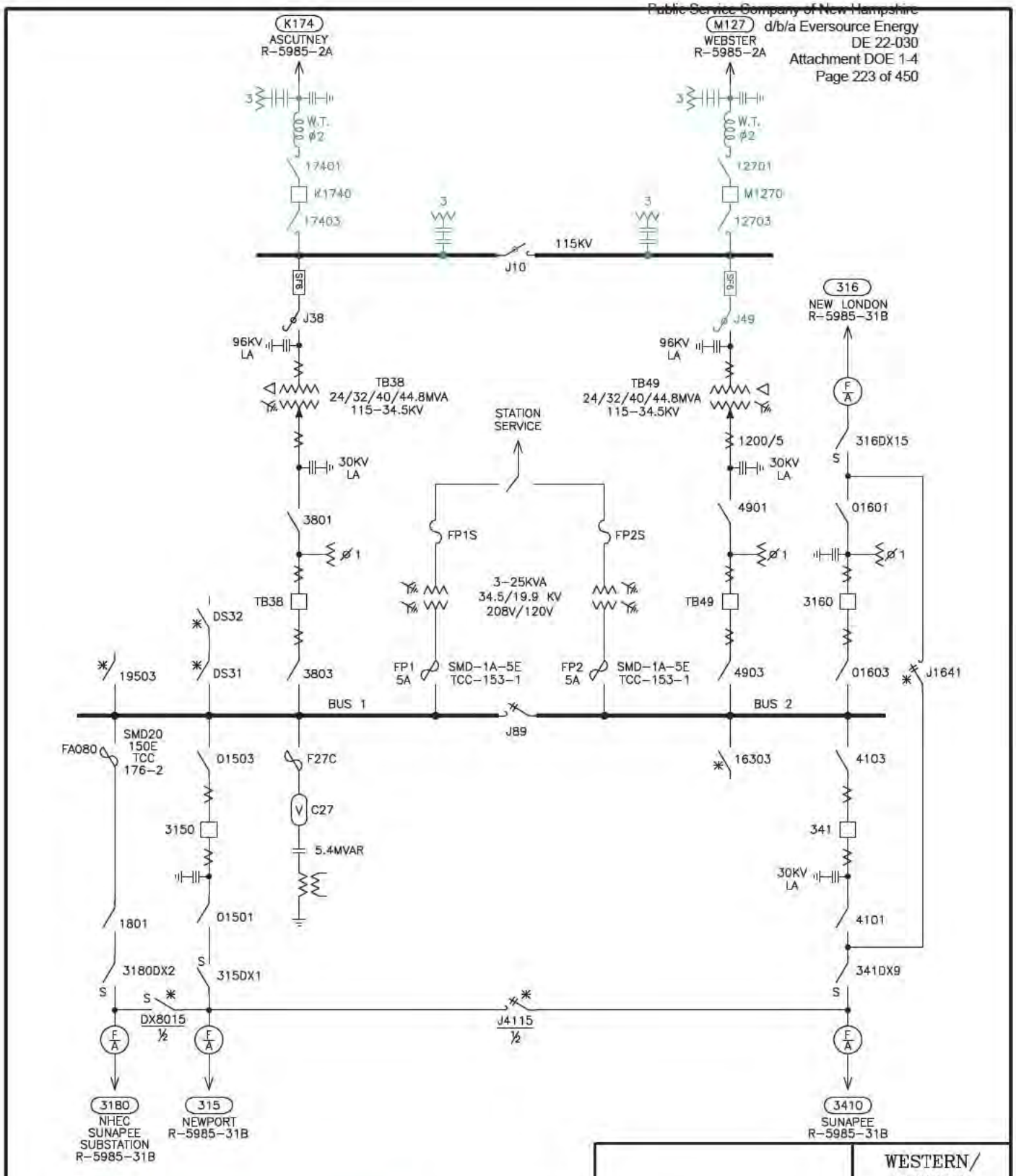


LAST REVISION DETAIL

REMOVALS

	WESTERN/ CENTRAL
NORTH ROAD NORTH ROAD, SUNAPEE, NH 763-5821	

DRN.	CHKD.	APPR.		
LJG			3/16/18	SKT-NORTHRD



LAST REVISION DETAIL

ADDITIONS

WESTERN/
CENTRAL

NORTH ROAD
NORTH ROAD, SUNAPEE, NH
763-5821

DRN.	CHKD.	APPR.		
LJG			3/16/18	SKT-NORTHRD

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Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name : North Road SS Breaker Additions					**PAF No: T1365A & A17W19**
Facility Type: ☐ BPS	☒ BES	☒ PTF	☐ non-PTF	☐ CIP	☒ Distribution
PLANNING					
Is a NX-9 required?					Yes
Is an ISO-NE PAC presentation required?					Yes
Is a PPA required?					Yes
Is a TCA Application Required?					Yes
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?					No
OPERATIONS					
Outage Required?	☒ Primary Equipment (Power Transfer)		☒ Secondary Equipment (P&C only)		☐ Outage Not Required
Do SCLL Conditions Exist?					Yes
Has an outage schedule been approved?					No
Are Operations & Maintenance procedures/training required?					No
STANDARDS					
Does the project include standard equipment and designs?					Yes
SUBSTATION ENGINEERING					
Does this impact Revenue Metering					No
Is preliminary short circuit/ breaker duty analysis required?					No
Are there any changes to the baseline audible noise?					No
Is there an impact to the existing ground grid?					No
Is a Transient Over Voltage (TOV) analysis required?					No
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?					No
If BPS, is an NPCC Directory #4 presentation required?					No

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Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : North Road SS Breaker Addition	**PAF No: T1365A & A17W19**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
SITING & CONSTRUCTION SERVICES (OUTREACH)	
What is the level of outreach expected?	Medium
INITIATOR	
Has a field constructability review been completed?	No
INVESTMENT RECOVERY	
Does the project require development of an Investment Recovery plan?	No
COST ESTIMATING	
How was the cost estimate prepared?	Other (specify below)
Who prepared the estimate?	Thelma Brown
Was the estimate reviewed by Eversource Estimating?	Yes

North Road SS Project Estimate

Thelma Brown 06/25/18 T1365A A17W19

		Transmission	Distr bution		Transmission	Distr bution	Transmission	Distribution	Transmission	Distribution
		TOTAL		**Prior**	**2017**		**2018**		**2019**	
CONSTRUCTION		$1,124,000	$250,000	$0	$0	$0	$1,124,000	$250,000	$0	$0
ENGINEERING/DESIGN		$450,000	$146,000	$0	$39,000	$66,000	$411,000	$80,000	$0	$0
LAND		$0	$0	$0	$0	$0	$0	$0	$0	$0
MATERIAL		$450,000	$108,000	$0	$0	$8,000	$450,000	$100,000	$0	$0
PROJECT MGR & SUPPORT		$0	$0	$0	$0	$0	$0	$0	$0	$0
REMOVAL		$10,000	$5,000	$0	$0	$0	$10,000	$5,000	$0	$0
TEST		$280,000	$70,000	$0	$0	$0	$280,000	$70,000	$0	$0
CONTINGENCY		$100,000	$0	$0	$1,000	$0	$99,000	$0	$0	$0
ESCALATION		$0	$0	$0	$0	$0	$0	$0	$0	$0
INDIRECTS		$286,000	$255,000	$0	$5,000	$20,000	$281,000	$235,000	$0	$0
AFUDC		$5,000	$2,000	$0	$0	$0	$5,000	$2,000	$0	$0
Total Cost		**$2,705,000**	$836,000	**$0**	**$45,000**	**$94,000**	**$2,660,000**	**$742,000**	**$0**	**$0**
		$3,541,000								

		Transmission					Distribution			
		2017	2018	2019	Total		2017	2018	2019	Total
Straight time labor		5	85	0	90		7	55	0	62
Overtime labor					0					0
Outside Services		34	1,740	-	1,774		59	350	-	409
Materials		$0	$450	$0	450		$8	$100	$0	108
Other		$1	$99	$0	100		$0	$0	$0	0
Total		40	2,374	-	2,414		74	505	-	579
Indirects		$5	$281	$0	$286		$20	$235	$0	$255
AFUDC		$0	$5	$0	$5		$0	$2	$0	$2
Total		$5	$286	$0	$291		$20	$237	$0	$257
Total Capital Costs		45	2,660	-	2,705		$94	742	-	836

Indirects based on T12%E&S, D45% E&S
Outside Services from PM
Materials from PM

Supplement Request Form

Approved at February 20, 2019 EPAC

Link to Meeting Minutes

Date Prepared: January 9, 2019	**Project Title: North Road SS Breaker Additions**
Company/Companies: Eversource NH	**Project ID Number: T1365A (T) & A17W19 (D)**
Organization: NH Operations	**Plant Class/ (F.P. Type): Transmission and Distribution Substation**
Project Initiator: David Cloutier	**Project Type: Specific**
Project Manager: Natacha Morales	**Capital Investment Part of Original Operating Plan? Yes**
Project Sponsor: Brian Dickie	**O&M Expenses Part of the Original Operating Plan? No**
Current Authorized Amount: $3,541,000 $2,705,000 (T) & $836,000 (D)	**Estimated in service date(s): December 31, 2019**
Supplement Request: $1,710,705 $788,216 (T) & $922,489 (D)	**PTF: Yes**
Total Request: $5,251,705 $3,493,216 (T) & $1,758,489 (D)	

Supplement Justification

Background

The Full Funding PAF (see attached) for this project was approved in PowerPlan in August 7th, 2018 for $2,705,000 (T) and $836,000 (D). This supplemental request is for $1,710,705 ($788,216 T; $922,489 D), which increases the total project cost to $5,251,705 ($3,493,216 T; $1,758,489 D). As of end of January 2019 engineering is complete, major materials have been received and the substation is under construction. The spend to date (01/13/19) is $1,310,667 for the Transmission portion and $781,869 for the Distribution portion. The substation will be wired and ready to begin testing and commissioning by the end of March 2019. The planned ISD has been pushed out to the end of December 2019 due to delays in project approval from ISO – NE and outage constraints. Since the approval of the project, the construction contract was competitively bid and appropriately awarded. Commissioning and testing proposals have been received and awarded.

The purpose of this project, as stated in the original PAF, is to replace 115kV transmission circuit switchers with 115kV circuit breakers for reliability purposes at North Road Substation. The project will also replace one (1) 115kV distribution circuit switcher and upgrade relays for circuit breaker failure. The project will require a control house expansion to accommodate the cabinets that will be housing new equipment to operate the new breakers. There has not been a change in scope.

After a competitive bid for construction, purchase of major materials and proposals for test and commissioning, the cost for materials (Eversource and Contractor), test and commissioning for this scope of work is significantly higher than expected. Construction is lower for the Transmission portion but much higher for the Distribution portion of the project. Part of this is due to incorrect assumptions regarding asset ownership in the original estimate.

Justification for Additional Resources

The following describes in detail, the contributing factors to the $1,710,705 increase in total project cost.

Materials $589,292 total

Distribution $309,967 – After a competitive bid for construction, the price for materials provided by the contractor was higher than forecasted, specifically for the control house expansion and yard work. Only major materials equipment was forecasted in the original estimate.

Transmission $279,325 – The cost of the materials to build foundations was higher than expected once the construction contract was competitively bid out. The original PAF included the replacement of six (6) 115kV CCVT's; as engineering advanced, it was determined that the existing bus CCVT's required replacement due to their existing accuracy.

Construction $334,604 total

The construction contract was competitively bid and awarded. The increase is mostly on the Distribution part of the project. There is an extensive amount of civil work to be done at the site which includes control house expansion, installation of new ground grid, fence work and trenching for new cabling. As North Road is a shared station, these shared assets are considered Distribution assets. The Transmission construction estimate was higher than what the actual bid pricing is based on proper asset cost allocation.

Distribution $410,927 – After a competitive bid, the construction cost for the Distribution scope of work in the Substation (fence work, expansion of the control house, grounding, yard racing, wiring, installation of Distribution major materials) resulted in a cost of $660,927. This resulted in a net increase of $410,927 above the $250,000 original budget.

Transmission ($76,323) – The construction scope of work was competitively bid resulting in a cost of $1,047,677. The bid price included lower than estimated costs for line construction labor and matting work. This resulted in a net decrease of $76,323 from the $1,124,000 original budget.

Internal labor $136,980 total

For both projects, the internal labor has increased due to extension of the overall duration of the project. The duration for construction, test and commissioning has increased. This leads to more man hours for Eversource's Construction Services. Outages have been extended and some of them have been moved to the Fall of 2019. The spend to date is $127,000 for internal labor (construction representative/station standby) which only covered 2018. The forecast of $161,980 will cover construction services for 2019.

Engineering $107,776 total

The relay settings development and review had to be outsourced as well as the design for the Webster Substation remote end. Additionally, to address operations concerns for customer reliability, a temporary bus design was developed to install a mobile transformer.

Test and Commissioning $100,380 total

Both projects have been extended in duration due to outage conflicts, construction duration and final ISO approval. The original outage duration was for a total of eight (8) weeks. However, there are other projects taking place on the M127 and the K174 115kV lines that have influenced the addition and extension of the outages. After coordination with the ESCC, mobile transformer availability and other projects, we will be using eighteen (18) weeks of outages in addition to the pre-outage time needed to complete isolation plans, energization plans, etc. This will require about 1,300-man hours to complete the test and commissioning of this project. This is a net increase of $100,380 from the $350,000 budgeted for both Distribution and Transmissions.

Environmental and permitting $74,100 total

The installation of the temporary mobile required environmental permitting (Utility Maintenance Notice) because of temporary wetland impact. Additionally, as the field crew mobilized a concern raised for asbestos and contaminants in the soil, which required additional environmental resources for testing. These activities caused a cost increase of $74,100 from the original budget.

Other/Property Taxes $38,883 total

Property taxes were not included in the original estimate.

The tables below summarize the line item categories from the original project estimates and the updated project estimates.

Transmission T1365A

Discipline	Original Estimate	Forecast	Delta
Internal Labor	$90,000	$254,432	$164,432
Engineering	$360,000	$428,210	$68,210
Environmental and permitting	$0	$74,100	$74,100
Construction	$1,124,000	$1,047,677	($76,323)
Testing & Commissioning	$280,000	$333,690	$53,690
Materials	$450,000	$729,325	$279,325
Removals	$10,000	$10,000	$0
Other/Property tax	$0	$30,399	$30,399
Contingency	$100,000	$50,000	($50,000)
Subtotal Direct Costs	$2,414,000	$2,957,833	$543,833
Indirects/AFUDC	$291,000	$535,383	$244,383
Total	**$2,705,000**	**$3,493,216**	**$788,216**

Distribution A17W19

Discipline	Original Estimate	Forecast	Delta
Internal Labor	$62,000	$34,548	($27,452)
Engineering	$84,000	$123,566	$39,566
Construction	$250,000	$660,927	$410,927
Environmental and permitting	$0	$0	$0
Testing & Commissioning	$70,000	$116,690	$46,690
Materials	$108,000	$417,967	$309,967
Removals	$5,000	$5,000	$0
Other/Property tax	$0	$8,484	$8,484
Contingency	$0	$50,000	$50,000
Subtotal Direct Costs	$579,000	$1,417,182	$838,182
Indirects/AFUDC	$257,000	$341,307	$84,307
Total	**$836,000**	**$1,758,489**	**$922,489**

Transmission and Distribution Combined

Discipline	Original Estimate	Forecast	Delta
Internal Labor	$152,000	$288,980	$136,980
Engineering	$444,000	$551,776	$107,776
Construction	$1,374,000	$1,708,604	$334,604
Environmental and permitting	$0	$74,100	$74,100
Testing & Commissioning	$350,000	$450,380	$100,380
Materials	$558,000	$1,147,292	$589,292
Removals	$15,000	$15,000	$0
Other/Property tax	$0	$38,883	$38,883
Contingency	$100,000	$100,000	$0
Subtotal Direct Costs	$2,993,000	$4,375,015	$1,382,015
Indirects/AFUDC	$548,000	$876,690	$328,690
Total	**$3,541,000**	**$5,251,705**	**$1,710,705**

Supplement Cost Summary - Transmission T1365A

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 2,414	$ 544	$ 2,958
Less Customer Contribution	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -
Total Direct Spending	$ 2,414	$ 544	$ 2,958
Capital Additions - Indirect	$ 286	$ 152	$ 438
AFUDC	$ 5	$ 92	$ 97
Total Capital Request	$ 2,705	$ 788	$ 3,493
O&M	$ -	$ -	$ -
Total Request	**$ 2,705**	**$ 788**	**$ 3,493**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2018	Year 2019	Total
Capital Additions - Direct	$ -	$ 544	$ 544
Less Customer Contribution	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -
Total Direct Spending	$ -	$ 544	$ 544
Capital Additions - Indirect	$ -	$ 152	$ 152
AFUDC	$ -	$ 92	$ 92
Total Capital Request	$ -	$ 788	$ 788
O&M	$ -	$ -	$ -
Total Request	**$ -**	**$ 788**	**$ 788**

Supplement Cost Summary - Distribution A17W19

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 579	$ 838	$ 1,417
Less Customer Contribution	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -
Total Direct Spending	$ 579	$ 838	$ 1,417
Capital Additions - Indirect	$ 255	$ 40	$ 295
AFUDC	$ 2	$ 44	$ 46
Total Capital Request	$ 836	$ 922	$ 1,758
O&M	$ -	$ -	$ -
Total Request	**$ 836**	**$ 922**	**$ 1,758**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2018	Year 2019	Total
Capital Additions - Direct	$ -	$ 838	$ 838
Less Customer Contribution	$ -	$ -	$ -
Removals net of Salvage ____%	$ -	$ -	$ -
Total Direct Spending	$ -	$ 838	$ 838
Capital Additions - Indirect	$ -	$ 40	$ 40
AFUDC	$ -	$ 44	$ 44
Total Capital Request	$ -	$ 922	$ 922
O&M	$ -	$ -	$ -
Total Request	**$ -**	**$ 922**	**$ 922**

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Operations Project Authorization Form

Approved at July 18, 2018 EPAC

Link to Meeting Minutes

Date Prepared: July 26, 2018	**Project Title:** North Road SS Breaker Additions
Company/ies: Eversource NH	**Project ID Number:** T1365A (T) & A17W19 (D)
Organization: NH Operations	**Class(es) of Plant:** Transmission and Distribution Substation
Project Initiator: David Cloutier	**Project Category:** T Reliability, Aging Infrastructure
Project Manager: Natacha Morales	**Project Type:** Specific Project
Project Sponsor: Brian Dickie	**Project Purpose:** Replace 115kV line switches with breakers and replace obsolete circuit switcher
Estimated in service date: 12/31/18	**If Transmission Project: PTF?**Yes
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan?** No
Total Request: $2,705,000 (T) & $836,000 (D)	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is to replace transmission line circuit switchers 1J74 and 1J27 with 115kV circuit breakers for reliability purposes. Since the North Road Substation in New Hampshire has 115-kV circuit switchers and not breakers, a fault condition on either the M-127 line or the K-174 line will initially trip both lines. Loss of the M-127 and K-174 lines will remove 115-kV supply to the North Road Substation until sectionalizing actions occur. The load at risk is approximately 15,700 customers, including tripping more than 40MW of generation.

This project is also to replace 115kV distribution equipment at North Road SS as defined by a specific program established to replace transmission S&C type G circuit switchers. At North Road SS, the Project includes adding two new relays for circuit switcher failure. The total project will also require a control house expansion, which is a distribution funded asset, since the existing control house is not large enough for the added relay and control cabinets.

The total funding request of this project is $2,705,000 for the transmission components and $836,000 for the distribution components.

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Project Costs Summary – Transmission T1365A
Note: Dollar values are in thousands

	Prior Authorized	2017	2018	2019+	Totals
Capital Additions - Direct	$370	$40	$2,374	$	$2,414
Less Customer Contribution	$	$	$	$	$
Removals net of Salvage ____%	$	$	$	$	$
Total - Direct Spending	$370	$40	$2,374	$	$2,414
Capital Additions - Indirect	$30	$5	$281	$	$286
Subtotal Request	$400	$45	$2,655	$	$2,700
AFUDC	$10	$0	$5	$	$5
Total Capital Request	$410	$45	$2,660	$	$2,705
O&M	$	$	$	$	$
Total Request	$410	$45	$2,660	$	$2,705

Project Costs Summary – Distribution A17W19
Note: Dollar values are in thousands

	Prior Authorized	2017	2018	2019+	Totals
Capital Additions - Direct	$80	$74	$505	$	$579
Less Customer Contribution	$	$	$	$	$
Removals net of Salvage %	$	$	$	$	$
Total - Direct Spending	$80	$74	$505	$	$579
Capital Additions - Indirect	$20	$20	$235	$	$255
Subtotal Request	$100	$94	$740	$	$834
AFUDC	$	$0	$2	$	$2
Total Capital Request	$100	$94	$742	$	$836
O&M	$	$	$	$	$
Total Request	$100	$94	$742	$	$836

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Financial Evaluation – Transmission T1365A
Note: Dollar values are in thousands

Direct Capital Costs	2017	2018	2019+	Total
Straight Time Labor	$5	$85	$	$90
Overtime Labor	$	$	$	$
Outside Services	$34	$1,740	$	$1,774
Materials	$0	$450	$	$450
Other, including contingency amounts	$1	$99	$	$100
Total Direct Costs	**$40**	**$2,374**	**$**	**$2,414**

Indirect Capital Costs	2017	2018	2019+	Total
Indirects/Overheads (including benefits)	$5	$281	$	$286
Capitalized interest or AFUDC, if any	$0	$5	$	$5
Total Indirect Costs	**$5**	**$286**	**$**	**$291**

Total Capital Costs	**$45**	**$2,660**	**$**	**$2,705**
Less Total Customer Contribution	$	$	$	$
Total Capital Project Costs	**$45**	**$2,660**	**$**	**$2,705**
Total O&M Project Costs	$0	$	$	$

Other/Contingency/Risk Allocation:
Installation of the Mobile - $30,000
Soil removal and disposal $40,000
Potential environmental monitoring - $10,000
Site restoration $20,000

Financial Evaluation – Distribution A17W19
Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	$7	$55	$	$62
Overtime Labor	$	$	$	$
Outside Services	$59	$350	$	$409
Materials	$8	$100	$	$108
Other, including contingency amounts (describe)	$	$	$	$
Total Direct Costs	**$74**	**$505**	**$**	**$579**

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	$20	$235	$	$255
Capitalized interest or AFUDC, if any	$	$2	$	$2
Total Indirect Costs	**$20**	**$237**	**$**	**$257**

Total Capital Costs	**$94**	**$742**	**$**	**$836**
Less Total Customer Contribution	$	$	$	$
Total Capital Project Costs	**$94**	**$742**	**$**	**$836**
Total O&M Project Costs	$	$	$	$

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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:
N/A

What functional area(s) will these future costs be funded in?_____N/A_____
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? If yes, please provide details:

N/A

Are there other environmental cleanup costs associated with this project? **Yes** If yes, please provide details:

Soils Disposal is included in the Risk Allocation/contingency.

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Technical Justification:

Project Need Statement

Transmission: This project is to replace transmission line circuit switchers 1J74 and 1J27 with 115kV circuit breakers for reliability purposes. Since the North Road Substation in New Hampshire has 115-kV circuit switchers and not breakers, a fault condition on either the M-127 line or the K-174 line will initially trip both lines. Loss of the M-127 and K-174 lines will remove 115-kV supply to the North Road Substation until sectionalizing actions occur. These are SCADA devices, so switching can be performed within a matter of a few minutes once the fault location is known. However, in the current configuration, the fault location must be determined by field personnel first, which lengthens the outage time until crews reach the site and locate the fault. There are also protection and operational issues that will be addressed with this project that currently are handled in Station Orders. Because of the lack of line breakers, one of the transformers has to be taken out of service whenever a line is out of service because of coordination issues.

Distribution: This project is proposed to change an obsolete 115kV circuit switcher J49 at North Road SS. The control house will be expanded by 10 X 26 feet (260 sf) to accommodate new relay and control panels. The other circuit switcher J38 was previously replaced and is in good condition.

Project Objectives

1. 115kV Circuit Breaker Installation

To limit the exposure of a fault on the M-127 and K-174 lines from interrupting service to North Road SS.

2. 115kV Circuit Switcher Replacement

Replace the known obsolete S&C type G circuit switcher replacement that was identified in TPS-07-082-NH for targeted replacement. The J49 circuit switcher is a distribution asset and was not replaced at the time of the 2007/2008 transmission program. Note that the J38 circuit switcher failed in 2007 and was replaced at that time.

Project Scope

Major Equipment To Be Removed

Transmission:

1. Two (2) S&C Mark V 115kV Circuit Switchers and associated equipment
2. Six (6) coupling capacitors (CCVT)
3. LAs

Distribution:

4. One (1) S&C type G 115kV circuit switcher and associated equipment

Major Equipment To Be Added

Transmission:

1. Two (2) 115kV SF6 Circuit Breakers
2. Two (2) 115kV Wave Traps
3. Four (4) three phase 115kV disconnect switches
4. Relay and control cabinets including new bus differential scheme, primary and secondary line relay for the new 115kV line breakers.
5. Twelve (12) 115kV CCVT

6. Motor operator for Switch J10
7. LAs
8. Control Cables
9. Conduits, as required
10. Various wire, mounting brackets and connectors
11. Yard lightning study and equipment installations as required.
12. 115kV Breaker foundations
13. Yard lightning evaluation and upgrade as required.
14. Relay and control setting modification at Velco, Webster and North Road Substations.

Distribution:

15. Control House Expansion
16. One (1) S&C Mark V 115kV Circuit Switcher
17. Control Cables
18. Conduits, as required
19. Various wire, mounting brackets and connectors
20. Ground grid upgrades and modifications as required.
21. Two (2) SEL type 351 relays
22. Two (2) lockout relays
23. Station Battery Upgrades, as necessary.

Background / Justification

Transmission: The K-174 line is a 115-kV line that connects the Ascutney Substation in Vermont and the North Road Substation in New Hampshire and is 16.3 miles long. The M-127 line is a 115-kV line that connects the Webster and North Road Substations in New Hampshire and is 25.8 miles long. Customers are exposed to outages from temporary and permanent outages from exposure to a total of 42.1 miles of 115kV lines. This project is on the top 10 ESCC issues list. A history of the lines shows that for a trip of one line, both temporary and permanent, both lines and all of the customers at North Road SS are affected.

Outage History of the M127 and K174 Lines

Outage History on M127 and K174 involving North Road S/S					
DIR	S/S	Line	Type	Root Cause	Comments
06-10-20-09	North Road and Webster Substations	M127	T	Equipment Failure	Webster breaker M127 T/R - Ascutney breaker K174 T/R - North Rd breaker TB38 T/R - North Rd breaker TB49 T/R/T - HP & L Generator T
07-05-27-01	North Road and Webster Substations	M127	T	Unknown	Webster breaker M127 T/R - Ascutney breaker K174 T/R - North Road TB38 & TB49 T/R -

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					Claremont breakers 52 & 59 T/R.
07-07-06-03	North Road and Webster Substations	M127	T	Lightning	Lightning in the area - T/R Found broken crossarms; replaced.
07-07-09-02	North Road and Webster Substations	M127	T	Lightning	Lightning in the area.
07-07-10-01	North Road and Webster Substations	M127	T	Lightning	Three crossarms replaced on K174 - Missed Scada indication on TB39 and TB49. Webster breaker M127 T/R - VE Ascutney breaker K174 T/R - North Rd breakers TB38 and TB49 TR - HempHill breaker G1 T. 12/04/07
08-12-12-20	North Road Substation	K174	T	Ice / Sleet / Snow	This was an operation at Ascutney. The K174 breaker was tripped by some problem in the VELCO systems. There was not a fault on the K174/M127 line. No PSNH equipment operated.
10-02-26-09	Webster Substation	M127	P	Unknown	Webster M127 T/R/T - North Road TB38 T/R - North Road TB49 T - Velco Ascutney K174 T/R - Lempster 260 T.
10-07-19-04	North Road and Webster Substations	M127	T	Lightning	Lightning in the area. Webster M127, VE Ascutney K174 and North RD TB49 T/R. Fault was on VELCO's line beyond North Road.

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11-08-19-06	North Road Substation	K174	T	Lightning	Ascutney K174 Tr/Rx. - Overtrip from V182 operation. Equipment changed out on VELCO system.
11-08-21-02	North Road and Webster Substations	M127	T	Lightning	Webster M127 Tr/Rx, North Road TB38 Tr/Rx, North Road TB49 Tr/Rx, Springfield Power Tr.
12-08-25-01	North Road and Webster Substations	M127	T	Lightning	Additional Lines Affected: K174 North Road TB38 Tr/Rx, North Road TB49 Tr/Rx, Webster M127 Tr/Rx, Ascutney K174 Tr/Rx, Lempster 260 Tr, Springfield P&L Tr. Storm in the area.
13-09-11-04	North Road and Webster Substations	M127	P	Lightning	Webster M127 Tr/Rx, Lempster OCR 260 Tr, North Road TB38 Tr, North Road TB49 Tr/Rx. Transfer trip sent to Lempster.
15-05-27-02	North Road and Webster Substations	M127	P	Lightning	Confirmed lightning strike near North Road Substation.
15-08-15-05	North Road and Webster Substations	M127	T	Lightning	Damaged crossarm at structure 204 was replaced the next day.
17-05-30	North Road Substation	K174	T	Lightning	

Additionally there are protection and operational issues associated with the lack of breakers at North Road SS. Because of the length of this line the Webster relays can detect faults on the 34.5 kV bus at North Road when the K174 is out. There is an operational requirement when feeding North Road SS radially from either Webster SS or Ascutney SS to remove one transformer from service at North Road

SS for relay coordination between the low side feeder breakers and the 115kV source. With the new 115kV breakers this operating restriction can be removed.

Distribution: This project is also to replace distribution equipment targeted at North Road SS as defined by a specific transmission program established to replace S&C type G circuit switches. An expansion to the substation control house is required.

1. The S&C type G circuit switcher replacement program was a Transmission program identified in TPS-07-082-NH. The J49 circuit switcher is old and past expected life. The vendor formally does not support this unit with spare parts. The TPS-07-082-NH is attached to this TAF.

Control House expansion to accommodate new relay and control panels.

Business Process and / or Technical Improvements:

Increase reliability to customers from transmission line faults or lightning strikes. Addresses protection and operational issues associated with the lack of breakers.

Replacement of obsolete equipment prior to failure to improve reliability.

Alternatives Considered with Cost Estimates

The alternative to the transmission project to install breakers for the 115kV M-127 and K-174 lines is to do nothing and continue to expose customers to outages associated with both lines.

The alternative to not replacing the known obsolete circuit switcher is exposure to unplanned bus outages in the event that there is a problem operating the J49 circuit switcher.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering Bid	11/1/17
Start Engineering	3/1/18
Permitting	7/1/18
Construction	9/1/18
In Service Date	12/31/18

Regulatory Approvals

Permitting required by the Town of Sunapee – Building Permit

Risks and Risk Mitigation Plans

Coordination with VELCO is required for the setting, testing & commissioning at their Ascutney SS.

- Delay in testing and commissioning.
- Make sure there are adequate communications with VELCO through the engineering and construction phases to coordinate testing and outages.
- Obtain LCE resources early in the project life cycle.
- Maintain close coordination between Eversource LCE's and VELCO's personnel as well as control centers to ensure safe outages

Maintenance and storm hardening projects

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- Coordinate with other PM's for both maintenance and storm hardening projects to utilize outages the best way possible without causing any interruption to the system.
- Provide the ESCC a detailed outage sequence with zones and durations.
- Request engineering vendor to provide a sequential one – lines.
- Maintain close coordination with the ESCC to ensure all three (3) projects can be successfully completed without any interruption.

The loading during construction may require the use of the mobile substation.

- Delay in construction while waiting for the mobile to be available.
- Make sure projects are engineered and ready so construction can be scheduled around the best times for loading.
- Obtain a detailed outage sequence early in the project life cycle.
- Negotiate with other PMs and the ESCC to ensure that the mobile is used appropriately.
- Coordinate with Maintenance Planner/Scheduler to ensure that a mobile is available for the project early in the project life cycle and reserve it.

- Outage cancelled due to unplanned events on the system resulting in schedule delay and potential labor cost to remobilize. Establish and manage outages using proven coordination teams; 1) Construction Management 2) Coordination Meetings 3) Outage Planning Meeting

Internal and external resource availability for engineering.

- Balance engineering and review work between internal resources and external resources. Implement the use of project schedules.

Lack of sufficient, qualified, local construction and testing & commissioning labor results in the need to import labor which potentially increases costs or lengthen the schedule which will result in project delays.

- Prepare construction bid package with 70%'s for all disciplines.
- RFP's for cabinets to start with 30% P&C.Prepare a thorough scope document to secure LCE's and testing early in the project life cycle.

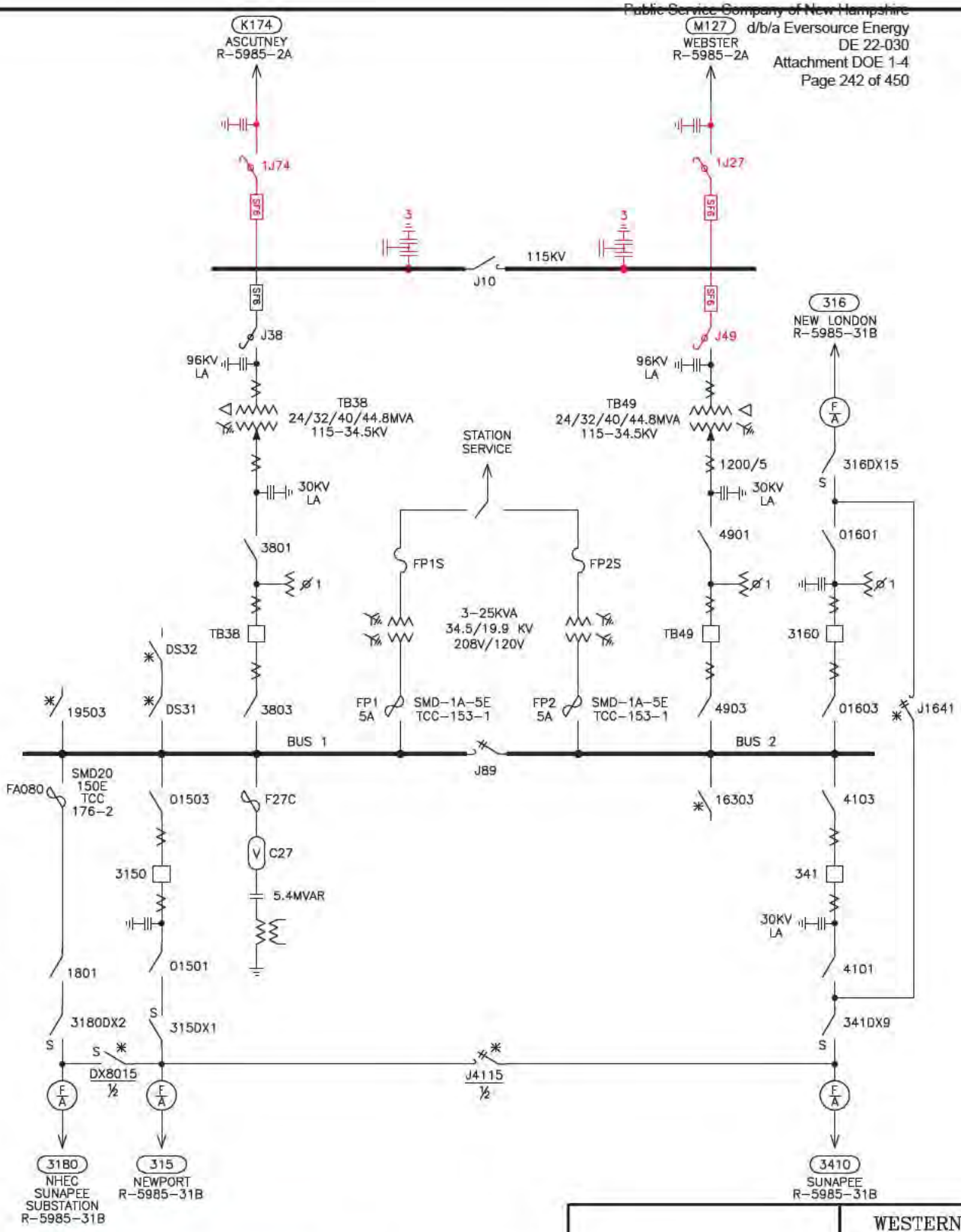
References

TPS-07-082-NH: PSNH Transmission System – Capital Replacement – replacement of old S&C type G circuit switchers-2007/2008.

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

SKT-NORTHRD_20180316 REMOVALS

SKT-NORTHRD_20180316 ADDITIONS

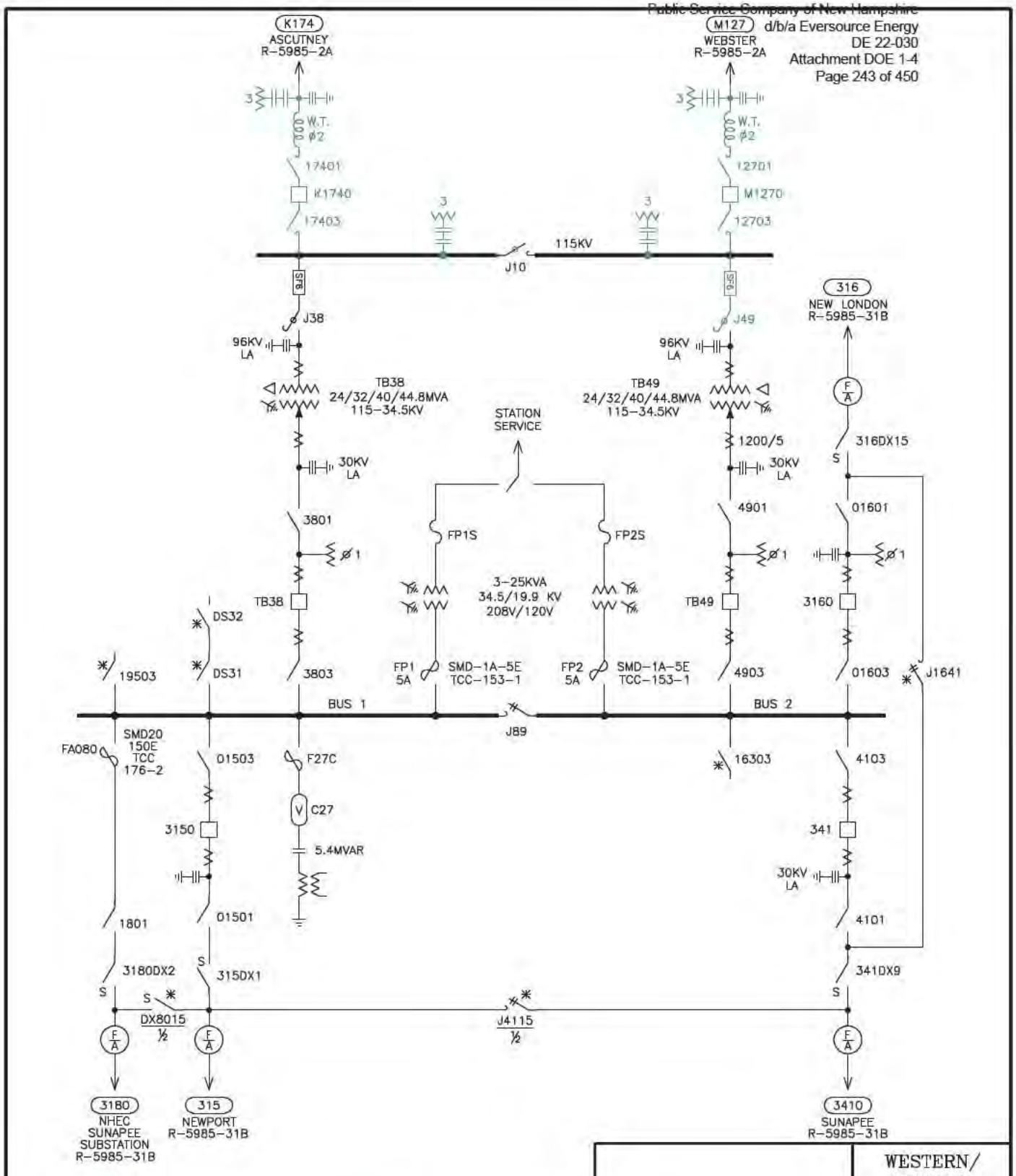


LAST REVISION DETAIL

REMOVALS

	WESTERN/ CENTRAL
NORTH ROAD NORTH ROAD, SUNAPEE, NH 763-5821	

DRN.	CHKD.	APPR.		
LJG			3/16/18	SKT-NORTHRD



LAST REVISION DETAIL

ADDITIONS

WESTERN/
CENTRAL

NORTH ROAD
NORTH ROAD, SUNAPEE, NH
763-5821

DRN.	CHKD.	APPR.		
LJG			3/16/18	SKT-NORTHRD

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Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name : North Road SS Breaker Additions					**PAF No: T1365A & A17W19**
Facility Type: ☐ BPS	☒ BES	☒ PTF	☐ non-PTF	☐ CIP	☒ Distribution
PLANNING					
Is a NX-9 required?					Yes
Is an ISO-NE PAC presentation required?					Yes
Is a PPA required?					Yes
Is a TCA Application Required?					Yes
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?					No
OPERATIONS					
Outage Required?	☒ Primary Equipment (Power Transfer)		☒ Secondary Equipment (P&C only)		☐ Outage Not Required
Do SCLL Conditions Exist?					Yes
Has an outage schedule been approved?					No
Are Operations & Maintenance procedures/training required?					No
STANDARDS					
Does the project include standard equipment and designs?					Yes
SUBSTATION ENGINEERING					
Does this impact Revenue Metering					No
Is preliminary short circuit/ breaker duty analysis required?					No
Are there any changes to the baseline audible noise?					No
Is there an impact to the existing ground grid?					No
Is a Transient Over Voltage (TOV) analysis required?					No
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?					No
If BPS, is an NPCC Directory #4 presentation required?					No

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Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : North Road SS Breaker Addition	**PAF No: T1365A & A17W19**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
SITING & CONSTRUCTION SERVICES (OUTREACH)	
What is the level of outreach expected?	Medium
INITIATOR	
Has a field constructability review been completed?	No
INVESTMENT RECOVERY	
Does the project require development of an Investment Recovery plan?	No
COST ESTIMATING	
How was the cost estimate prepared?	Other (specify below)
Who prepared the estimate?	Thelma Brown
Was the estimate reviewed by Eversource Estimating?	Yes

North Road SS Project Estimate

Thelma Brown 06/25/18 T1365A A17W19

		Transmission	Distr bution		Transmission	Distr bution	Transmission	Distribution	Transmission	Distribution
		TOTAL		**Prior**	**2017**		**2018**		**2019**	
CONSTRUCTION		$1,124,000	$250,000	$0	$0	$0	$1,124,000	$250,000	$0	$0
ENGINEERING/DESIGN		$450,000	$146,000	$0	$39,000	$66,000	$411,000	$80,000	$0	$0
LAND		$0	$0	$0	$0	$0	$0	$0	$0	$0
MATERIAL		$450,000	$108,000	$0	$0	$8,000	$450,000	$100,000	$0	$0
PROJECT MGR & SUPPORT		$0	$0	$0	$0	$0	$0	$0	$0	$0
REMOVAL		$10,000	$5,000	$0	$0	$0	$10,000	$5,000	$0	$0
TEST		$280,000	$70,000	$0	$0	$0	$280,000	$70,000	$0	$0
CONTINGENCY		$100,000	$0	$0	$1,000	$0	$99,000	$0	$0	$0
ESCALATION		$0	$0	$0	$0	$0	$0	$0	$0	$0
INDIRECTS		$286,000	$255,000	$0	$5,000	$20,000	$281,000	$235,000	$0	$0
AFUDC		$5,000	$2,000	$0	$0	$0	$5,000	$2,000	$0	$0
Total Cost		**$2,705,000**	$836,000	**$0**	**$45,000**	**$94,000**	**$2,660,000**	**$742,000**	**$0**	**$0**
		$3,541,000								
		Transmission					Distribution			
		2017	2018	2019	Total		2017	2018	2019	Total
Straight time labor		5	85	0	90		7	55	0	62
Overtime labor					0					0
Outside Services		34	1,740	-	1,774		59	350	-	409
Materials		$0	$450	$0	450		$8	$100	$0	108
Other		$1	$99	$0	100		$0	$0	$0	0
Total		40	2,374	-	2,414		74	505	-	579
Indirects		$5	$281	$0	$286		$20	$235	$0	$255
AFUDC		$0	$5	$0	$5		$0	$2	$0	$2
Total		$5	$286	$0	$291		$20	$237	$0	$257
Total Capital Costs		45	2,660	-	2,705		$94	742	-	836

Indirects based on T12%E&S, D45% E&S
Outside Services from PM
Materials from PM

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Operations Project Authorization Form

Approved at February 14, 2018 EPAC

Link to Meeting Minutes

Date Prepared: 1/23/18	**Project Title: Replace Pemigewasset Transformer**
Company/ies: Eversource NH	**Project ID Number: A18N05**
Organization: NH Operations	**Class(es) of Plant: Distribution Substation**
Project Initiator: Robert Mission	**Project Category: Peak Load Capacity - Substation**
Project Manager: Russel Johnson	**Project Type: Specific**
Project Sponsor: George Wegh	**Project Purpose: Upgrade overloaded transformer**
Estimated in service date: June 1, 2019	**If Transmission Project: PTF? n/a**
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan? N/A**
Total Request: $4,063,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is requesting full funding of $4,063,000 to:

- Replace the existing 115-34.5 kV, 20 MVA Pemigewasset substation transformer (TB88) with a company standard 62.5 MVA transformer,
- Replace 2 (34.5 kV) line oil circuit breakers with vacuum circuit breakers on the 3114X and 3149 lines.
- Upgrade the protective relaying associated with the transformer and breakers being replaced.

The work to be performed consists of final engineering, site work, material purchasing and construction necessary to remove and replace the existing substation transformer.

The NH 2018 load forecast shows that the Pemigewasset Substation transformer (TB88) is overloaded during heavy load periods under normal operating conditions. The size of the existing Pemigewasset transformer also limits customer restoration capabilities for loss of transformers at adjacent substations. Replacing the existing Pemigewasset Substation transformer with a larger unit will resolve the normal (N-0) overload and provide additional transformer capacity so that all customers can be restored for loss of transformers (N-1) at adjacent substations (Ashland or Laconia).

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Project Costs Summary

	Prior Authorized	2018	2019	20 +	Totals
Capital Additions - Direct	$ -	$ 1,797	$ 2,048	$ -	$ 3,845
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage %	-	-	-	-	-
Total - Direct Spending	$ -	$ 1,797	$ 2,048	$ -	$ 3,845
Capital Additions - Indirect	-	100	115	-	215
Subtotal Request	$ -	$ 1,897	$ 2,163	$ -	$ 4,060
AFUDC	-	1	2	-	3
Total Capital Request	$ -	$ 1,898	$ 2,165	$ -	$ 4,063
O&M	-	-	-	-	-
Total Request	$ -	$ 1,898	$ 2,165	$ -	$ 4,063

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	2018	2019	2020+	Total
Straight Time Labor	60	50		110
Overtime Labor				
Outside Services	1,011	810		1,821
Materials	576	1,000		1,576
Other, including contingency amounts (describe)	150	188		338
Total	1,797	2,048		3,845

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	100	115		215
Capitalized interest or AFUDC, if any	1	2		3
Total	101	117		218

Total Capital Costs	1,898	2,165		4,063
Less Total Customer Contribution				
Total Capital Project Costs	**1,898**	**2,165**		**4,063**
Total O&M Project Costs				

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$338K of Contingency/Risk Allocation includes:

1. SS site expansion $248K
2. Soil disposal/trucking 60 tons $60K
3. Mobile SS installation $30K

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:

Future costs for these structure installations will be limited to regular inspections and minor maintenance as necessary.

What functional area(s) will these future costs be funded in? NH Operations
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? NH Operations
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 If yes, please provide details:

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

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Technical Justification:

Project Need Statement

The NH 2018 load forecast shows that the existing 115-34.5 kV, 20 MVA Pemigewasset Substation transformer (TB88) is overloaded (forecast load of 23 MVA) for heavy load periods under normal operating conditions. The size of the existing Pemigewasset transformer also limits customer restoration capabilities for loss of transformers at adjacent substations. Replacing the existing Pemigewasset Substation transformer with a larger unit will resolve the normal (N-0) overload and provide additional transformer capacity so that all customers can be restored for loss of transformers (N-1) at adjacent substations (Ashland or Laconia).

Replacing the Pemigewasset transformer with a larger unit will require an outage(s) of the 34 kV bus at the substation. The existing 34 kV equipment was surveyed to determine if other equipment should be replaced based upon its condition. Two 34 kV distribution line breakers (3114X and 3149) and their associated relaying were identified as equipment that should be addressed at this time. Both breakers are oil circuit breakers that are approximately 65 years old.

Project Objectives

Increase Pemigewasset Substation transformer capacity to be able to supply the summer peak load in the area. Increased transformation capacity will also be utilized to restore customers during contingent loss of the adjacent substation transformers.

Replacing aging circuit breakers and protection equipment will improve system performance during fault detection and isolation along with reducing maintenance and testing work.

Project Scope

Replace the existing 115-34.5 kV, 20 MVA transformer at Pemigewasset substation with the standard 62.5 MVA transformer. The existing 34.5 kV, 3114X & 3149 line Oil Circuit Breakers (OCBs) will be replaced with new Siemens SDV7 vacuum circuit breakers. The existing relaying for the new transformer and the new line circuit breakers will also be upgraded to current standard relay packages.

Background / Justification

The Pemigewasset substation has a single 20 MVA transformer. This substation supplies the load on the 3114X and 345 lines. The 10.5 MW Ayers Island hydro station is connected to the 3149 line. The substation supplies the 3114X and 345 circuit loads, totaling 23.0 MW. This loading level requires that load be transferred from Pemigewasset substation to Laconia substation during high load periods. The capacity of the Pemigewasset transformer is also limiting the ability to restore the load for a loss of the Ashland transformer or loss of the 338 line between Ashland and Straits Road. (see attached area One-Line)

Currently for a loss of the Ashland transformer, cascading switching is required:

- Step #1; The 3196 line can be restored from Beebe River by opening the 3196 breaker at Ashland and closing the normally open tie switch 3196J11.
- Step #2; The NHEC substation at Moultonborough can be fed from White Lake by opening switch 338J10 and closing switch 338J50.
- Step #3 (Cascaded switching step); To restore the Ashland Municipal load from Pemi, a portion of the 345 line load (8.7 MW) needs to be transferred from Pemi to Laconia by opening 345R2 at Straits Rd and closing switch 345J90
- Step #4; Restore Ashland Municipal load by opening both breaker 3380 at Ashland and switch 338J7 at Straits Rd and closing switch 338J1 at Straits Rd.

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- After the four switching steps above, there would be 13.8 MW isolated at the NHEC substations at Meredith and Center Harbor. The ability to restore any additional load is limited by the existing Pemi transformer capacity.

Currently for loss of a transformer at Laconia, the remaining Laconia transformer is loaded above LTE. The existing Pemi transformer does not have any available capacity to pick up the 23 MW of customer load on the 368 line. The larger transformer at Pemi allows these customers to be restored. With the ability to transfer this load from Laconia to Pemi, this lowers the loading on the remaining Laconia transformer to below LTE.

A larger Pemigewasset transformer will allow the restoration of all customer load for the N-1 loss of the Ashland or Laconia transformers.

Business Process and / or Technical Improvements:
Eliminates the existing transformer overload during summer peak. Address concerns about reliability and removes the need to reconfigure the distribution system for summer heavy load conditions.

Alternatives Considered
Adding a second transformer at Pemigewasset was considered but found to be more expensive and impractical because of the substations hill top location. Factors considered include;

- Added costs of the 115 kV circuit switcher and expanding the 115 kV bus
- Added costs of the 34 kV transformer secondary breaker and expanding the 34 kV bus
- Added costs of control and protection work for the second transformer
- Extensive civil work needed to expand the existing hill top substation site.

Adding a second transformer at Ashland was considered however, the existing Ashland S/S is fed by a radial 115 kV tap from the E115 Line so that loss of the E115 line would result in loss of both Ashland transformers. Customer restoration would still be limited by the existing Pemigewasset transformer capacity. To resolve the N-0 loading issue at Pemigewasset load on the 345 line would need to be permanently transferred to Ashland.

Based upon the above, replacing the existing Pemigewasset Substation transformer with a larger unit is the preferred solution.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering (Start 3/18)	12/18
Construction (Start 9/18)	6/19
Material Procurement*	3/19
In-Service	6/19

* Transformer procurement may be earlier if decision is to use a transformer initially ordered for a project that has been delayed.

Regulatory Approvals
None

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Risks and Risk Mitigation Plans

Loading on Pemigewasset substation during construction requires that customers be transferred from Pemi to Laconia substation during the peak periods. Additionally, failure of the existing transformer may require that customers be transferred to Laconia and use of the 115-34.5 kV mobile to restore all customers.

Outage cancellation due to unplanned events on the system resulting in schedule delay and potential labor costs to remobilize.

1. Mitigation Plan – establish and manage outages using proven coordination teams such as
   a. construction management
   b. coordination meetings
   c. outage planning meetings.

Internal and external resources available for engineering.

1. Effort is being exercised to balance engineering and review work between internal and external resources.

References

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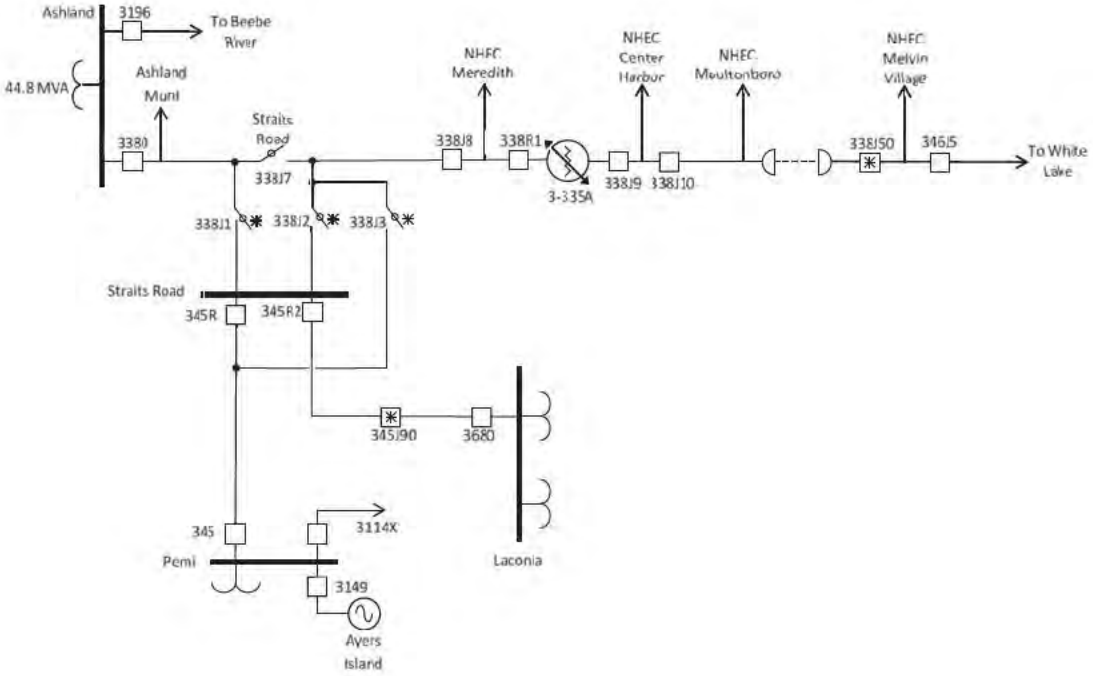
Attachments (One-Line Diagrams, Images, etc.)

Pemigewasset / Ashland Area One-Line



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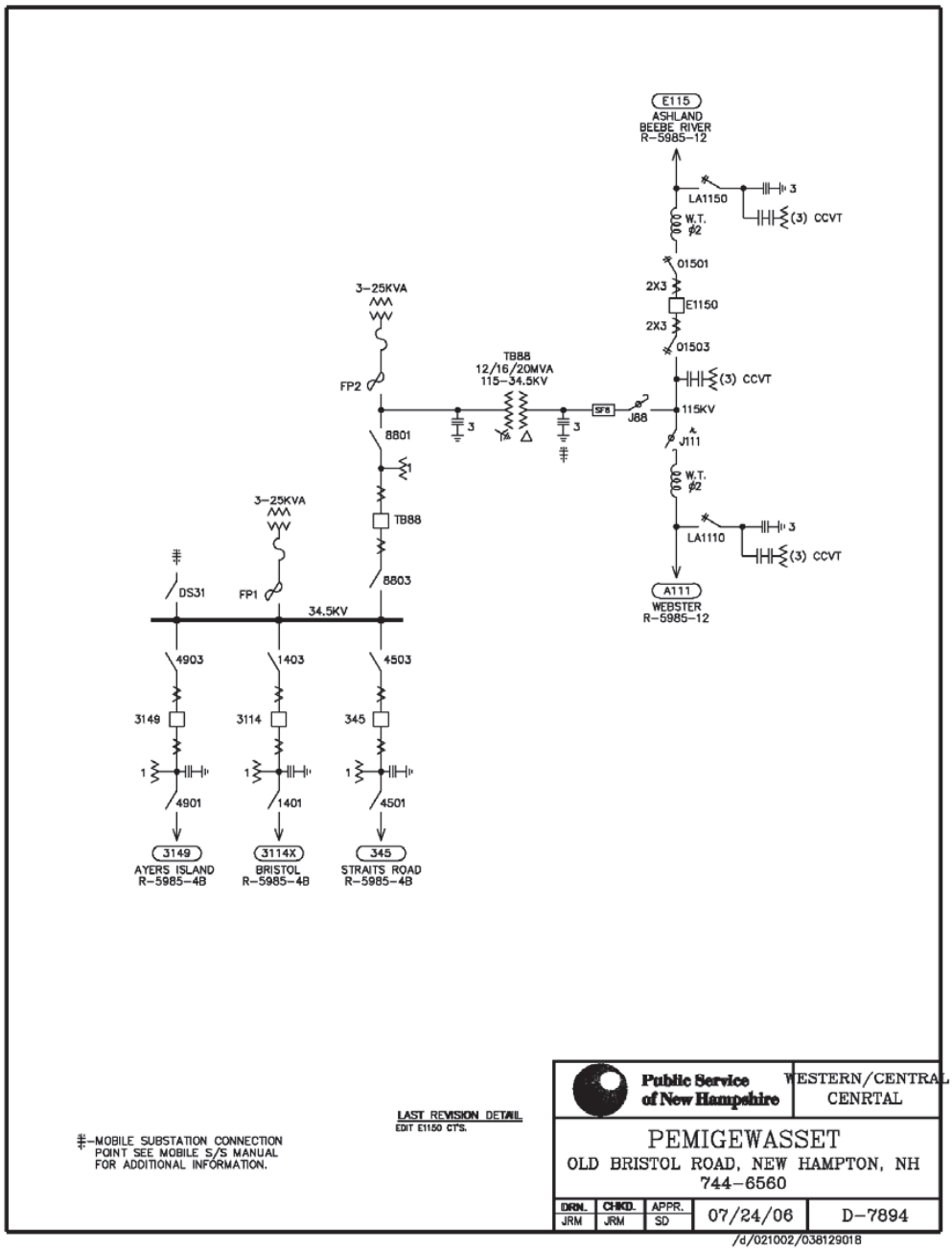
Pemigewasset Substation One-Line Diagram



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Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name : Replace Pemigewasset Transformer					**PAF No: A18N05**
Facility Type: ☐ BPS	☒ BES	☒ PTF	☐ non-PTF	☐ CIP	☒ Distribution
PLANNING					
Is a NX-9 required?					Yes
Is an ISO-NE PAC presentation required?					No
Is a PPA required?					Yes
Is a TCA Application Required?					No
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?					No
OPERATIONS					
Outage Required?	☒ Primary Equipment (Power Transfer)		☐ Secondary Equipment (P&C only)		☐ Outage Not Required
Do SCLL Conditions Exist?					Yes
Has an outage schedule been approved?					No
Are Operations & Maintenance procedures/training required?					Yes
STANDARDS					
Does the project include standard equipment and designs?					Yes
SUBSTATION ENGINEERING					
Does this impact Revenue Metering					No
Is preliminary short circuit/ breaker duty analysis required?					No
Are there any changes to the baseline audible noise?					No
Is there an impact to the existing ground grid?					Yes
Is a Transient Over Voltage (TOV) analysis required?					No
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?					No
If BPS, is an NPCC Directory #4 presentation required?					No

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Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : Replace Pemigewasset Transformer	**PAF No: A18N05**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
Is there an impact to the existing ground grid?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
Siting & Construction Services (Outreach)	
What is the level of outreach expected?	Low
INITIATOR	
Has a field constructability review been completed?	Yes

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Cost Estimate Backup Details

Standard Estimate Report

Pemigewasset Upgrade

Project name	Pemigewasset Upgrade 731 Old Bristol Rd New Hampton NH 03256 USA
Labor rate table	L-16-US40
Equipment rate table	E-16-US
Report format	Sorted by 'BidPkg/Bid tem/Model' 'Model' summary

Description	Quantity	Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Subcontract Amount	Equipment Amount	Other Amount	Total Amount
Contracted									
Bus Replacements									
G4010.1070	Substation Outdoor Hard Bus & Shielding: Bus, Disconnect Switch Replacement		1,048		1,632		6		2,686
G4010.1070					4,801				4,801
Bus Replacements			**1,048**		**6,433**		**6**		**7,487**
14.40	Labor hours								
5.76	Equipment hours								
Control House									
G4010.1070					50,000				50,000
Control House					**50,000**				**50,000**
0.000	Labor hours								
Equipment Additions									
G4010.1056	Substation Circuit Breaker: 2, CBs, 34 5kV, 1200A, Vacuum, 3114/3148		18,624		16,506		60		35,191
G4010.1060	Substation Transformer: 1, TX88 XFMR Installation, 115-34kV, 62.5MVA		37,998		48,822	25,000	1,165		112,986
G4010.1060			111,307						111,307
Equipment Additions			**167,929**		**65,328**	**25,000**	**1,226**		**259,483**
2,471.423	Labor hours								
32.174	Equipment hours								
Equipment Removals									
G4010.1050	Substation Disconnect Switch: 2, LA1110/LA1150 Switch Removal		18,148				882		19,030
G4010.1056	Substation Circuit Breaker: 2, CB Removal, 34.5kV, 1200A, Oil, 3114/3149		23,061				60		23,122
G4010.1060	Substation Transformer: 1, TB88 XFMR Removal, 115-34kV, 12/16/20 MVA		38,938				160		39,098
Equipment Removals			**80,147**				**1,103**		**81,250**
1,153.631	Labor hours								
42.183	Equipment hours								
Site Development									
G4010.1010	Site Development: Site Development, Expansion		10,574		6,073		617		17,264
G4010.1010			1,016		7,527				8,543
Site Development			**11,589**		**13,600**		**617**		**25,807**
169 914	Labor hours								
17.191	Equipment hours								

Standard Estimate Report

Pemigewasset Upgrade

Description	Quantity	Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Subcontract Amount	Equipment Amount	Other Amount	Total Amount
Contracted			***260,713***		***135,362***	***25,000***	***2,951***	***0***	***424,027***
	3,809.37 Labor hours								
	97.31 Equipment hours								
ES Procurement									
Equipment Additions									
G4010.1030	Metering, Protection and Controls: Protection and Controls Equipment				550,000				550,000
G4010.1056	Substation Circuit Breaker: 2, CBs, 34 5kV, 1200A, Vacuum, 3114/3148				32,240				32,240
G4010.1060	Substation Transformer: 1, TX88 XFMR Installation, 115-34kV, 62.5MVA				858,940				858,940
Equipment Additions					**1,441,180**				**1,441,180**
	1,529.000 Labor hours								
ES Procurement			***0***		***1,441,180***	***0***	***0***	***0***	***1,441,180***
	1,529.000 Labor hours								

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	260,713		5,338.369 hrs				6.42%	
Material	1,576,542						38.80%	
Subcontract	25,000						0.62%	
Equipment	2,951		97.308 hrs				0.07%	
Other								
Subtotal (Before Overheads)	**1,865,206**	**1,865,206 USD**					**45.91**	**45.91%**
Contracted Labor Overhead	130,357			50.000 %	C		3.21%	
Contracted Material Overhead	144,118			10.000 %	C		3.55%	
Equipment Overhead	295			10.000 %	C		0.01%	
Temp. Construction Mobile XFMR	50,000				L		1.23%	
Profit	328,496			15.000 %	T		8.09%	
Contracted Overhead Subtotal	**653,266**	**2,518,472 USD**					**16.08**	**61.99%**
Substation Engineering	137,280				L		3.38%	
P&C Engineering	304,735				L		7.50%	
Testing & Commissioning	96,000				L		2.36%	
Sound Study	25,000				L		0.62%	
Thermal Limits Study	6,000				L		0.15%	
Engineering Subtotal	**569,015**	**3,087,487 USD**					**14.00**	**75.99%**
Supplemental Design Eng.	53,802				L		1.32%	
Supplemental Construction Eng.	26,900				L		0.66%	
ES Supplemental Eng. Subtotal	**80,702**	**3,168,189 USD**					**1.99**	**77.98%**
ES Material Overhead	201,765			14.000 %	C		4.97%	
AS&E	7,920			0.250 %	T		0.19%	
E&S	5,380				L		0.13%	
ES Overhead Subtotal	**215,065**	**3,383,254 USD**					**5.29**	**83.27%**
Project Management	338,326			10.000 %	T		8.33%	
Risk Allocation	338,326			10.000 %	T		8.33%	
AFUDC	3,045			0.090 %	T		0.07%	
Global Overhead Subtotal	**679,697**	**4,062,951 USD**					**16.73**	**100.00%**
Total		***4,062,951 USD***						

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Approved at June 10, 2020 EPAC
Link to Meeting Minutes

Date Prepared: 7/31/2020	**Project Title: Replace Pemigewasset Transformer**
Company/Companies: Eversource NH	**Project ID Number: A18N05**
Organization: NH Project Management	**Plant Class/ (F.P. Type): Distribution Substation**
Project Initiator: Robert Mission	**Project Type: Specific**
Project Manager: Walter Quinn	**Capital Investment Part of Original Operating Plan? Yes**
Project Sponsor: Digaunto Chatterjee	**O&M Expenses Part of the Original Operating Plan? N/A**
Current Authorized Amount: $4,063K	**Estimated in service date(s): December 30, 2020**
Supplement Request: $2,754K	**Other:**
Total Request: $6,817K	

Supplement Justification

Scope of Work

The Pemigewasset Transformer project proposes to replace the existing 20 MVA transformer with a 62.5 MVA transformer per the original scope and budget as well as replace the two (2) 34.5kV oil circuit breakers (OCBs) with vacuum circuit breakers (VCBs). New control panels will be installed in the newly expanded control house. The control house will contain the new protection and control equipment, HMI cabinet, RTU extension cabinet, and battery bank.

Background

This project received full funding approval for $4,063K in PowerPlan on March 7, 2018. This supplement requests an additional $2,754K for a revised project total of $6,817K.

Several items contribute to this additional funding request:

- Expansion of the control house which was determined to have insufficient space for the necessary equipment additions.
- Testing & Commissioning contracts higher than budget
- Modifications necessary to support Smart Grid implementation
- Installation of animal protection equipment
- Increase in indirect costs

The original scope did not include the control house expansion, the addition of animal protection, or modifications to support Smart Grid implementation which were added scope items.

The decision to expand the control house was made in May 2019 after it was determined that the existing Control House did not have enough space to insert ten (10) additional control cabinets when only four (4) existing control cabinets were being replaced.

Several benefits will be realized by expanding the control house:

- Safety during construction
- Safety during operation: elimination of human performance traps due to cabinets being placed in random locations (basically, wherever one could fit)
- Addition of much needed air conditioning system to cool the new solid-state equipment (ten cabinets)
- After removals, some of the existing control house space will be available for future additions.

The need for supplemental funding to cover the Control House addition was noted at each monthly Work Plan meetings from July 2019 on through April 2020. It was discussed that once the prime electrical contractor was selected, a fully informed estimate could be developed and presented to EPAC, which would include the control house expansion.

Smart Grid additional design was identified as the PAF documents were being developed for this supplement and due to the undefined design at the time, a contingency of $90k to implement was set. The Electric System Control Center (ESCC) needs the smart grid data from the feeder primary and secondary relays for their Distribution Management System (DMS).

Smart Grid implementation will be required prior to the new feeder breakers going into service. It's an ESCC requirement to have this data being sent to them, although three phase values MW, MVAR and kV are already in the design and being provided via the M650 meters, these smart grid points are still needed before the new breakers are in service.

Subsequent to this project approval, a program to install animal protection at NH substations was approved. That scope has been incorporated into this funding request. In retrospect, a separate funding program release should have been requested for Pemigewasset substation.

Indirect costs were underestimated in the prior authorization.

Project Status

Through the end of June 2020, the project has invested $4,522K. Work performed to date includes: engineering, material procurement, control house expansion, and associated indirects.

The project in-service date has been extended from June 1, 2019 to December 30, 2020 due to outage availability.

Supplemental Cost Breakdown

The table below provides an overview of the line item categories from the initial authorization and the updated project estimate.

	Previously authorized	Current Project Forecast	Delta (request amt)
Internal labor	$110	$378	$268
Engineering/PSM	$907	$615	($292)
Construction/Removal	$653	$991	$338
Material	$1,576	$1,982	$406
Testing	$261	$677	$416
Contingency	$338	0	($338)
Other	$0	$9	$9
Subtotal Direct Costs	$3,845	$4,652	$807
Indirects	$215	$1,862	$1,647
AFUDC	$3	$303	$300
Total	**$4,063**	**$6,817**	**$2,754**

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APS 1 - Project Authorization Policy

Supplement Request Form

Justification for Additional Resources

Supplemental funds of $2,754K are required for the following scope changes and items that were underestimated in the original Project Authorization Form (PAF) as follows:

Internal Labor - $268K

- Internal labor costs increased due to Internal staffing not originally budgeted for this level of support; Internal Engineering support higher than estimated and Internal line and station construction services associated with installing the mobile transformer and dressing out the new transformer were higher than anticipated.

OS Engineering/PSM – ($292K)

- Costs for the Project Manager and the Construction Representative were originally budgeted in outside services. The actual positions were staffed by Eversource employees.

Construction / Removal – $338K

The major cost driver for the additional investment of $338K was the Control House addition:

- Control House weather tight shell – increase of $115K
- The Prime Electrical estimate was originally budgeted at $395K and when the Control House additional scope was included the contract purchase order was $643K. This increase is attributed to the control house electrical, lights, HVAC, interior grounding, cable tray and animal protection. – increase of $248K

Materials – $406K

- The new pad-mount transformer is a 300kVA unit. This is not a standard size and the cost was greater than originally estimated. (Additional cost - $187K)
- Eversource requested to add animal protection into the design, which was not included in the original scope.
- Additional budget is required for temporary materials for rerouting the 34.5kV lines around the existing 34.5 bus to provide continuity during breaker replacements, which was not identified at the time of the original estimate.
- Additional materials driven primarily by the control house addition, i.e., cable trays, HVAC system, cable trench, wiring/conductor for control house fit out.

Testing - $416K

- Testing and Commissioning were originally underestimated. Contractor proposals have been received to support the current forecast for these services. There is also additional budget associated with the control house expansion.

Contingency - ($338K)

Contingency was used to partially off-set overages in materials, construction and testing, as well as to address Smart Grid.

Other - $9K

- Additional employee expenses and property tax that were not accounted for in the original estimate.

Indirect - $1,647K

- Increased direct costs coupled with adjusted indirect rates, have increased the indirect costs by $1,647K since the original estimate.

AFUDC - $300K

- AFUDC was underestimated in original estimate. Extended in-service date coupled with overhead rate changes have increased the AFUDC by $300K.

See attached original authorization documentation.

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$3,845	$807	$4652
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage %	$0	$0	$0
Total Direct Spending	$3,845	$807	$4652
Capital Additions - Indirect	$215	$1,647	$1862
AFUDC	$3	$300	$303
Total Capital Request	$4,063	$2,754	$6,817
O&M	$0	$0	$0
Total Request	$4,063	$2,754	$6,817

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APS 1 - Project Authorization Policy

Supplement Request Form

Note: Dollar values are in thousands:

Total Supplement Request by Year View

	2019	2020+	Total
Capital Additions Direct	$0	$807	$807
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage	$0	$0	$0
Total Direct Spending	$0	$807	$807
Capital Additions - Indirect	$0	$1647	$1647
AFUDC	$0	$300	$300
Subtotal Request	$0	$2,754	$2,754
O&M	$0	$0	$0
Total Request	$0	$2,754	$2,754

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Project Authorization Form

Operations Project Authorization Form

Approved at February 14, 2018 EPAC

Link to Meeting Minutes

Date Prepared: 1/23/18	**Project Title: Replace Pemigewasset Transformer**
Company/ies: Eversource NH	**Project ID Number: A18N05**
Organization: NH Operations	**Class(es) of Plant: Distribution Substation**
Project Initiator: Robert Mission	**Project Category: Peak Load Capacity - Substation**
Project Manager: Russel Johnson	**Project Type: Specific**
Project Sponsor: George Wegh	**Project Purpose: Upgrade overloaded transformer**
Estimated in service date: June 1, 2019	**If Transmission Project: PTF? n/a**
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan? N/A**
Total Request: $4,063,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is requesting full funding of $4,063,000 to:

- Replace the existing 115-34.5 kV, 20 MVA Pemigewasset substation transformer (TB88) with a company standard 62.5 MVA transformer,
- Replace 2 (34.5 kV) line oil circuit breakers with vacuum circuit breakers on the 3114X and 3149 lines.
- Upgrade the protective relaying associated with the transformer and breakers being replaced.

The work to be performed consists of final engineering, site work, material purchasing and construction necessary to remove and replace the existing substation transformer.

The NH 2018 load forecast shows that the Pemigewasset Substation transformer (TB88) is overloaded during heavy load periods under normal operating conditions. The size of the existing Pemigewasset transformer also limits customer restoration capabilities for loss of transformers at adjacent substations. Replacing the existing Pemigewasset Substation transformer with a larger unit will resolve the normal (N-0) overload and provide additional transformer capacity so that all customers can be restored for loss of transformers (N-1) at adjacent substations (Ashland or Laconia).

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Project Costs Summary

	Prior Authorized	2018	2019	20 +	Totals
Capital Additions - Direct	$ -	$ 1,797	$ 2,048	$ -	$ 3,845
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage %	-	-	-	-	-
Total - Direct Spending	$ -	$ 1,797	$ 2,048	$ -	$ 3,845
Capital Additions - Indirect	-	100	115	-	215
Subtotal Request	$ -	$ 1,897	$ 2,163	$ -	$ 4,060
AFUDC	-	1	2	-	3
Total Capital Request	$ -	$ 1,898	$ 2,165	$ -	$ 4,063
O&M	-	-	-	-	-
Total Request	$ -	$ 1,898	$ 2,165	$ -	$ 4,063

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	2018	2019	2020+	Total
Straight Time Labor	60	50		110
Overtime Labor				
Outside Services	1,011	810		1,821
Materials	576	1,000		1,576
Other, including contingency amounts (describe)	150	188		338
Total	1,797	2,048		3,845

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	100	115		215
Capitalized interest or AFUDC, if any	1	2		3
Total	101	117		218

Total Capital Costs	1,898	2,165		4,063
Less Total Customer Contribution				
Total Capital Project Costs	**1,898**	**2,165**		**4,063**
Total O&M Project Costs				

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Project Authorization Form

$338K of Contingency/Risk Allocation includes:

1. SS site expansion $248K
2. Soil disposal/trucking 60 tons $60K
3. Mobile SS installation $30K

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:

Future costs for these structure installations will be limited to regular inspections and minor maintenance as necessary.

What functional area(s) will these future costs be funded in? NH Operations
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? NH Operations
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 If yes, please provide details:

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

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Technical Justification:

Project Need Statement

The NH 2018 load forecast shows that the existing 115-34.5 kV, 20 MVA Pemigewasset Substation transformer (TB88) is overloaded (forecast load of 23 MVA) for heavy load periods under normal operating conditions. The size of the existing Pemigewasset transformer also limits customer restoration capabilities for loss of transformers at adjacent substations. Replacing the existing Pemigewasset Substation transformer with a larger unit will resolve the normal (N-0) overload and provide additional transformer capacity so that all customers can be restored for loss of transformers (N-1) at adjacent substations (Ashland or Laconia).

Replacing the Pemigewasset transformer with a larger unit will require an outage(s) of the 34 kV bus at the substation. The existing 34 kV equipment was surveyed to determine if other equipment should be replaced based upon its condition. Two 34 kV distribution line breakers (3114X and 3149) and their associated relaying were identified as equipment that should be addressed at this time. Both breakers are oil circuit breakers that are approximately 65 years old.

Project Objectives

Increase Pemigewasset Substation transformer capacity to be able to supply the summer peak load in the area. Increased transformation capacity will also be utilized to restore customers during contingent loss of the adjacent substation transformers.

Replacing aging circuit breakers and protection equipment will improve system performance during fault detection and isolation along with reducing maintenance and testing work.

Project Scope

Replace the existing 115-34.5 kV, 20 MVA transformer at Pemigewasset substation with the standard 62.5 MVA transformer. The existing 34.5 kV, 3114X & 3149 line Oil Circuit Breakers (OCBs) will be replaced with new Siemens SDV7 vacuum circuit breakers. The existing relaying for the new transformer and the new line circuit breakers will also be upgraded to current standard relay packages.

Background / Justification

The Pemigewasset substation has a single 20 MVA transformer. This substation supplies the load on the 3114X and 345 lines. The 10.5 MW Ayers Island hydro station is connected to the 3149 line. The substation supplies the 3114X and 345 circuit loads, totaling 23.0 MW. This loading level requires that load be transferred from Pemigewasset substation to Laconia substation during high load periods. The capacity of the Pemigewasset transformer is also limiting the ability to restore the load for a loss of the Ashland transformer or loss of the 338 line between Ashland and Straits Road. (see attached area One-Line)

Currently for a loss of the Ashland transformer, cascading switching is required:

- Step #1; The 3196 line can be restored from Beebe River by opening the 3196 breaker at Ashland and closing the normally open tie switch 3196J11.
- Step #2; The NHEC substation at Moultonborough can be fed from White Lake by opening switch 338J10 and closing switch 338J50.
- Step #3 (Cascaded switching step); To restore the Ashland Municipal load from Pemi, a portion of the 345 line load (8.7 MW) needs to be transferred from Pemi to Laconia by opening 345R2 at Straits Rd and closing switch 345J90
- Step #4; Restore Ashland Municipal load by opening both breaker 3380 at Ashland and switch 338J7 at Straits Rd and closing switch 338J1 at Straits Rd.

- After the four switching steps above, there would be 13.8 MW isolated at the NHEC substations at Meredith and Center Harbor. The ability to restore any additional load is limited by the existing Pemi transformer capacity.

Currently for loss of a transformer at Laconia, the remaining Laconia transformer is loaded above LTE. The existing Pemi transformer does not have any available capacity to pick up the 23 MW of customer load on the 368 line. The larger transformer at Pemi allows these customers to be restored. With the ability to transfer this load from Laconia to Pemi, this lowers the loading on the remaining Laconia transformer to below LTE.

A larger Pemigewasset transformer will allow the restoration of all customer load for the N-1 loss of the Ashland or Laconia transformers.

Business Process and / or Technical Improvements:
Eliminates the existing transformer overload during summer peak. Address concerns about reliability and removes the need to reconfigure the distribution system for summer heavy load conditions.

Alternatives Considered
Adding a second transformer at Pemigewasset was considered but found to be more expensive and impractical because of the substations hill top location. Factors considered include;

- Added costs of the 115 kV circuit switcher and expanding the 115 kV bus
- Added costs of the 34 kV transformer secondary breaker and expanding the 34 kV bus
- Added costs of control and protection work for the second transformer
- Extensive civil work needed to expand the existing hill top substation site.

Adding a second transformer at Ashland was considered however, the existing Ashland S/S is fed by a radial 115 kV tap from the E115 Line so that loss of the E115 line would result in loss of both Ashland transformers. Customer restoration would still be limited by the existing Pemigewasset transformer capacity. To resolve the N-0 loading issue at Pemigewasset load on the 345 line would need to be permanently transferred to Ashland.

Based upon the above, replacing the existing Pemigewasset Substation transformer with a larger unit is the preferred solution.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering (Start 3/18)	12/18
Construction (Start 9/18)	6/19
Material Procurement*	3/19
In-Service	6/19

* Transformer procurement may be earlier if decision is to use a transformer initially ordered for a project that has been delayed.

Regulatory Approvals
None

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Risks and Risk Mitigation Plans

Loading on Pemigewasset substation during construction requires that customers be transferred from Pemi to Laconia substation during the peak periods. Additionally, failure of the existing transformer may require that customers be transferred to Laconia and use of the 115-34.5 kV mobile to restore all customers.

Outage cancellation due to unplanned events on the system resulting in schedule delay and potential labor costs to remobilize.

1. Mitigation Plan – establish and manage outages using proven coordination teams such as
   a. construction management
   b. coordination meetings
   c. outage planning meetings.

Internal and external resources available for engineering.

1. Effort is being exercised to balance engineering and review work between internal and external resources.

References

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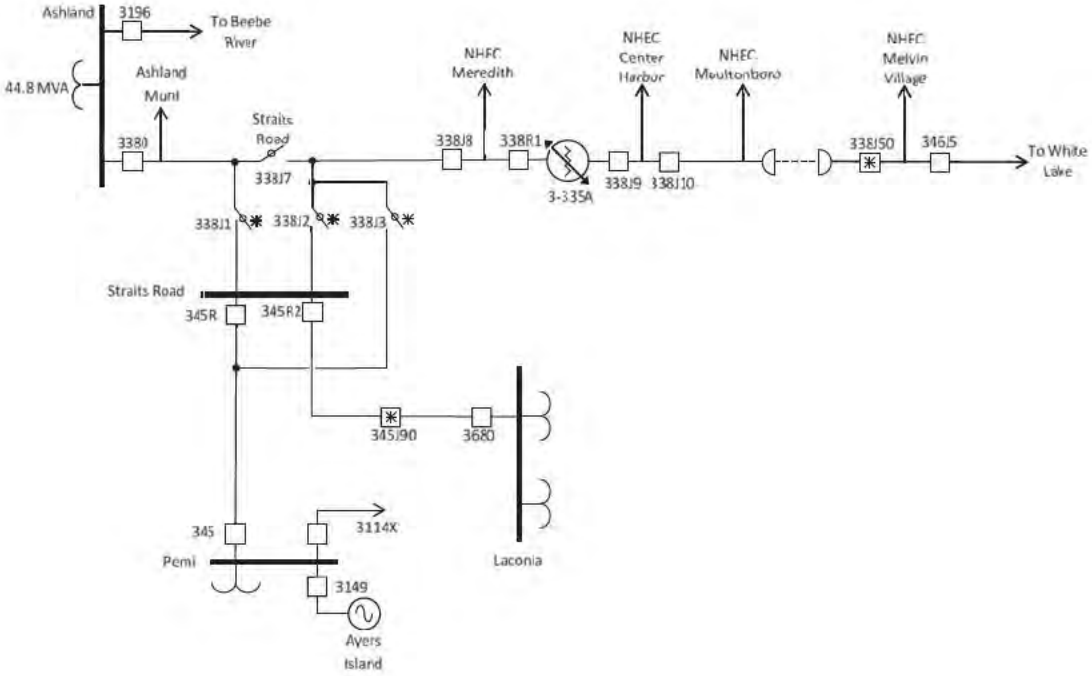
Project Authorization Form

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

Pemigewasset / Ashland Area One-Line



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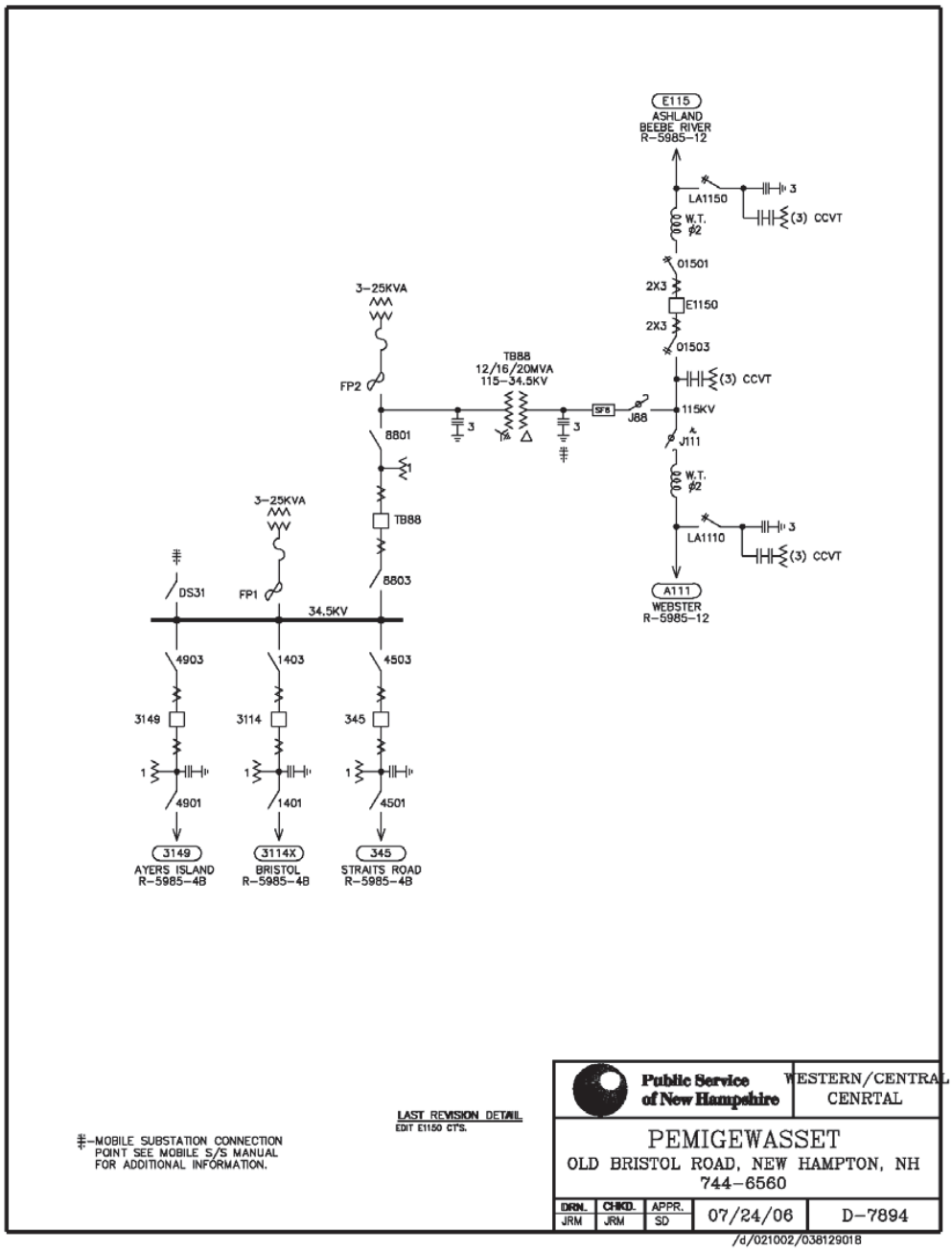
Pemigewasset Substation One-Line Diagram



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Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name : Replace Pemigewasset Transformer					**PAF No: A18N05**
Facility Type: ☐ BPS	☒ BES	☒ PTF	☐ non-PTF	☐ CIP	☒ Distribution
PLANNING					
Is a NX-9 required?					Yes
Is an ISO-NE PAC presentation required?					No
Is a PPA required?					Yes
Is a TCA Application Required?					No
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?					No
OPERATIONS					
Outage Required?	☒ Primary Equipment (Power Transfer)		☐ Secondary Equipment (P&C only)		☐ Outage Not Required
Do SCLL Conditions Exist?					Yes
Has an outage schedule been approved?					No
Are Operations & Maintenance procedures/training required?					Yes
STANDARDS					
Does the project include standard equipment and designs?					Yes
SUBSTATION ENGINEERING					
Does this impact Revenue Metering					No
Is preliminary short circuit/ breaker duty analysis required?					No
Are there any changes to the baseline audible noise?					No
Is there an impact to the existing ground grid?					Yes
Is a Transient Over Voltage (TOV) analysis required?					No
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?					No
If BPS, is an NPCC Directory #4 presentation required?					No

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Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : Replace Pemigewasset Transformer	**PAF No: A18N05**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
Is there an impact to the existing ground grid?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
Siting & Construction Services (Outreach)	
What is the level of outreach expected?	Low
INITIATOR	
Has a field constructability review been completed?	Yes

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Project Authorization Form

Cost Estimate Backup Details

Standard Estimate Report

Pemigewasset Upgrade

Project name	Pemigewasset Upgrade 731 Old Bristol Rd New Hampton NH 03256 USA
Labor rate table	L-16-US40
Equipment rate table	E-16-US
Report format	Sorted by 'BidPkg/Bid tem/Model' 'Model' summary

Description	Quantity	Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Subcontract Amount	Equipment Amount	Other Amount	Total Amount
Contracted									
Bus Replacements									
G4010.1070	Substation Outdoor Hard Bus & Shielding: Bus, Disconnect Switch Replacement		1,048		1,632		6		2,686
G4010.1070					4,801				4,801
Bus Replacements			**1,048**		**6,433**		**6**		**7,487**
14.40	Labor hours								
5.76	Equipment hours								
Control House									
G4010.1070					50,000				50,000
Control House					**50,000**				**50,000**
0.000	Labor hours								
Equipment Additions									
G4010.1056	Substation Circuit Breaker: 2, CBs, 34 5kV, 1200A, Vacuum, 3114/3148		18,624		16,506		60		35,191
G4010.1060	Substation Transformer: 1, TX88 XFMR Installation, 115-34kV, 62.5MVA		37,998		48,822	25,000	1,165		112,986
G4010.1060			111,307						111,307
Equipment Additions			**167,929**		**65,328**	**25,000**	**1,226**		**259,483**
2,471.423	Labor hours								
32.174	Equipment hours								
Equipment Removals									
G4010.1050	Substation Disconnect Switch: 2, LA1110/LA1150 Switch Removal		18,148				882		19,030
G4010.1056	Substation Circuit Breaker: 2, CB Removal, 34.5kV, 1200A, Oil, 3114/3149		23,061				60		23,122
G4010.1060	Substation Transformer: 1, TB88 XFMR Removal, 115-34kV, 12/16/20 MVA		38,938				160		39,098
Equipment Removals			**80,147**				**1,103**		**81,250**
1,153.631	Labor hours								
42.183	Equipment hours								
Site Development									
G4010.1010	Site Development: Site Development, Expansion		10,574		6,073		617		17,264
G4010.1010			1,016		7,527				8,543
Site Development			**11,589**		**13,600**		**617**		**25,807**
169 914	Labor hours								
17.191	Equipment hours								

Standard Estimate Report

Pemigewasset Upgrade

Description	Quantity	Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Subcontract Amount	Equipment Amount	Other Amount	Total Amount
Contracted			***260,713***		***135,362***	***25,000***	***2,951***	***0***	***424,027***
	3,809.37 Labor hours								
	97.31 Equipment hours								
ES Procurement									
Equipment Additions									
G4010.1030	Metering, Protection and Controls: Protection and Controls Equipment				550,000				550,000
G4010.1056	Substation Circuit Breaker: 2, CBs, 34 5kV, 1200A, Vacuum, 3114/3148				32,240				32,240
G4010.1060	Substation Transformer: 1, TX88 XFMR Installation, 115-34kV, 62.5MVA				858,940				858,940
Equipment Additions					**1,441,180**				**1,441,180**
	1,529.000 Labor hours								
ES Procurement			***0***		***1,441,180***	***0***	***0***	***0***	***1,441,180***
	1,529.000 Labor hours								

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	260,713		5,338.369 hrs				6.42%	
Material	1,576,542						38.80%	
Subcontract	25,000						0.62%	
Equipment	2,951		97.308 hrs				0.07%	
Other								
Subtotal (Before Overheads)	**1,865,206**	**1,865,206 USD**					**45.91**	**45.91%**
Contracted Labor Overhead	130,357			50.000 %	C		3.21%	
Contracted Material Overhead	144,118			10.000 %	C		3.55%	
Equipment Overhead	295			10.000 %	C		0.01%	
Temp. Construction Mobile XFMR	50,000				L		1.23%	
Profit	328,496			15.000 %	T		8.09%	
Contracted Overhead Subtotal	**653,266**	**2,518,472 USD**					**16.08**	**61.99%**
Substation Engineering	137,280				L		3.38%	
P&C Engineering	304,735				L		7.50%	
Testing & Commissioning	96,000				L		2.36%	
Sound Study	25,000				L		0.62%	
Thermal Limits Study	6,000				L		0.15%	
Engineering Subtotal	**569,015**	**3,087,487 USD**					**14.00**	**75.99%**
Supplemental Design Eng.	53,802				L		1.32%	
Supplemental Construction Eng.	26,900				L		0.66%	
ES Supplemental Eng. Subtotal	**80,702**	**3,168,189 USD**					**1.99**	**77.98%**
ES Material Overhead	201,765			14.000 %	C		4.97%	
AS&E	7,920			0.250 %	T		0.19%	
E&S	5,380				L		0.13%	
ES Overhead Subtotal	**215,065**	**3,383,254 USD**					**5.29**	**83.27%**
Project Management	338,326			10.000 %	T		8.33%	
Risk Allocation	338,326			10.000 %	T		8.33%	
AFUDC	3,045			0.090 %	T		0.07%	
Global Overhead Subtotal	**679,697**	**4,062,951 USD**					**16.73**	**100.00%**
Total		***4,062,951 USD***						

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Approved by EPAC Chairmen external to meeting on 04/05/2021

Link to 04/14/2021 EPAC Meeting Minutes

Date Prepared: 1/22/2021	**Project Title:** Replace Pemigewasset Transformer
Company/Companies: Eversource NH	**Project ID Number:** A18N05 (D) **Work Order Number:** TSNN2014 (T)
Organization: NH Project Management	**Plant Class/ (F.P. Type):** Distribution S/S; Transmission S/S
Project Initiator: Robert Mission	**Project Type:** Specific
Project Manager: Walter Quinn	**Capital Investment Part of Original Operating Plan?** Yes
Project Sponsor: Digaunto Chatterjee	**O&M Expenses Part of the Original Operating Plan?** N/A
Current Authorized Amount: D- $4,063K/T-$0	**Estimated in service date(s):** December 31, 2020
Supplement Request: D-$3,666K/T-$89K	**Other:**
Total Request: D-$7,729K/T-$89K	

Supplement Justification

Scope of Work

The Pemigewasset Transformer project proposes to replace the existing 20 MVA transformer with a 62.5 MVA transformer per the original scope and budget as well as replace the two (2) 34.5kV oil circuit breakers (OCBs) with vacuum circuit breakers (VCBs). New control panels will be installed in the newly expanded control house. The control house will contain the new protection and control equipment, HMI cabinet, RTU extension cabinet, and battery bank. Also, Webster A111 required a transfer trip scheme to be installed, which is a transmission asset, requiring a transmission project which was not part of the original authorization.

Background

This project received full funding approval for $4,063K in PowerPlan on March 7, 2018. This supplement requests an additional $3,755K for a revised project total of $7,818K.

Several items contribute to this additional funding request:

- Expansion of the control house which was determined to have insufficient space for the necessary equipment additions.

- Testing & Commissioning contracts higher than budget
- Internal support services higher than estimated
    - Additional support for all disciplines for control house addition
    - Additional work with Engineering Contractor on layout of equipment in control house addition.
- Installation of animal protection equipment
- Increase in indirect costs

The original scope did not include the control house expansion or the addition of animal protection

The decision to expand the control house was made in May of 2019 after it was determined that the original layout's remove and replace sequence would cause unacceptable reliability risk.

Several benefits will be realized by expanding the control house:

- Safety during construction
- Safety during operation: elimination of human performance traps due to cabinets being placed in random locations
- Addition of much needed air conditioning system to cool the new solid-state equipment (ten cabinets)
- After removals, some of the existing control house space will be available for future additions.

The need for supplemental funding to cover the Control House addition was noted at each monthly Work Plan meetings from July 2019 on through April 2020. It was discussed that once the prime electrical contractor was selected, a fully informed estimate could be developed and presented to EPAC, which would include the control house expansion.

The A111 tripping relay at Webster could not detect all transformer faults. To ensure that the Webster A111 terminal trips for all transformer faults coincident with circuit switcher failure, a transfer trip scheme needed to be installed. This requirement was known but not budgeted separately to a Transmission work order.

Subsequent to this project approval, a program to install animal protection at NH substations was approved. That scope has been incorporated into this funding request. In retrospect, a separate funding program release should have been requested for Pemigewasset substation.

During the energization of the Transformer, the team encountered issues that pushed the ISD from 15 December to 31 December 2020.

Indirect rates were updated based on the direct cost changes and in alignment with current rates.

Project Status

Work performed to date includes: engineering, material procurement, control house expansion, electrical construction and associated indirects. The project in-service date has been extended from June 1, 2019 to December 31, 2020 due to budget constraints, outage availability, storm delays and late breaking design issues. The Project reached In-Service December 31, 2020. Some additional work remains to remove a redundant switch on the new transformer, which is not needed in the protection system. P&C Engineering wants the switch removed to avoid confusion and to clean-up drawings.

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplemental Cost Breakdown

The table below provides an overview of the line item categories from the initial authorization and the updated project estimate.

Summary Distribution & Transmission

	Previously authorized	Current Project Forecast	Delta (request amt)
Internal labor	$110	$693	$583
Engineering/PSM	$907	$664	($243)
Construction/Removal	$653	$1,042	$389
Material	$1,576	$2,022	$446
Testing	$261	$897	$636
Contingency	$338	$15	($323)
Other	$0	$172	$172
Subtotal Direct Costs	$3,845	$5,505	$1,660
Indirects	$215	$2,053	$1,838
AFUDC	$3	$260	$257
Total	**$4,063**	**$7,818**	**$3,755**

A18N05 Pemigewasset Transformer

	Previously authorized	Current Project Forecast	Delta (request amt)
Internal labor	$110	$675	$565
Engineering/PSM	$907	$664	($243)
Construction/Removal	$653	$1,041	$388
Material	$1,576	$1,990	$414
Testing	$261	$895	$634
Contingency	$338	$10	($328)
Other	$0	$172	$172
Subtotal Direct Costs	$3,845	$5,447	$1,602
Indirects	$215	$2,024	$1,809
AFUDC	$3	$258	$255
Total	**$4,063**	**$7,729**	**$3,666**

TSNN2014 Webster A111 Transfer Trip

	Previously authorized	Current Project Forecast	Delta (request amt)
Internal labor	$0	$18	$18
Engineering/PSM	$0	$0	$0
Construction/Removal	$0	$1	$1
Material	$0	$32	$32
Testing	$0	$2	$2
Contingency	$0	$5	$5
Other	$0	$0	$0
Subtotal Direct Costs	$0	$58	$58
Indirects	$0	$29	$29
AFUDC	$0	$2	$2
Total	**$0**	**$89**	**$89**

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Supplement Request Form

Justification for Additional Resources

Supplemental funds of $3,755K are required for the following scope changes and items that were underestimated in the original Project Authorization Form (PAF) as follows:

Internal Labor - $583K

- Internal labor costs increased due to Internal staffing not originally budgeted for this level of support; Internal Engineering support higher than estimated and Internal line and station construction services associated with installing the mobile transformer and dressing out the new transformer were higher than anticipated as well as overall Area Work Center support to complete the project. Additional costs were required by Eversource Engineering, Electrical Maintenance, Transformer Testing when the energization of the new transformer was delayed.

OS Engineering/PSM – ($243K)

- Costs for Project Management & Support were estimated at $338K. The actuals have run considerably less at $145K for a savings of $193K. The Engineering was estimated at $569K and the actuals are $519K for additional savings of $50K.

Construction / Removal – $389K

- The major cost driver for the additional investment of $389K was the Control House addition:
  - Control House weather tight shell – increase of $115K
  - The prime electrical estimate was originally budgeted at $395K and when the Control House additional scope was included, the contract purchase order was increased to $643K. This increase is attributed to the control house electrical, lights, HVAC, interior grounding, cable tray and animal protection. – increase of $248K and additional testing support of $26K.

Materials – $446K

- The new pad-mount transformer is a 300kVA unit. This is not a standard size and the cost was greater than originally estimated. (Additional cost - $187K)
- Add animal protection into the design, which was not included in the original scope.
- Additional budget is required for temporary materials for rerouting the 34.5kV lines around the existing 34.5 bus to provide continuity during breaker replacements, which was not identified at the time of the original estimate.

- Additional materials driven primarily by the control house addition, i.e., cable trays, HVAC system, cable trench, wiring/conductor for control house fit out.

Testing - $636K

- Testing and Commissioning were originally underestimated. Contractor proposals have been received to support the current forecast for these services. There is also additional budget associated with the control house expansion, extended schedule and the completion of the testing for the Transformer energization.

Contingency - ($323K)

- Contingency was used to partially off-set overages in materials, construction and testing, as well as to address Smart Grid.

Other - $172K

- Due to property tax that was not accounted for in the original estimate.

Indirect - $1,838K

- Increased direct costs coupled with proper allocation of overhead rates to the original direct costs have increased the indirect costs by $1,838K since the original estimate,

AFUDC - $257K

- AFUDC was underestimated in original estimate. Extended in-service date coupled with overhead rate changes have increased the AFUDC by $257K.

See attached original authorization documentation.

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Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$3,845	$1,660	$5,505
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage %	$0	$0	$0
Total Direct Spending	$3,845	$1,660	$5,505
Capital Additions - Indirect	$215	$1,838	$2,053
AFUDC	$3	$257	$260
Total Capital Request	$4,063	$3,755	$7,818
O&M	$0	$0	$0
Total Request	$4,063	$3,755	$7,818

Total Supplement Request by Year View

Note: Dollar values are in thousands:

	2019	2020+	Total
Capital Additions Direct	$0	$1,660	$1,660
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage	$0	$0	$0
Total Direct Spending	$0	$1,660	$1,660
Capital Additions - Indirect	$0	$1,838	$1,838
AFUDC	$0	$257	$257
Subtotal Request	$0	$3,755	$3,755
O&M	$0	$0	$0
Total Request	$0	$3,755	$3,755

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Cost - Pemi S/S Transformer – A18N05

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$3,845	$1,602	$5,447
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage %	$0	$0	$0
Total Direct Spending	$3,845	$1,602	$5,447
Capital Additions - Indirect	$215	$1,809	$2,024
AFUDC	$3	$255	$258
Total Capital Request	$4,063	$3,666	$7,729
O&M	$0	$0	$0
Total Request	$4,063	$3,666	$7,729

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

	2019	2020+	Total
Capital Additions Direct	$0	$1,602	$1,602
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage	$0	$0	$0
Total Direct Spending	$0	$1,602	$1,602
Capital Additions - Indirect	$0	$1,809	$1,809
AFUDC	$0	$255	$255
Subtotal Request	$0	$3,666	$3,666
O&M	$0	$0	$0
Total Request	$0	$3,666	$3,666

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Cost – Webster Transfer Trip – TSNN2014

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$0	$58	$58
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage %	$0	$0	$0
Total Direct Spending	$0	$58	$58
Capital Additions - Indirect	$0	$29	$29
AFUDC	$0	$2	$2
Total Capital Request	$0	$89	$89
O&M	$0	$0	$0
Total Request	$0	$89	$89

Total Supplement Request by Year View

Note: Dollar values are in thousands:

	2019	2020+	Total
Capital Additions Direct	$0	$58	$58
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage	$0	$0	$0
Total Direct Spending	$0	$58	$58
Capital Additions - Indirect	$0	$29	$29
AFUDC	$0	$2	$2
Subtotal Request	$0	$89	$89
O&M	$0	$0	$0
Total Request	$0	$89	$89

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Project Authorization Form

Operations Project Authorization Form

Approved at February 14, 2018 EPAC

Link to Meeting Minutes

Date Prepared: 1/23/18	**Project Title: Replace Pemigewasset Transformer**
Company/ies: Eversource NH	**Project ID Number: A18N05**
Organization: NH Operations	**Class(es) of Plant: Distribution Substation**
Project Initiator: Robert Mission	**Project Category: Peak Load Capacity - Substation**
Project Manager: Russel Johnson	**Project Type: Specific**
Project Sponsor: George Wegh	**Project Purpose: Upgrade overloaded transformer**
Estimated in service date: June 1, 2019	**If Transmission Project: PTF? n/a**
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan? N/A**
Total Request: $4,063,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is requesting full funding of $4,063,000 to:

- Replace the existing 115-34.5 kV, 20 MVA Pemigewasset substation transformer (TB88) with a company standard 62.5 MVA transformer,
- Replace 2 (34.5 kV) line oil circuit breakers with vacuum circuit breakers on the 3114X and 3149 lines.
- Upgrade the protective relaying associated with the transformer and breakers being replaced.

The work to be performed consists of final engineering, site work, material purchasing and construction necessary to remove and replace the existing substation transformer.

The NH 2018 load forecast shows that the Pemigewasset Substation transformer (TB88) is overloaded during heavy load periods under normal operating conditions. The size of the existing Pemigewasset transformer also limits customer restoration capabilities for loss of transformers at adjacent substations. Replacing the existing Pemigewasset Substation transformer with a larger unit will resolve the normal (N-0) overload and provide additional transformer capacity so that all customers can be restored for loss of transformers (N-1) at adjacent substations (Ashland or Laconia).

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Project Authorization Form

Project Costs Summary

	Prior Authorized	2018	2019	20 +	Totals
Capital Additions - Direct	$ -	$ 1,797	$ 2,048	$ -	$ 3,845
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage %	-	-	-	-	-
Total - Direct Spending	$ -	$ 1,797	$ 2,048	$ -	$ 3,845
Capital Additions - Indirect	-	100	115	-	215
Subtotal Request	$ -	$ 1,897	$ 2,163	$ -	$ 4,060
AFUDC	-	1	2	-	3
Total Capital Request	$ -	$ 1,898	$ 2,165	$ -	$ 4,063
O&M	-	-	-	-	-
Total Request	$ -	$ 1,898	$ 2,165	$ -	$ 4,063

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	2018	2019	2020+	Total
Straight Time Labor	60	50		110
Overtime Labor				
Outside Services	1,011	810		1,821
Materials	576	1,000		1,576
Other, including contingency amounts (describe)	150	188		338
Total	1,797	2,048		3,845

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	100	115		215
Capitalized interest or AFUDC, if any	1	2		3
Total	101	117		218

Total Capital Costs	1,898	2,165		4,063
Less Total Customer Contribution				
Total Capital Project Costs	**1,898**	**2,165**		**4,063**
Total O&M Project Costs				

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$338K of Contingency/Risk Allocation includes:

1. SS site expansion $248K
2. Soil disposal/trucking 60 tons $60K
3. Mobile SS installation $30K

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:

Future costs for these structure installations will be limited to regular inspections and minor maintenance as necessary.

What functional area(s) will these future costs be funded in? NH Operations
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? NH Operations
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 If yes, please provide details:

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

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Technical Justification:

Project Need Statement

The NH 2018 load forecast shows that the existing 115-34.5 kV, 20 MVA Pemigewasset Substation transformer (TB88) is overloaded (forecast load of 23 MVA) for heavy load periods under normal operating conditions. The size of the existing Pemigewasset transformer also limits customer restoration capabilities for loss of transformers at adjacent substations. Replacing the existing Pemigewasset Substation transformer with a larger unit will resolve the normal (N-0) overload and provide additional transformer capacity so that all customers can be restored for loss of transformers (N-1) at adjacent substations (Ashland or Laconia).

Replacing the Pemigewasset transformer with a larger unit will require an outage(s) of the 34 kV bus at the substation. The existing 34 kV equipment was surveyed to determine if other equipment should be replaced based upon its condition. Two 34 kV distribution line breakers (3114X and 3149) and their associated relaying were identified as equipment that should be addressed at this time. Both breakers are oil circuit breakers that are approximately 65 years old.

Project Objectives

Increase Pemigewasset Substation transformer capacity to be able to supply the summer peak load in the area. Increased transformation capacity will also be utilized to restore customers during contingent loss of the adjacent substation transformers.

Replacing aging circuit breakers and protection equipment will improve system performance during fault detection and isolation along with reducing maintenance and testing work.

Project Scope

Replace the existing 115-34.5 kV, 20 MVA transformer at Pemigewasset substation with the standard 62.5 MVA transformer. The existing 34.5 kV, 3114X & 3149 line Oil Circuit Breakers (OCBs) will be replaced with new Siemens SDV7 vacuum circuit breakers. The existing relaying for the new transformer and the new line circuit breakers will also be upgraded to current standard relay packages.

Background / Justification

The Pemigewasset substation has a single 20 MVA transformer. This substation supplies the load on the 3114X and 345 lines. The 10.5 MW Ayers Island hydro station is connected to the 3149 line. The substation supplies the 3114X and 345 circuit loads, totaling 23.0 MW. This loading level requires that load be transferred from Pemigewasset substation to Laconia substation during high load periods. The capacity of the Pemigewasset transformer is also limiting the ability to restore the load for a loss of the Ashland transformer or loss of the 338 line between Ashland and Straits Road. (see attached area One-Line)

Currently for a loss of the Ashland transformer, cascading switching is required:

- Step #1; The 3196 line can be restored from Beebe River by opening the 3196 breaker at Ashland and closing the normally open tie switch 3196J11.
- Step #2; The NHEC substation at Moultonborough can be fed from White Lake by opening switch 338J10 and closing switch 338J50.
- Step #3 (Cascaded switching step); To restore the Ashland Municipal load from Pemi, a portion of the 345 line load (8.7 MW) needs to be transferred from Pemi to Laconia by opening 345R2 at Straits Rd and closing switch 345J90
- Step #4; Restore Ashland Municipal load by opening both breaker 3380 at Ashland and switch 338J7 at Straits Rd and closing switch 338J1 at Straits Rd.

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- After the four switching steps above, there would be 13.8 MW isolated at the NHEC substations at Meredith and Center Harbor. The ability to restore any additional load is limited by the existing Pemi transformer capacity.

Currently for loss of a transformer at Laconia, the remaining Laconia transformer is loaded above LTE. The existing Pemi transformer does not have any available capacity to pick up the 23 MW of customer load on the 368 line. The larger transformer at Pemi allows these customers to be restored. With the ability to transfer this load from Laconia to Pemi, this lowers the loading on the remaining Laconia transformer to below LTE.

A larger Pemigewasset transformer will allow the restoration of all customer load for the N-1 loss of the Ashland or Laconia transformers.

Business Process and / or Technical Improvements:
Eliminates the existing transformer overload during summer peak. Address concerns about reliability and removes the need to reconfigure the distribution system for summer heavy load conditions.

Alternatives Considered
Adding a second transformer at Pemigewasset was considered but found to be more expensive and impractical because of the substations hill top location. Factors considered include;

- Added costs of the 115 kV circuit switcher and expanding the 115 kV bus
- Added costs of the 34 kV transformer secondary breaker and expanding the 34 kV bus
- Added costs of control and protection work for the second transformer
- Extensive civil work needed to expand the existing hill top substation site.

Adding a second transformer at Ashland was considered however, the existing Ashland S/S is fed by a radial 115 kV tap from the E115 Line so that loss of the E115 line would result in loss of both Ashland transformers. Customer restoration would still be limited by the existing Pemigewasset transformer capacity. To resolve the N-0 loading issue at Pemigewasset load on the 345 line would need to be permanently transferred to Ashland.

Based upon the above, replacing the existing Pemigewasset Substation transformer with a larger unit is the preferred solution.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering (Start 3/18)	12/18
Construction (Start 9/18)	6/19
Material Procurement*	3/19
In-Service	6/19

* Transformer procurement may be earlier if decision is to use a transformer initially ordered for a project that has been delayed.

Regulatory Approvals
None

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Risks and Risk Mitigation Plans

Loading on Pemigewasset substation during construction requires that customers be transferred from Pemi to Laconia substation during the peak periods. Additionally, failure of the existing transformer may require that customers be transferred to Laconia and use of the 115-34.5 kV mobile to restore all customers.

Outage cancellation due to unplanned events on the system resulting in schedule delay and potential labor costs to remobilize.

1. Mitigation Plan – establish and manage outages using proven coordination teams such as
   a. construction management
   b. coordination meetings
   c. outage planning meetings.

Internal and external resources available for engineering.

1. Effort is being exercised to balance engineering and review work between internal and external resources.

References

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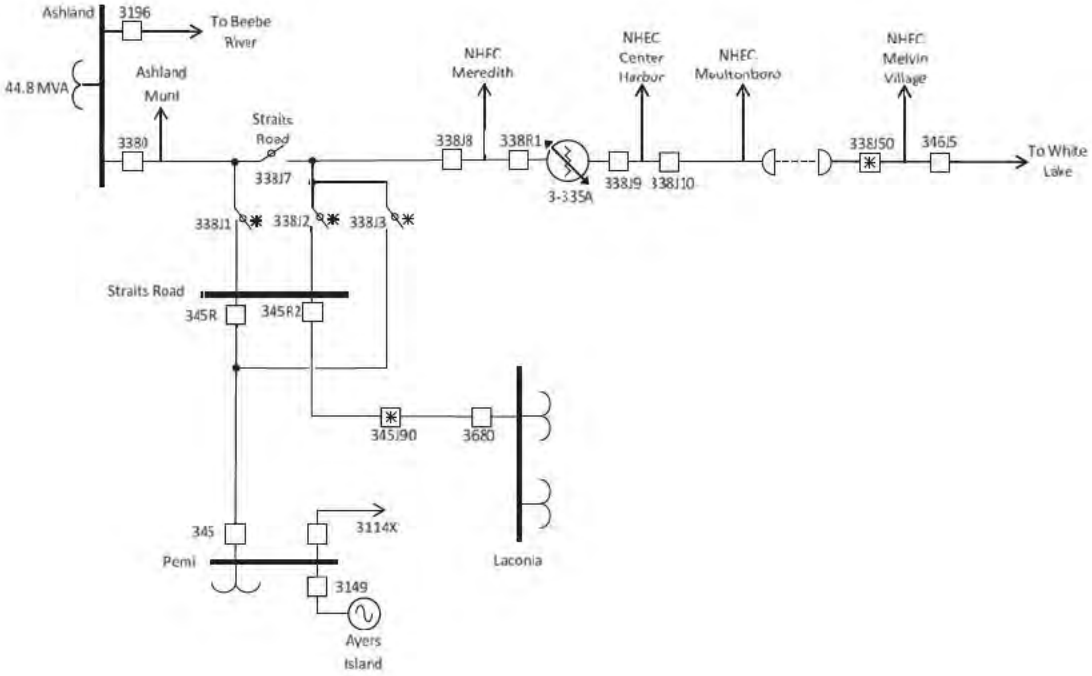
Attachments (One-Line Diagrams, Images, etc.)

Pemigewasset / Ashland Area One-Line



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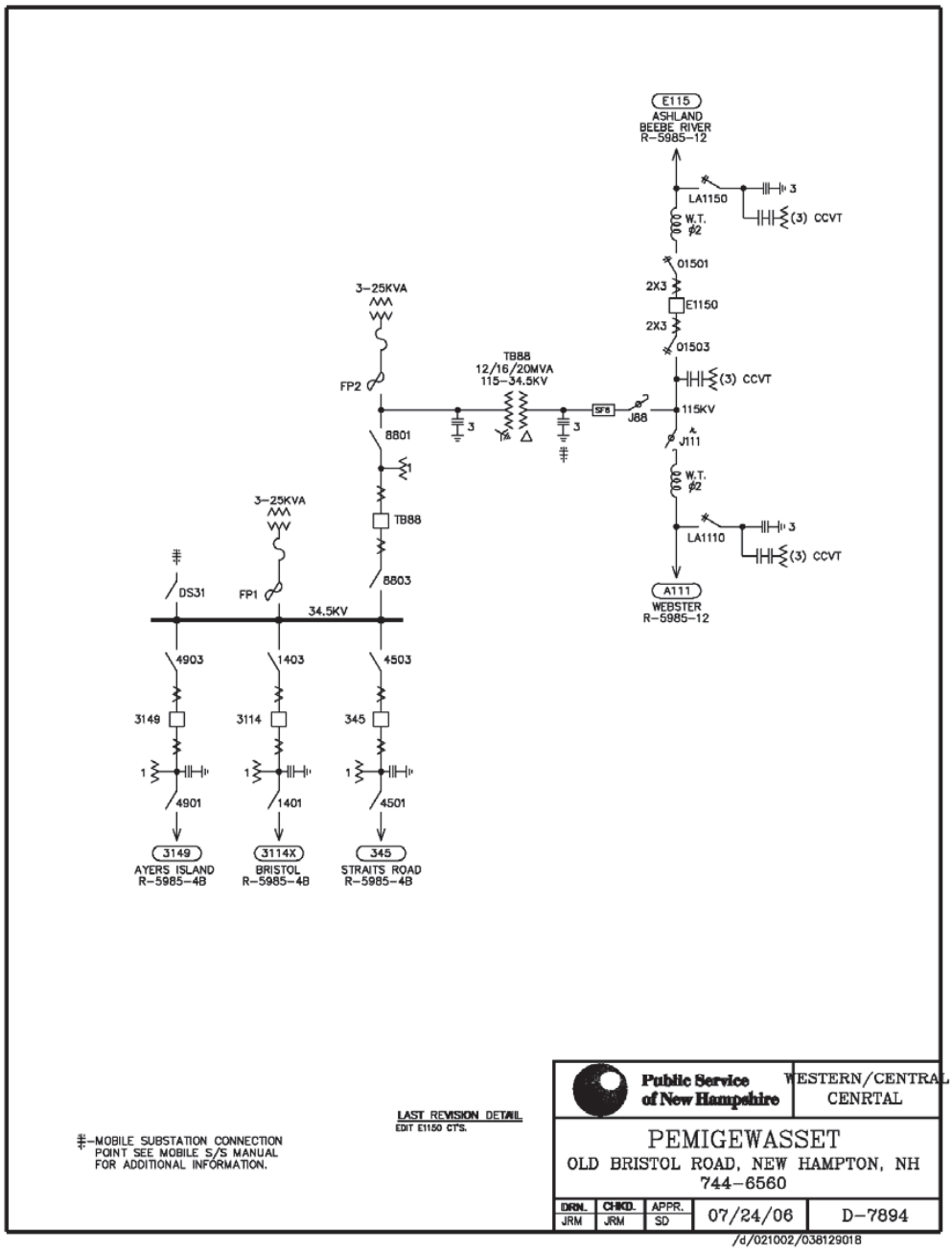
Pemigewasset Substation One-Line Diagram



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Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name : Replace Pemigewasset Transformer					**PAF No: A18N05**
Facility Type: ☐ BPS	☒ BES	☒ PTF	☐ non-PTF	☐ CIP	☒ Distribution
PLANNING					
Is a NX-9 required?					Yes
Is an ISO-NE PAC presentation required?					No
Is a PPA required?					Yes
Is a TCA Application Required?					No
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?					No
OPERATIONS					
Outage Required?	☒ Primary Equipment (Power Transfer)		☐ Secondary Equipment (P&C only)		☐ Outage Not Required
Do SCLL Conditions Exist?					Yes
Has an outage schedule been approved?					No
Are Operations & Maintenance procedures/training required?					Yes
STANDARDS					
Does the project include standard equipment and designs?					Yes
SUBSTATION ENGINEERING					
Does this impact Revenue Metering					No
Is preliminary short circuit/ breaker duty analysis required?					No
Are there any changes to the baseline audible noise?					No
Is there an impact to the existing ground grid?					Yes
Is a Transient Over Voltage (TOV) analysis required?					No
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?					No
If BPS, is an NPCC Directory #4 presentation required?					No

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Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : Replace Pemigewasset Transformer	**PAF No: A18N05**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
Is there an impact to the existing ground grid?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
Siting & Construction Services (Outreach)	
What is the level of outreach expected?	Low
INITIATOR	
Has a field constructability review been completed?	Yes

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Cost Estimate Backup Details

Standard Estimate Report

Pemigewasset Upgrade

Project name	Pemigewasset Upgrade 731 Old Bristol Rd New Hampton NH 03256 USA
Labor rate table	L-16-US40
Equipment rate table	E-16-US
Report format	Sorted by 'BidPkg/Bid tem/Model' 'Model' summary

Description	Quantity	Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Subcontract Amount	Equipment Amount	Other Amount	Total Amount
Contracted									
Bus Replacements									
G4010.1070	Substation Outdoor Hard Bus & Shielding: Bus, Disconnect Switch Replacement		1,048		1,632		6		2,686
G4010.1070					4,801				4,801
Bus Replacements			**1,048**		**6,433**		**6**		**7,487**
14.40	Labor hours								
5.76	Equipment hours								
Control House									
G4010.1070					50,000				50,000
Control House					**50,000**				**50,000**
0.000	Labor hours								
Equipment Additions									
G4010.1056	Substation Circuit Breaker: 2, CBs, 34 5kV, 1200A, Vacuum, 3114/3148		18,624		16,506		60		35,191
G4010.1060	Substation Transformer: 1, TX88 XFMR Installation, 115-34kV, 62.5MVA		37,998		48,822	25,000	1,165		112,986
G4010.1060			111,307						111,307
Equipment Additions			**167,929**		**65,328**	**25,000**	**1,226**		**259,483**
2,471.423	Labor hours								
32.174	Equipment hours								
Equipment Removals									
G4010.1050	Substation Disconnect Switch: 2, LA1110/LA1150 Switch Removal		18,148				882		19,030
G4010.1056	Substation Circuit Breaker: 2, CB Removal, 34.5kV, 1200A, Oil, 3114/3149		23,061				60		23,122
G4010.1060	Substation Transformer: 1, TB88 XFMR Removal, 115-34kV, 12/16/20 MVA		38,938				160		39,098
Equipment Removals			**80,147**				**1,103**		**81,250**
1,153.631	Labor hours								
42.183	Equipment hours								
Site Development									
G4010.1010	Site Development: Site Development, Expansion		10,574		6,073		617		17,264
G4010.1010			1,016		7,527				8,543
Site Development			**11,589**		**13,600**		**617**		**25,807**
169 914	Labor hours								
17.191	Equipment hours								

Standard Estimate Report

Pemigewasset Upgrade

Description	Quantity	Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Subcontract Amount	Equipment Amount	Other Amount	Total Amount
Contracted			***260,713***		***135,362***	***25,000***	***2,951***	***0***	***424,027***
	3,809.37 Labor hours								
	97.31 Equipment hours								
ES Procurement									
Equipment Additions									
G4010.1030	Metering, Protection and Controls: Protection and Controls Equipment				550,000				550,000
G4010.1056	Substation Circuit Breaker: 2, CBs, 34 5kV, 1200A, Vacuum, 3114/3148				32,240				32,240
G4010.1060	Substation Transformer: 1, TX88 XFMR Installation, 115-34kV, 62.5MVA				858,940				858,940
Equipment Additions					**1,441,180**				**1,441,180**
	1,529.000 Labor hours								
ES Procurement			***0***		***1,441,180***	***0***	***0***	***0***	***1,441,180***
	1,529.000 Labor hours								

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	260,713		5,338.369 hrs				6.42%	
Material	1,576,542						38.80%	
Subcontract	25,000						0.62%	
Equipment	2,951		97.308 hrs				0.07%	
Other								
Subtotal (Before Overheads)	**1,865,206**	**1,865,206 USD**					**45.91**	**45.91%**
Contracted Labor Overhead	130,357			50.000 %	C		3.21%	
Contracted Material Overhead	144,118			10.000 %	C		3.55%	
Equipment Overhead	295			10.000 %	C		0.01%	
Temp. Construction Mobile XFMR	50,000				L		1.23%	
Profit	328,496			15.000 %	T		8.09%	
Contracted Overhead Subtotal	**653,266**	**2,518,472 USD**					**16.08**	**61.99%**
Substation Engineering	137,280				L		3.38%	
P&C Engineering	304,735				L		7.50%	
Testing & Commissioning	96,000				L		2.36%	
Sound Study	25,000				L		0.62%	
Thermal Limits Study	6,000				L		0.15%	
Engineering Subtotal	**569,015**	**3,087,487 USD**					**14.00**	**75.99%**
Supplemental Design Eng.	53,802				L		1.32%	
Supplemental Construction Eng.	26,900				L		0.66%	
ES Supplemental Eng. Subtotal	**80,702**	**3,168,189 USD**					**1.99**	**77.98%**
ES Material Overhead	201,765			14.000 %	C		4.97%	
AS&E	7,920			0.250 %	T		0.19%	
E&S	5,380				L		0.13%	
ES Overhead Subtotal	**215,065**	**3,383,254 USD**					**5.29**	**83.27%**
Project Management	338,326			10.000 %	T		8.33%	
Risk Allocation	338,326			10.000 %	T		8.33%	
AFUDC	3,045			0.090 %	T		0.07%	
Global Overhead Subtotal	**679,697**	**4,062,951 USD**					**16.73**	**100.00%**
Total		***4,062,951 USD***						

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Operations Project Authorization Form

Date Prepared: 1/15/18	**Project Title:** Reconductor with Spacer Cable Rte 63 Hinsdale
Company/ies: Eversource NH	**Project ID Number:** A19W03
Organization: NH Operations	**Class(es) of Plant:** Distribution Line
Project Initiator: Mark Fraser	**Project Category:** Reliability – Distribution Lines
Project Manager: Mark Fraser	**Project Type:** Specific
Project Sponsor: Jim Eilenberger	**Project Purpose:** Reliability Improvement – 3139X
Estimated in service date: 11/15/19	**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: $1,000,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is intended to replace sections of open wire along Highway 63 in Hinsdale with three phase spacer cable. The 3139X circuit is a perennial hit list circuit in part due to the fact the circuit runs nearly 8 miles from Chestnut Hill Substation north along Route 63 until it gets to Route 9 where most of the load is concentrated. Despite significant tree trimming efforts, vegetation along this 8 mile section of line causes numerous outages resulting in most of the 2,631 customers on the circuit losing power until the fault is located and repaired. Because of the location of the circuit near the Vermont border there is no real possibility of a circuit tie.

Replacing the worst open wire sections with spacer cable along Route 63 will help improve reliability to the customers on the 3139X circuit by preventing outages from small trees and limbs from taking place.

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Project Costs Summary
Note: Dollar values are in thousands

	Prior Authorized	2019	20__	20__+	Totals
Capital Additions - Direct	$ -	$ 660	$ -	$ -	$ 660
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage ____%	-	42	-	-	42
Total - Direct Spending	$ -	$ 702	$ -	$ -	$ 702
Capital Additions - Indirect	-	276	-	-	276
Subtotal Request	$ -	$ 978	$ -	$ -	$ 978
AFUDC	-	22	-	-	22
Total Capital Request	$ -	$ 1,000	$ -	$ -	$ 1,000
O&M	-	-	-	-	-
Total Request	$ -	$ 1,000	$ -	$ -	$ 1,000

Financial Evaluation
Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	$18			$18
Overtime Labor				
Outside Services	472			472
Materials	213			213
Other, including contingency amounts (describe)				
Total Direct Costs	**$702**			**$702**

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	$276			$276
Capitalized interest or AFUDC, if any	22			22
Total Indirect Costs	**$298**			**$298**
Total Capital Costs	**$1,000**			**$1,000**
Less Total Customer Contribution				
Total Capital Project Costs	**$1,000**			**$1,000**
Total O&M Project Costs				

Note: Explain unique payment provisions, if applicable

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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

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Technical Justification

Project Need Statement

The 3139X was the worst performing New Hampshire circuit in 2017, ranked #1 on the Hit List. The circuit is radially fed from the Chestnut Hill Substation in Hinsdale and runs about 8 miles north up Rt. 63 to feed over 2000 customers. Over the past 3 years, the 3139X has experienced 2.01 million outage minutes due to tree damage along Rt. 63. The current line construction is open wire primarily on Heatherlite brackets. The plan would be to upgrade portions of the backbone to 477 spacer cable to reduce outage exposure. This project is anticipated to save approximately 75% of the outage minutes or 500,000 minutes annually.

Project Objective

The project objective is to significantly improve reliabiltity of the 3139X circuit. By installing Hendrix spacer cable along Rt. 63 and removing bare wire in Heatherlite configuration, tree outages will be greatly reduced. Three of the worst line segments have been selected for upgrade totaling approximately 3 miles. The new covered wire will reduce tree contact outages.

Project Scope

Install new pole plant and associated equipment including 477 MCM spacer cable in place of 336 ACSR conductors on approximately 1.9 miles of 34.5 kV line along Highway 63 in Hinsdale NH. Specifically the construction would involve the following three sections:

1. Pole 199/164 to pole 199/192 (5,500')
2. Pole 199/3 to pole 199/18 (3,000')
3. Pole 199/35 to pole 199/43 (1,760')

Background / Justification

- Annual Minutes saved – 503,418
- Anticiapted 75% reduction in outages with spacer cable
- The 3139X was #1 on the Hit List
- 2,010,000 outage minutes over three years
- Cost/min: $2.94
- Spacer cable pricing - $90/ft

Business Process and / or Technical Improvements:

This project will address the reliability of the 3139X along Rt. 63. Converting the 336 ASCR Heatherlite to 477 Hendrix spacer cable will protect against tree damage and improve reliability. Heatherlite Constructuion is prone to tree damage because of the line configuration. It is easier for a branch to hit and stay in the wires. Spacer cable is covered and more closely bundled reducing exposure to tree damage.

Alternatives Considered with Cost Estimates

Extensive ETT has been performed along Route 63. Heatherlite brackets have been changed to crossarm construction in other areas. This would mean greater trimming in this area with modest benefit. Reconductoring to spacer cable provides less exposure to trees.

Other projects are being completed in conjunction with the new line upgrade. New DA devices are being added with single phase tripping capability. This will reduce the number of three phase outages that occur when only one phase is impacted. A protection review has also been recently completed that reduced exposure to faults on side taps. Old switches have been removed and replaced with new polymer inline devices. Also, an extensive danger tree takedown project was just completed removing over 250 suspect trees.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Line Construction complete and project in service	11/15/19

Regulatory Approvals

Route 63 is a state highway and Eversource will need to work closely with the NH DOT.

Risks and Mitigation

Project is planned to go out to bid and there is a risk that bids could come back higher than estimated. Mitigation would be to reduce scope or attempt to seek additional funding.

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

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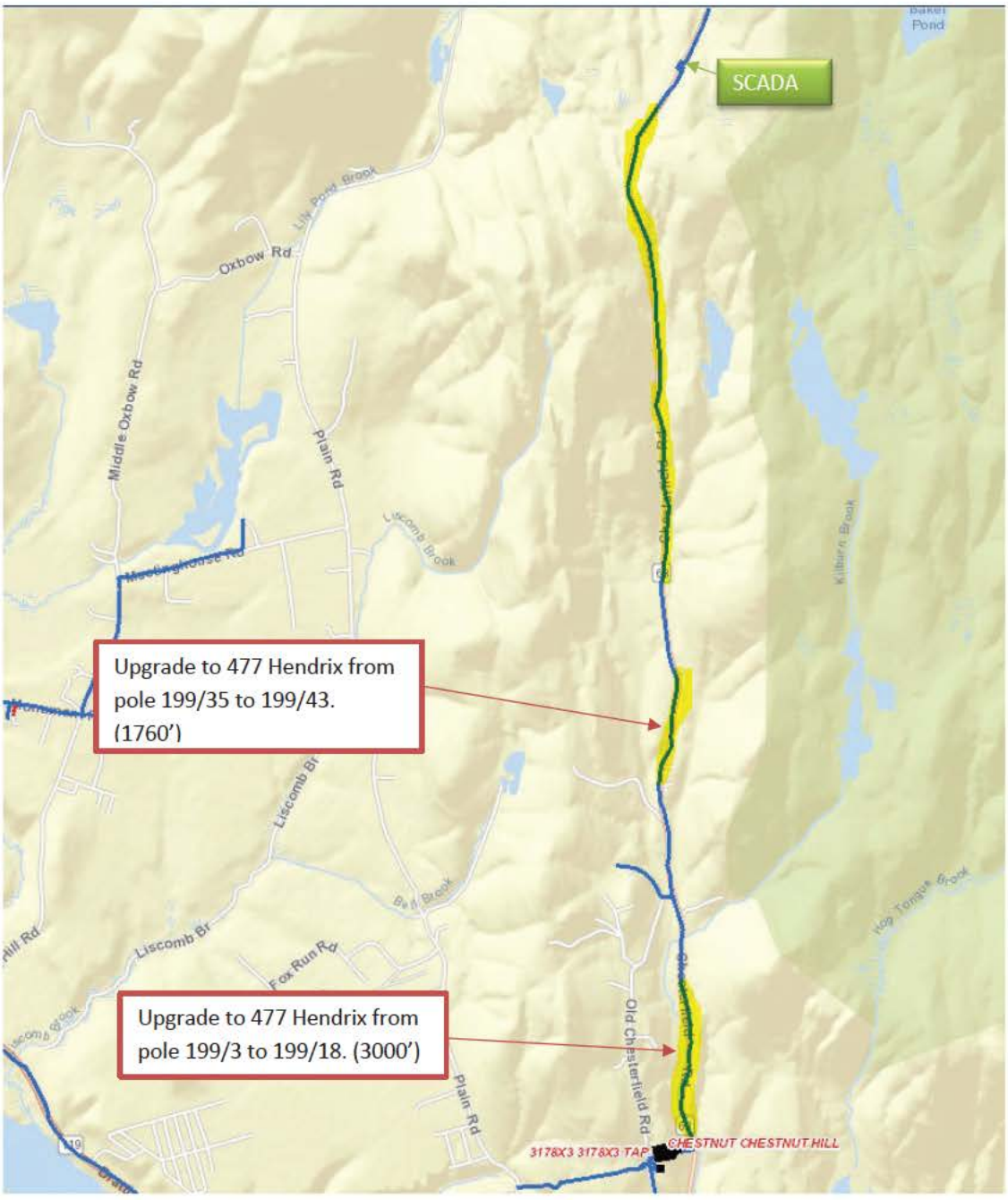

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START	END	CAUSE	REMARKS	DEVICE	DURA.	Total Outage Mins
12/12/2017 3:39:25 PM	12/12/2017 6:13:00 PM	TREE-Tree/Limb Outside Trim Zone/Unknown	TB87 opened at Chestnut substation. Crews cleared tree from primary, and repaired damaged cross arm.	SS_D_CB:CHESTNUT:TB87	2:34	283822
12/23/2017 10:07:00 PM	12/23/2017 11:37:00 PM	TREE-Tree/Limb Outside Trim Zone/Unknown	Crew fiybd tree ib akk tgre ogases at oike 16. Tree removed under Live Line Permission.	SS_D_CB:CHESTNUT:TB87	1:30	178380
4/4/2018 7:03:00 PM	4/4/2018 11:35:00 PM	TREE-Tree/Limb Outside Trim Zone/Unknown	Found limb at pole 199/168.	<inline_jumper.5700>	4:32	593232
12/12/2017 7:32:00 PM	12/12/2017 8:25:00 PM	EQUP-Equip Failure	Crew found failed insulator at pole 199/39. Issued LLP to crew, repairs made and restored power to all customers.	SS_D_CB:CHESTNUT:TB87	0:53	89305
2/21/2018 4:40:00 PM	2/21/2018 5:38:00 PM	PTNF-Patrolled Nothing Found	Crews found phase off insulator at pole 199/151. Patrolled line out to next closed devices 3139R56 and 3139R54, nothing found. Line was patrolled twice.	SCADA_VS_SW:199/97Y:3139J1	0:58	146972
6/12/2016 4:49:00 PM	6/12/2016 7:39:00 PM	TREE-Tree/Limb Outside Trim Zone/Unknown	Crew found tree took primary down at pole 199/14. Cleared tree, replaced broken crossarm, and restored power with ESCC assistance.	VS_SW:199/98:3139J1	2:50	433670
10/27/2016 11:09:00 PM	10/28/2016 1:01:00 AM	TREE-Tree/Limb Outside Trim Zone/Unknown	Tree on all three phases at pole 199/173.	VS_SW:199/98:3139J1	1:52	259504
6/18/2018 5:05:00 PM	6/18/2018 5:16:00 PM	TREE-Tree/Limb Outside Trim Zone/Unknown	ESCC switched out to restore customers.	SS_D_CB:CHESTNUT:TB87	0:11	28787
					Total Mins:	2013672
					Over 3 Years:	671224
					75% Mins Saved:	503418

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Date Prepared: 4/8/2020	**Project Title:** Reconductor with Spacer Cable Rte 63 Hinsdale
Company/Companies: Eversource	**Project ID Number:** A19W03
Organization: Eversource NH	**Plant Class/(F.P.Type):** Distribution - Line
Project Initiator: Mark Fraser	**Project Type:** Specific
Project Manager: Thomas Davis	**Capital Investment Part of Original Operating Plan?** Y
Project Sponsor: Mark Sandler	**O&M Expenses Part of the Original Operating Plan?** Y
Current Authorized Amount: $1,000,000	**Estimated in service date(s):** February 3, 2020
Supplement Request: $668,000	**Other:**
Total Request: $1,668,000	

Supplement Justification

Justification for Additional Resources

This Supplement request is seeking an additional $668,000 for this project.

The project originally consisted of replacing three sections of open wire construction along Route 63 in Hinsdale NH with new spacer cable construction. In late 2019 the decision was made to continue this work and replace a fourth segment of open wire along Route 63 with spacer cable, from pole 199/57 to pole 199/83, a distance of approximately 6,200 feet. This supplemental request is to cover the cost of this added work, which was outside the scope of the original authorized amount.

The contractor's Not-To-Exceed bid for this work was $228,000. In addition, there was one change order on the project resulting in additional material and outside services with a total cost of $52,953.69. Details on this change order can be found below. There were also increases in Eversource labor for contractor oversight ($37,000) and in materials for the additional 6,200 circuit feet of new spacer cable construction ($118,000).

Work Order	Work Request	Amount	Description
9K920184	3232904	$11,898.19	Additional crossarm work, unplanned switching events, and two additional anchors.
9K920175	3232898	$27,074.80	Installation of ledge pole sets, rock anchors, additional anchors and swamp anchors.
9K920176	32360807	$13,980.70	Installation of additional crossarms, one additional anchor at pole, four rock anchors, and two ledge set poles
	Total	$52,953.69	

The additional crossarms were done in order to mitigate the safety concern that was brought on by the heather-lite brackets that were on those structures. The anchors, ledge sets, and rock anchors were all required in order to complete the project to standard and the need was discussed prior to the work being performed.

Work was completed February 3, 2020.

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 660	$ 434	$ 1,094
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	42	-	42
Total Direct Spending	$ 702	$ 434	$ 1,136
Capital Additions - Indirect	276	227	503
AFUDC	22	7	29
Total Capital Request	$ 1,000	$ 668	$ 1,668
O&M	-	-	-
Total Request	**$ 1,000**	**$ 668**	**$ 1,668**

Note: Dollar values are in thousands:

	2019	Year 2020	Total
Capital Additions - Direct	$ 371	$ 63	$ 434
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	-	-
Total Direct Spending	$ 371	$ 63	$ 434
Capital Additions - Indirect	180	47	227
AFUDC	4	3	7
Total Capital Request	$ 555	$ 113	$ 668
O&M	-	-	-
Total Request	**$ 555**	**$ 113**	**$ 668**

Direct Capital Costs	Authorized	Actual	Supplemental
Straight Time Labor	$18	$55	$37
Outside Services	471	720	249
Materials	213	331	118
Other, Taxes, Vehicles, Per Diem (contractor)		30	30
Total Direct Costs	**$702**	**$1,136**	**$434**

Indirect Capital Costs			Total
Indirects/Overheads (including benefits)	$276	$503	$227
Capitalized interest or AFUDC, if any	22	29	7
Total Indirect Costs	**$298**	**$532**	**$234**
Total Capital Costs	**$1,000**	**$1,668**	**$668**

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APS 1 - Project Authorization Policy

Supplement Request Form

Operations Project Authorization Form

Date Prepared: 1/15/18	**Project Title:** Reconductor with Spacer Cable Rte 63 Hinsdale
Company/ies: Eversource NH	**Project ID Number:** A19W03
Organization: NH Operations	**Class(es) of Plant:** Distribution Line
Project Initiator: Mark Fraser	**Project Category:** Reliability – Distribution Lines
Project Manager: Mark Fraser	**Project Type:** Specific
Project Sponsor: Jim Eilenberger	**Project Purpose:** Reliability Improvement – 3139X
Estimated in service date: 11/15/19	**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: $1,000,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is intended to replace sections of open wire along Highway 63 in Hinsdale with three phase spacer cable. The 3139X circuit is a perennial hit list circuit in part due to the fact the circuit runs nearly 8 miles from Chestnut Hill Substation north along Route 63 until it gets to Route 9 where most of the load is concentrated. Despite significant tree trimming efforts, vegetation along this 8 mile section of line causes numerous outages resulting in most of the 2,631 customers on the circuit losing power until the fault is located and repaired. Because of the location of the circuit near the Vermont border there is no real possibility of a circuit tie.

Replacing the worst open wire sections with spacer cable along Route 63 will help improve reliability to the customers on the 3139X circuit by preventing outages from small trees and limbs from taking place.

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APS 1 - Project Authorization Policy

Supplement Request Form

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2019	20	20 +	Totals
Capital Additions - Direct	$ -	$ 660	$ -	$ -	$ 660
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage ____%	-	42	-	-	42
Total - Direct Spending	$ -	$ 702	$ -	$ -	$ 702
Capital Additions - Indirect	-	276	-	-	276
Subtotal Request	$ -	$ 978	$ -	$ -	$ 978
AFUDC	-	22	-	-	22
Total Capital Request	$ -	$ 1,000	$ -	$ -	$ 1,000
O&M	-	-	-	-	-
Total Request	$ -	$ 1,000	$ -	$ -	$ 1,000

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	$18			$18
Overtime Labor				
Outside Services	472			472
Materials	213			213
Other, including contingency amounts (describe)				
Total Direct Costs	**$702**			**$702**

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	$276			$276
Capitalized interest or AFUDC, if any	22			22
Total Indirect Costs	**$298**			**$298**

Total Capital Costs	**$1,000**			**$1,000**
Less Total Customer Contribution				
Total Capital Project Costs	**$1,000**			**$1,000**
Total O&M Project Costs				

Note: Explain unique payment provisions, if applicable

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APS 1 - Project Authorization Policy

Supplement Request 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 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

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APS 1 - Project Authorization Policy

Supplement Request Form

Technical Justification

Project Need Statement

The 3139X was the worst performing New Hampshire circuit in 2017, ranked #1 on the Hit List. The circuit is radially fed from the Chestnut Hill Substation in Hinsdale and runs about 8 miles north up Rt. 63 to feed over 2000 customers. Over the past 3 years, the 3139X has experienced 2.01 million outage minutes due to tree damage along Rt. 63. The current line construction is open wire primarily on Heatherlite brackets. The plan would be to upgrade portions of the backbone to 477 spacer cable to reduce outage exposure. This project is anticipated to save approximately 75% of the outage minutes or 500,000 minutes annually.

Project Objective

The project objective is to significantly improve reliabiltity of the 3139X circuit. By installing Hendrix spacer cable along Rt. 63 and removing bare wire in Heatherlite configuration, tree outages will be greatly reduced. Three of the worst line segments have been selected for upgrade totaling approximately 3 miles. The new covered wire will reduce tree contact outages.

Project Scope

Install new pole plant and associated equipment including 477 MCM spacer cable in place of 336 ACSR conductors on approximately 1.9 miles of 34.5 kV line along Highway 63 in Hinsdale NH. Specifically the construction would involve the following three sections:

1. Pole 199/164 to pole 199/192 (5,500')
2. Pole 199/3 to pole 199/18 (3,000')
3. Pole 199/35 to pole 199/43 (1,760')

Background / Justification

- Annual Minutes saved – 503,418
- Anticiapted 75% reduction in outages with spacer cable
- The 3139X was #1 on the Hit List
- 2,010,000 outage minutes over three years
- Cost/min: $2.94
- Spacer cable pricing - $90/ft

Business Process and / or Technical Improvements:

This project will address the reliability of the 3139X along Rt. 63. Converting the 336 ASCR Heatherlite to 477 Hendrix spacer cable will protect against tree damage and improve reliability. Heatherlite Constructuion is prone to tree damage because of the line configuration. It is easier for a branch to hit

and stay in the wires. Spacer cable is covered and more closely bundled reducing exposure to tree damage.

Alternatives Considered with Cost Estimates

Extensive ETT has been performed along Route 63. Heatherlite brackets have been changed to crossarm construction in other areas. This would mean greater trimming in this area with modest benefit. Reconductoring to spacer cable provides less exposure to trees.

Other projects are being completed in conjunction with the new line upgrade. New DA devices are being added with single phase tripping capability. This will reduce the number of three phase outages that occur when only one phase is impacted. A protection review has also been recently completed that reduced exposure to faults on side taps. Old switches have been removed and replaced with new polymer inline devices. Also, an extensive danger tree takedown project was just completed removing over 250 suspect trees.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Line Construction complete and project in service	11/15/19

Regulatory Approvals

Route 63 is a state highway and Eversource will need to work closely with the NH DOT.

Risks and Mitigation

Project is planned to go out to bid and there is a risk that bids could come back higher than estimated. Mitigation would be to reduce scope or attempt to seek additional funding.

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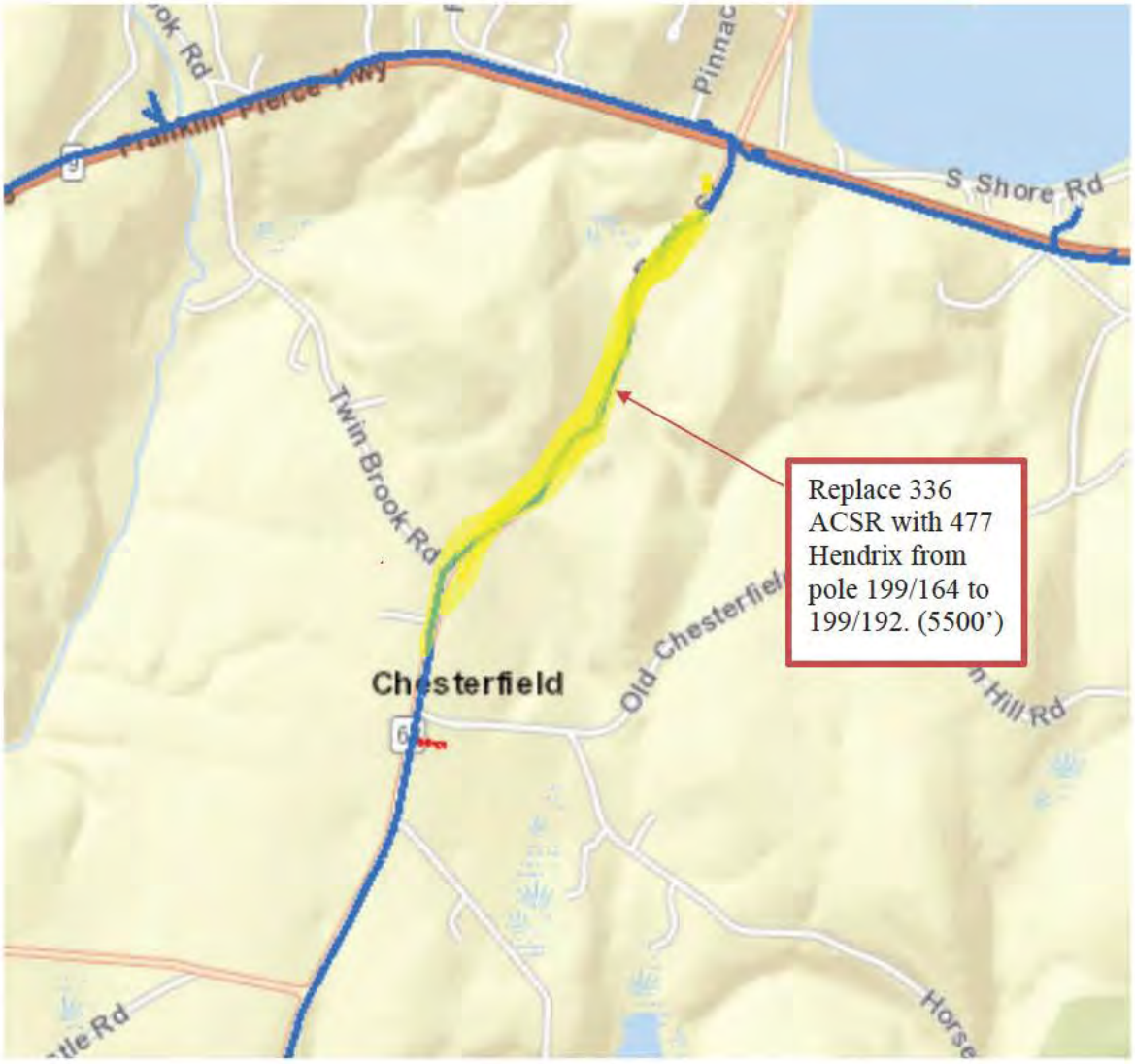
Supplement Request Form

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



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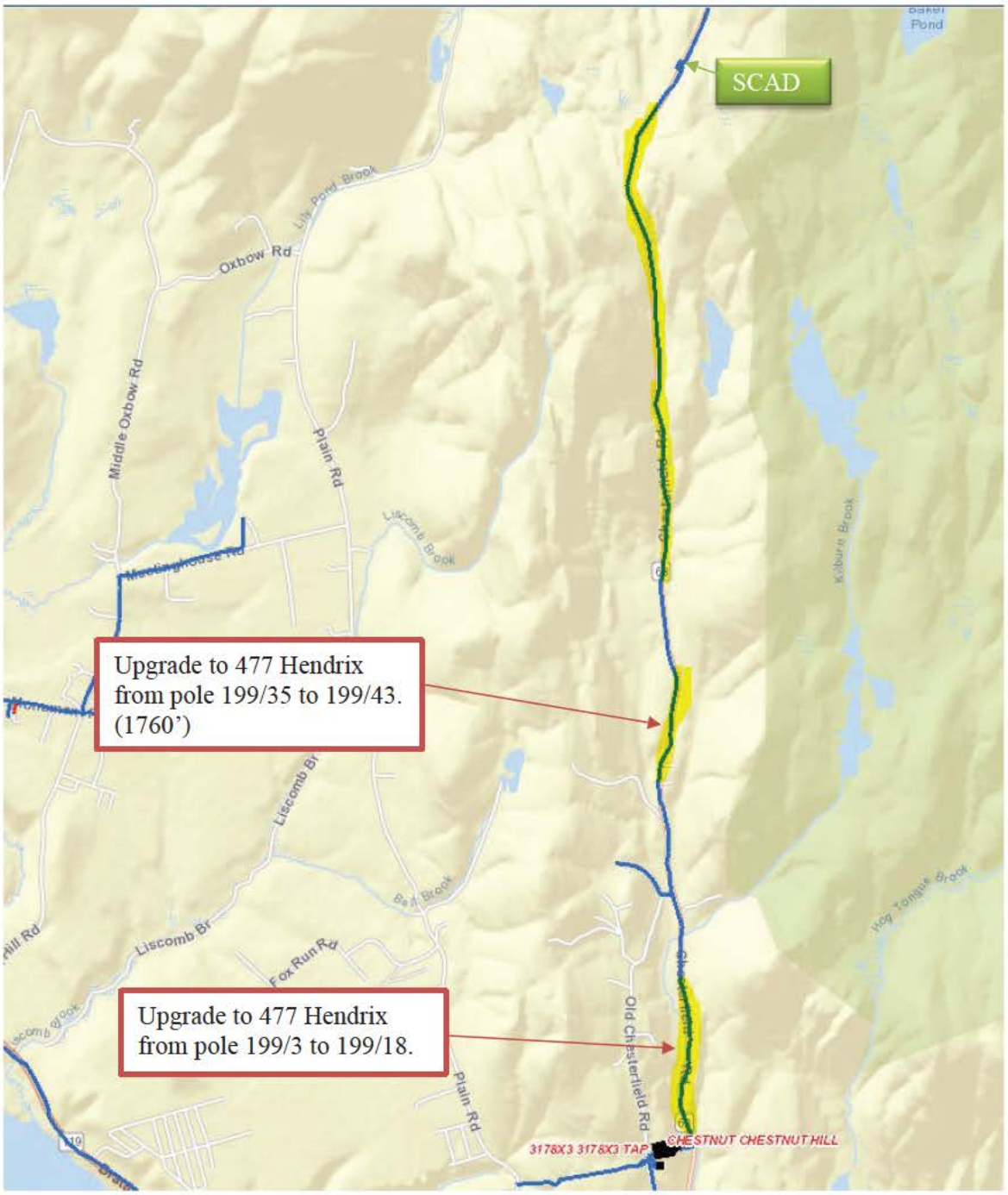
Supplement Request Form



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Supplement Request Form

START	END	CAUSE	REMARKS	DEVICE	DURA.	Total Outage Mins
12/12/2017 3:39:25 PM	12/12/2017 6:13:00 PM	TREE-Tree/Limb Outside Trim Zone/Unknown	TB87 opened at Chestnut substation. Crews cleared tree from primary, and repaired damaged cross arm.	SS_D_CB:CHESTNUT:TB87	2:34	283822
12/23/2017 10:07:00 PM	12/23/2017 11:37:00 PM	TREE-Tree/Limb Outside Trim Zone/Unknown	Crew fiybd tree ib akk tgre ogases at oike 16. Tree removed under Live Line Permission.	SS_D_CB:CHESTNUT:TB87	1:30	178380
4/4/2018 7:03:00 PM	4/4/2018 11:35:00 PM	TREE-Tree/Limb Outside Trim Zone/Unknown	Found limb at pole 199/168.	<inline_jumper.5700>	4:32	593232
12/12/2017 7:32:00 PM	12/12/2017 8:25:00 PM	EQUP-Equip Failure	Crew found failed insulator at pole 199/39. Issued LLP to crew, repairs made and restored power to all customers.	SS_D_CB:CHESTNUT:TB87	0:53	89305
2/21/2018 4:40:00 PM	2/21/2018 5:38:00 PM	PTNF-Patrolled Nothing Found	Crews found phase off insulator at pole 199/151. Patrolled line out to next closed devices 3139R56 and 3139R54, nothing found. Line was patrolled twice.	SCADA_VS_SW:199/97Y:3139J1	0:58	146972
6/12/2016 4:49:00 PM	6/12/2016 7:39:00 PM	TREE-Tree/Limb Outside Trim Zone/Unknown	Crew found tree took primary down at pole 199/14. Cleared tree, replaced broken crossarm, and restored power with ESCC assistance.	VS_SW:199/98:3139J1	2:50	433670
10/27/2016 11:09:00 PM	10/28/2016 1:01:00 AM	TREE-Tree/Limb Outside Trim Zone/Unknown	Tree on all three phases at pole 199/173.	VS_SW:199/98:3139J1	1:52	259504
6/18/2018 5:05:00 PM	6/18/2018 5:16:00 PM	TREE-Tree/Limb Outside Trim Zone/Unknown	ESCC switched out to restore customers.	SS_D_CB:CHESTNUT:TB87	0:11	28787
					Total Mins:	2013672
					Over 3 Years:	671224
					75% Mins Saved:	503418

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Appendix 4
Supplement Request Form

Supplement Request Form

Date Prepared: 4/18/19	Project Title: Line Relocation Hinsdale Wastewater Plant
Company/ies: Eversource NH	Project ID Number: A19W10
Organization: NH Operations	Plant Class/(F.P.Type): Distribution Line
Project Initiator: Mark Fraser	Project Type: Specific
Project Manager: Mark Fraser	Capital Investment Part of Original Operating Plan? Y
Project Sponsor: Jim Eilenberger	O&M Expenses Part of the Original Operating Plan? Y
Current Authorized Amount: $250,000	Estimated in service date(s): 10/19
Supplement Request: $42,000	Other:
Total Request: $292,000	

Supplement Justification

Justification for Additional Resources

There are four work packets that have been recently written to create a new three phase primary feed to the Hinsdale Waste Water Treatment Facility. Three of these packages were bundled together and put out to contractor bid. One job packet was retained to be constructed with internal Eversource crews.

Original cost estimates for this project were based on previous actual costs for similar type jobs. Once this project was formally designed, entered into STORMS, and bids were received, more precise estimates were formulated. The original estimate assumed that the entire project would be constructed by contractors, so only minimal Eversource labor was included in the estimate to cover design and supervision of the contractor.

The cost estimates to utilize outside contract line crews came in with higher direct costs than anticipated for the portion of the project they are to construct because of the complexity of that work. Based on previous projects, the contract labor was estimated at $75 per foot. On this project the lowest price bid is $99 per foot. The portion to be constructed by Eversource crews adds $50,000 in internal labor. In total this has led up to request $70,000 in additional direct funding with a reduction in Indirect charges resulting in a Supplemental Request of an additional $42,000 in total dollars for a total project cost of $292,000.

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 165	$ 55	$ 220
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	6	15	21
Total Direct Spending	$ 171	$ 70	$ 241
Capital Additions - Indirect	72	(28)	44
AFUDC	7	-	7
Total Capital Request	$ 250	$ 42	$ 292
O&M		-	-
Total Request	**$ 250**	**$ 42**	**$ 292**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2019	Year 20__	Year 20__+	Total
Capital Additions - Direct	$ 55	$ -	$ -	$ 55
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	15	-	-	15
Total Direct Spending	$ 70	$ -	$ -	$ 70
Capital Additions - Indirect	(28)	-	-	(28)
AFUDC	-	-	-	-
Total Capital Request	$ 42	$ -	$ -	$ 42
O&M	-	-	-	-
Total Request	**$ 42**	**$ -**	**$ -**	**$ 42**

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Operations Project Authorization Form

Date Prepared: 1/15/18	**Project Title:** Line Relocation Hinsdale Wastewater Plant
Company/ies: Eversource NH	**Project ID Number:** A19W10
Organization: NH Operations	**Class(es) of Plant:** Distribution Line
Project Initiator: Mark Fraser	**Project Category:** Reliability – Distribution Lines
Project Manager: Mark Fraser	**Project Type:** Specific
Project Sponsor: Jim Eilenberger	**Project Purpose:** CAIDI Improvement
Estimated in service date: 10/1/19	**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: $250,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is intended to replace the ROW line which currently feeds the Hinsdale Wastewater Treatment Facility with a new line constructed along the road. The existing ROW is overgrown and the electrical facilities are in poor condition. The new line will be built with 34 kV spacer cable along Old Stage Road and will be accessible with on-road vehicles. This will help improve reliability to this locally critical facility and reduce ongoing expenses for repair of the existing off road line.

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2019	20__	20__+	Totals
Capital Additions - Direct	$ -	$ 165	$ -	$ -	$ 165
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage ____%	-	6	-	-	6
Total - Direct Spending	$ -	$ 171	$ -	$ -	$ 171
Capital Additions - Indirect	-	72	-	-	72
Subtotal Request	$ -	$ 243	$ -	$ -	$ 243
AFUDC	-	7	-	-	7
Total Capital Request	$ -	$ 250	$ -	$ -	$ 250
O&M	-	-	-	-	-
Total Request	$ -	$ 250	$ -	$ -	$ 250

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	$11			$11
Overtime Labor				
Outside Services	122			122
Materials	37			37
Other, including contingency amounts (describe)	1			1
Total Direct Costs	**$171**			**$171**

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	$72			$72
Capitalized interest or AFUDC, if any	7			7
Total Indirect Costs	**$79**			**$79**
Total Capital Costs	**$250**			**$250**
Less Total Customer Contribution				
Total Capital Project Costs	**$250**			**$250**
Total O&M Project Costs				

Note: Explain unique payment provisions, if applicable

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Appendix 4
Supplement Request 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 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

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Technical Justification

Project Need Statement
In 2018 the ROW line to River Road feeding the Hinsdale Wastewater Treatment plant came down resulting in a 17 hour outage to the plant and eight residential customers. The 1,600 foot ROW line drops down from Hwy 63, crosses the Ashuelot River, and runs through a swampy area before it reaches River Road.

Project Objectives
The objective is to replace the ROW line feeding the Wastewater Treatment Plant and create a reliable and safe feed to a critical facility for the town of Hinsdale.

Project Scope
Install new pole plant and associated equipment including 1/0 spacer cable conductors in a new location in place of #2 ACSR conductors and increase voltage to 34 kV on approximately 3,200 feet of 7.2 kV single phase line along Old Stage Road in Hinsdale, NH.

Background / Justification
Over the last three years the Wastewater Treatment Plant has experienced nearly 50 hours of outages, including one which lasted approximately 17 hours when the line in ROW feeding the plant fell down.

Business Process and / or Technical Improvements:
This project will address the reliability of the line feeding the Hinsdale Wastewater Treatment Facility. The ROW line will be removed and 34.5 kV, 1/0 spacer cable will be installed from School St and along Old Stage Rd. This will help prevent long outages in this inaccessable section of line.

Alternatives Considered with Cost Estimates
An alternative was to construct a new 3,000 foot line south on River Rd to feed the Wastewater Treatment Plant. This is slighty more costly and faces more restricitions because of the river, trimming, and zoning.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Line Construction Completion and project placed in service	10/1/19

Regulatory Approvals
None.

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Appendix 4
Supplement Request Form

Risks and Risk Mitigation Plans

Some of this work will be put out to bid and bids may come back higher than anticipated. Mitigation of this risk would be to consider having Eversource crews complete the project or to request additional funding if required.

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Appendix 4
Supplement Request Form

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

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Project Authorization Form

Operations Project Authorization Form

Date Prepared: 1/15/18	**Project Title:** Line Relocation Hinsdale Wastewater Plant
Company/ies: Eversource NH	**Project ID Number:** A19W10
Organization: NH Operations	**Class(es) of Plant:** Distribution Line
Project Initiator: Mark Fraser	**Project Category:** Reliability – Distribution Lines
Project Manager: Mark Fraser	**Project Type:** Specific
Project Sponsor: Jim Eilenberger	**Project Purpose:** CAIDI Improvement
Estimated in service date: 10/1/19	**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: $250,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is intended to replace the ROW line which currently feeds the Hinsdale Wastewater Treatment Facility with a new line constructed along the road. The existing ROW is overgrown and the electrical facilities are in poor condition. The new line will be built with 34 kV spacer cable along Old Stage Road and will be accessible with on-road vehicles. This will help improve reliability to this locally critical facility and reduce ongoing expenses for repair of the existing off road line.

EVERSOURCE
Project Authorization Form

Project Costs Summary
Note: Dollar values are in thousands

	Prior Authorized	2019	20__	20__+	Totals
Capital Additions - Direct	$ -	$ 165	$ -	$ -	$ 165
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage ____%	-	6	-	-	6
Total - Direct Spending	$ -	$ 171	$ -	$ -	$ 171
Capital Additions - Indirect	-	72	-	-	72
Subtotal Request	$ -	$ 243	$ -	$ -	$ 243
AFUDC	-	7	-	-	7
Total Capital Request	$ -	$ 250	$ -	$ -	$ 250
O&M	-	-	-	-	-
Total Request	$ -	$ 250	$ -	$ -	$ 250

Financial Evaluation
Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	$11			$11
Overtime Labor				
Outside Services	122			122
Materials	37			37
Other, including contingency amounts (describe)	1			1
Total Direct Costs	**$171**			**$171**

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	$72			$72
Capitalized interest or AFUDC, if any	7			7
Total Indirect Costs	**$79**			**$79**
Total Capital Costs	**$250**			**$250**
Less Total Customer Contribution				
Total Capital Project Costs	**$250**			**$250**
Total O&M Project Costs				

Note: Explain unique payment provisions, if applicable

EVERSOURCE
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 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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
In 2018 the ROW line to River Road feeding the Hinsdale Wastewater Treatment plant came down resulting in a 17 hour outage to the plant and eight residential customers. The 1,600 foot ROW line drops down from Hwy 63, crosses the Ashuelot River, and runs through a swampy area before it reaches River Road.

Project Objectives
The objective is to replace the ROW line feeding the Wastewater Treatment Plant and create a reliable and safe feed to a critical facility for the town of Hinsdale.

Project Scope
Install new pole plant and associated equipment including 1/0 spacer cable conductors in a new location in place of #2 ACSR conductors and increase voltage to 34 kV on approximately 3,200 feet of 7.2 kV single phase line along Old Stage Road in Hinsdale, NH.

Background / Justification
Over the last three years the Wastewater Treatment Plant has experienced nearly 50 hours of outages, including one which lasted approximately 17 hours when the line in ROW feeding the plant fell down.

Business Process and / or Technical Improvements:
This project will address the reliability of the line feeding the Hinsdale Wastewater Treatment Facility. The ROW line will be removed and 34.5 kV, 1/0 spacer cable will be installed from School St and along Old Stage Rd. This will help prevent long outages in this inaccessable section of line.

Alternatives Considered with Cost Estimates
An alternative was to construct a new 3,000 foot line south on River Rd to feed the Wastewater Treatment Plant. This is slighty more costly and faces more restricitions because of the river, trimming, and zoning.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Line Construction Completion and project placed in service	10/1/19

Regulatory Approvals
None.

Risks and Risk Mitigation Plans
Some of this work will be put out to bid and bids may come back higher than anticipated. Mitigation of this risk would be to consider having Eversource crews complete the project or to request additional funding if required.

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Project Authorization Form

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

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 06/02/2020	**Project Title:** 2020 Circuit Patrol Repairs
Company: Eversource NH	**Project Number:** A20X38
Organization: Electric System Operations	**Class(es) of Plant:** D Line
Project Initiator: Pat Sullivan	**Project Category:** Lines - General
Project Manager: Pat Sullivan	**Project Type:** Specific
Project Sponsor: Mark Sandler	**Project Purpose:** Reliability – Repair of various facilities
Estimated in service date: 9/1/20	**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)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request: $2,195,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is intended to repair or replace distribution plant discovered to be deficient as a result of the circuit patrols completed in April and May of 2020. A total of approximately 900 items are to be repaired or replaced including broken, leaning, or damaged poles, broken or decayed crossarms and braces, damaged primary conductors, broken or loose guy wires and anchors, damaged insulators or bent pins, and broken insulator ties. Work is to be performed by contractors at unit prices.

EVERSOURCE

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	$	$	$	$	$	$	$	$	$
2. Environmental Approvals / Permits	$	$	$	$	$	$	$	$	$
3. Outreach	$	$	$	$	$	$	$	$	$
4. Siting Approvals / Permits	$	$	$	$	$	$	$	$	$
5. Engineering / Design	$	$	$	$	$	$	$	$	$
6. Materials (Eversource purchased)	$	$	$166	$	$	$	$	$	$
7. Construction (incl matl's by contractors)	$	$	$1,164	$	$	$	$	$	$
8. Testing / Commissioning	$	$	$	$	$	$	$	$	$
9. Project Mgmt Team	$	$	$20	$	$	$	$	$	$
10. Removals	$	$	$	$	$	$	$	$	$
11. Other	$	$	$	$	$	$	$	$	$
12. Risks	$	$	$	$	$	$	$	$	$
SUBTOTAL DIRECTS W/ RISKS	**$**	**$**	**$1,350**	**$**	**$**	**$**	**$**	**$**	**$**
13. Indirects/Overhead	$	$	$836	$	$	$	$	$	$
14. AFUDC	$	$	$9	$	$	$	$	$	$
PROJECT TOTAL – BASELINE BUDGET	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**
15. Contingency	$	$	$	$	$	$	$	$	$
TOTAL CAPITAL REQUEST	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**
16. Reimbursables/Customer Contribution	$	$	$	$	$	$	$	$	$
PROJECT TOTAL (LESS REIMBURSABLES)	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**
O&M	$	$	$	$	$	$	$	$	$
TOTAL REQUEST	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**

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

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EVERSOURCE

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	$	$	$20	$	$	$	$	$	$
OT Labor	$	$	$	$	$	$	$	$	$
Outside Services Labor	$	$	$1,164	$	$	$	$	$	$
Materials*	$	$	$166	$	$	$	$	$	$
Removals	$	$	$	$	$	$	$	$	$
Other	$	$	$	$	$	$	$	$	$
Indirects	$	$	$836	$	$	$	$	$	$
AFUDC	$	$	$9	$	$	$	$	$	$
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**

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

EVERSOURCE
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 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? No.

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement

Circuit patrols of overhead distribution circuits were completed in April and May of 2020 following a spring storm looking for damaged equipment which may result in future outages. The list of items found was assembled and prioritized. A total of approximately 900 items are to be repaired or replaced including broken, leaning, or damaged poles, broken or decayed crossarms and braces, damaged primary conductors, broken or loose guy wires and anchors, damaged insulators or bent pins, broken insulator ties, and missing spacer cable spacers.

Items which were reported but are not likely to caused outages such as clearance issues and double poles will be addressed through the normal course of business and are not part of this project.

Project Objectives

Improve reliability by repairing items which, if left unaddressed, could cause outages

Project Scope

Repair approximately 900 reported issues on 225 circuits throughout the state of NH.

Background / Justification

Circuit patrols were completed after the April 13, 2020 storm. Approximately 1,200 items were reported. These were prioritized based on the likelihood of the potential for an outage, based on the issue reported.

Item	Priority	Count
BROKEN / CRACKED CROSSARM	1	142
BROKEN / LOOSE GUY WIRE	1	146
BROKEN POLE	1	192
BROKEN TIE	1	139
CONDUCTOR	1	6
CROSSARM BRACE	1	6
DAMAGED SECONDARY BOX	1	1
DAMAGED/BROKEN INSULATOR	1	20
FLOATING PRIMARY	1	53
KNEE BRACE	1	1
MULTIPLE	1	0
ROTTED CROSSARM	1	15
TEMP POLE REPAIR	1	16
BENT PIN	2	97
LEANING POLE	2	15
REPL POLE	2	12
CLEARANCE	3	8
COMMUNICATION	3	1
DOUBLE POLE	3	3
FUSE OPEN (cap bank)	3	0
POLE GROUND	3	1
PORCELAIN	3	2
RMV EQUIP	3	5
UNFUSED LATERAL	3	8
CIRCUIT NOTE	4	1
UNFUSED TRANSFORMERS	4	267

Priority one and two items are to be addressed by this project. Priority three and four items will be addressed through the normal course of business.

EVERSOURCE
Project Authorization Form

Business Process and / or Technical Improvements
Improved reliability through the repair of known defective distribution equipment.

Alternatives Considered with Cost Estimates
None.

Project Schedule

Milestone/Phase Name	Estimated Date
Design Completion	6/22/20
Construction Start	6/22/20
In Service Date	9/1/20

Regulatory Approvals
None required.

Risks and Risk Mitigation Plans
Cost control on this project is being implemented through the use of unit rates from contractors. Eversource employees will be supervising the contractors' work.

Contingency
None.

References
None.

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

None.

Cost Estimate Backup Details

Cost estimate based on contractor unit price bids.

EVERSOURCE

Supplement Request Form

Date Prepared: 05/03/2021	**Project Title:** 2020 Circuit Patrol Repairs
Company: Eversource NH	**Project Number:** A20X38
Organization: Electric System Operations	**Class(es) of Plant:** D Line
Project Initiator: Pat Sullivan	**Project Category:** Lines - General
Project Manager: Pat Sullivan	**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: $2,195,000	**Estimated in service date:** 12/1/20
Supplement Request: $707,000	**ISO-NE Approvals Required** (check all that apply)**:** ☐ PAC ☐ TCA
Total Request: $2,902,000	

Background

This project is intended to repair or replace distribution plant discovered to be deficient as a result of the circuit patrols completed in April and May of 2020. A total of approximately 900 items are to be repaired or replaced including broken, leaning, or damaged poles, broken or decayed crossarms and braces, damaged primary conductors, broken or loose guy wires and anchors, damaged insulators or bent pins, and broken insulator ties. Work is to be performed by contractors at unit prices.

Supplement Justification Overview

Supplemental funding is requested due to the additional items found during the repair process which required replacement. While working to make repairs as identified during initial patrols, additional items were found that needed replacement. These resulted in additional unit costs. These costs were reviewed and discussed during the monthly budget meetings. Project oversight also increased on this project as a result of additional repairs and clearances being necessary.

Supplement Justification Detail

The reasons for the project authorization supplement of $707,000 are summarized below.

1. Construction (Contractor Labor): $281,000. This item increased because the original PAF assumed the project would only capture the initial items identified on the patrols. Additional items were found when working on the initially identified item.
2. Indirects/Overhead: $441,000. Indirects/Overheads increased due to the increase in Direct costs.
3. Materials decrease of $15,000

Total Supplement Request: $707,000

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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. Materials (Eversource purchased)	$166	$151	$(15)
2. Construction (incl matl's by contractors)	$1,164	$1,445	$281
3. Other	$20	$20	$0
SUBTOTAL DIRECTS W/ RISKS	**$1,350**	**$1616**	**$281**
13. Indirects/Overhead	$836	$1,277	$441
14. AFUDC	$9	$9	$0
PROJECT TOTAL – BASELINE BUDGET	**$2,195**	**$2,902**	**$707**
15. Contingency	$	$	$
TOTAL CAPITAL REQUEST	**$2,195**	**$2,902**	**$707**

Lessons Learned

Often when one item is identified on a patrol upon further investigation multiple issues are found and repairs are needed. This should be taken into account when establishing funding for these programs.

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 06/02/2020	**Project Title:** 2020 Circuit Patrol Repairs
Company: Eversource NH	**Project Number:** A20X38
Organization: Electric System Operations	**Class(es) of Plant:** D Line
Project Initiator: Pat Sullivan	**Project Category:** Lines - General
Project Manager: Pat Sullivan	**Project Type:** Specific
Project Sponsor: Mark Sandler	**Project Purpose:** Reliability – Repair of various facilities
Estimated in service date: 9/1/20	**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)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request: $2,195,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is intended to repair or replace distribution plant discovered to be deficient as a result of the circuit patrols completed in April and May of 2020. A total of approximately 900 items are to be repaired or replaced including broken, leaning, or damaged poles, broken or decayed crossarms and braces, damaged primary conductors, broken or loose guy wires and anchors, damaged insulators or bent pins, and broken insulator ties. Work is to be performed by contractors at unit prices.

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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	$	$	$	$	$	$	$	$	$
2. Environmental Approvals / Permits	$	$	$	$	$	$	$	$	$
3. Outreach	$	$	$	$	$	$	$	$	$
4. Siting Approvals / Permits	$	$	$	$	$	$	$	$	$
5. Engineering / Design	$	$	$	$	$	$	$	$	$
6. Materials (Eversource purchased)	$	$	$166	$	$	$	$	$	$
7. Construction (incl matl's by contractors)	$	$	$1,164	$	$	$	$	$	$
8. Testing / Commissioning	$	$	$	$	$	$	$	$	$
9. Project Mgmt Team	$	$	$20	$	$	$	$	$	$
10. Removals	$	$	$	$	$	$	$	$	$
11. Other	$	$	$	$	$	$	$	$	$
12. Risks	$	$	$	$	$	$	$	$	$
SUBTOTAL DIRECTS W/ RISKS	$	$	$1,350	$	$	$	$	$	$
13. Indirects/Overhead	$	$	$836	$	$	$	$	$	$
14. AFUDC	$	$	$9	$	$	$	$	$	$
PROJECT TOTAL – BASELINE BUDGET	$	$	$2,195	$	$	$	$	$	$
15. Contingency	$	$	$	$	$	$	$	$	$
TOTAL CAPITAL REQUEST	$	$	$2,195	$	$	$	$	$	$
16. Reimbursables/Customer Contribution	$	$	$	$	$	$	$	$	$
PROJECT TOTAL (LESS REIMBURSABLES)	$	$	$2,195	$	$	$	$	$	$
O&M	$	$	$	$	$	$	$	$	$
TOTAL REQUEST	$	$	$2,195	$	$	$	$	$	$

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 to Go	2021	2022	2023	2024	2025	Total
ST Labor	$	$	$20	$	$	$	$	$	$
OT Labor	$	$	$	$	$	$	$	$	$
Outside Services Labor	$	$	$1,164	$	$	$	$	$	$
Materials*	$	$	$166	$	$	$	$	$	$
Removals	$	$	$	$	$	$	$	$	$
Other	$	$	$	$	$	$	$	$	$
Indirects	$	$	$836	$	$	$	$	$	$
AFUDC	$	$	$9	$	$	$	$	$	$
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**

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

EVERSOURCE

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? No.

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

EVERSOURCE

Technical Justification

Project Need Statement

Circuit patrols of overhead distribution circuits were completed in April and May of 2020 following a spring storm looking for damaged equipment which may result in future outages. The list of items found was assembled and prioritized. **A total of approximately 900 items are to be repaired or replaced including broken, leaning, or damaged poles, broken or decayed crossarms and braces, damaged primary conductors, broken or loose guy wires and anchors, damaged insulators or bent pins, broken insulator ties, and missing spacer cable spacers.**

Items which were reported but are not likely to caused outages such as clearance issues and double poles will be addressed through the normal course of business and are not part of this project.

Project Objectives

Improve reliability by repairing items which, if left unaddressed, could cause outages

Project Scope

Repair approximately 900 reported issues on 225 circuits throughout the state of NH.

Background / Justification

Circuit patrols were completed after the April 13, 2020 storm. Approximately 1,200 items were reported. These were prioritized based on the likelihood of the potential for an outage, based on the issue reported.

Item	Priority	Count
BROKEN / CRACKED CROSSARM	1	142
BROKEN / LOOSE GUY WIRE	1	146
BROKEN POLE	1	192
BROKEN TIE	1	139
CONDUCTOR	1	6
CROSSARM BRACE	1	6
DAMAGED SECONDARY BOX	1	1
DAMAGED/BROKEN INSULATOR	1	20
FLOATING PRIMARY	1	53
KNEE BRACE	1	1
MULTIPLE	1	0
ROTTED CROSSARM	1	15
TEMP POLE REPAIR	1	16
BENT PIN	2	97
LEANING POLE	2	15
REPL POLE	2	12
CLEARANCE	3	8
COMMUNICATION	3	1
DOUBLE POLE	3	3
FUSE OPEN (cap bank)	3	0
POLE GROUND	3	1
PORCELAIN	3	2
RMV EQUIP	3	5
UNFUSED LATERAL	3	8
CIRCUIT NOTE	4	1
UNFUSED TRANSFORMERS	4	267

Priority one and two items are to be addressed by this project. Priority three and four items will be addressed through the normal course of business.

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Business Process and / or Technical Improvements
Improved reliability through the repair of known defective distribution equipment.

Alternatives Considered with Cost Estimates
None.

Project Schedule

Milestone/Phase Name	Estimated Date
Design Completion	6/22/20
Construction Start	6/22/20
In Service Date	9/1/20

Regulatory Approvals
None required.

Risks and Risk Mitigation Plans
Cost control on this project is being implemented through the use of unit rates from contractors. Eversource employees will be supervising the contractors' work.

Contingency
None.

References
None.

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

None.

Cost Estimate Backup Details

Cost estimate based on contractor unit price bids.

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 12/11/2020	**Project Title:** PCB Transformer Replacement Program
Company/ies: Eversource NH	**Project ID Number:** CO1PCB
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Pat Sullivan	**Project Category:** Basic Business - Environmental
Project Manager: Pat Sullivan	**Project Type:** Specific Annual Program
Project Sponsor: Mark Sandler	**Project Purpose:** PCB Transformer Replacement
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request (Gross): $140,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $140K is requested for the 2021 PCB Transformer Replacement program. The specific work is not identified during the budget cycle but is a result of monitoring the system throughout the year. Prior to 1978, polychlorinated biphenyls (PCBs) were used in transformers as a fire retardant, but were later identified as being detrimental to the environment and to humans and were banned in the late 1970s. Eversource has had a program each year to change out transformers on the system identified as potentially PCB contaminated and will continue to change out the suspect transformers on the system until they are all gone. The plan for 2021 is to remove 50 units from the system.

EVERSOURCE

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	$11	$0	$0	$0	$0	$0
7. Construction (incl matl's by contractors)	$0	$0	$0	$63	$0	$0	$0	$0	$74
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	$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**	**$0**	**$74**	**$0**	**$0**	**$0**	**$0**	**$74**
13. Indirects/Overhead	$0	$0	$0	$66	$0	$0	$0	$0	$66
14. AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**

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 to Go	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$0	$23	$0	$0	$0	$0	$23
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$40	$0	$0	$0	$0	$40
Materials*	$0	$0	$0	$11	$0	$0	$0	$0	$11
Removals	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$66	$0	$0	$0	$0	$66
AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**

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

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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? No

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
Capital funding is needed to address replacement of transformers identified as potentially contaminated with polychlorinated biphenyls (PCBs).

Project Objectives
Replacement of transformers containing PCBs.

Project Scope
Approval of the PCB Transformer Replacement (CO1PCB) project covers authorization of all area work center PCB transformer replacement work orders. The CO1PCB program encompasses the total NH PCB transformer replacement program budget. Actual charges will accumulate in the individual area work center work orders.

Background / Justification
This is a project for the Replacement of PCB contaminated transformers to remove them from the Eversource system.

Business Process and / or Technical Improvements:
Not applicable.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
2021 program funding levels were estimated using historical spending.

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Request Form

Approved by NH PAC 1/25/2022

Project Title: PCB Transformer Changeout Program	**Project Number:** CO1PCB
Date Prepared: 01/13/2022	**Company:** NH Electric Distribution 06
Organization: NH Operations	**Class(es) of Plant: Distribution**
Project Initiator: Jim Devereaux	**Project Category: Annual - Lines**
Project Manager: Jim Devereaux	**Project Type:** Annual
Project Sponsor: Jason Yergeau	**Project Purpose:** PCB Transformer Replacement
Estimated in service date: 12/31/2021	**Capital Investment part of original Operating Plan:** Yes
Current Authorization Amount: $ 140,000	**O&M Expenses part of request:** No
Supplement Request: $ 137,248	**Other:**
Total Request: $ ~~277,248~~275,568	

Supplement Justification

Direct spend for calendar year 2021 of $142,470 has exceeded the authorized amount of $74,000 by $68,470 (93%). The threshold for supplemental funding requests ~~for projects exceeded~~is a ~~-~~$25,000 overrun on~~of~~ the authorized direct cost.

Justification for Additional Resources

2021 actual capital cost incurred was $~~277,248~~275,568 versus the authorized amount of $140,000. The targeted number of transformers was achieved in 2021. The complexity of the units replaced increased in 2021, and will continue to increase, resulting in higher cost per unit.

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in thousands:

Capital Costs	Prior Authorized	Supplemental Request	Total
Direct Capital Costs			
Internal Labor	$9	$9	$18
Outside Services	$35	$32	$67
Materials	$9	$9	$18
Removals	$21	$19	$40
Risk and Contingency	$0	$0	$0
Other	$0	$0	$0
Subtotal	$74	$69	$143
Indirect Capital Costs			
Indirect/Overheads (including benefits)	$66	$69	$135
Capitalized interest or AFUDC, if any	$0	$0	$0
Subtotal	$66	$69	$135
Total Customer Contribution	$0	($2)	($2)
Total Capital Project Costs	**$140**	**$~~136~~136**	**$~~276~~276**

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Operations Project Authorization Form

Date Prepared: 12/11/2020	**Project Title:** PCB Transformer Replacement Program
Company/ies: Eversource NH	**Project ID Number:** CO1PCB
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Pat Sullivan	**Project Category:** Basic Business - Environmental
Project Manager: Pat Sullivan	**Project Type:** Specific Annual Program
Project Sponsor: Mark Sandler	**Project Purpose:** PCB Transformer Replacement
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request (Gross): $140,000	

Executive Summary

An approval of $140K is requested for the 2021 PCB Transformer Replacement program. The specific work is not identified during the budget cycle but is a result of monitoring the system throughout the year. Prior to 1978, polychlorinated biphenyls (PCBs) were used in transformers as a fire retardant but were later identified as being detrimental to the environment and to humans and were banned in the late 1970s. Eversource has had a program each year to change out transformers on the system identified as potentially PCB contaminated and will continue to change out the suspect transformers on the system until they are all gone. The plan for 2021 is to remove 50 units from the system.

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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	$11	$0	$0	$0	$0	$0
7. Construction (incl matl's by contractors)	$0	$0	$0	$63	$0	$0	$0	$0	$74
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	$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**	**$0**	**$74**	**$0**	**$0**	**$0**	**$0**	**$74**
13. Indirects/Overhead	$0	$0	$0	$66	$0	$0	$0	$0	$66
14. AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**

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 to Go	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$0	$23	$0	$0	$0	$0	$23
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$40	$0	$0	$0	$0	$40
Materials*	$0	$0	$0	$11	$0	$0	$0	$0	$11
Removals	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$66	$0	$0	$0	$0	$66
AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**

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

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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? No

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

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APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

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APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

Technical Justification

Project Need Statement
Capital funding is needed to address replacement of transformers identified as potentially contaminated with polychlorinated biphenyls (PCBs).

Project Objectives
Replacement of transformers containing PCBs.

Project Scope
Approval of the PCB Transformer Replacement (CO1PCB) project covers authorization of all area work center PCB transformer replacement work orders. The CO1PCB program encompasses the total NH PCB transformer replacement program budget. Actual charges will accumulate in the individual area work center work orders.

Background / Justification
This is a project for the Replacement of PCB contaminated transformers to remove them from the Eversource system.

Business Process and / or Technical Improvements:
Not applicable.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
2021 program funding levels were estimated using historical spending.

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APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 12/11/2020	**Project Title:** Maintain Voltage Annual Program
Company/ies: Eversource NH	**Project ID Number:** DK9R
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Pat Sullivan	**Project Category:** Peak Load – Distribution Line Capacity – Voltage Correction
Project Manager: Pat Sullivan	**Project Type:** Annual
Project Sponsor: Mark Sandler	**Project Purpose:** Maintain Voltage
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request: $1,158,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $1.158 million is requested for the 2021 Voltage Correction annual program.

An annual program includes many similar, small, and/or routine capital jobs performed over the course of a year for which one project authorization form can be prepared. This project authorization form is being prepared for the voltage correction program across New Hampshire, but not for the voltage correction projects established for each area work center or work orders used to track the voltage correction costs work. The individual area work center projects roll up to the annual program and are covered under this annual program authorization.

Annual Projects roll up to an Annual Program. If a single work order within an Annual Project exceeds the applicable threshold established in Accounting Policy Statement 1 (APS-01), the work order shall be included with a project authorization form and approved as a specific project.

The voltage correction annual program covers construction required to maintain voltage within required regulatory limits. Each area work center will have a separate project covering the voltage correction projects in the individual work center.

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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	$244	$0	$0	$0	$0	$244
7. Construction (incl matl's by contractors)	$0	$0	$0	$358	$0	$0	$0	$0	$358
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	$30	$0	$0	$0	$0	$30
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**	**$0**	**$632**	**$0**	**$0**	**$0**	**$0**	**$632**
13. Indirects/Overhead	$0	$0	$0	$521	$0	$0	$0	$0	$521
14. AFUDC	$0	$0	$0	$5	$0	$0	$0	$0	$5
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**

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 to Go	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$0	$124	$0	$0	$0	$0	$124
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$234	$0	$0	$0	$0	$234
Materials*	$0	$0	$0	$244	$0	$0	$0	$0	$244
Removals	$0	$0	$0	$30	$0	$0	$0	$0	$30
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$521	$0	$0	$0	$0	$521
AFUDC	$0	$0	$0	$5	$0	$0	$0	$0	$5
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**

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

EVERSOURCE

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? No

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
This Annual project provides funding for a variety of activities required to maintain service voltage within prescribed regulatory limits.

Project Objectives
Work performed under this annual may include the installation of capacitors and regulators, load balancing, conversions etc., provided the driving reason for the work is to maintain voltage within the limits set by the NHPUC.

Project Scope
Work under this annual will be performed at various locations around the state of NH within the Eversource service territory.

Background / Justification
This is an annual project which is required to fulfil the Company's obligation to provide voltage to customers within limit established by the NH Public Utilities Commission.

Business Process and / or Technical Improvements
Maintain voltage within regulatory limits.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
Failure to correct voltages outside regulatory limits may result in Regulatory action and/or decreases in customer satisfaction.
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Annual funding for this project was estimated using historical spending.

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Request Form

Project Title: 2021 Maintain Voltage Annual Program	**Project Number:** DK9R
Date Prepared: 01/19/2022	**Company:** NH Electric Distribution 06 -
Organization: NH Operations	**Class(es) of Plant: Distribution**
Project Initiator: Pat Sullivan	**Project Category: Peak Load – Distribution Line Capacity – Voltage Correction**
Project Manager: Pat Sullivan	**Project Type:** Annual
Project Sponsor: Jason Yergeau	**Project Purpose: Maintain Voltage**
Estimated in service date: 12/31/2021	**Capital Investment part of original Operating Plan:** Yes
Current Authorization Amount: $ 1,158,000	**O&M Expenses part of request:** Yes
Supplement Request: $1,020,000	**Other:**
Total Request: $2,178,000	

Supplement Justification

This Annual project was budgeted and authorized based on historical expenditures. An increase in the amount of work required to maintain voltage within regulatory limits in 2021 has necessitated this Supplemental request due to an increase in the authorized Direct costs. Increases are in Materials, Construction / Outside Services, Labor, Overtime, and Other categories.

Justification for Additional Resources

The reasons for the project authorization supplement of $1,020,000 are summarized below.

1. **Materials (by Eversource): $368,000** increase
2. **Construction: $272,000** increase
3. **Labor: $22,000** increase
4. **Overtime: $5,000** increase
5. **Other: $5,000** increase
6. **Indirects: $348,000** increase

Total Supplement Request: $1,020,000

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

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Supplement Cost Summary

Capital Costs	Prior Authorized	Supplemental Request	Total
Direct Capital Costs			
Internal Labor	154	27	181
Outside Services	234	272	506
Materials	244	368	612
Removals			
Risk and Contingency			
Other		5	5
Subtotal	**632**	**672**	**1,304**
Indirect Capital Costs			
Indirect/Overheads (including benefits)	521	347	868
Capitalized interest or AFUDC, if any	5	1	6
Subtotal	**526**	**348**	**874**
Total Customer Contribution	-	-	-
Total Capital Project Costs	**1,158**	**1,020**	**2,178**

The "Other" charges are allocations for tools and other materials.

Operations Project Authorization Form

Commented [MK1]: CONFIRM this is the PowerPlan version of the original PAF

Date Prepared: 12/11/2020	**Project Title:** Maintain Voltage Annual Program
Company/ies: Eversource NH	**Project ID Number:** DK9R
Organization: NH Operations	**Class(es) of Plant:** Distr bution
Project Initiator: Pat Sullivan	**Project Category:** Peak Load – Distr bution Line Capacity – Voltage Correction
Project Manager: Pat Sullivan	**Project Type:** Annual
Project Sponsor: Mark Sandler	**Project Purpose:** Maintain Voltage
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply):
Total Request: $1,158,000	☐ PTF ☐ non-PTF ☒ Distribution

Financial Requirements:

Project Authorization

ERM: _____

EVERSOURCE

FP&A: _____

Executive Summary

An approval of $1.158 million is requested for the 2021 Voltage Correction annual program.

An annual program includes many similar, small, and/or routine capital jobs performed over the course of a year for which one project authorization form can be prepared. This project authorization form is being prepared for the voltage correction program across New Hampshire, but not for the voltage correction projects established for each area work center or work orders used to track the voltage correction costs work. The individual area work center projects roll up to the annual program and are covered under this annual program authorization.

Annual Projects roll up to an Annual Program. If a single work order within an Annual Project exceeds the applicable threshold established in Accounting Policy Statement 1 (APS-01), the work order shall be included with a project authorization form and approved as a specific project.

The voltage correction annual program covers construction required to maintain voltage within required regulatory limits. Each area work center will have a separate project covering the voltage correction projects in the individual work center.

EVERSOURCE

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	$244	$0	$0	$0	$0	$244
7. Construction (incl matl's by contractors)	$0	$0	$0	$358	$0	$0	$0	$0	$358
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	$30	$0	$0	$0	$0	$30
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**	**$0**	**$632**	**$0**	**$0**	**$0**	**$0**	**$632**
13. Indirects/Overhead	$0	$0	$0	$521	$0	$0	$0	$0	$521
14. AFUDC	$0	$0	$0	$5	$0	$0	$0	$0	$5
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**

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

EVERSOURCE

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	$0	$124	$0	$0	$0	$0	$124
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$234	$0	$0	$0	$0	$234
Materials*	$0	$0	$0	$244	$0	$0	$0	$0	$244
Removals	$0	$0	$0	$30	$0	$0	$0	$0	$30
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$521	$0	$0	$0	$0	$521
AFUDC	$0	$0	$0	$5	$0	$0	$0	$0	$5
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**

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

EVERSOURCE

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? No

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

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Technical Justification

Project Need Statement
This Annual project provides funding for a variety of activities required to maintain service voltage within prescribed regulatory limits.

Project Objectives
Work performed under this annual may include the installation of capacitors and regulators, load balancing, conversions etc., provided the driving reason for the work is to maintain voltage within the limits set by the NHPUC.

Project Scope
Work under this annual will be performed at various locations around the state of NH within the Eversource service territory.

Background / Justification
This is an annual project which is required to fulfil the Company's obligation to provide voltage to customers within limit established by the NH Public Utilities Commission.

Business Process and / or Technical Improvements
Maintain voltage within regulatory limits.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
Failure to correct voltages outside regulatory limits may result in Regulatory action and/or decreases in customer satisfaction.
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Annual funding for this project was estimated using historical spending.

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

Subsidiary Board Approval Package Template

Template for Capital Project Review and Approval by a Subsidiary Board

[Sponsoring Operating Unit or Corporate and Shared Services Group] [Project Title]
Capital Project Review and Approval

[Subsidiary] Board of Directors [Sponsoring Officer] [Date of Submission]

Sub Board Approval Template.pptx

Note: to save, complete and print the template, please right click on the above icon and select Presentation Object and Open

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 12/18/2020	**Project Title:** Reliability Annual Programs – Line
Company/ies: Eversource NH	**Project ID Number:** DR9R
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Pat Sullivan	**Project Category:** Reliability – Distribution Line Reliability
Project Manager: Pat Sullivan	**Project Type:** Annual
Project Sponsor: Mark Sandler	**Project Purpose:** Reliability – Line
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request (gross): $3,000,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $3.0M is requested for the 2021 distribution line reliability annual program.

An annual program includes many similar, small, and/or routine capital jobs performed over the course of a year for which one project authorization form can be prepared. This project authorization form is being prepared for the distribution line reliability annual program across New Hampshire.

If a single work order within an Annual Project exceeds the applicable threshold established in Accounting Policy Statement 1 (APS-01), the work order shall be included with a project authorization form and approved as a specific project. Work orders under the DR program are exempt from the threshold as outlined in APS-01 and do not have a dollar limit threshold.

This work is not identified during the budget cycle but is a result of monitoring the system throughout the year. This project covers construction required to remedy conditions which are causing specific segments of distribution facilities to perform below levels defined by system reliability. It also funds projects which target the worst performing circuits.

EVERSOURCE

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

Line item Category	Prior Authorized	Actuals to Date	2021	2022	2023	2024	2025	Total
1. ROW / Easements / Land Acquisition	$0	$0	$0	$0	$0	$0	$0	$0
2. Environmental Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0
3. Outreach	$0	$0	$0	$0	$0	$0	$0	$0
4. Siting Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0
5. Engineering / Design	$0	$0	$0	$0	$0	$0	$0	$0
6. Materials (Eversource purchased)	$0	$0	$1,040	$0	$0	$0	$0	$1,040
7. Construction (incl matl's bycontractors)	$0	$0	$657	$0	$0	$0	$0	$657
8. Testing / Commissioning	$0	$0	$0	$0	$0	$0	$0	$0
9. Project Mgmt Team	$0	$0	$0	$0	$0	$0	$0	$0
10. Removals	$0	$0	$85	$0	$0	$0	$0	$85
11. Other	$0	$0	$0	$0	$0	$0	$0	$0
12. Risks	$0	$0	$0	$0	$0	$0	$0	$0
SUBTOTAL DIRECTS W/ RISKS	**$0**	**$0**	**$1,782**	**$0**	**$0**	**$0**	**$0**	**$1,782**
13. Indirects/Overhead	$0	$0	$1,200	$0	$0	$0	$0	$1,200
14. AFUDC	$0	$0	$18	$0	$0	$0	$0	$18
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$3,000**	**$0**	**$0**	**$0**	**$0**	**$3,000**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$3,000**	**$0**	**$0**	**$0**	**$0**	**$3,000**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$3,000**	**$0**	**$0**	**$0**	**$0**	**$3,000**
O&M	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$3,000**	**$0**	**$0**	**$0**	**$0**	**$3,000**

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

EVERSOURCE

Breakout Costs

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$330	$0	$0	$0	$0	$330
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$327	$0	$0	$0	$0	$327
Materials*	$0	$0	$1,040	$0	$0	$0	$0	$1,040
Removals	$0	$0	$85	$0	$0	$0	$0	$85
Other	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$1,200	$0	$0	$0	$0	$1,200
AFUDC	$0	$0	$18	$0	$0	$0	$0	$18
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	$0	$0	$3,000	$0	$0	$0	$0	$3,000

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

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EVERSOURCE

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? No

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
Capital funding is needed to address the installation or replacement of distribution line equipment and other items to improve the reliability of the system.

Project Objectives
This program is designed to address the reliability of the distribution system through the installation or replacement of line equipment required to remedy conditions which are causing specific segments of distribution facilities to perform below levels defined by system reliability. It also funds projects which target the worst performing circuits.

Project Scope
Work under this annual will be performed at various locations around the state of NH within the Eversource service territory. This project addresses statewide reliability issues with the distribution system assets not within the Right of Way. Actual charges will accumulate in the individual area work center work orders.

Background / Justification
This is an annual project which is required to maintain reliability of the Company's distribution system.

Business Process and / or Technical Improvements:
Reliability.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Annual funding for this project was estimated using historical spending level.

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Request Form

Project Title: Reliability Annual Programs - Line	**Project Number:** DR9R
Date Prepared: 01/19/2022	**Company:** NH Electric Distribution 06
Organization: NH Operations	**Class(es) of Plant: Distribution**
Project Initiator: Lee Lajoie	**Project Category: Reliability**
Project Manager: Jason Yergeau	**Project Type:** Annual
Project Sponsor: Douglas Foley	**Project Purpose: Maintain Reliability**
Estimated in service date: 12/31/2021	**Capital Investment part of original Operating Plan:** Yes
Current Authorization Amount: $ 3,000,000	**O&M Expenses part of request:** Yes
Supplement Request: $2,237,000	**Other:**
Total Request: $5,237,000	

Supplement Justification

Justification for Additional Resources

The Reliability Annual Program supports the work necessary to improve the reliability of service to customers including addressing circuits on the list of 50 worst performers, three or more device outages, or other reliability metrics. Each Area Work Center has a separate project which rolls up to this program. Typical work performed under this program is the installation of fused cutouts, TripSavers, and reclosers. All are expected to improve reliability across NH.

The initial budget for the distribution line reliability program is funded based on historical spending and/or known future investment needed within the overall distribution budget constraints. Program spending is monitored throughout the year through a budget review committee. As work is identified throughout the year, the budget committee determines whether the additional investment needed can be funded by reduced funding in other projects or whether the additional investment must be deferred to a future year to stay within the budget.

Investment in the distribution line reliability program was higher than originally budgeted due to more work being performed on the system than anticipated to improve overall reliability of the system.

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Supplement Cost Summary

Capital Costs	Prior Authorized	Supplemental Request	Total
Direct Capital Costs			
Internal Labor	330	259	589
Outside Services	327	591	918
Materials	1,125	424	1,549
Removals			
Risk and Contingency			
Other		558	558
Subtotal	**1,782**	**1,832**	**3,614**
Indirect Capital Costs			
Indirect/Overheads (including benefits)	1,200	417	1,617
Capitalized interest or AFUDC, if any	18	(12)	6
Subtotal	**1,218**	**405**	**1,623**
Total Customer Contribution	-	-	-
Total Capital Project Costs	**3,000**	**2,237**	**5,237**

Operations Project Authorization Form

Commented [MK1]: CONFIRM this is this version in PowerPlan

Date Prepared: 12/18/2020	**Project Title:** Reliability Annual Programs – Line
Company/ies: Eversource NH	**Project ID Number:** DR9R
Organization: NH Operations	**Class(es) of Plant:** Distr bution
Project Initiator: Pat Sullivan	**Project Category:** Reliability – Distr bution Line Reliability
Project Manager: Pat Sullivan	**Project Type:** Annual
Project Sponsor: Mark Sandler	**Project Purpose:** Reliability – Line
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA

EVERSOURCE

Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request (gross): $3,000,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $3.0M is requested for the 2021 distribution line reliability annual program.

An annual program includes many similar, small, and/or routine capital jobs performed over the course of a year for which one project authorization form can be prepared. This project authorization form is being prepared for the distribution line reliability annual program across New Hampshire.

If a single work order within an Annual Project exceeds the applicable threshold established in Accounting Policy Statement 1 (APS-01), the work order shall be included with a project authorization form and approved as a specific project. Work orders under the DR program are exempt from the threshold as outlined in APS-01 and do not have a dollar limit threshold.

This work is not identified during the budget cycle but is a result of monitoring the system throughout the year. This project covers construction required to remedy conditions which are causing specific segments of distribution facilities to perform below levels defined by system reliability. It also funds projects which target the worst performing circuits.

EVERSOURCE

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

Line item Category	Prior Authorized	Actuals to Date	2021	2022	2023	2024	2025	Total
1. ROW / Easements / Land Acquisition	$0	$0	$0	$0	$0	$0	$0	$0
2. Environmental Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0
3. Outreach	$0	$0	$0	$0	$0	$0	$0	$0
4. Siting Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0
5. Engineering / Design	$0	$0	$0	$0	$0	$0	$0	$0
6. Materials (Eversource purchased)	$0	$0	$1,040	$0	$0	$0	$0	$1,040
7. Construction (incl matl's by contractors)	$0	$0	$657	$0	$0	$0	$0	$657
8. Testing / Commissioning	$0	$0	$0	$0	$0	$0	$0	$0
9. Project Mgmt Team	$0	$0	$0	$0	$0	$0	$0	$0
10. Removals	$0	$0	$85	$0	$0	$0	$0	$85
11. Other	$0	$0	$0	$0	$0	$0	$0	$0
12. Risks	$0	$0	$0	$0	$0	$0	$0	$0
SUBTOTAL DIRECTS W/ RISKS	**$0**	**$0**	**$1,782**	**$0**	**$0**	**$0**	**$0**	**$1,782**
13. Indirects/Overhead	$0	$0	$1,200	$0	$0	$0	$0	$1,200
14. AFUDC	$0	$0	$18	$0	$0	$0	$0	$18
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$3,000**	**$0**	**$0**	**$0**	**$0**	**$3,000**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$3,000**	**$0**	**$0**	**$0**	**$0**	**$3,000**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$3,000**	**$0**	**$0**	**$0**	**$0**	**$3,000**
O&M	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$3,000**	**$0**	**$0**	**$0**	**$0**	**$3,000**

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

EVERSOURCE

Breakout Costs

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$330	$0	$0	$0	$0	$330
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$327	$0	$0	$0	$0	$327
Materials*	$0	$0	$1,040	$0	$0	$0	$0	$1,040
Removals	$0	$0	$85	$0	$0	$0	$0	$85
Other	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$1,200	$0	$0	$0	$0	$1,200
AFUDC	$0	$0	$18	$0	$0	$0	$0	$18
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$3,000**	**$0**	**$0**	**$0**	**$0**	**$3,000**

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

EVERSOURCE

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? No

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

Technical Justification

Project Need Statement
Capital funding is needed to address the installation or replacement of distribution line equipment and other items to improve the reliability of the system.

Project Objectives
This program is designed to address the reliability of the distribution system through the installation or replacement of line equipment required to remedy conditions which are causing specific segments of distribution facilities to perform below levels defined by system reliability. It also funds projects which target the worst performing circuits.

Project Scope

EVERSOURCE

Work under this annual will be performed at various locations around the state of NH within the Eversource service territory. This project addresses statewide reliability issues with the distribution system assets not within the Right of Way. Actual charges will accumulate in the individual area work center work orders.

Background / Justification
This is an annual project which is required to maintain reliability of the Company's distribution system.

Business Process and / or Technical Improvements:
Reliability.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Annual funding for this project was estimated using historical spending level.

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

Subsidiary Board Approval Package Template

Template for Capital Project Review and Approval by a Subsidiary Board

[Sponsoring Operating Unit or Corporate and Shared Services Group] [Project Title]
Capital Project Review and Approval

[Subsidiary] Board of Directors [Sponsoring Officer] [Date of Submission]

Sub Board Approval Template.pptx

Note: to save, complete and print the template, please right click on the above icon and select Presentation Object and Open

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 12/18/2020	**Project Title:** Purchase Transformers and Regulators
Company/ies: Eversource NH	**Project ID Number:** DT7P
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Skyla Normand	**Project Category:** Basic Business – Pre-Cap Line Transformers/Regulators
Project Manager: Richard Roy	**Project Type:** Annual
Project Sponsor: Paul Rotty	**Project Purpose:** Purchase Line Transformers/Regulators
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request (gross): $11,566,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $11,566,000 is requested for the 2021 Purchase Transformer and Regulators annual program. This annual program covers the purchase, initial installation and retirement of overhead, duct (DG) and direct buried (DB) distribution transformers and voltage regulators. Distribution line transformers up to 2,500 kVa are a pre-capitalized units of property.

EVERSOURCE

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	$10,793	$0	$0	$0	$0	$10,793
7. Construction (incl matl's by contractors)	$0	$0	$0	$0	$0	$0	$0	$0	$0
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	$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**	**$0**	**$10,793**	**$0**	**$0**	**$0**	**$0**	**$10,793**
13. Indirects/Overhead	$0	$0	$0	$773	$0	$0	$0	$0	$773
14. AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**

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

EVERSOURCE

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	$0	$0	$0	$0	$0	$0	$0
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Materials*	$0	$0	$0	$10,793	$0	$0	$0	$0	$10,793
Removals	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$773	$0	$0	$0	$0	$773
AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**

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

EVERSOURCE

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? No

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
Capital funding is needed to purchase transformers and regulators throughout the year.

Project Objectives
This annual program covers the purchase, initial installation and retirement of overhead, conventional underground, and direct buried (URD) distribution line transformers and voltage regulators. Distribution transformers up to and including 2,500 kVa are a pre-capitalized units of property.

Project Scope
Work under this annual will be performed at various locations around the state of NH within the Eversource service territory. Approval of the Purchase Transformers and Regulators (DT7P) annual program covers authorization of all overhead, conventional underground, and direct buried (URD) distribution line transformers and voltage regulators

Background / Justification
Capital funding is needed to address planned and emergent line transformer purchases that are needed each year to support distribution line work due to equipment failures and infrastructure upgrades.

Business Process and / or Technical Improvements:
Not applicable

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Annual funding level was estimated using historical spending.

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Request Form

Project Title: Purchase Transformers and Regulators	**Project Number:** DT7P
Date Prepared: 01/13/2022	**Company:** NH Electric Distribution 06
Organization: NH Operations	**Class(es) of Plant: Distribution**
Project Initiator: Skyla Normand	**Project Category: Annual - Lines**
Project Manager: Richard Roy	**Project Type:** Annual
Project Sponsor: Paul Rotty	**Project Purpose:** Purchase, initial installation, and retirement of overhead, duct (DG) and direct buried (DB) distribution transformers and voltage regulators.
Estimated in service date: 12/31/2021	**Capital Investment part of original Operating Plan:** Yes
Current Authorization Amount: $ 11,566,000	**O&M Expenses part of request:** No
Supplement Request: $ 3,058,958	**Other:**
Total Request: $ 14,624,958	

Supplement Justification

Direct spend for calendar year 2021 of $13,339,696 has exceeded the authorized amount of $10,793,000 by $2,546,696 (23.6%). The threshold for supplement funding requests for projects greater than $250,000 is a 10% overrun on authorized direct cost.

The reason for the additional costs in 2021 was the increased Ccost of Ffirst Iinstallation (CFI).

CFI is a calculated cost based on internal labor and contractor rates. The CFI calculation was updated in 2021 for the first time in several years and the increases in labor and contractor costs ~~(as reflected in the $2288 increase in outside services and the $1457 increase in internal labor) over the years~~ whereas significant. Costs increases in the table below include $2,288k increase in outside services and $1,457k increase in internal labor. ~~,~~ The increased costs have resulted ~~as reflected~~ in the need for a supplement.

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in Thousands

Capital Costs	Prior Authorized	Supplemental Request	Total
Direct Capital Costs			
Internal Labor	$0	$1,457	$1,457
Outside Services	$0	$2,288	$2,288
Materials	$10,793	($1,198)	$9,595
Removals	$0	$0	$0
Risk and Contingency	$0	$0	$0
Other	$0	$0	$0
Subtotal	$10,793	$2,547	$13,340
Indirect Capital Costs			
Indirect/Overheads (including benefits)	$773	$512	$1,285
Capitalized interest or AFUDC, if any	$0	$0	$0
Subtotal	$773	$512	$1,285
Total Customer Contribution	$0	$0	$0
Total Capital Project Costs	**$11,566**	**$3,059**	**$14,625**

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 12/18/2020	**Project Title:** Purchase Transformers and Regulators
Company/ies: Eversource NH	**Project ID Number:** DT7P
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Skyla Normand	**Project Category:** Basic Business – Pre-Cap Line Transformers/Regulators
Project Manager: Richard Roy	**Project Type:** Annual
Project Sponsor: Paul Rotty	**Project Purpose:** Purchase Line Transformers/Regulators
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request (gross): $11,566,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $11,566,000 is requested for the 2021 Purchase Transformer and Regulators annual program. This annual program covers the purchase, initial installation and retirement of overhead, duct (DG) and direct buried (DB) distribution transformers and voltage regulators. Distribution line transformers up to 2,500 kVa are a pre-capitalized units of property.

EVERSOURCE

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	$10,793	$0	$0	$0	$0	$10,793
7. Construction (incl matl's by contractors)	$0	$0	$0	$0	$0	$0	$0	$0	$0
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	$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**	**$0**	**$10,793**	**$0**	**$0**	**$0**	**$0**	**$10,793**
13. Indirects/Overhead	$0	$0	$0	$773	$0	$0	$0	$0	$773
14. AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**

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

EVERSOURCE

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	$0	$0	$0	$0	$0	$0	$0
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Materials*	$0	$0	$0	$10,793	$0	$0	$0	$0	$10,793
Removals	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$773	$0	$0	$0	$0	$773
AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**

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

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

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? No

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

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

Technical Justification

Project Need Statement
Capital funding is needed to purchase transformers and regulators throughout the year.

Project Objectives
This annual program covers the purchase, initial installation and retirement of overhead, conventional underground, and direct buried (URD) distribution line transformers and voltage regulators. Distribution transformers up to and including 2,500 kVa are a pre-capitalized units of property.

Project Scope
Work under this annual will be performed at various locations around the state of NH within the Eversource service territory. Approval of the Purchase Transformers and Regulators (DT7P) annual program covers authorization of all overhead, conventional underground, and direct buried (URD) distribution line transformers and voltage regulators

Background / Justification
Capital funding is needed to address planned and emergent line transformer purchases that are needed each year to support distribution line work due to equipment failures and infrastructure upgrades.

Business Process and / or Technical Improvements:
Not applicable

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Annual funding level was estimated using historical spending.

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 12/18/2020	**Project Title:** Engineering Tools & Equipment
Company/ies: Eversource NH	**Project ID Number:** GE9R
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Thelma Brown	**Project Category:** Basic Business – Tools & Equipment
Project Manager: Russel Johnson	**Project Type:** Specific Annual Program
Project Sponsor: Russel Johnson	**Project Purpose:** Purchase Tools and Equipment
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request: $75,000	

Financial Requirements:

Executive Summary

An approval of $75,000 is requested for the 2021 Tools and Equipment for the NH Engineering organization. Specific tool purchases are not identified during the budget cycle but are a result of requests and needs that arise throughout the year. This project is funded each year.

EVERSOURCE

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

Line item Category	Prior Authorized	Actuals to Date	2021	2022	2023	2024	2025	Total
1. ROW / Easements / Land Acquisition	$0	$0	$0	$0	$0	$0	$0	$0
2. Environmental Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0
3. Outreach	$0	$0	$0	$0	$0	$0	$0	$0
4. Siting Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0
5. Engineering / Design	$0	$0	$0	$0	$0	$0	$0	$0
6. Materials (Eversource purchased)	$0	$0	$75	$0	$0	$0	$0	$75
7. Construction (incl matl's bycontractors)	$0	$0	$0	$0	$0	$0	$0	$0
8. Testing / Commissioning	$0	$0	$0	$0	$0	$0	$0	$0
9. Project Mgmt Team	$0	$0	$0	$0	$0	$0	$0	$0
10. Removals	$0	$0	$0	$0	$0	$0	$0	$0
11. Other	$0	$0	$0	$0	$0	$0	$0	$0
12. Risks	$0	$0	$0	$0	$0	$0	$0	$0
SUBTOTAL DIRECTS W/ RISKS	**$0**	**$0**	**$75**	**$0**	**$0**	**$0**	**$0**	**$75**
13. Indirects/Overhead	$0	$0	$0	$0	$0	$0	$0	$0
14. AFUDC	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$75**	**$0**	**$0**	**$0**	**$0**	**$75**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$75**	**$0**	**$0**	**$0**	**$0**	**$75**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$75**	**$0**	**$0**	**$0**	**$0**	**$75**
O&M	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$75**	**$0**	**$0**	**$0**	**$0**	**$75**

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

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Exh. 12

EVERSOURCE

Breakout Costs

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$0	$0	$0	$0	$0	$0
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$0	$0	$0	$0	$0
Materials*	$0	$0	$75	$0	$0	$0	$0	$75
Removals	$0	$0	$0	$0	$0	$0	$0	$0
Other	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$0	$0	$0	$0	$0
AFUDC	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	$0	$0	$75	$0	$0	$0	$0	$75

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

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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? No

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
Capital funding is needed to address capital tool and equipment purchases for Engineering throughout the year.

Project Objectives
The tools and equipment project is used to respond to requests for tools and equipment purchases identified throughout the year.

Project Scope
The engineering tools and equipment project covers the costs associated with purchasing tools and equipment used by the Engineering organization.

Background / Justification
Capital funding is needed to address planned and emergent tool and equipment needs that develop each year.

Business Process and / or Technical Improvements:
Not applicable

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Project funding level was estimated using historical spending.

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Appendix 4
Supplement Request Form

Supplement Request Form

Project Title: 2021 NH Distribution Engineering Tools & Equipment	**Project Number:** GE9R
Date Prepared: 04/20/2022	**Company:** NH Electric Distribution 06
Organization: NH Electric System Operations	**Class(es) of Plant:** Distribution
Project Initiator: Jim Devereaux	**Project Category:** Annual - Engineering
Project Manager:	**Project Type:** Annual
Project Sponsor:	**Project Purpose:** Purchase Capital Tools & Equipment
Estimated in service date: 12/31/2021	**Capital Investment part of original Operating Plan:** Yes
Current Authorization Amount: $ 75,000	**O&M Expenses part of request:** No
Supplement Request: $ 67,000	**Other:**
Total Request: $ 142,000	

Supplement Justification

The spend for calendar year 2021 of $142,000 has exceeded the authorized amount of $75,000 by $67,000 (90%). The threshold for supplemental funding requests for projects less than $250,000 is a $25,000 overrun on the authorized direct cost.

Justification for Additional Resources

The additional resources were needed to fund the replacement of defective meters and the purchase of new voltage and power monitoring equipment used by Distribution Engineering to analyze customer voltage or service quality complaints.

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Appendix 4
Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in thousands:

Capital Costs	Prior Authorized	Supplemental Request	Total
Direct Capital Costs			
Internal Labor	$0	$0	$0
Outside Services	$0	$0	$0
Materials	$75	$65	$140
Removals	$0	$0	$0
Risk and Contingency	$0	$0	$0
Other	$0	$0	$0
Subtotal	$75	$65	$140
Indirect Capital Costs			
Indirect/Overheads (including benefits)	$0	$2	$2
Capitalized interest or AFUDC, if any	$0	$0	$0
Subtotal	$0	$2	$2
Total Customer Contribution	$0	$0	$0
Total Capital Project Costs	**$75**	**$67**	**$142**

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Operations Project Authorization Form

Date Prepared: 12/18/2020	**Project Title:** Engineering Tools & Equipment
Company/ies: Eversource NH	**Project ID Number:** GE9R
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Thelma Brown	**Project Category:** Basic Business – Tools & Equipment
Project Manager: Russel Johnson	**Project Type:** Specific Annual Program
Project Sponsor: Russel Johnson	**Project Purpose:** Purchase Tools and Equipment
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request: $75,000	

Financial Requirements:

Executive Summary

An approval of $75,000 is requested for the 2021 Tools and Equipment for the NH Engineering organization. Specific tool purchases are not identified during the budget cycle but are a result of requests and needs that arise throughout the year. This project is funded each year.

EVERSOURCE

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

Line item Category	Prior Authorized	Actuals to Date	2021	2022	2023	2024	2025	Total
1. ROW / Easements / Land Acquisition	$0	$0	$0	$0	$0	$0	$0	$0
2. Environmental Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0
3. Outreach	$0	$0	$0	$0	$0	$0	$0	$0
4. Siting Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0
5. Engineering / Design	$0	$0	$0	$0	$0	$0	$0	$0
6. Materials (Eversource purchased)	$0	$0	$75	$0	$0	$0	$0	$75
7. Construction (incl matl's by contractors)	$0	$0	$0	$0	$0	$0	$0	$0
8. Testing / Commissioning	$0	$0	$0	$0	$0	$0	$0	$0
9. Project Mgmt Team	$0	$0	$0	$0	$0	$0	$0	$0
10. Removals	$0	$0	$0	$0	$0	$0	$0	$0
11. Other	$0	$0	$0	$0	$0	$0	$0	$0
12. Risks	$0	$0	$0	$0	$0	$0	$0	$0
SUBTOTAL DIRECTS W/ RISKS	$0	$0	$75	$0	$0	$0	$0	$75
13. Indirects/Overhead	$0	$0	$0	$0	$0	$0	$0	$0
14. AFUDC	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL – BASELINE BUDGET	$0	$0	$75	$0	$0	$0	$0	$75
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	$0	$0	$75	$0	$0	$0	$0	$75
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	$0	$0	$75	$0	$0	$0	$0	$75
O&M	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	$0	$0	$75	$0	$0	$0	$0	$75

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	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$0	$0	$0	$0	$0	$0
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$0	$0	$0	$0	$0
Materials*	$0	$0	$75	$0	$0	$0	$0	$75
Removals	$0	$0	$0	$0	$0	$0	$0	$0
Other	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$0	$0	$0	$0	$0
AFUDC	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	$0	$0	$75	$0	$0	$0	$0	$75

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

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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? No

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

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Technical Justification

Project Need Statement
Capital funding is needed to address capital tool and equipment purchases for Engineering throughout the year.

Project Objectives
The tools and equipment project is used to respond to requests for tools and equipment purchases identified throughout the year.

Project Scope
The engineering tools and equipment project covers the costs associated with purchasing tools and equipment used by the Engineering organization.

Background / Justification
Capital funding is needed to address planned and emergent tool and equipment needs that develop each year.

Business Process and / or Technical Improvements:
Not applicable

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Project funding level was estimated using historical spending.

EVERSOURCE
Project Authorization Form

Operations Project Authorization Form

Approved by EPAC Chairmen external to meeting on 10/20/2020
Link to 10/28/2020 EPAC Meeting Minutes

Date Prepared: 10/20/2020	**Project Title:** 2021 NH Distribution S/S Capital Tool Annual
Company: Eversource NH	**Project Number:** GM9R21
Organization: Electric System Operations	**Class(es) of Plant:** General Plant
Project Initiator: John DiPaola-Tromba	**Project Category:** Annual - General
Project Manager: Operations Manager	**Project Type:** Annual
Project Sponsor: Joseph Purington	**Project Purpose:** Purchase of Tools
Estimated in service date: Various	**Capital Investment part of original Oper. Plan:** Yes
Eng./Constr. Resources Budgeted? Yes	**O&M Expenses part of original Oper. Plan:** N/A
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☒ non-PTF ☒ Distribution
Total Request: $100K	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $100K is requested for the purchase of tools meeting the capitalization threshold requirement of $500 per unit cost. Any work order greater than $100K (Directs) will require a separate Project Authorization Form (PAF) and Delegation of Authority (DOA) approval.

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized*	2021	2022	2023	Totals
Capital Additions - Direct	$ -	$ 100	$ -	$ -	$ 100
Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 100	$ -	$ -	$ 100
Capital Additions - Indirect	$ -	$ -	$ -	$ -	$ -
Subtotal Request	$ -	$ 100	$ -	$ -	$ 100
AFUDC	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 100	$ -	$ -	$ 100

**To be completed if supplemental authorization is required*

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Request Form

Project Title: 2021 NH Distribution S/S Capital Tool Annual	**Project Number:** GM9R21
Date Prepared: 04/20/2022	**Company:** NH Electric Distribution 06
Organization: NH Electric System Operations	**Class(es) of Plant: General Plant**
Project Initiator: James Devereaux	**Project Category: Annual - General**
Project Manager: Annette Conticchio	**Project Type:** Annual
Project Sponsor:	**Project Purpose:** Purchase Capital Tools & Equipment
Estimated in service date: 12/31/2021	**Capital Investment part of original Operating Plan:** Yes
Current Authorization Amount: $ 100,000	**O&M Expenses part of request:** No
Supplement Request: $ 525,000	**Other:**
Total Request: $ 625,000	

Supplement Justification

Spend for calendar year 2021 of $625,000 has exceeded the authorized amount of $100,000 by $525,000 (525%). The threshold for supplemental funding requests is a 10% overrun in direct cost.

Justification for Additional Resources

There was a significant underrun in 2021 on project DS9RD1 (emergent equipment failures). The savings on that program allowed for the opportunity to shift the capital investment from equipment failures to GM9R21 (tools & equipment). The additional spending on GM9R21 addressed a number of safety concerns and aging tools while netting close to $0 on the overall budget.

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Appendix 4
Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in thousands:

Capital Costs	Prior Authorized	Supplemental Request	Total
Direct Capital Costs			
Internal Labor	$0	$0	$0
Outside Services	$0	$4	$4
Materials	$100	$514	$614
Removals	$0	$0	$0
Risk and Contingency	$0	$0	$0
Other	$0	$0	$0
Subtotal	$100	$518	$618
Indirect Capital Costs			
Indirect/Overheads (including benefits)	$0	$7	$7
Capitalized interest or AFUDC, if any	$0	$0	$0
Subtotal	$0	$7	$7
Total Customer Contribution	$0	$0	$0
Total Capital Project Costs	**$100**	**$525**	**$625**

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Appendix 5
Subsidiary Board Approval Package Template

Operations Project Authorization Form

Approved by EPAC Chairmen external to meeting on 10/20/2020 Link to 10/28/2020 EPAC Meeting Minutes

Date Prepared: 10/20/2020	**Project Title:** 2021 NH Distribution S/S Capital Tool Annual
Company: Eversource NH	**Project Number:** GM9R21
Organization: Electric System Operations	**Class(es) of Plant:** General Plant
Project Initiator: John DiPaola-Tromba	**Project Category:** Annual - General
Project Manager: Operations Manager	**Project Type:** Annual
Project Sponsor: Joseph Purington	**Project Purpose:** Purchase of Tools
Estimated in service date: Various	**Capital Investment part of original Oper. Plan:** Yes
Eng./Constr. Resources Budgeted? Yes	**O&M Expenses part of original Oper. Plan:** N/A
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☒ non-PTF ☒ Distribution
Total Request: $100K	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $100K is requested for the purchase of tools meeting the capitalization threshold requirement of $500 per unit cost. Any work order greater than $100K (Directs) will require a separate Project Authorization Form (PAF) and Delegation of Authority (DOA) approval.

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Subsidiary Board Approval Package Template

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized*	2021	2022	2023	Totals
Capital Additions - Direct	$ -	$ 100	$ -	$ -	$ 100
Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ 100	$ -	$ -	$ 100
Capital Additions - Indirect	$ -	$ -	$ -	$ -	$ -
Subtotal Request	$ -	$ 100	$ -	$ -	$ 100
AFUDC	$ -	$ -	$ -	$ -	$ -
Total Request	$ -	$ 100	$ -	$ -	$ 100

**To be completed if supplemental authorization is required*

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Appendix 4
Supplement Request Form

Supplement Request Form

Project Title: Telecom WAN Annual	**Project Number:** IT6DWANA
Date Prepared: 04/20/2022	**Company:** PSNH
Organization: Telecommunications Strategy	**Class(es) of Plant: General Plant - Communications**
Project Initiator: James Ahrens	**Project Category: Annual - General**
Project Manager: Oloruntomi Fadipe	**Project Type:** Annual
Project Sponsor: Roderick Kalbfleisch	**Project Purpose:** Telecommunications
Estimated in service date: 12/31/2021	**Capital Investment part of original Operating Plan:** Yes
Current Authorization Amount: $ 779,000	**O&M Expenses part of request:** No
Supplement Request: $ 271,000	**Other:**
Total Request: $ 1,050,000	

Supplement Justification

Direct spend for calendar year 2021 of $901,000 has exceeded the authorized amount of $706,000 by $195,000 (28%). The threshold for supplemental funding is a 10% overrun.

Justification for Additional Resources

Spending under NH WAN Annuals in 2021 was used to complete critical improvement efforts needed on the Telecom system. The following list of work orders describes the work that was completed.

WO	Title	Description	2021 Actuals ($k)
NH20D001	LANCASTER TELECOM UPGRADES 2020	Microwave Link Install to Prospect Mtn.	8.7
NH20D002	PROSPECT MTN TELECOM UPGRADES 2020	Microwave Link Install to Lancaster	0
NH20D003	MONADNOCK S/S TELECOM UPGRADES	Node Upgrade to SEL ICON	16.1
NH20D004	SCOBIE 326 LINE, ADSS FIBER DROP CABLE	minor	
NH20D005	Nashua AWC Tower Replacement	40 Foot Antenna Structure Installation; Removal of old one	0.6
NH20D006	TAIT Radio Evaluation	Deployment of voice base radio at Tower Hill; Removal of existing GE III radio.	15.4

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Appendix 4
Supplement Request Form

NH20D007	Newington AP offload	Off-loaded DSCADA pole-top radios from Newington AP base data radio to other area base data radios	22.8
NH20D008	JMUX 1250 Lab nodes - Hooksett	JMUX Upgrades	4.5
NH20D009	JMUX R7 OC-48 node 1 – Scobie Pond Londonderry		9.7
NH20D010	JMUX R7 OC-48 node 2 – North Merrimack		15.9
NH20D011	JMUX R7 OC-48 node 3 – Bedford		9.3
NH20D012	JMUX R7 OC-48 node 5 – Scobie 115 Londonderry		20.2
NH20D013	JMUX R7 OC-48 node 6 - Hudson		10.6
NH20D014	JMUX R7 OC-48 node 7 – Bridge St		18.8
NH20D015	JMUX R7 OC-48 node 8 – Power St		16.5
NH20D016	JMUX R7 OC-48 node 9 – Mammoth Road		19.9
NH20D017	JMUX R7 OC-48 node 10 – Watts Brook		13.1
NH20D018	JMUX R7 OC-48 node 11 – Reeds Ferry		14.2
NH20D019	JMUX R7 OC-48 node 12 - Amherst		15.6
NH20D020	JMUX R7 OC-48 node 13 – Lawrence Road		16.5
NH20D021	JMUX R7 OC-48 node 14 - Thornton		6.4
NH20D022	JMUX R7 OC-48 node 15 – Scobie Comm Shelter		22.7
NH20D023	JMUX R7 OC-48 node 16 – Eagle 115		14
NH20D024	JMUX R7 OC-48 node 17 – Huse Road		15.5
NH20D025	JMUX R7 OC-48 node 18 – Eagle 345		14.3
NH20D026	PSNH E&I Lab Video Wall - Hooksett	Video Wall Installation in Lab	81.3
NH21D001	Mitchell Hill Batteries	minor	
NH21D002	Mt Agassiz	CES Backhaul and SiteBoss RTU Installation	65.3
NH21D003	Breezy Hill Data Site	Data Radio, CES Backhaul and SiteBoss RTU Installation	188.9
NH21D004	Core Box Additions	minor	
NH21D005	Garvins G146 Line Fiber Splice Can	minor	
NH21D006	Power St Telecom RTU & DSCADA Radio	Antenna Addition; Data Radio, SiteBoss RTU Installation	93.8
NH21D007	Pack Monadnock RTU & DSCADA Radio	Antenna Replacement and Addition; Data Radio, and SiteBoss RTU Installation	98.9

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Appendix 4
Supplement Request Form

NH21D008	Chesley Mountain RTU & DSCADA Radio	Antenna, Data Radio, CES Backhaul and SiteBoss RTU Installation	51.8
NH21D009	Morse Mtn RTU and Antenna	Antenna Replacement and SiteBoss RTU Installation	50.8
NH21D010	Epping AWC RTU and Antenna	Antenna Replacement and SiteBoss RTU Installation	22.1
NH21D011	Bean Hill Antenna	minor	
NH21D012	Bedford Fiber	minor	
NH21D013	Canal St. Comm Upgrades	Node Upgrade to SEL ICON	32.5

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Appendix 4
Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in thousands:

Capital Costs	Prior Authorized	Supplemental Request	Total
Direct Capital Costs			
Internal Labor	$165	$44	$209
Outside Services	$392	$108	$500
Materials	$145	$40	$185
Removals	$0	$0	$0
Risk and Contingency	$0	$0	$0
Other	$4	$3	$7
Subtotal	$706	$195	$901
Indirect Capital Costs			
Indirect/Overheads (including benefits)	$73	$76	$149
Capitalized interest or AFUDC, if any	$0	$0	$0
Subtotal	$73	$76	$149
Total Customer Contribution	$0	$0	$
Total Capital Project Costs	**$779**	**$271**	**$1,050**

EVERSOURCE

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Appendix 4
Supplement Request Form

Date Prepared: 01/31/2019	Project Title: Telecom WAN Annuals 2017
Company/Companies: PSNH	Project ID Number: IT6DWANA
Organization: Telecommunications Strategy	Plant Class/(F.P.Type): General Plant - Communications
Project Initiator: James Ahrens	Project Type: Specific
Project Owner/Manager: Oloruntomi Fadipe	Project Category: Telecommunications
Project Sponsor: Roderick Kalbfleisch	Project purpose: Telecommunications
Current Authorized Amount: $622K	Estimated in service date(s): 12/31/2017
Supplement Request: $157K	
Total Request: $779K	

Project Authorization Supplement Justification

This request is for supplemental funding in the amount of $157K for annual improvements to the Telecommunications Wide Area Network "WAN" in New Hampshire. The original plan was expanded to include additional installations of antenna's, microwave upgrades, sonnet nodes and radios at various sites. The additional work was added to improve communications in remote areas of the state that were experiencing operations communication issues.

Project Need Statement *(Description of Issue)*

Eversource's Vision is to be the best energy company in the nation by 2020. Eversource's objectives are to maintain safety, reliability and service standards at an increasingly lower cost while maximizing shareholder return.

Telecommunications services are essential to meeting these objectives.

Project Scope

- Install new antenna's and repeaters at various locations including dedicated frequency allocations, enclosures, physical security, and standby power supplies.
- Establish new radio sites at various locations with a UHF remote radio.
- Upgrade microwave by replacing existing DVM equipment at various locations
- Install Cisco sonnet nodes at various remote locations.

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Project Authorization Policy

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Project Authorization Supplement Cost Summary

Supplement (doll ars in thousands)

	Prior Authorized	Supplemental Request	Total
Capital Additions - Direct	$ 494	$ 211	$ 706
Less Customer Contribution	-	-	-
Removals new of Salvage %	-	-	-
Total Direct Spending	$ 494	$ 211	$ 706
Capital Additions - Indirect	128	(55)	73
AFUDC	-	-	-
Total Capital Request	$ 622	$ 157	$ 779
O&M	-	-	-
Total Request	**$ 622**	**$ 157**	**$ 779**

Total Supplement Request by year view:

	Prior/2017	2018	2019	Total
Capital Additions - Direct	$ 706	$ -	$ -	$ 706
Less Customer Contribution	-	-	-	-
Removals new of Salvage %	-	-	-	-
Total Direct Spending	$ 706	$ -	$ -	$ 706
Capital Additions - Indirect	73	-	-	73
AFUDC	-	-	-	-
T o tal Capital Request	$ 779	$ -	$ -	$ 779
O&M	-	-	-	-
Total **Request**	**$ 779**	**$ -**	**$.**	**$ 779**

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Request Form

Approved by NH PAC on 4/7/2022

Project Title: Distribution Line Emergent Equipment Failure – Minor Storms Program	**Project Number: MINOR9R**
Date Prepared: 4/1/2022	**Company:** Eversource NH
Organization: Electric Systems Operations	**Class(es) of Plant:** D Line
Project Initiator: Anthony Zawadski	**Project Category:** Annual - Lines
Managing Organization: Operations	**Schedule ID#:**
Project Manager: Thomas Davis	**Project Type:** Program
Project Sponsor: Jason Yergeau	**Capital Investment part of original Op Plan:** Yes
Current Authorized Amount: $202,000	**Emergency Related Request?** No
Supplement Request: $ 450,000	**ISO-NE Approval Required** (check all that apply): ☐ PAC ☐ TCA
Total Capital Request: $ 652,000	

Supplement Justification

Due to the higher than expected number of minor storms and their related unprecedented costs in 2021, supplementary funding is necessary for this annual to cover the capital expenditures associated with minor storm events. This project captures the cost of assets replaced during a minor weather event.

Minor storm costs in 2021 exceeded $5,000,000, which also surpassed the entire 2021 PSNH storm budget of $3,200,000.

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in Thousands

Capital Costs	Prior Authorized	Supplemental Request	Total
Direct Capital Costs			
Internal Labor	$45	$109	$154
Outside Services	$55	$12	$67
Materials	$0	$12	$12
Removals	$0	$0	$0
Risk and Contingency	$0	$0	$0
Other	$0	$2	$2
Subtotal	$100	$135	$235
Indirect Capital Costs			
Indirect/Overheads (including benefits)	$100	$315	$415
Capitalized interest or AFUDC, if any	$2	$0	$2
Subtotal	$102	$315	$417
Total Customer Contribution	$0	$0	$0
Total Capital Project Costs	**$202**	**$450**	**$652**

Lessons Learned

2021 was the first full year that the minor storm accounting was utilized. The PAF request for 2021 was based on 2020 actual expenditures, therefore an increase over previous storm capital expenditures should have been anticipated based on performance during the second half of 2020. The dramatic spike in total storm costs could not have been known in advance, however.

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Operations Project Authorization Form

Date Prepared: 12/18/2020	**Project Title:** Distribution Line Emergent Equipment Failure – Minor Storms Program
Company/ies: Eversource NH	**Project ID Number:** MINOR9R
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Pat Sullivan	**Project Category:** Basic Business – Emergent Equipment Failure - Line
Project Manager: Pat Sullivan	**Project Type:** Specific Annual Program
Project Sponsor: Mark Sandler	**Project Purpose:** Restore power following minor storms
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request: $202,000	

Financial Requirements:

Summary

An approval of $202,000 is requested for the 2021 Minor Storms (MINOR9R) project. This project covers capital expenditures associated with minor storm events. A minor storm event is defined as events not reaching the company defined threshold for a work order event but do achieve the company threshold for a minor storm classification. This project captures the cost of assets replaced during a minor weather event.

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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	$45	$0	$0	$0	$0	$45
7. Construction (incl matl's by contractors)	$0	$0	$0	$50	$0	$0	$0	$0	$50
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	$5	$0	$0	$0	$0	$5
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**	**$0**	**$100**	**$0**	**$0**	**$0**	**$0**	**$100**
13. Indirects/Overhead	$0	$0	$0	$100	$0	$0	$0	$0	$100
14. AFUDC	$0	$0	$0	$2	$0	$0	$0	$0	$2
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$202**	**$0**	**$0**	**$0**	**$0**	**$202**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$202**	**$0**	**$0**	**$0**	**$0**	**$202**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$202**	**$0**	**$0**	**$0**	**$0**	**$202**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$202**	**$0**	**$0**	**$0**	**$0**	**$202**

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 to Go	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$0	$50	$0	$0	$0	$0	$50
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Materials*	$0	$0	$0	$45	$0	$0	$0	$0	$45
Removals	$0	$0	$0	$5	$0	$0	$0	$0	$5
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$100	$0	$0	$0	$0	$100
AFUDC	$0	$0	$0	$2	$0	$0	$0	$0	$2
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$202**	**$0**	**$0**	**$0**	**$0**	**$202**

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

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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? No

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

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APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

Technical Justification

Project Need Statement

This project provides funding for a variety of activities relating to repairs and replacement of failed distribution equipment during minor storm events.

Project Objectives

This project is intended to provide funding for the replacement of failed distribution plant units to restore power during minor storm events.

Project Scope

This project addresses statewide issues with the distribution system including overhead, underground, and direct buried systems during minor storm events. Approval of the Minor Storm (MINOR9R) project covers authorization of all area work center capitalized storm work orders during minor storm events. The funding is authorized at the MINOR9R level, but this is the parent project for all minor storm projects. Actual charges will accumulate in the individual area work center work orders.

Background / Justification

This is a project that is funded each year and is required to maintain the integrity of the Company's distribution system and restore power during minor storm events.

Business Process and / or Technical Improvements:

Emergent capital repairs to distribution system during minor storm events.

Alternatives Considered with Cost Estimates

Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
In-Service date	12/31/2021

Regulatory Approvals

The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission

Risks and Risk Mitigation Plans

On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References

Not applicable.

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

Not applicable.

Cost Estimate Backup Details

Annual funding level for this project was estimated using historical spending.

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Operations Project Authorization Form

Date Prepared: 12/18/2020	**Project Title:** Distribution Line Emergent Equipment Failure – Minor Storms Program
Company/ies: Eversource NH	**Project ID Number:** MINOR9R
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Pat Sullivan	**Project Category:** Basic Business – Emergent Equipment Failure - Line
Project Manager: Pat Sullivan	**Project Type:** Specific Annual Program
Project Sponsor: Mark Sandler	**Project Purpose:** Restore power following minor storms
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request: $202,000	

Financial Requirements:

Summary

An approval of $202,000 is requested for the 2021 Minor Storms (MINOR9R) project. This project covers capital expenditures associated with minor storm events. A minor storm event is defined as events not reaching the company defined threshold for a work order event but do achieve the company threshold for a minor storm classification. This project captures the cost of assets replaced during a minor weather event.

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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	$45	$0	$0	$0	$0	$45
7. Construction (incl matl's by contractors)	$0	$0	$0	$50	$0	$0	$0	$0	$50
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	$5	$0	$0	$0	$0	$5
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**	**$0**	**$100**	**$0**	**$0**	**$0**	**$0**	**$100**
13. Indirects/Overhead	$0	$0	$0	$100	$0	$0	$0	$0	$100
14. AFUDC	$0	$0	$0	$2	$0	$0	$0	$0	$2
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$202**	**$0**	**$0**	**$0**	**$0**	**$202**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$202**	**$0**	**$0**	**$0**	**$0**	**$202**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$202**	**$0**	**$0**	**$0**	**$0**	**$202**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$202**	**$0**	**$0**	**$0**	**$0**	**$202**

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 to Go	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$0	$50	$0	$0	$0	$0	$50
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Materials*	$0	$0	$0	$45	$0	$0	$0	$0	$45
Removals	$0	$0	$0	$5	$0	$0	$0	$0	$5
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$100	$0	$0	$0	$0	$100
AFUDC	$0	$0	$0	$2	$0	$0	$0	$0	$2
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$202**	**$0**	**$0**	**$0**	**$0**	**$202**

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

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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? No

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
This project provides funding for a variety of activities relating to repairs and replacement of failed distribution equipment during minor storm events.

Project Objectives
This project is intended to provide funding for the replacement of failed distribution plant units to restore power during minor storm events.

Project Scope
This project addresses statewide issues with the distribution system including overhead, underground, and direct buried systems during minor storm events. Approval of the Minor Storm (MINOR9R) project covers authorization of all area work center capitalized storm work orders during minor storm events. The funding is authorized at the MINOR9R level, but this is the parent project for all minor storm projects. Actual charges will accumulate in the individual area work center work orders.

Background / Justification
This is a project that is funded each year and is required to maintain the integrity of the Company's distribution system and restore power during minor storm events.

Business Process and / or Technical Improvements:
Emergent capital repairs to distribution system during minor storm events.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
In-Service date	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Annual funding level for this project was estimated using historical spending.

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Supplement Request Form

Date Prepared: 09/09/2020	**Project Title:** 3178X Circuit Tie Hinsdale
Company: Eversource NH	**Project Number:** R18CTC02
Organization: Distribution Engineering	**Class(es) of Plant:** D Line
Project Initiator: Nate Duford	**Project Category:** Lines - General
Project Manager: Mark Fraser	**Project Type:** Specific
Project Sponsor: James Eilenberger	**Capital Investment Part of Original Oper. Plan:** Yes
Project Manager's Director: Russel Johnson	**O&M Expenses Part of the Original Oper. Plan:** N/A
Current Authorized Amount: $1,534,000	**Estimated in service date:**
Supplement Request: $535,000	**ISO-NE Approvals Required** (check all that apply)**:** ☐ PAC ☐ TCA
Total Request: $2,069,000	

Background

In 2014 an express feed circuit named at 3178X3 was constructed in ROW from Chestnut Hill substation in Hinsdale, west to Plain Road. This was to be the beginning of a circuit tie to the far end of the 3178X, one of our poor performing circuits. The project is intended to complete this tie with new spacer cable built up Plain Road and across Monument Road out to Route 119. A 10,500' 477 spacer cable three-phase line extension will be needed as well as replacing 5500' of # 2ACSR and with 477 spacer cable. Total cost of this tie $1,534,000.

Supplement Justification Overview

This job was intended to be completed by internal crews without sufficient funding in the original estimate for this project to be completed by contractors. Contractors were utilized instead of internal resources due to increased customer-driven work for internal resources. Internal labor costs were $511K less than their estimate however outside service increased costs surpassed those savings.

In addition to the above reason for the supplement, there was a scope change to replace a 1000' section of single phase URD on Monument Road.

The cost differences were reviewed at monthly budget meetings and were projected in the financials.

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Supplement Justification Detail

Provide a detailed summary of the various cost drivers for each line item; identify the supplemental dollar amount and describe in detail the justification for the cost increase. Please delete any line items here and in the table below that are $0 and have no change.

The reasons for the project authorization supplement of $535,000 are summarized below.

1. **ROW / Easements / Land Acquisition:**
2. **Environmental Approvals / Permits:**
3. **Outreach:**
4. **Siting Approvals / Permits:**
5. **Engineering / Design:**
6. **Materials (by Eversource): ($1,000)**
7. **Construction: $481,000**
8. **Testing / Commissioning:**
9. **Project Management Team:**
10. **Removals:**
11. **Other:**
12. **Risk:**
13. **Indirects/Overhead: $51,000**
14. **AFUDC: $4,000**
15. **Contingency:**
16. **Reimbursables/Customer Contribution:**

Total Supplement Request: $535,000

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

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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	$	$	$
3. Outreach	$	$	$
4. Siting Approvals / Permits	$	$	$
5. Engineering / Design	$	$	$
6. Materials (Eversource purchased)	$368	$367	($1)
7. Construction (incl matl's by contractors)	$551	$1,032	$481
8. Testing / Commissioning	$	$	$
9. Project Mgmt Team	$	$	$
10. Removals	$	$	$
11. Other	$	$	$
12. Risks	$	$	$
SUBTOTAL DIRECTS W/ RISKS	**$919**	**$1,399**	**$480**
13. Indirects/Overhead	$613	$664	$51
14. AFUDC	$2	$6	$4
PROJECT TOTAL – BASELINE BUDGET	**$1,534**	**$2,069**	**$535**
15. Contingency	$	$	$
TOTAL CAPITAL REQUEST	**$1,534**	**$2,069**	**$535**
16. Reimbursables/Customer Contribution	$	$	$
PROJECT TOTAL (LESS REIMBURSABLES)	**$**	**$**	**$**

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Total Supplement Request by Year

Note: Dollar values are in thousands:

Line item Category	Year 2019	Year 20	Year 20 +	Total
1. ROW / Easements / Land Acquisition	$	$	$	$
2. Environmental Approvals / Permits	$	$	$	$
3. Outreach	$	$	$	$
4. Siting Approvals / Permits	$	$	$	$
5. Engineering / Design	$	$	$	$
6. Materials (Eversource purchased)	($1)	$	$	$
7. Construction (incl matl's by contractors)	$481	$	$	$
8. Testing / Commissioning	$	$	$	$
9. Project Mgmt Team	$	$	$	$
10. Removals	$	$	$	$
11. Other	$	$	$	$
12. Risks	$	$	$	$
SUBTOTAL DIRECTS W/ RISKS	**$480**	**$**	**$**	**$**
13. Indirects/Overhead	$51	$	$	$
14. AFUDC	$4	$	$	$
PROJECT TOTAL – BASELINE BUDGET	**$535**	**$**	**$**	**$**
15. Contingency	$	$	$	$
TOTAL CAPITAL REQUEST	**$535**	**$**	**$**	**$**
16. Reimbursables/Customer Contribution	$	$	$	$
PROJECT TOTAL (LESS REIMBURSABLES)	**$**	**$**	**$**	**$**

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Lessons Learned

Include a description of lessons learned to prevent reoccurrence for each item discussed above that was a reason for a line item overage.

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APS 1 - Project Authorization Policy

Appendix 2
Operations Project Authorization Form

Operations Project Authorization Form

Date Prepared: 10/11/17	Project Title: 3178X Circuit Tie Hinsdale
Company/ies: Eversource NH	Project ID Number: R18CTC02
Organization: Western Field Engineering	Class(es) of Plant: Distribution Line
Project Initiator: Nate Duford	Project Category: D Regulatory Commitments REP
Project Manager: Mark Fraser	Project Type: Specific
Project Sponsor: James Eilenberger	Project Purpose: part of regulatory tracked program? Yes
Estimated in service date: 12/1/2018	If Transmission Project: NA
Authorization Type: Construction	Capital Investment Part of Original Operating Plan? Yes
	O&M Expenses Part of the Original Operating Plan? Yes

Project Authorization

If Subsidiary Board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

In 2014, an express feed circuit named the 3178X3 was constructed in ROW (Right-of-way) from Chestnut Hill S/S in Hinsdale west to Plain Road. This was to be the beginning of a circuit tie to the far end of the 3178X, a perennial top worst performing circuit. This project is to complete this tie with a new spacer cable line built up Plain Road and across Monument Road out to Hwy 119. A 10,500ft 477 spacer cable three phase line extension will be needed, as well as replacing 5500ft of #2 ACSR with 477 spacer cable. Monument Rd and Plains Rd will be converted to 34.5kV.

Project Costs Summary

.

Note: Dollar values are in thousands

	Prior Authorized	2018	20__	20__+	Totals
Capital Additions - Direct	$ -	$ 919	$ -	$ -	$ 919
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage ____%	-	-	-	-	-
Total - Direct Spending	$ -	$ 919	$ -	$ -	$ 919
Capital Additions - Indirect	-	613	-	-	613
Subtotal Request	$ -	$ 1,532	$ -	$ -	$ 1,532
AFUDC	-	2	-	-	2
Total Capital Request	$ -	$ 1,534	$ -	$ -	$ 1,534
O&M	-	66	-	-	66
Total Request	$ -	$ 1,600	$ -	$ -	$ 1,600

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APS 1 - Project Authorization Policy

Appendix 2
Operations Project Authorization Form

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	551			
Overtime Labor	0			
Outside Services	0			
Materials	368			
Other, including contingency amounts (describe)	0			
Total	$919			

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	613			
Capitalized interest or AFUDC, if any	2			
Total	615			

Total Capital Costs	$1,534			
Less Total Customer Contribution	0			
Total Capital Project Costs	$1,534			
Total O&M Project Costs	66			

Future Financial Impacts:

No future financial impacts are anticipated.

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Appendix 2
Operations Project Authorization Form

Operations Technical Authorization Form
TAF # NH-180029-D

Date Prepared: 10/11/17	Project Title: 3178X Circuit Tie Hinsdale
Company/ies: Eversource NH	Project ID Number: R18CTC02
Organization: Western Field Engineering	Class(es) of Plant: Distribution Line
Project Initiator: Nate Duford	Project Category: D Regulatory Commitments REP
Project Manager: Mark Fraser	Project Type: Specific
Project Sponsor: James Eilenberger	Project Purpose: Reliability
Estimated in service date: Winter 2018	If Transmission Project: N/A
Authorization Type: *Construct*	Authorization Amount: $1,600,000

Project Need Statement *(Description of Issue)*

This request is for $1.6M to construct a circuit tie on the 3178X circuit in Hinsdale, NH

The 3178X circuit feeds 4,245 customers radially out of Chestnut Hill SS. Added distributed automation has improved reliability for this circuit to #47 on the worst performing list in 2016. This tie would allow flexibility for addressing loading, maintenance, and emergency situations. This project offers the potential to save 291,000 customer minutes annually.

Construct a 10,500ft 477 spacer cable three phase line extension from the end of the 3178X3 circuit and replace 5500ft of #2 ACSR with 477 spacer cable. Convert Monument Rd and Plains Rd to 34.5kV.

Project Objectives

Improve reliability for the town of Hinsdale particularly in their manufacturing and commercial areas. Hinsdale is remote from Keene and our ability to swiftly isolate faults will significantly reduce minutes. The objective is to have a flexible and reliable circuit loop for the Hinsdale area. Completing this project would result in approximately 291,394 customer minutes saved annually.

Project Scope

- Upgrade to three phase 477 spacer cable from #2 ACSR north on Plain Road and west on Monument Road (15,000 ').
- Convert to 34.5 kV out through Monument Road.

Background / Justification

- The 3178 finished #47 on 2016 Hit List of worst performing circuits.
- Completing this project would save about 291,394 minutes annually, which calculates out to a cost/min of $4.39

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Appendix 2
Operations Project Authorization Form

Cost Estimate and Assumptions

Line Upgrade and Conversion – Plain and Monument Road:	1,100K
Wire Upgrade along Monument Road (5500ft):	500K
Total Cost:	$1,600K

Alternatives Considered with Cost Estimates

The original route to create a tie with Route 119 was through ROW. After investigating, it was found that the terrain in that portion of the ROW was too rough and another route to 119 was needed. Plains Rd to Monument Rd provided the most direct and cost effect way to complete the loop between the 3178X3 and the 3178.

Project Schedule

Describe the project schedule and milestones. Include estimated start and end dates.

Milestone/Phase Name	Estimated Completion Date

Risks and Risk Mitigation Plans

We do not anticipate any permitting issues due to entire project being completed on town roads. There is a possibility for extra costs to arise due to a 69kV ROW line which we must complete construction underneath.

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APS 1 - Project Authorization Policy

Appendix 2
Operations Project Authorization Form

One-Line Diagrams, Attachments, and Images

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--005 **Page 1 of 1**

Request from: Department of Energy

Witness: Johnson, Russel D

Request:

The following data request are related to the Attachment RDJ/DLP/JJD-1:

For those projects that reflect an Actual Project Cost-to-Date that is less than the Authorized amount, please provide an overall summary of the drivers of project under-runs (*i.e.*, over-estimating, change in project scope, *etc.*).

Response:

Please refer to Attachment DOE 1-005.

Public Service Company of New Hampshire
d/b/a Eversource Energy
DE 22-030
Attachment DOE 1-005
Page 1 of 1

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE D/B/A EVERSOURCE ENERGY
Specific Projects Placed in Service in 2021, excluding New Business

						Total Cost (direct and indirect includes install and cost of remova)					
Line	Year	Specific Project No.	Project Description	First in Service Event	2021 Plant in Service	Pre-Construction Authorization	Supplemental Authorization	As of 12/31/21 Actual Project Life to Date Costs	12/31/21 Project Life to Date Cost to Pre-Construction Estimate Variance ($)	12/31/21 Project Life to Date Cost to Pre-Construction Estimate Variance %	Drivers for under-run
	Col. A	Col. D	Col. E	Col. F	Col. H	Col. I	Col. J	Col. M	Col. N	Col. O	
1	2021	20755	Bow Mobile Substation Expansion	2021	$ 678 745	$ 871 729		$ 678 745	$ (192 984)	-22%	Efficiency in final design
2	2021	20760	Derry NH SOC Renovation	2021	$ 343 793	$ 396 980		$ 350 901	$ (46 079)	-12%	Efficiency in design
3	2021	21707	PSNH-D Fac 2021 LOB	2021	$ 746 280	$ 5 018 582		$ 956 475	$ (4 062 107)	-81%	Funding was moved to support other projects
4	2021	21715	PSNH-D ML 2021 LOB	2021	$ 312 862	$ 619 800		$ 315 987	$ (03 813)	-49%	Supply chain issues prevented purchase of planned materials (4 forks lifts)
5	2021	21759	NH Water Bottle Filling Stations	2021	$ 241 799	$ 314 521		$ 241 799	$ (72 722)	-23%	Efficiency of labor
6	2021	21772	PSNH-D LED Lighitng Replacements	2021	$ 79 736	$ 89 219		$ 80 486	$ (8 733)	-10%	Efficiency of labor
7	2021	21799	Hooksett-1250 LED Lighting	2021	$ 183 770	$ 599 530		$ 183 770	$ (415 760)	-69%	This project is still active
8	2021	217127	55 W Brook Retaining Wall	2021	$ 498 652	$ 542 739		$ 498 652	$ (44 087)	-8%	Efficiency in design
9	2021	217129	55 W Brook LED Lighting	2021	$ 289 086	$ 374 324		$ 289 086	$ (85 238)	-23%	This project is still in motion
10	2021	A06W42	RETROFIT CAPACITOR BANK CONTROLS	2021	$ 14 182	$ 1 657 826		$ 1 624 851	$ (32 975)	-2%	Within 2% of estimate
11	2021	A08N10	Portsmouth S/S - add transformer	2021	$ 7 852 765	$ 9 167 000		$ 7 852 765	$ (1 314 235)	-14%	Under run attributed to unused contingency
12	2021	A17C30	PACK MONADNOCK RBLD SINGLE-PHASE LI	2021	$ 1 668 701	$ 3 900 000		$ 2 219 139	$ (1 680 861)	-43%	This project included several years of of planning and re-engineering to satisfy the agencies permitting and the community to fina ize the design Agencies involved included DNCR NHDOT PUC as well as local group associated with the the Miller State Park Mountain. The ISD was further delayed in 2021 due to fall peak season mountain hiking. Construction Start: April 2021. Actual ISD May 2021. **Reason for decrease:** The team sucessfully mitigated the many risks associated with this project which included delays with the PUC license Telco set poles access due to steep mountainous ledge slopes along with weather conditions park roadway-trail closure access for public safety/facilate construction and NHDOT roadway damages-paving. In spite of the many requests from the local group the DNCR agreed upon scope was adhered to throughout construction. The well planned and executed construction of the project added to the many efficiencies which decreased the overall project costs.
13	2021	A17S03	MILLYARD SS REPLACEMENT	2021	$ 86 984	$ 14 267 000		$ 5 232 050	$ (9 034 950)	-63%	Project is st ll under construction with planned ISD of July 2022. Major equipment and construction costs not yet fina
14	2021	A19X223	ANIMAL PROTECTION AT VALLEY ST SS	2021	$ 54 621	$ 91 000		$ 54 621	$ (36 379)	-40%	Lower internal labor ($8k) material ($ k) other ($7k) indirects ($14k) than estimated. This was the first installation of its type and is lowe primarily due to labor and associated indirects.
15	2021	A19X61	Lawrence Road Substation	2021	$ 343 024	$ 792 000		$ 343 024	$ (448 976)	-57%	This project was originally authorized for $792k to cover two sites - Lawrence Road and North Keene. Subsequently North Keene was separateh authorized under project A21W75. Project A19X61 actual costs are ONLY for Lawrence Road.
16	2021	A20C16	BOUCHARD ST RPL CBL & SWTCHGR	2021	$ 452 841	$ 544 000		$ 502 81	$ (41 819)	-8%	Reduction in project scope
17	2021	A20C23	335X1 EXTEND 19.9kV 1P TO S. BOW RD	2021	$ 213 307	$ 319 000		$ 230 548	$ (88 452)	-28%	Project costs were over-estimated
18	2021	A20C40	MANCHESTER NETWORK CABLE REPLACEMEN	2021	$ 1 312 473	$ 3 733 000		$ 2 047 773	$ (1 685 227)	-45%	Construction pricing received through competitive bid process was very favorable compared to the estimated construction cost. Estimate assumed pulling old cable and replacing in same conduit however spare conduits were found allowing for a more efficient installation process.
19	2021	A20E04	North Dover Conversion	2021	$ 761 831	$ 936 000		$ 806 615	$ (129 385)	-14%	Lower internal labor ($7k) outside services ($33k) material ($25k) other ($2k) indirects ($60k) than estimatec
20	2021	A20N15	43W1 (13W1) Construct Circuit Tie	2021	$ 1 679 659	$ 2 200 000		$ 1 956 182	$ (243 818)	-11%	Contractor costs came in under bid. Contigencies for ledge sets rock anchors demobilization were never realized. Due to the remote location th coningencies were put in place. Material costs were also lower than projected.
21	2021	A20N45	REPLACE CT TRNSF BERLIN ES SS	2021	$ 379 848	$ 521 000		$ 391 279	$ (129 721)	-25%	The lower cost is primarily associated with lower Indirects ($106) and AFUDC ($27) than estimated.
22	2021	A20W09	Rte 9 Relo 2800' main li to roadsid	2021	$ 596 863	$ 792 000		$ 662 228	$ (129 772)	-16%	Project ongoing and to date lower internal labor ($42k) outside services ($24k) material ($19k) indirects ($56k) than estimate
23	2021	A20W33	PACK MONADNOCK SUMMIT SOLUTION	2021	$ 282 590	$ 425 000		$ 294 031	$ (130 969)	-31%	This project included several years of of planning and re-engineering to satisfy the agencies permitting and the community to fina ize the design Agencies involved included DNCR NHDOT PUC as well as local group associated with the the M ller State Park Mountain. The ISD was further delayed in 2021 due to fall peak season mountain hiking. Construction Start: April 2021. Actual ISD May 2021. **Reason for decrease:** The team sucessfully mitigated the many risks associated with this project which included delays with the PUC license Telco set poles access due to steep mountainous ledge slopes along with weather conditions park roadway-trail closure access for public safety/facilate construction and NHDOT roadway damages-paving. In spite of the many requests from the local group the DNCR agreed upon scope was adhered to throughout construction. The well planned and executed construction of the project added to the many efficiencies which decreased the overall project costs.
24	2021	A20W36	SUGAR RIVER SS UPGRADES	2021	$ 1 069 829	$ 1 641 000		$ 1 332 322	$ (308 678)	-19%	Construction bids came in lower than estimated
25	2021	A20W44	NEWPORT SS RECLOSER PROJECT	2021	$ 1 023 070	$ 1 093 000		$ 1 023 070	$ (69 930)	-6%	Slightly less than estimate as some of the specific costs were below their estimat
26	2021	A20X221	ANIMAL PROTECTION AT MAMMOTH SS	2021	$ 57 614	$ 114 000		$ 57 614	$ (56 386)	-49%	Lower internal labor ($8k) other ($32k) indirects ($17k) than estimated. Included in the estimate was installing a mobile for the construction. The work was able to be scheduled without using the mobile so the lower costs were primarily due to this and associated indirects.
27	2021	A20X39	NH T&D IEC 61850 SIMULATOR	2021	$ 1 137 446	$ 2 270 000		$ 1 137 446	$ (1 132 554)	-50%	Project underrun is due mostly to lower than estimated indirect costs (-$875k). Direct costs were under budget by $124k (mostly internal labor and contingency of $134k was not needed.
28	2021	A20X42	GE L90 RELAYS MOD 14 REPLACE NH D	2021	$ 6 189	$ 386 000		$ 6 189	$ (379 811)	-98%	Project underrun due to engineering and construction labor being kept in house
29	2021	A21C25	ADD PHASES ON NEW BOSTON RD	2021	$ 422 531	$ 825 000		$ 479 471	$ (345 529)	-42%	Favorable competitive bidding and lower internal labor ($130k) material ($28k) indirects ($241k) than estimatec
30	2021	A21C42	WESTLAND AVE CONVERSION	2021	$ 93 832	$ 261 000		$ 120 903	$ (140 097)	-54%	Favorable competitve bidding and lower material ($25k) indirects ($103k) than estimatec
31	2021	A21DA	2021 POLE TOP DISTRIBUTION AUTOMATI	2021	$ 3 457 314	$ 7 500 000		$ 5 080 413	$ (2 419 587)	-32%	Some of the preparation work was done in 2020 under A20DA therefore reduced costs for A21DA
32	2021	A21E08	CIRCUIT TIE 3191X1B TO 377X2	2021	$ 485 719	$ 829 000		$ 534 224	$ (294 776)	-36%	Construction was still ongoing for this work into 2022 therefore full project costs not reflected as of year-end 202
33	2021	A2 N32	LACONIA COMCAST NONBILLABLE 2021	2021	$ 105 702	$ 550 000		$ 163 030	$ (86 970)	-70%	Construction was still ongoing for this work into Q2-2022 therefore full project costs not reflected as of year end 2021
34	2021	A2 N33	LACONIA COMCAST BILLABLE 2021	2021	$ (3 410)	$ 1 100 000		$ 1 639	$ (1 098 361)	- 00%	Construction was still ongoing for this work into Q2-2022 therefore full project costs not reflected as of year end 2021. Current negative variance is due to receipt of Comcast pre-payments.
35	2021	A2 N34	GILFORD COMCAST NONBILLABLE 2021	2021	$ 142 978	$ 660 000		$ 181 744	$ (478 256)	-72%	Construction was still ongoing for this work into Q2-2022 therefore full project costs not reflected as of year end 2021
36	2021	A2 N88	#T1213 LOUDON PLEASANT STREET PV	2021	$ (31 213)	$ 322 000		$ 37 628	$ (284 372)	-88%	Additional spending in 2022
37	2021	A21RPR	ROADSIDE REJECT POLE REPLACEMENT	2021	$ 276 292	$ 2 500 000		$ 522 523	$ (1 977 477)	-79%	Less reject poles were discovered than anticipated when the PAF was preparei
38	2021	A21S27	DAMREN RD CONVERSION	2021	$ 82 377	$ 214 000		$ 111 839	$ (02 161)	-48%	Over-estimated based on conceptual $/ft estimate
39	2021	A21S89	#T1402 & T2007 NASHUA PENNICHUCK PV	2021	$ (9 562)	$ 482 000		$ (9 095)	$ (491 095)	- 02%	Additional spending in 2022
40	2021	A21X 8	ADD SCADA RECLOSERS TO DG SITES	2021	$ 95 645	$ 1 000 000		$ 297 000	$ (703 000)	-70%	Initial estimate assumed DA devices installed at 8-10 sites when only three DA devices were deployed in 2021. More DA devices will be deployec after sites are ident fied.
41	2021	MBLEYE06	Mobileye-Fleet Safety Mechanism	2021	$ 109 281	$ 181 671		$ 109 281	$ (72 390)	-40%	Negative impact of Covid on the automobile industry
42	2021	NHEDVH20	NH Elec Distrib Vehicle Purchase	2021	$ 256 464	$ 12 766 773		$ 5 827 495	$ (6 939 278)	-54%	Negative impact of Covid on the automobile industry leading to production delays and affected by chip shortage
43	2021	NHEDVH21	NH Distribution Vehicle Purchase	2021	$ 6 620 817	$ 7 613 807		$ 7 058 701	$ (555 106)	-7%	Spending was slightly lower due to delays in shipment
44	2021	NHTOOLS	NH-Tools/Equipment-Transportatior	2021	$ 33 945	$ 7 613 807		$ 139 830	$ (7 473 977)	-98%	This represents a minor NH program in a enterprise-wide authorization
45	2021	NHTRN21	NH Training Annual Capital Project	2021	$ 9 004	$ 60 000		$ 28 509	$ (31 491)	-52%	Spending was delayed due to shipping issues. Money w ll be spent in 2022
		2021 Total			**$ 34,516,277**						

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

Date Request Received: May 26, 2022 **Date of Response: June 06, 2022**
Data Request No. DOE 1--006 **Page 1 of 1**

Request from: Department of Energy

Witness: Devereaux, James J

Request:

The following data request are related to the Attachment RDJ/DLP/JJD-1:

For Specific Projects, please explain why so few projects are completed (account 101) and so many are in-service but not yet closed (account 106).

Response:

The projects listed in the Specific Project tab represent projects first placed into service in 2021; i.e., 2021 was the first year with any work orders for these projects. The in-service date could have been anytime between January 2021 through the end of December 2021. The average time to move these type of work orders from complete (account 106) to closed (account 101) is slightly more than a year. Therefore, it is not surprising that many of these projects have not been moved to complete.

Movement between account 106 and account 101 is simply moving the projects placed in service into their appropriate units of account classifications under the FERC Electric Plant Chart of Accounts (unitized). The Company acknowledges the delay in certain capital projects completed but not yet unitized and continues to actively facilitate the movement of projects placed in service from account 106 (non-unitized) to account 101 (unitized) as expeditiously and effectively as possible. The Company would also like to note that there is no risk to the customers or rates billed to customers should unitization of account 106 projects be delayed beyond the calendar year in which the projects were placed in service.

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--007 **Page 1 of 1**

Request from: Department of Energy

Witness: Devereaux, James J

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.
Nashua Renovation No. 19720

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-7(B) for the PAF for this project.

Public Service Company of New Hampshire d/b/a Eversource Energy
DE 22-030
Attachment DOE 1-007(A)
Page 1 of 2

TABLE 1: Detail on Specific Projects and Annuals

DOE DR #	Project Name	Project #	Contractors/Non-Affiliates			Internal		Other	TOTAL
			Competitively Bid	Sole Sourced	Preferred Supplier	Resources	Indirects		
	Specific Projects:								
DOE 1-7	Nashua Renovation	No. 19720	95%			1%	2%	2%	100%
DOE 1-8	Emerald Street Substation	No. A14W01	22%		36%	4%	29%	9%	100%
DOE 1-9	Replace 3891 Cable Nashua	No. A20S12		27%		3%	68%	2%	100%
DOE 1-10	Millyard SS Replacement	No. A17S03	43%		14%	5%	31%	7%	100%
DOE 1-11	Pack Monadnock RBLD	No. A17C30		13%	32%	7%	44%	4%	100%
	Annual Blanket Projects:								
DOE 1-12	Maintain Voltage	No. DK9R			20%	9%	45%	26%	100%
DOE 1-13	Dist Line ROW Program	No. DL9R			38%	3%	50%	9%	100%
DOE 1-14	Reliability Improvements	No. DR9R			18%	11%	34%	37%	100%
DOE 1-15	Purchase Transformers	No. DT7P			16%	10%	9%	65%	100%
DOE 1-16	Insurance Claim Annual	No. INSOH9R	Internal	Internal	Internal	40%	37%	23%	100%
DOE 1-17	Telecom WAN Annuals	No. IT6DWANA		48%		20%	14%	18%	100%
DOE 1-18	Reject Pole Replacement	No. A07X45			41%	8%	45%	6%	100%
DOE 1-19	PCB Transf Changeout Prgm	No. C01PCB			35%	10%	49%	6%	100%
	Specific Carryover:								
DOE 1-20	Café Renovations	No. 18740			98%	1%	1%	0%	100%
DOE 1-21	Berlin NH Yard Paving	No. 20739			98%	1%	1%	0%	100%
DOE 1-22	Jackman Replace Equip.	No. A16C10	50%		18%	5%	19%	8%	100%
DOE 1-23	11W1 Replace Submarine Cable	No. A16N01	59%			1%	37%	3%	100%
DOE 1-24	Second Transformer Lost Nation	No. A16N02	14%		35%	4%	19%	28%	100%
DOE 1-25	328 Line Reconductor	No. A17C26	24%		20%	3%	35%	18%	100%
DOE 1-26	Rochester 4kV Conversion	No. A17E09	23%			13%	49%	15%	100%
DOE 1-27	Pemi SS Upgrade	No. A18N05	32%		10%	9%	29%	20%	100%
DOE 1-28	Distribution Automation Pole Top	No. A20DA			18%	6%	37%	39%	100%
DOE 1-29	2020 Circuit Patrol Repairs	No. A20X38	47%			2%	44%	7%	100%
DOE 1-30	HN Full Width ROW Clearing	No. C18ROW	99%			0%	1%	0%	100%
DOE 1-31	Southern Region 2015 DA	No. A15SDA		12%		6%	30%	52%	100%
DOE 1-32	Laconia SS Equipment Repl	No. A17N18	25%		15%	8%	35%	17%	100%
DOE 1-33	CAIDI Improvement	No. A16X04			46%	14%	28%	12%	100%
DOE 1-34	Rye Area 4kV Study	No. A17E01	51%			3%	34%	12%	100%
DOE 1-35	NH Training Annual Cap Proj	No. NHTRN20		50%			4%	46%	100%

TABLE 2: Description of Alternatives Considered, including NWAs			
DOE DR #	**Project Name**	**Project #**	**Alternatives Considered in PAF? If not in PAF, describe below, including NWAs**
	Specific Projects:		
DOE 1-7	Nashua Renovation	No. 19720	Yes
DOE 1-8	Emerald Street Substation	No. A14W01	Yes
DOE 1-9	Replace 3891 Cable Nashua	No. A20S12	Yes
DOE 1-10	Millyard SS Replacement	No. A17S03	Yes
DOE 1-11	Pack Monadnock RBLD	No. A17C30	Yes
	Annual Blanket Projects:		
DOE 1-12	Maintain Voltage	No. DK9R	Not applicable
DOE 1-13	Dist Line ROW Program	No. DL9R	Not applicable
DOE 1-14	Reliability Improvements	No. DR9R	Not applicable
DOE 1-15	Purchase Transformers	No. DT7P	Not applicable
DOE 1-16	Insurance Claim Annual	No. INSOH9R	Not applicable
DOE 1-17	Telecom WAN Annuals	No. IT6DWANA	Not considered, multiple smaller prjects
DOE 1-18	Reject Pole Replacement	No. A07X45	Not applicable
DOE 1-19	PCB Transf Changeout Prgm	No. C01PCB	Not applicable
	Specific Carryover:		
DOE 1-20	Café Renovations	No. 18740	PAF explains done based upon employee engagement initiatives
DOE 1-21	Berlin NH Yard Paving	No. 20739	No alternatives considered. It was done on need for paving lifecycle replacement at this site.
DOE 1-22	Jackman Replace Equip.	No. A16C10	Yes
DOE 1-23	11W1 Replace Submarine Cable	No. A16N01	Install distributed generation on the island to serve as backup to the eventual failure of the cables. Distributed generation would be very costly and not appropriate avenue to provide back up.
DOE 1-24	Second Transformer Lost Nation	No. A16N02	Yes
DOE 1-25	328 Line Reconductor	No. A17C26	Yes
DOE 1-26	Rochester 4kV Conversion	No. A17E09	Yes
DOE 1-27	Pemi SS Upgrade	No. A18N05	Yes
DOE 1-28	Distribution Automation Pole Top	No. A20DA	Not considered
DOE 1-29	2020 Circuit Patrol Repairs	No. A20X38	Not considered
DOE 1-30	HN Full Width ROW Clearing	No. C18ROW	Yes
DOE 1-31	Southern Region 2015 DA	No. A15SDA	Not considered
DOE 1-32	Laconia SS Equipment Repl	No. A17N18	Yes
DOE 1-33	CAIDI Improvement	No. A16X04	PAF states signficant ETT needed, however, ETT (if permissions granted) would not address access issues.
DOE 1-34	Rye Area 4kV Study	No. A17E01	Yes
DOE 1-35	NH Training Annual Cap Proj	No. NHTRN20	Not considered, less than $24K

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 3
Corporate Shared Service Project Authorization Form

Date Prepared: 08/20/2019	Project Title: Nashua AWC Construction/Renovation
Company/Companies: Public Service of New Hampshire – Distribution (PSNH-D)	Project ID Number: 19720
Organization: Real Estate & Property Mgmt.	Plant Class/(Peptide): Buildings & General Plant
Project Initiator: Armando Pereira	Project Type: *Specific*
Project Manager: Jason Plumb	Capital Investment Part of Original Operating Plan? Yes
Project Sponsor: Ellen Angley	Transfer of Budgets Request: No
Estimated in service date(s): 12/31/2020	Emergency Related Request: No
Total Capital Request: $7,930,505 Total Funding Request: $8,000,000	Software Projects Only – Estimated Life of Asset: N/A ____ 5 years ____ 10 Years ____15 Years

Project Authorization

Project Authorization Forms must be completed for Corporate Shared Services projects totaling $500K or greater in accordance with the Project Authorization Policy and approval levels in the Delegation of Authority Policy (DOA).

If Subsidiary Board approval is required (Corporate Shared Services capital projects > $15M), document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A) (attach email approval).

ERM: _____

FP&A: _____

If this is a Transfer of Budgets Request Vice President of Financial Planning and Analysis approval is required. If the Vice President of Financial Planning and Analysis deems appropriate, additional approvals may also be required (see page 7 of the Project Authorization Policy – Project Approval is not Transferable for further detail):

Date of Approval
VP of FP&A:_____

Other:_____

Documentation/Explanation:_____

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Executive Summary

(If related to an Emergency Request – please provide specific details of emergency situation and operational impacts to business and/or customer)

The Property Management group conducted a review of the Eversource Company footprint together with key representatives from Electric Operations. Findings include:

- The Nashua Area Work Center (AWC) is outdated and too small to accommodate anticipated growth. The main section of the building was built in 1960 with two additions in the 1970's. There have been minimal renovations in the last 20 years. Most of the electrical and plumbing systems are original, and the mechanical systems are from the 1990's. The roof is from the mid 1990's and the pavement is either gone, rutted, or cracked. The garage does not properly accommodate the new, longer line trucks.
- The building is fragmented with hard walls causing inefficient use of the space.
- Southern NH has had tremendous growth in the last 20 years. Electric Operations has added construction line crews as well as troubleshooter line crews. Their plan is to add additional crews once the site is expanded.
- The Nashua AWC will expand from 18,450 sq. ft. to 31,000 sq. ft. Today, the split is 11,450 sq. ft. office and 7,000 sq. ft. for garage. The proposed building is 15,000 sq. ft. for office and 16,000 sq. ft. for garage.
- There will be both renovation and new construction components in this project. For renovation, the current garage will be entirely renovated to Eversource office standards space. A new 16-bay garage will be constructed.
- The office and garage renovations will be a complete renovation. The only building structure to remain will be load bearing walls. The office renovations will include new roof, windows, electrical distribution, electrical switchgear, generator, plumbing, lighting, sprinkler system, flooring, HVAC, card readers, security, and furniture. The garage will be new construction. Site work will include expanding the paved area, drainage, fencing, gates, card readers, and lighting.

Project Costs Summary

See APS3 and APS8 requirements and consult with Plant Accounting for capital/O&M determination. Use published loaders for benefits, materials, and invoices, maintained by the Director, Budget and Financial Analysis.

Note: Dollar values are in whole dollars:

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	Year 2019	Year 2020	Year 20__+	Totals
Capital Additions - Direct	$ 515,000	$ 6,285,000	$ -	$ 6,800,000
Capital Additions - Indirect	13,200	309,825	-	323,025
Removals net of salvage ____%	5,000	151,990	-	156,990
Subtotal Request	**533,200**	**6,746,815**	**-**	**7,280,015**
O&M	3,000	66,495		69,495
Contingency	20,000	630,490	-	650,490
Total Request	**$ 556,200**	**$ 7,443,800**	**$ -**	**$ 8,000,000**

Financial Evaluation

Provide the following financial information (provide additional detail if summarized items are significant, additional information is needed or there are unique payment provisions).

Note: Dollar values are in whole dollars:

Direct Capital Costs	**Year 2019**	**Year 2020**	**Year 20___ +**	**Total**
Eversource Labor	$ 15,000	$ 60,000	$ -	$ 75,000
Outside Services/Consultants	500,000	5,625,000	-	6,125,000
Removal Costs	5,000	151,990	-	156,990
Furniture, Fixtures, & Equipment - GP	-	350,000	-	350,000
IT Cost	-	150,000	-	150,000
Security	-	100,000		100,000
Other, including contingency amounts (Describe) Contingency ____%	20,000	630,490	-	650,490
Total Direct Capital Costs	**$ 540,000**	**$ 7,067,480**	**$ -**	**$ 7,607,480**

Indirect Capital Costs	**Year 2019**	**Year 2020**	**Year 20___ +**	**Total**
Indirects/Overheads (including benefits)	$ 13,200	$ 309,825	$ -	**$ 323,025**
Capitalized interest or AFUDC , if any	-	-	-	-
Total Indirect Capital Costs	**$ 13,200**	**$ 309,825**	**$ -**	**$ 323,025**
Total Capital Costs	**$ 553,200**	**$ 7,377,305**	**$ -**	**$ 7,930,505**
Total O&M Costs	**$ 3,000**	**$ 66,495**	**$ -**	**$ 69,495**
Total Project Costs	**$ 556,200**	**$ 7,443,800**	**$ -**	**$ 8,000,000**
Vendor software payments (indicate whether or not included in the above)*	$ -	$ -	$ -	$ -

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Description	Capital Cost
Construction Mgmt/Design	
Existing Building Reno	$ 2,000,000
Building Addition/Vehicle Garage	$ 2,275,000
Architectural Design	$ 550,000
Site Work	$ 1,300,000
IT/Radio Communications	$ 150,000
Security	$ 100,000
Furniture, Fixtures & Equip	$ 350,000
Eversource Labor	$ 75,000
Contingency	$ 650,490
Removal	$ 156,990
Indirect Capital Costs	$ 323,025
Sub Total Eversource Costs	$ 7,930,505
Description	**O&M Cost**
Moving Costs	$ 69,495
Total Project Cost	***$ 8,000,000***

By Company Summary

Note: Dollar values are in whole dollars:

	Entity 06	Enity ____	Entity ____	Entity ____	Totals
Capital Additions - Direct	$ 7,450,490		$ -	$ -	$ 7,450,490
Capital Additions - Indirect	323,025		-	-	323,025
Removals net of salvage ____%	156,990		-	-	156,990
Subtotal Request	**7,930,505**	-	-	-	7,930,505
O&M	69,495	-	-	-	69,495
Total Request	**$ 8,000,000**	**$ -**	**$ -**	**$ -**	**$ 8,000,000**

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Overall Justification:

Project Need Statement *(Description of Issue)*

- Need for a new or renovated work center in Nashua NH area. The building is fragmented with hard walls causing inefficient use of the space.
- Most of the electrical, plumbing, and mechanical systems are out of date. The roof is from the mid 1990's and the pavement is either gone, rutted, or cracked. The garage does not properly accommodate the new, longer line trucks.
- Southern NH has had tremendous growth in the last 20 years. Electric Operations has added construction line crews as well as troubleshooter line crews. They plan to add additional crews once the site is expanded.

Project Scope

The Nashua AWC will expand from 18,450 sq. ft. to 31,000 sq. ft. The proposed building is 15,000 sq. ft. for office and 16,000 sq. ft. for garage.

There will be both renovation and new construction components in this project. For renovation, the current garage will be entirely renovated to office space. A new 16-bay garage will be constructed.

The office and garage renovations will be a complete renovation. The only building structure to remain will be load bearing walls. The office renovations will include new roof, windows, electrical distribution, electrical switchgear, plumbing, lighting, sprinkler system, flooring, HVAC, card readers, security, furniture, and generator. The garage will be new construction. Site work will include expanding the paved area, drainage, fencing, gates, card readers, and lighting.

Project Objectives

The objective is to expand and completely renovate the Nashua Service Center to create a more effective environment for the employees and improve operational efficiencies. The expansion of the service center will accommodate current and future growth of the work force and Operations team.

Background / Justification

See "Project Need Statement" above.

Business Process and / or Technical Improvements: *Quantitative and qualitative project benefits, including assumptions used to estimate benefits and customer impacts; describe the changes in performance to the business process or technology performance metrics that can be expected because of this project*

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Future Financial Impacts:

Provide below the estimated future costs that will result from the project: N/A
Note: Dollar values are in whole dollars:

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

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

Provide below the estimated financial benefits that will result from the project: N/A
Note: Dollar values are in whole dollars:

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:
N/A

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

What is the project's IRR? N/A

What is the project's NPV? N/A

What is the project's payback period? N/A

Use appropriate discount rate by company and associated corporate models (to be provided by Financial Planning and Analysis).

If the above items are not applicable, explain why (e.g., if negative but there are other reasons to proceed).

We are doing this project for additional space requirements to alleviate congestion and accommodate growth of the Nashua AWC, and this is the best solution for our future operating needs to better serve our customers and employees. There are no direct financial benefits.

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

An ARO is a current legal obligation to remove or retire property, plant or equipment at some point in the future. Please refer to APS8 or contact Plant Accounting for further detail.

Is there an ARO associated with this project? If yes, please provide details: N/A

Are there other environmental cleanup costs associated with this project? If yes, please provide details.

This is unknown at this point, but costs have been budgeted based upon historical site development at similar service centers.

The decision was based on a business needs across the system and not a financial payback or financial benefit. We identified the following facilities needs across the system:

- Need for new or renovated work center in Nashua NH.
- Need to address current and future growth issues at Nashua Service Center.

Alternatives Considered with Cost Estimates

Do nothing and Nashua AWC will still have space congestion. Service Center's electrical, plumbing, and mechanical systems are inadequate. Existing structure would require extensive repairs.

Alternative locations were reviewed but came with a much higher price due to the cost of purchase plus renovation. Approximately 12 locations were reviewed.

Project Schedule

Describe the project schedule and milestones. Include estimated start and end dates.

Milestone/Phase Name	Estimated Start - Completion Date
Planning/Design	2019 Q1 – 2019 Q3
2019 Construction – Phase 1	2019 Q4 – 2020 Q1
2020 Construction – Phase 2	2020 Q2– 2020 Q3
Move In	2020 Q4

Regulatory Approvals

N/A

Risks and Risk Mitigation Plans

Describe the applicable risks and associated risk mitigation plans: e.g., construction, customer, reputational, schedule, financial, regulatory, environmental, safety and IT risks. Indicate discussions with relevant subject matter experts.

Project is budgeted in the 2019 REPM budget and will continue into 2020 REPM budget.

References (*additional supporting documentation*)

N/A

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--008 **Page 1 of 1**

Request from: Department of Energy

Witness: Plante, David L

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.
Emerald Street Substation No. A14W01

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-8 for the PAF for this project.

Supplement Request Form

Approved at May 03, 2019 EPAC

Link to Meeting Minutes

Date Prepared: April 17, 2019	**Project Title: Emerald Street Substation Rebuild**
Company/Companies: Eversource NH	**Project ID Number: A14W01**
Organization: NH Operations	**Plant Class / (F.P. Type): Distribution Substation**
Project Initiator: Thelma Brown	**Project Type: Specific**
Project Manager: Alan Roe	**Capital Investment Part of Original Operating Plan? Y**
Project Sponsor: John Zicko	**O&M Expenses Part of the Original Operating Plan? N/A**
Current Authorized Amount: $11,011K	**Estimated in service date(s): December 31, 2020**
Supplement Request: $5,824K	**PAC: Not Required**
Total Request: $16,835K	**TCA: Not Required**

Supplemental Justification

Distribution Project

In September 2014, TPS-14-165-NH was approved for the construction of a new North Keene substation and the rebuild of Emerald Street substation in Keene, NH. North Keene substation was placed in service in October 2016. TAF # NH-160001-TDS Rev. 0 requested $1,000K for preliminary engineering to rebuild the Emerald Street substation and was approved in PowerPlan on December 19, 2016. A PAF for equipment purchase and additional approved engineering was approved $5.3M in PowerPlan on June 5, 2017. A PAF for full funding for the Distribution portion of the Emerald Street rebuild project was approved in PowerPlan on December 12, 2017 for the current authorized amount of $11,011K.

The original Distribution scope of work, which has not significantly changed, includes the removal of (4) four (of five) transformers, the installation of (2) two new 115/12.47kV transformers, the removal of the existing 12.47kV switchgear, and the installation of new metalclad switchgear along with new protection and control equipment.

Transmission Project

Approval to proceed with the Transmission portion of the rebuild of Emerald Street was provided in October 2017. $50K was approved for preliminary engineering for the Transmission portion of the project to rebuild the Emerald Street substation on February 14, 2017. On April 25, 2018, the PAF for full funding for the Emerald Street rebuild project was approved at EPAC. The project was approved in PowerPlan on June 14, 2018 for the current authorized amount of $1,664K.

The original Transmission scope of work included the installation of three (3) 115kV CCVTs, the replacement of the existing primary bus differential relay, and the addition of a secondary bus differential relay.

In October 2018, it was proposed to expand the scope of the project to include the replacement of several obsolete relays and to add a single 115kV line tie circuit breaker. The relays were added to the scope because the Emerald Street 115kV protection scheme includes several

electromechanical relays identified as obsolete by the Eversource Asset Strategy Program for protective relays (RF-AS-9017, Rev. 3). Additionally, the 115kV bus protection and breaker failure schemes are a legacy design that do not meet the current standard.

The addition of a single 115kV line tie was proposed because during the development of the construction outage sequence, the Electric System Control Center (ESCC) highlighted the risk of unacceptable loss of customer load for an N-1-1 contingency. To mitigate this risk, a sub-set of the project team from System Planning, Substation Engineering, Operations, and Project Management proposed a 115kV line tie between the A152 and D108 lines to address these SCLL issues. The permanent line tie circuit breaker replaces a temporary line tie circuit switch which was installed but subsequently removed.

When System Planning studies scheduled outages in the short-term, cascading load (offloading an affected area to increase local system capacity for restoration efforts) is acceptable as the review is of an N-1-1 scenario. Current system planning criteria for N-1 distribution studies does not allow cascading load transfers and directs system improvements based on system restrictions found. Restoration switching for contingencies during an Emerald Street Substation 115 kV Bus 2 outage was reviewed with and without cascading switching. When a planned outage occurs between Greggs and Emerald Street, the ESCC (Electric System Control Center) usually institutes some pre-contingent switching to reduce customer exposure. The following review looked at the system as-is without any pre-contingent switching.

Greggs F162 Contingency – 36,952 customers affected (84 MW)

Loss of Weare, Jackman, North Keene, and Emerald Street 115 kV Bus 1

Cascading load not allowed: All customers can be restored during every season except summer (June-early September) (ISO loading at or less than 17,500 MW) with at most 25 switching actions. At summer peak, approximately 7,983 customers would remain without power.

Cascading load allowed: Due to line overloads and system voltage below limits, cascading load does not provide additional benefit.

Vernon K186/N186 Contingency – 10,267 customers affected (24 MW)

Loss of Chestnut Hill and Swanzey

Cascading load not allowed: All customers fed from Swanzey can be restored with at most 4 switching actions during summer peak load levels. However, due to Chestnut Hill's location, it does not have any 34.5 kV circuit ties to other sources. 6,878 customers would remain without power.

Cascading load allowed: Chestnut Hill remaining isolated is a transmission source issue. The ability to cascade load or not does not apply to this contingency scenario.

Monadnock T198 Contingency – 3,449 customers affected (25 MW)

Loss of Emerald Street 115 kV Bus 3

Cascading load not allowed: With not all breakers at Emerald Street having SCADA control, 1,771 customers cannot be restored until manual switching at Emerald Street is performed. With manual switching, all customers can be restored following loss of the T198 source to 115 kV Bus 3.

Cascading load allowed: The lack of SCADA control on the W2A and W9A reclosers at Emerald Street Substation prohibit full restoration of all customers. Being able to cascade load would bear no impact on this issue.

To address the above findings, it is proposed to continue with the Distribution project as planned based on the approved PAF dated 9/25/17. The scope of the Transmission project would be expanded to add a 115kV circuit breaker tie between the A152 and D108 lines plus two additional circuit breakers added in the 115kV bus to replace existing switches. These two bus tie breakers will be operated via SCADA for switching operations only and will not be tied into the existing bus protection systems. The addition of 115kV bus tie breakers at the Keene substation improves customer reliability and ease of maintenance. For any single bus contingency, all customers can be restored via SCADA switching within 5 minutes. Without bus tie breakers, the single bus SCLL strands approximately 2500 customers due to distribution limitations. Ease of maintenance is increased when a bus section is required OOS. Without bus tie breakers, removing a section of bus from service requires offloading multiple transformers. The revised scope was approved by the chair of the Solution Design Committee on March 26, 2019.

While the addition of the proposed 115kV line tie will only be used during construction and for maintenance, ISO-NE will require a new I.3.9 submission. This has been discussed with ISO-NE and no issues are anticipated. The additional bus tie breakers will not be provided with protective relaying and therefore create no new contingencies. As such an I.3.9 submission is not required for the bus tie addition. All work at Emerald Street is classed as Local and no TCA is required.

A supplemental request for an additional $3,930K for a total request of $5,594K for the Transmission portion of the Emerald Street project accompanies this document. The scope of work for the Transmission project now includes the installation of three (3) 115kV CCVTs and a second 115kV bus differential relay, the replacement of the existing 115kV bus differential relay, the replacement of various obsolete relays and the installation of three (3) 115kV circuit breakers, associated disconnects and protection and control equipment.

The operational requirement for the line and bus tie breakers increased the cost of the Transmission project. It also impacted the cost of the Distribution project because it requires the creation of multiple engineering drawing packages and extends the duration of the project.

Project Status

As of the end of March 2019, the project has invested $6,082K with additional commitments of $2,500K for work done but not yet invoiced. Commitments include $1,061K for remaining switchgear payments due in April 2019. Total spend to-date plus commitments is approximately $8,582K out of $11,011K authorized.

Civil and electrical IFC drawings have been issued to the Contractor and construction started on January 7, 2019. The new switchgear arrived on site on April 10, 2019 and the two (2) replacement transformers have been delivered to the site.

This supplement requests approval of $5,824K for a total request of $16,835K, an increase of 46% over the current authorized amount. The primary driver for the additional cost is due to unforeseen construction costs, the need to split the P&C drawings into several phases due to an extended outage schedule and associated additional labor costs due to a longer construction schedule. The details for the increase are explained below.

Cumulative effect of Changes since September 2017

Justification for Additional Resources

The reasons for the project authorization supplement of $5,824K are summarized below:

1) **Company Labor ($202K):** The original construction schedule was based on an in-service date of December 2018. With the requirement to construct a new 115kV line tie for the transmission portion of the project, the project duration has increased and the final in-service date for the Distribution portion of the project is now December 2020. The longer construction schedule increases the amount of time needed for Construction supervision and safety coverage. It also increases the amount of Engineering time needed to review and comment on multiple drawing packages.

2) **Project Management ($62K):** The estimate for Project Management services in September 2017 was based on the hours needed to complete the project in December 2018. Because the Transmission portion of the project scope has expanded, the construction sequence for the Distribution portion of the project was extended until December 2018**.** The forecasted PM costs have increased from $125K to $187K.

3) **Engineering ($299K)**: The estimate for Engineering design has increased from $460K to $759K due to the need to generate multiple IFC drawing packages associated with the phased approach needed to incorporate the 115kV line tie into the overall project scope. Initially a single construction sequence was envisaged which only required one-set of P&C drawings. Because it was not operationally acceptable to take 115kV Bus 1 and Bus 2 outages, an additional 115kV line tie breaker is needed. This work will create a significant break in the schedule and requires multiple sets of P&C drawings. The original scope of work for the engineering design vendor did not include these multiple drawing revisions. In addition, due to the location of abandoned cables a duct bank design needed to be revised. Other unforeseen changes include:

    - Eversource contracted Leidos Engineering to provide the engineering design for the Emerald Street rebuild project. This included all engineering to interface with the AZZ metal clad switchgear design. As the project developed, it became clear that fifty-two drawings beyond those originally provided to AZZ would need to be

updated by Leidos to allow AZZ to develop their design. This work was outside of Leidos' original scope.

- VHB was contracted to provide the site plans for the project, but the detailed design of the fence and additional retaining wall was not included in either VHBs or Leidos' scope of work. It was agreed to request Leidos to incorporate this into their contract as they had all the site civil drawings under their control.
- Eversource provided AZZ with conceptual P&C application diagrams as part of the bid specification. The intention was that AZZ would take the application drawings provided by Leidos and complete them as part of their scope. However, AZZ did not have the capability to update the application diagrams and Leidos was requested to complete the application drawings. Prior to final payment we will request AZZ credit the cost of completing these drawings.

The estimate for Engineering has also been increased to meet the request for the P&C Engineers on the project team to bring an Owner's Engineer on to the project to review P&C designs.

4) **Construction ($2,434K):** In the September 2017 PAF, the forecasted cost for construction was estimated at $2,379K. The contracted price was higher than forecast due to the complexity of the construction sequence and several unforeseen items that were not captured in the original construction contract scope of work, including:

- Additional exploratory vacuum excavation was required to safely locate live 12.47kV cables and abandoned power and control cables near a proposed new duct bank;
- Winter work caused by delaying the start of construction from September 2018 to January 2019. The delay was required due to internal budget constraints;
- Installation of temporary services for the switchgear and transformers. To test and commission the new switchgear, a temporary service is needed to provide light, HVAC and to power the battery chargers. To prevent damage due to moisture, temporary power to the four heaters in each of the two new transformers is required;
- Additional grounding needed outside the substation fence to avoid potential step and touch issues;
- Because the construction contract was issued using 70% design documents, there was an adjustment to the quantity of materials between the drawings issued for bidding and the final issued for construction drawings. The additional materials also require additional labor for installation;
- Ground heating for soil sampling. The number and location of soil samples for pre-characterization were based on the 70% design drawings and estimated foundation depths. Once detailed foundation drawings were issued, and additional foundations were identified for the line and bus tie breakers, additional samples were needed. Because of the schedule it was necessary to heat frozen ground so that the samples could be taken prior to excavation and soil removal;

- Soil Management & Disposal – during project development, contaminated soils were confirmed relative to planned excavations which increased forecasted soil management and disposal costs. $134K was previously budgeted for soil management; however, this forecast has since been increased to $190K for the preparation of the soil management plan, site inspections during construction and disposal of contaminated soils. Additional contaminants and hazardous materials on site that have been or are expected to be removed or remediated include: Transite pipe, asbestos sheets, asbestos coated wiring, abandoned lead sheathed cable and petroleum contaminated groundwater;
- Lifting & handling – the two transformers were delivered in March 2018 based on the originally planned in-service date of December 2018. With the overall schedule delays the transformers will have to be stored temporarily and moved a second time. The cost to move the new transformers a second time was not anticipated in September 2017. Based on proposals received, $222K is included in the current forecast to move the new transformers from their temporary storage position to their permanent location. This forecast also includes the cost to remove the old transformers and switchgear prior to scrapping; and
- Permitting support – the cost to support the development of the site plans has increased from an estimated $50K in September 2017 to $115K. The increase is due to the addition of a pre-construction sound survey, a ground penetrating radar survey and additional design for the proposed retaining wall. Permitting also includes weekly environmental compliance monitoring during construction which is required to ensure the Contractor is complying with all mandatory environmental legislation and permit requirements. Incremental request $65K.

The current construction forecast also includes $250K for potential future change orders, final landscaping, control building renovations, paving and potential de-watering.

5) **Testing ($1,276K):** The cut-over schedule currently has more than 50 weeks of back-to-back outages which is longer than previously indicated in the schedule issued for bidding purposes. Additionally, the P&C engineering team proposed the use of a load bank to test the polarity and ratio of the current transformers prior to in-service load testing. The rental of the load bank adds to the testing costs and was not anticipated in September 2017. The role of the testing contractor has expanded in recent years, which although reduced the number of unwanted trips, it has resulted in the cost for testing services increasing beyond those anticipated in September 2017.

6) **Commissioning ($351K):** With the complexity of the cut-over sequence, the services of a Lead Commissioning Engineer (LCE) were secured early to assist with construction sequencing, reviewing design documents to ensure constructability, identifying the outage requirements and reviewing testing plans, etc. Bringing the LCE on to the project much earlier in the sequence was not anticipated in the September 2017 PAF. The current forecast has been increased to $601K to cover LCE support prior to construction and during the construction, testing and commissioning phase.

7) **Material (-$1,025K):** The September 2017 forecast for materials was high. There are small increases in the switchgear and transformer costs compared to the 2017 forecast, but these increases are offset by reductions in cable costs and other miscellaneous material cost reductions. Because of the delays to the project, the new transformers have been filled with oil temporarily which incurred an additional $66K for oil and labor.

8) **Removal ($161K):** Since September 2017, the estimate for removal costs has increased to better reflect the amount of material to be removed (switchgear, steelwork, redundant wood poles, transformers and associated oil removal). The original forecast also included a credit of $50K for investment recovery which is no longer anticipated. It is likely to cost more to scrap all the materials than we would recover from salvage costs.

9) **Miscellaneous (-$33K):** The September 2017 forecast included $206K for miscellaneous project charges including employee expenses (accommodation, meals, etc.). The miscellaneous forecast has been reduced at this stage.

10) **Property Tax ($444K):** In September 2017 property taxes were not included in the project estimate. To date, the project has incurred $174K in property taxes with a further $270K estimated through November 2020.

Total incremental request for direct costs **$4,171K**

11) **Indirect costs ($1,455K):** In the September 2017 PAF, indirect costs were forecasted to be $1,824K. To date, the project has incurred $1,709K in adders and is expected to incur an additional $1,570K to the end of the project. The indirect cost increase is primarily driven by the increase in direct costs.

12) **AFUDC ($199K):** In the September 2017 PAF, AFUDC charges for the project were originally estimated at $174K. Actual AFUDC charges incurred to date are $55K with an additional $318K forecast for the remainder of the project.

Total incremental request for indirect costs **$1,654K**, resulting in an overall Supplement Request of **$5,824K**.

Please see the previously authorized documents attached.

Supplement Cost Breakdown (Local Costs)

Note: Dollar values are in thousands:

Line item Category	Original Estimate ($K)	New Estimate ($K)	Variance ($K)
1) Internal Labor	128	330	202
2) Project Management	125	187	62
3) Engineering	460	759	299
4) Construction	2,379	4,813	2,434
5) Testing	250	1,526	1,276
6) Commissioning	250	601	351
7) Material	4,829	3,804	(1,025)
8) Removal	385	546	161
9) Miscellaneous	206	173	(33)
10) Property taxes	0	444	444
Total Directs	**9,012**	**13,183**	**4,171**
11) Indirect	1,824	3,279	1,455
12) AFUDC	174	373	199
Total Indirect	**1,998**	**3,652**	**1,654**
Total ($K rounded)	**11,011**	**16,835**	**5,824**

Supplement Cost Summary (Local Costs)

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$8,628	$4,009	$12,637
Less Customer Contribution	$0	$0	$0
Removals net of Salvage ____%	$385	$161	$546
Total Direct Spending	$9,013	$4,170	$13,183
Capital Additions - Indirect	$1,824	$1,455	$3,279
AFUDC	$174	$199	$373
Total Capital Request	$11,011	$5,824	$16,835
O&M	$0	$0	$0
Total Request	**$11,011**	**$5,824**	**$16,835**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

Request by Year	Year 2019	Year 2020	Total
Capital Additions - Direct	$2,000	$2,009	$4,009
Less Customer Contribution	$0	$0	$0
Removals net of Salvage ____%	$0	$161	$161
Total Direct Spending	$2,000	$2,170	$4,170
Capital Additions - Indirect	$728	$727	$1,455
AFUDC	$100	$99	$199
Total Capital Request	$2,828	$2,996	$5,824
O&M	$0	$0	$0
Total Request	**$2,828**	**$2,996**	**$5,824**

Operations Project Authorization Form

Date Prepared: **09/25/17**	Project Title: **Emerald Street**
Company/ies: **Eversource NH**	Project ID Number: **A14W01 (D) & T1347A (T)**
Organization: **NH Operations**	Class(es) of Plant: **Distribution & Transmission**
Project Initiator: **Charles Christensen, PE**	Project Category: **Substation**
Project Manager: **Alan Roe**	Project Type: ***Specific***
Project Sponsor: **James Eilenberger**	Project Purpose: **Replace obsolete equipment**
Estimated in service date: **12/31/18**	If Transmission Project: **Non-PTF**
Eng. /Constr. Resources Budgeted? **Yes**	Capital Investment Part of Original Operating Plan? **Yes**
	O&M Expenses Part of the Original Operating Plan? **No**

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Subsidiary Board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

The project scope includes

1) Removing four (4) 115-12.47kV transformers (TB3 will remain)
2) Removing existing 15kV switchgear and associated equipment
3) Install two (2) new 115-12.47kV 30MVA transformers
4) Install nine (9) 115kV CCVTs
5) Install new 15kV switchgear with integral control room and associated systems
6) Adding a second 115kV bus differential protection
7) Replacing obsolete and non-standard 115kV relaying

The joint T&D TAF for this project was approved at the 11/19/16 Technical Review Committee. That approval allowed engineering design to proceed at a cost of $1,000k split $950k (D) and $50k (T).

An initial PAF document was subsequently approved on 03/09/17 for an additional $4,300k to proceed with ordering long lead time materials (transformers and 15kV metal clad switchgear). The Distribution authorized amount was increased from $950k to $5,250k and the Transmission authorized amount remained at $50k.

This PAF now requests full funding of $12,400k (T - $1,400k D - $11,000k) for the project based on known commitments for engineering, Eversource supplied material and firm pricing for the 15kV switchgear. It includes estimates for civil, electrical / P&C construction and Vendor supplied materials. Contingency amounts of $244k and $100k are included in the D & T estimates respectively. The $12,400k estimate is inside the +/-25% of the approved TAF of $10,000k ($7,500 - $12,500).

Since the original TAF, Transmission P&C Engineering has recommended the replacement of several obsolete and non-standard relays at an estimated cost of $750,000. Recommended relay replacements are:

- T1980 breaker failure system: 50/62/BF-T1980: SEL-501 (non-standard breaker failure relay)
- A1520 breaker failure system: 50/BF-A1520: CHC electromechanical BF overcurrent relay; 62/BF-A1520: auxiliary BF timer
- T1980 reclosing system: 79/T1980: ACR electromechanical reclosing relay with 79Y
- A1520 reclosing system: 79/A1520: ACR electromechanical reclosing relay with 79Y
- Currently, all the 115kV breaker failure relays hit a single/shared 86/BF lockout, which is a legacy/non-standard scheme. P&C Engineering recommends replacement with individual lockout coils for each breaker failure relay to match current standards.
- T198 and A152 line relay POTT keying schemes are currently over leased phone lines (via RFL-9745) to Monadnock and Chestnut Hill, respectively. P&C Engineering and Telecommunications Engineering recommend transferring those schemes to the more reliable Eversource fiber.

Based on spend to date, the estimated cost to complete the Distribution portion of the project is $10,820k and $1,354k for Transmission.

Project Costs Summary

See APS3 and APS8 requirements and consult with Plant Accounting for capital/O&M determination. Use published loaders for benefits, materials, and invoices, maintained by the Director, Budget and Internal Reporting.
Note: Dollar values are in thousands

A14W01 *($k)*	Prior Authorized	2017	2018	Totals
Capital Additions - Direct	$12	$819	$7,797	$8,628
Less Customer Contribution	$0	$0	$0	$0
Removals net of Salvage %	$0	$0	$385	$385
Total – Direct Spending	$12	$819	$8,182	$9,013
Capital Additions – Indirect	$0	$197	$1,627	$1,824
Subtotal Request	$12	$1,016	$9,809	$10,837
AFUDC	$0	$3	$171	$174
Total Capital Request	$12	$1,019	$9,980	$11,011
O&M	$0	$0	$0	$0
Total Request	$12	$1,019	$9,980	$11,011

T1347A *($k)*	Prior Authorized	2017	2018	Totals
Capital Additions - Direct	$0	$86	$1,253	$1,339
Less Customer Contribution	$0	$0	$0	$0
Removals net of Salvage %	$0	$0	$60	$60
Total – Direct Spending	$0	$86	$1,313	$1,399
Capital Additions – Indirect	$0	$6	$12	$18
Subtotal Request	$0	$92	$1,325	$1,417
AFUDC	$0	$1	$8	$9
Total Capital Request	$0	$93	$1,333	$1,426
O&M	$0	$0	$0	$0
Total Request	$0	$93	$1,333	$1,426

Prior Distribution authorized amount is for $950k approved at TRC on 11/19/16.
An additional $4,300 for transformer and switchgear purchase was approved at CPAC on 03/09/17.

Prior Transmission authorized amount is $50k that was approved at TRC on 11/19/16.

Financial Evaluation

Provide the following financial information (attach additional detail if summarized items are significant or additional information is needed). Note: Dollar values are in thousands

Distribution Project (A14W01)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$1	$56	$81	$138
Overtime Labor	$0	$0	$0	$0
Outside Services	$11	$485	$2,969	$3,465
Materials	$0	$276	$4,553	$4,829
Other, including contingency amounts	$0	$2	$579	$581
Total	$12	$819	$8,182	$9,013

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$197	$1,627	$1,824
Capitalized interest or AFUDC, if any	$0	$3	$171	$174
Total	$0	$200	$1,798	$1,998

Total Capital Costs	$12	$1,019	$9,980	$11,011
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	**$12**	**$1,019**	**$9,980**	**$11,011**
Total O&M Project Costs	$0	$0	$0	$0

Transmission Project (T1347A)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$0	$8	$12	$20
Overtime Labor	$0	$0	$0	$0
Outside Services	$0	$77	$1,081	$1,158
Materials	$0	$0	$60	$60
Other, including contingency amounts	$0	$0	$160	$160
Total	$0	$85	$1,313	$1,398

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$6	$12	$18
Capitalized interest or AFUDC, if any	$0	$0	$8	$8
Total	$0	$6	$20	$26

Total Capital Costs	$0	$91	$1,333	$1,424
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	**$0**	**$91**	**$1,333**	**$1,424**
Total O&M Project Costs	$0	$0	$0	$0

- Straight time forecast is based on original project estimate.
- Outside services forecast is based on committed contracts (engineering and project management) plus forecast costs for civil, electrical / P&C construction and testing, etc.
- Material costs are based on $1,371k for transformer purchase plus $1,797k for 15kV switchgear. $1,738k for Eversource purchased materials and miscellaneous vendor supplied materials.

This is NOT a new customer project

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	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

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

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):

An ARO is a current legal obligation to remove or retire property, plant or equipment at some point in the future. Please refer to APS8 or contact Plant Accounting for further detail.

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. **Forecast includes $50k for soil disposal based on an assumption of 1,000 tons at $35/ton haulage and $10/ton disposal costs.**

Operations Project Authorization Form

Date Prepared: **09/25/17**	Project Title: **Emerald Street**
Company/ies: **Eversource NH**	Project ID Number: **A14W01 (D) & T1347A (T)**
Organization: **NH Operations**	Class(es) of Plant: **Distribution & Transmission**
Project Initiator: **Charles Christensen, PE**	Project Category: **Substation**
Project Manager: **Alan Roe**	Project Type: ***Specific***
Project Sponsor: **James Eilenberger**	Project Purpose: **Replace obsolete equipment**
Estimated in service date: **12/31/18**	If Transmission Project: **Non-PTF**
Eng. /Constr. Resources Budgeted? **Yes**	Capital Investment Part of Original Operating Plan? **Yes**
	O&M Expenses Part of the Original Operating Plan? **No**

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Subsidiary Board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

The project scope includes

1) Removing four (4) 115-12.47kV transformers (TB3 will remain)
2) Removing existing 15kV switchgear and associated equipment
3) Install two (2) new 115-12.47kV 30MVA transformers
4) Install nine (9) 115kV CCVTs
5) Install new 15kV switchgear with integral control room and associated systems
6) Adding a second 115kV bus differential protection
7) Replacing obsolete and non-standard 115kV relaying

The joint T&D TAF for this project was approved at the 11/19/16 Technical Review Committee. That approval allowed engineering design to proceed at a cost of $1,000k split $950k (D) and $50k (T).

An initial PAF document was subsequently approved on 03/09/17 for an additional $4,300k to proceed with ordering long lead time materials (transformers and 15kV metal clad switchgear). The Distribution authorized amount was increased from $950k to $5,250k and the Transmission authorized amount remained at $50k.

This PAF now requests full funding of $12,400k (T - $1,400k D - $11,000k) for the project based on known commitments for engineering, Eversource supplied material and firm pricing for the 15kV switchgear. It includes estimates for civil, electrical / P&C construction and Vendor supplied materials. Contingency amounts of $244k and $100k are included in the D & T estimates respectively. The $12,400k estimate is inside the +/-25% of the approved TAF of $10,000k ($7,500 - $12,500).

Since the original TAF, Transmission P&C Engineering has recommended the replacement of several obsolete and non-standard relays at an estimated cost of $750,000. Recommended relay replacements are:

- T1980 breaker failure system: 50/62/BF-T1980: SEL-501 (non-standard breaker failure relay)
- A1520 breaker failure system: 50/BF-A1520: CHC electromechanical BF overcurrent relay; 62/BF-A1520: auxiliary BF timer
- T1980 reclosing system: 79/T1980: ACR electromechanical reclosing relay with 79Y
- A1520 reclosing system: 79/A1520: ACR electromechanical reclosing relay with 79Y
- Currently, all the 115kV breaker failure relays hit a single/shared 86/BF lockout, which is a legacy/non-standard scheme. P&C Engineering recommends replacement with individual lockout coils for each breaker failure relay to match current standards.
- T198 and A152 line relay POTT keying schemes are currently over leased phone lines (via RFL-9745) to Monadnock and Chestnut Hill, respectively. P&C Engineering and Telecommunications Engineering recommend transferring those schemes to the more reliable Eversource fiber.

Based on spend to date, the estimated cost to complete the Distribution portion of the project is $10,820k and $1,354k for Transmission.

Project Costs Summary

See APS3 and APS8 requirements and consult with Plant Accounting for capital/O&M determination. Use published loaders for benefits, materials, and invoices, maintained by the Director, Budget and Internal Reporting.
Note: Dollar values are in thousands

A14W01 *($k)*	Prior Authorized	2017	2018	Totals
Capital Additions - Direct	$12	$819	$7,797	$8,628
Less Customer Contribution	$0	$0	$0	$0
Removals net of Salvage %	$0	$0	$385	$385
Total – Direct Spending	$12	$819	$8,182	$9,013
Capital Additions – Indirect	$0	$197	$1,627	$1,824
Subtotal Request	$12	$1,016	$9,809	$10,837
AFUDC	$0	$3	$171	$174
Total Capital Request	$12	$1,019	$9,980	$11,011
O&M	$0	$0	$0	$0
Total Request	$12	$1,019	$9,980	$11,011

T1347A *($k)*	Prior Authorized	2017	2018	Totals
Capital Additions - Direct	$0	$86	$1,253	$1,339
Less Customer Contribution	$0	$0	$0	$0
Removals net of Salvage %	$0	$0	$60	$60
Total – Direct Spending	$0	$86	$1,313	$1,399
Capital Additions – Indirect	$0	$6	$12	$18
Subtotal Request	$0	$92	$1,325	$1,417
AFUDC	$0	$1	$8	$9
Total Capital Request	$0	$93	$1,333	$1,426
O&M	$0	$0	$0	$0
Total Request	$0	$93	$1,333	$1,426

Prior Distribution authorized amount is for $950k approved at TRC on 11/19/16.
An additional $4,300 for transformer and switchgear purchase was approved at CPAC on 03/09/17.

Prior Transmission authorized amount is $50k that was approved at TRC on 11/19/16.

Financial Evaluation

Provide the following financial information (attach additional detail if summarized items are significant or additional information is needed). Note: Dollar values are in thousands

Distribution Project (A14W01)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$1	$56	$81	$138
Overtime Labor	$0	$0	$0	$0
Outside Services	$11	$485	$2,969	$3,465
Materials	$0	$276	$4,553	$4,829
Other, including contingency amounts	$0	$2	$579	$581
Total	$12	$819	$8,182	$9,013

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$197	$1,627	$1,824
Capitalized interest or AFUDC, if any	$0	$3	$171	$174
Total	$0	$200	$1,798	$1,998

Total Capital Costs	$12	$1,019	$9,980	$11,011
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	**$12**	**$1,019**	**$9,980**	**$11,011**
Total O&M Project Costs	$0	$0	$0	$0

Transmission Project (T1347A)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$0	$8	$12	$20
Overtime Labor	$0	$0	$0	$0
Outside Services	$0	$77	$1,081	$1,158
Materials	$0	$0	$60	$60
Other, including contingency amounts	$0	$0	$160	$160
Total	$0	$85	$1,313	$1,398

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$6	$12	$18
Capitalized interest or AFUDC, if any	$0	$0	$8	$8
Total	$0	$6	$20	$26

Total Capital Costs	$0	$91	$1,333	$1,424
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	**$0**	**$91**	**$1,333**	**$1,424**
Total O&M Project Costs	$0	$0	$0	$0

- Straight time forecast is based on original project estimate.
- Outside services forecast is based on committed contracts (engineering and project management) plus forecast costs for civil, electrical / P&C construction and testing, etc.
- Material costs are based on $1,371k for transformer purchase plus $1,797k for 15kV switchgear. $1,738k for Eversource purchased materials and miscellaneous vendor supplied materials.

This is NOT a new customer project

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	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

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

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):

An ARO is a current legal obligation to remove or retire property, plant or equipment at some point in the future. Please refer to APS8 or contact Plant Accounting for further detail.

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. **Forecast includes $50k for soil disposal based on an assumption of 1,000 tons at $35/ton haulage and $10/ton disposal costs.**

Operations Project Authorization Form

TAF # NH-160001-TDS

Date Prepared: March 10, 2017	Project Title: Emerald Street SS Rebuild
Company/ies: Eversource NH	Project ID Number: A14W01 (D) & T1347A (T)
Organization: NH Operations	Class(es) of Plant: Distribution & Transmission
Project Initiator: Charles Christensen, PE	Project Category: Substation
Project Manager: Thelma Brown	Project Type: *Specific*
Project Sponsor: James Eilenberger	Project Purpose: part of regulatory tracked program? N
Estimated in service date: December 31, 2018	If Transmission Project: Non-PTF
Eng. /Constr. Resources Budgeted? Yes	Capital Investment Part of Original Operating Plan? Yes
	O&M Expenses Part of the Original Operating Plan? NA

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Subsidiary Board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project is currently approved for $1,000,000 for engineering (see attached TAF). The approval for the transformers and switchgear in addition to the engineering previously approved adds up to the request for a total of $5,300,000 for this project.

This PAF is a request for approval to place long lead-time materials on order for the Emerald Street SS rebuild project. This request includes material funding of $4,300,000 for:

> Two 30MVA 115-12.47kV transformers. Transformers are estimated at $900,000 each for a total of $1,800,000. The lead time for transformers is approximately 52 weeks. The transformer needs to be delivered to the project in Q2 2018.
>
> 12.47kV Metalclad switchgear including fifteen (15) breakers and a control house enclosure. This switchgear is estimated at $2,500,000. The lead time for switchgear is approximately 52 weeks. The switchgear needs to be delivered to the project in Q2 2018.

This project is for the rebuild of the existing substation. Much of the equipment at Emerald Street substation is more than 50 years old. There are five 115-12.47kV transformers feeding the 15kV switchgear which was installed around 1949. There are issues with equipment condition, fault duty, and flooding at the site that will be addressed with this project.

The risk in procuring the transformers if the project does not go forward is limited. This transformer is the standard voltage used in the western part of the Eversource NH system. If this project is not approved the

transformers will become system spares and be available for replacement of a failed unit. There are currently 7 of these units in-service including the 5 at Emerald Street SS. In the event it is decided to cancel the order within 20 weeks of placing it, the risk is a partial cost of the transformers. Below is a typical cancellation schedule for a recent transformer purchase.

Cancellation Schedule

The Purchaser may cancel order only upon written notice and upon payment to the Seller of reasonable and proper cancellation charges. These charges will be based on the following schedule unless separate written agreement is made with Seller:
Time frame is from PO date or letter of Intent date.

0	to	10 weeks	20% of the transformer Selling price
>10	to	20 weeks	80% of the transformer Selling price
>20	to	30 weeks	100% of the transformer Selling price

The risk in procuring the switchgear if the project does not go forward is substantial. There may be cancellation policies that can be negotiated but it is recognized that the approval to procure the switchgear should indicate a preference for the project to go forward, although it could be delayed due to funding in 2018 which would push the in-service date out. A $250,000 deposit payment on the switchgear is due in 2017.

Project Costs Summary

Note: Dollar values are in thousands

Distribution Project A14W01

	Prior Authorized	2017	2018	2020+	Totals
Capital Additions - Direct	$ 860	$ 250	$ 4,050	$ -	$ 5,160
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage %	-	-	-	-	-
Total - Direct Spending	$ 860	$ 250	$ 4,050	$ -	$ 5,160
Capital Additions - Indirect	130	-	-	-	130
Subtotal Request	$ 990	$ 250	$ 4,050	$ -	$ 5,290
AFUDC	10	-	-	-	10
Total Capital Request	$ 1,000	$ 250	$ 4,050	$ -	$ 5,300
O&M	-	-	-	-	-
Total Request	$ 1,000	$ 250	$ 4,050	$ -	$ 5,300

Transmission Project T1347A

	Prior Authorized	2017	2018	2020+	Totals
Capital Additions - Direct	$ 45	$ -	$ -	$ -	$ 45
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage %	-	-	-	-	-
Total - Direct Spending	$ 45	$ -	$ -	$ -	$ 45
Capital Additions - Indirect	5	-	-	-	5
Subtotal Request	$ 50	$ -	$ -	$ -	$ 50
AFUDC	-	-	-	-	-
Total Capital Request	$ 50	$ -	$ -	$ -	$ 50
O&M	-	-	-	-	-
Total Request	$ 50	$ -	$ -	$ -	$ 50

Financial Evaluation

Provide the following financial information (attach additional detail if summarized items are significant or additional information is needed). Note: Dollar values are in thousands

Distribution Project A14W01

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	60			60
Overtime Labor				
Outside Services	800			800
Materials	250	4,050		4,300
Other, including contingency amounts (describe)				
Total	1,110	4,050		5,160

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	130			130
Capitalized interest or AFUDC, if any	10			10
Total	140			140

Total Capital Costs	1,250	4,050		5,300
Less Total Customer Contribution				
Total Capital Project Costs	1,250	4,050		5,300
Total O&M Project Costs				

Transmission Project T1347A

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	5			5
Overtime Labor				
Outside Services	40			40
Materials				
Other, including contingency amounts (describe)				
Total	45			45

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	4			4
Capitalized interest or AFUDC, if any	1			1
Total	5			5

Total Capital Costs	50			50
Less Total Customer Contribution				
Total Capital Project Costs	50			50
Total O&M Project Costs				

Note: Explain unique payment provisions, if applicable

Future Financial Impacts:

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

Future Costs	Year 2017	Year 2018	Year20__	Year 20__+	Total Future Project Costs
Capital	$ 1,000	$ 9,000	$ -	$ -	$ 10,000
O&M	-	-	-	-	-
Other	-	-	-	-	-
TOTAL	**$ 1,000**	**$ 9,000**	**$ -**	**$ -**	**$ 10,000**

Total distribution cost of the project is estimated to be $10,000,000. This is proposed for 2018 construction.

What functional area(s) will these future costs be funded in?___NH Operations___
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:

This project is to replace aging equipment and address operational concerns with the existing substation.

What functional area(s) will these benefits be reflected in?_____NH Operations_____

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):

An ARO is a current legal obligation to remove or retire property, plant or equipment at some point in the future. Please refer to APS8 or contact Plant Accounting for further detail.

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.

This project is located at a former MPG site and handling of the subsurface materials during construction will need to be monitored. Formal cleanup of the site is complete but this needs to be considered for construction.

Technical Authorization Form

TAF # NH-160001-TDS Rev. 0

Date Prepared: November 18, 2016	Project Title: Emerald Street SS Rebuild
Company/ies: Eversource, NH	Project ID Number: A14W01 (D) & T1347A (T)
Organization: NH Operations	Class(es) of Plant: Distribution & Transmission
Project Initiator: Charles Christensen, PE	Project Category: Substation
Project Owner/Manager: Thelma Brown	Project Type: *Specific*
Project Sponsor: James Eilenberger	Project Purpose: part of regulatory tracked program? No
Estimated in service date: December 31, 2018	If Transmission Project: *Non-PTF*
Authorization Type: *Conceptual Engineering*	Authorization Amount: $1,000,000 for Engineering

Project Need Statement *(Description of Issue)*

In 2012 an area study was performed to determine how to best address the area loading and retirement of equipment at the Emerald Street SS. The study recommended two substation projects to replace the existing equipment currently concentrated at the Emerald Street SS in Keene: 1) a new 115-12.47kV substation in the north section of Keene; and 2) a new/rebuilt 115-12.47kV substation on Emerald Street, at the site of the existing substation. This approach places sources closer to the load, addresses aging and overduty equipment, and provides two separate electrical sources to the area.

In November 2016 the North Keene SS was put in-service. This TAF is for the second phase of the 2012 solution, a project which will replace and/or rebuild the existing Emerald Street SS in Keene.

Project Objectives

1. Retire aging infrastructure.

Much of the equipment at Emerald Street substation is more than 50 years old. There are five 115-12.47kV transformers feeding the 15kV switchgear which was installed around 1949.

The testing and maintenance on the transformers has identified that the 47 year old TB-12 is in the worst shape of the transformers with degraded oil and it is recommended that the transformer be reconditioned or replaced. Three of the transformers are more than 50 years old.

Besides the age and condition of the 67 year old switchgear, there is a concern about the fault duty of the equipment. Operating in the normal , the bus 1 and bus 2 switchgear breakers are at 85.40% to 98.62% of their interrupting rating. Because of the fault duty the bus tie breaker must remain open in the switchgear which limits loading on one bus for the failure of a single transformer.

2. Flood Mitigation

The Ashuelot River is near Emerald Street SS and has been identified as a flood threat. When there has been flooding in the Keene area the river level has come up to the south west corner of the substation but not actually flooded the yard. The 500 year flood plain does penetrate the south west corner of the substation. The plan to rebuild the substation will include grading and retaining walls to prevent potential flooding.

3. 115kV Bus Differential Protection

This project will include adding a 2nd 115kV bus differential protection to Emerald Street SS. Emerald Street Substation is classified as a NERC Bulk Electric System (BES) element and is subject to the maintenance and testing requirements outlined in NERC Standard PRC-005-2. This testing includes the trip testing of the 115kV bus differential protection scheme. The existing system lacks redundancy to

permit the triup testing without de-energizing the distribution load served by this substation. . The new construction includes adding the equipment and protection to eliminate this exposure to customers. This 2nd 115kV bus differential scheme installation was defined and approved in 2013 in accordance with the NERC Standard PRC-005-2 relay test requiremens for BES elements. The project was deferred to allow coordination with the proposed transformer changes.

Project Scope

1) Remove four (4) 115-12.47kV transformers (TB3 will remain)
2) Remove existing 15kV switchgear and associated equipment
3) Install two (2) 115-12.47kV 30MVA transformers
4) Install six (6) 115kV CCVTs
5) Install new switchgear with integral control room and associated systems
6) Install underground control cable raceway systems from the existing control house to new switchgear/control house
7) Install new fence and grounding
8) Regrade yard and install a retaining wall to address 500 year flood levels
9) Install yard lighting
10) Install CIP security measures including cameras
11) Protection and control system upgrades including 2nd 115kV bus differential scheme.
12) Install new batteries and monitoring system.

Background / Justification

In 2012 an area study was performed to determine how to best address the loading and retirement of equipment at the Emerald Street SS. The study recommended that two new 115 kV to 12.47 kV substations be built to replace the existing equipment currently concentrated at the Emerald Street SS in Keene: one in the North section of Keene; and one on Emerald Street, adjacent to the existing substation. This approach places sources closer to the load, reduces fault current, and provides two separately located electrical sources to the area.

In November 2016 the North Keene SS was put in-service. This TAF is for the second phase of the study, a project which will replace and/or rebuild the existing Emerald Street SS in Keene. In addition to providing for future peak load in the area, the transformation at Emerald Street SS will be sized to back up North Keene SS which currently has only one transformer but two express lines between the substations.

The switchgear was installed in 1949 and is 67 years old. The transformers were installed at different times and four of the five will be retired by this project:

Transformer	Size(MVA)	Age (yrs)
TB18	12.5	61
TB23	12.5	59
TB7	20	52
TB12	20	47
TB3	20	16 (to remain)

Three of the transformers are over 50 but TB12 condition is of the most concern. The oil fluid quality in the main tank of TB12 is wet, has poor dielectric strength, is dark in color and oxidized, and has low interfacial tension.

Emerald Street (Keene) Substation currently has five 115 kV to 12.47 kV transformers feeding three switchgear busses that cannot be tied together. There are operational issues with the switchgear which

limit the flexibility to use bus ties. Closing a bus tie breaker to put three or more transformers on the combined bus puts seven of eight feeder breakers well above their interrupting ability. This is a potential safety risk and limits the loadability and reliability of the substation. Additionally, there are many advantages to upgrading the relay protection as part of the project. In most cases, the existing relaying is as old as the switchgear being replaced, is inflexible as to settings, and gives no remote (or local) access to fault information for event investigation.

This project will include adding a 2nd 115kV bus differential protection to Emerald Street SS. This 2nd 115kV bus differential scheme installation was defined and approved in 2013 in accordance with the NERC Standard PRC-005-2 relay test requiremens for BES elements. The project was deferred to allow coordination with the proposed transformer changes.

Business Process and / or Technical Improvements:

This project addresses aging infrastructure, equipment fault duty, and flood mitigation. It is also a part of the overall area plan and strategy to provide a reliable backup to North Keene SS and provide for future growth.

Cost Estimate and Assumptions

The total price of this project is estimated to cost:

Distribution:	9,500,000
Transmission:	500,000
Total:	$10,000,000

($7,500,000 - $12,500,000) (-25% +25%)

Alternatives Considered with Cost Estimates

Note that this PAF addresses step two in the Alternative recommended in the 2012 Keene Area Study.

Alternative 1: Do nothing.
Emerald Street SS equipment is aging. By doing nothing there is more exposure to customer outages for failure of equipment. The failure of an existing transformer without the proposed 115kV differential system protection results in an outage for all customers fed from Emerald Street SS. Estimated cost for Alternative 1: $0.

Alternative 2: Install a second 115-12.47kV transformer at North Keene SS.
This solution will provide capacity and transformer redundancy at North Keene SS. However, as shown on Attachment A – All circuits were originally fed out of Emerald Street as a hub. North Keene bisects two of the circuits and provides a ROW backup feed to Emerald Street. While this could work load-wise it puts a majority of the circuits on two lines fed from Keene to Emerald Street which is much more exposure to line outages. This may require a switching station at Emerald Street, Keene, potentially switchgear. If this alternative was preferred, additional ROW lines and breakers from North Keene SS are recommended. Estimated cost for Alternative 2: $5,000,000

Alternative 3: Construct a new 115-12.47kV South Keene SS.
North Keene SS was constructed to feed the circuits to the north of Emerald Street SS. A second substation could be constructed south of Keene to address the load. Originally this solution was not preferred partially because of the difficulty of finding a location that is not within the 100 year flood plain. Estimated cost for Alternative 3: $15,000,000

Alternative 4: Construct the Emerald Street SS with one 115-12.47 transformer instead of two. This alternative will save approximately $1,000,000. It does remove a level of reliability from the solution. This also limits future growth. Between the North Keene SS and Emerald Street SS projects, the effective capacity in the Keene area will be reduced by 5MVA if a second transformer is not installed with this project. Estimated cost for Alternative 4: $9,000,000.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
TAF Approval	12/15/16
Scoping Document Development	12/31/16
Engineering & Design	9/1/17
PAF Approval	9/1/17
Construction	12/1/18
Substation tested, In-Service and Complete	12/1/18

Regulatory Approvals

ISO-NE Level 1 approval for the distribution transformer replacements will be required.

Permitting required by the City of Keene, the State of New Hampshire or US Regulatory Departments

Permitting for excavations on the site of a former MPG site.

Risks and Risk Mitigation Plans

The difficulty of constructing, in effect, around an active station. This will be mitigated by getting a thorough engineering design including identification of phasing for construction and a complete constructability reviews.

Outages cancelled due to unplanned events on the system resulting in schedule delay and potential labor cost to remobilize.

- Mitigation Plan - Establish and manage outages using proven coordination teams; 1) Construction Management 2) Coordination Meetings 3) Outage Planning and Risk Mitigation Meeting 4) Utilization of the circuit ties to North Keene Substation and 5) Deploying a mobile substation (MX66 – CL&P mobile) as required.

Internal and external resource availability for engineering.

- Effort is being exerted to balance engineering and review work between internal resources and external resources.

- Lack of sufficient, qualified, local construction labor results in the need to import labor which potentially increases costs or lengthen the schedule which will result in project delays.
    - Develop overall strategy for construction allocation.

References

Keene Area Study Report

Scope Document

One-Line Diagrams, Attachments, and Images

[ONE-LINE DIAGRAM REDACTED]

One-line - Removals

[ONE-LINE DIAGRAM REDACTED]

One-line - Additions

ATTACHMENT A - KEENE AREA CIRCUITS

[ONE-LINE DIAGRAM REDACTED]

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--009 **Page 1 of 1**

Request from: Department of Energy

Witness: Johnson, Russel D

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.
Replace 3891 Cable Nashua No. A20S12

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-9 for the PAF for this project.

EVERSOURCE
Request for Initial Funding

Initial Funding Request Form

Date Prepared: 05/13/2021	**Project Title: Replace 3891 Cable, Nashua**
Company/ies: Eversource NH	**Project Number: A20S12**
Organization: Electric System Operations	**Class(es) of Plant:** D Line
Project Initiator: E. A. Bradshaw	**Project Category:** Lines - General
Project Manager: G. R. Loura	**Project Type:** Specific
Project Sponsor: R. D. Johnson	**Project Purpose: Replace main line cable**
Estimated in service date: 12-1-21	**If Transmission Project** (check all that apply)**:**
Authorization Type: Initial Funding	**PTF** ☐ **Non-PTF** ☐
Total Request: $ 100,000	

Project Need Statement:

This project is for the replacement of 0.25 miles of 40 year old double runs of 34.5 kV 500 MCM aluminum cable and inaccessible riser poles along the railroad ROW with an extended underground so as to make the riser poles accessible and to permit the addition of Distribution Automation devices for sectionalization.

Project Objectives:

This work will take place in Nashua, NH. The new cable will extend an additional 250 feet on the Bridge Street Substation end to rise in an accessible location and a Distribution Automation device will be added for sectionalization. The Front Street Substation end of the 3891 cable will rise before it reaches the substation which will allow a Distribution Automation device to be installed between the new riser cable and the Front Street Substation bus.

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

This Initial Funding request is for $100,000 to perform preliminary actions necessary for the design of the line including easement research and drilling test pits to finalize cable, pole, and manhole locations. This design will be utilized to obtain construction bids which will be utilized for a full funding estimate.

EVERSOURCE
Request for Initial Funding

Preliminary Schedule:

Milestone/Phase Name	Estimated Date
Research easements	May 2021
Finalize route	June 2021
Finalize design	June 2021
Obtain line construction bids	July 2021
Request full funding	August 2021
Begin construction	September 2021

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 11/23/2021	**Project Title:** Replace 3891 Cable
Company: Eversource NH	**Project Number:** A20S12
Organization: Electric System Operations	**Class(es) of Plant:** D Line
Project Initiator: Ayush Oli	**Project Category:** Lines - Rebuild
Project Manager: George Loura	**Project Type:** Specific
Project Sponsor: Russel Johnson	**Project Purpose:** Reliability
Estimated in service date: 12/13/21	**Capital Investment part of original Oper. Plan:** Yes
Eng./Constr. Resources Budgeted? Yes	**O&M Expenses part of original Oper. Plan:** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request: $ 291,000	

Executive Summary

This funding request is for $291,000 to install a Distribution Automation device outside Front Street substation. It includes installation of a new manhole near Front Street substation to intercept the existing underground cable, a new riser pole outside the substation, and a Distribution Automation device for sectionalizing.

Proceeding with this portion of the scope at this time is beneficial since the DA device, which is part of the original scope, allows for the 40+ year old 3891 cable to be isolated from the Front Street bus and Front Street S/S to be re-energized via dispatcher action.

Initial funding of $100k was approved for 2021 of which $56k has already been spent. The $291k requested is for full funding for the project.

EVERSOURCE

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

Line item Category	Prior Authorized	Actuals to Date	2021	2022	2023	2024	2025	Total
1. ROW / Easements / Land Acquisition	$0	$0	$0	$0	$0	$0	$0	$0
2. Environmental Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0
3. Outreach	$0	$0	$0	$0	$0	$0	$0	$0
4. Siting Approvals / Permits	$0	$9	$0	$0	$0	$0	$0	$9
5. Engineering / Design	$100	$7	$57	$0	$0	$0	$0	$64
6. Materials (Eversource purchased)	$0	$18	$0	$0	$0	$0	$0	$18
7. Construction (incl matl's by contractors)	$0	$0	$116	$0	$0	$0	$0	$116
8. Testing / Commissioning	$0	$0	$1	$0	$0	$0	$0	$1
9. Project Mgmt Team	$0	$0	$0	$0	$0	$0	$0	$0
10. Removals	$0	$0	$0	$0	$0	$0	$0	$0
11. Other	$0	$0	$0	$0	$0	$0	$0	$0
12. Risks	$0	$0	$10	$0	$0	$0	$0	$10
SUBTOTAL DIRECTS W/ RISKS	$100	$34	$185	$0	$0	$0	$0	$319
13. Indirects/Overhead	$0	$22	$34	$0	$0	$0	$0	$56
14. AFUDC	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL – BASELINE BUDGET	$0	$56	$219	$0	$0	$0	$0	$275
15. Contingency	$0	$0	$16	$0	$0	$0	$0	$16
TOTAL CAPITAL REQUEST	$0	$56	$235	$0	$0	$0	$0	$291
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	$0	$56	$235	$0	$0	$0	$0	$291
O&M	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	$0	$56	$235	$0	$0	$0	$0	$291

Risk include charges for unknown conditions encountered during excavation.
Contingency include charges for unanticipated increased contract labor charges.

Construction charges were based on Maximo estimates, an estimate from the civil contractor, and current contractor rates.

EVERSOURCE

Breakout Costs

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2021	2022	2023	2024	2025	Total
ST Labor	$100	$0	$64	$0	$0	$0	$0	$64
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$126	$0	$0	$0	$0	$126
Materials*	$0	$0	$18	$0	$0	$0	$0	$18
Removals	$0	$0	$0	$0	$0	$0	$0	$0
Other	$0	$0	$27	$0	$0	$0	$0	$27
Indirects	$0	$0	$56	$0	$0	$0	$0	$56
AFUDC	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	$100	$0	$291	$0	$0	$0	$0	$291

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

EVERSOURCE
Project Authorization Form

Future Financial Impacts:

Provide below the estimated future costs that will result from the project: N/A
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: N/A
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: No.

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement

Adding a Distribution Automation device outside Front Street substation will enable sectionalizing 3891 underground cable to improve reliability. The portion of underground cable will be removed, replacing cable that has reached the end of its useful life with new overhead conductor.

Project Objectives

Currently, the 3891 underground cable rises inside Front St substation and connects to the substation bus directly. The funding for this project is to install a new riser pole outside Front Street substation and install a Distribution Automation device to have the ability to remotely sectionalize Front Street substation and the underground cable.

Project Scope

Install a new manhole to intercept the existing underground cable
Install new riser pole
Provide new overhead conductors from new riser pole into Front Street substation bus.
Install a Distribution Automation device between the new riser and Front Street substation bus on a new pole outside the substation fence
The old underground cable will be removed.

Background / Justification

In 2020 it was identified that the 3891 underground cable should be replaced and automation could be added to remotely sectionalize the cable. This project was initiated to design the new cable and perform easement research and drilling test pits to finalize cable, pole, and manhole location.

During the easement research issues were identified that will delay the replacement of the 3891 underground cable originally identified. The resolution of these issues may delay the project a few years.

This project is now proceeding to add the Distribution Automation and relocate the underground feed to Front Street substation to an overhead feed.

Business Process and / or Technical Improvements

The project provides isolation capability of the Front Street substation and the underground cable remotely which will allow for timely restoration to customers for improved reliability.

Alternatives Considered with Cost Estimates

EVERSOURCE
Project Authorization Form

An overhead option was considered instead of the complete 3891 cable replacement; however, City of Nashua would not allow overhead construction. Alternatives for the full 3891 underground cable replacement are currently being pursued. This project provides some of the reliability improvements originally envisioned.

Project Schedule

Milestone/Phase Name	Estimated Date
100% Engineering Completion	11/01/2021
Construction Start	11/29/2021
Testing/Commissioning	12/20/2021
In Service Date	12/20/2021

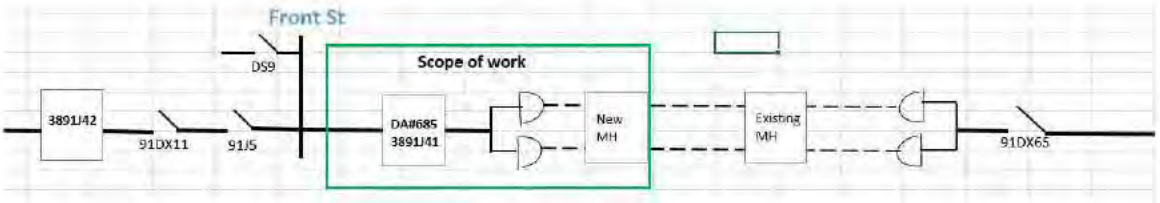
Regulatory Approvals
None

Risks and Risk Mitigation Plans
Risk includes unknowns encountered during underground excavation.

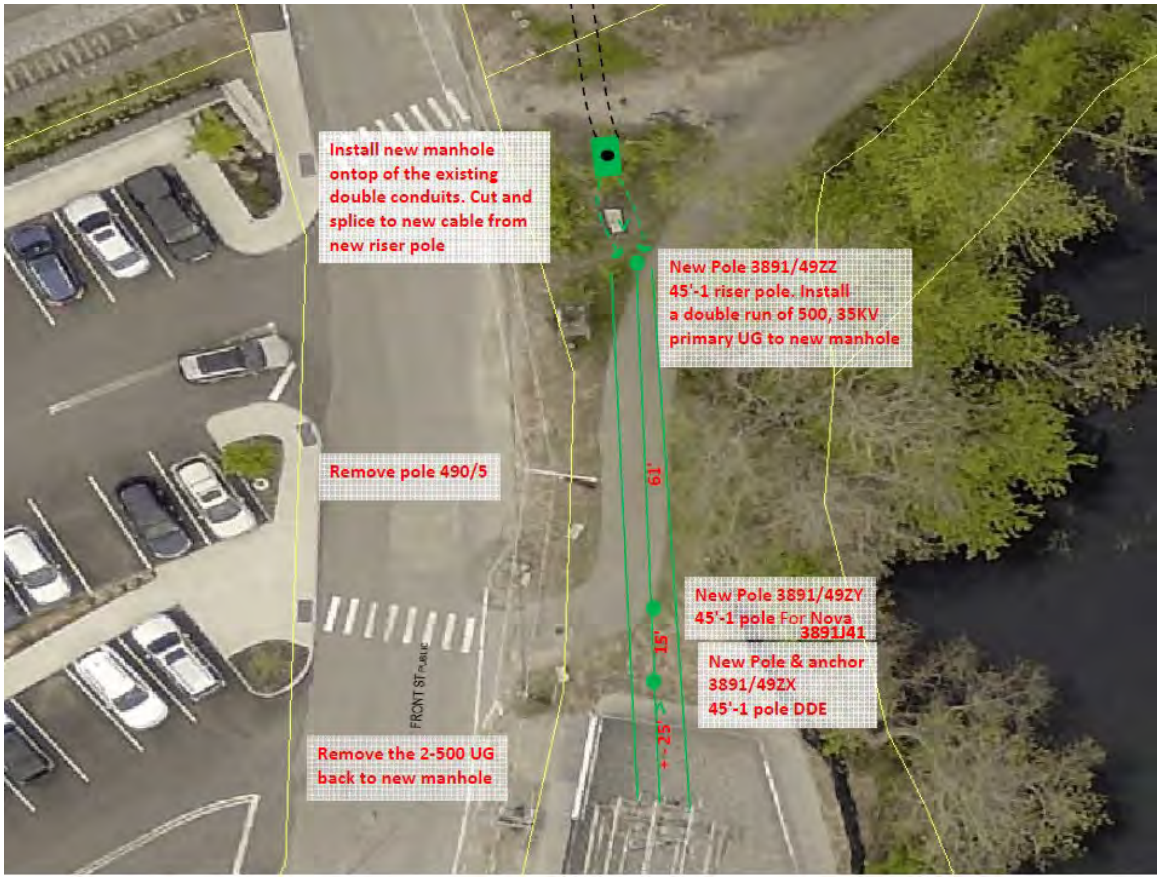
Contingency
Contingencies were added to address unanticipated increases in contract labor.

References
Project Authorization Form for initial funding attached.

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



EVERSOURCE
Project Authorization Form



EVERSOURCE
Project Authorization Form

Initial Funding Request Form

Date Prepared: 05/13/2021	**Project Title: Replace 3891 Cable, Nashua**
Company/ies: Eversource NH	**Project Number: A20S12**
Organization: Electric System Operations	**Class(es) of Plant:** D Line
Project Initiator: E. A. Bradshaw	**Project Category:** Lines - General
Project Manager: G. R. Loura	**Project Type:** Specific
Project Sponsor: R. D. Johnson	**Project Purpose: Replace main line cable**
Estimated in service date: 12-1-21	**If Transmission Project** (check all that apply)**:**
Authorization Type: Initial Funding	**PTF** ☐ **Non-PTF** ☐
Total Request: $ 100,000	

Project Need Statement:

This project is for the replacement of 0.25 miles of 40-year-old double runs of 34.5 kV 500 MCM aluminum cable and inaccessible riser poles along the railroad ROW with an extended underground to make the riser poles accessible and to permit the addition of Distribution Automation devices for sectionalization.

Project Objectives:

This work will take place in Nashua, NH. The new cable will extend an additional 250 feet on the Bridge Street Substation end to rise in an accessible location and a Distribution Automation device will be added for sectionalization. The Front Street Substation end of the 3891 cable will rise before it reaches the substation which will allow a Distribution Automation device to be installed between the new riser cable and the Front Street Substation bus.

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

This Initial Funding request is for $100,000 to perform preliminary actions necessary for the design of the line including easement research and drilling test pits to finalize cable, pole, and manhole locations. This design will be utilized to obtain construction bids which will be utilized for a full funding estimate.

EVERSOURCE
Project Authorization Form

Preliminary Schedule:

Milestone/Phase Name	Estimated Date
Research easements	May 2021
Finalize route	June 2021
Finalize design	June 2021
Obtain line construction bids	July 2021
Request full funding	August 2021
Begin construction	September 2021

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--010 **Page 1 of 1**

Request from: Department of Energy

Witness: Plante, David L

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.
Millyard SS Replacement No. A17S03

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-10 for the PAF for this project.

Operations Project Authorization Form

Approved at March 31, 2021 EPAC
Link to Meeting Minutes

Date Prepared: 03/04/2021	**Project Title: Millyard SS Replacement**
Company: Eversource NH	**Project Number: A17S03**
Organization: Electric System Operations	**Class(es) of Plant: D SS**
Project Initiator: Thelma Brown	**Project Category: Stations - Reconfiguration**
Project Manager: Walter Quinn	**Project Type: Specific**
Project Sponsor: Paul Melzen	**Project Purpose: Replace & Upgrade existing Millyard SS**
Estimated in service date: May 29, 2022	**Capital Investment part of original Oper. Plan: Yes**
Eng./Constr. Resources Budgeted? Yes	**O&M Expenses part of original Oper. Plan: N/A**
Authorization Type: Full Funding	**Facility Type (check all that apply):** ☐ **PTF** ☐ **non-PTF** ☒ **Distribution**
Total Request: $14.267M	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

The existing substation transformers are 68 and 71 years old and the switchgear is of the same vintage. Additionally, over the last few years 3 of the 6 circuit feeders have failed. The substation currently provides for 2,700 customers. Initial project funding of $1M was approved in PowerPlan on July 20, 2017 to begin engineering for site design, subdivision of City property, and acquisition of the property for the construction of a new Millyard substation in Nashua, NH. An additional request of $744K was requested and approved in PowerPlan on April 15, 2020 to progress engineering to Detailed Design for Civil, Electrical and P&C engineering. The only open item on design is the detailed P&C design development. The Detailed Design P&C package will be available April 2021. Full funding is required to issue Purchase Orders for the manufacturing of the transformers and the switchgear to ensure delivery by January 2022. Full funding is also required to procure a contractor to provide environmental clean-up of the new substation starting in May 2021 in preparation for construction to start in September 2021.

At the end of January 2021, the project has invested $1,702K. Categorically the funds to date have been to support conceptual design for site planning development, environmental investigation on two (2) parcels of land, IFC civil design, Detailed Design electrical design and Preliminary P&C design.

An environmental investigation has been completed, including test pit excavation with soil sampling and analysis. A final report with the results has been issued and costs associated with soil disposal is included in the full funding request.

The project requires seven (7) easement stakeholders to approve for the project to be constructed. Five (5) of the easement stakeholders are still pending with two (2) of the seven (7) stakeholders having accepted. The City of Nashua has submitted the updated easement package to the Board of Alderman for approval on March 17, 2021 – targeting May 14, 2021 for completion of the land swap with the City of Nashua, New Hampshire. Once the city approves their easements, the remaining easements will have been completed.

This Project Authorization Form (PAF) is requesting an additional $12.523M for a full funding total of $14.267M to complete the substation.

Project Costs Summary

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2021 to Go	2022	2023	2024	2025	2026	Total
1. ROW / Easements / Land Acquisition	$37	$ 37	$120	$0	$	$	$	$	$157
2. Environmental Approvals / Permits	$92	$92	$0	$0	$	$	$	$	$92
3. Outreach	$33	$33	$14	$16	$	$	$	$	$63
4. Siting Approvals / Permits	$122	$122	$20	$21	$	$	$	$	$163
5. Engineering / Design	$406	$367	$214	$35	$	$	$	$	$616
6. Materials (Eversource purchased)	$283	$283	$274	$3,052	$	$	$	$	$3,609
7. Construction (incl matl's by contractors)	$0	$0	$661	$1,584	$	$	$	$	$2,245
8. Testing / Commissioning	$0	$0	$0	$658	$	$	$	$	$658
9. Project Mgmt Team	$131	$130	$195	$41	$	$	$	$	$366
10. Removals	$0	$77	$500	$433	$	$	$	$	$1,010
11. Other/Property Tax	$40	$44	$224	$85	$	$	$	$	$353
12. Risks	$0	$0	$550	$300	$	$	$	$	$850
SUBTOTAL DIRECTS W/ RISKS	**$1,144**	**$1,185**	**$2,772**	**$6,225**	**$**	**$**	**$**	**$**	**$10,182**
13. Indirects/Overhead	$514	$445	$1,041	$1,549	$	$	$	$	$3,035
14. AFUDC	$86	$72	$592	$93	$	$	$	$	$757
PROJECT TOTAL – BASELINE BUDGET	**$1,744**	**$1,702**	**$4,405**	**$7,867**	**$**	**$**	**$**	**$**	**$13,974**
15. Contingency	$0	$0	$174	$119	$	$	$	$	$293
TOTAL CAPITAL REQUEST	**$1,744**	**$1,702**	**$4,579**	**$7,986**	**$**	**$**	**$**	**$**	**$14,267**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$	$	$	$	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$1,744**	**$1,702**	**$4,579**	**$7,986**	**$**	**$**	**$**	**$**	**$14,267**
O&M	$0	$0	$0	$0	$	$	$	$	$0
TOTAL REQUEST	**$1,744**	**$1,702**	**$4,579**	**$7,986**	**$**	**$**	**$**	**$**	**$14,267**

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

Risk Breakdown:

- Potential Additional Environmental $330,000
- Severe Weather, Delays, OT $140,000
- Scope increase due to incomplete design $180,000
  The current design for P&C is incomplete until the internal switchgear design can be confirmed which could also impact the electrical design package and missing or incorrect Bill of Material issues.
- Additional Civil Work $100,000
- Misc. Hardware/Fittings/Connectors/Equipment $100,000

Total $850,000

Breakout Costs

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2021 to Go	2022	2023	2024	2025	2026	Total
ST Labor	$145	$149	$248	$140	$	$	$	$	$537
OT Labor	$0	$0	$0	$0	$	$	$	$	$0
Outside Services Labor	$676	$632	$407	$2,370	$	$	$	$	$3,409
Materials*	$283	$283	$398	$3,222	$	$	$	$	$3,903
Removals	$0	$77	$500	$433	$	$	$	$	$1,010
Other	$40	$44	$1,068	$504	$	$	$	$	$1,616
Indirects	$514	$445	$1,366	$1,224	$	$	$	$	$3,035
AFUDC	$86	$72	$592	$93	$	$	$	$	$757
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$1,744**	**$1,702**	**$4,579**	**$7,986**	**$**	**$**	**$**	**$**	**$14,267**

*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: N/A
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 N/A
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? N/A
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: **Yes**
The existing sight is required to be fully removed and the land remediated. Upon completion of the project, the land the existing Millyard SS is built on will be turned over to the city as agreed upon in the Purchase & Sales agreement.

Are there other environmental cleanup costs associated with this project? If yes, please provide details: **Yes.**
There has been an evaluation of the existing substation site and the adjacent land where the new substation will be constructed. An environmental investigation has been completed, including test pit excavation with soil sampling and analysis.

The soil analysis did not find contamination levels above what was expected from the earlier desktop analysis. Eversource has asked the City of Nashua to consider allowing the soils that

are disturbed be accepted at the City's remedial land fill to reduce the cost of disposal. As of April 14, 2020, a rejection response from the City was received. A meeting was held on April 28th to discuss alternatives with the Mayor. The meeting resulted in agreement that the city would review other possibilities to mitigate our costs. The city has provided a schedule of fees that would apply should the project wish to use the city land fill. The estimated cost to clean the existing substation parcel is approximately $300K. The cost to remediate the City parcel is approximately $500K. These costs assume soil disposal at a commercial landfill, not the City's landfill, and are the reason for the higher estimate for soil disposal.

Technical Justification:

Project Need Statement

Millyard SS is a 34.5kV-4.16kV substation, located in the Millyard area of Nashua, NH. Millyard SS is scheduled to be retired in 2022. The existing Substation feeds more than 2,700 customers. The existing substation transformers are 68 and 71 years old. This is a unit substation with the switchgear attached with throat connections to the transformer. The failure of a transformer and replacement with a spare top bushing mounted transformer is not ideal in an emergency due to the change in transformer connection methods. The switchgear is the same vintage as the transformer and will also be replaced. The existing feeders have experienced failures and the circuit risers require a rebuild. Several circuits rise on a single pole and are therefore subject to exposure for multiple circuit outages for a single event on the pole. The existing substation and junction pole with FIVE 4.16 kV circuits are pictured below:

Eversource completed a Distribution System Study for the 4.16kV system in downtown Nashua in March 2016. This study supports the rebuild of the Millyard SS with two (2) 34.5-4.16kV transformers and six (6) feeder circuits. The study recommended two (2) 5MVA transformers but the design criteria has since been updated so two (2) 10 MVA transformers are now required. This will support continued load growth in the Nashua Millyard and provides a reliable backup to other 4.16kV circuits normally fed from other substations.

Project Objectives

1. Retire aging infrastructure

To replace the existing equipment, it is recommended that the Millyard SS be completely rebuilt.

The new substation will have a transformer with top mounted bushings connected to the metalclad switchgear instead of a unit substation. This is all standard Eversource equipment.

2. Masterplans

The City of Nashua has been developing a Waterfront Plan to encourage further development in this area. The Broad Street Parkway, which opened in December 2015, is a road bringing more traffic directly to the Nashua Millyard. Eversource's existing Millyard SS is in the middle of two (2) City properties. The City is interested in moving the Eversource SS to the Northwest corner of their property and procuring the Eversource Property. Eversource negotiated with the City on this arrangement and has executed a Purchase and Sales Agreement which has been signed by both parties. The original closing date was March 31, 2020. However, Eversource has requested to extend the closing date to June 30, 2021 because of the delay in procuring easements. Eversource's request has been accepted and signed by both parties. The actual land transfer is scheduled to take place December 31, 2022, upon energization of the new substation and the final removal of the old substation.

The Nashua Millyard with existing and Proposed SS location.

Project Scope

The existing Millyard Substation is a 34.5kV-4.16kV substation, located in the Millyard area of Nashua, NH. The existing Millyard Substation is scheduled to be retired in 2022. A new substation will be built on property adjacent to the existing SS. The new substation will be a 34.5-4.16kV substation with two transformer high side 34.5kV circuit breakers, one 34.5kV line tie VCS switch, two 10/12.5MVA transformers, a metal clad switchgear with two transformer low side breakers, six 4.16 kV feeder breakers and a mobile tap breaker, a bus tie breaker, and a battery system for DC power. The transformer oil containment system (Albarrie Sorbweb) was selected due to limitations created by the size and location (near the Nashua river) of the substation lot. This system will allow for the collection and containment areas to be the same rather than separate. A sound study has already been performed in 2019. The new transformers have maximum sound rating 9dBA which is lower than the existing equipment, so the change in ambient sound levels is a decrease. The primary and alternate station services transformers for AC power will be installed outside the substation. A new ADSS fiber optic cable will be installed on line 3891X between the new Millyard Substation and Front St Substation to provide all telecommunications services as part of a separate project being done by Field Engineering. (Project Number A20S02)

Major Equipment To Be Removed

1. All equipment in the existing Millyard SS including the fence and foundations.

Major Equipment To Be Added

1. Two (2) 34.5kV Vacuum Breakers
2. Two (2) 34.5-4.16kV 10/12.5MVA transformers
3. Switchgear lineup with ten (10) 4.16kV breakers (Six (6) feeder breakers, one (1) bus tie breaker, two (2) low-side transformer breakers, one (1) spare /mobile connection breaker) Disconnect Switches
4. Current Transformers
5. Bus PTs
6. Disconnect switches
7. Primary and Alternate Station Service
8. Control house and associated equipment
9. Equipment cabinets in the control house
10. Control Cables
11. Conduits
12. Various wire, mounting brackets and connectors
13. Animal protection
14. Ground grid and fencing
15. Equipment foundations
16. Structural Steel for the 34.5kV equipment
17. Site plantings for screening
18. Underground feeder getaways from the SS to the poles along the street
19. Rerouting of 34.5kV lines and associated easements
20. Transformer oil containment system (Albarrie Sorbweb)

Background / Justification

Eversource completed a Distribution System Study for the 4.16kV system in downtown Nashua in March 2016. This study supported the rebuild of the Millyard SS with two (2) 5 MVA 34.5-4.16kV transformers and six (6) feeder circuits. Alternative 4 (see below) is the recommended solution.

Since that time, the transformers have been uprated to 10MVA to satisfy the design criteria and address load growth prior to the rebuild of Front Street SS. The location of the substation has also changed from Spine Road to a City owned lot adjacent to the existing substation because the Spine Road lot was unsuitable for construction. As noted above, Eversource has a signed Purchase and Sales Agreement to rebuild on the City owned property adjacent to the existing substation.

Business Process and / or Technical Improvements

This project will improve the reliability of the distribution system in the City of Nashua. The potential failure of 68 and 71-year-old transformers will be eliminated. The reliability of the underlying distribution system will be improved by strengthening the 4kV system which will provide the ability to utilize distribution automation to effectively minimize the customer impact of unexpected outages.

Alternatives Considered

These Alternatives were considered in the Nashua 4.16-kV Distribution System Study. These alternatives, descriptions, and estimates are directly from the report, in which Alternative 4 was selected. Please refer to the Solution Selection Form (SSF) presented at the Solution Design Committee (SDC) Meeting held on July 10, 2019 for additional details.

In the last three (3) years the Millyard SS rebuild, as the first phase of Alternative 4, has been better defined and is proposed for this project. The Millyard SS Rebuild is the subject of this PAF. The Front Street SS Rebuild project will be the next phase of substation construction following the completion of Millyard SS. A separate project will be initiated for the Front Street Rebuild.

For all Alternatives, the Solution Estimate is based on the substation components from Appendix B in the System Study. No distribution linework is included in these estimates; Rough Order of Magnitude (ROM) is $2 to 3M and will be covered by a separate funding request. The project number is A20S02 with design completing for the 4.16kV distribution lines and the design for 34.5kV line is just getting started and will be in alignment with the substation.

Below is the matrix for rating the alternatives that is in Appendix C of the System Study. The cost for the preferred Alternative 4 and the second preferred Alternative 2 is the same as the first step in the rebuild of Millyard SS.

Appendix C: Decision Matrix

	Weight	Rating 4-5 Superior, 2-3 = Adequate, 0-1 = Inferior						
		Option 1 Front Street & Millyard Tech	Option 2 Front Street & Millyard Assoc.	Option 3 Nashua Drive & Millyard Tech	Option 4 Nashua Drive & Millyard Assoc.	Option 5 Millyard Tech & Millyard Assoc.	Option 6 Millyard Tech	Option 7 Millyard Assoc.
Addresses ED-3002 Design Criteria	8	4	4	4	4	4	3	3
Addresses Area Load Growth (Long Term, 10 Years)	8	5	5	5	5	5	4	4
Improves Reliability: SAIDI	8	3	4	3	4	3	2	2
Project Cost	7	3	3	3	3	3	4	4
Environmental Impact	5	4	3	4	3	3	4	3
Contingency Solution	5	3	3	4	4	3	0	0
Power Quality Improvement (SARFI-70)	4	4	4	4	4	4	3	3
Operating Cost	3	3	3	3	3	3	4	4
System Loss Savings	3	3	5	3	5	4	3	3
Total		**186**	**195**	**191**	**200**	**184**	**153**	**148**
Rank		**4**	**2**	**3**	**1**	**5**	**6**	**7**

Alternative 1: Front Street & Millyard Technology Park (This option is **not** recommended)

This option replaces Front Street Substation with a new substation at the Front Street parking lot and replaces Millyard Substation with a new substation at the Millyard Technology Park parking lot.

The substation on Front Street would be constructed with a single 5 MVA 34.5-4.16 kV transformer, while the substation at the Millyard Technology Park would be constructed with two (2) 5 MVA 34.5-4.16 kVA transformers.

Relocating Millyard Substation to the Millyard Technology Park parking lot would require five (5) circuits to share a single pole line for an additional 0.3 miles, increasing exposure with the risk of lowering reliability due to the potential of tree contact and vehicle accidents.

With use of the Front Street parking lot, circuit configuration and construction is minimal for replacement of Front Street Substation.

Alternative 2: Front Street & Millyard Associates (This option is **not** recommended)

This option replaces Front Street Substation with a new substation at the Front Street parking lot and replaces Millyard Substation with a new substation at the property owned by Millyard Associates on Spine Road.

The substation on Front Street would be constructed with a single 5 MVA 34.5-4.16 kV transformer, while substation at the Millyard Associates property would be constructed with two (2) 5 MVA 34.5-4.16 kVA transformers.

This option would have the least impact on the distribution system compared to the other options presented. With so few changes, this option is the closest to today's system configuration.

Alternative 3: Nashua Drive & Millyard Technology Park (This option is **not** recommended)

This option replaces Front Street Substation with a new substation at the Nashua Drive parking lot and replaces Millyard Substation with a new substation at the Millyard Technology Park parking lot.

The substation on Nashua Drive would be constructed with a single 5 MVA 34.5-4.16 kV transformer, while substation at the Millyard Technology Park would be constructed with two (2) 5 MVA 34.5-4.16 kVA transformers.

Relocating Millyard Substation to the Millyard Technology Park parking lot would require five (5) circuits to share a single pole line for an additional 0.3 miles, increasing exposure with the risk of lowering reliability due to the potential of tree contact and vehicle accidents.

With use of the Nashua Drive parking lot, circuit reconfiguration is minimal for replacement of Front Street Substation. The 9H2 would be split into two (2) circuits at the location of the new substation. One new circuit would feed Crown Hill while the second would feed Main Street south of the river and Front Street (9H1).

Alternative 4: Nashua Drive & Millyard Associates (This **is the recommended** option**)**

This option replaces Front Street Substation with a new substation at the Nashua Drive parking lot and replaces Millyard Substation with a new substation at the property owned by Millyard Associates on Spine Road.

The substation on Nashua Drive would be constructed with a single 5 MVA 34.5-4.16 kV transformer, while substation at the Millyard Associates property would be constructed with two (2) 5 MVA 34.5-4.16 kVA transformers.

This option would have the least impact on the distribution system in the Millyard area. With use of the Nashua Drive parking lot, circuit reconfiguration is minimal for replacement of Front Street Substation. The 9H2 would be split into two (2) circuits at the location of the new substation. One new circuit would feed Crown Hill while the second would feed Main Street south of the river and Front Street (9H1).

Note that subsequent to the report, this was updated to have two (2) 10/12.5MVA 34.5-4.16kV transformers at a location adjacent to the existing substation instead of at Spine Road.

Alternative 5: Millyard Technology Park & Millyard Associates (This option is **not** recommended)

This option replaces Front Street Substation with a new substation at the Millyard Technology Park parking lot and replaces Millyard Substation with a new substation at the property owned by Millyard Associates on Spine Road. Distribution System Study: Nashua 4.16 kV

The substation at Millyard Technology Park would be constructed with a single 5 MVA 34.5-4.16 kV transformer, while substation at the Millyard Associates property would be constructed with two (2) 5 MVA 34.5-4.16 kVA transformers.

The existing 18H1 line, which is double-circuited around the Millyard Technology Park building, would make for an ideal "bus tie" between the two substations, however this would require the 18H1 to be transferred to the new substation in the Millyard Technology Park parking lot. With the combined loading of the 9H1, 9H2, and 18H1, recent historical loading would have already exceeded 85% of the transformer TFRAT rating. This would mean that two (2) new river crossings would be needed to be able to feed the 9H1 and 9H2 from the new substation.

With use of the Millyard Associates' property, circuit configuration and construction is minimal for replacement of Millyard Substation.

Alternative 6: Millyard Technology Park (This option is **not** recommended)

This option consolidates the existing Millyard and Front Street Substations into one new substation located at the Millyard Technology Park parking lot. The 9H2 would be split in half at the disconnects located at the Nashua River crossing, with load being transferred to the 17H3 and 18H3 circuits.

Line work would be required to extend both Millyard circuits to reach the 9H2. The 18H3 would need a new river crossing with the 18H1 and 3891, easily tying into the 9H1 once reaching Charles Street. The 17H3 would require a new crossing of Main Street at Factory/Temple Street.

Relocating Millyard Substation to the Millyard Technology Park parking lot would require five (5) circuits to share a single pole line for an additional 0.3 miles, increasing exposure with the risk of lowering reliability due to the potential of tree contact and vehicle accidents.

Alternative 7: Millyard Associates (This option is **not** recommended)

This option consolidates the existing Millyard and Front Street Substations into one (1) new substation located at the property owned by Millyard Associates on Spine Road. The 9H2 would be split in half at the disconnects located at the Nashua River crossing, with load being transferred to the 17H3 and 18H3 circuits.

Line work would be required to extend both Millyard circuits to reach the 9H2. The 18H3 would utilize the second run of the 18H1 to get around the Millyard Technology Park building and then need a new river crossing with the 18H1 and 3891, easily tying into the 9H1 once reaching Charles Street. The 17H3 would require a new crossing of Main Street at Factory/Temple Street.

Project Schedule

Milestone/Phase Name	Estimated Date
Engineering Completion	June 2021
Issue Purchase Orders Transformer & Switchgear	April 2021
Site Remediation start	May 2021
Construction Start	September 2021
Site delivery Switchgear	January 2022
Site delivery Transformers	January 2022

Milestone/Phase Name	Estimated Date
Testing/Commissioning	March 2022
In Service Date	May 2022

See attached P6 schedule.

Regulatory Approvals

The Site approvals are complete; these include The City of Nashua, New Hampshire Division of Historical Resources Request for Project Review and Natural Heritage Bureau.

A building permit is required from the City of Nashua. The building permit will be procured by the construction contractor prior to start of construction.

Risks and Risk Mitigation Plans

Coordination with existing SS

- Build a greenfield site adjacent to the existing system. Energize the new system prior to the conversion. A mobile should not be required.
- A full environmental study has been performed on the existing SS site and new SS site. The amount of site remediation has been identified and will be included with the full funding request.
- A pre-construction sound survey has been completed. A post-construction survey will be performed later.

Contingency

- $293K has been allocated for any unknowns during the project

References

- Nashua 4kV Distribution System Study (v2)
- Solution Selection Form (SSF) July 10, 2019 SDC Meeting

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

- Attachment A: P-20-800 A17S03 New Millyard Substation Cost Estimate
- Attachment B: Reconciliation to PAF Estimate
- Attachment C: A17S0301 Millyard SS Summary P6 Schedule
- Attachment D: Millyard Substation Relocation - Acoustic Review
- Attachment E: Nashua Millyard Constructability Review Form

INSTRUCTIONS:
It is the responsibility of the initiator to contact the subject matter experts in the listed area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution. See the PAF Guide for additional instruction.

Project Checklist - Transmission & Substation Capital Project					
Project Name: Millyard SS Replacement			**Project Number: A17S03**		
Facility Type: ☐ BPS ☐ BES ☐ PTF ☐ non-PTF ☐ CIP ☒ Distribution					
PLANNING					
Is a NX-9 required?			No		
Is an ISO-NE PAC presentation required?			No		
ISO-NE Presentation Date (if completed):			N/A		
Cost in ISO-NE Presentation ($M) (if completed):			N/A		
Is a PPA required?			No		
Is a TCA Application Required?			No		
TCA Submittal Date (if submitted):			N/A		
Cost in TCA Submittal ($M) (if submitted):			N/A		
Enter ISO-NE RSP / Asset Condition ID, if assigned:			N/A		
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?			No		
OPERATIONS					
Outage Required?	☒ Primary Equipment (Power Transfer)	☐ Secondary Equipment (P&C only)		☐ Outage Not Required	
Do SCLL Conditions Exist?			No		
Has an outage schedule been approved?			No		
Are Operations & Maintenance procedures/training required?			No		
STANDARDS					
Does the project include standard equipment and designs?			Yes		
SUBSTATION ENGINEERING					
Does this impact Revenue Metering			No		
Is preliminary short circuit/ breaker duty analysis required?			Yes		
Are there any changes to the baseline audible noise?			Yes		
Is there an impact to the existing ground grid?			No		
Is a Transient Over Voltage (TOV) analysis required?			No		

Project Checklist - Transmission & Substation Capital Project	
Project Name: Millyard SS Replacement	**Project Number: A17S03**
P&C ENGINEERING	
OP-22 - Are PMUs and DDR required?	No
If BPS, is an NPCC Directory #4 presentation required?	No
Are ISO-NE OP-24 Appendix B updates necessary?	No
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
SITING	
Is a Siting filing required? *(If yes, list in regulatory approvals section)*	No
PERMITTING	
Is there any permitting required? *(If yes, list in regulatory approvals section)*	Yes
SITING & CONSTRUCTION SERVICES (OUTREACH)	
What is the level of outreach expected?	Medium
INITIATOR	
Has a field constructability review been completed?	Yes
INVESTMENT RECOVERY	
Does the project require development of an Investment Recovery plan?	Yes
COST ESTIMATING	
What team/firm prepared the cost estimate?	Estimate was prepared by the Eversource Estimating Team
Name of the person who prepared the estimate:	Kevin Flaherty
Was the estimate reviewed by Eversource Estimating?	Yes - Full Review

Cost Estimate Backup Details

See Attachment A for Backup Cost Estimate details

ESTIMATE SUMMARY

Project Title:Nashua Millyard Substation
Project Mgr/Lead:Walter Quinn
Project Number:A17S03
WO & Task #:A17S0301
Est. Revision # 00

Estimate By: Kevin F.
Date of Estimate:2/5/2021
ISD:03/15/2022
Estimate # P-20-800

Template Revision # 01.4

ESTIMATE SUMMARY

Estimate Type: Planning

WBS	Description	TOTAL	% of Total	Priors	2020	2021	2022	2023	2024	2025
1	ROW / Easements / Land purchases									
2	Environmental Approvals / Permits	$95,100	0.7%	$95,100						
3	Outreach	$66,100	0.5%	$36,200	$14,300	$8,800	$6,800			
4	Siting Approvals / Permits	$41,000	0.3%		$19,600	$12,200	$9,200			
5	Engineering / Design	$631,500	4.6%	$452,500	$24,000	$152,000	$3,000			
6	Materials (Eversource purchased)	$3,607,700	26.2%		$3,512,400	$66,600	$28,700			
7	Construction (incl matl's by contractors)	$2,332,100	17.0%	$294,600	$32,400	$1,385,200	$619,900			
8	Testing / Commissioning	$617,900	4.5%				$617,900			
9	PMT Project Mgmt Team	$461,600	3.4%	$225,400	$26,400	$168,900	$40,900			
10	Removals	$1,010,300	7.4%			$599,000	$411,300			
11	Other									
12	Risks	$850,000	6.2%			$550,000	$300,000			
	Project Directs Total w/Risks	**$9,713,300**	70.7%	**$1,103,800**	**$3,629,100**	**$2,942,700**	**$2,037,700**			
13	Indirects/Overhead	$2,981,400	21.7%	$451,500	$462,800	$1,157,300	$909,800			
14	AFUDC	$756,600	5.5%	$62,100	$201,500	$395,400	$97,600			
	Project Total - Baseline Budget	**$13,451,300**	97.9%	**$1,617,400**	**$4,293,400**	**$4,495,400**	**$3,045,100**			
15	Contingency	$293,100	2.1%		$173,900	$86,300	$32,900			
	Project Total - Funding Approval Level	**$13,744,400**	100.0%	**$1,617,400**	**$4,467,300**	**$4,581,700**	**$3,078,000**			
16	Reimbursables/Customer Contribution									
	Project Total (less reimbursables)	**$13,744,400**		**$1,617,400**	**$4,467,300**	**$4,581,700**	**$3,078,000**			
	Amount of Escalation included above	$243,500				$97,000	$146,500			
6	Total materials - Eversource	$3,607,700			$3,512,400	$66,600	$28,700			
	Total materials - Contractor	$840,846		$283,146		$388,700	$169,000			
	Total materials	$4,448,546		$283,146	$3,512,400	$455,300	$197,700			

NOTE: Risk / Contingency is 9.1% of Project Total Costs (incl escal/indirects/AFUDC but excl reimb.)

Estimate Range	**-25%**	-	**25%**
	$10,308,000	-	**$17,181,000**

COMMENTS:

Project Scope:

Replace existing Millyard Substation with new 34.5kV-4.16kV substation on adjacent property.
Major Equipment to be Installed
- Two (2) 38kV Vacuum Circuit Breaker
- One (1) 34.5kV Suspension Disconnect Switch
- Two (2) 34.5kV Disconnect Switches
- Six (6) 30kV Intermediate Class Lightning Arresters
- Six (6) 34.5kV Potential Transformers
- Two (2) 34.5-4.16kV 10/12.5 MVA Transformer
- Six (6) 4kV Station Class Lightning Arresters
- Two (2) 4.16kV Potential Transformer
- One Powercon Outdoor Switchgear
- Two HICO 10/12MVA 34.5-4.16kV Transformers

Assumptions/Clarifications;

Indirect rates based on; 6D - NH , Station work

Prior costs shown are through 12/31/2020
Outsourced
- Engineering outsourced
- Construction
- Testing/Commissioning
- Environmental testing
- Project Management

Inhouse Items
-Switching/Tagging/Station Standby/Construction Rep
- Inhouse engineering review

Substation only this estimate. Distribution work outside station fences under separate estimate.

RISKS

Potential Additional Envrionmental	$ 330,000
Severe Weather, Delays, OT	$ 140,000
Scope increase due to incomplete design	$ 180,000
Additional Civil Work	$ 100,000
Misc. Hardware/Fittings/Connectors/Equipment	$ 100,000

MILLYARD PAF REQUEST

Reconcilation to Base Estimate

P-20-800 A17S03 New Millyard Substation Rev2 EXT

Base Estimate Total	**$13,744**
Additional Eversource Engineering	$82
95% OH	$74
2 weeks Load Bank Rental	$40
15% OH	$6
Cost of Easements	$120
1% OH	$12
Construction Pricing Variability	$200
OH 45% + 1%	$93
DA RTU	-$282
OH 45% + 1%	-$131
Property Tax	$309
PAF Total Request	**$14,267**

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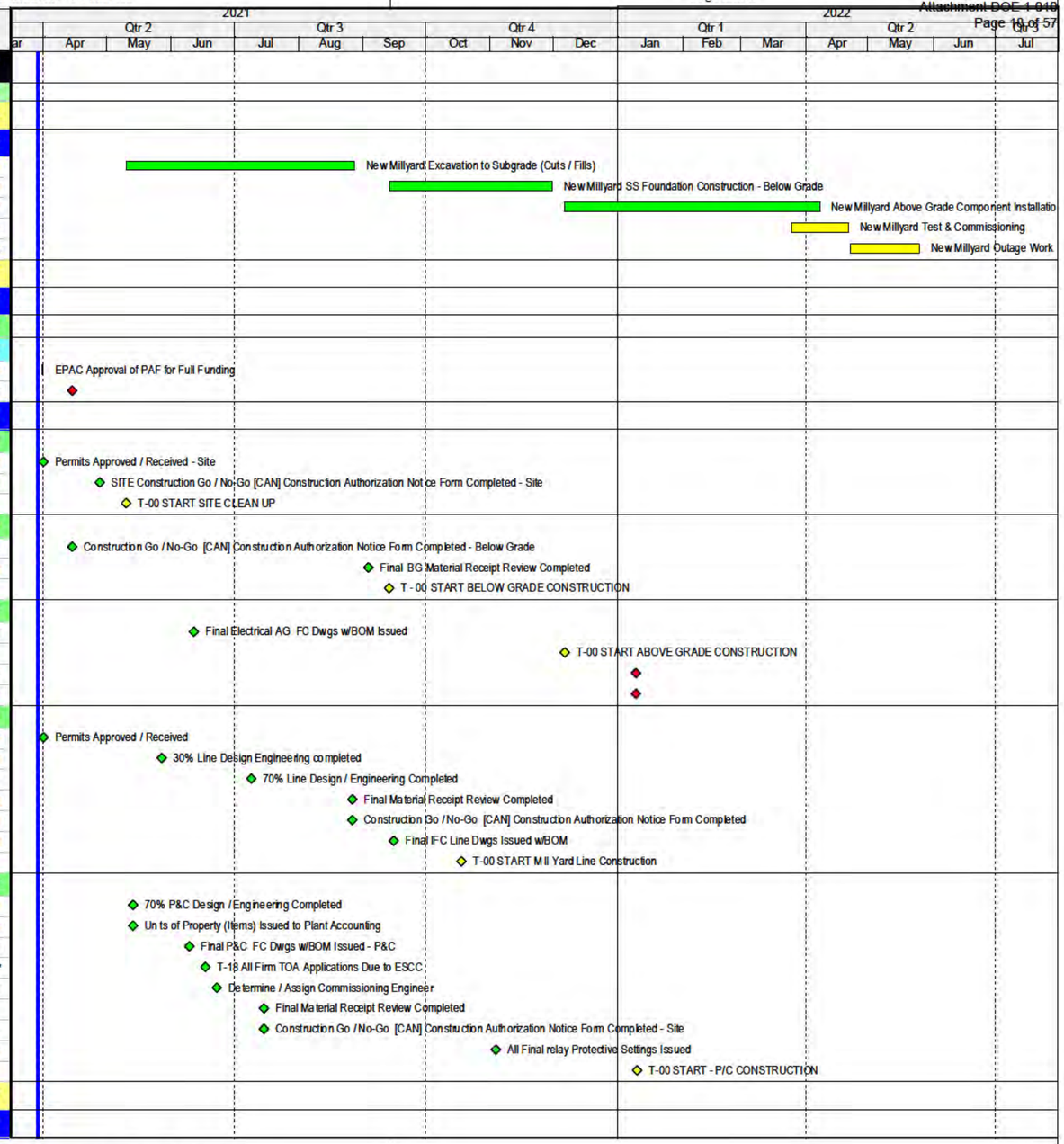
Activity ID	Activity Name	Project Lead	Rem Dur	ES	EF
A17S0301 Nashua New Tech (Millyard) SS Repl			317d	26-Aug-19 A	29-Jun-22
Nashua New Tech (Millyard) SS Repl			317d	26-Aug-19 A	29-Jun-22
PROJECT SUMMARY			381d	10-May-21	25-May-22
Work Windows			381d	10-May-21	25-May-22
AC_H8	New Millyard Excavation to Subgrade (Cuts / Fills)	MREKMS	110d	10-May-21	27-Aug-21
AC_H9	New Millyard SS Foundation Construction - Below Grade	MREKMS	79d	13-Sep-21	30-Nov-21
AC_H2	New Millyard Above Grade Component Installation	MREKMS	123d	06-Dec-21	07-Apr-22
AC_H17	New Millyard Test & Commissioning	MREKMS	28d	25-Mar-22	21-Apr-22
AC_H16	New Millyard Outage Work	MREKMS	34d	22-Apr-22	25-May-22
PROJECT INITIATION			195d	31-Mar-21	10-Jan-22
Project Initiation			11d	31-Mar-21	14-Apr-21
Initiation Activity			11d	31-Mar-21	14-Apr-21
EPAC Full Funding			11d	31-Mar-21	14-Apr-21
A1150	EPAC Approval of PAF for Full Funding	QUINNW	1d	31-Mar-21*	31-Mar-21
CPA4	Complete Power Plan Approval - Full Funding PAF	QUINNW	0d		14-Apr-21
T-Minus Milestones			284d	31-Mar-21	10-Jan-22
Site Clean Up T Milestones			39d	31-Mar-21	10-May-21
ST0801	Permits Approved / Received - Site	QUINNW	0d		31-Mar-21
ST0203	SITE Construction Go / No-Go [CAN] Construction Authorization Notice Form Completed - Site	QUINNW	0d		27-Apr-21
ST00	T-00 START SITE CLEAN UP	QUINNW	0d	10-May-21*	
Civil T-Minus Milestones			151d	14-Apr-21	13-Sep-21
BT0203	Construction Go / No-Go [CAN] Construction Authorization Notice Form Completed - Below Grade	QUINNW	0d		14-Apr-21
BT0401	Final BG Material Receipt Review Completed	QUINNW	0d		03-Sep-21
BT00	T - 00 START BELOW GRADE CONSTRUCTION	QUINNW	0d	13-Sep-21*	
Electrical T-Milestones			212d	11-Jun-21	09-Jan-22
AT0805E	Final Electrical AG IFC Dwgs w/BOM Issued	QUINNW	0d		11-Jun-21
AT00	T-00 START ABOVE GRADE CONSTRUCTION	QUINNW	0d	06-Dec-21*	
AT0401	Final AG Material Receipt Review Completed	QUINNW	0d		09-Jan-22
AT0203	Construction Go / No-Go [CAN] AG Construction Authorization Notice Form Completed - Above Grade	QUINNW	0d		09-Jan-22
OH T-Minus Milestones			200d	31-Mar-21	18-Oct-21
DT0801	Permits Approved / Received	QUINNW	0d		31-Mar-21
DT2605	30% Line Design Engineering completed	QUINNW	0d		27-May-21
DT1811	70% Line Design / Engineering Completed	QUINNW	0d		09-Jul-21
DT0401	Final Material Receipt Review Completed	QUINNW	0d		26-Aug-21
DT0203	Construction Go / No-Go [CAN] Construction Authorization Notice Form Completed	QUINNW	0d		26-Aug-21
DT0805L	Final FC Line Dwgs Issued w/BOM	QUINNW	0d		15-Sep-21
DT00	T-00 START Mill Yard Line Construction	QUINNW	0d	18-Oct-21*	
P&C T-Minus Milestones			241d	13-May-21	10-Jan-22
PT1811	70% P&C Design / Engineering Completed	QUINNW	0d		13-May-21
PT0602	Units of Property (Items) Issued to Plant Accounting	QUINNW	0d		13-May-21
PT0805PC	Final P&C FC Dwgs w/BOM Issued - P&C	QUINNW	0d		09-Jun-21
PT1801	T-18 All Firm TOA Applications Due to ESCC	QUINNW	0d		17-Jun-21*
PT2404	Determine / Assign Commissioning Engineer	QUINNW	0d		22-Jun-21
PT0401	Final Material Receipt Review Completed	QUINNW	0d		15-Jul-21
PT0203	Construction Go / No-Go [CAN] Construction Authorization Notice Form Completed - Site	QUINNW	0d		15-Jul-21
PT0404	All Final relay Protective Settings Issued	QUINNW	0d		03-Nov-21
PT00	T-00 START - P/C CONSTRUCTION	QUINNW	0d	10-Jan-22*	
ENVIRONMENTAL APPROVALS AND PERMITS			17d	05-Apr-21	27-Apr-21
STATE APPROVALS AND PERMITS			17d	05-Apr-21	27-Apr-21



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Project Manager - Walter Quinn

NASHUA MILLYARD REBUILD PROJECT SCHEDULE

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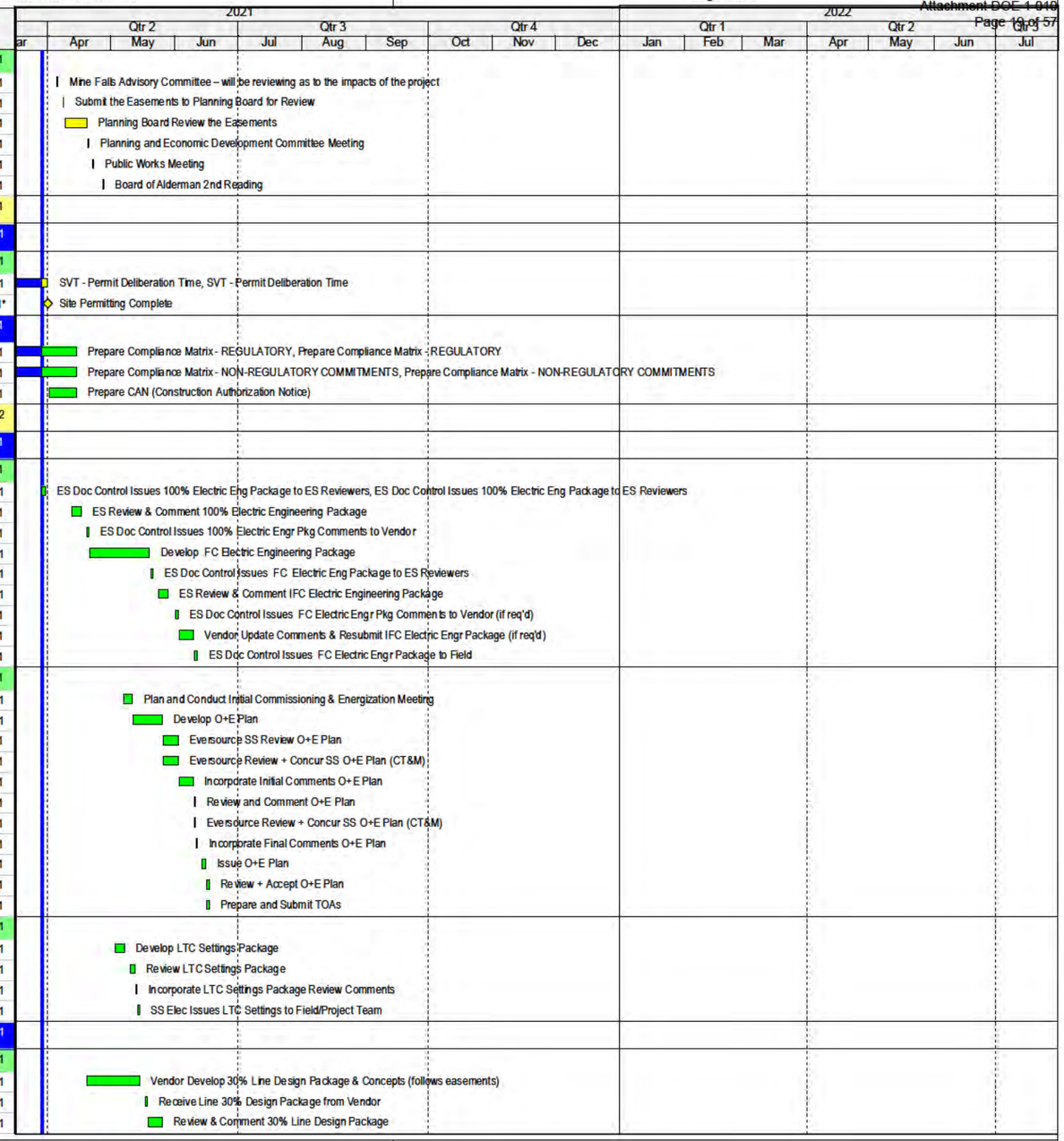
Activity ID	Activity Name	Project Lead	Rem Dur	ES	EF
Siting Council / Board			17d	05-Apr-21	27-Apr-21
12374	Mine Falls Advisory Committee – will be reviewing as to the impacts of the project	QUINNW	1d	05-Apr-21*	05-Apr-21
12376	Submit the Easements to Planning Board for Review	QUINNW	1d	08-Apr-21*	08-Apr-21
12378	Planning Board Review the Easements	QUINNW	7d	09-Apr-21	19-Apr-21
12380	Planning and Economic Development Committee Meeting	QUINNW	1d	20-Apr-21	20-Apr-21
12382	Public Works Meeting	QUINNW	1d	22-Apr-21*	22-Apr-21
12384	Board of Alderman 2nd Reading	QUINNW	1d	27-Apr-21*	27-Apr-21
SITING APPROVALS AND PERMITS			13d	26-Aug-19 A	14-Apr-21
STATE APPROVALS AND PERMITS			3d	06-Jan-20 A	31-Mar-21
Siting Council / Board			3d	06-Jan-20 A	31-Mar-21
1660	SVT - Permit Deliberation Time	3ULATAA	3d	06-Jan-20 A	31-Mar-21
356	Site Permitting Complete	QUINNW	0d		31-Mar-21*
Compliance Matrices - Regulatory & Non Regulatory Committments			13d	26-Aug-19 A	14-Apr-21
REG-LOE	Prepare Compliance Matrix - REGULATORY	NELSOKI	13d	26-Aug-19 A	14-Apr-21
COM-LOE	Prepare Compliance Matrix - NON-REGULATORY COMMITMENTS	M.COMM	13d	26-Aug-19 A	14-Apr-21
12188	Prepare CAN (Construction Authorization Notice)	QUINNW	10d	01-Apr-21	14-Apr-21
ENGINEERING AND DESIGN			221d	09-Feb-21 A	11-Feb-22
Electrical Engineering			58d	29-Mar-21 A	17-Jun-21
Electrical Engineering 100% & IFC Design			54d	29-Mar-21 A	11-Jun-21
4265	ES Doc Control Issues 100% Electric Eng Package to ES Reviewers	MAILLEL	2d	29-Mar-21 A	30-Mar-21
4185	ES Review & Comment 100% Electric Engineering Package	OMANZA	5d	12-Apr-21*	16-Apr-21
4285	ES Doc Control Issues 100% Electric Engr Pkg Comments to Vendor	MAILLEL	2d	19-Apr-21	20-Apr-21
4190	Develop FC Electric Engineering Package	V.RLC	21d	21-Apr-21	19-May-21
4290	ES Doc Control Issues FC Electric Eng Package to ES Reviewers	MAILLEL	2d	20-May-21	21-May-21
11878	ES Review & Comment IFC Electric Engineering Package	OMANZA	5d	24-May-21	28-May-21
4199	ES Doc Control Issues FC Electric Engr Pkg Comments to Vendor (if req'd)	MAILLEL	2d	01-Jun-21	02-Jun-21
12302	Vendor Update Comments & Resubmit IFC Electric Engr Package (if req'd)	V.RLC	5d	03-Jun-21	09-Jun-21
12312	ES Doc Control Issues FC Electric Engr Package to Field	MAILLEL	2d	10-Jun-21	11-Jun-21
O+E Plan			29d	07-May-21	17-Jun-21
4252	Plan and Conduct Initial Commissioning & Energization Meeting	QUINNW	3d	07-May-21	11-May-21
4250	Develop O+E Plan	OMANZA	10d	12-May-21	25-May-21
4267	Eversource SS Review O+E Plan	DBRIECS	5d	26-May-21	02-Jun-21
4269	Eversource Review + Concur SS O+E Plan (CT&M)	MIREKMS	5d	26-May-21	02-Jun-21
4270	Incorporate Initial Comments O+E Plan	OMANZA	5d	03-Jun-21	09-Jun-21
4268	Review and Comment O+E Plan	ROSSDA	1d	10-Jun-21	10-Jun-21
4271	Eversource Review + Concur SS O+E Plan (CT&M)	MIREKMS	1d	10-Jun-21	10-Jun-21
4272	Incorporate Final Comments O+E Plan	OMANZA	1d	11-Jun-21	11-Jun-21
4275	Issue O+E Plan	OMANZA	2d	14-Jun-21	15-Jun-21
4280	Review + Accept O+E Plan	ROSSDA	2d	16-Jun-21	17-Jun-21
4283	Prepare and Submit TOAs	MIREKMS	2d	16-Jun-21	17-Jun-21
LTC Control Development			10d	03-May-21	14-May-21
4651	Develop LTC Settings Package	TOUCHJC	5d	03-May-21	07-May-21
4653	Review LTC Settings Package	DBRIECS	3d	10-May-21	12-May-21
4655	Incorporate LTC Settings Package Review Comments	TOUCHJC	1d	13-May-21	13-May-21
4657	SS Elec Issues LTC Settings to Field/Project Team	TOUCHJC	1d	14-May-21	14-May-21
OH Line Engineering			105d	19-Apr-21	15-Sep-21
OH Line Engineering 30% Design			29d	19-Apr-21	27-May-21
12074	Vendor Develop 30% Line Design Package & Concepts (follows easements)	/ LEIDOS	20d	19-Apr-21*	14-May-21
4295	Receive Line 30% Design Package from Vendor	MAILLEL	2d	17-May-21	18-May-21
12084	Review & Comment 30% Line Design Package	SPERRJR	5d	19-May-21	25-May-21



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Project Manager - Walter Quinn

NASHUA MILLYARD REBUILD PROJECT SCHEDULE

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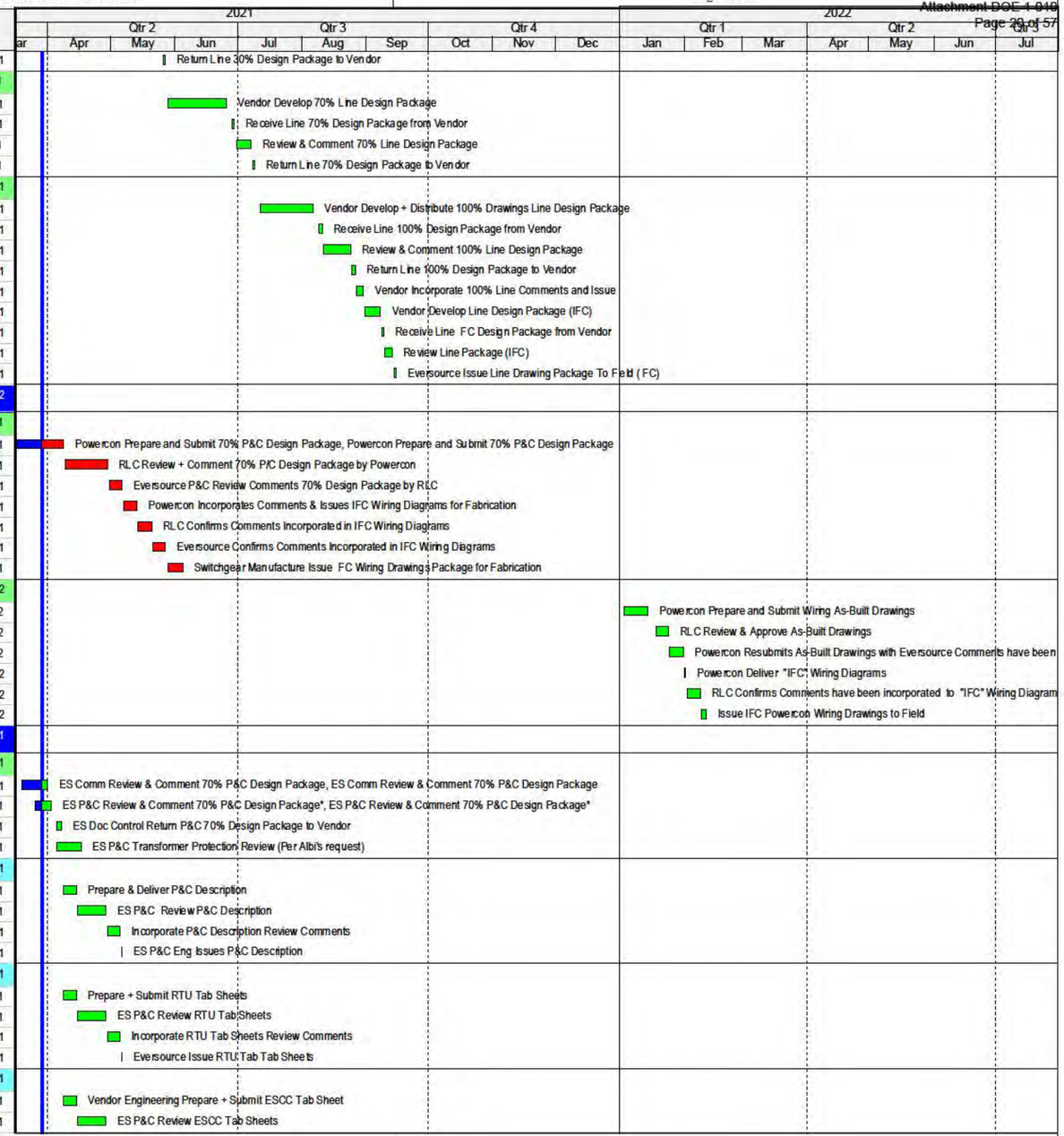
Activity ID	Activity Name	Project Lead	Rem Dur	ES	EF
4300	Return Line 30% Design Package to Vendor	MAILLEL	2d	26-May-21	27-May-21
OH Line Engineering 70% Design			29d	28-May-21	09-Jul-21
12070	Vendor Develop 70% Line Design Package	/ LEIDOS	20d	28-May-21	25-Jun-21
4305	Receive Line 70% Design Package from Vendor	MAILLEL	2d	28-Jun-21	29-Jun-21
12078	Review & Comment 70% Line Design Package	SPERRJR	5d	30-Jun-21	07-Jul-21
4310	Return Line 70% Design Package to Vendor	MAILLEL	2d	08-Jul-21	09-Jul-21
OH Line Engineering IFC Design			47d	12-Jul-21	15-Sep-21
12072	Vendor Develop + Distribute 100% Drawings Line Design Package	/ LEIDOS	20d	12-Jul-21	06-Aug-21
4315	Receive Line 100% Design Package from Vendor	MAILLEL	2d	09-Aug-21	10-Aug-21
12080	Review & Comment 100% Line Design Package	SPERRJR	10d	11-Aug-21	24-Aug-21
4320	Return Line 100% Design Package to Vendor	MAILLEL	2d	25-Aug-21	26-Aug-21
12066	Vendor Incorporate 100% Line Comments and Issue	/ LEIDOS	2d	27-Aug-21	30-Aug-21
12068	Vendor Develop Line Design Package (IFC)	/ LEIDOS	5d	31-Aug-21	07-Sep-21
4325	Receive Line FC Design Package from Vendor	MAILLEL	2d	08-Sep-21	09-Sep-21
12088	Review Line Package (IFC)	SPERRJR	2d	10-Sep-21	13-Sep-21
12086	Eversource Issue Line Drawing Package To Field (FC)	MAILLEL	2d	14-Sep-21	15-Sep-21
PHASE I - Switchgear Engineering by Powecon Manufacture			221d	09-Feb-21 A	11-Feb-22
Powercon Wiring Diagrams Design Package			49d	09-Feb-21 A	04-Jun-21
P14050	Powercon Prepare and Submit 70% P&C Design Package	V.PCC	9d	09-Feb-21 A	08-Apr-21
P14060	RLC Review + Comment 70% P/C Design Package by Powercon	V.RLC	15d	09-Apr-21	29-Apr-21
P14065	Eversource P&C Review Comments 70% Design Package by RLC	SHEGAA	5d	30-Apr-21	06-May-21
P14070	Powercon Incorporates Comments & Issues FC Wiring Diagrams for Fabrication	V.PCC	5d	07-May-21	13-May-21
P14080	RLC Confirms Comments Incorporated in IFC Wiring Diagrams	V.RLC	5d	14-May-21	20-May-21
P14082	Eversource Confirms Comments Incorporated in IFC Wiring Diagrams	SHEGAA	5d	21-May-21	27-May-21
P14085	Switchgear Manufacture Issue FC Wiring Drawings Package for Fabrication	V.PCC	5d	28-May-21	04-Jun-21
Powercon As-Built Drawings			29d	03-Jan-22	11-Feb-22
P14090	Powercon Prepare and Submit Wiring As-Built Drawings	V.PCC	10d	03-Jan-22	14-Jan-22
P14100	RLC Review & Approve As-Built Drawings	V.RLC	5d	18-Jan-22	24-Jan-22
P14110	Powercon Resubmits As-Built Drawings with Eversource Comments have been incorporated	V.PCC	5d	25-Jan-22	31-Jan-22
P14130	Powercon Deliver " FC" Wiring Diagrams	V.PCC	1d	01-Feb-22	01-Feb-22
P14120	RLC Confirms Comments have been incorporated to "IFC" Wiring Diagrams	V.RLC	5d	02-Feb-22	08-Feb-22
P14150	Issue IFC Powercon Wiring Drawings to Field	MAILLEL	3d	09-Feb-22	11-Feb-22
PHASE II - P&C Engineering (by RLC)			154d	19-Mar-21 A	03-Nov-21
Phase II - P&C Engineering 70% Design			29d	19-Mar-21 A	06-May-21
12094	ES Comm Review & Comment 70% P&C Design Package	AK MANR	3d	19-Mar-21 A	31-Mar-21
P21160	ES P&C Review & Comment 70% P&C Design Package*	SHEGAA	5d	26-Mar-21 A	02-Apr-21
4345	ES Doc Control Return P&C 70% Design Package to Vendor	MAILLEL	3d	05-Apr-21	07-Apr-21
P21714	ES P&C Transformer Protection Review (Per Albi's request)	CROTELJ	10d	05-Apr-21*	16-Apr-21
P&C Design Description			21d	08-Apr-21	06-May-21
P21360	Prepare & Deliver P&C Description	V.RLC	5d	08-Apr-21	14-Apr-21
P21350	ES P&C Review P&C Description	SHEGAA	10d	15-Apr-21	28-Apr-21
P21380	Incorporate P&C Description Review Comments	V.RLC	5d	29-Apr-21	05-May-21
P21390	ES P&C Eng Issues P&C Description	SHEGAA	1d	06-May-21	06-May-21
RTU/IO Tab Sheets			21d	08-Apr-21	06-May-21
P21290	Prepare + Submit RTU Tab Sheets	V.RLC	5d	08-Apr-21	14-Apr-21
P21280	ES P&C Review RTU Tab Sheets	SHEGAA	10d	15-Apr-21	28-Apr-21
P21300	Incorporate RTU Tab Sheets Review Comments	V.RLC	5d	29-Apr-21	05-May-21
P21310	Eversource Issue RTU Tab Tab Sheets	SHEGAA	1d	06-May-21	06-May-21
ESCC Tab Sheets			21d	08-Apr-21	06-May-21
P21400	Vendor Engineering Prepare + Submit ESCC Tab Sheet	V.RLC	5d	08-Apr-21	14-Apr-21
P21440	ES P&C Review ESCC Tab Sheets	SHEGAA	10d	15-Apr-21	28-Apr-21



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Project Manager - Walter Quinn

NASHUA MILLYARD REBUILD PROJECT SCHEDULE

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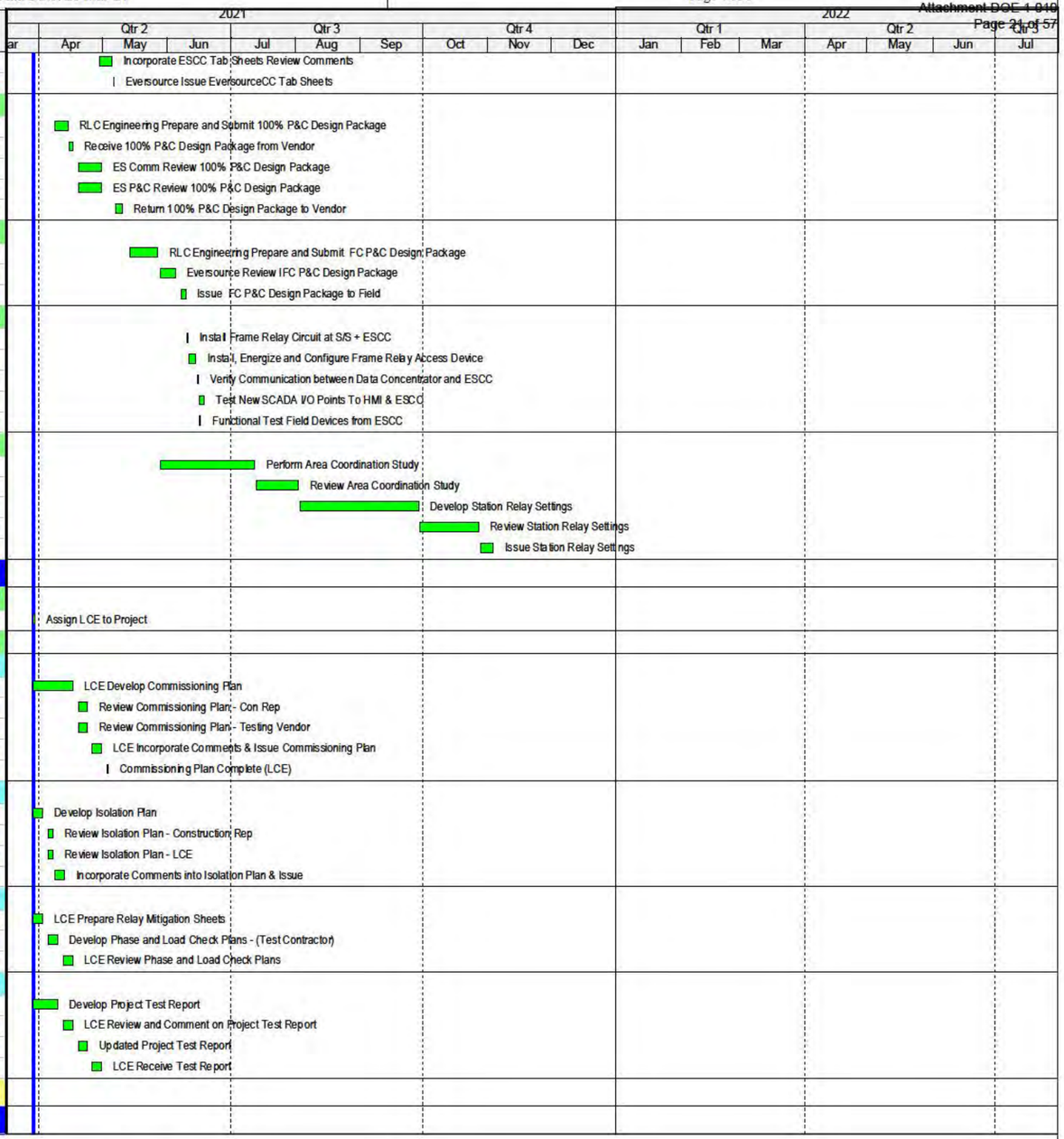
Activity ID	Activity Name	Project Lead	Rem Dur	ES	EF
P21420	Incorporate ESCC Tab Sheets Review Comments	V.RLC	5d	29-Apr-21	05-May-21
P21430	Eversource Issue EversourceCC Tab Sheets	SHEGAA	1d	06-May-21	06-May-21
Phase II - P&C 100% Design			23d	08-Apr-21	10-May-21
P21180	RLC Engineering Prepare and Submit 100% P&C Design Package	V.RLC	5d	08-Apr-21	14-Apr-21
4350	Receive 100% P&C Design Package from Vendor	MAILLEL	2d	15-Apr-21	16-Apr-21
R109	ES Comm Review 100% P&C Design Package	AK MANR	10d	19-Apr-21	30-Apr-21
P21190	ES P&C Review 100% P&C Design Package	SHEGAA	10d	19-Apr-21	30-Apr-21
4355	Return 100% P&C Design Package to Vendor	MAILLEL	2d	07-May-21	10-May-21
Phase II - P&C IFC Design			18d	14-May-21	09-Jun-21
P21200	RLC Engineering Prepare and Submit FC P&C Design Package	V.RLC	10d	14-May-21*	27-May-21
P21220	Eversource Review IFC P&C Design Package	SHEGAA	5d	28-May-21	04-Jun-21
P21620	Issue IFC P&C Design Package to Field	MAILLEL	3d	07-Jun-21	09-Jun-21
Distribution Automation			7d	10-Jun-21	18-Jun-21
P21140	Instal Frame Relay Circuit at S/S + ESCC	PM.AUTO	1d	10-Jun-21	10-Jun-21
P21120	Instal, Energize and Configure Frame Relay Access Device	PM.AUTO	2d	11-Jun-21	14-Jun-21
P21130	Verify Communication between Data Concentrator and ESCC	PM.AUTO	1d	15-Jun-21	15-Jun-21
P21100	Test New SCADA I/O Points To HMI & ESCC	PM.AUTO	3d	16-Jun-21	18-Jun-21
P21110	Functional Test Field Devices from ESCC	TBD-TPM	1d	16-Jun-21	16-Jun-21
Relay Settings Development			110d	28-May-21	03-Nov-21
P21330	Perform Area Coordination Study	SHEGAA	30d	28-May-21	12-Jul-21
P21320	Review Area Coordination Study	CROTELJ	15d	13-Jul-21	02-Aug-21
P21600	Develop Station Relay Settings	SHEGAA	40d	03-Aug-21	28-Sep-21
P21735	Review Station Relay Settings	CROTELJ	20d	29-Sep-21	27-Oct-21
P21340	Issue Station Relay Settings	SHEGAA	5d	28-Oct-21	03-Nov-21
LCE			26d	29-Mar-21	03-May-21
Lead Commissioning Engineer (LCE) Engineering Activities			1d	29-Mar-21	29-Mar-21
L1001	Assign LCE to Project	DUHAIKP	1d	29-Mar-21	29-Mar-21
Lead Commissioning Engineer - LCE			26d	29-Mar-21	03-May-21
LCE Commissioning Plan			26d	29-Mar-21	03-May-21
L1005	LCE Develop Commissioning Plan	DUHAIKP	15d	29-Mar-21	16-Apr-21
L1010	Review Commissioning Plan - Con Rep		5d	19-Apr-21	23-Apr-21
L1015	Review Commissioning Plan - Testing Vendor		5d	19-Apr-21	23-Apr-21
L1020	LCE Incorporate Comments & Issue Commissioning Plan	DUHAIKP	5d	26-Apr-21	30-Apr-21
L1025	Commissioning Plan Complete (LCE)	DUHAIKP	1d	03-May-21	03-May-21
Isolation Plan			11d	29-Mar-21	12-Apr-21
L1030	Develop Isolation Plan	V.C.TEST	5d	29-Mar-21	02-Apr-21
L1035	Review Isolation Plan - Construction Rep	CT+M.CR	3d	05-Apr-21	07-Apr-21
L1040	Review Isolation Plan - LCE	DUHAIKP	3d	05-Apr-21	07-Apr-21
L1045	Incorporate Comments into Isolation Plan & Issue	V.C.TEST	3d	08-Apr-21	12-Apr-21
Test Planning			15d	29-Mar-21	16-Apr-21
L1050	LCE Prepare Relay Mitigation Sheets	DUHAIKP	5d	29-Mar-21	02-Apr-21
L1055	Develop Phase and Load Check Plans - (Test Contractor)	V.C.TEST	5d	05-Apr-21	09-Apr-21
L1060	LCE Review Phase and Load Check Plans	DUHAIKP	5d	12-Apr-21	16-Apr-21
Test Reporting			25d	29-Mar-21	30-Apr-21
L1065	Develop Project Test Report	V.C.TEST	10d	29-Mar-21	09-Apr-21
L1070	LCE Review and Comment on Project Test Report	DUHAIKP	5d	12-Apr-21	16-Apr-21
L1075	Updated Project Test Report	V.C.TEST	5d	19-Apr-21	23-Apr-21
L1080	LCE Receive Test Report	DUHAIKP	5d	26-Apr-21	30-Apr-21
MATERIAL			204d	08-Apr-21	31-Jan-22
Civil Material			20d	09-Aug-21	03-Sep-21



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Project Manager - Walter Quinn

NASHUA MILLYARD REBUILD PROJECT SCHEDULE

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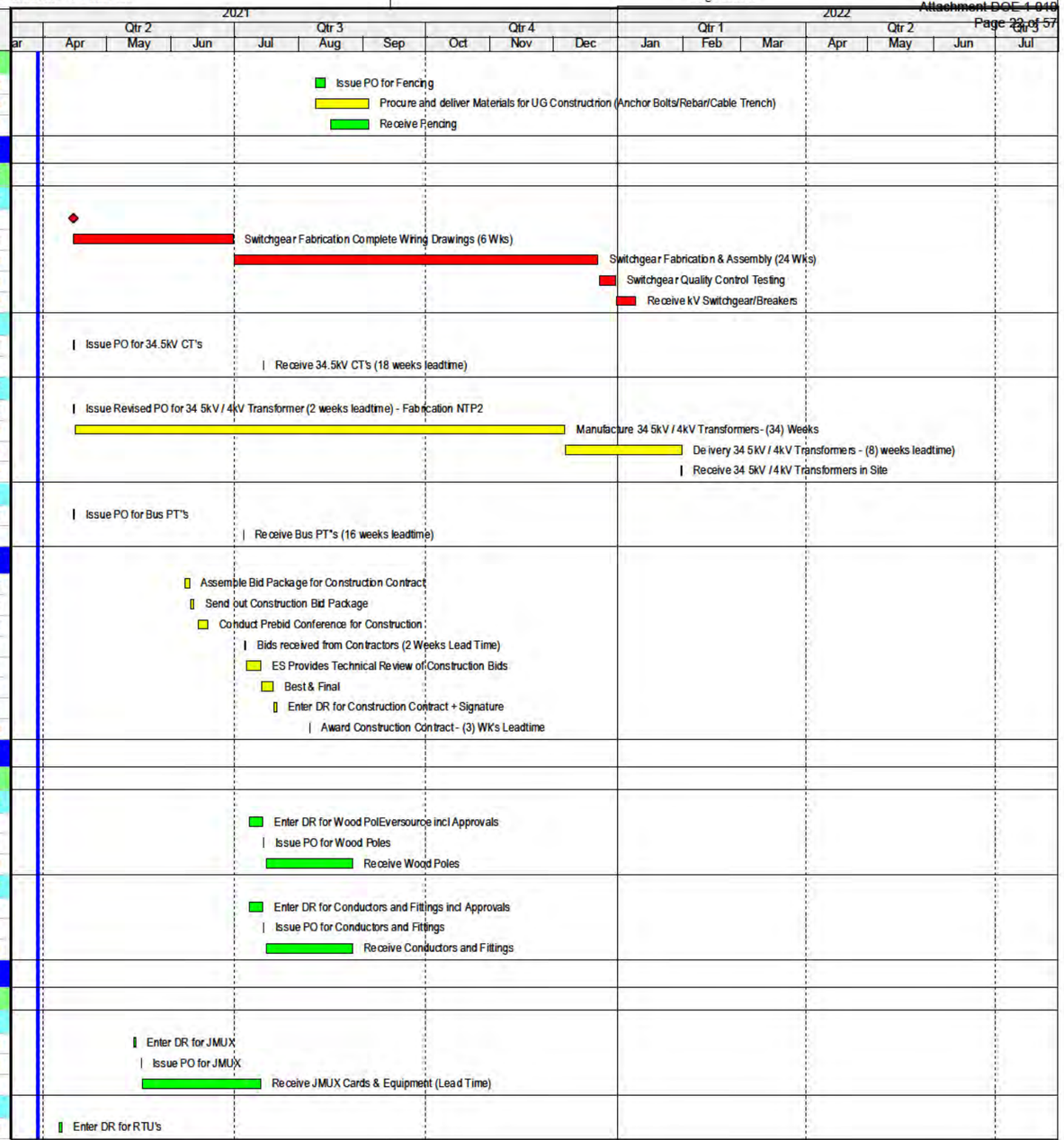
Activity ID	Activity Name	Project Lead	Rem Dur	ES	EF
Civil Material			20d	09-Aug-21	03-Sep-21
11824	Issue PO for Fencing	V	5d	09-Aug-21	13-Aug-21
11868	Procure and deliver Materials for UG Construction (Anchor Bolts/Rebar/Cable Trench)	V	20d	09-Aug-21	03-Sep-21
11826	Receive Fencing	V	15d	16-Aug-21	03-Sep-21
Electrial Material			199d	15-Apr-21	31-Jan-22
Electrical Material			199d	15-Apr-21	31-Jan-22
Switchgear			184d	15-Apr-21	09-Jan-22
12218	Award / Issue PO for kV Switchgear/Breakers (4Wks Leadtime) - Fabrication NTP2	CRUZFR	0d	15-Apr-21	
12221	Switchgear Fabrication Complete Wiring Drawings (6 Wks)	V.PCC	54d	15-Apr-21	30-Jun-21
12194	Switchgear Fabrication & Assembly (24 Wks)	V.PCC	120d	01-Jul-21	22-Dec-21
12204	Switchgear Quality Control Testing	V.PCC	5d	23-Dec-21	30-Dec-21
11587	Receive kV Switchgear/Breakers	MREKMS	10d	31-Dec-21	09-Jan-22
Curent Transformers			64d	15-Apr-21	15-Jul-21
1960	Issue PO for 34.5kV CT's	TM.PURC	1d	15-Apr-21	15-Apr-21
1965	Receive 34.5kV CT's (18 weeks leadtime)	MREKMS	1d	15-Jul-21	15-Jul-21
Transformers			199d	15-Apr-21	31-Jan-22
12216	Issue Revised PO for 34.5kV / 4kV Transformer (2 weeks leadtime) - Fabrication NTP2	TM.PURC	1d	15-Apr-21	15-Apr-21
11651	Manufacture 34.5kV / 4kV Transformers- (34) Weeks	V.HICO	235d	16-Apr-21	06-Dec-21
9940	Delivery 34.5kV / 4kV Transformers - (8) weeks leadtime)	V.HICO	56d	07-Dec-21	31-Jan-22
9945	Receive 34.5kV / 4kV Transformers in Site	V.HICO	1d	31-Jan-22	31-Jan-22
Bus PT's			56d	15-Apr-21	05-Jul-21
12214	Issue PO for Bus PT's	TM.PURC	1d	15-Apr-21*	15-Apr-21
12210	Receive Bus PT's (16 weeks leadtime)	MREKMS	1d	05-Jul-21	05-Jul-21
Electrical Services			44d	07-Jun-21	06-Aug-21
3841	Assemble Bid Package for Construction Contract	ODONEA	3d	07-Jun-21	09-Jun-21
11870	Send out Construction Bid Package	ODONEA	2d	10-Jun-21	11-Jun-21
3840	Conduct Prebid Conference for Construction	ODONEA	5d	14-Jun-21	18-Jun-21
11872	Bids received from Contractors (2 Weeks Lead Time)	ODONEA	1d	06-Jul-21	06-Jul-21
3843	ES Provides Technical Review of Construction Bids	QUINNW	5d	07-Jul-21	13-Jul-21
3844	Best & Final	ODONEA	4d	14-Jul-21	19-Jul-21
3863	Enter DR for Construction Contract + Signature	QUINNW	2d	20-Jul-21	21-Jul-21
1750	Award Construction Contract - (3) WK's Leadtime	ODONEA	1d	06-Aug-21	06-Aug-21
OH Line Material			36d	08-Jul-21	26-Aug-21
OH Line Material			36d	08-Jul-21	26-Aug-21
Wood Poles			36d	08-Jul-21	26-Aug-21
12142	Enter DR for Wood PolEversource incl Approvals	SPERRJR	5d	08-Jul-21	14-Jul-21
12144	Issue PO for Wood Poles	CRUZFR	1d	15-Jul-21	15-Jul-21
12146	Receive Wood Poles	MREKMS	30d	16-Jul-21	26-Aug-21
Conductors and Fittings			36d	08-Jul-21	26-Aug-21
12148	Enter DR for Conductors and Fittings incl Approvals	SPERRJR	5d	08-Jul-21	14-Jul-21
12150	Issue PO for Conductors and Fittings	CRUZFR	1d	15-Jul-21	15-Jul-21
12152	Receive Conductors and Fittings	MREKMS	30d	16-Jul-21	26-Aug-21
P&C Material			72d	08-Apr-21	20-Jul-21
P&C Material			72d	08-Apr-21	20-Jul-21
JMUX's			41d	14-May-21	13-Jul-21
11137	Enter DR for JMUX	MK.MANR	1d	14-May-21	14-May-21
12166	Issue PO for JMUX	ODONEA	1d	17-May-21	17-May-21
7139	Receive JMUX Cards & Equipment (Lead Time)	MREKMS	39d	18-May-21	13-Jul-21
RTU's			72d	08-Apr-21	20-Jul-21
11707	Enter DR for RTU's	SHEGAA	2d	08-Apr-21	09-Apr-21



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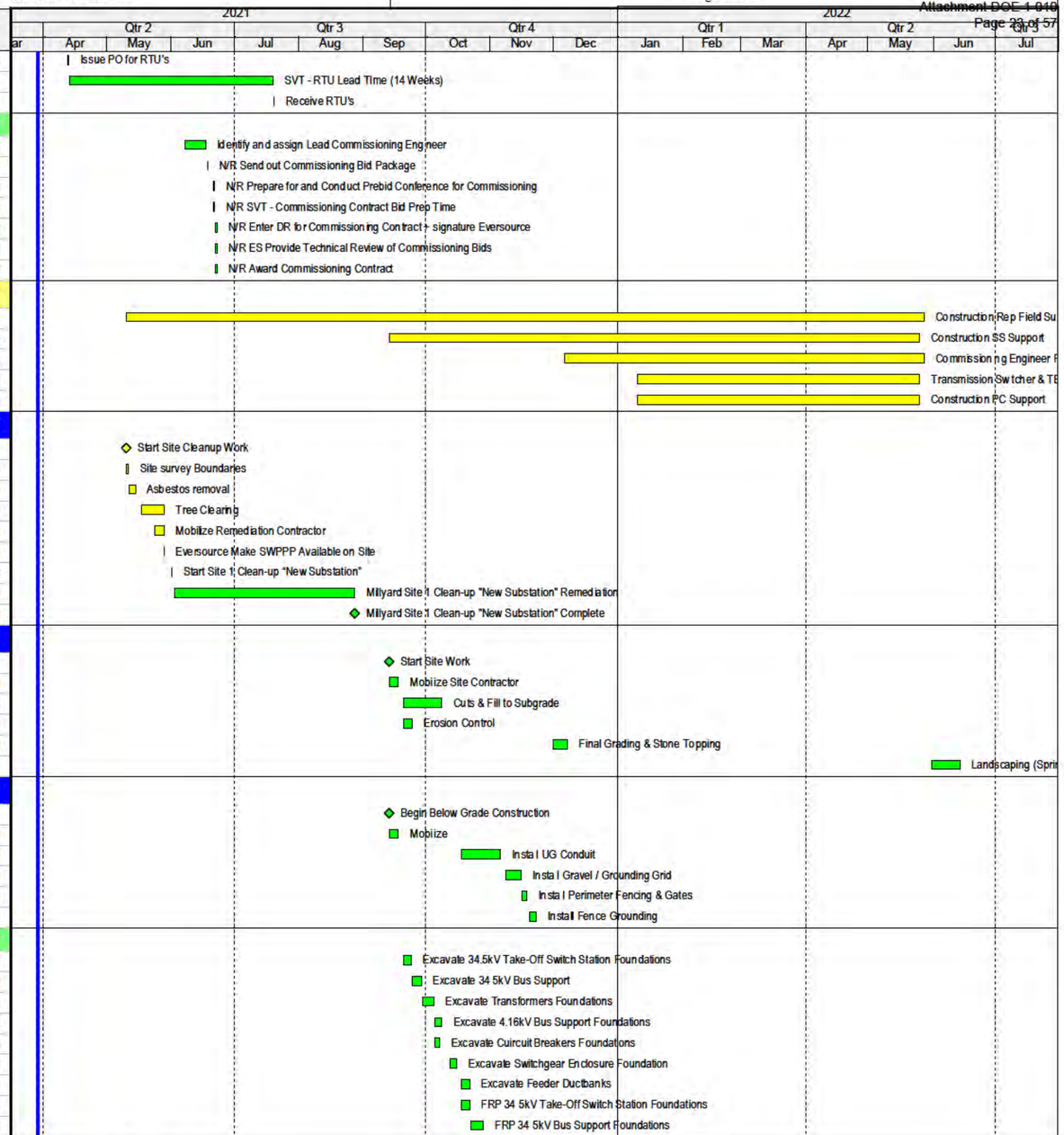
Activity ID	Activity Name	Project Lead	Rem Dur	ES	EF
12176	Issue PO for RTU's	V	1d	12-Apr-21	12-Apr-21
12050	SVT - RTU Lead Time (14 Weeks)	3ULATAA	98d	13-Apr-21	19-Jul-21
11711	Receive RTU's	V	1d	20-Jul-21	20-Jul-21
P&C Service			12d	07-Jun-21	22-Jun-21
11846	Identify and assign Lead Commissioning Engineer	DUHAIKP	9d	07-Jun-21	17-Jun-21
11874	N/R Send out Commissioning Bid Package	ODONEA	1d	18-Jun-21	18-Jun-21
11848	N/R Prepare for and Conduct Prebid Conference for Commissioning	ODONEA	1d	21-Jun-21	21-Jun-21
11850	N/R SVT - Commissioning Contract Bid Prep Time	3ULATAA	1d	21-Jun-21	21-Jun-21
11854	N/R Enter DR for Commissioning Contract + signature Eversource	QUINNW	1d	22-Jun-21	22-Jun-21
11852	N/R ES Provide Technical Review of Commissioning Bids	QUINNW	1d	22-Jun-21	22-Jun-21
11860	N/R Award Commissioning Contract	ODONEA	1d	22-Jun-21	22-Jun-21
CONSTRUCTION			275d	10-May-21	13-Jun-22
Con-Rep	Construction Rep Field Support - S/S	MIREKMS	275d	10-May-21	27-May-22
Con-SS	Construction SS Support	OMANZA	229d	13-Sep-21	25-May-22
Com-Eng	Commissioning Engineer Field Support	V.C.CM	173d	06-Dec-21	27-May-22
7000	Transmission Switcher & TEversourceter Field Support - S/S	CT+M.CR	98d	10-Jan-22	25-May-22
Con-PC	Construction PC Support	SHEGAA	122d	10-Jan-22	25-May-22
Millyard Remediation - Site Clean Up			78d	10-May-21	27-Aug-21
7400	Start Site Cleanup Work	V	0d	10-May-21	
7405	Site survey Boundaries	V	2d	10-May-21	11-May-21
7410	Asbestos removal	V	3d	12-May-21	14-May-21
7415	Tree Clearing	V	10d	17-May-21	28-May-21
7420	Mobilize Remediation Contractor	V	5d	24-May-21*	28-May-21
3102	Eversource Make SWPPP Available on Site	V	1d	28-May-21	28-May-21
7425	Start Site 1 Clean-up "New Substation"	V	1d	01-Jun-21	01-Jun-21
7430	Millyard Site 1 Clean-up "New Substation" Remediation	V	62d	02-Jun-21	27-Aug-21
7435	Millyard Site 1 Clean-up "New Substation" Complete	V	0d		27-Aug-21
Site Construction			188d	13-Sep-21	13-Jun-22
12342	Start Site Work	V	0d	13-Sep-21	
12352	Mobilize Site Contractor	V	5d	13-Sep-21	17-Sep-21
12362	Cuts & Fill to Subgrade	V	15d	20-Sep-21	08-Oct-21
12372	Erosion Control	V	5d	20-Sep-21	24-Sep-21
M1080	Final Grading & Stone Topping	V	5d	01-Dec-21	07-Dec-21
M1090	Landscaping (Spring 2022)	MIREKMS	10d	31-May-22	13-Jun-22
Below Grade Construction			54d	13-Sep-21	30-Nov-21
1590	Begin Below Grade Construction	V	0d	13-Sep-21	
M1010	Mobilize	V	5d	13-Sep-21	17-Sep-21
M1040	Instal UG Conduit	V	15d	18-Oct-21	05-Nov-21
M1050	Instal Gravel / Grounding Grid	V	5d	08-Nov-21	15-Nov-21
M1060	Instal Perimeter Fencing & Gates	V	3d	16-Nov-21	18-Nov-21
M1070	Instal Fence Grounding	V	2d	19-Nov-21	22-Nov-21
Foundations			49d	20-Sep-21	30-Nov-21
FN-1101	Excavate 34.5kV Take-Off Switch Station Foundations	V	4d	20-Sep-21	23-Sep-21
FN-1103	Excavate 34.5kV Bus Support	V	3d	24-Sep-21	28-Sep-21
FN-1107	Excavate Transformers Foundations	V	4d	29-Sep-21	04-Oct-21
FN-1109	Excavate 4.16kV Bus Support Foundations	V	4d	05-Oct-21	08-Oct-21
FN-1112	Excavate Cuircuit Breakers Foundations	V	3d	05-Oct-21	07-Oct-21
FN-1105	Excavate Switchgear Enclosure Foundation	V	4d	12-Oct-21	15-Oct-21
FN-1108	Excavate Feeder Ductbanks	V	4d	18-Oct-21	21-Oct-21
FN-1114	FRP 34.5kV Take-Off Switch Station Foundations	V	4d	18-Oct-21	21-Oct-21
FN-1102	FRP 34.5kV Bus Support Foundations	V	5d	22-Oct-21	28-Oct-21



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NASHUA MILLYARD REBUILD PROJECT SCHEDULE

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Activity ID	Activity Name	Project Lead	Rem Dur	ES	EF
FN-1119	Backfll Take-Off Switch Station Foundations	V	2d	22-Oct-21	25-Oct-21
FN-1117	Backfll 34.5kV Bus Support Foundations	V	2d	29-Oct-21	01-Nov-21
FN-1115	FRP Transformers Foundations	V	5d	29-Oct-21	04-Nov-21
FN-1113	FRP Cuircuit Breakers Foundations	V	2d	03-Nov-21	04-Nov-21
FN-1104	FRP Switchgear Enclosure Foundation	V	5d	05-Nov-21	12-Nov-21
FN-1116	Instal Retaining Wall	V	5d	05-Nov-21	12-Nov-21
FN-1121	FRP 4.16kV Bus Support Foundations	V	4d	05-Nov-21	10-Nov-21
FN-1118	Backfll Switchgear Enclosure Foundation	V	2d	15-Nov-21	16-Nov-21
FN-1120	Backfll Breakers & Transformers Foundations	V	2d	15-Nov-21	16-Nov-21
FN-1106	Bring Site to Grade	V	5d	23-Nov-21	30-Nov-21
Above Grade Construction			117d	08-Dec-21	25-May-22
1740	Begin Above Grade Construction	V	0d	08-Dec-21	
M1100	Set Switchgear	V	2d	21-Jan-22	24-Jan-22
BS-001	Instal Switchgear	V	5d	25-Jan-22	31-Jan-22
FN-1110	Set XFMR's	V	2d	01-Feb-22	02-Feb-22
M1120	Dress Transformers	V	10d	03-Feb-22	16-Feb-22
M1110	Instal Steel	V	5d	10-Feb-22	16-Feb-22
SS-1102	Instal Bus Steel	V	5d	17-Feb-22	24-Feb-22
M1130	Above Grade Conduits	V	10d	17-Feb-22	03-Mar-22
M1140	Above Grade Grounding	V	10d	17-Feb-22	03-Mar-22
M1150	Instal Equipment	V	10d	17-Feb-22	03-Mar-22
M1125	Test Transformers	V	5d	17-Feb-22	24-Feb-22
M1160	Pull Control Cables	V	15d	04-Mar-22	24-Mar-22
M1170	Terminate Control Cables	V	10d	25-Mar-22	07-Apr-22
M1180	Testing & Commissioning	V	20d	25-Mar-22	21-Apr-22
Outages			24d	22-Apr-22	25-May-22
1667	Begin New Millyard Outage Work	MREKMS	0d	22-Apr-22	
LOE_A	Energize New 34.5-4.16kV 10MVA Transformer TX17H	MREKMS	2d	22-Apr-22	25-Apr-22
LOE_B	Energize New 34.5kV Breaker TB17H	MREKMS	2d	26-Apr-22	27-Apr-22
LOE_C	Energize New 15kV Metal Clad Switchgear	MREKMS	2d	28-Apr-22	29-Apr-22
LOE_D	Energize New 34.5-4.16kV 10MVA Transformer TX18H	MREKMS	2d	02-May-22	03-May-22
LOE_E	Energize New 34.5kV Breaker TB18H	MREKMS	2d	04-May-22	05-May-22
LOE_F	Placeholder - Energize (6) Distribution Line Feeders	MREKMS	6d	06-May-22	11-May-22
AC_H1	Placeholder - Schedule Contingency for Outage Work	QUINNW	14d	12-May-22	25-May-22
1679	New Millyard Outage Work Complete	MREKMS	0d		25-May-22
OH Line Construction			82d	01-Nov-21	02-Mar-22
1700	Start 3891 34.5kV Distribution Line Construction	MREKMS	0d	01-Nov-21*	
1705	Relocate 34.5kV 3891 Line to East Side of Nashua Rivera	MREKMS	15d	01-Nov-21	22-Nov-21
1710	Relocate 34.5kV 3891 Line Construction to the new Millyard SS	MREKMS	10d	23-Nov-21	07-Dec-21
1715	Relocate (6) Distribution Line Feeders new get-a-way positions	MREKMS	10d	08-Dec-21	21-Dec-21
1720	Distribution Lines Construction Complete	MREKMS	0d		21-Dec-21
1725	Begin Distribution Lines Energization	MREKMS	0d	17-Jan-22*	
1730	Placeholder - Terminate & Energize 34.5kV 3189 Line	MREKMS	10d	18-Jan-22	31-Jan-22
1735	Cut Over 4kV Feeder	MREKMS	12d	19-Feb-22*	02-Mar-22
1745	Distribution Lines Energization Complete	MREKMS	0d		02-Mar-22
REMOVALS			20d	31-May-22	27-Jun-22
7522	Demolish existing Old Millyard SS	MREKMS	15d	31-May-22	20-Jun-22
7524	Restore existing SS Site after Demolition	MREKMS	5d	21-Jun-22	27-Jun-22
TEST AND COMMISION			20d	25-Mar-22	21-Apr-22
M1185	PLACEHOLDER - Test & Commissioning	V	20d	25-Mar-22	21-Apr-22
PROJECT CLOSE OUT			68d	25-Mar-22	29-Jun-22

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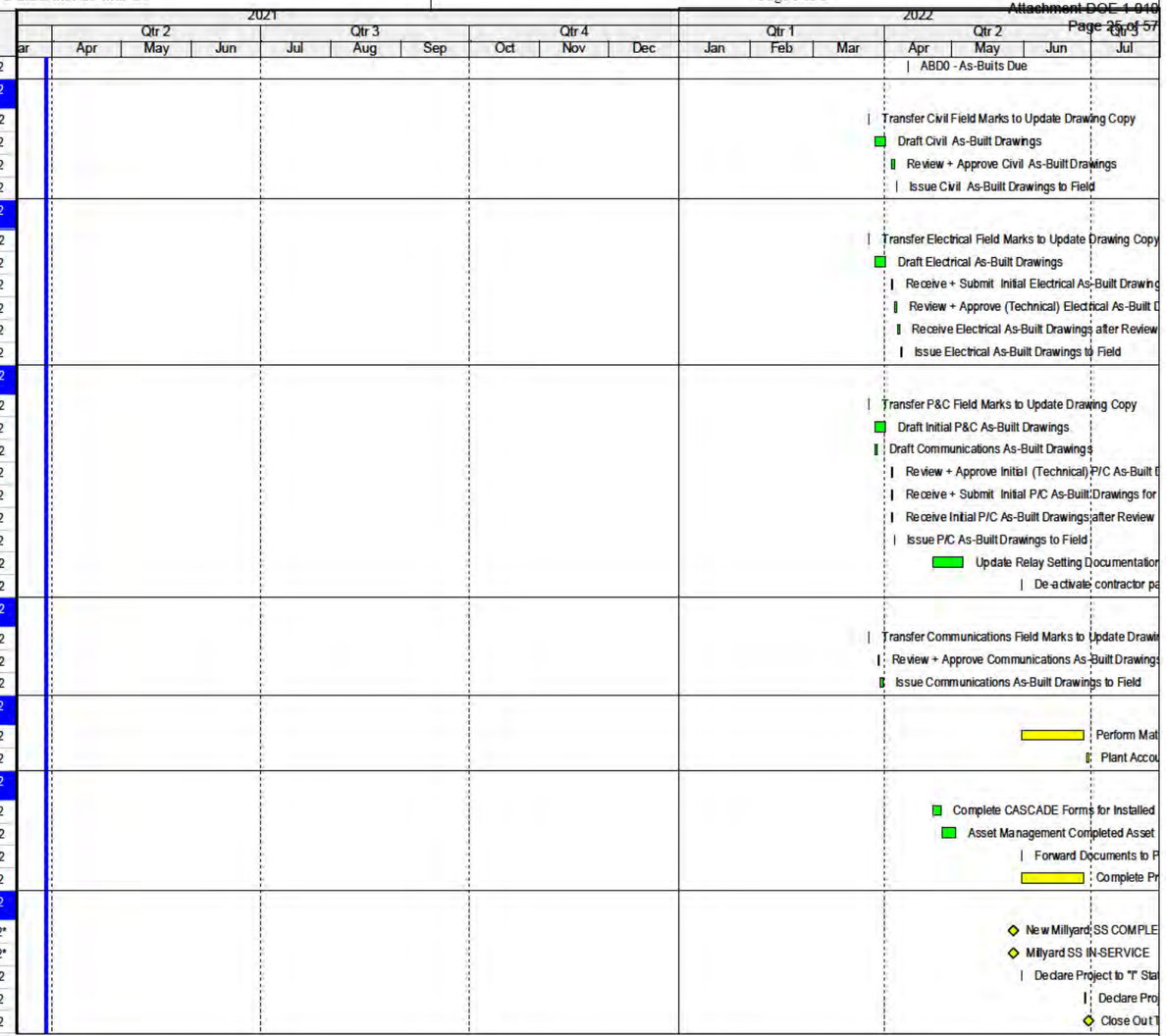
Activity ID	Activity Name	Project Lead	Rem Dur	ES	EF
ABD0	ABD0 - As-Buits Due	MAILLEL	1d	11-Apr-22	11-Apr-22
Civil Close Out			9d	25-Mar-22	06-Apr-22
1083	Transfer Civil Field Marks to Update Drawing Copy	/IREKMS	1d	25-Mar-22	25-Mar-22
1085	Draft Civil As-Built Drawings	V.RLC	5d	28-Mar-22	01-Apr-22
1087	Review + Approve Civil As-Built Drawings	STILLDM	2d	04-Apr-22	05-Apr-22
1089	Issue Civil As-Built Drawings to Field	MAILLEL	1d	06-Apr-22	06-Apr-22
Electrical Close Out			11d	25-Mar-22	08-Apr-22
4444	Transfer Electrical Field Marks to Update Drawing Copy	/IREKMS	1d	25-Mar-22	25-Mar-22
1011	Draft Electrical As-Built Drawings	V.RLC	5d	28-Mar-22	01-Apr-22
1045	Receive + Submit Initial Electrical As-Built Drawings for Review	MAILLEL	1d	04-Apr-22	04-Apr-22
1024	Review + Approve (Technical) Electrical As-Built Drawings	OMANZA	2d	05-Apr-22	06-Apr-22
1056	Receive Electrical As-Built Drawings after Review	MAILLEL	1d	07-Apr-22	07-Apr-22
1016	Issue Electrical As-Built Drawings to Field	MAILLEL	1d	08-Apr-22	08-Apr-22
P&C Close Out			47d	25-Mar-22	31-May-22
1030	Transfer P&C Field Marks to Update Drawing Copy	/IREKMS	1d	25-Mar-22	25-Mar-22
1034	Draft Initial P&C As-Built Drawings	V.RLC	5d	28-Mar-22	01-Apr-22
1040	Draft Communications As-Built Drawings	V.RLC	1d	28-Mar-22	28-Mar-22
1038	Review + Approve Initial (Technical) P/C As-Built Drawings	SHEGAA	1d	04-Apr-22	04-Apr-22
1046	Receive + Submit Initial P/C As-Built Drawings for Review	MAILLEL	1d	04-Apr-22	04-Apr-22
1049	Receive Intial P/C As-Built Drawings after Review	MAILLEL	1d	04-Apr-22	04-Apr-22
1039	Issue P/C As-Built Drawings to Field	MAILLEL	1d	05-Apr-22	05-Apr-22
1031	Update Relay Setting Documentation	SHEGAA	10d	22-Apr-22	05-May-22
3819	De-activate contractor password on protective relays	SHEGAA	1d	31-May-22	31-May-22
Communications Close Out			5d	25-Mar-22	31-Mar-22
1041	Transfer Communications Field Marks to Update Drawing Copy	/IREKMS	1d	25-Mar-22	25-Mar-22
1042	Review + Approve Communications As-Built Drawings	\K MANR	1d	29-Mar-22	29-Mar-22
1043	Issue Communications As-Built Drawings to Field	MAILLEL	2d	30-Mar-22	31-Mar-22
ISO Cost Allocation Close Out (12C)			22d	31-May-22	29-Jun-22
1044	Perform Material Reconciliation & Work Order Analysis	PM.COST	20d	31-May-22	27-Jun-22
Z_STAT	Plant Accounting Places Project in "Z" Status	PM.COST	1d	29-Jun-22	29-Jun-22
Work Order / Financial Close Out			46d	22-Apr-22	27-Jun-22
4438	Complete CASCADE Forms for Installed Equipment	/IREKMS	2d	22-Apr-22	25-Apr-22
1020	Asset Management Completed Asset Update(s) in CASCADE	'ARMENJ	5d	26-Apr-22	02-May-22
4439	Forward Documents to Plant Accounting	QUINNW	1d	31-May-22	31-May-22
4441	Complete Project Closeout Forms (per Project Management Process)	QUINNW	20d	31-May-22	27-Jun-22
Project Management Close Out			22d	27-May-22	29-Jun-22
COMP	New Millyard SS COMPLETE	QUINNW	0d		27-May-22*
ISD	Millyard SS IN-SERVICE	QUINNW	0d		27-May-22*
I_STAT	Declare Project to "I" Status	QUINNW	1d	31-May-22	31-May-22
F_STAT	Declare Project to "F" Status	QUINNW	1d	28-Jun-22	28-Jun-22
END	Close Out Tasks Complete	QUINNW	0d		29-Jun-22



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Project Manager - Walter Quinn

NASHUA MILLYARD REBUILD PROJECT SCHEDULE

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CONSULTANTS IN ACOUSTICS, AUDIOVISUAL AND THEATER

October 15, 2019

Mr. Nicholas Golon, P.E.
TFMoran, Inc.
48 Constitution Drive
Bedford, NH 03110

SUBJECT: Millyard Substation - Relocation
Acoustic Review

Dear Mr. Golon,

At your request, Cavanaugh Tocci has evaluated environmental sound produced by the proposed relocation of the Millyard Substation in Nashua, New Hampshire. It is our understanding that the project involves relocating the existing substation to an adjacent parcel. The relocated substation will replace the existing transformers with two new 12.5 MW transformers. This letter reviews applicable noise regulations and presents the results of computer noise modeling that was used to estimate the acoustic impact of the project.

Noise Regulations

To the best of our knowledge, there are no Federal, State or local noise regulation that define limits for environmental sound produced by the proposed substation relocation Project. As such this evaluation assesses project sound impact in comparison to sound emissions associated with existing substation.

On September 12, 2019, Cavanaugh Tocci visited the existing substation and conducted sound measurements at multiple fence line locations. The objective of these measurements was to quantify and characterize existing sound emissions for the two existing transformers. Based on these measurements, we have determined that the existing transformers have National Electric Manufacturers Association (NEMA) sound rating of 70 dBA. Essentially the NEMA sound rating is the average A-weighted sound level measured at a distance of approximately 1 foot from the transformer (6 feet from fan-cooled surfaces).

Facility Sound Analysis

It is our understanding that two new 12.5 MW transformers will replace the existing transformers at the adjacent parcel as indicated in Figure 1. Sound levels associated with the future operation of the new transformers have been estimated at the nearest occupied properties. For this project, a maximum NEMA sound rating of 61 dBA has been specified for the new transformers. Note that these new transformers will have a NEMA sound rating that is 9 dBA lower than the existing transformers. Figure 2 identifies nearest receptor properties, and Table 1 compares the new substation sound impact with the exiting substation sound impact at these receptors.

Table 1: Summary of Acoustic Modeling Results

Location	Substation A-weighted Sound Level (dBA)	
	Existing Substation	Future Substation
Commercial - North	41	39
Commercial- East	39	30
Commercial - South	53	35
Residential - Northwest	32	24
Residential - Northeast	31	24
Residential - Southeast	31	22

As indicated in Table 1, sound produced by the new relocated Millyard substation is expected to be lower at all surrounding properties. Furthermore, project related sound is not expected to be audible at nearest residential properties.

Sincerely,
CAVANAUGH TOCCI

Douglas Bell

Douglas H. Bell
19203/Millyard Substation Relocation - Acoustic Review.docx

FIGURES

[ONE-LINE DIAGRAM REDACTED]

Figure 1

Figure 2

CAVANAUGHTOCCI

Project Title: Nashua Millyard Substation Re-build	☒	Prior Constructability Review Performed?
	☐	Program Related Site Specific Review?
Project Numbers(s): A17S0301	**Project Constructability Phase:**	
Date(s) of Constructability Review: Click to enter a date Various Dates	☐ Conceptual Engineering Design	
Click to enter a date	☐ Preliminary Engineering Design	
	☑ Detailed Engineering Design	
Project Scope Statement: Millyard SS is a 35.5kV - 4.16kV substation, located in the millyard area of Nashua, NH. Millyard is scheduled to be retired in 2022. A new substation will be built just North of the Old Station. A full environmental study is completed		

Department Review/Walkdown Attendees*:

Required [X]	Attended [X]	Department	Name	Required [X]	Attended [X]	Department	Name
☐	☒	Project Management	Walter Quinn	☐	☐	S/S Engineering	Zac Roman
☐	☐	Asset Management		☐	☒	P&C Engineering	Albi Shegani
☐	☒	Constr. Management	Matt Mirek	☐	☒	Civil Engineering	Dave Still
☐	☒	S/S Technical / LCE	Carl Riecke	☐	☐	Telecom	Rachel Akimana
☐	☐	S/S Operations**		☐	☒	Environmental	Kurt Nelson
☐	☒	Field Engineering	Elizabeth Bradshaw	☐	☐	Real Estate	
☐	☒	Line Engineering	Joseph Sperry	☐	☐	T&D ROW	
☐	☐	Vegetation Management		☐	☐	Survey Engineering	
☐	☐	Siting		☐	☐	Cost Estimating	
☐	☐	Safety		☐	☒	Outreach (SCS)	Sarah Hoodlet
☐	☐	SCADA		☐	☐	Material Procurement	

*** Sign-off in the table above for the Detailed Engineering Design Constructability Review indicates that all Action Items/Concerns from prior Constructability Reviews have been mitigated/resolved as documented in this form. Not every department is required to attend walkdowns for every project but should be consulted for project impact considerations**

** Internal Eversource Substation Operations must be included in the review even if external construction resources are planned

[Project Manager] certifies that this review was performed to completeness, that all applicable departments were informed of the project and have had opportunity to provide input to this review:

Walter Quinn/ *Walter Quinn* 2 April 2021

Name / Signature *Date*

Documents available for use prior to Constructability Review					
[X]	Document	[X]	Document	[X]	Document
☒	Initial Scope -Birdseye site plan -General Arrangement	☒	Preliminary Drawings -Civil Site Drawing -Electrical Drawing -Section Drawings	☒	Prints in hand for marking up -Panel Front/Read View -Control Enclosure Layout -Floor / Wall Plans
☒	Detailed Scope Document	☒	Proposed Schedule	☐	Construction Sequence/Timeline
☐	Previous Notes / Comments / Observations	☒	Major Material / Equipment List	☐	Replace / Reuse of equipment

Action Items and Resolutions:

Item No.	Const. Review Action Item/Concern	Design Resolution/Mitigation:
1		
2		
3		
4		
5		

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
A	**Engineering & Asset Management**		
1	**Scope of Work** - Is scope adequately developed and sufficiently detailed for intended deliverable? - Any complimentary projects or other adjacent obsolete equipment for inclusion? - Any overlapping projects that could impact work/outages? - Consider Physical Installation, P&C Scope, Civil Scope, Engineering studies, Design standard adherence - Any remote station impacts? - Engineering Estimates for Design and Technical Support? (EE and EOC) Total Project	☐	The scope is well known and the only overlapping will be the new distribution lines(Project # A20A02) to support the cutovers for energization.

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
2	**Materials Identified/Ordered** -Any concerns with BOM/Major Materials? Review BOM lead times and project need dates -Specialty Major Materials: Identify Specialty Equipment & Materials potentials - temporary/replacement - long lead items? -Any Materials needed to facilitate construction access?	☐	Major materials are the Transformers and the switchgear which have very long lead times of 42 weeks and 32 weeks respectively
3	**Control House** - Review Unmapped equipment interferences, Control/Battery Enclosure Layout, HVAC System (if equipment added), space for new or modified equipment, AC / DC station breaker availability and service loading, Panel Space, Expansion, one-line and/or riser type panelboard drawings, other..	☒	
4	**Ratings & Dimensions** for Major Equipment. Any concerns upon field review? Equipment Rating One Line (and/or equipment thermal ratings tables) - Review for any errors in field	☒	
5	**Wall, Fence, Gate, and Foundation Considerations** -Any permanent / temporary alterations or relocations required? -Pre-Project Sound Measurements Needed? Sound Walls? -Take measurements for Foundation quantities, dimensions and concrete volumes -CIP Review/Ballistic needs. Any Physical Security Requirement Consideration? -Assess condition of existing yard equipment foundations and viability for reuse (if proposed) -Review station expansion areas (if needed) for structures, old foundations, etc. -Any Steel Structural Plan Considerations? -Any impacts to construction plan?	☐	All new substation at new site (Vacant Lot) - old station will be razed upon energization no asset recovery old equipment is over 60 years old.
6	**Below Grade / Enclosure Raceway** - If possible, evaluate existing raceway and review spacing requirements. Review for any subsurface investigation needs or potential below grade obstructions. GPR/test pits needed? Geotechnical Investigation - is soil boring or resistivity investigation needed?	☐	resistivity study complete

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
7	**Underground Obstructions** -Drawing review concerns? -Is preconstruction or test excavation needed? -Is reuse of underground control cables / Conduits /replace Non-Shielded Cable feasible (if applicable) -Are spare conduits available? Are they useable? -Review if any areas will need to be plated for increased load bearing for equipment access (i.e. large Xfmr, etc.)	☒	All new construction, no re-use or conduits is proposed. A full environmental study isis completed
8	**Grounding Plan (Ground Grid)** - Will footprint impact layout or other equipment? Identify locations to improve grounding. Impacts to foundations and ground grid plans. Observations on wetlands or ability to perform tests	☒	All new grounding plan
9	Nomenclature / Switching One-Line Diagram -Any obvious deviations from diagrams provided?	☒	
10	BPS Separation Requirements - Is this BPS Substation? Y/N (part of PAF) - Changes to pre-existing BPS standards?	☒	
11	IEC 61850 Substation Automation and Communication Requirements - Any Impacts/Retrofit needed?	☒	
12	Any Upgrades to ES Standards - Is retrofit needed to bring up to ES standards? Can that be done?	☒	
B	**Construction**		
1	**Any safety hazards specific to the facility? i.e. Low Bus, Deterioration, etc.**	☒	
2	**Prior known Site Specific Conditions** -Common or Obvious station Issues -Missing scope items that could impact costs?	☒	
3	**Identify/Consider Required Depts for Construction?** -Who is constructor: Internal vs External Resources -S/S Ops, GO, Test, Field Engineering, etc	☐	Prime Contractor will be external. Will need External Testing company and Engineer of record can provide Field engineering if required

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
	-Specialty Contractors Required? -Required Oversite Needed - Estimated level of CR and LCE support needed		Contractor to remove asbestos waste and Contractor to remove contaminated soils
4	**Site Plan, Access, and Temporary Construction Facilities:** -Confirm maintenance access for proposed new or replaced equipment -Verify clear footprint for yard equipment / Property Plan -General access to site, can areas outside substation be utilized? -Substation Entry Plan (driveway and drive path modifications) - Identification of Unique Requirements, i.e. (access bridges, station service, etc.) -Site Development Plan (grading and drainage) with Cut/Fill -Existing Rock Conditions? Potential Impacts (rock quantity)? -Any police details needed for deliveries, restricted hours, and/or need for extended hour approvals -Any Sanitary Civil Requirements? (Septic tanks, etc) -Review turning radius for delivery trucks (if critical) -Any Substation Access and site/yard access Limitations? -Office Trailer Needs: Facilities, Utilities, Restroom, Container, Dumpster Space -Weather impacts to Site (Snow Placement) -Identify Material Laydown and Security -Where will new vs removed equipment go? -Construction permit for trailers outside substation fence?	☐	This will be a vacant lot/ new site with good access from main roads. The site analysis found no rock or ledge concerns.Police details will only be required upon delivery of the Transformers and switchgear. No extended work or weekends required.
5	Unique Equipment Considerations: Gas insulated substation, Gas insulated line, Gas insulated bus, Pass Breaker, Statcom, Sync Condenser		Not applicable

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
6	**Outage & Energization Plan and Construction Sequence:** *Review electrical working clearances for equipment during construction, Detailed look at protection zone changes, Locked sequence or random outages, Outage durations minimized.* ***Considerations:*** -Approach Distances – Outage Requirements to maintain electrical clearances throughout proposed installation -Distribution Clearances -Clearance Holder Assignments -Drawings vs Field Conditions -Outage boundaries and interconnections -Phased approach needs for additional mobilizations -Verify outage sequence supports the planned construction sequence and timeline. (Lead Commissioning Engineer "LCE", Substation Operations, and Outage Planner input) -Any design alterations or considerations to Eliminate SCLL Conditions, Reduce Recall Time, Reduce Outage durations, Special Conditions -Additional outage requirements: Railroad Catenaries, Fiber outage, SCADA outage, Relay permissions -Seasonal or weather conditions impacts	☐	This is on a vacant lot, new site and will have the cutovers completed only at the end of the project no need for clearance concerns - a load bank will be used for the switchgear during the final cutovers. The old substation will be in operation until the new substation is energized.
7	**Equipment Testing & Acceptance** -Grounding plans / Resources? Will we need grounds hung? -Hi-pot testing and where will the equipment be set up?	☐	
8	Need for mobile generator and where connected (if needed)	☒	
9	Need for mobile battery and where connected (if needed)	☐	Load Bank will be used for switchgear to support cutovers
10	OT work required or Notable Permit Conditions (special hours)?	☒	
11	Coordination of boundaries/seams (Identification of point of demarcation for connection to existing equipment and/or for coordination with other municipalities)	☒	

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
C	**Environmental**		
1	Soil Pre-Characterization or Grab Sampling Completed/Planned	☐	A full environmental study has been completed
2	**Desktop investigation and EAD Review** -Required Permits -Stormwater Considerations -Dewatering requirements -Wetland and buffer review	☐	All permits issued - Storm water and dewatering covered in SSWP report issued
3	Risk or presence of PCB's/Asbestos/Lead/SF6	☐	Asbestos shingles will be removed by specaility contractor
4	Transformer Spill Containment Recommended?	☐	SorbWeb Plus a secondary oil containment system
5	Expanding Footprint / New Buildings or future Expansion Plans? (Enviro Impact)	☒	N/A
6	Environmental oversight considerations? (Inspection type/Interval)	☐	The project will have GZA provide oversight during the environmental Clean-up and the site during general construction
7	Environmental mitigations - Any matting or seasonal needs? Review D&M Plan with CR.	☐	This will only require the normal environmental controls
D	**Siting, S&CS, and T&D Real Estate**		
1	**Any regulatory concerns or approvals needed?** - Consider scope/design alterations to mitigate concerns - Consider Visual screening considerations (feasibility or location) -Zoning Relief and Permits required	☐	Permits have been obtained Vegatation Cover in one area for a near by office facility has been agreed too.
2	**Neighbor/Abutter impacts:** - Any noise, visual impacts, or sensitive abutters - Any changes to lighting or additional lighting needed?	☐	This is an industrial area, no noise sensitivity anticipated; several businesses in the area may be impacted by road closures for deliveries, post in advance when closures exceed 1-hour
3	Review for roadway, gate access, trailers, equip height, noise, weekend/night work, or any potential public disturbance related to work	☐	No night work or weekends required and limited trailers and site will be fenced Nashua work hours: 7am-5pm, M-F
4	Installation within Eversource Rights - Is Rights and Restrictions Review required?	☐	New easements/rights have been acquired or are in the process of being acquired
5	Expanding Footprint / New Buildings or future Expansion Plans?	☒	N/A
6	Proposed Equipment on same property? - Any Encroachments	☒	This will be a new site no encroachments

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
F	**Protection & Controls**		
1	Panel Graphic additions and/or Modifications	☒	
2	Space on existing panels for new equipment? (front & rear of panel fronts)	☒	
3	Panel fronts conform to drawings	☒	
4	Access to bring new panels into control enclosure	☒	
5	Nameplate list and location of nameplates	☒	
6	Verifies that relays and meters that will be an interconnected project work are as shown on the drawings.	☒	
7	Temporary protection, relays, control cable needed? How long will they be required?	☒	
8	Will relay setting changes be needed? Any additional outage requirements for changes?		This is will be a vacant lot to on build with new Switchgear
G	**Telecom Engineering**		
1	Review telecom equipment in existing control enclosure	☒	
2	Review path to get telecom circuits into the station and paths within the control house. Determine whether new underground duct or overhead tray work is needed.	☒	
3	Review current or proposed Telecom equipment power connections and validate with P&C any need for system 1 and system 2 separation.	☒	
4	Review current Telecom fiber diversity and validate with P&C any fiber diversity requirements.	☒	
5	Review and list any remote station impacts/updates	☒	
6	Confirm whether correct interface equipment is available (i.e.) for fiber termination or multiplexor termination	☒	
7	Confirm whether existing communications cabinets are enough to support additional telecommunications equipment installed	☒	

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
8	Review space for any required additional communications cabinets which may be required to support additional telecommunications equipment installed	☒	
9	Review third party Telecommunications at substation and confirm whether additional capacity or Ground Potential Rise protection is required	☒	

Photos

(Ex. Equipment control cabinet, Breakers, MODs, CCVTs, PTs, Transformers)

Operations Project Authorization Form

Approved at April 15, 2020 EPAC
Link to Meeting Minutes

Date Prepared: May 18, 2020	**Project Title: Millyard SS Replacement**
Company/ies: Eversource NH	**Project ID Number: A17S03**
Organization: NH Operations	**Class(es) of Plant: Distribution Substation**
Project Initiator: Thelma Brown	**Project Category: Stations - Reconfiguration**
Project Manager: Walter Quinn	**Project Type: Specific**
Project Sponsor: Paul Melzen	**Project Purpose: Replace the existing Millyard SS**
Estimated in service date: December 28, 2021	**If Transmission Project, PTF/Non-PTF: NA**
Eng. / Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan: Yes**
Authorization Type: Partial Funding	**O&M Expenses Part of the Original Operating Plan: NA**
Total Request: $1.744M	

Financial Requirements:

Executive Summary

Initial funding of $1M was approved in PowerPlan on July 20, 2017 to go forward with the engineering for site design, subdivision of City property, and acquisition of the property for the construction of a new Millyard substation in Nashua, NH.

As of the end of April 2020, the project has invested $983K. The attached excel file provides full detail by vendor on funds spent through April 2020. Categorically the funds to date have been to support conceptual design for site planning, easement development, environmental investigation on two (2) parcels of land and 30% design civil/electrical packages. To date, site design is complete and final site plans have been approved, the subdivision has been approved by the City of Nashua and the Purchase and Sales agreement for the land swap has been signed by both parties. Engineering design for the metalclad switchgear, two (2) Transformers and associated interfaces is in development. Civil/Electrical 70% package will be available in July 2020. Due to design inconsistencies with the switchgear schematics and the Transformers the 70% P&C design package is delayed until January 2021. The P&C 70% design package has slipped 60 days due to additional reviews of the switchgear front views, mechanical and schematics shop drawings and a duration error in the schedule logic to produce wiring design – the Eversource schedule originally used 5 weeks when it should have been 10 weeks to complete all wiring. The cost and schedule have been greatly impacted by the quality of shop drawings submitted by the Transformer and Switchgear suppliers.

An environmental investigation has been completed to determine the extent of soil contamination on the site, including test pit excavation with soil sampling and analysis. A final report with the results has been issued and costs associated with soil disposal will be included in the full funding request.

This Project Authorization Form (PAF) is requesting an additional $0.744M for a partial funding total of $1.744M to complete the engineering design to the 70% stage, at which point a full funding PAF will be presented for approval in February 2021. The original initial funding of $1M did not consider that shop drawings for the transformer and the switchgear would require 10% down payments to obtain the drawings, which increases the direct costs by $262K and the indirect costs of $160K to complete 70% engineering.

The overall project cost is forecast at $8.595M and construction is anticipated to begin in early 2021 assuming EPAC full funding approval in February 2021.

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	Spent through 4/30/20	May - January 2021	Totals
Capital Additions - Direct	$845	$674	$470	$1,144
Less Customer Contribution	$	$	$	$
Removals net of Salvage ____%	$	$	$	$
Total - Direct Spending	$845	$674	$470	$1,144
Capital Additions - Indirect	$140	$278	$236	$514
Subtotal Request	$985	$952	$706	$1,658
AFUDC	$15	$31	$55	$,86
Total Capital Request	$1,000	983	$761	$,1744
O&M	$	$		
Total Request	$1,000	$983	$761	$1744

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Spent through 4/30/20	May - January 2021	Totals
Straight Time Labor	$96	$55	$151
Overtime Labor	$	$	$
Outside Services	$555	$223	$778
Materials	$	122	$122
Other, including contingency amounts (describe)	$23	$70	$93
Total Direct Costs	**674**	**$470**	**$1,144**
Indirect Capital Costs	Spent through 4/30/20	May - January 2021	Totals
Indirects/Overheads (including benefits)	$278	$236	$514
Capitalized interest or AFUDC, if any	$31	$55	$86
Total Indirect Costs	**$309**	**$291**	**$600**
Total Capital Costs	**$983**	**$761**	**$1,744**
Less Total Customer Contribution	$	$	$
Total Capital Project Costs	**$983**	**$761**	**$,1,744**
Total O&M Project Costs	$	$	$

Note: Explain unique payment provisions, if applicable:

Other/Contingency includes: Easements ($65K) and Property Taxes ($20K).

Future Financial Impacts:

Provide below the estimated future costs that will result from the project: N/A
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:
NA

What functional area(s) will these future costs be funded in? NA

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: N/A
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:
NA

What functional area(s) will these benefits be reflected in: N/A

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: Yes. There has been an evaluation of the existing substation site and the adjacent land where the new substation will be constructed. An environmental investigation has been completed, including test pit excavation with soil sampling and analysis. A final report with the results has been provided.

The soils analysis did not find contamination levels to exceed what was expected from the earlier desktop analysis. Eversource has asked the City of Nashua to consider allowing the soils that are disturbed be accepted at the City's remedial land fill to reduce the cost of disposal. As of April 14, 2020, a rejection response from the City was received. A meeting on April 28th to discuss alternatives with the Mayor was held, resulting in agreement that the city would review other possibilities to mitigate our costs. The estimated cost to clean the existing substation parcel is approximately $290K. The cost to remediate the City parcel is approximately $500K. These costs assume soil disposal at a commercial landfill, other than the City's landfill and therefore, the higher estimate for soil disposal.

Technical Justification:

Project Need Statement

Millyard SS is a 34.5kV-4.16kV substation, located in the Millyard area of Nashua, NH. Millyard SS is scheduled to be retired in 2021. The existing Substation feeds more than 2,700 customers. The existing substation transformers are 67 and 70 years old. This is a unit substation with the switchgear attached with throat connections to the transformer. The failure of a transformer and replacement with a spare top bushing mounted transformer is not ideal in an emergency. The switchgear is the same vintage as the transformer and will also be replaced. The existing feeders have experienced failures and the circuit risers require a rebuild. Several circuits rise on a single pole and are therefore subject to exposure for multiple circuit outages for a single event on the pole. The existing substation and line configuration are pictured below:

Eversource completed a Distribution System Study for the 4.16kV system in downtown Nashua in March 2016. This study supports the rebuild of the Millyard SS with two (2) 34.5-4.16kV transformers and six (6) feeder circuits. The study recommended two (2) 5MVA transformers but the design criteria has since been updated so two (2) 10 MVA transformers are now

required. This will support continued load growth in the Nashua Millyard and provides a reliable backup to other 4.16kV circuits normally fed from other substations.

Project Objectives

1. Retire aging infrastructure

In order to replace the existing equipment, it is recommended that the Millyard SS be completely rebuilt.

The new substation will have a transformer with top mounted bushings connected to the metalclad switchgear instead of a unit substation. This is all standard Eversource equipment.

2. Masterplans

The City of Nashua has been developing a Waterfront Plan to encourage further development in this area. The Broad Street Parkway, which opened in December 2015, is a road bringing more traffic directly to the Nashua Millyard. Eversource's existing Millyard SS is in the middle of two (2) City properties. The City is interested in moving the Eversource SS to the Northwest corner of their property and procuring the Eversource Property. Eversource negotiated with the City on this arrangement and has executed a Purchase and Sales Agreement which has been signed by both parties. The original closing date was March 31, 2020. However, Eversource has requested to extend the closing date to May 26, 2020 because of the delay in procuring easements. Eversource's request has been accepted and signed by both parties. The actual land transfer is scheduled to take place December 31, 2021, upon energization of the new substation and the final removal of the old substation.

Project Scope

A new substation is proposed to be built on property adjacent to the existing SS. This will be a 34.5-4.16kV substation with two (2) 10MVA transformers and six (6) feeder Circuits. The property for the new substation is currently owned by the City of Nashua. A Constructability Review was completed based on several site walk downs (see Attachment 2).

Major Equipment To Be Removed

1. All equipment in the existing Millyard SS including the fence and foundations.

Major Equipment To Be Added

1. Two (2) 34.5kV Vacuum Breakers
2. Two (2) 34.5-4.16kV 10/12.5MVA transformers

3. Switchgear lineup with ten (10) 4.16kV breakers (Six (6) feeder breakers, one (1) bus tie breaker, two (2) low-side transformer breakers, one (1) spare /mobile connection breaker)
4. Disconnect Switches
5. Current Transformers
6. Bus PTs
7. Disconnect switches
8. Primary and Alternate Station Service
9. Control house and associated equipment
10. Equipment cabinets in the control house
11. Control Cables
12. Conduits
13. Various wire, mounting brackets and connectors
14. Animal protection
15. Ground grid and fencing
16. Equipment foundations
17. Structural Steel for the 34.5kV equipment
18. Site plantings for screening
19. Underground feeder getaways from the SS to the poles along the street
20. Rerouting of 34.5kV lines and associated easements

Background / Justification

Eversource completed a Distribution System Study for the 4.16kV system in downtown Nashua in March 2016. This study supported the rebuild of the Millyard SS with two (2) 5 MVA 34.5-4.16kV transformers and six (6) feeder circuits. Alternative 4 (see below) is the recommended solution.

Since that time, the transformers have been uprated to 10MVA to satisfy the design criteria and address load growth prior to the rebuild of Front Street SS. The location of the substation has also changed from Spine Road to a City owned lot adjacent to the existing substation because the Spine Road lot was unsuitable for construction. As noted above, Eversource has a signed Purchase and Sales Agreement to rebuild on the City owned property adjacent to the existing substation.

Business Process and / or Technical Improvements:

This project will improve the reliability of the distribution system in the City of Nashua. The potential failure of 67 and 70-year-old transformers will be eliminated. The reliability of the underlying distribution system will be improved by strengthening the 4kV system which will provide the ability to utilize distribution automation to effectively minimize the customer impact of unexpected outages.

Alternatives Considered with Cost Estimates

These Alternatives were considered in the Nashua 4.16-kV Distribution System Study. These alternatives, descriptions, and estimates are directly from the report, in which Alternative 4 was selected. This planning study was completed three (3) years ago and the cost estimates for the non-chosen Alternatives have not been updated. However, the current estimate for the chosen Alternative 4 is $8.7M for the Millyard SS rebuild. In the study, the cost for the Millyard SS was $5.3M. The cost estimate for building a new Millyard SS has increased by $3.4M. Major factors for the cost increase include:

- Environmental cleanup costs now that the site has been evaluated ($800K). This includes costs associated with the existing Eversource SS site and the City site, which Eversource has negotiated with the City to remediate.
- Transformer costs due to current pricing and a larger size ($700K)
- Construction costs based on current pricing ($400K)
- Incremental costs for Testing and Commissioning based on current estimates ($300K)
- Indirects based on increased direct costs and current numbers ($700K)

The expectation is that all of the alternative cost estimates have increased accordingly since the study three (3) years ago. All alternatives include building a new Millyard SS, which is now estimated at $8.7M. It is expected that the rebuild of Front Street SS or a new Nashua Drive SS, also part of the alternatives, would increase based on current transformer, construction, and testing and commissioning cost estimates for this work.

In the last two (2) years the Millyard SS rebuild, as the first phase of Alternative 4, has been better defined and is proposed and estimated for this project. The Millyard SS Rebuild is the subject of this PAF. The Front Street SS Rebuild project will be the next phase of substation construction following the completion of Millyard SS. A separate project will be initiated for the Front Street Rebuild in 2020.

For all Alternatives, the Solution Estimate is based on the substation components from Appendix B in the System Study. No distribution linework is included in these estimates; Rough Order of Magnitude (ROM) is $2 to 3M and will be covered by a separate funding request.

Below is the matrix for rating the alternatives that is in Appendix C of the System Study. The cost for the preferred Alternative 4 and the second preferred Alternative 2 are the same as the first step is the rebuild of Millyard SS.

Appendix C: Decision Matrix

	Weight	Rating 4-5 Superior, 2-3 = Adequate, 0-1 = Inferior						
		Option 1 Front Street & Millyard Tech	Option 2 Front Street & Millyard Assoc.	Option 3 Nashua Drive & Millyard Tech	Option 4 Nashua Drive & Millyard Assoc.	Option 5 Millyard Tech & Millyard Assoc.	Option 6 Millyard Tech	Option 7 Millyard Assoc.
Addresses ED-3002 Design Criteria	8	4	4	4	4	4	3	3
Addresses Area Load Growth (Long Term, 10 Years)	8	5	5	5	5	5	4	4
Improves Reliability: SAIDI	8	3	4	3	4	3	2	2
Project Cost	7	3	3	3	3	3	4	4
Environmental Impact	5	4	3	4	3	3	4	3
Contingency Solution	5	3	3	4	4	3	0	0
Power Quality Improvement (SARFI-70)	4	4	4	4	4	4	3	3
Operating Cost	3	3	3	3	3	3	4	4
System Loss Savings	3	3	5	3	5	4	3	3
Total		**186**	**195**	**191**	**200**	**184**	**153**	**148**
Rank		**4**	**2**	**3**	**1**	**5**	**6**	**7**

Alternative 1: Front Street & Millyard Technology Park (This option is **not** recommended)

This option replaces Front Street Substation with a new substation at the Front Street parking lot and replaces Millyard Substation with a new substation at the Millyard Technology Park parking lot.

The substation on Front Street would be constructed with a single 5 MVA 34.5-4.16 kV transformer, while the substation at the Millyard Technology Park would be constructed with two (2) 5 MVA 34.5-4.16 kVA transformers.

Relocating Millyard Substation to the Millyard Technology Park parking lot would require five (5) circuits to share a single pole line for an additional 0.3 miles, increasing exposure with the risk of lowering reliability due to the potential of tree contact and vehicle accidents.

With use of the Front Street parking lot, circuit configuration and construction is minimal for replacement of Front Street Substation.

Two-Transformer SS Replacement for existing Millyard SS: $5,300,000
One-Transformer SS Replacement for existing Front St SS: $1,900,000
Distribution Line Work: Not included in solution estimate, ROM of $2 to 3M.
Solution Estimate: $7,200,000

Alternative 2: Front Street & Millyard Associates (This option is **not** recommended)

This option replaces Front Street Substation with a new substation at the Front Street parking lot and replaces Millyard Substation with a new substation at the property owned by Millyard Associates on Spine Road.

The substation on Front Street would be constructed with a single 5 MVA 34.5-4.16 kV transformer, while substation at the Millyard Associates property would be constructed with two (2) 5 MVA 34.5-4.16 kVA transformers.

This option would have the least impact on the distribution system compared to the other options presented. With so few changes, this option is the closest to today's system configuration.

Two-Transformer SS Replacement for existing Millyard SS: $5,300,000
One-Transformer SS Replacement for existing Front St SS: $1,900,000
Distribution Line Work: Not included in solution estimate, ROM of $2 to 3M.
Solution Estimate: $7,200,000

Alternative 3: Nashua Drive & Millyard Technology Park (This option is **not** recommended)

This option replaces Front Street Substation with a new substation at the Nashua Drive parking lot and replaces Millyard Substation with a new substation at the Millyard Technology Park parking lot.

The substation on Nashua Drive would be constructed with a single 5 MVA 34.5-4.16 kV transformer, while substation at the Millyard Technology Park would be constructed with two (2) 5 MVA 34.5-4.16 kVA transformers.

Relocating Millyard Substation to the Millyard Technology Park parking lot would require five (5) circuits to share a single pole line for an additional 0.3 miles, increasing exposure with the risk of lowering reliability due to the potential of tree contact and vehicle accidents.

With use of the Nashua Drive parking lot, circuit reconfiguration is minimal for replacement of Front Street Substation. The 9H2 would be split into two (2) circuits at the location of the new substation. One new circuit would feed Crown Hill while the second would feed Main Street south of the river and Front Street (9H1).

Two-Transformer SS Replacement for existing Millyard SS: $5,300,000
One-Transformer SS Replacement for existing Front St SS: $1,900,000
Distribution Line Work: Not included in solution estimate
Solution Estimate: $7,200,000

Alternative 4: Nashua Drive & Millyard Associates (This **is the recommended** option**)**

This option replaces Front Street Substation with a new substation at the Nashua Drive parking lot and replaces Millyard Substation with a new substation at the property owned by Millyard Associates on Spine Road.

The substation on Nashua Drive would be constructed with a single 5 MVA 34.5-4.16 kV transformer, while substation at the Millyard Associates property would be constructed with two (2) 5 MVA 34.5-4.16 kVA transformers.

This option would have the least impact on the distribution system in the Millyard area. With use of the Nashua Drive parking lot, circuit reconfiguration is minimal for replacement of Front Street Substation. The 9H2 would be split into two (2) circuits at the location of the new substation. One new circuit would feed Crown Hill while the second would feed Main Street south of the river and Front Street (9H1).

Two-Transformer SS Replacement for existing Millyard SS: $5,300,000
One-Transformer SS Replacement for existing Front St SS: $1,900,000
Distribution Line Work: Not included in solution estimate, ROM of $2 to 3M.
Solution Estimate: $7,200,000

Note that subsequent to the report, this was updated to have two (2) 10/12.5MVA 34.5-4.16kV transformers at a location adjacent to the existing substation instead of at Spine Road.

Alternative 5: Millyard Technology Park & Millyard Associates (This option is **not** recommended)

This option replaces Front Street Substation with a new substation at the Millyard Technology Park parking lot and replaces Millyard Substation with a new substation at the property owned by Millyard Associates on Spine Road. Distribution System Study: Nashua 4.16 kV

The substation at Millyard Technology Park would be constructed with a single 5 MVA 34.5-4.16 kV transformer, while substation at the Millyard Associates property would be constructed with two (2) 5 MVA 34.5-4.16 kVA transformers.

The existing 18H1 line, which is double-circuited around the Millyard Technology Park building, would make for an ideal “bus tie” between the two substations, however this would require the 18H1 to be transferred to the new substation in the Millyard Technology Park parking lot. With the combined loading of the 9H1, 9H2, and 18H1, recent historical loading would have already exceeded 85% of the transformer TFRAT rating. This would mean that two (2) new river crossings would be needed to be able to feed the 9H1 and 9H2 from the new substation.

With use of the Millyard Associates’ property, circuit configuration and construction is minimal for replacement of Millyard Substation.

Two-Transformer SS Replacement for existing Millyard SS: $5,300,000
One-Transformer SS Replacement for existing Front St SS: $2,000,000
Distribution Line Work: Not included in solution estimate, ROM of $2 to 3M.
Solution Estimate: $7,300,000

Alternative 6: Millyard Technology Park (This option is **not** recommended)

This option consolidates the existing Millyard and Front Street Substations into one new substation located at the Millyard Technology Park parking lot. The 9H2 would be split in half at the disconnects located at the Nashua River crossing, with load being transferred to the 17H3 and 18H3 circuits.

Line work would be required to extend both Millyard circuits to reach the 9H2. The 18H3 would need a new river crossing with the 18H1 and 3891, easily tying into the 9H1 once reaching Charles Street. The 17H3 would require a new crossing of Main Street at Factory/Temple Street.

Relocating Millyard Substation to the Millyard Technology Park parking lot would require five (5) circuits to share a single pole line for an additional 0.3 miles, increasing exposure with the risk of lowering reliability due to the potential of tree contact and vehicle accidents.

Two-Transformer SS Replacement for existing Millyard and Front St Substations: $5,300,000
Distribution Line Work: Not included in solution estimate, ROM of $2 to 3M.
Solution Estimate: $5,300,000

Alternative 7: Millyard Associates (This option is **not** recommended)

This option consolidates the existing Millyard and Front Street Substations into one (1) new substation located at the property owned by Millyard Associates on Spine Road. The 9H2 would be split in half at the disconnects located at the Nashua River crossing, with load being transferred to the 17H3 and 18H3 circuits.

Line work would be required to extend both Millyard circuits to reach the 9H2. The 18H3 would utilize the second run of the 18H1 to get around the Millyard Technology Park building and then need a new river crossing with the 18H1 and 3891, easily tying into the 9H1 once reaching Charles Street. The 17H3 would require a new crossing of Main Street at Factory/Temple Street.

Two-Transformer SS Replacement for existing Millyard and Front St Substations: $5,300,000
Distribution Line Work: Not included in solution estimate, ROM of $2 to 3M.
Solution Estimate: $5,300,000

Project Schedule

Milestone/Phase Name	Estimated Completion Date
SDC Approval - Completed August 30, 2019	June 10, 2019
Obtain Site Plan Approval City and State Permits Approval – Completed	July 2019 – November 2019
EPAC Approval - Partial Funding	April 2020 - June 2020
EPAC Approval - Full Funding	February 2021
Engineering 70% Completion - Focus of this partial funding request	January 2021
Engineering IFC Complete	March 2021
Construction Contractor - Secure Building Permit	April 2021
Construction – Start 5/3/21	May 2021
Test & Commissioning	December 2021
In-Service	December 28, 2021
Project Closeout	January 31, 2022

Regulatory Approvals

The Site approvals are complete; these include The City of Nashua, New Hampshire Division of Historical Resources Request for Project Review and Natural Heritage Bureau.

A building permit is required from the City of Nashua. The building permit will be procured by the construction contractor prior to start of construction.

Risks and Risk Mitigation Plans

Coordination with existing SS

- Build a greenfield site adjacent to the existing system. Energize the new system prior to the conversion. A mobile should not be required.
- A full environmental study has been performed on the existing SS site and new SS site. The amount of site remediation has been identified and will be included with the full funding request.
- A pre-construction sound survey has been completed. A post-construction survey will be performed later.

References

- Purchase & Sale Agreement, dated November 26, 2019
- Nashua 4kV Distribution System Study (v2)
- Project A17S03 (NH-170044-S) - PAF TAF - Millyard SS Replacement Rev 1

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

- Attachment 1 - Partial Funding Cost Estimate Backup Details
- Attachment 2 - Constructability Review Form

Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name: Millyard SS Replacement			**Project ID Number: A17S03**		
Facility Type: ☐ BPS	☐ BES	☐ PTF	☐ non-PTF	☐ CIP	☒ Distribution
PLANNING					
Is a NX-9 required?			No		
Is an ISO-NE PAC presentation required?			No		
Is a PPA required?			No		
Is a TCA Application Required?			No		
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?			No		
OPERATIONS					
Outage Required?	☒ Primary Equipment (Power Transfer)		☐ Secondary Equipment (P&C only)		☐ Outage Not Required
Do SCLL Conditions Exist?			No		
Has an outage schedule been approved?			No		
Are Operations & Maintenance procedures/training required?			No		
STANDARDS					
Does the project include standard equipment and designs?			Yes		
SUBSTATION ENGINEERING					
Does this impact Revenue Metering			No		
Is preliminary short circuit/ breaker duty analysis required?			Yes		
Are there any changes to the baseline audible noise?			Yes		
Is there an impact to the existing ground grid?			No		
Is a Transient Over Voltage (TOV) analysis required?			No		
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?			No		
If BPS, is an NPCC Directory #4 presentation required?			No		
Are ISO-NE OP-24 Appendix B updates necessary?			No		

Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name: Millyard SS Replacement	**Project ID Number: A17S03**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
SITING & CONSTRUCTION SERVICES (OUTREACH)	
What is the level of outreach expected?	Medium
INITIATOR	
Has a field constructability review been completed?	Yes
INVESTMENT RECOVERY	
Does the project require development of an Investment Recovery plan?	Yes
COST ESTIMATING	
How was the cost estimate prepared?	Other (specify below)
Who prepared the estimate?	Estimate for partial funding based on Project Manager's forecast supported by Contract pricing and estimates for soil remediation from GZA.
Was the estimate reviewed by Eversource Estimating?	Yes - Partial Review

Cost Estimate Backup Details

Millyard Substation Re-Build

	Original Funding	Spent 30 April 20	Funding Not spent	Required Spend to 70% Design	Additional Funding to reach 70% Design	Total Project
Eversource	$75,000	$96,200	($21,200)	$55,000	$76,200	$196,100
Contractor Services	$770,000	$405,951	$364,049	$223,478	($140,571)	$751,800
Materials		$149,100		$121,986	$121,986	$2,784,000
Construction				$0	$0	$2,024,300
Testing				$0	$0	$505,800
Other	$0	$22,900	($22,900)	$69,553	$92,453	$154,000
sub-total	**$845,000**	**$674,151**	**$170,849**	**$470,017**	**$299,168**	**$6,416,000**
AFUDC	$15,000	$30,724	($15,724)	$54,640	$70,364	$152,000
Loaders	$140,000	$277,768	($137,768)	$236,333	$374,101	$2,027,200
sub-total	**$155,000**	**$308,492**	**($153,492)**	**$290,973**	**$444,465**	**$2,179,200**
Grand Total	**$1,000,000**	**$982,643**	**$17,357**	**$760,990**	**$743,633**	**$8,595,200**

Required Additional Funding to 70%	
Remaining Spend to 70%	**$760,990**
Remaining Original Funding	**$17,357**
Additional Funding to reach 70%	**$743,633**

Submit a PDF copy of this signed form to TranEPAC@eversource.com along with the PAF

Project Number(s): A17S0301	**Project Title:** Nashua MillYard Substation Re-build
Date of Constructability Review: Enter date	Various Dates

Constructability Review Team: *list below the department and names of all who participated in the constructability review walkdown*

Lead*	Department**	Name and Title
☒	Project Management	Walter Quinn
☐	Operations	
☐	Construction	
☒	Engineering	David Still – Substation Civil Engineer
	Siting	
	Siting & Construction Services	
X	Environmental	Nick Golan
	Rights & Survey	
	Other:	
	Other:	
	Other:	

*Check the box of the individual who coordinated/led the constructability review
**List names from any other departments who attended the constructability review, add additional rows to the table if necessary

Observations/Findings/Scope Review/Risks Identified:
list below the outcome of the constructability review.

- Project site is in a highly visible location with little or no screening in most directions. All construction activities will be subject to a high degree of scrutiny by the general public, abutting businesses and City representatives.
- The project parcel is relatively small. While adequate for the proposed substation once built, construction activities will require use of additional space on the adjacent lot(s) for storage of materials, equipment off loading, etc.
- Site work for the project requires significant grading in the immediate vicinity of the Nashua River, extra care is needed to protect and maintain the integrity of erosion control measures.
- TFMoran has observed the site during initial site survey as well as during evaluations for preparation of the substation site plans. We did not observe anything on site that in our opinion would prevent the site from being constructed as currently designed.

The Construction Services Supervisor, Engineer lead, or Project Manager must sign below.

Walter Quinn _____ 6 April 2020 _____

Signature *Date*

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--011 **Page 1 of 1**

Request from: Department of Energy

Witness: Plante, David L

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Pack Monadnock RBLD No. A17C30

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-11 for the PAF for this project.

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Operations Project Authorization Form

Date Prepared: 4/15/2020	**Project Title**: Rebuild Pack Monadnock Distribution Line
Company/ies: Eversource NH	**Project ID Number**: A17C30
Organization: Electric Field Operations	**Class(es) of Plant**: Distribution Line
Project Initiator: Julie Walsh/ Mark Fraser	**Project Category**: Reliability -Obsolete Equipment Line
Project Manager: Tom Davis	**Project Type**: Specific
Project Sponsor: Mark Sandler	**Project Purpose**: Replace aged and unsafe facilities
Estimated in service date: 11/1/2020	**If Transmission Project**: N/A
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan?** Yes
Total Request: $3,900,000	

Financial Requirements:

Executive Summary

Approximately three years ago, SegTel, Inc. d/b/a FIRSTLIGHT FIBER, a third-party telecommunication company, requested pole attachments on the utility line running from Highway Route 101 up to the top of Pack Monadnock. This line is approximately 5,200 feet long. The line was originally installed in the 1930's by Greenville Electric Light Company and New England Telephone and Telegraph Company. The initial review of this project showed the need for significant facility upgrades. The project caught the attention of the New Hampshire Public Utilities Commission, the New Hampshire Division of Parks and Recreation, local and State elected officials and members of the public who use the park. In April of 2017, the NH PUC Director of Safety and Security visited the location and cited many safety violations on both the electric and communication facilities.

Because of the sensitive nature of this project and our desire to meet the safety, reliability, aesthetic, and community needs and expectations, a collaborative process was established involving the public, State, and Eversource. Over the last three years, numerous public sessions and site meetings were held. Multiple options were explored, reviewed, modified, and, eventually, a mutually agreed upon plan was selected. Eversource will construct a new 5,200 foot overhead line to the summit utilizing 30 poles. This line will be in agreed upon ROW. The existing pole line and primary cable in conduit laying on the ground will be removed. The electric facilities at the summit of the mountain will be addressed under a separate project.

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Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	20	20	20 +	Totals
Capital Additions - Direct	$ 25	$ 2,240	$ -	$ -	$ 2,265
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage ____%	-	-	-	-	-
Total - Direct Spending	$ 25	$ 2,240	$ -	$ -	$ 2,265
Capital Additions - Indirect	-	1,620	-	-	1,620
Subtotal Request	$ 25	$ 3,860	$ -	$ -	$ 3,885
AFUDC	-	15	-	-	15
Total Capital Request	$ 25	$ 3,875	$ -	$ -	$ 3,900
O&M	-	-	-	-	-
Total Request	$ 25	$ 3,875	$ -	$ -	$ 3,900

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	435			435
Overtime Labor	0			0
Outside Services	1760			1760
Materials	70			70
Other, including contingency amounts (describe)				
Total	2,265			2,265

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	1,620			1,620
Capitalized interest or AFUDC, if any	15			15
Total	1,635			1,635

Total Capital Costs	3,900			3,900
Less Total Customer Contribution				
Total Capital Project Costs	3,900			3,900
Total O&M Project Costs				

Note: Explain unique payment provisions, if applicable

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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):

An ARO is a current legal obligation to remove or retire property, plant or equipment at some point in the future. Please refer to APS8 or contact Plant Accounting for further detail.

Is there an ARO associated with this project? No

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

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Technical Justification

Project Need Statement

An off-road single-phase primary electric power line was constructed up the side of Pack Monadnock Mountain over 90 years ago to service buildings, observatories, and communication equipment located at the top. The feed begins as overhead pole line construction and transitions to above ground cable in conduit halfway up the mountain. The pole plant and conductors are in poor condition and not accessible for repair because of the extremely rugged terrain. The conduit system along the ground is also in poor condition. Some of the conduit is suspended high in the air due to the uneven terrain of the mountainside. This existing construction poses a safety risk to the public, accessibility issues for line crews, and has had numerous safety violations cited by the NH PUC Director of Safety and Security (see References section below).

Project Objectives

The objective of this project is to provide safe and reliable power to the services at the summit of the mountain. All safety issues associated with the existing line will be addressed and reasonable access will be obtained for maintenance and restoration. It is also important that we work closely with local and State stakeholders to minimize impacts to the State Park and its guests.

Project Scope

The scope of this project is to construct a new 5,200 foot of primary single-phase line with covered primary conductor. Thirty new poles will be installed. All of the existing line and equipment up to the summit will be removed. A new service will be run to the MIT building, located approximately halfway up the mountain. Work associated with the summit will be addressed under a separate Project Authorization.

Background / Justification

The existing electric facilities are in disrepair and pose a potential safety hazard to the public. On April 21, 2017, an inspection by New Hampshire Public Utilities Commission Director of Safety and Security Randy Knepper found multiple safety and code violations on both utility and the customer owned equipment. Eversource was directed to rebuild the line to today's codes and standards, thereby resolving the identified code violations.

Also, communications companies segTEL Inc., and Comcast is requesting attachment to facilities to connect their services to the mountain summit.

Business Process and / or Technical Improvements

The new line is be constructed overhead with covered conductor. The covered wire should improve resiliency of the line and improve protection from tree contact. The new poles will be stronger and able to withstand greater tree contact and weather conditions. Also, this line is being constructed with guidance from Hendrix Cable, a New Hampshire company that is the leader in spacer cable and tree wire installations. Better line clearing and access are being created through this upgrade.

Cost Estimate and Assumptions

This project has been fully written in STORMS. Costs have been derived from closely working with Engineering, Operations, Vegetation Management, Surveying, Transmission Construction and Maintenance, Scheduling and Planning, preferred contractors, preferred vendors, and our regulatory group.

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Alternatives Considered with Cost Estimates
Multiple alternatives have been considered including various overhead and underground options. All were reviewed internally and with external stakeholders. The final solution for this upgraded line was the result of three years of negotiations, public forums, site meetings, constructability reviews, and buy-in from our State partners.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Construction Start	
Construction completion	11/1/20

Regulatory Approvals
There were many State permits required by New Hampshire's Department of Natural and Cultural Resources, New Hampshire DOT, New Hampshire PUC, and other State requirements. These are all in progress and expected to be approved.

Risks and Risk Mitigation Plans
We have been working through these issues for the last three years. We need to continue our strong communication with our State partners and other stakeholders to ensure a positive result and response to this project.

References
Preliminary funding PAF dated 5/9/2017 is attached.

One-Line Diagrams, Attachments, and Images
Included in Preliminary Funding PAF, attached.

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Operations Technical Authorization Form

TAF # NH-170037-D

Date Prepared: 5/9/2017	Project Title: Rebuild Single-Phase Line Servicing Pack Monadnock Summit
Company/ies: Eversource NH	Project ID Number: A17C30
Organization: Electric Field Operations	Class(es) of Plant: Distribution Line
Project Initiator: Julie Walsh	Project Category: Reliability - Obsolete Equipment - Line
Project Owner/Manager: Marc Pilotte	Project Type: Specific
Project Sponsor: Jim Eilenberger	Project Purpose: PUC Requirement to replace unsafe line
Estimated in service date: 11/1/17	If Transmission Project: NA
Authorization Type: Detailed Engineering	Authorization Amount: $22,500

Project Need Statement

This request is for $22,500 to design this project in the Storms work management system. This figure is based on10% of the estimated cost of $225,000.

Single-phase service to several communications towers and other services atop Pack Monadnock was constructed many years ago using above-ground cable in conduit. In places, this conduit is suspended high in the air, due to the uneven terrain of the mountainside. This existing construction poses a safety risk to the public, accessibility issues for line crews, and has had numerous safety violations cited by the NH PUC Director of Safety and Security (see References section below).

Project description

Rebuild second half of line from the end of the existing overhead section to the top of the mountain with single-phase spacer cable along the access road. Remove old above-ground facilities in conduit and vault.

Project Objectives

.
Comply with PUC request by removing unsafe and obsolete primary line construction and replacing with new overhead construction. Project also facilitates a current Segtel request for third party attachment.

Project Scope

Rebuild approximately 3000 feet of primary line with single phase 1/0 spacer cable. Install 20 new Class 2 poles. Remove approximately 2400 feet of old above-ground cable in conduit, one vault containing a cutout, and several risers. Add one service transformer at the end of primary to split load and shorten secondary runs.

It is anticipated that initial tree clearing to be completed by NH State Parks Department, however, there is no firm commitment as of the date of this document.

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Background / Justification

Electric facilities are now obsolete as constructed. They are unsightly and a potential safety hazard to the public. An inspection by PUC Director of Safety and Security Randy Knepper on April 21, 2017 found multiple violations on both the utility and the customer equipment, for both electric power and telecommunications. Eversource was requested to propose an overhead solution to address the electric utility violations since the amount of ledge and outcroppings in the terrain prohibit an underground solution. Segtel is requesting attachment to facilities to connect their services to the mountain summit.

Business Process and / or Technical Improvements:

Regulatory Requirement, System renewal.

Cost Estimate and Assumptions

.
$225,000 –This cost estimate assumes 18 overhead spans at $10,000 per pole span ($7000 for pole, wire, and other hardware, plus $3000 extra to cover tree removals and ledge pole sets). An additional $45,000 is included for removals.

Alternatives Considered with Cost Estimates

Replace above-ground conduit with direct-buried cable in conduit. Due to the rugged mountain terrain, this was not considered a viable option. Randy Knepper, PUC Director of Safety & Security, proposes an overhead solution as the current terrain prohibits an underground solution.

Project Schedule

Describe the project schedule and milestones. Include estimated start and end dates.

Milestone/Phase Name	Estimated Completion Date
Tree clearing	8/1/17
Poles set	9/1/17
Line work complete	11/1/17

Regulatory Approvals

None

Risks and Risk Mitigation Plans

The State (DRED) is indicating a willingness to pay for the initial tree removals. However, there is no obligation for them to do so yet, and therefore removals have been included in the cost estimate.

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APS 1 - Project Authorization Policy

Appendix 2
Operations Project Authorization Form

References

Email from PUC Director of Safety and Security from 4/24/17:

From: "Knepper, Randy" <Randy.Knepper@puc.nh.gov>
To: "Spoerl, Robert" <Robert.Spoerl@dred.nh.gov>, Ronald L. Pepin/NUS@NU,
Cc: James C. Eilenberger/NUS@NU, Marc W. Pilotte/NUS@NU, Karen T. Mackey/NUS@NU, PSNHPUCLiaison@NU, "Linnenbringer, Frank" <Frank.Linnenbringer@dot.nh.gov>, "Lyons, Johanna" <Johanna.Lyons@dred.nh.gov>
Date: 04/24/2017 10:28 AM
Subject: RE: Pack Monadnock utility relocation

Yes, my inspection on April 21, 2017 found numerous safety violations both on the customer side and utility. This includes electric power and telecommunications. I am less concerned on how and why but more concerned on reinstalling the utilities and private service connections in a manner that is safe, legal, documented, properly placed, well coordinated and can last into the future. The present situation was created over time in a haphazard manner but can be rectified. This will involve coordination between the end users, multiple state agencies, private land owners, power and telecommunications providers and requires a collaborative approach.
The PUC can act as a co-facilitator. I envision multiple meetings to get things moving. At this point I have informed our general counsel and she will be reaching out to AG's office to help coordinate. Here are my initial thoughts:

1) Legal Research – which statutes and rules apply including licensing
2) Land and Parcel Research – build a historical record of each segment
3) Survey/ GPS/ GEOcoding –any existing portion that will be reused, new proposals, and new installation
4) Define current and future needs of end users
5) Design and Layout – Eversource needs to propose an **overhead solution –** the amount of ledge and outcroppings prohibit an underground solution
6) Coordination with attachees
7) Cost considerations and scheduling considerations
8) View, Park needs, end user needs and ROW considerations

My suggestion is for Eversource to propose a preliminary solution with any potential options to get us rolling.

Randy Knepper
Director of Safety and Security
New Hampshire Public Utilities Commission
21 South Fruit St
Concord NH 03301
603-271-6026

Appendix 2
Operations Project Authorization Form

One-Line Diagrams, Attachments, and Images

[ONE-LINE DIAGRAM REDACTED]

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APS 1 - Project Authorization Policy

Appendix 2
Operations Project Authorization Form

[ONE-LINE DIAGRAM REDACTED]

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APS 1 - Project Authorization Policy

Appendix 2
Operations Project Authorization Form

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APS 1 - Project Authorization Policy

Appendix 2
Operations Project Authorization Form

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APS 1 - Project Authorization Policy

Operations Technical Authorization Form

TAF # NH-170037-D

Date Prepared: 5/9/2017	Project Title: Rebuild Single-Phase Line Servicing Pack Monadnock Summit
Company/ies: Eversource NH	Project ID Number: A17C30
Organization: Electric Field Operations	Class(es) of Plant: Distribution Line
Project Initiator: Julie Walsh	Project Category: Reliability - Obsolete Equipment - Line
Project Owner/Manager: Marc Pilotte	Project Type: Specific
Project Sponsor: Jim Eilenberger	Project Purpose: PUC Requirement to replace unsafe line
Estimated in service date: 11/1/17	If Transmission Project: NA
Authorization Type: Detailed Engineering	Authorization Amount: $22,500

Project Need Statement

This request is for $22,500 to design this project in the Storms work management system. This figure is based on10% of the estimated cost of $225,000.

Single-phase service to several communications towers and other services atop Pack Monadnock was constructed many years ago using above-ground cable in conduit. In places, this conduit is suspended high in the air, due to the uneven terrain of the mountainside. This existing construction poses a safety risk to the public, accessibility issues for line crews, and has had numerous safety violations cited by the NH PUC Director of Safety and Security (see References section below).

Project description

Rebuild second half of line from the end of the existing overhead section to the top of the mountain with single-phase spacer cable along the access road. Remove old above-ground facilities in conduit and vault.

Project Objectives

.
Comply with PUC request by removing unsafe and obsolete primary line construction and replacing with new overhead construction. Project also facilitates a current Segtel request for third party attachment.

Project Scope

Rebuild approximately 3000 feet of primary line with single phase 1/0 spacer cable. Install 20 new Class 2 poles. Remove approximately 2400 feet of old above-ground cable in conduit, one vault containing a cutout, and several risers. Add one service transformer at the end of primary to split load and shorten secondary runs.

It is anticipated that initial tree clearing to be completed by NH State Parks Department, however, there is no firm commitment as of the date of this document.

Background / Justification

Electric facilities are now obsolete as constructed. They are unsightly and a potential safety hazard to the public. An inspection by PUC Director of Safety and Security Randy Knepper on April 21, 2017

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APS 1 - Project Authorization Policy

found multiple violations on both the utility and the customer equipment, for both electric power and telecommunications. Eversource was requested to propose an overhead solution to address the electric utility violations since the amount of ledge and outcroppings in the terrain prohibit an underground solution. Segtel is requesting attachment to facilities to connect their services to the mountain summit.

Business Process and / or Technical Improvements:

Regulatory Requirement, System renewal.

Cost Estimate and Assumptions

.
$225,000 –This cost estimate assumes 18 overhead spans at $10,000 per pole span ($7000 for pole, wire, and other hardware, plus $3000 extra to cover tree removals and ledge pole sets). An additional $45,000 is included for removals.

Alternatives Considered with Cost Estimates

Replace above-ground conduit with direct-buried cable in conduit. Due to the rugged mountain terrain, this was not considered a viable option. Randy Knepper, PUC Director of Safety & Security, proposes an overhead solution as the current terrain prohibits an underground solution.

Project Schedule

Describe the project schedule and milestones. Include estimated start and end dates.

Milestone/Phase Name	Estimated Completion Date
Tree clearing	8/1/17
Poles set	9/1/17
Line work complete	11/1/17

Regulatory Approvals

None

Risks and Risk Mitigation Plans

The State (DRED) is indicating a willingness to pay for the initial tree removals. However, there is no obligation for them to do so yet, and therefore removals have been included in the cost estimate.

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APS 1 - Project Authorization Policy

References

Email from PUC Director of Safety and Security from 4/24/17:

From: "Knepper, Randy" <Randy.Knepper@puc.nh.gov>
To: "Spoerl, Robert" <Robert.Spoerl@dred.nh.gov>, Ronald L. Pepin/NUS@NU,
Cc: James C. Eilenberger/NUS@NU, Marc W. Pilotte/NUS@NU, Karen T. Mackey/NUS@NU, PSNHPUCLiaison@NU, "Linnenbringer, Frank" <Frank.Linnenbringer@dot.nh.gov>, "Lyons, Johanna" <Johanna.Lyons@dred.nh.gov>
Date: 04/24/2017 10:28 AM
Subject: RE: Pack Monadnock utility relocation

Yes, my inspection on April 21, 2017 found numerous safety violations both on the customer side and utility. This includes electric power and telecommunications. I am less concerned on how and why but more concerned on reinstalling the utilities and private service connections in a manner that is safe, legal, documented, properly placed, well coordinated and can last into the future. The present situation was created over time in a haphazard manner but can be rectified. This will involve coordination between the end users, multiple state agencies, private land owners, power and telecommunications providers and requires a collaborative approach.
The PUC can act as a co-facilitator. I envision multiple meetings to get things moving. At this point I have informed our general counsel and she will be reaching out to AG's office to help coordinate. Here are my initial thoughts:

1) Legal Research – which statutes and rules apply including licensing
2) Land and Parcel Research – build a historical record of each segment
3) Survey/ GPS/ GEOcoding –any existing portion that will be reused, new proposals, and new installation
4) Define current and future needs of end users
5) Design and Layout – Eversource needs to propose an **overhead solution –** the amount of ledge and outcroppings prohibit an underground solution
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8) View, Park needs, end user needs and ROW considerations

My suggestion is for Eversource to propose a preliminary solution with any potential options to get us rolling.

Randy Knepper
Director of Safety and Security
New Hampshire Public Utilities Commission
21 South Fruit St
Concord NH 03301
603-271-6026

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APS 1 - Project Authorization Policy

One-Line Diagrams, Attachments, and Images

[ONE-LINE DIAGRAM REDACTED]

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APS 1 - Project Authorization Policy

[ONE-LINE DIAGRAM REDACTED]

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APS 1 - Project Authorization Policy

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APS 1 - Project Authorization Policy

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APS 1 - Project Authorization Policy

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--012 **Page 1 of 1**

Request from: Department of Energy

Witness: Johnson, Russel D

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.
Maintain Voltage No. DK9R

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-12 for the PAF for this project.

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Request Form

Project Title: 2021 Maintain Voltage Annual Program	**Project Number:** DK9R
Date Prepared: 01/19/2022	**Company:** NH Electric Distribution 06 -
Organization: NH Operations	**Class(es) of Plant: Distribution**
Project Initiator: Pat Sullivan	**Project Category: Peak Load – Distribution Line Capacity – Voltage Correction**
Project Manager: Pat Sullivan	**Project Type:** Annual
Project Sponsor: Jason Yergeau	**Project Purpose: Maintain Voltage**
Estimated in service date: 12/31/2021	**Capital Investment part of original Operating Plan:** Yes
Current Authorization Amount: $ 1,158,000	**O&M Expenses part of request:** Yes
Supplement Request: $1,020,000	**Other:**
Total Request: $2,178,000	

Supplement Justification

This Annual project was budgeted and authorized based on historical expenditures. An increase in the amount of work required to maintain voltage within regulatory limits in 2021 has necessitated this Supplemental request due to an increase in the authorized Direct costs. Increases are in Materials, Construction / Outside Services, Labor, Overtime, and Other categories.

Justification for Additional Resources

The reasons for the project authorization supplement of $1,020,000 are summarized below.

1. **Materials (by Eversource): $368,000** increase
2. **Construction: $272,000** increase
3. **Labor: $22,000** increase
4. **Overtime: $5,000** increase
5. **Other: $5,000** increase
6. **Indirects: $348,000** increase

Total Supplement Request: $1,020,000

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

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Supplement Cost Summary

Capital Costs	Prior Authorized	Supplemental Request	Total
Direct Capital Costs			
Internal Labor	154	27	181
Outside Services	234	272	506
Materials	244	368	612
Removals			
Risk and Contingency			
Other		5	5
Subtotal	**632**	**672**	**1,304**
Indirect Capital Costs			
Indirect/Overheads (including benefits)	521	347	868
Capitalized interest or AFUDC, if any	5	1	6
Subtotal	**526**	**348**	**874**
Total Customer Contribution	-	-	-
Total Capital Project Costs	**1,158**	**1,020**	**2,178**

The "Other" charges are allocations for tools and other materials.

Operations Project Authorization Form

Date Prepared: 12/11/2020	**Project Title:** Maintain Voltage Annual Program
Company/ies: Eversource NH	**Project ID Number:** DK9R
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Pat Sullivan	**Project Category:** Peak Load – Distribution Line Capacity – Voltage Correction
Project Manager: Pat Sullivan	**Project Type:** Annual
Project Sponsor: Mark Sandler	**Project Purpose:** Maintain Voltage
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply):
Total Request: $1,158,000	☐ PTF ☐ non-PTF ☒ Distribution

Financial Requirements:

Project Authorization

ERM: _____

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FP&A: _____

Executive Summary

An approval of $1.158 million is requested for the 2021 Voltage Correction annual program.

An annual program includes many similar, small, and/or routine capital jobs performed over the course of a year for which one project authorization form can be prepared. This project authorization form is being prepared for the voltage correction program across New Hampshire, but not for the voltage correction projects established for each area work center or work orders used to track the voltage correction costs work. The individual area work center projects roll up to the annual program and are covered under this annual program authorization.

Annual Projects roll up to an Annual Program. If a single work order within an Annual Project exceeds the applicable threshold established in Accounting Policy Statement 1 (APS-01), the work order shall be included with a project authorization form and approved as a specific project.

The voltage correction annual program covers construction required to maintain voltage within required regulatory limits. Each area work center will have a separate project covering the voltage correction projects in the individual work center.

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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	$244	$0	$0	$0	$0	$244
7. Construction (incl matl's by contractors)	$0	$0	$0	$358	$0	$0	$0	$0	$358
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	$30	$0	$0	$0	$0	$30
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**	**$0**	**$632**	**$0**	**$0**	**$0**	**$0**	**$632**
13. Indirects/Overhead	$0	$0	$0	$521	$0	$0	$0	$0	$521
14. AFUDC	$0	$0	$0	$5	$0	$0	$0	$0	$5
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**

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 to Go	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$0	$124	$0	$0	$0	$0	$124
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$234	$0	$0	$0	$0	$234
Materials*	$0	$0	$0	$244	$0	$0	$0	$0	$244
Removals	$0	$0	$0	$30	$0	$0	$0	$0	$30
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$521	$0	$0	$0	$0	$521
AFUDC	$0	$0	$0	$5	$0	$0	$0	$0	$5
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**

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

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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? No

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

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Technical Justification

Project Need Statement
This Annual project provides funding for a variety of activities required to maintain service voltage within prescribed regulatory limits.

Project Objectives
Work performed under this annual may include the installation of capacitors and regulators, load balancing, conversions etc., provided the driving reason for the work is to maintain voltage within the limits set by the NHPUC.

Project Scope
Work under this annual will be performed at various locations around the state of NH within the Eversource service territory.

Background / Justification
This is an annual project which is required to fulfil the Company's obligation to provide voltage to customers within limit established by the NH Public Utilities Commission.

Business Process and / or Technical Improvements
Maintain voltage within regulatory limits.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
Failure to correct voltages outside regulatory limits may result in Regulatory action and/or decreases in customer satisfaction.
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Annual funding for this project was estimated using historical spending.

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APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

Subsidiary Board Approval Package Template

Template for Capital Project Review and Approval by a Subsidiary Board

[Sponsoring Operating Unit or Corporate and Shared Services Group] [Project Title]
Capital Project Review and Approval

[Subsidiary] Board of Directors [Sponsoring Officer] [Date of Submission]

Sub Board Approval Template.pptx

Note: to save, complete and print the template, please right click on the above icon and select Presentation Object and Open

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Operations Project Authorization Form

Date Prepared: 12/11/2020	**Project Title:** Maintain Voltage Annual Program
Company/ies: Eversource NH	**Project ID Number:** DK9R
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Pat Sullivan	**Project Category:** Peak Load – Distribution Line Capacity – Voltage Correction
Project Manager: Pat Sullivan	**Project Type:** Annual
Project Sponsor: Mark Sandler	**Project Purpose:** Maintain Voltage
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:**
Total Request: $1,158,000	☐ PTF ☐ non-PTF ☒ Distribution

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $1.158 million is requested for the 2021 Voltage Correction annual program.

An annual program includes many similar, small, and/or routine capital jobs performed over the course of a year for which one project authorization form can be prepared. This project authorization form is being prepared for the voltage correction program across New Hampshire, but not for the voltage correction projects established for each area work center or work orders used to track the voltage correction costs work. The individual area work center projects roll up to the annual program and are covered under this annual program authorization.

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The voltage correction annual program covers construction required to maintain voltage within required regulatory limits. Each area work center will have a separate project covering the voltage correction projects in the individual work center.

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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	$244	$0	$0	$0	$0	$244
7. Construction (incl matl's by contractors)	$0	$0	$0	$358	$0	$0	$0	$0	$358
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	$30	$0	$0	$0	$0	$30
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**	**$0**	**$632**	**$0**	**$0**	**$0**	**$0**	**$632**
13. Indirects/Overhead	$0	$0	$0	$521	$0	$0	$0	$0	$521
14. AFUDC	$0	$0	$0	$5	$0	$0	$0	$0	$5
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**

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 to Go	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$0	$124	$0	$0	$0	$0	$124
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$234	$0	$0	$0	$0	$234
Materials*	$0	$0	$0	$244	$0	$0	$0	$0	$244
Removals	$0	$0	$0	$30	$0	$0	$0	$0	$30
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$521	$0	$0	$0	$0	$521
AFUDC	$0	$0	$0	$5	$0	$0	$0	$0	$5
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$1,158**	**$0**	**$0**	**$0**	**$0**	**$1,158**

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

EVERSOURCE

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? No

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
This Annual project provides funding for a variety of activities required to maintain service voltage within prescribed regulatory limits.

Project Objectives
Work performed under this annual may include the installation of capacitors and regulators, load balancing, conversions etc., provided the driving reason for the work is to maintain voltage within the limits set by the NHPUC.

Project Scope
Work under this annual will be performed at various locations around the state of NH within the Eversource service territory.

Background / Justification
This is an annual project which is required to fulfil the Company's obligation to provide voltage to customers within limit established by the NH Public Utilities Commission.

Business Process and / or Technical Improvements
Maintain voltage within regulatory limits.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
Failure to correct voltages outside regulatory limits may result in Regulatory action and/or decreases in customer satisfaction.
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Annual funding for this project was estimated using historical spending.

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--013 **Page 1 of 1**

Request from: Department of Energy

Witness: Davis, Thomas W

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Dist Line ROW Program No. DL9R

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-13 for the PAF for this project.

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 10/27/2020	**Project Title:** Distribution Line Right of Way Program
Company: Eversource NH	**Project Number:** DL9R
Organization: Electric System Operations	**Class(es) of Plant:** D Line
Project Initiator: Josh Letourneau	**Project Category:** Annual - Lines
Project Manager: Tom Davis	**Project Type:** Program
Project Sponsor: Joseph Purington	**Project Purpose:** Reliability – Right of Way
Estimated in service date: 12/31/2021	**Capital Investment part of original Oper. Plan:** Yes
Eng./Constr. Resources Budgeted? Yes	**O&M Expenses part of original Oper. Plan:** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request: $5,000,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $5 million is requested for the 2021 Distribution Right of Way program. The specific work is not identified during the budget cycle but is a result of monitoring the system throughout the year. The program covers planned, proactive replacement of equipment in the Right of Way. Emergent equipment failure in the ROW is covered under project DS9RE.

EVERSOURCE

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	$450	$0	$0	$0	$0	$450
7. Construction (incl matl's by contractors)	$0	$0	$0	$2,656	$0	$0	$0	$0	$2,656
8. Testing / Commissioning	$0	$0	$0	$0	$0	$0	$0	$0	$0
9. Project Mgmt Team	$0	$0	$0	$110	$0	$0	$0	$0	$110
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**	**$0**	**$3,216**	**$0**	**$0**	**$0**	**$0**	**$3,216**
13. Indirects/Overhead	$0	$0	$0	$1,777	$0	$0	$0	$0	$1,777
14. AFUDC	$0	$0	$0	$7	$0	$0	$0	$0	$7
PROJECT TOTAL – BASELINE BUDGET	$0	$0	$0	$5,000	$0	$0	$0	$0	$5,000
15. Contingency	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
TOTAL CAPITAL REQUEST	$0	$0	$0	$5,000	$0	$0	$0	$0	$5,000
16. Reimbursables/Customer Contribution	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
PROJECT TOTAL (LESS REIMBURSABLES)	$0	$0	$0	$5,000	$0	$0	$0	$0	$5,000
O&M									
TOTAL REQUEST	**$0**	**$0**	**$0**	**$5,000**	**$0**	**$0**	**$0**	**$0**	**$5,000**

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

EVERSOURCE

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	$0	$100	$0	$0	$0	$0	$100
OT Labor	$0	$0	$0	$10	$0	$0	$0	$0	$10
Outside Services Labor	$0	$0	$0	$2,656	$0	$0	$0	$0	$2,656
Materials*	$0	$0	$0	$450	$0	$0	$0	$0	$450
Removals	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$1,777	$0	$0	$0	$0	$1,777
AFUDC	$0	$0	$0	$7	$0	$0	$0	$0	$7
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$5,000**	**$0**	**$0**	**$0**	**$0**	**$5,000**

*All materials including Eversource purchased and outside service purchased. Note that outside service purchased material included in construction in project cost summary above.
* 2021 Indirects/AFUDC based on 2021 approved rate table

EVERSOURCE
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 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: NA

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
The Distribution Right of Way project covers planned, proactive replacement of equipment in the Right of Way.

Project Objectives
This project is intended to provide funding for the Proactive replacement of aging equipment in the right of way to avoid future failures, and/or comply with regulatory, statutory, and intracompany requirements and agreements.

Project Scope
Work under this project will be performed at various locations around the state of NH within the Eversource service territory. This project addresses statewide issues with the distribution system assets in the ROW. Approval of the Distribution ROW (DL9R) project covers authorization of statewide distribution ROW work orders. Actual charges will accumulate in the individual area work center work orders.

Background / Justification
This is a project that is funded each year and is required to maintain the integrity of the Company's distribution system.

Business Process and / or Technical Improvements
Reliability.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

Contingency
None.

References
None.

Attachments (One-Line Diagrams, Images, etc.)
None.

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--014 **Page 1 of 1**

Request from: Department of Energy

Witness: Johnson, Russel D

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Reliability Improvements No. DR9R

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-14 for the PAF for this project.

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Request Form

Project Title: Reliability Annual Programs - Line	**Project Number:** DR9R
Date Prepared: 01/19/2022	**Company:** NH Electric Distribution 06
Organization: NH Operations	**Class(es) of Plant: Distribution**
Project Initiator: Lee Lajoie	**Project Category: Reliability**
Project Manager: Jason Yergeau	**Project Type:** Annual
Project Sponsor: Douglas Foley	**Project Purpose: Maintain Reliability**
Estimated in service date: 12/31/2021	**Capital Investment part of original Operating Plan:** Yes
Current Authorization Amount: $ 3,000,000	**O&M Expenses part of request:** Yes
Supplement Request: $2,237,000	**Other:**
Total Request: $5,237,000	

Supplement Justification

Justification for Additional Resources

The Reliability Annual Program supports the work necessary to improve the reliability of service to customers including addressing circuits on the list of 50 worst performers, three or more device outages, or other reliability metrics. Each Area Work Center has a separate project which rolls up to this program. Typical work performed under this program is the installation of fused cutouts, TripSavers, and reclosers. All are expected to improve reliability across NH.

The initial budget for the distribution line reliability program is funded based on historical spending and/or known future investment needed within the overall distribution budget constraints. Program spending is monitored throughout the year through a budget review committee. As work is identified throughout the year, the budget committee determines whether the additional investment needed can be funded by reduced funding in other projects or whether the additional investment must be deferred to a future year to stay within the budget.

Investment in the distribution line reliability program was higher than originally budgeted due to more work being performed on the system than anticipated to improve overall reliability of the system.

EVERSOURCE

Supplement Cost Summary

Capital Costs	Prior Authorized	Supplemental Request	Total
Direct Capital Costs			
Internal Labor	330	259	589
Outside Services	327	591	918
Materials	1,125	424	1,549
Removals			
Risk and Contingency			
Other		558	558
Subtotal	**1,782**	**1,832**	**3,614**
Indirect Capital Costs			
Indirect/Overheads (including benefits)	1,200	417	1,617
Capitalized interest or AFUDC, if any	18	(12)	6
Subtotal	**1,218**	**405**	**1,623**
Total Customer Contribution	-	-	-
Total Capital Project Costs	**3,000**	**2,237**	**5,237**

Operations Project Authorization Form

Date Prepared: 12/18/2020	**Project Title:** Reliability Annual Programs – Line
Company/ies: Eversource NH	**Project ID Number:** DR9R
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Pat Sullivan	**Project Category:** Reliability – Distribution Line Reliability
Project Manager: Pat Sullivan	**Project Type:** Annual
Project Sponsor: Mark Sandler	**Project Purpose:** Reliability – Line
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA

EVERSOURCE

Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:**
Total Request (gross): $3,000,000	☐ PTF ☐ non-PTF ☒ Distribution

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $3.0M is requested for the 2021 distribution line reliability annual program.

An annual program includes many similar, small, and/or routine capital jobs performed over the course of a year for which one project authorization form can be prepared. This project authorization form is being prepared for the distribution line reliability annual program across New Hampshire.

If a single work order within an Annual Project exceeds the applicable threshold established in Accounting Policy Statement 1 (APS-01), the work order shall be included with a project authorization form and approved as a specific project. Work orders under the DR program are exempt from the threshold as outlined in APS-01 and do not have a dollar limit threshold.

This work is not identified during the budget cycle but is a result of monitoring the system throughout the year. This project covers construction required to remedy conditions which are causing specific segments of distribution facilities to perform below levels defined by system reliability. It also funds projects which target the worst performing circuits.

EVERSOURCE

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

Line item Category	Prior Authorized	Actuals to Date	2021	2022	2023	2024	2025	Total
1. ROW / Easements / Land Acquisition	$0	$0	$0	$0	$0	$0	$0	$0
2. Environmental Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0
3. Outreach	$0	$0	$0	$0	$0	$0	$0	$0
4. Siting Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0
5. Engineering / Design	$0	$0	$0	$0	$0	$0	$0	$0
6. Materials (Eversource purchased)	$0	$0	$1,040	$0	$0	$0	$0	$1,040
7. Construction (incl matl's by contractors)	$0	$0	$657	$0	$0	$0	$0	$657
8. Testing / Commissioning	$0	$0	$0	$0	$0	$0	$0	$0
9. Project Mgmt Team	$0	$0	$0	$0	$0	$0	$0	$0
10. Removals	$0	$0	$85	$0	$0	$0	$0	$85
11. Other	$0	$0	$0	$0	$0	$0	$0	$0
12. Risks	$0	$0	$0	$0	$0	$0	$0	$0
SUBTOTAL DIRECTS W/ RISKS	$0	$0	$1,782	$0	$0	$0	$0	$1,782
13. Indirects/Overhead	$0	$0	$1,200	$0	$0	$0	$0	$1,200
14. AFUDC	$0	$0	$18	$0	$0	$0	$0	$18
PROJECT TOTAL – BASELINE BUDGET	$0	$0	$3,000	$0	$0	$0	$0	$3,000
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	$0	$0	$3,000	$0	$0	$0	$0	$3,000
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	$0	$0	$3,000	$0	$0	$0	$0	$3,000
O&M	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	$0	$0	$3,000	$0	$0	$0	$0	$3,000

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

EVERSOURCE

Breakout Costs

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$330	$0	$0	$0	$0	$330
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$327	$0	$0	$0	$0	$327
Materials*	$0	$0	$1,040	$0	$0	$0	$0	$1,040
Removals	$0	$0	$85	$0	$0	$0	$0	$85
Other	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$1,200	$0	$0	$0	$0	$1,200
AFUDC	$0	$0	$18	$0	$0	$0	$0	$18
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	$0	$0	$3,000	$0	$0	$0	$0	$3,000

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

EVERSOURCE

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? No

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

Technical Justification

Project Need Statement
Capital funding is needed to address the installation or replacement of distribution line equipment and other items to improve the reliability of the system.

Project Objectives
This program is designed to address the reliability of the distribution system through the installation or replacement of line equipment required to remedy conditions which are causing specific segments of distribution facilities to perform below levels defined by system reliability. It also funds projects which target the worst performing circuits.

Project Scope

EVERSOURCE

Work under this annual will be performed at various locations around the state of NH within the Eversource service territory. This project addresses statewide reliability issues with the distribution system assets not within the Right of Way. Actual charges will accumulate in the individual area work center work orders.

Background / Justification
This is an annual project which is required to maintain reliability of the Company's distribution system.

Business Process and / or Technical Improvements:
Reliability.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Annual funding for this project was estimated using historical spending level.

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

Subsidiary Board Approval Package Template

Template for Capital Project Review and Approval by a Subsidiary Board

[Sponsoring Operating Unit or Corporate and Shared Services Group] [Project Title]
Capital Project Review and Approval

[Subsidiary] Board of Directors [Sponsoring Officer] [Date of Submission]

Sub Board Approval Template.pptx

Note: to save, complete and print the template, please right click on the above icon and select Presentation Object and Open

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 12/18/2020	**Project Title:** Reliability Annual Programs – Line
Company/ies: Eversource NH	**Project ID Number:** DR9R
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Pat Sullivan	**Project Category:** Reliability – Distribution Line Reliability
Project Manager: Pat Sullivan	**Project Type:** Annual
Project Sponsor: Mark Sandler	**Project Purpose:** Reliability – Line
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request (gross): $3,000,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $3.0M is requested for the 2021 distribution line reliability annual program.

An annual program includes many similar, small, and/or routine capital jobs performed over the course of a year for which one project authorization form can be prepared. This project authorization form is being prepared for the distribution line reliability annual program across New Hampshire.

If a single work order within an Annual Project exceeds the applicable threshold established in Accounting Policy Statement 1 (APS-01), the work order shall be included with a project authorization form and approved as a specific project. Work orders under the DR program are exempt from the threshold as outlined in APS-01 and do not have a dollar limit threshold.

This work is not identified during the budget cycle but is a result of monitoring the system throughout the year. This project covers construction required to remedy conditions which are causing specific segments of distribution facilities to perform below levels defined by system reliability. It also funds projects which target the worst performing circuits.

EVERSOURCE

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

Line item Category	Prior Authorized	Actuals to Date	2021	2022	2023	2024	2025	Total
1. ROW / Easements / Land Acquisition	$0	$0	$0	$0	$0	$0	$0	$0
2. Environmental Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0
3. Outreach	$0	$0	$0	$0	$0	$0	$0	$0
4. Siting Approvals / Permits	$0	$0	$0	$0	$0	$0	$0	$0
5. Engineering / Design	$0	$0	$0	$0	$0	$0	$0	$0
6. Materials (Eversource purchased)	$0	$0	$1,040	$0	$0	$0	$0	$1,040
7. Construction (incl matl's by contractors)	$0	$0	$657	$0	$0	$0	$0	$657
8. Testing / Commissioning	$0	$0	$0	$0	$0	$0	$0	$0
9. Project Mgmt Team	$0	$0	$0	$0	$0	$0	$0	$0
10. Removals	$0	$0	$85	$0	$0	$0	$0	$85
11. Other	$0	$0	$0	$0	$0	$0	$0	$0
12. Risks	$0	$0	$0	$0	$0	$0	$0	$0
SUBTOTAL DIRECTS W/ RISKS	$0	$0	$1,782	$0	$0	$0	$0	$1,782
13. Indirects/Overhead	$0	$0	$1,200	$0	$0	$0	$0	$1,200
14. AFUDC	$0	$0	$18	$0	$0	$0	$0	$18
PROJECT TOTAL – BASELINE BUDGET	$0	$0	$3,000	$0	$0	$0	$0	$3,000
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	$0	$0	$3,000	$0	$0	$0	$0	$3,000
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	$0	$0	$3,000	$0	$0	$0	$0	$3,000
O&M	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	$0	$0	$3,000	$0	$0	$0	$0	$3,000

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

EVERSOURCE

Breakout Costs

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$330	$0	$0	$0	$0	$330
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$327	$0	$0	$0	$0	$327
Materials*	$0	$0	$1,040	$0	$0	$0	$0	$1,040
Removals	$0	$0	$85	$0	$0	$0	$0	$85
Other	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$1,200	$0	$0	$0	$0	$1,200
AFUDC	$0	$0	$18	$0	$0	$0	$0	$18
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	$0	$0	$3,000	$0	$0	$0	$0	$3,000

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

EVERSOURCE

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? No

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
Capital funding is needed to address the installation or replacement of distribution line equipment and other items to improve the reliability of the system.

Project Objectives
This program is designed to address the reliability of the distribution system through the installation or replacement of line equipment required to remedy conditions which are causing specific segments of distribution facilities to perform below levels defined by system reliability. It also funds projects which target the worst performing circuits.

Project Scope
Work under this annual will be performed at various locations around the state of NH within the Eversource service territory. This project addresses statewide reliability issues with the distribution system assets not within the Right of Way. Actual charges will accumulate in the individual area work center work orders.

Background / Justification
This is an annual project which is required to maintain reliability of the Company's distribution system.

Business Process and / or Technical Improvements:
Reliability.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Annual funding for this project was estimated using historical spending level.

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

Date Request Received: May 26, 2022 **Date of Response: June 09, 2022**
Data Request No. DOE 1--015 **Page 1 of 1**

Request from: Department of Energy

Witness: Devereaux, James J

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Purchase Transformers No. DT7P

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-15 for the PAF for this project.

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 12/18/2020	**Project Title:** Purchase Transformers and Regulators
Company/ies: Eversource NH	**Project ID Number:** DT7P
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Skyla Normand	**Project Category:** Basic Business – Pre-Cap Line Transformers/Regulators
Project Manager: Richard Roy	**Project Type:** Annual
Project Sponsor: Paul Rotty	**Project Purpose:** Purchase Line Transformers/Regulators
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request (gross): $11,566,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $11,566,000 is requested for the 2021 Purchase Transformer and Regulators annual program. This annual program covers the purchase, initial installation and retirement of overhead, duct (DG) and direct buried (DB) distribution transformers and voltage regulators. Distribution line transformers up to 2,500 kVa are a pre-capitalized units of property.

EVERSOURCE

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	$10,793	$0	$0	$0	$0	$10,793
7. Construction (incl matl's by contractors)	$0	$0	$0	$0	$0	$0	$0	$0	$0
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	$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**	**$0**	**$10,793**	**$0**	**$0**	**$0**	**$0**	**$10,793**
13. Indirects/Overhead	$0	$0	$0	$773	$0	$0	$0	$0	$773
14. AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**

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

EVERSOURCE

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	$0	$0	$0	$0	$0	$0	$0
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Materials*	$0	$0	$0	$10,793	$0	$0	$0	$0	$10,793
Removals	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$773	$0	$0	$0	$0	$773
AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**

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

EVERSOURCE

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? No

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
Capital funding is needed to purchase transformers and regulators throughout the year.

Project Objectives
This annual program covers the purchase, initial installation and retirement of overhead, conventional underground, and direct buried (URD) distribution line transformers and voltage regulators. Distribution transformers up to and including 2,500 kVa are a pre-capitalized units of property.

Project Scope
Work under this annual will be performed at various locations around the state of NH within the Eversource service territory. Approval of the Purchase Transformers and Regulators (DT7P) annual program covers authorization of all overhead, conventional underground, and direct buried (URD) distribution line transformers and voltage regulators

Background / Justification
Capital funding is needed to address planned and emergent line transformer purchases that are needed each year to support distribution line work due to equipment failures and infrastructure upgrades.

Business Process and / or Technical Improvements:
Not applicable

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Annual funding level was estimated using historical spending.

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Request Form

Project Title: Purchase Transformers and Regulators	**Project Number:** DT7P
Date Prepared: 01/13/2022	**Company:** NH Electric Distribution 06
Organization: NH Operations	**Class(es) of Plant: Distribution**
Project Initiator: Skyla Normand	**Project Category: Annual - Lines**
Project Manager: Richard Roy	**Project Type:** Annual
Project Sponsor: Paul Rotty	**Project Purpose:** Purchase, initial installation, and retirement of overhead, duct (DG) and direct buried (DB) distribution transformers and voltage regulators.
Estimated in service date: 12/31/2021	**Capital Investment part of original Operating Plan:** Yes
Current Authorization Amount: $ 11,566,000	**O&M Expenses part of request:** No
Supplement Request: $ 3,058,958	**Other:**
Total Request: $ 14,624,958	

Supplement Justification

Direct spend for calendar year 2021 of $13,339,696 has exceeded the authorized amount of $10,793,000 by $2,546,696 (23.6%). The threshold for supplement funding requests for projects greater than $250,000 is a 10% overrun on authorized direct cost.

The reason for the additional costs in 2021 was the increased Cost of First Installation (CFI).

CFI is a calculated cost based on internal labor and contractor rates. The CFI calculation was updated in 2021 for the first time in several years and the increases in labor and contractor costs were significant. Costs increases in the table below include $2,288k increase in outside services and $1,457k increase in internal labor. The increased costs have resulted in the need for a supplement.

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in Thousands

Capital Costs	Prior Authorized	Supplemental Request	Total
Direct Capital Costs			
Internal Labor	$0	$1,457	$1,457
Outside Services	$0	$2,288	$2,288
Materials	$10,793	($1,198)	$9,595
Removals	$0	$0	$0
Risk and Contingency	$0	$0	$0
Other	$0	$0	$0
Subtotal	$10,793	$2,547	$13,340
Indirect Capital Costs			
Indirect/Overheads (including benefits)	$773	$512	$1,285
Capitalized interest or AFUDC, if any	$0	$0	$0
Subtotal	$773	$512	$1,285
Total Customer Contribution	$0	$0	$0
Total Capital Project Costs	**$11,566**	**$3,059**	**$14,625**

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 12/18/2020	**Project Title:** Purchase Transformers and Regulators
Company/ies: Eversource NH	**Project ID Number:** DT7P
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Skyla Normand	**Project Category:** Basic Business – Pre-Cap Line Transformers/Regulators
Project Manager: Richard Roy	**Project Type:** Annual
Project Sponsor: Paul Rotty	**Project Purpose:** Purchase Line Transformers/Regulators
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:**
Total Request (gross): $11,566,000	☐ PTF ☐ non-PTF ☒ Distribution

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $11,566,000 is requested for the 2021 Purchase Transformer and Regulators annual program. This annual program covers the purchase, initial installation and retirement of overhead, duct (DG) and direct buried (DB) distribution transformers and voltage regulators. Distribution line transformers up to 2,500 kVa are a pre-capitalized units of property.

EVERSOURCE

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	$10,793	$0	$0	$0	$0	$10,793
7. Construction (incl matl's by contractors)	$0	$0	$0	$0	$0	$0	$0	$0	$0
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	$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**	**$0**	**$10,793**	**$0**	**$0**	**$0**	**$0**	**$10,793**
13. Indirects/Overhead	$0	$0	$0	$773	$0	$0	$0	$0	$773
14. AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**

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

EVERSOURCE

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	$0	$0	$0	$0	$0	$0	$0
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Materials*	$0	$0	$0	$10,793	$0	$0	$0	$0	$10,793
Removals	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$773	$0	$0	$0	$0	$773
AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$11,566**	**$0**	**$0**	**$0**	**$0**	**$11,566**

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

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

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? No

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

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

Technical Justification

Project Need Statement
Capital funding is needed to purchase transformers and regulators throughout the year.

Project Objectives
This annual program covers the purchase, initial installation and retirement of overhead, conventional underground, and direct buried (URD) distribution line transformers and voltage regulators. Distribution transformers up to and including 2,500 kVa are a pre-capitalized units of property.

Project Scope
Work under this annual will be performed at various locations around the state of NH within the Eversource service territory. Approval of the Purchase Transformers and Regulators (DT7P) annual program covers authorization of all overhead, conventional underground, and direct buried (URD) distribution line transformers and voltage regulators

Background / Justification
Capital funding is needed to address planned and emergent line transformer purchases that are needed each year to support distribution line work due to equipment failures and infrastructure upgrades.

Business Process and / or Technical Improvements:
Not applicable

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Annual funding level was estimated using historical spending.

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--016 **Page 1 of 1**

Request from: Department of Energy

Witness: Devereaux, James J

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Insurance Claim Annual No. INSOH9R

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-16 for the PAF for this project.

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 12/18/2020	**Project Title:** Insurance Claim/Keep Costs Program
Company/ies: Eversource NH	**Project ID Number:** INSOH9R (Overhead), INSUG9R (Underground), INSDB9R (Direct Buried)
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Pat Sullivan	**Project Category:** : Basic Business – Insurance Claim/Keep Costs
Project Manager: Pat Sullivan	**Project Type:** Specific Annual Program
Project Sponsor: Mark Sandler	**Project Purpose:** Insurance Claim Work
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request (gross): $3,164,000	

Financial Requirements:

Summary

An approval of $3,164,000 is requested for the 2021 Insurance Claim/Keep Costs program. This is before estimated contributions of $2,192,000 (resulting from property damage billing) are credited to the project, resulting in a net budget impact of $972,000.

The Insurance Claim/Keep Costs program includes overhead (INSOH9R), underground (INSUG9R) and direct buried (INSDB9R) costs associated with work associated with trouble call property damage that is eligible for reimbursement (9A billing) but cannot be billed out within the program year. Each area work center will have a separate project covering the insurance claim/keep costs projects in the individual work center.

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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	$301	$0	$0	$0	$0	$301
7. Construction (incl matl's by contractors)	$0	$0	$0	$843	$0	$0	$0	$0	$843
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	$342	$0	$0	$0	$0	$342
11. Other	$0	$0	$0	$14	$0	$0	$0	$0	$14
12. Risks	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBTOTAL DIRECTS W/ RISKS	**$0**	**$0**	**$0**	**$1,500**	**$0**	**$0**	**$0**	**$0**	**$1,500**
13. Indirects/Overhead	$0	$0	$0	$1,644	$0	$0	$0	$0	$1,644
14. AFUDC	$0	$0	$0	$20	$0	$0	$0	$0	$20
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$3,164**	**$0**	**$0**	**$0**	**$0**	**$3,164**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$3,164**	**$0**	**$0**	**$0**	**$0**	**$3,164**
16. Reimbursables/Customer Contribution	$0	$0	$0	$2,192	$0	$0	$0	$0	$2,192
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$972**	**$0**	**$0**	**$0**	**$0**	**$972**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$972**	**$0**	**$0**	**$0**	**$0**	**$972**

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

Gross: $3,164k Net of reimbursements: $972k

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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	$0	$211	$0	$0	$0	$0	$211
OT Labor	$0	$0	$0	$367	$0	$0	$0	$0	$367
Outside Services Labor	$0	$0	$0	$265	$0	$0	$0	$0	$265
Materials*	$0	$0	$0	$301	$0	$0	$0	$0	$301
Removals	$0	$0	$0	$342	$0	$0	$0	$0	$342
Other	$0	$0	$0	$14	$0	$0	$0	$0	$14
Indirects	$0	$0	$0	$1,644	$0	$0	$0	$0	$1,644
AFUDC	$0	$0	$0	$20	$0	$0	$0	$0	$20
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$3,164**	**$0**	**$0**	**$0**	**$0**	**$3,164**

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

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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? No

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
This project provides funding for a reimbursable property damage that cannot be billed out within the program year.

Project Objectives
This project is intended to fund repairs to existing facilities requiring capital work as a result of actions caused by others.

Project Scope
This project addresses the portion of reimbursable property damage to Eversource's overhead, underground and direct buried assets that is not billed out in the program year. It includes all projects and work orders under the specific area work center project INSOH9*x*, INSUG9*x*, and INSDB*x* where *x* is the letter representing the area work center.

Background / Justification
This is a program that is funded each year to cover the costs associated with repairs to the Company's distribution system for which a reimbursement cannot be processed within the program year.

Business Process and / or Technical Improvements:
Not applicable.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Annual program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also, on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed, and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
Annual project funding level was estimated using historical spending.

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--017 **Page 1 of 1**

Request from: Department of Energy

Witness: Devereaux, James J

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Telecom WAN Annuals No. IT6DWANA

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-17 for the PAF for this project.

EVERSOURCE
Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

Date Prepared: 01/31/2019	Project Title: Telecom WAN Annuals 2018
Company/Companies: PSNH	Project ID Number: IT6DWANA
Organization: Telecommunications Strategy	Plant Class/(F.P.Type): General Plant - Communications
Project Initiator: James Ahrens	Project Type: Specific
Project Owner/Manager: Oloruntomi Fadipe	Project Category: Telecommunications
Project Sponsor: Roderick Kalbfleisch	Project purpose: Telecommunications
Current Authorized Amount: $245K	Estimated in service date(s): 12/31/2017
Supplement Request: $428K	
Total Request: $673K	

Project Authorization Supplement Justification

This request is for supplemental funding in the amount of $428K for annual improvements to the Telecommunications Wide Area Network "WAN" in New Hampshire. The original plan was expanded to include additional installations of antenna's, micro wave upgrades, sonnet nodes and radios at various sites. The additional work was added to improve communications in remote areas of the state that were experiencing operations communication issues.

Project Need Statement *(Description of Issue)*

Eversource's Vision is to be the best energy company in the nation by 2020. Eversource's objectives are to maintain safety, reliability and service standards at an increasingly lower cost while maximizing shareholder return.

Telecommunications services are essential to meeting these objectives.

Project Scope

- Install new antenna's and repeaters at various locations including dedicated frequency allocations, enclosures, physical security, and standby power supplies.
- Establish new radio sites at various locations with a UHF remote radio.
- Upgrade micro wave by replacing existing DVM equipment at various locations
- Install Cisco sonnet nodes at various remote locations.

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Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

Project Authorization Supplement Cost Summary

Supplement (dollars in thousands)

		Prior Authorized	Supplemental Request	Total
Capital Additions - Direct		$ 201	$ 424	$ 624
Less Customer Contribution		-	-	-
Removals new of Salvage	%	-	-	-
Total Direct Spending		$ 201	$ 424	$ 624
Capital Additions - Indirect		44	4	48
AFUDC		-	-	
Total Capital Request		$ 245	$ 428	$ 673
O&M		-	-	-
Total Request		**$ 245**	**$ 428**	**$ 673**

Total Supplement Request by year view:

		Prior/2018	2019	2020	Total
Capital Additions - Direct		$ 624	$ -	$ -	$ 624
Less Customer Contribution		-	-	-	-
Removals new of Salvage	%	-	-	-	-
Total Direct Spending		$ 624	$ -	$	$ 624
Capital Additions - Indirect		48			48
AFUDC		-			
Total Capital Request		$ 673	$ -	$ -	$ 673
O&M		-	-	-	-
Total Request		**$ 673**	**$ -**	**$ -**	**$ 673**

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Request Form

Project Title: Telecom WAN Annual	**Project Number:** IT6DWANA
Date Prepared: 04/20/2022	**Company:** PSNH
Organization: Telecommunications Strategy	**Class(es) of Plant: General Plant - Communications**
Project Initiator: James Ahrens	**Project Category: Annual - General**
Project Manager: Oloruntomi Fadipe	**Project Type:** Annual
Project Sponsor: Roderick Kalbfleisch	**Project Purpose:** Telecommunications
Estimated in service date: 12/31/2021	**Capital Investment part of original Operating Plan:** Yes
Current Authorization Amount: $ 779,000	**O&M Expenses part of request:** No
Supplement Request: $ 271,000	**Other:**
Total Request: $ 1,050,000	

Supplement Justification

Direct spend for calendar year 2021 of $901,000 has exceeded the authorized amount of $706,000 by $195,000 (28%). The threshold for supplemental funding is a 10% overrun.

Justification for Additional Resources

Spending under NH WAN Annuals in 2021 was used to complete critical improvement efforts needed on the Telecom system. The following list of work orders describes the work that was completed.

WO	Title	Description	2021 Actuals ($k)
NH20D001	LANCASTER TELECOM UPGRADES 2020	Microwave Link Install to Prospect Mtn.	8.7
NH20D002	PROSPECT MTN TELECOM UPGRADES 2020	Microwave Link Install to Lancaster	0
NH20D003	MONADNOCK S/S TELECOM UPGRADES	Node Upgrade to SEL ICON	16.1
NH20D004	SCOBIE 326 LINE, ADSS FIBER DROP CABLE	minor	
NH20D005	Nashua AWC Tower Replacement	40 Foot Antenna Structure Installation; Removal of old one	0.6
NH20D006	TAIT Radio Evaluation	Deployment of voice base radio at Tower Hill; Removal of existing GE III radio.	15.4

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

NH20D007	Newington AP offload	Off-loaded DSCADA pole-top radios from Newington AP base data radio to other area base data radios	22.8
NH20D008	JMUX 1250 Lab nodes - Hooksett	JMUX Upgrades	4.5
NH20D009	JMUX R7 OC-48 node 1 – Scobie Pond Londonderry		9.7
NH20D010	JMUX R7 OC-48 node 2 – North Merrimack		15.9
NH20D011	JMUX R7 OC-48 node 3 – Bedford		9.3
NH20D012	JMUX R7 OC-48 node 5 – Scobie 115 Londonderry		20.2
NH20D013	JMUX R7 OC-48 node 6 - Hudson		10.6
NH20D014	JMUX R7 OC-48 node 7 – Bridge St		18.8
NH20D015	JMUX R7 OC-48 node 8 – Power St		16.5
NH20D016	JMUX R7 OC-48 node 9 – Mammoth Road		19.9
NH20D017	JMUX R7 OC-48 node 10 – Watts Brook		13.1
NH20D018	JMUX R7 OC-48 node 11 – Reeds Ferry		14.2
NH20D019	JMUX R7 OC-48 node 12 - Amherst		15.6
NH20D020	JMUX R7 OC-48 node 13 – Lawrence Road		16.5
NH20D021	JMUX R7 OC-48 node 14 - Thornton		6.4
NH20D022	JMUX R7 OC-48 node 15 – Scobie Comm Shelter		22.7
NH20D023	JMUX R7 OC-48 node 16 – Eagle 115		14
NH20D024	JMUX R7 OC-48 node 17 – Huse Road		15.5
NH20D025	JMUX R7 OC-48 node 18 – Eagle 345		14.3
NH20D026	PSNH E&I Lab Video Wall - Hooksett	Video Wall Installation in Lab	81.3
NH21D001	Mitchell Hill Batteries	minor	
NH21D002	Mt Agassiz	CES Backhaul and SiteBoss RTU Installation	65.3
NH21D003	Breezy Hill Data Site	Data Radio, CES Backhaul and SiteBoss RTU Installation	188.9
NH21D004	Core Box Additions	minor	
NH21D005	Garvins G146 Line Fiber Splice Can	minor	
NH21D006	Power St Telecom RTU & DSCADA Radio	Antenna Addition; Data Radio, SiteBoss RTU Installation	93.8
NH21D007	Pack Monadnock RTU & DSCADA Radio	Antenna Replacement and Addition; Data Radio, and SiteBoss RTU Installation	98.9

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

NH21D008	Chesley Mountain RTU & DSCADA Radio	Antenna, Data Radio, CES Backhaul and SiteBoss RTU Installation	51.8
NH21D009	Morse Mtn RTU and Antenna	Antenna Replacement and SiteBoss RTU Installation	50.8
NH21D010	Epping AWC RTU and Antenna	Antenna Replacement and SiteBoss RTU Installation	22.1
NH21D011	Bean Hill Antenna	minor	
NH21D012	Bedford Fiber	minor	
NH21D013	Canal St. Comm Upgrades	Node Upgrade to SEL ICON	32.5

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in thousands:

Capital Costs	Prior Authorized	Supplemental Request	Total
Direct Capital Costs			
Internal Labor	$165	$44	$209
Outside Services	$392	$108	$500
Materials	$145	$40	$185
Removals	$0	$0	$0
Risk and Contingency	$0	$0	$0
Other	$4	$3	$7
Subtotal	$706	$195	$901
Indirect Capital Costs			
Indirect/Overheads (including benefits)	$73	$76	$149
Capitalized interest or AFUDC, if any	$0	$0	$0
Subtotal	$73	$76	$149
Total Customer Contribution	$0	$0	$
Total Capital Project Costs	**$779**	**$271**	**$1,050**

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Date Prepared: 01/31/2019	Project Title: Telecom WAN Annuals 2017
Company/Companies: PSNH	Project ID Number: IT6DWANA
Organization: Telecommunications Strategy	Plant Class/(F.P.Type): General Plant - Communications
Project Initiator: James Ahrens	Project Type: Specific
Project Owner/Manager: Oloruntomi Fadipe	Project Category: Telecommunications
Project Sponsor: Roderick Kalbfleisch	Project purpose: Telecommunications
Current Authorized Amount: $622K	Estimated in service date(s): 12/31/2017
Supplement Request: $157K	
Total Request: $779K	

Project Authorization Supplement Justification

This request is for supplemental funding in the amount of $157K for annual improvements to the Telecommunications Wide Area Network "WAN" in New Hampshire. The original plan was expanded to include additional installations of antenna's, microwave upgrades, sonnet nodes and radios at various sites. The additional work was added to improve communications in remote areas of the state that were experiencing operations communication issues.

Project Need Statement *(Description of Issue)*

Eversource's Vision is to be the best energy company in the nation by 2020. Eversource's objectives are to maintain safety, reliability and service standards at an increasingly lower cost while maximizing shareholder return.

Telecommunications services are essential to meeting these objectives.

Project Scope

- Install new antenna's and repeaters at various locations including dedicated frequency allocations, enclosures, physical security, and standby power supplies.
- Establish new radio sites at various locations with a UHF remote radio.
- Upgrade microwave by replacing existing DVM equipment at various locations
- Install Cisco sonnet nodes at various remote locations.

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

EVERSOURCE
Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

Project Authorization Supplement Cost Summary

Supplement (doll ars in thousands)

		Prior Authorized	Supplemental Request	Total
Capital Additions - Direct		$ 494	$ 211	$ 706
Less Customer Contribution		-	-	-
Removals new of Salvage_	%	-	-	-
Total Direct Spending		$ 494	$ 211	$ 706
Capital Additions - Indirect		128	(55)	73
AFUDC		-	-	-
Total Capital Request		$ 622	$ 157	$ 779
O&M		-	-	-
Total Request		**$ 622**	**$ 157**	**$ 779**

Total Supplement Request by year view:

		Prior/2017	2018	2019	Total
Capital Additions - Direct		$ 706	$ -	$ -	$ 706
Less Customer Contr bution		-	-	-	-
Removals new of Salvage_	%	-	-	-	-
Total Direct Spending		$ 706	$ -	$ -	$ 706
Capital Additions - Indirect		73	-	-	73
AFUDC		-	-	-	-
T o tal Capital Request		$ 779	$ -	$ -	$ 779
O&M		-	-	-	-
Total **Request**		**$ 779**	**$ -**	**$.**	**$ 779**

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--018 **Page 1 of 1**

Request from: Department of Energy

Witness: Davis, Thomas W

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Reject Pole Replacement No. A07X45

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-18 for the PAF for this project.

EVERSOURCE
Project Authorization Form

Operations Project Authorization Form

Date Prepared: 11/01/2020	**Project Title:** 2021 Reject Pole Replacement
Company/ies: Eversource NH	**Project ID Number:** A07X45
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Pat Sullivan	**Project Category:** Reliability – Line
Project Manager: Mark Sandler	**Project Type:** Program
Project Sponsor: Joseph Purington	**Project Purpose:** Reject Pole Replacement
Estimated in service date: 12/31/21	**If Transmission Project: PTF?** No
Eng. /Constr. Resources Budgeted? No	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan?** Yes
Total Request: $2,341,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

The Eversource Maintenance Program (EMP) and the Intercompany Operating Procedures (IOPs) both require all wood poles in Eversource maintenance territory to be inspected every 10 years. This project funds the replace of poles which are deemed “rejects” as part of the annual inspection program.

Project Costs Summary

	Prior Authorized	2021	20	20 +	Totals
Capital Additions - Direct	$ -	$ 1,211.0	$ -	$ -	$ 1,211.0
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage ___%	-	200.0	-	-	200.0
Total - Direct Spending	$ -	$ 1,411.0	$ -	$ -	$ 1,411.0
Capital Additions - Indirect	-	907.0	-	-	907.0
Subtotal Request	$ -	$ 2,318.0	$ -	$ -	$ 2,318.0
AFUDC	-	23.0	-	-	23 0
Total Capital Request	$ -	$ 2,341.0	$ -	$ -	$ 2,341 0
O&M	-	-	-	-	-
Total Request	$ -	$ 2,341.0	$ -	$ -	$ 2,341.0

EVERSOURCE
Project Authorization Form

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	$113			$113
Overtime Labor	$4			$4
Outside Services	$1,150			$1,150
Materials	$144			$144
Other, including contingency amounts (describe)				
Total	$1,411			$2,012

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	$907			$907
Capitalized interest or AFUDC, if any	$23			$23
Total	$930			$930

Total Capital Costs	$2,341			$2,341
Less Total Customer Contribution	0			0
Total Capital Project Costs	$2,341			$2,341
Total O&M Project Costs				

Note: Explain unique payment provisions, if applicable

EVERSOURCE
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 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.

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
Eversource inspects approximately 35,000 wood poles each year as part of its annual pole inspection program. 403 poles were identified as requiring replacement as a result of the 2020 pole inspection program.

Project Objectives
Replace poles that are identified as either a higher priority or normal priority reject during the annual inspection program.

Project Scope
403 poles were identified as requiring replacement as a result of inspections that were completed by Smith Mountain Investments in 2020. Project A07X45 funds the replacement of the poles that are identified as deficient based on inspection criteria.

Background / Justification
Eversource inspects its wood poles utilizing a 10 year inspection cycle. As a result of the 2020 pole inspection program, 403 poles were identified as requiring replacement.

Business Process and / or Technical Improvements:
The annual pole inspection program typically identifies between 300 and 500 poles that require replacement.

Alternatives Considered with Cost Estimates
The alternative is to do nothing which would likely lead to decreased reliability of electric service due to pole failures. This would also violate the terms of the Intercompany Operating Procedures and result in unsafe conditions, especially for a worker climbing a pole. There would be no financial cost to this option, although it would likely result in increased regulatory scrutiny.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Project Completion	12/31/2021

Regulatory Approvals
None.

Risks and Risk Mitigation Plans
None.

References
None.

Attachments (One-Line Diagrams, Images, etc.)
None.

Project Cost Estimate Backup Details
Cost based on historical expenditures.

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--019 **Page 1 of 1**

Request from: Department of Energy

Witness: Yergeau, Jason M

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

PCB Transf Changeout Prgm No. C01PCB

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-19 for the PAF for this project.

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 12/11/2020	**Project Title:** PCB Transformer Replacement Program
Company/ies: Eversource NH	**Project ID Number:** CO1PCB
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Pat Sullivan	**Project Category:** Basic Business - Environmental
Project Manager: Pat Sullivan	**Project Type:** Specific Annual Program
Project Sponsor: Mark Sandler	**Project Purpose:** PCB Transformer Replacement
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request (Gross): $140,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

An approval of $140K is requested for the 2021 PCB Transformer Replacement program. The specific work is not identified during the budget cycle but is a result of monitoring the system throughout the year. Prior to 1978, polychlorinated biphenyls (PCBs) were used in transformers as a fire retardant, but were later identified as being detrimental to the environment and to humans and were banned in the late 1970s. Eversource has had a program each year to change out transformers on the system identified as potentially PCB contaminated and will continue to change out the suspect transformers on the system until they are all gone. The plan for 2021 is to remove 50 units from the system.

EVERSOURCE

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	$11	$0	$0	$0	$0	$0
7. Construction (incl matl's by contractors)	$0	$0	$0	$63	$0	$0	$0	$0	$74
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	$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**	**$0**	**$74**	**$0**	**$0**	**$0**	**$0**	**$74**
13. Indirects/Overhead	$0	$0	$0	$66	$0	$0	$0	$0	$66
14. AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**

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 to Go	2021	2022	2023	2024	2025	Total
ST Labor	$0	$0	$0	$23	$0	$0	$0	$0	$23
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$40	$0	$0	$0	$0	$40
Materials*	$0	$0	$0	$11	$0	$0	$0	$0	$11
Removals	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$66	$0	$0	$0	$0	$66
AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**

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

EVERSOURCE

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? No

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
Capital funding is needed to address replacement of transformers identified as potentially contaminated with polychlorinated biphenyls (PCBs).

Project Objectives
Replacement of transformers containing PCBs.

Project Scope
Approval of the PCB Transformer Replacement (CO1PCB) project covers authorization of all area work center PCB transformer replacement work orders. The CO1PCB program encompasses the total NH PCB transformer replacement program budget. Actual charges will accumulate in the individual area work center work orders.

Background / Justification
This is a project for the Replacement of PCB contaminated transformers to remove them from the Eversource system.

Business Process and / or Technical Improvements:
Not applicable.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
2021 program funding levels were estimated using historical spending.

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Request Form

Approved by NH PAC 1/25/2022

Project Title: PCB Transformer Changeout Program	**Project Number:** CO1PCB
Date Prepared: 01/13/2022	**Company:** NH Electric Distribution 06
Organization: NH Operations	**Class(es) of Plant: Distribution**
Project Initiator: Jim Devereaux	**Project Category: Annual - Lines**
Project Manager: Jim Devereaux	**Project Type:** Annual
Project Sponsor: Jason Yergeau	**Project Purpose:** PCB Transformer Replacement
Estimated in service date: 12/31/2021	**Capital Investment part of original Operating Plan:** Yes
Current Authorization Amount: $ 140,000	**O&M Expenses part of request:** No
Supplement Request: $ 137,248	**Other:**
Total Request: $ 275,568	

Supplement Justification

Direct spend for calendar year 2021 of $142,470 has exceeded the authorized amount of $74,000 by $68,470 (93%). The threshold for supplemental funding requests is a $25,000 overrun on the authorized direct cost.

Justification for Additional Resources

2021 actual capital cost incurred was $275,568 versus the authorized amount of $140,000. The targeted number of transformers was achieved in 2021. The complexity of the units replaced increased in 2021, and will continue to increase, resulting in higher cost per unit.

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APS 1 - Project Authorization Policy

Appendix 4
Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in thousands:

Capital Costs	Prior Authorized	Supplemental Request	Total
Direct Capital Costs			
Internal Labor	$9	$9	$18
Outside Services	$35	$32	$67
Materials	$9	$9	$18
Removals	$21	$19	$40
Risk and Contingency	$0	$0	$0
Other	$0	$0	$0
Subtotal	$74	$69	$143
Indirect Capital Costs			
Indirect/Overheads (including benefits)	$66	$69	$135
Capitalized interest or AFUDC, if any	$0	$0	$0
Subtotal	$66	$69	$135
Total Customer Contribution	$0	($2)	($2)
Total Capital Project Costs	**$140**	**$136**	**$276**

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 12/11/2020	**Project Title:** PCB Transformer Replacement Program
Company/ies: Eversource NH	**Project ID Number:** CO1PCB
Organization: NH Operations	**Class(es) of Plant:** Distribution
Project Initiator: Pat Sullivan	**Project Category:** Basic Business - Environmental
Project Manager: Pat Sullivan	**Project Type:** Specific Annual Program
Project Sponsor: Mark Sandler	**Project Purpose:** PCB Transformer Replacement
Estimated in service date: 12/31/2021	**If Transmission Project: PTF?** NA
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Full Funding	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request (Gross): $140,000	

Executive Summary

An approval of $140K is requested for the 2021 PCB Transformer Replacement program. The specific work is not identified during the budget cycle but is a result of monitoring the system throughout the year. Prior to 1978, polychlorinated biphenyls (PCBs) were used in transformers as a fire retardant but were later identified as being detrimental to the environment and to humans and were banned in the late 1970s. Eversource has had a program each year to change out transformers on the system identified as potentially PCB contaminated and will continue to change out the suspect transformers on the system until they are all gone. The plan for 2021 is to remove 50 units from the system.

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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	$11	$0	$0	$0	$0	$0
7. Construction (incl matl's by contractors)	$0	$0	$0	$63	$0	$0	$0	$0	$74
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	$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**	**$0**	**$74**	**$0**	**$0**	**$0**	**$0**	**$74**
13. Indirects/Overhead	$0	$0	$0	$66	$0	$0	$0	$0	$66
14. AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL – BASELINE BUDGET	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**
15. Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**
16. Reimbursables/Customer Contribution	$0	$0	$0	$0	$0	$0	$0	$0	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**
O&M	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL REQUEST	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**

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

EVERSOURCE

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	$0	$23	$0	$0	$0	$0	$23
OT Labor	$0	$0	$0	$0	$0	$0	$0	$0	$0
Outside Services Labor	$0	$0	$0	$40	$0	$0	$0	$0	$40
Materials*	$0	$0	$0	$11	$0	$0	$0	$0	$11
Removals	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0
Indirects	$0	$0	$0	$66	$0	$0	$0	$0	$66
AFUDC	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$0**	**$0**	**$0**	**$140**	**$0**	**$0**	**$0**	**$0**	**$140**

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

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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? No

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

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APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

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APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

Technical Justification

Project Need Statement
Capital funding is needed to address replacement of transformers identified as potentially contaminated with polychlorinated biphenyls (PCBs).

Project Objectives
Replacement of transformers containing PCBs.

Project Scope
Approval of the PCB Transformer Replacement (CO1PCB) project covers authorization of all area work center PCB transformer replacement work orders. The CO1PCB program encompasses the total NH PCB transformer replacement program budget. Actual charges will accumulate in the individual area work center work orders.

Background / Justification
This is a project for the Replacement of PCB contaminated transformers to remove them from the Eversource system.

Business Process and / or Technical Improvements:
Not applicable.

Alternatives Considered with Cost Estimates
Not applicable.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Program completion	12/31/2021

Regulatory Approvals
The construction budget is submitted to the New Hampshire Public Utilities Commission in accordance with Rule Puc 308.07 using Form E-22. Also on a quarterly basis projects not previously reported in the annual construction budget that have exceeded $100,000 are reported to the New Hampshire Public Utilities Commission.

Risks and Risk Mitigation Plans
On a monthly basis, capital project spending is reviewed and any risks are identified and managed during that meeting.

References
Not applicable.

Attachments (One-Line Diagrams, Images, etc.)
Not applicable.

Cost Estimate Backup Details
2021 program funding levels were estimated using historical spending.

EVERSOURCE

APS 1 - Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--020 **Page 1 of 1**

Request from: Department of Energy

Witness: Devereaux, James J

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.
Café Renovations No. 18740

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-20 for the PAF for this project.

Corporate Shared Services Project Authorization Form

Date Prepared: December 20, 2017	Project Title: Energy Park Cafeteria Renovation
Company/Companies: PSNH-D	Project ID Number: 18740
Organization: Supply Chain	Plant Class/(F.P.Type): Buildings
Project Initiator: Blair Gourley	Project Type: *Specific*
Project Manager: Tom McDermott	Capital Investment Part of Original Operating Plan? Y
Project Sponsor: Ellen Angley	O&M Expenses Part of the Original Operating Plan? N
Estimated in service date(s): May 31, 2018	Transfer of Funds Request: N
Total Request: : $500,000	Emergency Related Request: N

Project Authorization

Project Authorization Forms must be completed for Corporate Shared Services projects totaling $500K or greater in accordance with the Project Authorization Policy and approval levels in the Delegation of Authority Policy (DOA).

If Subsidiary Board approval is required (Corporate Shared Services capital projects > $15M), document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A) (attach email approval).

ERM: _____

FP&A: _____

If this is a Transfer of Funds Request Vice President of Financial Planning and Analysis approval is required. If the Vice President of Financial Planning and Analysis deems appropriate, additional approvals may also be required (see page 7 of the Project Authorization Policy – Project Approval is not Transferable for further detail):

Date of Approval
CFO:_____

Other:_____

Documentation/Explanation:_____

Executive Summary

(If related to an Emergency Request – please provide specific details of emergency situation and operational impacts to business and/or customer.)

Construct a new collaborative work space at the Energy Park to be used for meetings, lunches, and other business gatherings. The work will involve the demolition of the existing lunchroom and the Merrimack Conference Room. New construction will include a variety of meeting spaces and lunchroom amenities. This work will include new walls, flooring, HVAC, lighting, and furniture.

Project Costs Summary

See APS3 and APS8 requirements and consult with Plant Accounting for capital/O&M determination. Use published loaders for benefits, materials, and invoices, maintained by the Director, Budget and Financial Analysis.

	2018	Year 20__	Year 20__+	Totals
Capital Additions - Direct	$ 453,150	$ -	$ -	$ 453,150
Capital Additions - Indirect	$ 23,000	$ -	$ -	$ 23,000
Removals net of salvage ____%	$ 23,850	$ -	$ -	$ 23,850
Contingency	$ -			
Subtotal Request	$ 500,000	$ -	$ -	$ 500,000
O&M	$ -	$ -	$ -	$ -
Total Request	**$ 500,000**	**$ -**	**$ -**	**$ 500,000**

Financial Evaluation

Provide the following financial information (provide additional detail if summarized items are significant, additional information is needed or there are unique payment provisions).

Direct Capital Costs	Year 2018	Year 20___	Year 20___ +	Total
Straight Time Labor	$ 5,000	$ -	$ -	$ 5,000
Overtime	$ -	$ -	$ -	$ -
Outside Services/Consultants	$ 448,150	$ -	$ -	$ 448,150
Removal	$ 23,850	$ -	$ -	$ 23,850
Hardware	$ -	$ -	$ -	$ -
Materials	$ -	$ -	$ -	$ -
Other, including contingency amounts (Describe) Contingency ____%	-	$ -	$ -	$ -
Total Direct Capital Costs	**$ 477,000**	**$ -**	**$ -**	**$ 477,000**

Indirect Capital Costs	Year 2018	Year 20___	Year 20___ +	Total
Indirects/Overheads (including benefits)	**$ 23,000**	**$ -**	**$ -**	**$ 23,000**
Capitalized interest or AFUDC , if any	-	-	-	-
Total Indirect Capital Costs	**$ 23,000**	**$ -**	**$ -**	**$ 23,000**
Total Capital Costs	**$ 500,000**	**$ -**	**$ -**	**$ 500,000**
Total O&M Costs	**$ -**	**$ -**	**$ -**	**$ -**
Total Project Costs	**$ 500,000**	**$ -**	**$ -**	**$ 500,000**
Vendor software payments (indicate whether or not included in the above)*	$ -	$ -	$ -	$ -

*Accounting for vendor software payments for SaaS or other agreements involving the right to use software is to be determined by a separate analysis, and approval by Plant Accounting and Budgeting and Financial Analysis is required. Plant Accounting maintains a checklist to aid in this analysis.

By Company Summary:

	Entity 06	Entity ____	Entity ____	Entity ____	Totals
Capital Additions - Direct	$ 453,150	$ -	$ -	$ -	$ 453,150
Capital Additions - Indirect	$ 23,000	-	-	-	$ 23,000
Removals net of salvage ____%	$ 23,850	-	-	-	$ 23,850
Subtotal Request	$ 500,000	-	-	-	$ 500,000
O&M	-	-	-	-	-

Overall Justification:

Project Need Statement

Construct a new meeting and lunchroom facility at the Energy Park.

Project Scope

Construct a work space that includes meeting spaces and lunchroom amenities. This project will include new walls, flooring, HVAC, lighting, and furniture.

Project Objectives

To create a work space to encourage collaboration and team work amongst our employees and to create a more flexible work environment to increase employee morale and productivity.

Background / Justification

This is an employee engagement project. Eversource is trying to create a more creative and flexible work place. This space will be an alternative to the normal cubicle or office.

Business Process and / or Technical Improvements: *Quantitative and qualitative project benefits, including assumptions used to estimate benefits and customer impacts; describe the changes in performance to the business process or technology performance metrics that can be expected as a result of this project*

Future Financial Impacts:

Provide below the estimated future costs that will result from the project:

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 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.

What is the project's IRR? _____

What is the project's NPV? _____

What is the project's payback period? _____

Use appropriate discount rate by company and associated corporate models (to be provided by Financial Planning and Analysis).

If the above items are not applicable, explain why (e.g., if negative but there are other reasons to proceed).

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

An ARO is a current legal obligation to remove or retire property, plant or equipment at some point in the future. Please refer to APS8 or contact Plant Accounting for further detail.

Is there an ARO associated with this project? If yes, please provide details:

Are there other environmental cleanup costs associated with this project? If yes, please provide details.

Alternatives Considered with Cost Estimates

None considered.

Project Schedule

Describe the project schedule and milestones. Include estimated start and end dates.

Milestone/Phase Name	Estimated Start - Completion Date
Create Project Authorization Form	12/20/2017 – 12/21/2017
Bid and build contracts	02/01/2018 – 02/25/2018
Receive drawings & estimates	02/01/2018 – 02/25/2018
Construction	03/01/2018 – 05/15/2018
Completion	05/25/2018

Regulatory Approvals:

None.

Risks and Risk Mitigation Plans

Describe the applicable risks and associated risk mitigation plans: e.g., construction, customer, reputational, schedule, financial, regulatory, environmental, safety and IT risks. Indicate discussions with relevant subject matter experts.

References (*additional supporting documentation*)

Diagrams, Attachments, and Images

Authorization Criteria Specific to IT Projects

Describe the applications that are impacted and include information regarding the interfaces and interdependencies related to this IT project (diagrams may be considered to assist in review and approval).

N/A

Assess the fit of this IT project with the overall IT strategy.

Describe control matters, such as the processes for data migration, change management plan including impacts to business processes, data maintenance controls, whether or not this IT project will be or impacts a Sarbanes-Oxley critical application, and the business continuity plan.

Attached SaaS form where applicable

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--021 **Page 1 of 1**

Request from: Department of Energy

Witness: Devereaux, James J

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.
Berlin NH Yard Paving No. 20739

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

This project is below the threshold of requiring a PAF per APS-01.

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--022 **Page 1 of 1**

Request from: Department of Energy

Witness: Plante, David L

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Jackman Replace Equip. No. A16C10

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-22 for the PAF for this project.

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Approved at February 14, 2018 EPAC

Link to Meeting Minutes

Date Prepared: February 8, 2018	**Project Title: Jackman Replace Obsolete Equipment**
Company/Companies: Eversource (NH)	**Project ID Number: A16C10 / A07X44B2**
Organization: NH Operations	**Plant Class/(F.P.Type): Distribution Substation**
Project Initiator: Thelma Brown	**Project Type: Specific**
Project Manager: Alan Roe	**Capital Investment Part of Original Operating Plan? Y**
Project Sponsor: James Eilenberger	**O&M Expenses Part of the Original Operating Plan? No**
Current Authorized Amount: $5,400k	**Estimated in service date(s): April 30, 2018**
Supplement Request: $1,755k	**Other:**
Total Request: $7,155k	

Supplement Justification

Background

The original Project Authorization Form ("PAF") for the Jackman Replace Obsolete Equipment project was approved in April 2016. At that time, the project was approved at a cost of $4,557k with an in-service date of June 2017. The project estimate was based on direct costs of $4,228k with indirect costs of $325k and AFUDC of $4k.

A supplemental Project Authorization Form was approved in April 2017 with an expected cost to complete the project of $5,400k (direct costs - $5,027; indirect costs - $369k and AFUDC - $4.5k). At that time the expected in-service date was November 2017.

Project Status

At this point, all 34.5kV circuit breakers have been replaced and all relaying, controls and metering have been transferred over to the new control house. The final installation and commissioning of the capacitor bank and cap-switcher will occur in April 2018 (the first available outage) along with all 'punch list' and site restoration activities.

This supplemental Project Authorization Form requests approval of $1,755K for a total request of $7,155k. Since April 2017, direct costs have increased by $869k and associated increases in Indirect costs are $844k. AFUDC has increased $43k. The reasons for these increases are explained below

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APS 1 - Project Authorization Policy

Supplement Request Form

Cumulative effect of Changes since April 2017

	April 2017 (Current Authorized)	February 2018 (Total Request)	Difference (Supplement Request)
1. Eng./PM/Permitting	$850,007	$900,218	$50,212
2. Construction	$2,326,939	$3,533,898	$1,206,959
3. Testing & Commissioning	$493,000	$577,387	$84,387
4. Internal Labor / Exp.	$291,000	$326,741	$35,741
5. Eversource Supplied Material	$694,618	$304,128	($390,490)
6. Allowances / Contingency	$371,090	$0	($371,090)
7. Property Taxes	$0	$173,753	$173,753
8. Misc. Other	$0	$79,554	$79,554
Total Directs	$5,026,654	$5,895,662	$869,008
9. Indirect	$369,012	$1,212,861	$843,849
10. AFUDC	$4,542	$46,736	$42,194
Total	$5,400,208	$7,155,259	$1,755,051

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Justification for Additional Resources

1. Engineering / Project Management / Permitting

To increase the supplier base of Engineering design vendors, Altran, based in New Jersey, was awarded the contract to design the Jackman project. Unfortunately, Altran were not sufficiently experienced to complete the project to the required quality, they had insufficient experience working with Eversource design standards and they lost several key resources to other vendors during the project.

Because of a lack of confidence in Altran, it was decided by the Project team to request Leidos to complete the as-built drawings for the project, this incurred an additional $48,606 which was not anticipated in April 2017. This plus minor forecasting changes result in an increase in Engineering / Project Management and Permitting of $50,212. The project manager will contact Procurement to discuss the possibility of recovering the additional as-built drawing costs from Altran.

Total Incremental Request for Engineering / Project Management and Permitting: $50,212

2. Construction

Because of Altran's lack of engineering design quality, a large amount of engineering in the field was required to meet the design intent and to comply with Eversource standards. This led to the installation contractor having to do additional work beyond what was included in their original scope. Construction costs also increased due to charges to the project that were not forecasted back in April 2017. Change orders, unforecasted charges and a difference in how materials were recorded resulted in an increase in Construction costs by $1,206,959 (See item #5 below for corresponding decrease in Eversource supplied material costs).

Total Incremental Request for Construction: $1,206,959

3. Testing and Commission

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APS 1 - Project Authorization Policy

Supplement Request Form

During construction, it was necessary to extend outages on transformer TB33 and to work several weekends because outages of the 34.5k bus were not granted due to loss of customer load concerns. Weekend and overtime working meant the project incurred additional labor costs from the testing contractor, and lead commissioning engineer.

Total Incremental Request for testing and commissioning: $84,387

4. Labor and Expenses

With the project delays, and additional effort needed to resolve issues with the Altran design, additional internal labor for engineering, site supervision and management was incurred. This includes time spent following one safety incident and one unwanted trip during construction.

Total Incremental Request for Labor and Expenses: $35,741

5. Eversource Supplied Material

As noted in #2 above, some of the increases in Construction charges is offset by a reduction in the Eversource supplied materials forecast. Originally the materials were forecast as Eversource supplied at a cost of $694,618 but much of this was supplied by the Construction contractor which is reflected in the increase in Construction costs above and a commensurate reduction in Eversource supplied materials.

Total Incremental Request for Materials: ($390,490)

6. Allowances / Contingency

The April 2017 forecast included allowances of $371,090 for weather related events, design uncertainty, unforeseen ground conditions and final site remediation costs. These allowances were used to offset the construction increases. The project team is now accounting for this spend in the construction category, so contingency amount in updated total forecast is now zero.

Total Incremental Request for Allowances / Contingency: ($371,090)

7. Property Taxes

The original project estimate and the April 2017 forecast did not include an allowance for property taxes. To the end of 2017, the project has incurred $119,753k in property taxes with an additional $54,000 forecast through April 2018.

Total Incremental Request for property taxes: $173,753

8. Miscellaneous Other

To the end of 2017, the project has incurred $76,554 in Miscellaneous Distribution Expenses Capitalized Overheads (“MDEC”). These additional miscellaneous charges were not forecast in April 2017. Based on charges to date and a rate of 0.015 an additional $3,000 is forecast until the end of April 2018.

Total Incremental Request for Miscellaneous Items: $79,554

9. Indirect costs

In the April 2017 forecast, indirect costs were forecast to be $369k based on the previous estimate in the April 2016 PAF of $325k. To date, the project has incurred $1,063k in adders and is expected to incur an additional $150k to the end of the project. Both the original PAF estimate in April 2016 and Supplemental

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APS 1 - Project Authorization Policy

Supplement Request Form

PAF estimate in April 2017 were low. Total increase in indirect costs for this supplement request is $843K

10. AFUDC

in April 2017, AFUDC charges for the project were forecast as $4k. Actual AFUDC charges incurred to date are $35k with an additional $12k forecast for the remainder of the project. Again it is clear that both the original AFUDC estimate and estimate in the April 2017 supplemental PAF were low. Total increase in ADUFC for this supplement request is $42.2k

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplemental Request	Total
Capital Additions – Direct	$5,027	$868	$5,896
Less Customer Contribution	$0	$0	$0
Removals net of Salvage ___ %	$0	$0	$0
Total Direct Spending	$5,027	$868	$5,896
Capital Additions – Indirect	$369	$843	$1,213
AFUDC	$4.5	$42.5	$47
O&M	$0	$0	$0
Total Request	$5,400	$1,755	$7,155

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	To Date	Year 2018	Year 2019	Total
Capital Additions – Direct	$5,322	$574	$0	$5,896
Less Customer Contribution	$0	$0	$0	$0
Removals net of Salvage %	$0	$0	$0	$0
Total Direct Spending	$5,322	$574	$0	$5,896
Capital Additions – Indirect	$1,063	$150	$0	$1,213
AFUDC	$34	$12	$0	$47
O&M	$0	$0	$0	$0
Total Request	$6,419	$736	$0	$7,155

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Project Authorization Policy
Operations Project Authorization

Date Prepared: **January 31, 2017**	Project Title: **Jackman Replace Obsolete Equipment**
Company/Companies: **Eversource (NH)**	Project ID Number: **A16C10 / A07X44B2**
Organization: **NH Operations**	Plant Class/(F.P.Type): **Distribution**
Project Initiator: **Thelma Brown**	Project Type: ***Specific*** */ Annual / Prelim Project / Parent*
Project Owner/Manager: **Alan Roe**	Capital Investment Part of Original Operating Plan? **Y** / N
Project Sponsor: **James Eilenberger**	O&M Expenses Part of the Original Operating Plan? Y / N
Current Authorized Amount:**$4,557,000**	Estimated in service date(s): **November 30, 2017**
Supplement Request:**$843,154**	Other:
Total Request: **$5,400,154**	

Project Authorization Supplement Justification

The Project Authorization Form (PAF) for the Jackman Replace Obsolete Equipment project was approved in April 2016. At that time, the project was approved at a cost of $4,557,000 with an in-service date of June 2017. The total project cost was based on direct costs of $4,228,000 with indirect costs of $325,000 and AFUDC of $4,000.

The expected cost to complete the project is now $5,400,154 which is $843,154 above the approved project amount.

	PAF Approved Budget	Current Forecast
Direct	$4,228,000	$5,026,654
Indirect	$325,000	$369,012
AFUDC	$4,000	$4,542
Total	$4,557,000	$5,400,154
Difference	$843,154	

At this stage in the project, the majority of Contracts are in place, with only the following contracts to be awarded:

- electrical testing ($249,069 forecast based on best evaluated bid),
- installation and removal of the mobile substation ($75,000 forecast based on a recent similar installation), and
- site security ($82,000 forecast based on Securitas proposal)
- cost to complete includes $85,000 of specific risk allowances e.g. weather, design uncertainty, site remediation.

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Project Authorization Policy
Operations Project Authorization

Justification for Additional Resources

The project moved in to Construction at the beginning of January. Engineering design had a number of challenges (lack of available drawings, re-design of equipment, late changes to scope, etc.). Construction is also expected to be challenging due to the complexity of the project, the potential for buried equipment not shown on drawings, availability of outages, complex cut-over requirements, etc. The current planned in-service date is now November 2017 due to outage unavailability in the summer.

Explanation for Cost Increase

Materials - The main construction contract was awarded to ES Boulos as the best evaluated bidder following a formal bidding process. As is typical, construction pricing was requested based on the 70% design and bill of materials. Once the IFC drawings were issued a large difference between the bill of materials was identified.

Estimated Cost Increase $261,090

Lead Commissioning Engineer - During the development of the project, the project team requested that an independent Lead Commissioning Engineer be brought onboard. The cut-over sequence from the old control house is extremely complex and an experienced commissioning engineer was considered prudent. Commissioning was included in the forecast, but the use of an LCE was not included in the original PAF estimate. After an RFP process, the T&M contract was awarded to EIG as the best evaluated bidder but prices for the LCE services came in much higher than anticipated.

Estimated Cost Increase $150,000

Contaminated Soils - The main construction contract was awarded to ES Boulos as the best evaluated bidder following a formal bidding process. While the contract price was in-line with the anticipated cost an allowance of $25,000 was also included in the PO amount for the removal of contaminated soils. The removal cost for the soils is now estimated to be $40,000 ($35,000 for transportation and $5,000 for disposal).

Estimated Cost Increase $15,000

Site Security - During the previous Transmission project at Jackman, there were three incidents of thefts of material from site. To reduce the risk during this project it was proposed to use a security guard during nights and weekends. This activity was not specifically included in the PAF forecast. Securitas has submitted a proposal for $82,000 for this work. This contract is not yet awarded but is included in the current forecast. The risk of theft will be managed by securing material in locked Conex boxes and by arranging delivery of materials on a just-in-time basis.

Estimated Cost Increase $82,000

Owner's Engineer - During the engineering design process, the P&C Engineering group requested that the services of an Owner's Engineer be contracted to review the P&C drawings due to a lack of internal resources. This work was directly awarded to one of the of-choice vendors (HDR). While the engineering reviews were included in the original direct labor costs the Owner's Engineer T&M contract increased the Outside Services element of the project.

Estimated Cost Increase $50,000

Mobile Substation - During the development of the project, it was realized that the installation and removal of the mobile substation would be required to support the TB61 and TB33 outages. The cost to tap-up and remove the mobile substation was not included in the original PAF estimate and although the contract has yet to be let $75,000 is forecast for this activity based on a similar recent installation at Whitefield. This is anticipated to be a fixed price contract.

Estimated Cost Increase $75,000

Additional Engineering – During the engineering design process, a number of additional owner directed tasks were assigned to the Engineering vendor (Altran). One of the changes related to the provision of new revenue metering to support generation divestiture. This was not included in the original scope of work or the PAF estimate. Additional tasks such as an analysis of the station lighting and lightning protection was also requested as these studies were not available. The two Altran change orders together were $77,150.

Estimated Cost Increase $77,150

Indirects / AFUDC - In addition to the increase in direct costs, Indirect and AFUDC charges have also been estimated to increase by $44,500 based on the ratio of direct and indirect costs in the original PAF estimate.

Estimated Cost Increase $44,500

Summary

Activity	Estimated Cost Increase
Materials	$261,090
Lead Commissioning Engineer	$150,000
Contaminated Soils	$15,000
Site Security	$82,000
Owner's Engineer	$50,000
Mobile Substation	$75,000
Additional Engineering	$77,100
Indirects / AFUDC	$44,500
Total	**$754,690**

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Project Authorization Policy
Operations Project Authorization

The $754,690 increase represents the worst case scenario at this stage. It assumes that:

- all additional materials cost is required;
- site security will be needed for the full duration of construction;
- HDR will charge to the full amount of their PO for design reviews;
- EIG will charge to the full amount of their PO for commissioning support;
- the mobile installation charges will be $75,000; and
- soil removal transportation and disposal costs are capped at 1,000 tons.

Project Authorization Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 4,228,000	$ 798,600	$ 5,026,600
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	-	-
Total Direct Spending	$ 4,228,000	$ 798,600	$ 5,026,600
Capital Additions - Indirect	325,000.00	44,012.00	369,012.00
AFUDC	4,000.00	542.00	4,542.00
Total Capital Request	$ 4,557,000	$ 843,154	$ 5,400,154
O&M	-	-	-
Total Request	**$ 4,557,000**	**$ 843,154**	**$ 5,400,154**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2017	Year 20__	Year 20__+	Total
Capital Additions - Direct	$ 798,600	$ -	$ -	$ 798,600
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	-	-	-	-
Total Direct Spending	$ 798,600	$ -	$ -	$ 798,600
Capital Additions - Indirect	44,012.00	-	-	44,012.00
AFUDC	542.00	-	-	542.00
Total Capital Request	$ 843,154	$ -	$ -	$ 843,154
O&M	-	-	-	-
Total Request	**$ 843,154**	**$ -**	**$ -**	**$ 843,154**

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Accounting Policy Statement No. 2
Operations Project Authorization

Project Authorization Form

General Information

Date Prepared: 02/18/2016	Project Title: Replace Jackman OCB
Company: Eversource NH	Project ID Number: A07X44A
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Thelma Brown	Project Category: Reliability
Project Owner/Manager: Alan Roe	Project Type: Specific
Project Sponsor: James Eilenberger	Project Purpose: part of regulatory tracked program? N
Estimated in service date: 06/1/2017	Capital Investment Part of Original Operating Plan? Y
If Transmission Project: PTF / Non-PTF / N/A	Supplement to Existing Authorization? Y
	O&M Expenses Part of the Original Operating Plan? N

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project addresses the replacement of obsolete equipment programs specifically replacing Oil Circuit Breakers (OCB). A total of ten (10) substation project work orders have been written under this project. Nine of the projects have been completed for $4,030,544. The last work order for this project is for Jackman Substation. When the Jackman work order was initiated in 2014 the plan was to replace four oil circuit breakers, a capacitor switch, and two relays at Jackman for $2,400,000.

In early 2015 the decision was made to divest from generation. Currently all relays and controls for the distribution equipment at Jackman SS is in the generation power house. Once divestiture was announced it was determined that the scope of the work at Jackman should be increased to include the removal of distribution relaying from the generation control house, replacement of electromechanical relays, reconfiguration of substation bus work, and building a new distribution control house.

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Accounting Policy Statement No. 2
Operations Project Authorization

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized*	Prior Spend*	2016	2017+	Totals	Supplemental Authorization*
Capital Additions - Direct	$	$	$3,303	$1,085	$4,388	$*
Customer Contribution	$	$	$0	$0	$0	$0
Removals net of Salvage	$	$	$33	$26	$59	$0
Total - Direct Spending	$	$	$3,337	$1,111	$4,448	$0
Capital Additions - Indirect	$	$	$703	$286	$989	$0
Subtotal Request	$	$	$4,040	$1,397	$5,437	$7,656
AFUDC	$	$	$0	$0	$0	$0
Total Request	$2,250 (1)	$4,469 (2)	$4,040	$1,397	$5,437	$7,656 (3)

(1) Only the total for the Prior Authorized amount is shown. The last approved revision for this project was for $2,250,447 which was the 2015 budget amount authorized on 3/24/15
(2) Only the total for the Prior Spend 2011 - 2015 amount is shown. The previous spending on this project was for ten separate work orders. A total of $4,469,449 has been spent at ten substations to date.
(3) Only the total request for the Supplemental Authorization is shown. This is the amount to complete the Jackman SS work order. The Total Request for the Supplemental Authorization is the amount spent and required for the Jackman work order above the amount approved in Power Plan 3/24/15.It is the amount above the currently authorized amount: $4,469 + $5,437 - $2,250 = $7,656

* to be completed if supplemental authorization is required

Summary Project Description

Circuit Breaker Replacement

At Jackman substation four existing 34.5kV oil circuit breakers (313, 3173, 311 & 3140) will be removed and replaced with Siemens type SDV7 vacuum breakers. The table below shows the ages of the circuit breakers along with their replacement priority out of 127 breakers on the system.

OCB	Age	Rank
Line Breaker 313	60	28
Line Breaker 3173	60	33
Line Breaker 311	45	65
Line Breaker 3140	41	91

To facilitate the future separation of generation and distribution assets, a new 34.5kV bay will be installed adjacent to the 313 line position and the 313 and 3173 line positions will each shift south one position. This shift will generate sufficient space to create a fenced compound for the existing GSU transformer.

Capacitor Switcher Replacement

In addition to the circuit breaker replacement, the existing C22 vacuum capacitor switcher will be removed, relocated and replaced with a new Southern States Cap-switcher along with two sets of new current transformers (CTs). The existing capacitor vacuum switcher outdoor relays and

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Accounting Policy Statement No. 2
Operations Project Authorization

outdoor relay cabinet will be removed and new protection equipment will be installed inside a new control house (see below). To provide better access to the site, the existing C22 cap bank will also be removed and relocated so that the existing overhead strain bus that feeds it can be removed. A replacement 5.4MVAR capacitor bank mounted on a 10.8MVAR rack will be installed.

The vacuum capacitor switch is part of a targeted program for replacement. Additionally, to separate the Distribution assets from generation assets the capacitor switch and bank need to be relocated. This relocation has the added benefit of opening up access to the yard on the north side of the substation.

To allow for the installation of a future bus tie breaker, the existing station service transformer will also be relocated to the ends of the 34.5kV bus.

Construction of Control House
With the need to update the control equipment associated with the circuit breaker and capacitor switcher replacements and the need to provide new directional phase and ground overcurrent protection on line positions 313, 3173, 311 and 3140 it was decided that with the impending physical separation of the Eversource distribution and transmission equipment from the generation equipment that a new control house should be constructed.

The protection and control cabinets for the 313, 3713, 311 and 3140 feeder breakers, transformer TB33 & TB61, circuit switchers J33 & J61 and capacitor switcher C22 will be added in the new control house. The GSU transformer breaker TB9 protection and control cabinet will also be added in the new control house.

To accommodate the new control house, the existing TB61 34.5kV strain bus will be relocated using a new underground feed (2-1000kcmil Al).

A new annunciator/communication cabinet, GPS clock, Teletone line sharing switch, dial-up modem and communication processor will also be included in the new control house. A new GE type D20MX RTU cabinet will be installed to control the Distribution equipment, the existing RTU in the hydro control house will remain to control the hydro generation equipment.

Project Authorization

Approver	Approver Name	Approver Signature	Date
Project Initiator	Thelma Brown		
Project Manager	Alan Roe		
Plant Accounting	Frank Errato, Jr.		
Director	James Eilenberger		
Sr. Vice President	Peter Clarke		

Overall Justification

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Accounting Policy Statement No. 2
Operations Project Authorization

This project will address the replacement of targeted obsolete equipment – OCBs, electromechanical relays, and capacitor switchers. It is also required to address the divestiture of generation and separation from generation assets.

Project Scope

Replace 4 Oil Circuit Breakers, electromechanical relays and capacitor switcher. Construct a new control house and reconfigure for separation of generation assets. Reconfiguration includes relocating one breaker and capacitor bank, including steel structure additions and removals.

Project Objectives

Replace obsolete equipment, facilitate the segregation of generation assets, maintain reliability to customers. Reduce the amount of oil on site adjacent to the river.

Business Process and / or Technical Improvements:

Targeted obsolete equipment replacement programs. Remove 4 of the 127 34.5kV oil circuit breakers on the system identified to be replaced.
Generation divestiture. Separation of distribution assets from generation assets is targeted to be complete by the completion of divestiture in 2017.

Assumptions

It is assumed that the proposed control house can be constructed by undergrounding the existing strain bus and extending the existing fence line. It is assumed that only local permitting is required and these permits will be readily granted.

Alternatives Considered

There is a transmission control house that was built in 2008. Adding distribution relay and control equipment in the transmission control house was considered but this would require expansion of the control house. The transmission control house is situated alongside the river and there is insufficient room to expand plus the Transmission control house is located inside the 500 year flood zone. For these reasons it was decided to build a new distribution control house outside of the flood zone.

Only replace the OCB as a part of the targeted program. This would leave all relay and control functions in the generation control house. Additionally, the generation control house is small and crowded. Leaving Eversource equipment where it can be operated or damaged by the new generation owner is not preferred.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering RFP	02/01/16
Engineering Award	03/29/16
Engineering Complete	08/29/16
Construction Start	09/01/16
In-service date	06/01/17

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Accounting Policy Statement No. 2
Operations Project Authorization

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	$106	$81	$0	$187
Overtime Labor	$0	$0	$0	$0
Outside Services	$2,501	$1,020	$0	$3,522
Materials	$550	$0	$0	
Other, including contingency amounts (describe)	$179	$10	$0	$186
Total	$3,337	$1,111	$0	$4,448

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	$703	$286	$0	$989
Capitalized interest or AFUDC, if any	0	0	$0	$0
Total	$703	$286	$0	$989

Total Capital Costs	$4,040	$1,397	$0	$5,437

Total O&M Costs	0	0	$0	$0

Total Project Costs	$4,040	$1,397	$0	5,437

Note: Explain unique payment provisions, if applicable

Regulatory Approvals

Anticipated Permits:

- NHDES - Shoreland Permit
- Town of Hillsborough Planning Board - Site Plan Approval
- NH Public Utilities Commission - License to Construct and Maintain Electric Line over Public Waters

Risks and Risk Mitigation Plans

There is a risk that local planning board approval is not forthcoming. To mitigate this risk we have engaged TF Moran to facilitate all of the permitting activities on behalf of Eversource.

The site is congested with little room for establishing site cabins, material laydown areas, etc. It is hoped that existing generation land could be used but in the event this is not available other local property may need to be leased for the duration of the project.

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

The project timescales are short, any delays to the engineering design or review cycles may impact on the ability to meet the construction schedule. Regular project team meetings will track progress against milestones and the schedule or resources will be adjusted to meet schedule dates.

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Project Authorization Form

General Information

Date Prepared: 03/30/2016	Project Title: Jackman – Replace Obsolete Equipment
Company: Eversource NH	Project ID Number: A16C10
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Thelma Brown	Project Category: Reliability
Project Owner/Manager: Alan Roe	Project Type: Specific
Project Sponsor: James Eilenberger	Project Purpose: Part of Regulatory Tracked Program? N
Estimated in service date: 06/1/2017	Capital Investment Part of Original Operating Plan? Y
If Transmission Project: N/A	Supplement to Existing Authorization? Y
	O&M Expenses Part of the Original Operating Plan? N

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project addresses Generation Divestiture issues and the replacement of obsolete equipment at Jackman S/S. When the Jackman S/S work order was originally initiated in 2014, the plan was to replace four oil circuit breakers under the annual OCB Breaker Replacement Project A07X44A for $1,615,000 of direct charges. The replacement of a capacitor switch and two relays was also included as they are part of targeted obsolete equipment programs.

In early 2015 the decision was made to divest from generation. Currently all relays and controls for the distribution equipment at Jackman S/S are in the generation power house. Once divestiture was announced it was determined that the scope of the work at Jackman S/S should be increased to include the removal of distribution relaying from the generation control house, replacement of electromechanical relays, reconfiguration of some substation bus work and building a new distribution control house which will provide the desired physical separation between the generation facilities and distribution facilities. This additional work increased the cost of the project to $4,557,000.

This project is being initiated in order to make the Jackman S/S project a stand-alone project and remove it from the annual OCB Breaker Replacement Project. Spending prior to 2016 ($439K) was for preliminary engineering and materials (Circuit breakers) and was transferred to this new specific Project Number (A16C10).

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized*	Prior Spend*	2016	2017+	Totals	Supplemental Authorization*
Capital Additions - Direct	$	$ 372	$2,716	$797	$3,885	$0
Customer Contribution	$	$	$0	$0	$0	$0
Removals net of Salvage	$	$	$266	$77	$343	$0
Total - Direct Spending	$1,615	$ 372	$2,982	$874	$4,228	$3,205
Capital Additions - Indirect	$	$ 63	$183	$79	$325	$0
Subtotal Request	$	$ 435	$3,165	$953	$4,553	$0
AFUDC	$	$ 4	$0	$0	$4	$0
Total Request	$	$439	$3,165	$953	$4,557	$0

* to be completed if supplemental authorization is required

Summary Project Description

Circuit Breaker Replacement
At Jackman S/S four existing 34.5kV oil circuit breakers (313, 3173, 311 & 3140) will be removed and replaced with Siemens type SDV7 vacuum breakers. The table below shows the ages of the circuit breakers along with their replacement priority out of 127 breakers left on the system.

OCB	Age	Rank
Line Breaker 313	60	28
Line Breaker 3173	60	33
Line Breaker 311	45	65
Line Breaker 3140	41	91

To facilitate the future separation of generation and distribution assets, a new 34.5kV bay will be installed adjacent to the 313 line position and the 313 and 3173 line positions will each shift south one position. This shift will generate sufficient space to create a fenced compound for the existing GSU transformer.

Capacitor Switcher Replacement
The vacuum capacitor switch is part of a targeted program for replacement. Additionally, to separate the Distribution assets from generation assets the capacitor switch and bank need to be relocated. This relocation has the added benefit of opening up access to the yard on the north side of the substation. Therefore, the existing C22 vacuum capacitor switcher (Allis Chalmers VSC-34) will be removed, relocated and replaced with a new Southern States Cap-switcher along with two sets of new current transformers (CTs). The existing capacitor vacuum switcher outdoor relays and outdoor relay cabinet will be removed and new protection equipment will be installed inside a new control house (see below). Another reason the existing C22 cap bank needs to be removed and relocated is so that the existing overhead strain bus that feeds it can be removed. A replacement 5.4MVAR capacitor bank will be installed.

To allow for the installation of a future bus tie breaker, the existing station service transformer will also be relocated to the ends of the 34.5kV bus.

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Construction of Control House
With the need to update the control equipment associated with the circuit breaker, capacitor switcher replacements and the need to provide new directional phase and ground overcurrent protection on line positions 313, 3173, 311 and 3140, it was decided that with the impending physical separation of the Eversource distribution and transmission equipment from the generation equipment that a new control house should be constructed.

The protection and control cabinets for the 313, 3713, 311 and 3140 feeder breakers, transformer TB33 & TB61, circuit switchers J33 & J61 and capacitor switcher C22 will be added in the new control house. The GSU transformer breaker TB9 protection and control cabinet will also be added in the new control house.

To accommodate the new control house, the existing TB61 34.5kV strain bus will be relocated using a new underground feed (2-1000kcmil Al).

A new annunciator/communication cabinet, GPS clock, Teletone line sharing switch, dial-up modem and communication processor will also be included in the new control house. A new GE type D20MX RTU cabinet will be installed to control the Distribution equipment, the existing RTU in the hydro control house will remain to control the hydro generation equipment.

Summary Project Description Table

($000)	Total Project Costs	Amount in Operating Plan	Difference
Capital	$4,557	$5,437	($880)
O&M	$0	$0	$0
Total	$4,557	$5,437	($880)

The $5,437K amount in the operating plan was for project #A07X44A, the annual OCB Breaker Replacement Project. This new project A16C10 reflects the funding for A07X44A being transferred in addition to the $430K that was spent on the Jackman S/S work order prior to 2016.

Project Authorization

Approver	Approver Name	Approver Signature	Date
Project Initiator	Thelma Brown		
Project Manager	Alan Roe		
Plant Accounting	Michele Roncaioli		
Manager- S/S Design	Thelma Brown		
Director	James Eilenberger		
Sr. Vice President	Peter Clarke		

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Overall Justification

This project addresses the replacement of targeted obsolete equipment including OCBs, electromechanical relays, and capacitor switchers. It is also required to address the divestiture of generation and separation of distribution and generation assets.

Project Scope

Replace 4 Oil Circuit Breakers, electromechanical relays and capacitor switcher. Construct a new control house and reconfigure for separation of generation assets. Reconfiguration includes relocating one breaker and capacitor bank, including steel structure additions and removals.

Project Objectives

Replace obsolete equipment, facilitate the segregation of generation assets, maintain reliability to customers. Reduce the amount of oil on site adjacent to the river.

Business Process and / or Technical Improvements

Targeted obsolete equipment replacement programs- Remove 4 of the 127 34.5kV oil circuit breakers left on the system identified to be replaced and other obsolete equipment such as electro mechanical relays.
Generation divestiture- Separation of distribution assets from generation assets is targeted to be complete by the completion of divestiture in 2017.

Assumptions

It is assumed that only local permitting is required and these permits will be readily granted.

Alternatives Considered

1. There is a transmission control house that was built in 2008. Adding distribution relay and control equipment in the transmission control house was considered but this would require expansion of the control house. The transmission control house is situated alongside the river and there is insufficient room to expand plus the Transmission control house is located inside the 500 year flood zone. For these reasons it was decided to build a new distribution control house outside of the flood zone.

2. Only replace the OCB as a part of the targeted program. This would leave all relay and control functions in the generation control house. Additionally, the generation control house is small and crowded. Leaving Eversource equipment where it can be operated or damaged by the new generation owner is not preferred.

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering RFP	03/01/16
Engineering Award	03/29/16
Engineering Complete	08/29/16
Construction Start	09/01/16
In-service date	06/01/17

Financial Evaluation

Direct Capital Costs ($000)	Prior	2016	2017	Total
Straight Time Labor	$21	$192	$89	$302
Overtime Labor	$0	$0	$0	$0
Outside Services	$147	$2,705	$785	$3,637
Materials	$194	$85	$0	$279
Other, including contingency amounts (describe)	$10	$0	$0	$10
Total	$372	$2,982	$874	$4,228

Indirect Capital Costs ($000)	Prior	2016	2017	Total
Indirects/Overheads (including benefits)	$63	$183	$79	$325
Capitalized interest or AFUDC, if any	4	0	$0	$4
Total	$67	$183	$79	$329

Total Capital Costs	$439	$3,165	$953	$4,557
Total O&M Costs	0	0	$0	$0
Total Project Costs	$439	$3,165	$953	4,557

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Regulatory Approvals

Anticipated Permits:

- NHDES - Shoreland Permit
- Town of Hillsborough Planning Board - Site Plan Approval
- NH Public Utilities Commission - License to Construct and Maintain Electric Line over Public Waters

Risks and Risk Mitigation Plans

There is a risk that local planning board approval is not forthcoming. To mitigate this risk we have engaged TF Moran to facilitate all of the permitting activities on behalf of Eversource.

The site is congested with little room for establishing site cabins, material laydown areas, etc. It is hoped that existing generation land could be used but in the event this is not available other local property may need to be leased for the duration of the project.

The project timescales are short, any delays to the engineering design or review cycles may impact on the ability to meet the construction schedule. Regular project team meetings will track progress against milestones and the schedule or resources will be adjusted to meet schedule dates.

Date Prepared: **February 9, 2017**	Project Title: **Jackman Replace Obsolete Equipment**
Company/Companies: **Eversource (NH)**	Project ID Number: **A16C10 / A07X44B2**
Organization: **NH Operations**	Plant Class/(F.P.Type): **Distribution**
Project Initiator: **Thelma Brown**	Project Type: ***Specific*** */ Annual / Prelim Project / Parent*
Project Owner/Manager: **Alan Roe**	Capital Investment Part of Original Operating Plan? **Y** / N
Project Sponsor: **James Eilenberger**	O&M Expenses Part of the Original Operating Plan? Y / N
Current Authorized Amount:**$4,557,000**	Estimated in service date(s): **November 30, 2017**
Supplement Request:**$843,154**	Other:
Total Request: **$5,400,154**	

Project Authorization Supplement Justification

The Project Authorization Form ("PAF") for the Jackman Replace Obsolete Equipment project was approved in April 2016. At that time, the project was approved at a cost of $4,557,000 with an in-service date of June 2017. The project estimate was based on direct costs of $4,228,000 with indirect costs of $325,000 and AFUDC of $4,000.

The expected cost to complete the project is now $5,400,154 which is $843,154 above the approved project amount.

$,000	PAF Approved Budget	Current Forecast
Direct	$4,228	$5,027
Indirect	$325	$369
AFUDC	$4	$4.5
Total	$4,557	$5,400
Difference	$843	

At this stage in the project, the majority of Contracts are in place, with only the following contracts to be awarded:

- electrical testing ($249,069 forecast based on best evaluated bid),
- installation and removal of the mobile substation ($75,000 forecast based on a recent similar installation), and
- site security ($82,000 forecast based on Securitas proposal)

Justification for Additional Resources

The project moved in to Construction at the beginning of January. Engineering design had a number of challenges (lack of available drawings, re-design of equipment, late changes to scope, etc.). Construction is also expected to be challenging due to the complexity of the project, the potential for buried equipment not shown on drawings, availability of outages, complex cut-over requirements, etc. The current planned in-service date is now November 2017 due to outage unavailability in the summer.

Explanation for Cost Increase

Materials & Labor - The main construction contract was awarded to ES Boulos as the best evaluated bidder following a formal bidding process. As is typical, construction pricing was requested based on the 70% design and bill of materials. Once the Issued for Construction ("IFC") drawings were issued a large difference between the bill of materials was identified leading to an increase in both material and installation costs (material $93,454; installation $167,636).

Estimated Cost Increase $261,090

Lead Commissioning Engineer - During the development of the project, the project team requested that an independent Lead Commissioning Engineer be brought onboard. The cut-over sequence from the old control house is extremely complex and an experienced commissioning engineer was considered prudent. Commissioning was included in the forecast, but the use of an LCE was not included in the original PAF estimate. After an RFP process, the T&M contract was awarded to EIG as the best evaluated bidder but prices for the LCE services came in much higher than anticipated.

Estimated Cost Increase $150,000

Contaminated Soils - The main construction contract was awarded to ES Boulos as the best evaluated bidder following a formal bidding process. While the contract price was in-line with the anticipated cost, an allowance of $25,000 was also included in the PO amount for the removal of contaminated soils. The removal cost for the soils is now estimated to be $40,000 ($35,000 for transportation and $5,000 for disposal).

Estimated Cost Increase $15,000

Site Security - During the previous Transmission project at Jackman, there were three incidents of thefts of material from site. To reduce the risk during this project it was proposed to use a security guard during nights and weekends. This activity was not specifically included in the PAF forecast. Securitas has submitted a proposal for $82,000 for this work. This contract is not yet awarded but is included in the current forecast. The risk of theft will be managed by securing material in locked Conex boxes and by arranging delivery of materials on a just-in-time basis.

Estimated Cost Increase $82,000

Owner's Engineer - During the engineering design process, the P&C Engineering group requested that the services of an Owner's Engineer be contracted to review the P&C drawings due to a lack of internal resources. This work was directly awarded to one of the of-choice vendors (HDR). While the engineering reviews were included in the original direct labor costs the Owner's Engineer T&M contract increased the Outside Services element of the project.

Estimated Cost Increase $50,000

Mobile Substation - During the development of the project, it was realized that the installation and removal of the mobile substation would be required to support the TB61 and TB33 outages. The cost to tap-up and remove the mobile substation was not included

in the original PAF estimate and although the contract has yet to be let $75,000 is forecast for this activity based on a similar recent installation at Whitefield. This is anticipated to be a fixed price contract.

Estimated Cost Increase $75,000

Additional Engineering – During the engineering design process, a number of additional owner directed tasks were assigned to the Engineering vendor (Altran). One of the changes related to the provision of new revenue metering to support generation divestiture. This was not included in the original scope of work or the PAF estimate. Additional tasks such as an analysis of the station lighting and lightning protection was also requested as these studies were not available. The two Altran change orders together were $77,150

Estimated Cost Increase $77,150

Miscellaneous – A small amount of contingency was included in the electrical / civil installation contract to cover foreseeable risks such as adverse weather, site remediation, design changes, etc.

Estimated Cost Increase $88,454

Indirects / AFUDC - In addition to the increase in direct costs, Indirect and AFUDC charges have also been estimated to increase by $44,500 based on the ratio of direct and indirect costs in the original PAF estimate.

Estimated Cost Increase $44,500

Summary

Activity	Estimated Cost Increase
Materials	$261,090
Lead Commissioning Engineer	$150,000
Contaminated Soils	$15,000
Site Security	$82,000
Owner's Engineer	$50,000
Mobile Substation	$75,000
Additional Engineering	$77,100
Miscellaneous	$88,454
Indirects / AFUDC	$44,500
Total	**$843,154**

The $843,154 increase represents the worst case scenario at this stage. It assumes that:

- all additional material and installation costs are required;
- site security will be needed for the full duration of construction;
- HDR will charge to the full amount of their PO for design reviews;
- EIG will charge to the full amount of their PO for commissioning support;
- the mobile installation charges will be $75,000; and
- soil removal transportation and disposal costs are capped at 1,000 tons.

Project Authorization Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 4,228	$ 799	$ 5,027
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	-	-
Total Direct Spending	$ 4,228	$ 799	$ 5,027
Capital Additions - Indirect	325.00	44.00	369.00
AFUDC	4.00	0.54	4.54
Total Capital Request	$ 4,557	$ 843	$ 5,400
O&M	-	-	-
Total Request	**$ 4,557**	**$ 843**	**$ 5,400**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2017	Year 20__	Year 20__+	Total
Capital Additions - Direct	$ 799	$ -	$ -	$ 799
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	-	-	-	-
Total Direct Spending	$ 799	$ -	$ -	$ 799
Capital Additions - Indirect	44.00	-	-	44.00
AFUDC	0.54	-	-	0.54
Total Capital Request	$ 843	$ -	$ -	$ 843
O&M	-	-	-	-
Total Request	**$ 843**	**$ -**	**$ -**	**$ 843**

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--023 **Page 1 of 1**

Request from: Department of Energy

Witness: Johnson, Russel D

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

11W1 Replace Submarine Cable No. A16N01

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-23 for the PAF for this project.

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Project Authorization Form

General Information

Date Prepared: 4/5/2016	Project Title: 11W1 – Install Submarine Cable to Welch Island
Company: Eversource - NH	Project ID Number: A16N01
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Bill Steff	Project Category: Reliability (Dist. Lines)
Project Owner/Manager: Marc Geaumont/Sam Bosse	Project Purpose: part of regulatory tracked program? No
Project Sponsor: Jim Eilenberger	Project Type: Specific
Estimated in service date: 10/31/2016	Capital Investment Part of Original Operating Plan? Yes
If Transmission Project: N/A	Supplement to Existing Authorization? No
	O&M Expenses Part of the Original Operating Plan? N/A

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

Two 15 kV submarine cables were installed between the mainland and Welch Island & Lockes Island in 1960 to provide electric service to residents of the two islands. The Lockes Island cable is a 3Ø cable, where one of the phases has already failed. The cable serving Welch Island has a severely deteriorated neutral conductor where it crosses the shoreline onto the island. The distance between the mainland and Welch Island is about 5,400ft, and Lockes Island is about 1,400ft. This proposal would install a new 3Ø 1/0 submarine cable to both islands. The anticipated cost of this project is $360,000.

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized*	Prior Spend*	2016	2017+	Totals	Supplemental Authorization*
Capital Additions - Direct	$	$	$ 240	$	$ 240	
Customer Contribution	$	$	$ 0	$	$ 0	
Removals net of Salvage	$	$	$ 13	$	$ 13	
Total - Direct Spending	$	$	$ 253	$	$ 253	$
Capital Additions - Indirect	$	$	$ 103	$	$ 103	
Subtotal Request	$	$	$ 356	$	$ 356	
AFUDC	$	$	$ 4	$	$ 4	
Total Request	$	$	$ 360	$	$ 360	

* to be completed if supplemental authorization is required

Summary Project Description

Replace 5,400 feet of submarine cable between the mainland and Welch Island, install 2 new riser poles, one on shore, and the other on the island. Directional bore conduit from the risers out into the lake bed to a depth of approximately 25 feet to avoid exposing the cable to wave and ice damage.

Replace 1,400 feet of submarine cable between the mainland and Lockes Island, install 2 new riser poles, one on shore, and the other on the island. Directional bore conduit from the risers out into the lake bed to a depth of approximately 25 feet to avoid exposing the cable to wave and ice damage.

Note: Dollar values are in thousands

	Total Project Costs	Amount in Operating Plan	Difference
Capital	$360	$360	$0
O&M	$0	$0	$0
Total	$360	$360	$0

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Project Authorization

Approver	Approver Name	Approver Signature	Date
Project Initiator	Bill Steff		
Project Manager	Marc Geaumont		
Plant Accounting	Michele Roncaioli		
Manager	Sam Bosse		
Director	James Eilenberger		
Sr. Vice President	Peter Clarke		

Overall Justification

Electric service to Welch Island is presently provided through a single #2 -15 kV submarine cable which has a deteriorated neutral conductor. Failure of this cable would result in an outage of a very significant length to the 58 customers on the island. Likewise, electric service to Lockes Island is presently provided through a 3Ø #4 – 15 kV submarine cable, which has 1 phase already failed. Failure of this cable would result in an outage of a very significant length to the 42 customer on the island. This project seeks to proactively replace the aging cables with new submarine cables and eliminate the cables from exposure to wave and ice action which has accelerated the deterioration.

Project Scope

Obtain permits as needed for the cable on the lake bottom and the shore crossings on the mainland and islands. Lay new submarine cables along the lake bed between the mainland and islands. Supply new riser poles to serve both ends of the cable. Directional bore conduits each end of the cables to protect the cables from wave and ice action.

Project Objectives

Prevent an open neutral condition on Welch Island. Proactively replace an aging and damaged cable (neutral bundle) before it fails and leaves 56 customers on the island without power for an undeterminable length of time. Proactively replace an aging and damaged cable (1Ø already failed) before it fails and leaves 42 customers on Lockes Island without power for an undeterminable length of time.

Business Process and / or Technical Improvements

Upgrade aging equipment to new technology.

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Accounting Policy Statement No. 2
Operations Project Authorization

Assumptions

This project assumes that the permitting of the cable will receive approval from the various State departments, and will not delay the installation. The project assumes that the untimely failure of the existing cables could result in a time consuming and costly repair depending upon the season and weather involved. It also assumes that the untimely failure of the existing cables during winter months where the lake is frozen over, no action would be taken to restore service until the ice melts in the spring.

Alternatives Considered

Install distributed generation on the Island to serve as backup to the eventual failure of the cables. Distributed generation would be very costly and not an appropriate avenue to provide backup.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Complete Engineering	2/1/16
Complete Design	4/30/16
Complete Permitting	9/1/16
Complete job	10/1/16

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	2016	2017	2018+	Total
Straight Time Labor	$2	$	$	$2
Overtime Labor	$0	$	$	$0
Outside Services	$223	$	$	$223
Materials	$21	$	$	$21
Other, including contingency amounts (describe) Vehicles	$7	$	$	$7
Total	253	$	$	$253

Indirect Capital Costs	2016	2017	2018+	Total
Indirects/Overheads (including benefits)	$103	$	$	$103
Capitalized interest or AFUDC, if any	$4	$	$	$4
Total	$107	$	$	$107

Total Capital Costs	$360	$	$	$360

Total O&M Costs	$0	$	$	$0

Total Project Costs	$360	$	$	$360

Note: Explain unique payment provisions, if applicable

Regulatory Approvals

NHDES approvals are required for the shoreline crossing on each of the mainland sites, and island sites. State of NH approval would be required for the cable crossing.

Risks and Risk Mitigation Plans

The risk of not replacing the cables is possibility of incurring a significant outage to the islands. Risk related to power quality issues on Welch Island due to the deteriorated neutral serving the island. One mitigation plan for the neutral issues has been identified to hire a diver to piece on a new neutral wire from the depths of the lake, and run this ashore, parallel to the cable, and splice it onto the cable on land. Additional risk from this plan includes failure of cable due to movement to the cable related to splicing a neutral onto it.

EVERSOURCE

APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Date Prepared: 10/1/19	**Project Title:** 11W1 – Replace Submarine Cable
Company/ies: Eversource NH	**Project ID Number:** A16N01
Organization: NH Operations	**Plant Class/(F.P.Type):** Distribution Line
Project Initiator: Sam Bosse	**Project Type:** Specific
Project Manager: Sam Bosse	**Capital Investment Part of Original Operating Plan?** N
Project Sponsor: Paul Renaud	**O&M Expenses Part of the Original Operating Plan?** N
Current Authorized Amount: $360,000	**Estimated in service date(s):** 12/15/19
Supplement Request: $1,557,000	**Other:**
Total Request: $1,917,000	

Supplement Justification

Supplement Request Forms must be completed for projects in accordance with the Project Authorization Policy and approval levels in the Delegation of Authority Policy (DOA) as follows:

Justification for Additional Resources

Two 15 kV submarine cables were installed between the mainland and Welch Island & Lockes Island in 1960 and 1940 respectively to provide electric service to residents of the islands. The 1,100 foot Lockes Island cable is a three phase cable serving single phase load and one of the phases has already failed. The 5,400 foot cable serving Welch Island has a severely deteriorated neutral conductor where it crosses the shoreline onto the island. This project is to install two single phase 1/0 15 kV submarine cables to each island, totaling approximately 15,000 feet of cable. One cable will be the normal feed to the island with the second serving as a backup cable. Eversource has secured all necessary permits, including three easements from property owners, one municipal license, two water crossing permits, four shoreland impact permits, and four wetland impact permits.

This project was originally authorized in 2016 for $360,000. Current charges to the project total approximately $163,000. At this time the project has been put out to bid twice, with the lowest cost vendor selected after the second round. The anticipated cost of this project is $1,917,000, with $1,142,000 in direct spending.

EVERSOURCE

APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 240	$ 734	$ 974
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	13	155	168
Total Direct Spending	$ 253	$ 889	$ 1,142
Capital Additions - Indirect	103	670	773
AFUDC	4	(2)	2
Total Capital Request	$ 360	$ 1,557	$ 1,917
O&M	-	-	-
Total Request	**$ 360**	**$ 1,557**	**$ 1,917**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2019	Year 20	Year 20 +	Total
Capital Additions - Direct	$ 734	$ -	$ -	$ 734
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	155	-	-	155
Total Direct Spending	889	-	-	889
Capital Additions - Indirect	670	-	-	670
AFUDC	(2)	-	-	(2)
Total Capital Request	1,557	-	-	1,557
O&M	-	-	-	-
Total Request	**$ 1,557**	**$ -**	**$ -**	**$ 1,557**

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APS 1 - Project Authorization Policy

Supplement Request Form

Project Authorization Form

General Information

Date Prepared: 4/5/2016	Project Title: 11W1 – Install Submarine Cable to Welch Island
Company: Eversource - NH	Project ID Number: A16N01
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Bill Steff	Project Category: Reliability (Dist. Lines)
Project Owner/Manager: Marc Geaumont/Sam Bosse	Project Purpose: part of regulatory tracked program? No
Project Sponsor: Jim Eilenberger	Project Type: Specific
Estimated in service date: 10/31/2016	Capital Investment Part of Original Operating Plan? Yes
If Transmission Project: N/A	Supplement to Existing Authorization? No
	O&M Expenses Part of the Original Operating Plan? N/A

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

Two 15 kV submarine cables were installed between the mainland and Welch Island & Lockes Island in 1960 to provide electric service to residents of the two islands. The Lockes Island cable is a 3Ø cable, where one of the phases has already failed. The cable serving Welch Island has a severely deteriorated neutral conductor where it crosses the shoreline onto the island. The distance between the mainland and Welch Island is about 5,400ft, and Lockes Island is about 1,400ft. This proposal would install a new 3Ø 1/0 submarine cable to both islands. The anticipated cost of this project is $360,000.

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Supplement Request Form

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized*	Prior Spend*	2016	2017+	Totals	Supplemental Authorization*
Capital Additions - Direct	$	$	$ 240	$	$ 240	
Customer Contribution	$	$	$ 0	$	$ 0	
Removals net of Salvage	$	$	$ 13	$	$ 13	
Total - Direct Spending	$	$	$ 253	$	$ 253	$
Capital Additions - Indirect	$	$	$ 103	$	$ 103	
Subtotal Request	$	$	$ 356	$	$ 356	
AFUDC	$	$	$ 4	$	$ 4	
Total Request	$	$	$ 360	$	$ 360	

* to be completed if supplemental authorization is required

Summary Project Description

Replace 5,400 feet of submarine cable between the mainland and Welch Island, install 2 new riser poles, one on shore, and the other on the island. Directional bore conduit from the risers out into the lake bed to a depth of approximately 25 feet to avoid exposing the cable to wave and ice damage.

Replace 1,400 feet of submarine cable between the mainland and Lockes Island, install 2 new riser poles, one on shore, and the other on the island. Directional bore conduit from the risers out into the lake bed to a depth of approximately 25 feet to avoid exposing the cable to wave and ice damage.

Note: Dollar values are in thousands

	Total Project Costs	Amount in Operating Plan	Difference
Capital	$360	$360	$0
O&M	$0	$0	$0
Total	$360	$360	$0

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Project Authorization

Approver	Approver Name	Approver Signature	Date
Project Initiator	Bill Steff		
Project Manager	Marc Geaumont		
Plant Accounting	Michele Roncaioli		
Manager	Sam Bosse		
Director	James Eilenberger		
Sr. Vice President	Peter Clarke		

Overall Justification

Electric service to Welch Island is presently provided through a single #2 -15 kV submarine cable which has a deteriorated neutral conductor. Failure of this cable would result in an outage of a very significant length to the 58 customers on the island. Likewise, electric service to Lockes Island is presently provided through a 3Ø #4 – 15 kV submarine cable, which has 1 phase already failed. Failure of this cable would result in an outage of a very significant length to the 42 customer on the island. This project seeks to proactively replace the aging cables with new submarine cables and eliminate the cables from exposure to wave and ice action which has accelerated the deterioration.

Project Scope

Obtain permits as needed for the cable on the lake bottom and the shore crossings on the mainland and islands. Lay new submarine cables along the lake bed between the mainland and islands. Supply new riser poles to serve both ends of the cable. Directional bore conduits each end of the cables to protect the cables from wave and ice action.

Project Objectives

Prevent an open neutral condition on Welch Island. Proactively replace an aging and damaged cable (neutral bundle) before it fails and leaves 56 customers on the island without power for an undeterminable length of time. Proactively replace an aging and damaged cable (1Ø already failed) before it fails and leaves 42 customers on Lockes Island without power for an undeterminable length of time.

Business Process and / or Technical Improvements

Upgrade aging equipment to new technology.

Assumptions

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Supplement Request Form

This project assumes that the permitting of the cable will receive approval from the various State departments, and will not delay the installation. The project assumes that the untimely failure of the existing cables could result in a time consuming and costly repair depending upon the season and weather involved. It also assumes that the untimely failure of the existing cables during winter months where the lake is frozen over, no action would be taken to restore service until the ice melts in the spring.

Alternatives Considered

Install distributed generation on the Island to serve as backup to the eventual failure of the cables. Distributed generation would be very costly and not an appropriate avenue to provide backup.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Complete Engineering	2/1/16
Complete Design	4/30/16
Complete Permitting	9/1/16
Complete job	10/1/16

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Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	2016	2017	2018+	Total
Straight Time Labor	$2	$	$	$2
Overtime Labor	$0	$	$	$0
Outside Services	$223	$	$	$223
Materials	$21	$	$	$21
Other, including contingency amounts (describe) Vehicles	$7	$	$	$7
Total	253	$	$	$253

Indirect Capital Costs	2016	2017	2018+	Total
Indirects/Overheads (including benefits)	$103	$	$	$103
Capitalized interest or AFUDC, if any	$4	$	$	$4
Total	$107	$	$	$107

Total Capital Costs	$360	$	$	$360
Total O&M Costs	$0	$	$	$0
Total Project Costs	$360	$	$	$360

Note: Explain unique payment provisions, if applicable

Regulatory Approvals

NHDES approvals are required for the shoreline crossing on each of the mainland sites, and island sites. State of NH approval would be required for the cable crossing.

Risks and Risk Mitigation Plans

The risk of not replacing the cables is possibility of incurring a significant outage to the islands. Risk related to power quality issues on Welch Island due to the deteriorated neutral serving the island. One mitigation plan for the neutral issues has been identified to hire a diver to piece on a new neutral wire from the depths of the lake, and run this ashore, parallel to the cable, and splice it onto the cable on land. Additional risk from this plan includes failure of cable due to movement to the cable related to splicing a neutral onto it.

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--024 **Page 1 of 1**

Request from: Department of Energy

Witness: Plante, David L

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Second Transformer Lost Nation No. A16N02

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-24 for the PAF for this project.

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Supplement Request Form

Supplement Request Form

Approved at October 23, 2018 EPAC

Link to Meeting Minutes

Date Prepared: December 18, 2018	**Project Title: Lost Nation 2nd Transformer**
Company/Companies: Eversource (NH)	**Project ID Number: A16N02**
Organization: NH Operations	**Plant Class/ (F.P. Type): Distribution**
Project Initiator: Thelma Brown	**Project Type: Specific**
Project Manager: Alan Roe	**Capital Investment Part of Original Operating Plan? Y**
Project Sponsor: James Eilenberger	**O&M Expenses Part of the Original Operating Plan? N/A**
Current Authorized Amount: $4,558K	**Estimated in service date(s): April 19, 2019**
Supplement Request: $1,201K	**Other: N/A**
Total Request: $5,759K	

Supplement Justification

Background

A joint Transmission & Distribution (T&D) Technical Authorization Form ("TAF") for the Lost Nation 2nd transformer project was approved by the Technical Review Committee on November 11, 2016. At that time, the project was estimated at $2,850K and the approved authorized budget for engineering was $285K (10%).

An initial Project Approval Form ("PAF") was submitted in December 2016, which approved the purchase of the transformer for the project. The initial PAF increased the authorized budget to $1,185K. The overall project estimate was unchanged at $2,850K. A second PAF was submitted and approved in April 2017 to purchase additional long lead items and the authorized budget was increased to $1,435K. At that time, the project was re-estimated at $3,337K, including revised forecasts for civil and electrical installation costs.

A third PAF was submitted in August 2017 after the 70% design stage. This PAF requested full funding for the project with an estimated cost to complete the project of $3,911K, the currently authorized amount. At that point the estimate included actual costs for construction and estimates for testing and commissioning.

A supplemental PAF was submitted in March 2018 to increase the approved budget to capture issues with the P&C engineering design, increased testing and commissioning costs and unforeseen property taxes plus associated indirect charges. The approved budget was increased to $4,558K.

This supplemental Project Authorization Form requests approval of $1,201K for a total request of $5,759K. The Transmission portion of the project (T1346A) remains within approved budget.

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Supplement Request Form

Project Status

As of the end of November 2018, the project has invested $4,266K with additional commitments of $126K for work done but not yet invoiced. Total spent to-date plus commitments is $4,392K out of $4,558K authorized.

To date, all civil work is complete and much of the substation electrical equipment is installed. The P&C drawings were issued for construction on October 10, 2018 and relay panels were delivered in October.

Since March 2018, direct costs have increased by $972K and associated increases in indirect costs are $207K. AFUDC has increased by $23K. The reasons for these increases are explained below:

Relay panel installation, wiring and testing is underway, and the first outage was completed on December 7, 2018. The overall project is scheduled to go in-service in August 2019.

	March 2018 (Current Authorized)	December 2018 (Total Request)	Difference (Supplement Request)
Eng./PM/Permitting	$695,213	$991,830	$296,617
Construction	$1,087,955	$1,382,745	$294,790
Testing & Commissioning	$295,424	$525,622	$230,198
Internal Labor / Exp.	$122,304	$187,382	$65,078
Eversource Supplied Material	$1,439,970	$1,428,013	($11,957)
Allowances / Contingency			$0
Other / Property Taxes	$128,148	$242,717	$114,569
Removals	$17,691	$0	($17,691)
Total Directs	$3,786,705	$4,758,309	$971,604
Indirect	$708,369	$915,490	$207,121
AFUDC	$62,742	$85,319	$22,577
Total Indirects	$771,111	$1,000,809	$229,698
Total	$4,557,816	$5,759,118	$1,201,302

Justification for Additional Resources

1. Engineering / Project Management / Permitting

Since March 2018, TRC was hired to complete the P&C engineering design and to develop a hydrogen detection and venting arrangement associated with a battery replacement project, these additional engineering costs were partly offset by a reduction in forecast PLM charges. Because of the project delays additional project management time is needed to manage the project through

commissioning and close out. With the additional drawing reviews needed, Owner's Engineer charges for the project have also increased. With delays during construction the project shut down during the Winter of 2017/2018, which resulted in additional construction monitoring charges and GPR survey costs. Incremental request $296,617

2. Construction

Since March 2018, forecast construction costs have increased. Increases include the cost of relay panels which were inadvertently missed in the previous supplement, the provision of a site trailer, unforeseen tree clearing for the relocation of the mobile connection, unanticipated charges from CHA for transformer factory inspections, additional work for Cianbro to install a 34.5kV line tie switch the cost of which was higher than forecast, Burns & McDonald charges for siting and construction support and additional work by USA Inc. to relocate the existing mobile substation 34.5kV connections. These charges were offset by the removal charges for soil removal, a reduction in the forecast for Hutter to complete the fire wall installation and a reduction in the forecast to commissioning the CALISTO oil monitoring device. An issue with conduit over-fill was also recently identified, which requires additional trench and conduit at a cost of $250k (which includes $60k for conduit). This plus other changes to AC and DC panels ($44k) and the changes listed above increased construction costs by $294K. Incremental request $294,790

3. Testing and Commission

Since March 2018, forecast testing charges have increase to include additional labor hours and SFRA testing of the transformer and commissioning charges are forecast to increase to reflect the additional effort needed prior to outages plus the review of revised P&C drawings. Incremental request $230,198

4. Internal Labor and Expenses

With the project delays and additional effort needed to resolve issues with PLM's design, additional internal labor for engineering and site supervision is forecast. Incremental Request $65,078

5. Other / Property Taxes

The March 2018 project estimate included $128,148 for other / property taxes. To the end of November 2018, the project has incurred $154,614 in property taxes with an additional $88,103 forecast ($242,717 in total). Incremental Request $114,569

6. Removals

The March 2018 project estimate included $17,691 for removals. There are no removals anticipated at this stage, so the project forecast has been reduced. Incremental Request ($17,691).

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Supplement Request Form

7. Indirect costs

In the March 2018 PAF, indirect costs were forecast to be $708,369. To date, the project has incurred $655,490 in adders and is expected to incur an additional $260,000 to the end of the project ($915,490 in total). Incremental request $207,121.

8. AFUDC

In March 2018, AFUDC charges for the project were forecast as $62,742. Actual AFUDC charges incurred to date are $30,819 with an additional $54,500 forecast for the remainder of the project ($85,319 in total). Incremental request $22,577.

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplemental Request	Total
Capital Additions – Direct	$3,787	$972	$4,758
Less Customer Contribution	$0	$0	$0
Removals net of Salvage ___%	$0	$0	$0
Total Direct Spending	$3,787	$972	$4,758
Capital Additions – Indirect	$708	$207	$915
AFUDC	$63	$23	$86
O&M	$0	$0	$0
Total Request	$4,558	$1,201	$5,759

Total Request by year view:

Note: Dollar values are in thousands:

	To Date	Year 2018	Year 2019	Total
Capital Additions – Direct	$3,787	$0	$972	$4,758
Less Customer Contribution	$0	$0	$0	$0
Removals net of Salvage %	$0	$0	$0	$0
Total Direct Spending	$3,787	$0	$972	$4,758
Capital Additions – Indirect	$708	$0	$207	$915
AFUDC	$63	$0	$23	$86
O&M	$0	$0	$0	$0
Total Request	$4,558	$0	$1,201	$5,759

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Approved at March 28, 2018 EPAC

Link to Meeting Minutes

Date Prepared: March 29, 2018	**Project Title: Lost Nation 2nd Transformer**
Company/Companies: Eversource (NH)	**Project ID Number: A16N02**
Organization: NH Operations	**Plant Class/(F.P.Type): Distribution Station**
Project Initiator: Thelma Brown	**Project Type: Specific**
Project Manager: Alan Roe	**Capital Investment Part of Original Operating Plan? Y**
Project Sponsor: James Eilenberger	**O&M Expenses Part of the Original Operating Plan? N/A**
Current Authorized Amount: $3,912k	**Estimated in service date(s): November 31, 2018**
Supplement Request: $646k	**Other:**
Total Request: $4,558k	

Supplement Justification

Background

A joint T&D Technical Authorization Form ("TAF") for the Lost Nation 2nd transformer project was approved by the Technical Review Committee on November 11, 2016. At that time, the project was estimated at $2,850k and the approved authorized budget for engineering was $285k (10%).

An initial Project Approval Form ("PAF") was submitted in December 2016, which approved the purchase of the transformer for the project. The initial PAF increased the authorized budget to $1,185k. The overall project estimate was unchanged at $2,850k.

A second PAF was submitted and approved in April 2017 to purchase additional long lead items. At that time, the project was re-estimated at $3,337k and the authorized budget was increased to $1,435k. The increased estimate included revised forecasts for civil and electrical installation costs.

A third PAF was submitted in August 2017 after the 70% design stage. This PAF requested full funding for the project with an estimated cost to complete the project of $3,911k, the currently authorized amount. At that point the estimate included actual costs for construction and estimates for testing and commissioning.

Project Status

At this point, all civil work, apart from the construction of the masonry fire wall, is complete and much of the substation electrical equipment is installed but not wired. Because of minor scope changes (e.g. relocation of a relay and addition of relay test switches), and problems with the quality and accuracy of the P&C engineering drawings, the project is approximately six months behind schedule. The 30% P&C drawings have been reviewed and comments returned to the engineering design vendor (PLM). 70% drawing submission is expected on March 30, 2018 and assuming no additional delays, the P&C drawings will be issued to the field on June 8, 2018. Relay cabinet delivery is forecast on August 6, 2018 with a final in-service date for the project of November 30, 2018.

This supplemental Project Authorization Form requests approval of $646K for a total request of $4,558k. An increase of 17% over the currently authorized amount.

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Supplement Request Form

Since August 2017, direct costs have increased by $278k and associated increases in Indirect costs are $329k. AFUDC has increased by $39k. The reasons for these increases are explained below.

Cumulative effect of Changes since August 2017

	August 2017 (Current Authorized)	March 2018 (Total Request)	Difference (Supplement Request)
1. Eng./PM/Permitting	$491,344	$695,213	$203,869
2. Construction	$1,106,578	$1,087,955	($18,623)
3. Testing & Commissioning	$200,000	$295,424	$95,424
4. Internal Labor / Exp.	$65,276	$122,304	$57,028
5. Eversource Supplied Material	$1,589,756	$1,439,970	($149,786)
6. Allowances / Contingency	$0	$0	$0
7. Property Taxes	$0	$128,148	$128,148
8. Removals	$55,905	$17,691	($38,214)
Total Directs	$3,508,859	$3,786,705	$277,846
9. Indirect	$379,178	$708,369	$329,191
10. AFUDC	$23,851	$62,742	$38,891
Total	$3,911,888	$4,557,816	$645,928
Total ($k rounded)	$3,912	$4,558	$646

Justification for Additional Resources

1. Engineering / Project Management / Permitting

Because of a shortage of internal P&C resources, an Owner's Engineering was brought on to the project at the 30% P&C design review stage to review and comment on the P&C drawings. This added an additional $117,900 to the project that was not included in the August 2017 estimate. Total Incremental Request for Engineering / Project Management and Permitting: $203,869.

2. Testing and Commission

Testing and commissioning contracts were higher than forecast back in August 2017. Total Incremental Request for testing and commissioning: $95,424

3. Labor and Expenses

With the project delays, and additional effort needed to resolve issues with the PLM's design, additional internal labor for engineering, site supervision and management was incurred. Total Incremental Request for Labor and Expenses: $57,028

4. Property Taxes

The original project estimate and the August 2017 forecast did not include an allowance for property taxes. To the end of February 2018, the project has incurred $38,148 in property taxes with an additional $90,000 forecast through November 2018. Total Incremental Request for property taxes: $128,148

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Supplement Request Form

5. Indirect costs

In the August 2017 PAF, indirect costs were forecast to be $379,178. To date, the project has incurred $427,118 in adders and is expected to incur an additional $281,251 to the end of the project. Total increase in indirect costs for this supplement request is $329,191.

6. AFUDC

In August 2017, AFUDC charges for the project were forecast as $23,851. Actual AFUDC charges incurred to date are $10,242 with an additional $52,000 forecast for the remainder of the project. Total increase in AFUDC for this supplement request is $38,891

These increases together with reductions in estimated materials costs and lower than forecast costs for construction and removals result in an overall Incremental Request of $645,928

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplemental Request	Total
Capital Additions – Direct	$3,509	$3,787	$278
Less Customer Contribution	$0	$0	$0
Removals net of Salvage %	$0	$0	$0
Total Direct Spending	$3,509	$3,787	$278
Capital Additions – Indirect	$379	$708	$329
AFUDC	$24	$63	$39
O&M	$0	$0	$0
Total Request	$3,912	$4,558	$646

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	To Date	Year 2018	Year 2019	Total
Capital Additions – Direct	$2,745	$1,044	$0	$3,787
Less Customer Contribution	$0	$0	$0	$0
Removals net of Salvage %	$0	$0	$0	$0
Total Direct Spending	$2,745	$1,044	$0	$3,787
Capital Additions – Indirect	$427	$281	$0	$708
AFUDC	$10	$52	$0	$63
O&M	$0	$0	$0	$0
Total Request	$3,182	$1,377	$0	$4,558

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APS 1 - Project Authorization Policy

Operations Project Authorization Form

Operations Project Authorization Form

Date Prepared: **8/10/17**	Project Title: **Lost Nation 2nd Transformer**
Company/ies: **Eversource NH**	Project ID Number: **A16N02 (D) & T1346A (T)**
Organization: **NH Operations**	Class(es) of Plant: **Distribution & Transmission**
Project Initiator: **Charles Christensen, PE**	Project Category: **Substation**
Project Manager: **Alan Roe**	Project Type: ***Specific***
Project Sponsor: **James Eilenberger**	Project Purpose: **Add second 115/34.5kV transformer**
Estimated in service date: **03/31/2018**	If Transmission Project: **Non-PTF**
Eng. /Constr. Resources Budgeted? **Yes**	Capital Investment Part of Original Operating Plan? **Yes**
	O&M Expenses Part of the Original Operating Plan? **No**

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Subsidiary Board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project is for the installation of a second 115-34kV 44.8MVA transformer at Lost Nation substation. The project includes the installation of a new 115kV breaker and 115kV bus rework to install the second transformer.

The joint T&D TAF for this project was approved at the 11/3/16 Technical Review Committee. Approval was for $550,000 split $285,000 (D) and $265,000 (T) for engineering design only.

An initial PAF document was approved on 12/7/16 for an additional $900,000 to place an order for the transformer against Project A16N02. A second PAF was approved on 4/7/17 which authorized an additional $500,000 for materials (split 50:50 between Transmission and Distribution). The Distribution authorized amount was increased from $1,185,000 to $1,435,000 and the Transmission authorized amount was increased from $265,000 to $515,000.

This PAF requests full funding of $5,800k (T - $1,900k D - $3,900k) for the project based on known commitments for engineering, project management, materials, commissioning and civil construction. It includes estimates for electrical / P&C construction and estimates for Vendor supplied materials. No contingency amounts are included. The $6,900k estimate is inside the +/-25% of the approved TAF of $5,500k.

A number of additional items have been incorporated into the scope as the engineering design has progressed. These include the addition of slip-over CTs on TB033 and the replacement of a number of obsolete and non-standard relays. All scope additions are necessary to ensure that the new TX129 transformer and TB033 can be operated in parallel and are adequately protected.

Due to performance issues with the Engineering design vendor, the in-service date for the transformer has been postponed into early 2018. The Transmission equipment is still scheduled to go into service by the end of 2017 assuming that relay cabinets can be fabricated and wired in time to meet the

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Operations Project Authorization Form

schedule. Based on the current schedule, bids for electrical / P&C construction will be received on 8/25.

The estimated cost to complete the Distribution portion of the project is $3,000k and $1,663k for Transmission.

Project Costs Summary

See APS3 and APS8 requirements and consult with Plant Accounting for capital/O&M determination. Use published loaders for benefits, materials, and invoices, maintained by the Director, Budget and Internal Reporting.
Note: Dollar values are in thousands

Capital Additions - Direct	$ 1,435	$ 2,897	$ 612	$ 3,509
Less Customer Contribution	$ -	$ -	$ -	$ -
Removals net of Salvage _____%	$ -	$ -	$ -	$ -
Total - Direct Spending	$ 1,435	$ 2,897	$ 612	$ 3,509
Capital Additions - Indirect	$ -	$ 272	$ 108	$ 380
Subtotal Request	$ 1,435	$ 3,169	$ 720	$ 3,889
AFUDC	$ -	$ 8	$ 15	$ 23
Total Capital Request	$ 1,435	$ 3,177	$ 735	$ 3,912
O&M	$ -	$ -	$ -	$ -
Total Request	$ 1,435	$ 3,177	$ 735	$ 3,912

Capital Additions - Direct	$ 515	$ 1,600	$ 117	$ 1,717
Less Customer Contribution	$ -	$ -	$ -	$ -
Removals net of Salvage _____%	$ -	$ -	$ -	$ -
Total - Direct Spending	$ 515	$ 1,600	$ 117	$ 1,717
Capital Additions - Indirect	$ -	$ 175	$ -	$ 175
Subtotal Request	$ 515	$ 1,775	$ 117	$ 1,892
AFUDC	$ 0	$ 6	$ -	$ 6
Total Capital Request	$ 515	$ 1,781	$ 117	$ 1,898
O&M	$ -	$ -	$ -	$ -
Total Request	$ 515	$ 1,781	$ 117	$ 1,898

Prior Distribution authorized amount is for $285k approved at TRC on 11/3/16.
An additional $900k for transformer purchase was approved at CPAC on 12/7/16.
An additional $250k for materials was approved at CPAC on 4/7/16.

Prior Transmission authorized amount is $265k that was approved at TRC on 11/3/16.
An additional $250k for materials was approved at CPAC on 4/7/16.

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APS 1 - Project Authorization Policy

Operations Project Authorization Form

Financial Evaluation

Provide the following financial information (attach additional detail if summarized items are significant or additional information is needed). Note: Dollar values are in thousands

Distribution Project (A16N02)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$0	$61	$4	$65
Overtime Labor	$0	$0	$0	$0
Outside Services	$0	$1,190	$608	$1,798
Materials	$0	$1,578	$0	$1,578
Other, including contingency amounts	$0	$67	$0	$67
Total	$0	$2,896	$612	$3,508

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$272	$107	$379
Capitalized interest or AFUDC, if any	$0	$9	$15	$24
Total	$0	$281	$122	$403

Total Capital Costs	$0	$3,177	$734	**$3,911**
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	$0	$3,178	$734	$3,911
Total O&M Project Costs	$0	$0	$0	$0

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Transmission Project (T1346A)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$0	$25	$5	$30
Overtime Labor	$0	$0	$0	$0
Outside Services	$0	$1,052	$75	$1,127
Materials	$0	$509	$37	$546
Other, including contingency amounts	$0	$6	$0	$6
Total	$0	$1,592	$117	$1,709

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$175	$0	$175
Capitalized interest or AFUDC, if any	$0	$7	$0	$7
Total	$0	$182	$0	$182

Total Capital Costs	$0	$1,774	$117	$1,891
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	$0	$1,774	$117	$1,891
Total O&M Project Costs	$0	$0	$0	$0

- Straight time forecast is based on original project estimate.
- Outside services forecast is based on committed contracts (engineering, project management, civil construction and commissioning) plus forecast costs for electrical / P&C construction and testing.
- Material costs are based on $900k for transformer purchase plus $171k for P&C cabinets, Eversource purchased materials and miscellaneous vendor supplied materials.
- $5,802,000 is the total project forecast.
- Due to engineering design issues, some of the project costs a forecast to run into 2018.

Note: Explain unique payment provisions, if applicable

If this is a new business project, is a customer contribution required? If yes, please note the contribution amount. **This is NOT a new customer project**

In addition, for all electric and gas growth / new business projects, please attach the CIAC calculation

Provide other financial documentation as warranted by management and / or regulatory precedent. When performing financial analysis, use appropriate discount rate by company (can be provided by Budgeting and Internal Reporting or Financial Planning and Analysis).

Future Financial Impacts:

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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	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Minor additional O&M costs will result from the addition of a second transformer and switchgear e.g. additional oil and gas samples, visual inspections, etc.

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; N/A

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):

An ARO is a current legal obligation to remove or retire property, plant or equipment at some point in the future. Please refer to APS8 or contact Plant Accounting for further detail.

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. **No**

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Lost Nation PAF – 12/6/16

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Operations Project Authorization Form

Operations Project Authorization Form

Date Prepared: **4/6/17 (Rev. 1)**	Project Title: **Lost Nation 2nd Transformer**
Company/ies: **Eversource NH**	Project ID Number: **A16N02 (D) & T1346A (T)**
Organization: **NH Operations**	Class(es) of Plant: **Distribution & Transmission**
Project Initiator: **Charles Christensen, PE**	Project Category: **Substation**
Project Manager: **Alan Roe**	Project Type: ***Specific***
Project Sponsor: **James Eilenberger**	Project Purpose: **Add second 115/34.5kV transformer**
Estimated in service date: **11/03/2017**	If Transmission Project: **Non-PTF**
Eng. /Constr. Resources Budgeted? **Yes**	Capital Investment Part of Original Operating Plan? **Yes**
	O&M Expenses Part of the Original Operating Plan? **No**

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Subsidiary Board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project is for the installation of a second 115-34kV 44.8MVA transformer at Lost Nation substation. It includes the installation of a new 115kV breaker and 115kV bus rework to install the second transformer.

The joint T&D TAF for this project was approved at the 11/3/16 Technical Review Committee. Approval was for $550,000 split $285,000 (D) and $265,000 (T) for engineering design only.

A PAF document was approved on 12/7/16 for an additional $900,000 to place an order for the transformer against Project A16N02. This increased the Distribution portion of the approved budget to $1,185,000 and the Transmission project (T1346A) remained at $265,000.

The PAF stated that “Engineering will not be complete on the project until August 2017. The PAF for the full scope of work will be submitted at that time”. The current planned in-service date for the new transformer is 11/3/17. In order to meet that date, additional approval for $500,000 is required to purchase long-lead and other materials including;

- 8 x 115kV CCVTs
- 1 x 115kV Gas circuit breaker
- 1 x 115kV Circuit switcher
- 1 x 115kV Motor operated disconnect
- 1 x 115kV single phase PT
- 2 x 34.5kV vacuum circuit breakers
- 2 x 2400/4160V – 120/240V alternate station service transformers
- 1 x 34.5kV 2 phase bus PT
- 3 x P&C cabinets

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Based on the current schedule, bids for construction would be requested at the 30% design stage. Full project approval will now be requested in June 2017 once construction, testing and commissioning prices are known.

The additional $500,000 for materials will be split 50:50 between Transmission and Distribution. The Distribution authorized amount will increase from $1,185,000 to $1,435,000 and the Transmission authorized amount will increase from $265,000 to $515,000.

Project Costs Summary

See APS3 and APS8 requirements and consult with Plant Accounting for capital/O&M determination. Use published loaders for benefits, materials, and invoices, maintained by the Director, Budget and Internal Reporting.
Note: Dollar values are in thousands

Distribution (A16N02)

	Prior Authorized	2017	2018	20__+	Totals
Capital Additions - Direct	$ 1,185	$ 250	$ -	$ -	$ 1,435
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage _____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ 1,185	$ 250	$ -	$ -	$ 1,435
Capital Additions - Indirect	$ -	$ -	$ -	$ -	$ -
Subtotal Request	$ 1,185	$ 250	$ -	$ -	$ 1,435
AFUDC	$ 0	$ -	$ -	$ -	$ 0
Total Capital Request	$ 1,185	$ 250	$ -	$ -	$ 1,435

Transmission (T1346A)

	Prior Authorized	2017	2018	20__+	Totals
Capital Additions - Direct	$ 265	$ 250	$ -	$ -	$ 515
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage _____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ 265	$ 250	$ -	$ -	$ 515
Capital Additions - Indirect	$ -	$ -	$ -	$ -	$ -
Subtotal Request	$ 265	$ 250	$ -	$ -	$ 515
AFUDC	$ 0	$ -	$ -	$ -	$ 0
Total Capital Request	$ 265	$ 250	$ -	$ -	$ 515

Prior Distribution authorized amount is for $285k that was approved at TRC on 11/3/16. An additional $900k for transformer purchase was approved at CPAC on 12/7/16.

Prior Transmission authorized amount is $265k that was approved at TRC on 11/3/16.

Financial Evaluation

Provide the following financial information (attach additional detail if summarized items are significant or additional information is needed). Note: Dollar values are in thousands

Distribution Project (A16N02)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$12	$43	$5	$60
Overtime Labor	$0	$0	$0	$0
Outside Services	$0	$1,222	$105	$1,327
Materials	$0	$1,200	$0	$1,200
Other, including contingency amounts (Replace existing switch disconnect and additional CTs)	$0	$500	$0	$0
Total	$12	$2,965	$110	$3,087

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$230	$9	$239
Capitalized interest or AFUDC, if any	$0	$10	$1	$11
Total	$0	$240	$10	$250

Total Capital Costs	$12	$3,205	$120	$3,337
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	$12	$3,205	$120	$3,337
Total O&M Project Costs	$0	$0	$0	$0

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Transmission Project (T1346A)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$0	$43	$5	$48
Overtime Labor	$0	$0	$0	$0
Outside Services	$0	$1,225	$70	$1,295
Materials	$0	$500	$0	$500
Other, including contingency amounts	$0	$0	$0	$0
Total	$0	$1,768	$75	$1,843

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$200	$15	$215
Capitalized interest or AFUDC, if any	$0	$5	$0	$5
Total	$0	$205	$15	$220

Total Capital Costs	$0	$1,973	$90	$2,063
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	$0	$1,973	$0	$2,063
Total O&M Project Costs	$0	$0	$0	$0

- Straight time forecast is based on original project estimate.
- Outside services forecast is based on committed contracts (engineering and project management) plus forecast costs for construction, testing and commissioning.
- Materials is based on $900k for transformer, $270k for materials listed above plus $60k for P&C cabinets and $170k for miscellaneous vendor supplied materials.
- $5,400,000 is the total project forecast (original estimate $5,500,000),
- Work on TB033 cannot commence until the new TB129 is in-service. Therefore some of the project costs a forecast to run into 2018.

Note: Explain unique payment provisions, if applicable

If this is a new business project, is a customer contribution required? If yes, please note the contribution amount. **This is NOT a new customer project**

In addition, for all electric and gas growth / new business projects, please attach the CIAC calculation

Provide other financial documentation as warranted by management and / or regulatory precedent. When performing financial analysis, use appropriate discount rate by company (can be provided by Budgeting and Internal Reporting or Financial Planning and Analysis).

Future Financial Impacts:

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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	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Minor additional O&M costs will result from the addition of a second transformer and switchgear e.g. additional oil and gas samples, visual inspections, etc.

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; N/A

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):

An ARO is a current legal obligation to remove or retire property, plant or equipment at some point in the future. Please refer to APS8 or contact Plant Accounting for further detail.

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. **No**

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Lost Nation PAF – 12/6/16

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Project Authorization Policy
Operations Project Authorization

Project Authorization Form

Date Prepared: December 7, 2016	Project Title: Lost Nation 2nd Transformer
Company/ies: Eversource, NH	Project ID Number: A16N02 (D) & T1346A (T)
Organization: NH Operations	Class(es) of Plant: Distribution & Transmission
Project Initiator: Charles Christensen, PE	Project Category: Substation
Project Owner/Manager: Thelma Brown	Project Type: *Specific*
Project Sponsor: James Eilenberger	Project Purpose: part of regulatory tracked program? No
Estimated in service date: November 1, 2017	If Transmission Project: *Non-PTF*
Supplement to Existing Authorization? No	Capital Investment Part of Original Operating Plan? Yes
Eng./Constr. Resources Budgeted? Material	O&M Expenses Part of the Original Operating Plan? No

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project is for the installation of a second 115-34kV 44.8 MVA transformer at Lost Nation Substation. It includes the installation of a 115kV breaker and 115kV bus rework to install the second transformer. The TAF for this project was approved at the 11/3/16 Technical Review Committee and is attached.

This PAF is a request for approval to place an order for the transformer at $900,000 against Project A16N02.

The material procurement request is for a 115-34kV 44.8 MVA transformer to be installed at Lost Nation SS. The lead time for the transformer is approximately 40 weeks. The transformer is needed to be delivered to Lost Nation Substation in September 2017. Conceptual Engineering will not be complete on the project until August 2017. The PAF for the full scope of work will be submitted at that time.

The risk in procuring the transformer if the project does not go forward is limited. This transformer is the standard size and voltage used throughout the Eversource NH system. If this project is not approved it is likely to be used at another site within a year or become a system spare.

A Project Costs Summary is provided below for just the transformer purchase in 2017. Additionally, the Project Costs Summary and Financial Evaluation are for the total project estimated at 25% accuracy is included. These will be reevaluated and submitted for full funding project approval by August 2017.

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Project Authorization Policy
Operations Project Authorization

Project Costs Summary

Project Costs Summary for Transformer procurement only:

Note: Dollar values are in thousands

Distribution Costs Summary – Project #A16N02

	Prior Authorized*	2016	2017	2018+	Totals
Capital Additions - Direct	$285.0	$0.0	$900.0		$1,185.0
Less Customer Contribution					$0.0
Removals net of Salvage					$0.0
Total - Direct Spending	$285.0	$0.0	$900.0	$0.0	$1,185.0
Capital Additions - Indirect		$0.0	$0.0		$0.0
Subtotal Request	$285.0	$0.0	$900.0	$0.0	$1,185.0
AFUDC			$0.0		
Total Request	$285.0	$0.0	$900.0	$0.0	$1,185.0

* Prior authorized amount is for the $285K that was approved at TRC for the Distribution Engineering for project #A16N02 on 11/3/16.

TOTAL Project Costs Summary based on 25% accuracy estimate:

Note: Dollar values are in thousands

Distribution Costs Summary

	Prior Authorized*	2016	2017	2018+	Totals
Capital Additions - Direct	$0.0	$10.0	$2,590.0		$2,600.0
Less Customer Contribution					$0.0
Removals net of Salvage					$0.0
Total - Direct Spending	$0.0	$10.0	$2,590.0	$0.0	$2,600.0
Capital Additions - Indirect		$0.0	$240.0		$240.0
Subtotal Request	$0.0	$10.0	$2,830.0	$0.0	$2,840.0
AFUDC			$10.0		
Total Request	$0.0	$10.0	$2,840.0	$0.0	$2,850.0

Transmission Costs Summary

	Prior Authorized*	2016	2017	2018+	Totals
Capital Additions - Direct	$0.0	$10.0	$2,420.0		$2,430.0
Less Customer Contribution					$0.0
Removals net of Salvage					$0.0
Total - Direct Spending	$0.0	$10.0	$2,420.0	$0.0	$2,430.0
Capital Additions - Indirect		$0.0	$215.0		$215.0
Subtotal Request	$0.0	$10.0	$2,635.0	$0.0	$2,645.0
AFUDC			$5.0		
Total Request	$0.0	$10.0	$2,640.0	$0.0	$2,650.0

** to be completed if supplemental authorization is required*

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Project Authorization Policy
Operations Project Authorization

Financial Evaluation

Dollar values are in thousands

Distribution Financial Evaluation

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	5,000	55,000		60,000
Overtime Labor				
Outside Services	5,000	1,535,000		1,540,000
Materials		1,000,000		1,000,000
Other, including contingency amounts (describe)				
Total	10,000	2,590,000		2,590,000

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	0	239,500		239,500
Capitalized interest or AFUDC, if any	0	10,500		10,500
Total	0	250,000		250,000

Total Capital Costs	10,000	2,840,000		2,850,000
Less Total Customer Contribution	0	0		0
Total Capital Project Costs	10,000	2,840,000		2,850,000
Total O&M Project Costs	0	0		0

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Project Authorization Policy
Operations Project Authorization

Transmission Financial Evaluation

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	5,000	55,000		60,000
Overtime Labor				
Outside Services	5,000	1,365,000		1,370,000
Materials		500,000		500,000
Other, including contingency amounts (describe)		500,000		500,000
Total	10,000	2,420,000		2,430,000

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	0	215,000		215,000
Capitalized interest or AFUDC, if any	0	5,000		5,000
Total	0	220,000		220,000

Total Capital Costs	10,000	2,640,000		2,650,000
Less Total Customer Contribution	0	0		0
Total Capital Project Costs	10,000	2,640,000		2,650,000
Total O&M Project Costs	0	0		0

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Project Authorization Policy
Operations Project Authorization

Technical Authorization Form

Date Prepared: October 31, 2016	Project Title: Lost Nation 2nd Transformer
Company/ies: Eversource, NH	Project ID Number: A16N02 (D) & T1346A (T)
Organization: NH Operations	Class(es) of Plant: Distribution & Transmission
Project Initiator: Charles Christensen, PE	Project Category: Substation
Project Owner/Manager: Thelma Brown	Project Type: *Specific*
Project Sponsor: James Eilenberger	Project Purpose: part of regulatory tracked program? No
Estimated in service date: November 1, 2017	If Transmission Project: *Non-PTF*
Authorization Type: *Conceptual Engineering*	Authorization Amount: $550,000 for Engineering

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Project Need Statement *(Description of Issue)*

The Lost Nation 115-34.5kV transformer TB029 failed and was removed more than 10 years ago. Today the remaining Lost Nation TB033 115-34.5kV transformer and the combustion turbine (CT) provide the system's ground source for the distribution system emanating out of the Lost Nation Substation's 34.5kV bus. When TB033 is removed from service for maintenance the CT's GSU must remain connected to the system or a mobile substation is required. The mobile substation option is costly and the CT GSU will not be under our direct control once divestiture is complete. Mobilization of the 115-34.5kV mobile adds around $30K to a maintenance job and removes it from being available in other locations. The pending sale of the combustion turbine removes the CT ground source from Eversource's direct control and potential availability. In the event of a failure of TB033 after divestiture, there is the potential we will need to isolate load until the mobile can be installed.

This project is for the installation of a second 115-34kV 44.8 MVA transformer at Lost Nation Substation. It includes the installation of a 115kV breaker and 115kV bus rework to install the second transformer.

Project Objectives

The project remedies the System Protection Sensitivity and Ground Current Source issue for 34.5kV circuits 355X, 376X and 384 fed from Lost Nation Substation.

In addition to adding a power transformer and ancillary equipment it will improve the system's ground system sensitivity and improve the system's continuity of service by having a second transformer at the substation.

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Project Authorization Policy
Operations Project Authorization

Project Scope

1. Installation of a second 115-34kV, 44.8 MVA standard power transformer
2. One (1) new 115kV circuit breaker – O154 line Lost Nation to Paris,
3. Remove 115kV switch 154J2,
4. Install two (2) new 115kV circuit breaker disconnect switches, this requires a new steel struss to be installed on the existing take-off structure,
5. Remove the 115kV wire bus that runs around the 115kV structure D142 GCB is installed below,
6. Install six (6) new 115kV CCVTs,
7. Install one (1) new 115kV Circuit Switcher for high-side transformer protection,
8. Install one (1) new low side 34kV transformer circuit breaker,
9. Install one (1) new low side 34kV potential transformer,
10. Alternate AC station service source must be changed. The station service is open delta, 240 volts, fed from two 50kVA transformers (86kVA maximum). The alternate station service is supplied from two – distribution pole mounted transformers (2-15kVA) tapped off the 4 kV circuit (25.8kVA maximum).

Background / Justification

Today the Lost Nation TB033 115-34.5kV transformer and the combustion turbine (CT) provide the system's ground source for the distribution system emanating out of the Lost Nation Substation's 34.5kV bus. When TB033 is removed from service for maintenance the CT's GSU must remain connected to the system or a mobile substation is required. The mobile substation option is costly and the CT GSU will not be under our direct control once divestiture is complete. Mobilization of the 115-34.5kV mobile adds around $30K to a maintenance job and removes it from being available in other locations. The pending sale of the combustion turbine removes the CT ground source from Eversource's direct control and potential availability. In the event of a failure of TB033 after divestiture, there is the potential we will need to isolate load until the mobile can be installed.

This project is for the installation of a second 115-34kV 44.8 MVA transformer at Lost Nation Substation. It includes the installation of a 115kV breaker and 115kV bus rework to install the second transformer.

Business Process and / or Technical Improvements:

This project will improve the operation of the system, address generation divestiture, and provide a more reliable system with two transformers at the station.

Cost Estimate and Assumptions

The total price of this project is estimated to cost:

Distribution:	2,850,000
Transmission:	2,650,000
Total:	$5,500,000

($4,125,000 - $6,875,000) (-25% +25%)

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Project Authorization Policy
Operations Project Authorization

Alternatives Considered with Cost Estimates

1. Do nothing. This leaves the risk to **isolate customers** for a failure of transformer TB033 if the CT is not available under new ownership. If the CT is available to dispatch, this emergency power source will have to be paid for by Eversource customers which may be significantly above the market rate. The generation divestiture effort will remove this CT from Eversource's direct control. In addition to the customer outage risk the lack of an adequate ground source results in problematic protection and control system design issues that may result in a lower continuity of service to all the customer fed from Lost Nation Substation.

   Estimated capital cost to do nothing is $0.

2. Install a grounding transformer. As with option 1, this option leaves the risk to **isolate customers** for a failure of transformer TB033 (N-1) if the CT is not available when under new ownership. The installation of a grounding bank only addresses the technical issue of the lack of a system ground source. If the CT is available to dispatch, this emergency power source will have to be paid for by Eversource customers which may be significantly above the market rate.

   The total price of the Alternative 2 project is estimated to cost:
   Distribution: 2,000,000
   Total: $2,000,000
   ($1,500,000 - $2,500,000) (-25% +25%)

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Project Approval	11/3/16
Engineering	8/1/17
Construction	11/1/17
In-Service date	11/1/17

Regulatory Approvals

ISO-NE Level 2 approval for the distribution transformer and 115kV circuit breaker addition may be required.

Permitting required by the Town of Northumberland, the State of New Hampshire or US Regulatory Departments

Risks and Risk Mitigation Plans

The loading during construction may require the use of the mobile substation.

- Delay in construction while waiting for the mobile to be available.
- Run the CT

Outage cancelled due to unplanned events on the system resulting in schedule delay and potential labor cost to remobilize.

- Mitigation Plan - Establish and manage outages using proven coordination teams; 1) Construction Management 2) Coordination Meetings 3) Outage Planning Meeting

Internal and external resource availability for engineering.

- Effort is being exerted to balance engineering and review work between internal resources and external resources.

- Lack of sufficient, qualified, local construction labor results in the need to import labor which potentially increases costs or lengthen the schedule which will result in project delays.
    - Develop overall strategy for construction allocation.

References

Go to **N:\Temp60Day\NH Transmission P&C and Sub\Lost Nation - 2nd Tx and other items**
For pictures of the Substation go to folders:
Yard-Control Blding Mar 30 2016
Control House P&C Mar 30 2016

One-Line Diagrams, Attachments, and Images

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Project Authorization Policy
Operations Project Authorization

Technical Authorization Form

Date Prepared: October 31, 2016	Project Title: Lost Nation 2nd Transformer
Company/ies: Eversource, NH	Project ID Number: A16N02 (D) & T1346A (T)
Organization: NH Operations	Class(es) of Plant: Distribution & Transmission
Project Initiator: Charles Christensen, PE	Project Category: Substation
Project Owner/Manager: Thelma Brown	Project Type: *Specific*
Project Sponsor: James Eilenberger	Project Purpose: part of regulatory tracked program? No
Estimated in service date: November 1, 2017	If Transmission Project: *Non-PTF*
Authorization Type: *Conceptual Engineering*	Authorization Amount: $550,000 for Engineering

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Project Need Statement *(Description of Issue)*

The Lost Nation 115-34.5kV transformer TB029 failed and was removed more than 10 years ago. Today the remaining Lost Nation TB033 115-34.5kV transformer and the combustion turbine (CT) provide the system's ground source for the distribution system emanating out of the Lost Nation Substation's 34.5kV bus. When TB033 is removed from service for maintenance the CT's GSU must remain connected to the system or a mobile substation is required. The mobile substation option is costly and the CT GSU will not be under our direct control once divestiture is complete. Mobilization of the 115-34.5kV mobile adds around $30K to a maintenance job and removes it from being available in other locations. The pending sale of the combustion turbine removes the CT ground source from Eversource's direct control and potential availability. In the event of a failure of TB033 after divestiture, there is the potential we will need to isolate load until the mobile can be installed.

This project is for the installation of a second 115-34kV 44.8 MVA transformer at Lost Nation Substation. It includes the installation of a 115kV breaker and 115kV bus rework to install the second transformer.

Project Objectives

The project remedies the System Protection Sensitivity and Ground Current Source issue for 34.5kV circuits 355X, 376X and 384 fed from Lost Nation Substation.

In addition to adding a power transformer and ancillary equipment it will improve the system's ground system sensitivity and improve the system's continuity of service by having a second transformer at the substation.

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Project Authorization Policy
Operations Project Authorization

Project Scope

1. Installation of a second 115-34kV, 44.8 MVA standard power transformer
2. One (1) new 115kV circuit breaker – O154 line Lost Nation to Paris,
3. Remove 115kV switch 154J2,
4. Install two (2) new 115kV circuit breaker disconnect switches, this requires a new steel struss to be installed on the existing take-off structure,
5. Remove the 115kV wire bus that runs around the 115kV structure D142 GCB is installed below,
6. Install six (6) new 115kV CCVTs,
7. Install one (1) new 115kV Circuit Switcher for high-side transformer protection,
8. Install one (1) new low side 34kV transformer circuit breaker,
9. Install one (1) new low side 34kV potential transformer,
10. Alternate AC station service source must be changed. The station service is open delta, 240 volts, fed from two 50kVA transformers (86kVA maximum). The alternate station service is supplied from two – distribution pole mounted transformers (2-15kVA) tapped off the 4 kV circuit (25.8kVA maximum).

Background / Justification

Today the Lost Nation TB033 115-34.5kV transformer and the combustion turbine (CT) provide the system's ground source for the distribution system emanating out of the Lost Nation Substation's 34.5kV bus. When TB033 is removed from service for maintenance the CT's GSU must remain connected to the system or a mobile substation is required. The mobile substation option is costly and the CT GSU will not be under our direct control once divestiture is complete. Mobilization of the 115-34.5kV mobile adds around $30K to a maintenance job and removes it from being available in other locations. The pending sale of the combustion turbine removes the CT ground source from Eversource's direct control and potential availability. In the event of a failure of TB033 after divestiture, there is the potential we will need to isolate load until the mobile can be installed.

This project is for the installation of a second 115-34kV 44.8 MVA transformer at Lost Nation Substation. It includes the installation of a 115kV breaker and 115kV bus rework to install the second transformer.

Business Process and / or Technical Improvements:

This project will improve the operation of the system, address generation divestiture, and provide a more reliable system with two transformers at the station.

Cost Estimate and Assumptions

The total price of this project is estimated to cost:

Distribution:	2,850,000
Transmission:	2,650,000
Total:	$5,500,000

($4,125,000 - $6,875,000) (-25% +25%)

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Project Authorization Policy
Operations Project Authorization

Alternatives Considered with Cost Estimates

1. Do nothing. This leaves the risk to **isolate customers** for a failure of transformer TB033 if the CT is not available under new ownership. If the CT is available to dispatch, this emergency power source will have to be paid for by Eversource customers which may be significantly above the market rate. The generation divestiture effort will remove this CT from Eversource's direct control. In addition to the customer outage risk the lack of an adequate ground source results in problematic protection and control system design issues that may result in a lower continuity of service to all the customer fed from Lost Nation Substation.

   Estimated capital cost to do nothing is $0.

2. Install a grounding transformer. As with option 1, this option leaves the risk to **isolate customers** for a failure of transformer TB033 (N-1) if the CT is not available when under new ownership. The installation of a grounding bank only addresses the technical issue of the lack of a system ground source. If the CT is available to dispatch, this emergency power source will have to be paid for by Eversource customers which may be significantly above the market rate.

   The total price of the Alternative 2 project is estimated to cost:
   Distribution: 2,000,000
   Total: $2,000,000
   ($1,500,000 - $2,500,000) (-25% +25%)

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Project Approval	11/3/16
Engineering	8/1/17
Construction	11/1/17
In-Service date	11/1/17

Regulatory Approvals

ISO-NE Level 2 approval for the distribution transformer and 115kV circuit breaker addition may be required.

Permitting required by the Town of Northumberland, the State of New Hampshire or US Regulatory Departments

Risks and Risk Mitigation Plans

The loading during construction may require the use of the mobile substation.

- Delay in construction while waiting for the mobile to be available.
- Run the CT

Outage cancelled due to unplanned events on the system resulting in schedule delay and potential labor cost to remobilize.

- Mitigation Plan - Establish and manage outages using proven coordination teams; 1) Construction Management 2) Coordination Meetings 3) Outage Planning Meeting

Internal and external resource availability for engineering.

- Effort is being exerted to balance engineering and review work between internal resources and external resources.

- Lack of sufficient, qualified, local construction labor results in the need to import labor which potentially increases costs or lengthen the schedule which will result in project delays.
    - Develop overall strategy for construction allocation.

References

Go to **N:\Temp60Day\NH Transmission P&C and Sub\Lost Nation - 2nd Tx and other items**
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Control House P&C Mar 30 2016

One-Line Diagrams, Attachments, and Images

[ONE-LINE DIAGRAM REDACTED]

EVERSOURCE ENERGY
NEW HAMPSHIRE | NORTHERN

LOST NATION
LOST NATION ROAD, NORTHUMBERLAND, NH
PRELIMINARY MAR. 2016 CEC

DRN.	CHKD.	APPR.		
LJG			5/3/16	SKT-LSTNAT-2016

[ONE-LINE DIAGRAM REDACTED]

LAST REVISION DETAIL

EVERSOURCE ENERGY
NEW HAMPSHIRE

NORTHERN

LOST NATION
LOST NATION ROAD, NORTHUMBERLAND, NH
PRELIMINARY MAR. 2016 CEC

DRN.	CHKD.	APPR.		
LJG			5/3/16	SKT-LSTNAT-2016

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Approved at March 28, 2018 EPAC

Link to Meeting Minutes

Date Prepared: March 29, 2018	**Project Title: Lost Nation 2nd Transformer**
Company/Companies: Eversource (NH)	**Project ID Number: A16N02**
Organization: NH Operations	**Plant Class/(F.P.Type): Distribution Station**
Project Initiator: Thelma Brown	**Project Type: Specific**
Project Manager: Alan Roe	**Capital Investment Part of Original Operating Plan? Y**
Project Sponsor: James Eilenberger	**O&M Expenses Part of the Original Operating Plan? N/A**
Current Authorized Amount: $3,912k	**Estimated in service date(s): November 31, 2018**
Supplement Request: $646k	**Other:**
Total Request: $4,558k	

Supplement Justification

Background

A joint T&D Technical Authorization Form ("TAF") for the Lost Nation 2nd transformer project was approved by the Technical Review Committee on November 11, 2016. At that time, the project was estimated at $2,850k and the approved authorized budget for engineering was $285k (10%).

An initial Project Approval Form ("PAF") was submitted in December 2016, which approved the purchase of the transformer for the project. The initial PAF increased the authorized budget to $1,185k. The overall project estimate was unchanged at $2,850k.

A second PAF was submitted and approved in April 2017 to purchase additional long lead items. At that time, the project was re-estimated at $3,337k and the authorized budget was increased to $1,435k. The increased estimate included revised forecasts for civil and electrical installation costs.

A third PAF was submitted in August 2017 after the 70% design stage. This PAF requested full funding for the project with an estimated cost to complete the project of $3,911k, the currently authorized amount. At that point the estimate included actual costs for construction and estimates for testing and commissioning.

Project Status

At this point, all civil work, apart from the construction of the masonry fire wall, is complete and much of the substation electrical equipment is installed but not wired. Because of minor scope changes (e.g. relocation of a relay and addition of relay test switches), and problems with the quality and accuracy of the P&C engineering drawings, the project is approximately six months behind schedule. The 30% P&C drawings have been reviewed and comments returned to the engineering design vendor (PLM). 70% drawing submission is expected on March 30, 2018 and assuming no additional delays, the P&C drawings will be issued to the field on June 8, 2018. Relay cabinet delivery is forecast on August 6, 2018 with a final in-service date for the project of November 30, 2018.

This supplemental Project Authorization Form requests approval of $646K for a total request of $4,558k. An increase of 17% over the currently authorized amount.

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APS 1 - Project Authorization Policy

Supplement Request Form

Since August 2017, direct costs have increased by $278k and associated increases in Indirect costs are $329k. AFUDC has increased by $39k. The reasons for these increases are explained below.

Cumulative effect of Changes since August 2017

	August 2017 (Current Authorized)	March 2018 (Total Request)	Difference (Supplement Request)
1. Eng./PM/Permitting	$491,344	$695,213	$203,869
2. Construction	$1,106,578	$1,087,955	($18,623)
3. Testing & Commissioning	$200,000	$295,424	$95,424
4. Internal Labor / Exp.	$65,276	$122,304	$57,028
5. Eversource Supplied Material	$1,589,756	$1,439,970	($149,786)
6. Allowances / Contingency	$0	$0	$0
7. Property Taxes	$0	$128,148	$128,148
8. Removals	$55,905	$17,691	($38,214)
Total Directs	$3,508,859	$3,786,705	$277,846
9. Indirect	$379,178	$708,369	$329,191
10. AFUDC	$23,851	$62,742	$38,891
Total	$3,911,888	$4,557,816	$645,928
Total ($k rounded)	$3,912	$4,558	$646

Justification for Additional Resources

1. Engineering / Project Management / Permitting

Because of a shortage of internal P&C resources, an Owner's Engineering was brought on to the project at the 30% P&C design review stage to review and comment on the P&C drawings. This added an additional $117,900 to the project that was not included in the August 2017 estimate. Total Incremental Request for Engineering / Project Management and Permitting: $203,869.

2. Testing and Commission

Testing and commissioning contracts were higher than forecast back in August 2017. Total Incremental Request for testing and commissioning: $95,424

3. Labor and Expenses

With the project delays, and additional effort needed to resolve issues with the PLM's design, additional internal labor for engineering, site supervision and management was incurred. Total Incremental Request for Labor and Expenses: $57,028

4. Property Taxes

The original project estimate and the August 2017 forecast did not include an allowance for property taxes. To the end of February 2018, the project has incurred $38,148 in property taxes with an additional $90,000 forecast through November 2018. Total Incremental Request for property taxes: $128,148

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Supplement Request Form

5. Indirect costs

In the August 2017 PAF, indirect costs were forecast to be $379,178. To date, the project has incurred $427,118 in adders and is expected to incur an additional $281,251 to the end of the project. Total increase in indirect costs for this supplement request is $329,191.

6. AFUDC

In August 2017, AFUDC charges for the project were forecast as $23,851. Actual AFUDC charges incurred to date are $10,242 with an additional $52,000 forecast for the remainder of the project. Total increase in AFUDC for this supplement request is $38,891

These increases together with reductions in estimated materials costs and lower than forecast costs for construction and removals result in an overall Incremental Request of $645,928

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplemental Request	Total
Capital Additions – Direct	$3,509	$3,787	$278
Less Customer Contribution	$0	$0	$0
Removals net of Salvage %	$0	$0	$0
Total Direct Spending	$3,509	$3,787	$278
Capital Additions – Indirect	$379	$708	$329
AFUDC	$24	$63	$39
O&M	$0	$0	$0
Total Request	$3,912	$4,558	$646

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	To Date	Year 2018	Year 2019	Total
Capital Additions – Direct	$2,745	$1,044	$0	$3,787
Less Customer Contribution	$0	$0	$0	$0
Removals net of Salvage %	$0	$0	$0	$0
Total Direct Spending	$2,745	$1,044	$0	$3,787
Capital Additions – Indirect	$427	$281	$0	$708
AFUDC	$10	$52	$0	$63
O&M	$0	$0	$0	$0
Total Request	$3,182	$1,377	$0	$4,558

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APS 1 - Project Authorization Policy

Operations Project Authorization Form

Operations Project Authorization Form

Date Prepared: **8/10/17**	Project Title: **Lost Nation 2nd Transformer**
Company/ies: **Eversource NH**	Project ID Number: **A16N02 (D) & T1346A (T)**
Organization: **NH Operations**	Class(es) of Plant: **Distribution & Transmission**
Project Initiator: **Charles Christensen, PE**	Project Category: **Substation**
Project Manager: **Alan Roe**	Project Type: ***Specific***
Project Sponsor: **James Eilenberger**	Project Purpose: **Add second 115/34.5kV transformer**
Estimated in service date: **03/31/2018**	If Transmission Project: **Non-PTF**
Eng. /Constr. Resources Budgeted? **Yes**	Capital Investment Part of Original Operating Plan? **Yes**
	O&M Expenses Part of the Original Operating Plan? **No**

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Subsidiary Board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project is for the installation of a second 115-34kV 44.8MVA transformer at Lost Nation substation. The project includes the installation of a new 115kV breaker and 115kV bus rework to install the second transformer.

The joint T&D TAF for this project was approved at the 11/3/16 Technical Review Committee. Approval was for $550,000 split $285,000 (D) and $265,000 (T) for engineering design only.

An initial PAF document was approved on 12/7/16 for an additional $900,000 to place an order for the transformer against Project A16N02. A second PAF was approved on 4/7/17 which authorized an additional $500,000 for materials (split 50:50 between Transmission and Distribution). The Distribution authorized amount was increased from $1,185,000 to $1,435,000 and the Transmission authorized amount was increased from $265,000 to $515,000.

This PAF requests full funding of $5,800k (T - $1,900k D - $3,900k) for the project based on known commitments for engineering, project management, materials, commissioning and civil construction. It includes estimates for electrical / P&C construction and estimates for Vendor supplied materials. No contingency amounts are included. The $6,900k estimate is inside the +/-25% of the approved TAF of $5,500k.

A number of additional items have been incorporated into the scope as the engineering design has progressed. These include the addition of slip-over CTs on TB033 and the replacement of a number of obsolete and non-standard relays. All scope additions are necessary to ensure that the new TX129 transformer and TB033 can be operated in parallel and are adequately protected.

Due to performance issues with the Engineering design vendor, the in-service date for the transformer has been postponed into early 2018. The Transmission equipment is still scheduled to go into service by the end of 2017 assuming that relay cabinets can be fabricated and wired in time to meet the

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Operations Project Authorization Form

schedule. Based on the current schedule, bids for electrical / P&C construction will be received on 8/25.

The estimated cost to complete the Distribution portion of the project is $3,000k and $1,663k for Transmission.

Project Costs Summary

See APS3 and APS8 requirements and consult with Plant Accounting for capital/O&M determination. Use published loaders for benefits, materials, and invoices, maintained by the Director, Budget and Internal Reporting.
Note: Dollar values are in thousands

Capital Additions - Direct	$ 1,435	$ 2,897	$ 612	$ 3,509
Less Customer Contribution	$ -	$ -	$ -	$ -
Removals net of Salvage _____%	$ -	$ -	$ -	$ -
Total - Direct Spending	$ 1,435	$ 2,897	$ 612	$ 3,509
Capital Additions - Indirect	$ -	$ 272	$ 108	$ 380
Subtotal Request	$ 1,435	$ 3,169	$ 720	$ 3,889
AFUDC	$ -	$ 8	$ 15	$ 23
Total Capital Request	$ 1,435	$ 3,177	$ 735	$ 3,912
O&M	$ -	$ -	$ -	$ -
Total Request	$ 1,435	$ 3,177	$ 735	$ 3,912

Capital Additions - Direct	$ 515	$ 1,600	$ 117	$ 1,717
Less Customer Contribution	$ -	$ -	$ -	$ -
Removals net of Salvage _____%	$ -	$ -	$ -	$ -
Total - Direct Spending	$ 515	$ 1,600	$ 117	$ 1,717
Capital Additions - Indirect	$ -	$ 175	$ -	$ 175
Subtotal Request	$ 515	$ 1,775	$ 117	$ 1,892
AFUDC	$ 0	$ 6	$ -	$ 6
Total Capital Request	$ 515	$ 1,781	$ 117	$ 1,898
O&M	$ -	$ -	$ -	$ -
Total Request	$ 515	$ 1,781	$ 117	$ 1,898

Prior Distribution authorized amount is for $285k approved at TRC on 11/3/16.
An additional $900k for transformer purchase was approved at CPAC on 12/7/16.
An additional $250k for materials was approved at CPAC on 4/7/16.

Prior Transmission authorized amount is $265k that was approved at TRC on 11/3/16.
An additional $250k for materials was approved at CPAC on 4/7/16.

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Operations Project Authorization Form

Financial Evaluation

Provide the following financial information (attach additional detail if summarized items are significant or additional information is needed). Note: Dollar values are in thousands

Distribution Project (A16N02)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$0	$61	$4	$65
Overtime Labor	$0	$0	$0	$0
Outside Services	$0	$1,190	$608	$1,798
Materials	$0	$1,578	$0	$1,578
Other, including contingency amounts	$0	$67	$0	$67
Total	$0	$2,896	$612	$3,508

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$272	$107	$379
Capitalized interest or AFUDC, if any	$0	$9	$15	$24
Total	$0	$281	$122	$403

Total Capital Costs	$0	$3,177	$734	**$3,911**
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	$0	$3,178	$734	$3,911
Total O&M Project Costs	$0	$0	$0	$0

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APS 1 - Project Authorization Policy

Operations Project Authorization Form

Transmission Project (T1346A)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$0	$25	$5	$30
Overtime Labor	$0	$0	$0	$0
Outside Services	$0	$1,052	$75	$1,127
Materials	$0	$509	$37	$546
Other, including contingency amounts	$0	$6	$0	$6
Total	$0	$1,592	$117	$1,709

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$175	$0	$175
Capitalized interest or AFUDC, if any	$0	$7	$0	$7
Total	$0	$182	$0	$182

Total Capital Costs	$0	$1,774	$117	$1,891
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	$0	$1,774	$117	$1,891
Total O&M Project Costs	$0	$0	$0	$0

- Straight time forecast is based on original project estimate.
- Outside services forecast is based on committed contracts (engineering, project management, civil construction and commissioning) plus forecast costs for electrical / P&C construction and testing.
- Material costs are based on $900k for transformer purchase plus $171k for P&C cabinets, Eversource purchased materials and miscellaneous vendor supplied materials.
- $5,802,000 is the total project forecast.
- Due to engineering design issues, some of the project costs a forecast to run into 2018.

Note: Explain unique payment provisions, if applicable

If this is a new business project, is a customer contribution required? If yes, please note the contribution amount. **This is NOT a new customer project**

In addition, for all electric and gas growth / new business projects, please attach the CIAC calculation

Provide other financial documentation as warranted by management and / or regulatory precedent. When performing financial analysis, use appropriate discount rate by company (can be provided by Budgeting and Internal Reporting or Financial Planning and Analysis).

Future Financial Impacts:

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Operations Project Authorization Form

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	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Minor additional O&M costs will result from the addition of a second transformer and switchgear e.g. additional oil and gas samples, visual inspections, etc.

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; N/A

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):

An ARO is a current legal obligation to remove or retire property, plant or equipment at some point in the future. Please refer to APS8 or contact Plant Accounting for further detail.

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. **No**

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Project Authorization Policy
Operations Project Authorization

Technical Authorization Form

Date Prepared: October 31, 2016	Project Title: Lost Nation 2nd Transformer
Company/ies: Eversource, NH	Project ID Number: A16N02 (D) & T1346A (T)
Organization: NH Operations	Class(es) of Plant: Distribution & Transmission
Project Initiator: Charles Christensen, PE	Project Category: Substation
Project Owner/Manager: Thelma Brown	Project Type: *Specific*
Project Sponsor: James Eilenberger	Project Purpose: part of regulatory tracked program? No
Estimated in service date: November 1, 2017	If Transmission Project: *Non-PTF*
Authorization Type: *Conceptual Engineering*	Authorization Amount: $550,000 for Engineering

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Project Need Statement *(Description of Issue)*

The Lost Nation 115-34.5kV transformer TB029 failed and was removed more than 10 years ago. Today the remaining Lost Nation TB033 115-34.5kV transformer and the combustion turbine (CT) provide the system's ground source for the distribution system emanating out of the Lost Nation Substation's 34.5kV bus. When TB033 is removed from service for maintenance the CT's GSU must remain connected to the system or a mobile substation is required. The mobile substation option is costly and the CT GSU will not be under our direct control once divestiture is complete. Mobilization of the 115-34.5kV mobile adds around $30K to a maintenance job and removes it from being available in other locations. The pending sale of the combustion turbine removes the CT ground source from Eversource's direct control and potential availability. In the event of a failure of TB033 after divestiture, there is the potential we will need to isolate load until the mobile can be installed.

This project is for the installation of a second 115-34kV 44.8 MVA transformer at Lost Nation Substation. It includes the installation of a 115kV breaker and 115kV bus rework to install the second transformer.

Project Objectives

The project remedies the System Protection Sensitivity and Ground Current Source issue for 34.5kV circuits 355X, 376X and 384 fed from Lost Nation Substation.

In addition to adding a power transformer and ancillary equipment it will improve the system's ground system sensitivity and improve the system's continuity of service by having a second transformer at the substation.

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Project Authorization Policy
Operations Project Authorization

Project Scope

1. Installation of a second 115-34kV, 44.8 MVA standard power transformer
2. One (1) new 115kV circuit breaker – O154 line Lost Nation to Paris,
3. Remove 115kV switch 154J2,
4. Install two (2) new 115kV circuit breaker disconnect switches, this requires a new steel struss to be installed on the existing take-off structure,
5. Remove the 115kV wire bus that runs around the 115kV structure D142 GCB is installed below,
6. Install six (6) new 115kV CCVTs,
7. Install one (1) new 115kV Circuit Switcher for high-side transformer protection,
8. Install one (1) new low side 34kV transformer circuit breaker,
9. Install one (1) new low side 34kV potential transformer,
10. Alternate AC station service source must be changed. The station service is open delta, 240 volts, fed from two 50kVA transformers (86kVA maximum). The alternate station service is supplied from two – distribution pole mounted transformers (2-15kVA) tapped off the 4 kV circuit (25.8kVA maximum).

Background / Justification

Today the Lost Nation TB033 115-34.5kV transformer and the combustion turbine (CT) provide the system's ground source for the distribution system emanating out of the Lost Nation Substation's 34.5kV bus. When TB033 is removed from service for maintenance the CT's GSU must remain connected to the system or a mobile substation is required. The mobile substation option is costly and the CT GSU will not be under our direct control once divestiture is complete. Mobilization of the 115-34.5kV mobile adds around $30K to a maintenance job and removes it from being available in other locations. The pending sale of the combustion turbine removes the CT ground source from Eversource's direct control and potential availability. In the event of a failure of TB033 after divestiture, there is the potential we will need to isolate load until the mobile can be installed.

This project is for the installation of a second 115-34kV 44.8 MVA transformer at Lost Nation Substation. It includes the installation of a 115kV breaker and 115kV bus rework to install the second transformer.

Business Process and / or Technical Improvements:

This project will improve the operation of the system, address generation divestiture, and provide a more reliable system with two transformers at the station.

Cost Estimate and Assumptions

The total price of this project is estimated to cost:

Distribution:	2,850,000
Transmission:	2,650,000
Total:	$5,500,000

($4,125,000 - $6,875,000) (-25% +25%)

EVERSOURCE

Project Authorization Policy
Operations Project Authorization

Alternatives Considered with Cost Estimates

1. Do nothing. This leaves the risk to **isolate customers** for a failure of transformer TB033 if the CT is not available under new ownership. If the CT is available to dispatch, this emergency power source will have to be paid for by Eversource customers which may be significantly above the market rate. The generation divestiture effort will remove this CT from Eversource's direct control. In addition to the customer outage risk the lack of an adequate ground source results in problematic protection and control system design issues that may result in a lower continuity of service to all the customer fed from Lost Nation Substation.

   Estimated capital cost to do nothing is $0.

2. Install a grounding transformer. As with option 1, this option leaves the risk to **isolate customers** for a failure of transformer TB033 (N-1) if the CT is not available when under new ownership. The installation of a grounding bank only addresses the technical issue of the lack of a system ground source. If the CT is available to dispatch, this emergency power source will have to be paid for by Eversource customers which may be significantly above the market rate.

   The total price of the Alternative 2 project is estimated to cost:
   Distribution: 2,000,000
   Total: $2,000,000
   ($1,500,000 - $2,500,000) (-25% +25%)

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Project Approval	11/3/16
Engineering	8/1/17
Construction	11/1/17
In-Service date	11/1/17

Regulatory Approvals

ISO-NE Level 2 approval for the distribution transformer and 115kV circuit breaker addition may be required.

Permitting required by the Town of Northumberland, the State of New Hampshire or US Regulatory Departments

Risks and Risk Mitigation Plans

The loading during construction may require the use of the mobile substation.

- Delay in construction while waiting for the mobile to be available.
- Run the CT

Outage cancelled due to unplanned events on the system resulting in schedule delay and potential labor cost to remobilize.

- Mitigation Plan - Establish and manage outages using proven coordination teams; 1) Construction Management 2) Coordination Meetings 3) Outage Planning Meeting

Internal and external resource availability for engineering.

- Effort is being exerted to balance engineering and review work between internal resources and external resources.

- Lack of sufficient, qualified, local construction labor results in the need to import labor which potentially increases costs or lengthen the schedule which will result in project delays.
    - Develop overall strategy for construction allocation.

References

Go to **N:\Temp60Day\NH Transmission P&C and Sub\Lost Nation - 2nd Tx and other items**
For pictures of the Substation go to folders:
Yard-Control Blding Mar 30 2016
Control House P&C Mar 30 2016

One-Line Diagrams, Attachments, and Images

[ONE-LINE DIAGRAM REDACTED]

EVERSOURCE ENERGY
NEW HAMPSHIRE

NORTHERN

LOST NATION

LOST NATION ROAD, NORTHUMBERLAND, NH
PRELIMINARY MAR. 2016 CEC

DRN.	CHKD.	APPR.		
LJG			5/3/16	SKT-LSTNAT-2016

[ONE-LINE DIAGRAM REDACTED]

EVERSOURCE ENERGY
NEW HAMPSHIRE

NORTHERN

LOST NATION

LOST NATION ROAD, NORTHUMBERLAND, NH
PRELIMINARY MAR. 2016 CEC

DRN.	CHKD.	APPR.		
LJG			5/3/16	SKT-LSTNAT-2016

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Project Authorization Policy
Operations Project Authorization

Project Authorization Form

Date Prepared: December 7, 2016	Project Title: Lost Nation 2nd Transformer
Company/ies: Eversource, NH	Project ID Number: A16N02 (D) & T1346A (T)
Organization: NH Operations	Class(es) of Plant: Distribution & Transmission
Project Initiator: Charles Christensen, PE	Project Category: Substation
Project Owner/Manager: Thelma Brown	Project Type: *Specific*
Project Sponsor: James Eilenberger	Project Purpose: part of regulatory tracked program? No
Estimated in service date: November 1, 2017	If Transmission Project: *Non-PTF*
Supplement to Existing Authorization? No	Capital Investment Part of Original Operating Plan? Yes
Eng./Constr. Resources Budgeted? Material	O&M Expenses Part of the Original Operating Plan? No

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project is for the installation of a second 115-34kV 44.8 MVA transformer at Lost Nation Substation. It includes the installation of a 115kV breaker and 115kV bus rework to install the second transformer. The TAF for this project was approved at the 11/3/16 Technical Review Committee and is attached.

This PAF is a request for approval to place an order for the transformer at $900,000 against Project A16N02.

The material procurement request is for a 115-34kV 44.8 MVA transformer to be installed at Lost Nation SS. The lead time for the transformer is approximately 40 weeks. The transformer is needed to be delivered to Lost Nation Substation in September 2017. Conceptual Engineering will not be complete on the project until August 2017. The PAF for the full scope of work will be submitted at that time.

The risk in procuring the transformer if the project does not go forward is limited. This transformer is the standard size and voltage used throughout the Eversource NH system. If this project is not approved it is likely to be used at another site within a year or become a system spare.

A Project Costs Summary is provided below for just the transformer purchase in 2017. Additionally, the Project Costs Summary and Financial Evaluation are for the total project estimated at 25% accuracy is included. These will be reevaluated and submitted for full funding project approval by August 2017.

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Project Authorization Policy
Operations Project Authorization

Project Costs Summary

Project Costs Summary for Transformer procurement only:

Note: Dollar values are in thousands

Distribution Costs Summary – Project #A16N02

	Prior Authorized*	2016	2017	2018+	Totals
Capital Additions - Direct	$285.0	$0.0	$900.0		$1,185.0
Less Customer Contribution					$0.0
Removals net of Salvage					$0.0
Total - Direct Spending	$285.0	$0.0	$900.0	$0.0	$1,185.0
Capital Additions - Indirect		$0.0	$0.0		$0.0
Subtotal Request	$285.0	$0.0	$900.0	$0.0	$1,185.0
AFUDC			$0.0		
Total Request	$285.0	$0.0	$900.0	$0.0	$1,185.0

* Prior authorized amount is for the $285K that was approved at TRC for the Distribution Engineering for project #A16N02 on 11/3/16.

Financial Evaluation

Dollar values are in thousands

Distribution Financial Evaluation

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	5	25		30
Overtime Labor				
Outside Services	5	200		205
Materials		900		900
Other, including contingency amounts (describe)				
Total	10	1,125		1,135

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	0	50		50
Capitalized interest or AFUDC, if any	0	0		0
Total	0	50		50

Total Capital Costs	10	1,175		1,185
Less Total Customer Contribution	0	0		0
Total Capital Project Costs	10	1,175		1,185
Total O&M Project Costs	0	0		0

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Project Authorization Policy
Operations Project Authorization

Technical Authorization Form

Date Prepared: October 31, 2016	Project Title: Lost Nation 2nd Transformer
Company/ies: Eversource, NH	Project ID Number: A16N02 (D) & T1346A (T)
Organization: NH Operations	Class(es) of Plant: Distribution & Transmission
Project Initiator: Charles Christensen, PE	Project Category: Substation
Project Owner/Manager: Thelma Brown	Project Type: *Specific*
Project Sponsor: James Eilenberger	Project Purpose: part of regulatory tracked program? No
Estimated in service date: November 1, 2017	If Transmission Project: *Non-PTF*
Authorization Type: *Conceptual Engineering*	Authorization Amount: $550,000 for Engineering

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Project Need Statement *(Description of Issue)*

The Lost Nation 115-34.5kV transformer TB029 failed and was removed more than 10 years ago. Today the remaining Lost Nation TB033 115-34.5kV transformer and the combustion turbine (CT) provide the system's ground source for the distribution system emanating out of the Lost Nation Substation's 34.5kV bus. When TB033 is removed from service for maintenance the CT's GSU must remain connected to the system or a mobile substation is required. The mobile substation option is costly and the CT GSU will not be under our direct control once divestiture is complete. Mobilization of the 115-34.5kV mobile adds around $30K to a maintenance job and removes it from being available in other locations. The pending sale of the combustion turbine removes the CT ground source from Eversource's direct control and potential availability. In the event of a failure of TB033 after divestiture, there is the potential we will need to isolate load until the mobile can be installed.

This project is for the installation of a second 115-34kV 44.8 MVA transformer at Lost Nation Substation. It includes the installation of a 115kV breaker and 115kV bus rework to install the second transformer.

Project Objectives

The project remedies the System Protection Sensitivity and Ground Current Source issue for 34.5kV circuits 355X, 376X and 384 fed from Lost Nation Substation.

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Project Authorization Policy
Operations Project Authorization

In addition to adding a power transformer and ancillary equipment it will improve the system's ground system sensitivity and improve the system's continuity of service by having a second transformer at the substation.

Project Scope

1. Installation of a second 115-34kV, 44.8 MVA standard power transformer
2. One (1) new 115kV circuit breaker – O154 line Lost Nation to Paris,
3. Remove 115kV switch 154J2,
4. Install two (2) new 115kV circuit breaker disconnect switches, this requires a new steel struss to be installed on the existing take-off structure,
5. Remove the 115kV wire bus that runs around the 115kV structure D142 GCB is installed below,
6. Install six (6) new 115kV CCVTs,
7. Install one (1) new 115kV Circuit Switcher for high-side transformer protection,
8. Install one (1) new low side 34kV transformer circuit breaker,
9. Install one (1) new low side 34kV potential transformer,
10. Alternate AC station service source must be changed. The station service is open delta, 240 volts, fed from two 50kVA transformers (86kVA maximum). The alternate station service is supplied from two – distribution pole mounted transformers (2-15kVA) tapped off the 4 kV circuit (25.8kVA maximum).

Background / Justification

Today the Lost Nation TB033 115-34.5kV transformer and the combustion turbine (CT) provide the system's ground source for the distribution system emanating out of the Lost Nation Substation's 34.5kV bus. When TB033 is removed from service for maintenance the CT's GSU must remain connected to the system or a mobile substation is required. The mobile substation option is costly and the CT GSU will not be under our direct control once divestiture is complete. Mobilization of the 115-34.5kV mobile adds around $30K to a maintenance job and removes it from being available in other locations. The pending sale of the combustion turbine removes the CT ground source from Eversource's direct control and potential availability. In the event of a failure of TB033 after divestiture, there is the potential we will need to isolate load until the mobile can be installed.

This project is for the installation of a second 115-34kV 44.8 MVA transformer at Lost Nation Substation. It includes the installation of a 115kV breaker and 115kV bus rework to install the second transformer.

Business Process and / or Technical Improvements:

This project will improve the operation of the system, address generation divestiture, and provide a more reliable system with two transformers at the station.

Cost Estimate and Assumptions

The total price of this project is estimated to cost:

Distribution:	2,850,000
Transmission:	2,650,000

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Project Authorization Policy
Operations Project Authorization

Total: $5,500,000
($4,125,000 - $6,875,000) (-25% +25%)

Alternatives Considered with Cost Estimates

1. Do nothing. This leaves the risk to **isolate customers** for a failure of transformer TB033 if the CT is not available under new ownership. If the CT is available to dispatch, this emergency power source will have to be paid for by Eversource customers which may be significantly above the market rate. The generation divestiture effort will remove this CT from Eversource's direct control. In addition to the customer outage risk the lack of an adequate ground source results in problematic protection and control system design issues that may result in a lower continuity of service to all the customer fed from Lost Nation Substation.

   Estimated capital cost to do nothing is $0.

2. Install a grounding transformer. As with option 1, this option leaves the risk to **isolate customers** for a failure of transformer TB033 (N-1) if the CT is not available when under new ownership. The installation of a grounding bank only addresses the technical issue of the lack of a system ground source. If the CT is available to dispatch, this emergency power source will have to be paid for by Eversource customers which may be significantly above the market rate.

   The total price of the Alternative 2 project is estimated to cost:
   Distribution: 2,000,000
   Total: $2,000,000
   ($1,500,000 - $2,500,000) (-25% +25%)

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Project Approval	11/3/16
Engineering	8/1/17
Construction	11/1/17
In-Service date	11/1/17

Regulatory Approvals

ISO-NE Level 2 approval for the distribution transformer and 115kV circuit breaker addition may be required.

Permitting required by the Town of Northumberland, the State of New Hampshire or US Regulatory Departments

Risks and Risk Mitigation Plans

The loading during construction may require the use of the mobile substation.

- Delay in construction while waiting for the mobile to be available.
- Run the CT

Outage cancelled due to unplanned events on the system resulting in schedule delay and potential labor cost to remobilize.

- Mitigation Plan - Establish and manage outages using proven coordination teams; 1) Construction Management 2) Coordination Meetings 3) Outage Planning Meeting

Internal and external resource availability for engineering.

- Effort is being exerted to balance engineering and review work between internal resources and external resources.

- Lack of sufficient, qualified, local construction labor results in the need to import labor which potentially increases costs or lengthen the schedule which will result in project delays.
    - Develop overall strategy for construction allocation.

References

Go to **N:\Temp60Day\NH Transmission P&C and Sub\Lost Nation - 2nd Tx and other items**
For pictures of the Substation go to folders:
Yard-Control Blding Mar 30 2016
Control House P&C Mar 30 2016

One-Line Diagrams, Attachments, and Images

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APS 1 - Project Authorization Policy

Operations Project Authorization Form

Operations Project Authorization Form

Date Prepared: **4/6/17 (Rev. 1)**	Project Title: **Lost Nation 2nd Transformer**
Company/ies: **Eversource NH**	Project ID Number: **A16N02 (D) & T1346A (T)**
Organization: **NH Operations**	Class(es) of Plant: **Distribution & Transmission**
Project Initiator: **Charles Christensen, PE**	Project Category: **Substation**
Project Manager: **Alan Roe**	Project Type: ***Specific***
Project Sponsor: **James Eilenberger**	Project Purpose: **Add second 115/34.5kV transformer**
Estimated in service date: **11/03/2017**	If Transmission Project: **Non-PTF**
Eng. /Constr. Resources Budgeted? **Yes**	Capital Investment Part of Original Operating Plan? **Yes**
	O&M Expenses Part of the Original Operating Plan? **No**

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Subsidiary Board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project is for the installation of a second 115-34kV 44.8MVA transformer at Lost Nation substation. It includes the installation of a new 115kV breaker and 115kV bus rework to install the second transformer.

The joint T&D TAF for this project was approved at the 11/3/16 Technical Review Committee. Approval was for $550,000 split $285,000 (D) and $265,000 (T) for engineering design only.

A PAF document was approved on 12/7/16 for an additional $900,000 to place an order for the transformer against Project A16N02. This increased the Distribution portion of the approved budget to $1,185,000 and the Transmission project (T1346A) remained at $265,000.

The PAF stated that “Engineering will not be complete on the project until August 2017. The PAF for the full scope of work will be submitted at that time”. The current planned in-service date for the new transformer is 11/3/17. In order to meet that date, additional approval for $500,000 is required to purchase long-lead and other materials including;

- 8 x 115kV CCVTs
- 1 x 115kV Gas circuit breaker
- 1 x 115kV Circuit switcher
- 1 x 115kV Motor operated disconnect
- 1 x 115kV single phase PT
- 2 x 34.5kV vacuum circuit breakers
- 2 x 2400/4160V – 120/240V alternate station service transformers
- 1 x 34.5kV 2 phase bus PT
- 3 x P&C cabinets

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APS 1 - Project Authorization Policy

Operations Project Authorization Form

Based on the current schedule, bids for construction would be requested at the 30% design stage. Full project approval will now be requested in June 2017 once construction, testing and commissioning prices are known.

The additional $500,000 for materials will be split 50:50 between Transmission and Distribution. The Distribution authorized amount will increase from $1,185,000 to $1,435,000 and the Transmission authorized amount will increase from $265,000 to $515,000.

Project Costs Summary

See APS3 and APS8 requirements and consult with Plant Accounting for capital/O&M determination. Use published loaders for benefits, materials, and invoices, maintained by the Director, Budget and Internal Reporting.
Note: Dollar values are in thousands

Distribution (A16N02)

	Prior Authorized	2017	2018	20__+	Totals
Capital Additions - Direct	$ 1,185	$ 250	$ -	$ -	$ 1,435
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage _____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ 1,185	$ 250	$ -	$ -	$ 1,435
Capital Additions - Indirect	$ -	$ -	$ -	$ -	$ -
Subtotal Request	$ 1,185	$ 250	$ -	$ -	$ 1,435
AFUDC	$ 0	$ -	$ -	$ -	$ 0
Total Capital Request	$ 1,185	$ 250	$ -	$ -	$ 1,435

Transmission (T1346A)

	Prior Authorized	2017	2018	20__+	Totals
Capital Additions - Direct	$ 265	$ 250	$ -	$ -	$ 515
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage _____%	$ -	$ -	$ -	$ -	$ -
Total - Direct Spending	$ 265	$ 250	$ -	$ -	$ 515
Capital Additions - Indirect	$ -	$ -	$ -	$ -	$ -
Subtotal Request	$ 265	$ 250	$ -	$ -	$ 515
AFUDC	$ 0	$ -	$ -	$ -	$ 0
Total Capital Request	$ 265	$ 250	$ -	$ -	$ 515

Prior Distribution authorized amount is for $285k that was approved at TRC on 11/3/16. An additional $900k for transformer purchase was approved at CPAC on 12/7/16.

Prior Transmission authorized amount is $265k that was approved at TRC on 11/3/16.

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APS 1 - Project Authorization Policy

Operations Project Authorization Form

Financial Evaluation

Provide the following financial information (attach additional detail if summarized items are significant or additional information is needed). Note: Dollar values are in thousands

Distribution Project (A16N02)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$12	$43	$5	$60
Overtime Labor	$0	$0	$0	$0
Outside Services	$0	$1,222	$105	$1,327
Materials	$0	$1,200	$0	$1,200
Other, including contingency amounts (Replace existing switch disconnect and additional CTs)	$0	$500	$0	$0
Total	$12	$2,965	$110	$3,087

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$230	$9	$239
Capitalized interest or AFUDC, if any	$0	$10	$1	$11
Total	$0	$240	$10	$250

Total Capital Costs	$12	$3,205	$120	$3,337
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	$12	$3,205	$120	$3,337
Total O&M Project Costs	$0	$0	$0	$0

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Operations Project Authorization Form

Transmission Project (T1346A)

Direct Capital Costs	2016	2017	2018	Total
Straight Time Labor	$0	$43	$5	$48
Overtime Labor	$0	$0	$0	$0
Outside Services	$0	$1,225	$70	$1,295
Materials	$0	$500	$0	$500
Other, including contingency amounts	$0	$0	$0	$0
Total	$0	$1,768	$75	$1,843

Indirect Capital Costs	2016	2017	2018	Total
Indirects/Overheads (including benefits)	$0	$200	$15	$215
Capitalized interest or AFUDC, if any	$0	$5	$0	$5
Total	$0	$205	$15	$220

Total Capital Costs	$0	$1,973	$90	$2,063
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	$0	$1,973	$0	$2,063
Total O&M Project Costs	$0	$0	$0	$0

- Straight time forecast is based on original project estimate.
- Outside services forecast is based on committed contracts (engineering and project management) plus forecast costs for construction, testing and commissioning.
- Materials is based on $900k for transformer, $270k for materials listed above plus $60k for P&C cabinets and $170k for miscellaneous vendor supplied materials.
- $5,400,000 is the total project forecast (original estimate $5,500,000),
- Work on TB033 cannot commence until the new TB129 is in-service. Therefore some of the project costs a forecast to run into 2018.

Note: Explain unique payment provisions, if applicable

If this is a new business project, is a customer contribution required? If yes, please note the contribution amount. **This is NOT a new customer project**

In addition, for all electric and gas growth / new business projects, please attach the CIAC calculation

Provide other financial documentation as warranted by management and / or regulatory precedent. When performing financial analysis, use appropriate discount rate by company (can be provided by Budgeting and Internal Reporting or Financial Planning and Analysis).

Future Financial Impacts:

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APS 1 - Project Authorization Policy

Operations Project Authorization Form

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	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Minor additional O&M costs will result from the addition of a second transformer and switchgear e.g. additional oil and gas samples, visual inspections, etc.

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; N/A

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):

An ARO is a current legal obligation to remove or retire property, plant or equipment at some point in the future. Please refer to APS8 or contact Plant Accounting for further detail.

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. **No**

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APS 1 - Project Authorization Policy

Operations Project Authorization Form

Adobe Acrobat Document

Lost Nation PAF – 12/6/16

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--025 **Page 1 of 1**

Request from: Department of Energy

Witness: Plante, David L

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

328 Line Reconductor No. A17C26

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-25 for the PAF for this project.

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Project Authorization Form

Supplement Request Form

Date Prepared: April 04, 2018	**Project Title: Line 328 Reconstruction**
Company/ies: Eversource, NH	**Project ID Number: A17C26**
Organization: Distribution	**Class(es) of Plant: Distribution**
Project Initiator: Russel Johnson	**Project Category: Substation / Distribution Lines**
Project Manager: Natacha Morales	**Project Type: Specific**
Project Sponsor: Jim Eilenberger	**Project Purpose: Update required to meet expected line loads**
Estimated in service date: December 31, 2019	**If Transmission Project: PTF? Non-PTF**
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan? No**
Total Request: $4,264,778	

Supplement Justification

Justification for Additional Resources

This request is for full funding for this project. Previously approved amount was for detailed engineering only. The original TAF, approved in May of 2017, is attached below.

This project is requesting full funding of $4,264,778 to reconstruct 3.65 miles of the existing 328 Line (34.5 kV) in ROW between Rimmon S/S and the J9428 Recloser. The work performed will consist of final engineering, permitting, survey, clearing, materials purchasing and construction required to remove 3.65 miles of bare 266 ACSR conductor and reconstruct the line with 477 Spacer Cable. This also includes installation of fiber cable from Rimmon SS to the J9428 Recloser. The fiber optic cable will primarily be ADSS cable except where OPGW is needed due to span lengths. The fiber is being installed at the request of Telecom Engineering. Another, separate, project will be requested to bring the fiber into Greggs SS on the J114 or O161 Lines. Preliminary engineering for this project was completed in 2017 NH Distribution Planning determined this project is needed to allow the retirement of the Greggs S/S transformer and oil circuit breaker without resulting in a negative impact to reliability. The Greggs S/S transformer condition is very poor and a transformer differential operation clears the 115kV bus until the high side switch is manually opened and the lockout relay is reset.

The project estimate is based on aggregated information from the 3271, 334/335, 61W2 and 3891 line projects which were all partial rebuild projects using spacer cable construction. It also has been updated to include structure counts based on the current engineering design.

A portion of the work was completed in 2017 under Work Order A17C2601 for $100,000. An additional $4,164,778 is needed to complete the work.

Engineering was the only activity performed in 2017. Final engineering, surveying, wetland and DHR review, materials procurement, construction services, wetlands oversight and final survey will be completed in 2018.

EVERSOURCE
Project Authorization Form

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	2018	2019	20__+	Totals
Capital Additions - Direct	$ 100	$ 1,094	$ 1,527	$ -	$ 2,721
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage 10%	-		-	-	-
Total - Direct Spending	$ 100	$ 1,094	$ 1,527	$ -	$ 2,721
Capital Additions - Indirect	-	600	901	-	1,501
Subtotal Request	$ 100	$ 1,694	$ 2,428	$ -	$ 4,222
AFUDC	-	15	27	-	42
Total Capital Request	$ 100	$ 1,709	$ 2,455	$ -	$ 4,264
O&M	-	-	-	-	-
Total Request	$ 100	$ 1,709	$ 2,455	$ -	$ 4,264

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2018	Year 2019	Year 20__+	Total
Capital Additions - Direct	$ 1,094	$ 1,527	$ -	$ 2,621
Less Customer Contribution	-	-	-	-
Removals net of Salvage _____%	-	-	-	-
Total Direct Spending	$ 1,094	$ 1,527	$ -	$ 2,621
Capital Additions - Indirect	600	901.00	-	1,501
AFUDC	15	25.00	-	40
Total Capital Request	$ 1,709	$ 2,455	$ -	$ 4,164
O&M	-	-	-	-
Total Request	**$ 1,709**	**$ 2,455**	**$ -**	**$ 4,164**

EVERSOURCE
Project Authorization Form

Technical Authorization Form

Date Prepared: May, 2017	Project Title: 328 Line Reconductor
Company/ies: Eversource, NH	Project ID Number: A17C26
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Robert Mission	Project Category: Substation / Distribution Lines
Project Owner/Manager: Russel Johnson	Project Type: *Specific*
Project Sponsor: Jim Eilenberger	Project Purpose: part of regulatory tracked program? No
Estimated in service date: June 30, 2019	If Transmission Project: *NA*
Authorization Type: *Detailed Engineering*	Authorization Amount: $100,000 for Engineering

Project Need Statement *(Description of Issue)*
This requested authorization is for engineering design and permitting to reconductor 3.65 miles of 266 ACSR with 477 Al Spacer Cable on the 328 Line. The line reconductoring is needed to allow the retirement of the Greggs S/S transformer and oil circuit breaker without resulting in a negative impact to reliability. The Greggs S/S transformer condition is very poor and a transformer differential operation clears the 115kV bus until the high side switch is manually opened and the lockout relay is reset.

Project description
- The electric system in the Goffstown / Weare area is served from three 115-34.5 kV substations
  - Weare substation – 1-44.5 MVA transformer, 9 years old, loaded to 34% nameplate, located in the western part of the area.
  - Greggs substation – 20 MVA transformer, 67 years old, loaded to 63% nameplate, located in the center of the area. This transformer is planned to be retired.
  - Rimmon substation – 2-44.8 MVA transformers, 2 years old, loaded 57% nameplate.
- The area is served by 2 circuits fed from Weare substation, 2 circuits fed from Greggs substation (only one breaker) and 1 circuit fed from Rimmon substation.
- The load carrying capability of the 328 line from Rimmon to J9428 is limited to 20 MW by 3.65 miles of 266 ACSR conductor

(see figure 1 in the one-line attachment section of this TAF for a one-line of the existing system)

Project Objectives
With the planned retirement of the Greggs transformer and associated substation equipment, the 328 circuit from Rimmon will be upgraded in order to be able to supply the area during a contingent loss of the Weare transformer or the 3271 Line from Weare S/S. (see figure 2 in the one-line attachment section of this TAF for a one-line of the proposed system)

Project Scope
- Reconductor 3.65 miles of the 328 line. Replace the existing 266 ACSR conductor with 477 AL Spacer Cable.
- Configure the distribution system to be fed from Weare and Rimmon substations.
- Retire the Greggs transformer and associated substation equipment.

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Project Authorization Form

Background / Justification

- The Greggs transformer was built in 1950. The unit has main tank and bushing oil leaks on which repairs have been attempted many times including gasket replacement, welding, and The Colt Group's patented injection method. There are also leaks in the LTC control cabinet and the oil temperature gauge no longer functions. In addition there is an oil leak on the transformer breaker and concrete foundations are deteriorated. The equipment is beyond its useful life and is planned to be retired.
- Greggs S/S has been on the ESCC top 10 list for many years. The transformer protection scheme clears the 115kV bus until the high side switch is opened and the lockout relay reset. No measures have been taken to address this condition since the substation is to be retired.
- The 328 line is built with 266 ACSR conductor. During a contingency, this line limits the ability to restore load. With the Greggs distribution S/S retired, there would be 13.6 MW isolated with the 328 line loaded to 116% of its normal rating and 100% of its LTE rating. This line will be replaced with 477 AL spacer cable. The original steel towers (circa 1930) were mostly replaced in the 1990's.

Business Process and / or Technical Improvements:

This project improves the reliability of the distribution system in the Goffstown/Weare area. Lack of line capability to serve the load during a contingent loss of the Weare transformer or the 3271 line will be eliminated.

Cost Estimate and Assumptions

Reconductor 328 line	$2,500,000
Retire Greggs substation	$100,000

Alternatives Considered with Cost Estimates

1) Replace Greggs transformer and associated equipment $10,100,000
2) Add second transformer at Weare substation $7,100,000

For discussion of the options and the decision matrix, refer to the Greggs Area Distribution System Study – May 2017 (see reference section of this TAF for the location of this report) The study finds that the best ultimate solution is to rebuild Greggs with a larger transformer and proper high and low side protection, however, the 328 line reconductoring is recommended at this time.

Project Schedule

Describe the project schedule and milestones. Include estimated start and end dates.

Milestone/Phase Name	Estimated Completion Date
Project Approval	06/01/17
Engineering	09/01/17
Rebuild the 328 line	06/30/19
In-Service date	06/30/19

Regulatory Approvals

Permitting as required for the reconstruction of the 328 line

Risks and Risk Mitigation Plans

Transformer failure at Weare during construction may require the use of a mobile substation.

References

For a detailed description of this project, refer to the 'Greggs Area Distribution System Study – May 2017'. This study is located in: **N:\Temp60Day\NH Distribution\Greggs Area Distribution System Study**

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Project Authorization Form

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

[ONE-LINE DIAGRAM REDACTED]

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Project Authorization Form

Project Checklist – Transmission and Substation

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name : 328 Line Reconstruction				**PAF No:**	
Facility Type: ☐ BPS ☐ BES ☐ PTF ☐ non-PTF ☐ CIP ☒ Distribution					
PLANNING					
Is a NX-9 required?				Yes	
Is an ISO-NE PAC presentation required?				No	
Is a PPA required?				No	
Is a TCA Application Required?				No	
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?				No	
OPERATIONS					
Outage Required?	☒ Primary Equipment (Power Transfer)	☐ Secondary Equipment (P&C only)	☐ Outage Not Required		
Do SCLL Conditions Exist?				No	
Has an outage schedule been approved?				No	
Are Operations & Maintenance procedures/training required?				No	
STANDARDS					
Does the project include standard equipment and designs?				Yes	
SUBSTATION ENGINEERING					
Does this impact Revenue Metering				No	
Is preliminary short circuit/ breaker duty analysis required?				No	
Are there any changes to the baseline audible noise?				No	
Is there an impact to the existing ground grid?				No	
Is a Transient Over Voltage (TOV) analysis required?				No	
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?				No	
If BPS, is an NPCC Directory #4 presentation required?				No	

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Project Authorization Form

Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : 328 Line Reconstruction	**PAF No:**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
Is there an impact to the existing ground grid?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
Siting & Construction Services (Outreach)	
What is the level of outreach expected?	Medium
INITIATOR	
Has a field constructability review been completed?	Yes

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Project Authorization Form

Cost Estimate Backup Details

See attached estimate P-18-268 Line 328 Reconstruct for direct costs only.

ESTIMATE SUMMARY
PSNH

Project Title: Line 328 Reconstruction — **Estimate By: MPD**
Project Mgr/Lead: Natacha Morales — **Date of Estimate: 05/14/18**
Project Number: A18S14 — **ISD: 12/01/18**
TAF # NA — **Estimate # P 18-268**

ESTIMATE SUMMARY

ESTIMATE TYPE: Conceptual

	TOTAL	Prior	2018	2019	2020	2021	2022 and FUTURE
CONSTRUCTION	$1,591,332	$0	$1,591,332	$0	$0	$0	$0
ENGINEERING/DESIGN	$143,545	$0	$143,545	$0	$0	$0	$0
LAND	$0	$0	$0	$0	$0	$0	$0
MATERIAL	$775,569	$0	$775,569	$0	$0	$0	$0
PROJECT MGR & SUPPORT	$86,047	$0	$86,047	$0	$0	$0	$0
REMOVAL	$124,500	$0	$124,500	$0	$0	$0	$0
TEST	$0	$0	$0	$0	$0	$0	$0
CONTINGENCY	$0	$0	$0	$0	$0	$0	$0
ESCALATION	$0	$0	$0	$0	$0	$0	$0
INDIRECTS	$1,501,018	$0	$1,501,018	$0	$0	$0	$0
AFUDC	$42,767	$0	$42,767	$0	$0	$0	$0
Total Cost	**$4,264,778**	**$0**	**$4,264,778**	**$0**	**$0**	**$0**	**$0**

	-25%	-	50%
Conceptual Range	**$3,198,584**	-	########

COMMENTS:

Project Scope:

Reconstruct 3.65 Miles of existing Distribution Line 328 in existing ROW.

Estimate includes all triming matting and permitttting.
Estimate includes removal and replacement of the existing line poles and croossarms
Estimate includes survey work
Estimate assumes construction using 34.5 kV Hendrix standards.
Estimate includes fiber optic cable installation to Rimmon SS

Assumptions:
Engineering to be outsourced with in-house review, construction to be outsourced.
This estimate is based on actual prior costs, bid estimates and material costs from stock.
All new equipment will be installed within the confines of the existing fenced yard or ROW
No additional allowances have been added for aggressive outage recall times.
Estimate includes an average of 0% contingency on Construction direct costs which equates to 0% contingency of total cost.

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Date Prepared: August 9, 2019	**Project Title: Line 328 Reconstruction**
Company/Companies: Eversource, NH	**Project ID Number: A17C26**
Organization: Distribution	**Plant Class/(F.P. Type): Distribution**
Project Initiator: Russell Johnson	**Project Type: Specific**
Project Manager: Natacha Morales	**Capital Investment Part of Original Operating Plan? Yes**
Project Sponsor: James Eilenberger	**O&M Expenses Part of the Original Operating Plan? No**
Current Authorized Amount: $4,264K	**Estimated in service date(s): In service 7/31/2019**
Supplement Request: $473K	**Other:**
Total Request: $4,737K	

Supplement Justification

Background

The Full Funding PAF (see attached) for this project was approved in PowerPlan in October 9th, 2018 for $4,263,999.92. This supplemental request is for $473K which increases the total project cost to $4,737K. As of end of June 2019, the new line has been put in service. As of end of July, the decommissioning and restoration of the Right-of-Way (ROW) as well as abutter's properties are still ongoing. As of August 2019, the total spend is $4,224,209. The restoration of all properties will be complete by the end of September 2019.

The purpose of this project, as stated in the original PAF is to reconstruct 3.65 miles of the existing 328 line (34.5kV) in ROW between Rimmon Substation and the J9428 Recloser. This requires the removal of 3.65 miles of bare 266 ACSR conductor and reconstruction of the line with 477 Spacer Cable. This also includes installation of fiber optic cable from Rimmon Substation to J9428 Recloser. Since then, the original scope has changed and will be explained further in the Justification for Additional Resources section of this Supplement Request Form (SRF)

Justification for Additional Resources

Most of the increase is due to costs associated with engineering, project support vendors, and construction. There were increases associated with additional scope of work (tap, SCADA design), environmental monitoring and archeological services as well as unplanned lawn mitigations and stakeholders' requirements for temporary access agreements.

The following describes in detail the contributing factors for the $473K increase in total project cost.

1. **Construction & Removal: ($180K)**

The construction bid documentation included the additional scope of work which was competitively bid and awarded. The actual cost for the construction of this project was less than what was anticipated.

2. **Engineering and Survey: +$234K**

The cost increase in engineering is mainly due to additional scope of work for the project that was added after the original design proposal. The original scope of work for the engineering firm did not include the design of line taps and incorporation of automated switches design along the new line. The original scope of work stated that cutovers of taps and preparation of the line for automation would be completed by Eversource after the new line was completed. Due to outage coordination along the line this was not possible. There were several iterations of the design from both Eversource Operations and Engineering that required additional, unanticipated design revisions. The Bedford Area Work Center and Transmission's engineers had to work together to make sure that the design for taps and Scadamates would not affect or cause any disruption in the operations during construction and that the line could be worked with available equipment at the work centers after construction was complete. Finally, the originally engineering scope of work did not include designing the 328 line in STORMS work management system. Adding this to the scope of work added approximately $10k to the project cost. The total additional engineering cost was approximately $140K to the project. This includes internal engineering associated with additional design reviews, field meetings and construction support.

Another increase to the project was due to surveying and monumentation for engineering. The original scope of work included in the estimate included only construction layout using internal Eversource survey crews. Due to the complexity of the right-of way easements with various widths and locations an external survey firm was required to perform right-of-way research, stake the edges of the right of way, perform monumentation and complete the as-built survey. The survey firm also provided additional support for off right-of way access routes which were not included in the original scope. The additional survey scope added an additional cost of $94K.

3. **Material: +$91K**

To support the cutover of the line taps and prepare the line for distribution automation additional poles were purchased for the taps and all associated materials to relocate/install taps. These poles were not included in the original scope of work or estimated. Also, the spacer cable cost increased about 20% from the original estimate. The original project estimate was created approximately18 months prior to ordering the cable which was purchased under the new price value.

4. **PM/Project Support: $144K**

- Siting and construction services (outreach) $34K - Stakeholder negotiations were more extensive and time consuming than planned for. These negotiations included but were not limited to temporary access agreements and lawn mitigations.
- Landscaping and access gates (property mitigation) $59K - After consulting with several abutters for temporary access and lawn mitigations, the project team was required to fulfill agreements for gates, landscaping and stump grinding to mitigate the effects of the construction on different properties. This was not anticipated nor covered in original cost and scope of the project.
- Extra monitoring and archeological Phase 1B study (permitting and environmental) $51K– Archeological Phase 1A study determined that a Phase 1B study needed to be completed in a specific area of the 328 R.O.W. Also, the duration of construction was longer than the original proposal from the environmental vendor, adding more manhours to the project.

5. **Property Taxes: $47K**

These charges were not included in the previous estimate. The increase of $47K consists of actuals up to end of June.

6. **Indirects: $99K**

This increase is directly related to the increase of direct costs for construction, engineering vendor and materials.

7. **AFUDC: $38K**

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APS 1 - Project Authorization Policy

Supplement Request Form

Summary:

Discipline	Original Estimate $K	New Forecast/Actuals $K	Delta $K
Construction/Removal	$1,716	$1,536	($180)
Engineering	$143	$377	$234
Material	$776	$867	$91
PM/Project Support	$86	$230	$144
Property Taxes	$0	$47	$47
Subtotal Direct Costs	$2,721	$3,057	$336
Indirects	$1,501	$1,600	$99
AFUDC	$42	$80	$38
Total	**$4,264**	**$4,737**	**$473**

Supplement Cost Summary

Note: Dollar values are in thousands

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$2,720	$337	$3,057
Less Customer Contribution	-	-	-
Removals Net of Salvage ___%	-	-	-
Total Direct Spending	$2,720	$337	$3,057
Capital Additions - Indirect	$1,501	$99	$1,600
AFUDC	$43	$37	$80
Total Capital Request	$4,264	$473	$4,737
O&M	-	-	-
Total Request	$4,264	$473	$4,737

Total Supplement Request by year view:

Note: Dollar values are in thousands

	Year 2018	Year 2019	Total
Capital Additions Direct	$ -	$337	$337
Less Customer Contribution	$ -	$ -	$ -
Removals Net of Salvage ___%	$ -	$ -	$ -
Total Direct Spending	$ -	$337	$337
Capital Additions - Indirect	$ -	$99	$99
AFUDC	$ -	$37	$37
Subtotal Request	$ -	$473	$473
O&M	$ -	$ -	$ -
Total Request	$ -	$473	$473

Lessons Learned

- Project management and engineering – Cost increases are all linked to insufficient scope detail at the start of the project which impacts both scope and schedule. Minor design changes are inevitable as the project develops, but the more conceptual engineering that can be done prior to full funding approval, the fewer the cost increases or schedule overruns will occur. This also includes the Area Work Center and distribution engineering personnel.
- Materials – Cost of materials should be updated in the estimating tool frequently. This will yield better estimates as well as handling costs.

Supplement Request Form

Date Prepared: April 04, 2018	**Project Title: Line 328 Reconstruction**
Company/ies: Eversource, NH	**Project ID Number: A17C26**
Organization: Distribution	**Class(es) of Plant: Distribution**
Project Initiator: Russel Johnson	**Project Category: Substation / Distribution Lines**
Project Manager: Natacha Morales	**Project Type: Specific**
Project Sponsor: Jim Eilenberger	**Project Purpose: Update required to meet expected line loads**
Estimated in service date: December 31, 2019	**If Transmission Project: PTF? Non-PTF**
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan? No**
Total Request: $4,264,778	

Supplement Justification

Justification for Additional Resources

This request is for full funding for this project. Previously approved amount was for detailed engineering only. The original TAF, approved in May of 2017, is attached below.
This project is requesting full funding of $4,264,778 to reconstruct 3.65 miles of the existing 328 Line (34.5 kV) in ROW between Rimmon S/S and the J9428 Recloser. The work performed will consist of final engineering, permitting, survey, clearing, materials purchasing and construction required to remove 3.65 miles of bare 266 ACSR conductor and reconstruct the line with 477 Spacer Cable. This also includes installation of fiber cable from Rimmon SS to the J9428 Recloser. The fiber optic cable will primarily be ADSS cable except where OPGW is needed due to span lengths. The fiber is being installed at the request of Telecom Engineering. Another, separate, project will be requested to bring the fiber into Greggs SS on the J114 or O161 Lines. Preliminary engineering for this project was completed in 2017 NH Distribution Planning determined this project is needed to allow the retirement of the Greggs S/S transformer and oil circuit breaker without resulting in a negative impact to reliability. The Greggs S/S transformer condition is very poor and a transformer differential operation clears the 115kV bus until the high side switch is manually opened and the lockout relay is reset.

The project estimate is based on aggregated information from the 3271, 334/335, 61W2 and 3891 line projects which were all partial rebuild projects using spacer cable construction. It also has been updated to include structure counts based on the current engineering design.

A portion of the work was completed in 2017 under Work Order A17C2601 for $100,000. An additional $4,164,778 is needed to complete the work.

Engineering was the only activity performed in 2017. Final engineering, surveying, wetland and DHR review, materials procurement, construction services, wetlands oversight and final survey will be completed in 2018.

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	2018	2019	20__+	Totals
Capital Additions - Direct	$ 100	$ 1,094	$ 1,527	$ -	$ 2,721
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage 10%	-		-	-	-
Total - Direct Spending	$ 100	$ 1,094	$ 1,527	$ -	$ 2,721
Capital Additions - Indirect	-	600	901	-	1,501
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AFUDC	-	15	27	-	42
Total Capital Request	$ 100	$ 1,709	$ 2,455	$ -	$ 4,264
O&M	-	-	-	-	-
Total Request	$ 100	$ 1,709	$ 2,455	$ -	$ 4,264

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2018	Year 2019	Year 20__+	Total
Capital Additions - Direct	$ 1,094	$ 1,527	$ -	$ 2,621
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	-	-	-	-
Total Direct Spending	$ 1,094	$ 1,527	$ -	$ 2,621
Capital Additions - Indirect	600	901.00	-	1,501
AFUDC	15	25.00	-	40
Total Capital Request	$ 1,709	$ 2,455	$ -	$ 4,164
O&M	-	-	-	-
Total Request	**$ 1,709**	**$ 2,455**	**$ -**	**$ 4,164**

EVERSOURCE

APS 1 - Project Authorization Policy

Supplement Request Form

Technical Authorization Form

Date Prepared: May, 2017	Project Title: 328 Line Reconductor
Company/ies: Eversource, NH	Project ID Number: A17C26
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Robert Mission	Project Category: Substation / Distribution Lines
Project Owner/Manager: Russel Johnson	Project Type: *Specific*
Project Sponsor: Jim Eilenberger	Project Purpose: part of regulatory tracked program? No
Estimated in service date: June 30, 2019	If Transmission Project: *NA*
Authorization Type: *Detailed Engineering*	Authorization Amount: $100,000 for Engineering

Project Need Statement *(Description of Issue)*

This requested authorization is for engineering design and permitting to reconductor 3.65 miles of 266 ACSR with 477 Al Spacer Cable on the 328 Line. The line reconductoring is needed to allow the retirement of the Greggs S/S transformer and oil circuit breaker without resulting in a negative impact to reliability. The Greggs S/S transformer condition is very poor and a transformer differential operation clears the 115kV bus until the high side switch is manually opened and the lockout relay is reset.

Project description

- The electric system in the Goffstown / Weare area is served from three 115-34.5 kV substations
  - Weare substation – 1-44.5 MVA transformer, 9 years old, loaded to 34% nameplate, located in the western part of the area.
  - Greggs substation – 20 MVA transformer, 67 years old, loaded to 63% nameplate, located in the center of the area. This transformer is planned to be retired.
  - Rimmon substation – 2-44.8 MVA transformers, 2 years old, loaded 57% nameplate.
- The area is served by 2 circuits fed from Weare substation, 2 circuits fed from Greggs substation (only one breaker) and 1 circuit fed from Rimmon substation.
- The load carrying capability of the 328 line from Rimmon to J9428 is limited to 20 MW by 3.65 miles of 266 ACSR conductor

(see figure 1 in the one-line attachment section of this TAF for a one-line of the existing system)

Project Objectives

With the planned retirement of the Greggs transformer and associated substation equipment, the 328 circuit from Rimmon will be upgraded in order to be able to supply the area during a contingent loss of the Weare transformer or the 3271 Line from Weare S/S. (see figure 2 in the one-line attachment section of this TAF for a one-line of the proposed system)

Project Scope

- Reconductor 3.65 miles of the 328 line. Replace the existing 266 ACSR conductor with 477 AL Spacer Cable.
- Configure the distribution system to be fed from Weare and Rimmon substations.
- Retire the Greggs transformer and associated substation equipment.

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APS 1 - Project Authorization Policy

Supplement Request Form

Background / Justification

- The Greggs transformer was built in 1950. The unit has main tank and bushing oil leaks on which repairs have been attempted many times including gasket replacement, welding, and The Colt Group's patented injection method. There are also leaks in the LTC control cabinet and the oil temperature gauge no longer functions. In addition there is an oil leak on the transformer breaker and concrete foundations are deteriorated. The equipment is beyond its useful life and is planned to be retired.
- Greggs S/S has been on the ESCC top 10 list for many years. The transformer protection scheme clears the 115kV bus until the high side switch is opened and the lockout relay reset. No measures have been taken to address this condition since the substation is to be retired.
- The 328 line is built with 266 ACSR conductor. During a contingency, this line limits the ability to restore load. With the Greggs distribution S/S retired, there would be 13.6 MW isolated with the 328 line loaded to 116% of its normal rating and 100% of its LTE rating. This line will be replaced with 477 AL spacer cable. The original steel towers (circa 1930) were mostly replaced in the 1990's.

Business Process and / or Technical Improvements:

This project improves the reliability of the distribution system in the Goffstown/Weare area. Lack of line capability to serve the load during a contingent loss of the Weare transformer or the 3271 line will be eliminated.

Cost Estimate and Assumptions

Reconductor 328 line	$2,500,000
Retire Greggs substation	$100,000

Alternatives Considered with Cost Estimates

1)	Replace Greggs transformer and associated equipment	$10,100,000
2)	Add second transformer at Weare substation	$7,100,000

For discussion of the options and the decision matrix, refer to the Greggs Area Distribution System Study – May 2017 (see reference section of this TAF for the location of this report) The study finds that the best ultimate solution is to rebuild Greggs with a larger transformer and proper high and low side protection, however, the 328 line reconductoring is recommended at this time.

Project Schedule

Describe the project schedule and milestones. Include estimated start and end dates.

Milestone/Phase Name	Estimated Completion Date
Project Approval	06/01/17
Engineering	09/01/17
Rebuild the 328 line	06/30/19
In-Service date	06/30/19

Regulatory Approvals

Permitting as required for the reconstruction of the 328 line

Risks and Risk Mitigation Plans

Transformer failure at Weare during construction may require the use of a mobile substation.

References

For a detailed description of this project, refer to the 'Greggs Area Distribution System Study – May 2017'.
This study is located in: **N:\Temp60Day\NH Distribution\Greggs Area Distribution System Study**

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

[ONE-LINE DIAGRAM REDACTED]

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APS 1 - Project Authorization Policy

Supplement Request Form

Project Checklist – Transmission and Substation

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name : 328 Line Reconstruction				**PAF No:**	
Facility Type: ☐ BPS	☐ BES	☐ PTF	☐ non-PTF	☐ CIP	☒ Distribution
PLANNING					
Is a NX-9 required?				Yes	
Is an ISO-NE PAC presentation required?				No	
Is a PPA required?				No	
Is a TCA Application Required?				No	
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?				No	
OPERATIONS					
Outage Required?	☒ Primary Equipment (Power Transfer)	☐ Secondary Equipment (P&C only)	☐ Outage Not Required		
Do SCLL Conditions Exist?				No	
Has an outage schedule been approved?				No	
Are Operations & Maintenance procedures/training required?				No	
STANDARDS					
Does the project include standard equipment and designs?				Yes	
SUBSTATION ENGINEERING					
Does this impact Revenue Metering				No	
Is preliminary short circuit/ breaker duty analysis required?				No	
Are there any changes to the baseline audible noise?				No	
Is there an impact to the existing ground grid?				No	
Is a Transient Over Voltage (TOV) analysis required?				No	
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?				No	
If BPS, is an NPCC Directory #4 presentation required?				No	

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APS 1 - Project Authorization Policy

Supplement Request Form

Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : 328 Line Reconstruction	**PAF No:**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
Is there an impact to the existing ground grid?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
Siting & Construction Services (Outreach)	
What is the level of outreach expected?	Medium
INITIATOR	
Has a field constructability review been completed?	Yes

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APS 1 - Project Authorization Policy

Supplement Request Form

Cost Estimate Backup Details

See attached estimate P-18-268 Line 328 Reconstruct for direct costs only.

ESTIMATE SUMMARY
PSNH

Project Title: Line 328 Reconstruction
Project Mgr/Lead: Natacha Morales
Project Number: A18S14
TAF # NA

Estimate By: MPD
Date of Estimate: 05/14/18
ISD: 12/01/18
Estimate # P 18-268

ESTIMATE SUMMARY

ESTIMATE TYPE: Conceptual

	TOTAL	Prior	2018	2019	2020	2021	2022 and FUTURE
CONSTRUCTION	$1,591,332	$0	$1,591,332	$0	$0	$0	$0
ENGINEERING/DESIGN	$143,545	$0	$143,545	$0	$0	$0	$0
LAND	$0	$0	$0	$0	$0	$0	$0
MATERIAL	$775,569	$0	$775,569	$0	$0	$0	$0
PROJECT MGR & SUPPORT	$86,047	$0	$86,047	$0	$0	$0	$0
REMOVAL	$124,500	$0	$124,500	$0	$0	$0	$0
TEST	$0	$0	$0	$0	$0	$0	$0
CONTINGENCY	$0	$0	$0	$0	$0	$0	$0
ESCALATION	$0	$0	$0	$0	$0	$0	$0
INDIRECTS	$1,501,018	$0	$1,501,018	$0	$0	$0	$0
AFUDC	$42,767	$0	$42,767	$0	$0	$0	$0
Total Cost	**$4,264,778**	**$0**	**$4,264,778**	**$0**	**$0**	**$0**	**$0**
	-25%	**50%**					
Conceptual Range	**$3,198,584**	########					

COMMENTS:

Project Scope:

Reconstruct 3 65 Miles of existing Distribution Line 328 in existing ROW.

Estimate includes all triming matting and permittting.
Estimate includes removal and replacement of the existing line poles and croossarms
Estimate includes survey work
Estimate assumes construction using 34 5 kV Hendrix standards.
Estimate includes fiber optic cable installation to Rimmon SS

Assumptions:
Engineering to be outsourced with in-house review, construction to be outsourced.
This estimate is based on actual prior costs, bid estimates and material costs from stock.
All new equipment will be installed within the confines of the existing fenced yard or ROW
No additional allowances have been added for aggressive outage recall times.
Estimate includes an average of 0% contingency on Construction direct costs which equates to 0% contingency of total cost.

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--026 **Page 1 of 1**

Request from: Department of Energy

Witness: Plante, David L

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Rochester 4kV Conversion No. A17E09

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-26 for the PAF for this project.

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Project Authorization Form

Operations Project Authorization Form

Date Prepared: 2/28/2018	**Project Title: Rochester 4kV Conversion**
Company/ies: Eversource NH	**Project ID Number: A17E09**
Organization: NH Operations	**Class(es) of Plant: Distribution**
Project Initiator: Robert Mission	**Project Category: Reliability - Distribution Lines**
Project Manager: Russel Johnson	**Project Type: Specific**
Project Sponsor: James Eilenberger	**Project Purpose: Improve Reliability, Eliminate 4 kV S/S**
Estimated in service date: 6/1/2021	**If Transmission Project: PTF? n/a**
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan? Yes**
Total Request: $5,236,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This request is for full funding in the amount of $5,236,000 for the project described. This project was approved for $100,000 for Engineering on 3/9/17 by the NH Technical Review Committee.

This project will improve the reliability of the distribution system in the city of Rochester by converting three 4 kV circuits to 12.47 kV, establishing new circuit ties between four 12.47 kV circuits in Rochester and allow for the use of distribution automation.

This project includes the conversion of the distribution system in downtown Rochester from 4.16 kV to 12.47 kV. The 34.5-4.16 transformer at Portland Street substation that feeds a portion of the downtown distribution system failed recently. This transformer was replaced with a 4.16/12.47 kV dual voltage transformer. When the conversion takes place, this transformer will be switched to 12.47 kV to feed a portion of the downtown 12.47 kV system.

The 34.5-4/16 kV substation at Twombley Street substation will be replaced with a new 34.5-12.47 kV substation to feed the remaining downtown distribution system. The Twombley Street substation replacement is estimated for $2,000,000 and will be done with a separate substation project authorization. The remaining 4.16 kV distribution system will then be converted to 12.47 kV.

After the downtown is converted to 12.47 kV, the 34.5-4.16 kV substation at Signal Street will be retired.

When completed, there will be two circuits from Twombley Street and two circuits from Portland Street these circuits will be tied together with normally open automated devices (see one-line in the attachment section).

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Project Authorization Form

Project Costs Summary

	Prior Authorized	2018	2019	2020+	Totals
Capital Additions - Direct	$ 100	$ 1,409	$ 640	$ 1,842	$ 3,991
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage %	-	16	75		91
Total - Direct Spending	$ 100	$ 1,425	$ 715	$ 1,842	$ 4,082
Capital Additions - Indirect	-	554	153	441	1,148
Subtotal Request	$ 100	$ 1,979	$ 868	$ 2,283	$ 5,230
AFUDC	-	4	-	-	4
Total Capital Request	$ 100	$ 1,983	$ 868	$ 2,283	$ 5,234
O&M	-	2	-	-	2
Total Request	$ 100	$ 1,985	$ 868	$ 2,283	$ 5,236

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	2018	2019	2020+	Total
Straight Time Labor	41	12	5	58
Overtime Labor	1			1
Outside Services	1,024	528	1,333	2,885
Materials	207	88	252	547
Other, including contingency amounts (describe)	152	87	252	501
Total	1,425	715	1,842	3,982

Indirect Capital Costs	2018	2019	2020+	Total
Indirects/Overheads (including benefits)	554	153	441	1,148
Capitalized interest or AFUDC, if any	4	0	0	4
Total	558	153	441	1,152

Total Capital Costs	**1,983**	**868**	**2,283**	**5,134**
Less Total Customer Contribution				
Total Capital Project Costs	**1,983**	**868**	**2,283**	**5,134**
Total O&M Project Costs	2	0	0	2

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Project Authorization Form

Note: Explain unique payment provisions, if applicable

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:

n/a

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? If yes, please provide details: No.

Are there other environmental cleanup costs associated with this project? If yes, please provide details: No.

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Project Authorization Form

Technical Justification:

Project Need Statement

The 4.16 kV distribution system (circuit 28H1), which serves the downtown Rochester, is fed by the Signal Street, Twombley Street and Portland Street substations.

The Signal Street substation transformer is over 62 years old and the sister units to this transformer (Community Street and Franklin) have failed in recent years. There are 2 circuits being fed from this substation, 28H1 and 28H2. Because the circuit is heavily loaded, fuse coordination on the 28H1 circuit is lost and the only circuit protection is back to the substation breaker. This results in an outage to the entire circuit for a fault near the end of the circuit.

The Twombley Street transformer is loaded to over 91% of its nameplate rating. A new 12.47 kV transformer at Twombley Street coupled with a change to 12.47 kV at Portland Street S/S will also help to off load the other Portland Street 12.47 kV transformer which is loaded to over 97% of its nameplate rating.

Project Objectives

This project will upgrade the distribution system in the city of Rochester including the following:

- Create a 12.47 kV interconnected system between Portland St and Twombly St substations.
- Increase switching flexibility between two, 12.47 kV substations (Portland St and Twombley Street).
- This increased switching flexibility and substation capacity will allow for the increased use of distribution automation to increase reliability
- Improve the protection margins of the distribution system to improve system reliability.
- Allow for the retirement of the 62-year-old Signal Street substation.
- Provide additional 12kV transformer capacity at Portland Street to support heavily loaded 34W3 transformer.

Project Scope

2018 work scope:

- Reconductor the 34H1 with spacer cable from Portland Street substation down Portland Street to School Street then south on Winter Street to Route 125 (Columbus Ave.) and convert the 4.16 kV to 12.47 kV.
- Reconductor south along route 125 to Brock Street and convert Brock Street to Washington Street

2019 work scope (complete prior to 6/1 to allow Twombley Street substation to be taken out-of-service):

- Convert Washington Street to Twombley Street substation
- Install 3-500 kVA steps on the 340 line and feed 43H1 in the No. Main Street area
- Take Twombley Street substation out of service for construction of a new 12.47 kV substation. (this will be done under a separate substation project authorization)

2020 work scope (to begin after the new Twombley substation goes into service, 6/1)

- Convert 43H1 and remove steps
- Convert 28H1

2021 work scope:

- Convert 28H2
- Convert 34H2

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Project Authorization Form

Background / Justification
The electrical system in downtown Rochester consists of three 4.16 kV substations:

- Twombley Street (43H) – 2,800 kVA, 55 years, loaded to 91% nameplate, located on the west side of the downtown
- Signal Street (28H) – 3,750 kVA, 62 years, loaded to 61% nameplate, located in the center of the downtown
- Portland Street (34H) – 6,250 kVA, 7 years, located on the east side of the downtown (this transformer recently failed and was replaced with a dual voltage 4.16/12.47 kV unit and is planned for future use at 12.47 kV).

There are 5, 4.16 kV circuits (43H1, 28H1, 28H2, 34H1 and 34H2) in downtown Rochester. There are 2 additional 12.47 kV circuits from Portland Street (34W3 and 34W4). (See the following diagram.)

[ONE-LINE DIAGRAM REDACTED]

The proposed project eliminates Signal Street S/S, replaces Twombley St S/S with a 12.47 kV 12.5 MVA substation, and converts the line voltage in the area from 4kV to 12.47 kV. An interconnected 12.47 kV system will increase reliability by creating new circuit ties between Portland Street and a new 12.47 kV Twombley Street substations and allow for the use of distribution automation. (see attached one-line diagram)

Business Process and / or Technical Improvements:
This project will improve the reliability of the distribution system in the city of Rochester. The imminent failure of a 62-year-old transformer with sister units that have already failed will be eliminated. The reliability of the underlying distribution system will be improved by converting the system to a 12.47 kV voltage which will improve the protection margins and provide the ability to utilize distribution automation to effectively minimize the customer impact of unexpected outages.

Alternatives Considered with Cost Estimates
Alternatives Considered:

1) Build a 4.16 kV Substation at Twombley Street and Signal Street $7,950,000
2) Retire Twombley and Signal Street, Convert downtown to 34.5 kV $8,419,500

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Project Authorization Form

For a discussion of the options and the decision matrix, refer to the Rochester 4.16 kV Distribution System Study – January 2017.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Phase 1 – Reconductor and convert Portland Street 34H1 to 12.47 kV Reconductor and convert a portion of the 43H1 to 12.47 kV	12/01/18
Phase 2 – Convert another portion of the 43H1 to 12.47 kV. Install steps to off load the Twombley Street substation	6/1/19
Phase 3 – Convert the remaining 43H1 to 12.47 kV. Convert the 28H1 to 12.47 kV	12/1/20
Phase 4 – Convert the remaining 4.16 kV circuits (28H2 & 34H2) to 12.47 kV and retire Signal Street substation	12/1/21

Regulatory Approvals

Permitting as required by the City of Rochester and the State of New Hampshire

Risks and Risk Mitigation Plans

Substation transformer failure before or during construction may require the use of a mobile substation.

References

For a detailed description of this project, refer to the 'Rochester 4.16 kV Distribution System Study – January 2017'.

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

Proposed ultimate one-line of the Rochester interconnected 12.47 kV system between Portland Street and the new Twombley Street substations.

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Project Authorization Form

[ONE-LINE DIAGRAM REDACTED]

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Supplement Request Form

Date Prepared: 11/01/2021	**Project Title: Rochester 4 kV Conversion Project**
Company: Eversource NH	**Project Number: A17E09**
Organization: Electric System Operations	**Class(es) of Plant:** D Line
Project Initiator: Robert Mission	**Project Category:** Lines - Rebuild
Project Manager: Tim Kelley/ Dena Champy	**Project Type:** Specific
Project Sponsor: Russel Johnson	**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: $5,236,000	**Estimated in service date:12/31/2021**
Supplement Request: $4,057,237	**ISO-NE Approvals Required** (check all that apply)**:** ☐ PAC ☐ TCA
Total Request: $ 9,293,237	

Background

This request is for supplemental funding in the amount of $4,057k to complete the Rochester 4 kV upgrade project, increasing the total authorized amount to $9,293k. Full funding for this project in the amount of $5,236k was authorized by NHPAC on May 10, 2018 and approved in PowerPlan on July 2, 2018. The project has expended $5,989k through September 2021 and the project is currently in construction to complete in December 2021. In anticipation of exceeding 10% threshold for direct costs, this supplemental is being requested.

This project is being completed to improve the reliability of the distribution system in the City of Rochester by converting three 4 kV circuits to 12.47 kV, establishing new circuit ties between four 12.47 kV circuits in Rochester and allowing for the use of distribution automation.

This project includes the conversion of the distribution system in downtown Rochester from 4.16 kV to 12.47 kV. The 34.5-4.16 kV transformer at Portland Street substation was replaced with a 4.16/12.47 kV dual voltage transformer under a different project. When the conversion takes place, this transformer will be switched to 12.47 kV to feed a portion of the downtown 12.47 kV system.

The 34.5-4.16 kV substation at Twombly Street substation has been replaced with a new 34.5-12.47 kV substation to feed the remaining downtown distribution system. The Twombly Street substation replacement was completed under a separate substation project authorization. The remaining 4.16 kV distribution system has been converted to 12.47 kV.

After completion of the downtown conversion to 12.47 kV, the 34.5-4.16 kV substation at Signal Street will be retired.

Once completed, there will be two circuits from Twombly Street and two circuits from Portland Street; these circuits will be tied together with normally open automated devices.
This project was sequenced over a period of several years and is scheduled for completion in 2021.

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Supplement Justification Overview

Here are the main drivers for the increased project cost.

- Aged Estimate - The original estimate for the Rochester 4 kv Conversion project was created in 2017 based on an engineering study completed that same year. The estimate was based on a series of known conditions, planned scope and resourcing plan relevant at that point in time. Given this was a multi-year project, it would have been difficult to predict future changes to conditions and/or scope that would ultimately impact the overall project cost.
- Additional Project Scope - The project scope has changed in the following ways since original funding was approved.
    - Eversource taking over the full cost of maintenance and installation of new poles.
        - In 2019 Eversource NH made the decision to complete pole sets that formerly would have been the responsibility of Consolidated Communications under the Joint Ownership Agreement. This resulted in Eversource assuming the full cost of maintenance and installation of poles. vs. paying a portion of the cost under the original Joint Ownership agreement.
    - Expanded Underground scope in downtown Rochester:
        - The original Scope of Work required for the underground conversion of the downtown area included the replacement of a live front transformer and existing underground infrastructure. In 2021, Eversource approached the City of Rochester with the underground design. This original plan was rejected by the City primarily due to conflicts with the City's plan to improve the area and interference with the existing underground utilities. After several iterations with the city engineer, Eversource and the City agreed on new design which significantly expanded the scope of the underground work. The new underground design required additional overhead poles and wire, manholes, ducts banks and underground conductors.
    - Increased materials required to complete the expanded Scope of Work
        - The increased cost of materials from the original estimate is largely a result of the expanded work scope.
- Revised Construction Resource Mix - The 2020 and 2021 scope of work is being executed by a different resource mix than originally planned.
    - Due to issues related to COVID 19 in 2020, the Eversource apprentice program was suspended and the number of Eversource crews, both local and crews from other NH AWCs, could no longer provide the necessary resources to complete the planned 2020 scope. As a mitigation strategy, external resources were contracted during the 4th quarter to complete the overhead work to meet both schedule and financial objectives for the year.
    - In 2021, a similar resourcing strategy became necessary given the increased scope of the underground work required complete this project in 2021. A decision was made to utilize local crews and crews from other NH AWCs to execute the remaining overhead work and the underground work would be executed by an external contractor. These deviations in resourcing resulted in increased costs to complete the planned scope.

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The project was previously planned for a contractor but then changed to internal labor so the project could use the apprentices, etc. and this resulted in a cost increase up to $7.2M but did not require a Supplemental Request Form because direct costs did not exceed the 10% variance. The Supplemental is now required due to the increase in direct costs which is associated with bringing in contractors to complete the expanded scope.

- Increased Indirect costs –Indirect costs are the single largest contributor to the estimated project cost and are responsible for approximately 81% of the change to the overall project cost. The increased indirect costs are the result of the resource mix change identified in Section 3:

Supplement Justification Detail

The project supplement authorization of $4,057,237 is summarized by line item category detail.

1. **Engineering / Design: $16,912**
   Additional engineering and design work became necessary primarily due to the requirement to convert the underground facilities and avoid existing utilities. There were also associated modifications to the original overhead work scope that contributed to the increased engineering and design spend.
2. **Materials (by Eversource): $102,219**
   The increase in material costs is primarily driven by the following contributing factors:
   - Additional materials were required to execute the conversion with the unforeseen underground obstructions and coordination with the City's downtown area improvement plan.
   - Eversource assumed responsibility for pole replacements in the Consolidated Communications pole maintenance area.
3. **Construction: $1,024,523**
   This is the single largest increase to direct costs and is based on the following:
   - Increased Underground Scope - Originally, the underground scope was to replace a single live front transformer and associated underground cabling in a downtown parking lot as required to convert the circuit. This work was estimated to cost approximately $400k. Since that time, the scope of the underground work changed significantly based on the need to avoid interferences with other underground utilities and to accommodate the city's current downtown improvement plan. This is a significant increase from the original estimate.
   - Eversource construction costs were higher due to taking responsibility for the pole installation in the Consolidated maintenance area. A second contributing factor was the use of AWC crews to execute the overhead work. These conditions were not included in the original estimate.
4. **Testing / Commissioning: $1,403 –** This increase was based on additional work to support the line side of the testing and commissioning of the Twombly substation when the new Twombly substation was commissioned.
5. **Project Management Team: $31,023**
   This project has seen a substantial increase in project management costs due to the necessity to engage management from several different groups within the NH Operations group, to assist with the coordination of both internal and external resources, and to respond to evolving working conditions in response to the various scope changes. This became especially challenging in 2020 during the pandemic when external resources were needed to complete the planned scope.

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6. **Other: ($468,389) –** This value was originally forecasted for costs that were not previously captured in other cost centers. With the project nearing completion, this value was removed from the forecast.
7. **Indirects/Overhead: $3,288,378**
   - The 2020 and 2021 scope of work is being executed by a different resource mix than originally planned. Refer to Revised Construction Resource Mix section above for details.
   - The original project estimate projected total indirect costs of $1,148k. This estimate was based on the overhead rates at the time. The indirect rates have increased substantially since the original estimate was completed in 2018.
8. **AFUDC: $47,512 –** AFUDC charges have accrued beyond what was originally forecasted. Again, AFUDC charges were $4k in the original estimate. This increase is based on current AFUDC charges.
9. **Reimbursables/Customer Contribution: $13,656 –** This cost increase was based on Eversource taking over 2018 Joint Line billing payments made by ES.

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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	$	$	$
3. Outreach	$	$	$
4. Siting Approvals / Permits	$	$	$
5. Engineering / Design	$	$16,912	$16,912
6. Materials (Eversource purchased)	$547,000	$649,219	$102,219
7. Construction (incl matl's by contractors)	$3,036,000	$4,060,523	$1,024,523
8. Testing / Commissioning	$	$1,403	$1,403
9. Project Mgmt Team	$	$31,023	$31,023
10. Removals	$	$	$
11. Other	$501,000	$32,611	($468,389)
12. Risks	$	$	$
SUBTOTAL DIRECTS W/ RISKS	**$4,084,000**	**$4,791,691**	**$707,691**
13. Indirects/Overhead	$1,148,000	$4,436,378	$3,288,378
14. AFUDC	$4,000	$51,512	$47,512
PROJECT TOTAL – BASELINE BUDGET	**$5,236,000**	**$9,279,581**	**$4,043,581**
15. Contingency	$	$	$
TOTAL CAPITAL REQUEST	**$5,236,000**	**$9,279,581**	**$4,043,581**
16. Reimbursables/Customer Contribution JO Billing payments by ES in 2018	$	($13,656)	($13,656)
PROJECT TOTAL (LESS REIMBURSABLES)	**$5,236,000**	**$9,293,237**	**$4,057,237**

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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	$	$	$	$
2. Environmental Approvals / Permits	$	$	$	$
3. Outreach	$	$	$	$
4. Siting Approvals / Permits	$	$	$	$
5. Engineering / Design	$16,912	$	$	$16,912
6. Materials (Eversource purchased)	$102,219	$	$	$102,219
7. Construction (incl matl's by contractors)	$1,024,523	$	$	$1,024,523
8. Testing / Commissioning	$1,403	$	$	$1,403
9. Project Mgmt Team	$31,023	$	$	$31,023
10. Removals	$	$	$	$
11. Other	($468,389)	$	$	($468,389)
12. Risks	$	$	$	$
SUBTOTAL DIRECTS W/ RISKS	**$707,691**	**$**	**$**	**$707,691**
13. Indirects/Overhead	$3,288,378	$	$	$3,288,378
14. AFUDC	$47,512	$	$	$47,512
PROJECT TOTAL – BASELINE BUDGET	**$4,043,581**	**$**	**$**	**$4,043,581**
15. Contingency	$	$	$	$
TOTAL CAPITAL REQUEST	**$4,043,581**	**$**	**$**	**$4,043,581**
16. Reimbursables/Customer Contribution	($13,656)	$	$	($13,656)
PROJECT TOTAL (LESS REIMBURSABLES)	**$4,057,237**	**$**	**$**	**$4,057,237**

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Lessons Learned

- **Resource planning** – During 2020 at the onset of the COVID-19 pandemic, the project team assumed that local crew resources could continue to execute the conversion work on schedule. However, in hindsight, given the impact of the pandemic, the reality was, the work could not be completed with the same efficiency as possible in non-pandemic conditions. This was due to multiple factors including loss of personnel including other NH AWC crew resources and local crews who were diverted to other local priorities. The effects of these resource challenges resulted in the need to bring in external resources to complete planned scope and paying a premium to complete the work.

- **Scope Changes** – The expanded underground work packages during the summer of 2021 were the primary driver for requiring supplemental funding. This significant change in forecast should have prompted discussions regarding the potential need for additional funds. The lesson learned is once these cost triggers are first identified, they need to be vetted into the project forecast as soon as possible.

- **Multi-Year Project** – Create an annual PAF to ensure that detailed designs and the latest recognition of scope can be incorporated into the estimate. An overall estimated project cost will still be included in the text of the PAF.

A copy of the prior authorization document is attached below.

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Operations Project Authorization Form

Date Prepared: 2/28/2018	**Project Title: Rochester 4kV Conversion**
Company/ies: Eversource NH	**Project ID Number: A17E09**
Organization: NH Operations	**Class(es) of Plant: Distribution**
Project Initiator: Robert Mission	**Project Category: Reliability - Distribution Lines**
Project Manager: Russel Johnson	**Project Type: Specific**
Project Sponsor: James Eilenberger	**Project Purpose: Improve Reliability, Eliminate 4 kV S/S**
Estimated in service date: 6/1/2021	**If Transmission Project: PTF? n/a**
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan? Yes**
Total Request: $5,236,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This request is for full funding in the amount of $5,236,000 for the project described. This project was approved for $100,000 for Engineering on 3/9/17 by the NH Technical Review Committee.

This project will improve the reliability of the distribution system in the city of Rochester by converting three 4 kV circuits to 12.47 kV, establishing new circuit ties between four 12.47 kV circuits in Rochester and allow for the use of distribution automation.

This project includes the conversion of the distribution system in downtown Rochester from 4.16 kV to 12.47 kV. The 34.5-4.16 transformer at Portland Street substation that feeds a portion of the downtown distribution system failed recently. This transformer was replaced with a 4.16/12.47 kV dual voltage transformer. When the conversion takes place, this transformer will be switched to 12.47 kV to feed a portion of the downtown 12.47 kV system.

The 34.5-4/16 kV substation at Twombley Street substation will be replaced with a new 34.5-12.47 kV substation to feed the remaining downtown distribution system. The Twombley Street substation replacement is estimated for $2,000,000 and will be done with a separate substation project authorization. The remaining 4.16 kV distribution system will then be converted to 12.47 kV.

After the downtown is converted to 12.47 kV, the 34.5-4.16 kV substation at Signal Street will be retired.

When completed, there will be two circuits from Twombley Street and two circuits from Portland Street these circuits will be tied together with normally open automated devices (see one-line in the attachment section).

Project Costs Summary

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	Prior Authorized	2018	2019	2020+	Totals
Capital Additions - Direct	$ 100	$ 1,409	$ 640	$ 1,842	$ 3,991
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage %	-	16	75		91
Total - Direct Spending	$ 100	$ 1,425	$ 715	$ 1,842	$ 4,082
Capital Additions - Indirect	-	554	153	441	1,148
Subtotal Request	$ 100	$ 1,979	$ 868	$ 2,283	$ 5,230
AFUDC	-	4	-	-	4
Total Capital Request	$ 100	$ 1,983	$ 868	$ 2,283	$ 5,234
O&M	-	2	-	-	2
Total Request	$ 100	$ 1,985	$ 868	$ 2,283	$ 5,236

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	2018	2019	2020+	Total
Straight Time Labor	41	12	5	58
Overtime Labor	1			1
Outside Services	1,024	528	1,333	2,885
Materials	207	88	252	547
Other, including contingency amounts (describe)	152	87	252	501
Total	1,425	715	1,842	3,982

Indirect Capital Costs	2018	2019	2020+	Total
Indirects/Overheads (including benefits)	554	153	441	1,148
Capitalized interest or AFUDC, if any	4	0	0	4
Total	558	153	441	1,152

Total Capital Costs	**1,983**	**868**	**2,283**	**5,134**
Less Total Customer Contribution				
Total Capital Project Costs	**1,983**	**868**	**2,283**	**5,134**
Total O&M Project Costs	2	0	0	2

Note: Explain unique payment provisions, if applicable

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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:

n/a

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? If yes, please provide details: No.

Are there other environmental cleanup costs associated with this project? If yes, please provide details: No.

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Technical Justification:

Project Need Statement

The 4.16 kV distribution system (circuit 28H1), which serves the downtown Rochester, is fed by the Signal Street, Twombley Street and Portland Street substations.

The Signal Street substation transformer is over 62 years old and the sister units to this transformer (Community Street and Franklin) have failed in recent years. There are 2 circuits being fed from this substation, 28H1 and 28H2. Because the circuit is heavily loaded, fuse coordination on the 28H1 circuit is lost and the only circuit protection is back to the substation breaker. This results in an outage to the entire circuit for a fault near the end of the circuit.

The Twombley Street transformer is loaded to over 91% of its nameplate rating. A new 12.47 kV transformer at Twombley Street coupled with a change to 12.47 kV at Portland Street S/S will also help to off load the other Portland Street 12.47 kV transformer which is loaded to over 97% of its nameplate rating.

Project Objectives

This project will upgrade the distribution system in the city of Rochester including the following:

- Create a 12.47 kV interconnected system between Portland St and Twombly St substations.
- Increase switching flexibility between two, 12.47 kV substations (Portland St and Twombley Street).
- This increased switching flexibility and substation capacity will allow for the increased use of distribution automation to increase reliability
- Improve the protection margins of the distribution system to improve system reliability.
- Allow for the retirement of the 62-year-old Signal Street substation.
- Provide additional 12kV transformer capacity at Portland Street to support heavily loaded 34W3 transformer.

Project Scope

2018 work scope:

- Reconductor the 34H1 with spacer cable from Portland Street substation down Portland Street to School Street then south on Winter Street to Route 125 (Columbus Ave.) and convert the 4.16 kV to 12.47 kV.
- Reconductor south along route 125 to Brock Street and convert Brock Street to Washington Street

2019 work scope (complete prior to 6/1 to allow Twombley Street substation to be taken out-of-service):

- Convert Washington Street to Twombley Street substation
- Install 3-500 kVA steps on the 340 line and feed 43H1 in the No. Main Street area
- Take Twombley Street substation out of service for construction of a new 12.47 kV substation. (this will be done under a separate substation project authorization)

2020 work scope (to begin after the new Twombley substation goes into service, 6/1)

- Convert 43H1 and remove steps
- Convert 28H1

2021 work scope:

- Convert 28H2
- Convert 34H2

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Background / Justification

The electrical system in downtown Rochester consists of three 4.16 kV substations:

- Twombley Street (43H) – 2,800 kVA, 55 years, loaded to 91% nameplate, located on the west side of the downtown
- Signal Street (28H) – 3,750 kVA, 62 years, loaded to 61% nameplate, located in the center of the downtown
- Portland Street (34H) – 6,250 kVA, 7 years, located on the east side of the downtown (this transformer recently failed and was replaced with a dual voltage 4.16/12.47 kV unit and is planned for future use at 12.47 kV).

There are 5, 4.16 kV circuits (43H1, 28H1, 28H2, 34H1 and 34H2) in downtown Rochester. There are 2 additional 12.47 kV circuits from Portland Street (34W3 and 34W4). (See the following diagram.)

[ONE-LINE DIAGRAM REDACTED]

The proposed project eliminates Signal Street S/S, replaces Twombley St S/S with a 12.47 kV 12.5 MVA substation, and converts the line voltage in the area from 4kV to 12.47 kV. An interconnected 12.47 kV system will increase reliability by creating new circuit ties between Portland Street and a new 12.47 kV Twombley Street substations and allow for the use of distribution automation. (see attached one-line diagram)

Business Process and / or Technical Improvements:

This project will improve the reliability of the distribution system in the city of Rochester. The imminent failure of a 62-year-old transformer with sister units that have already failed will be eliminated. The reliability of the underlying distribution system will be improved by converting the system to a 12.47 kV voltage which will improve the protection margins and provide the ability to utilize distribution automation to effectively minimize the customer impact of unexpected outages.

Alternatives Considered with Cost Estimates

Alternatives Considered:

1) Build a 4.16 kV Substation at Twombley Street and Signal Street $7,950,000
2) Retire Twombley and Signal Street, Convert downtown to 34.5 kV $8,419,500

For a discussion of the options and the decision matrix, refer to the Rochester 4.16 kV Distribution System Study – January 2017.

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Project Schedule

Milestone/Phase Name	Estimated Completion Date
Phase 1 – Reconductor and convert Portland Street 34H1 to 12.47 kV Reconductor and convert a portion of the 43H1 to 12.47 kV	12/01/18
Phase 2 – Convert another portion of the 43H1 to 12.47 kV. Install steps to off load the Twombley Street substation	6/1/19
Phase 3 – Convert the remaining 43H1 to 12.47 kV. Convert the 28H1 to 12.47 kV	12/1/20
Phase 4 – Convert the remaining 4.16 kV circuits (28H2 & 34H2) to 12.47 kV and retire Signal Street substation	12/1/21

Regulatory Approvals
Permitting as required by the City of Rochester and the State of New Hampshire

Risks and Risk Mitigation Plans
Substation transformer failure before or during construction may require the use of a mobile substation.

References

For a detailed description of this project, refer to the 'Rochester 4.16 kV Distribution System Study – January 2017'.

Attachments (One-Line Diagrams, Images, etc.)
Proposed ultimate one-line of the Rochester interconnected 12.47 kV system between Portland Street and the new Twombley Street substations.

[ONE-LINE DIAGRAM REDACTED]

EVERSOURCE

Project Authorization Policy
Operations Project Authorization

Technical Authorization Form

#NH-170015-DS

Date Prepared: January 11, 2017	Project Title: Rochester 4 kV Distribution System Upgrade
Company/ies: Eversource, NH	Project ID Number: A17E05/A17E09
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Robert Mission	Project Category: Substation / Distribution Lines
Project Owner/Manager: Russel Johnson	Project Type: *Specific*
Project Sponsor: Jim Eilenberger	Project Purpose: part of regulatory tracked program? No
Estimated in service date: November 1, 2019	If Transmission Project: *NA*
Authorization Type: *Conceptual Engineering*	Authorization Amount: $400,000 for Engineering

Project Need Statement *(Description of Issue)*

This requested authorization is for $100,000 for writing the line conversion construction, and $300,000 for surveying the substation property and substation engineering.

The Signal St. transformer sister units (Community Street and Franklin) have recently failed. The 4.16 kV circuit (28H1) out of Signal Street is overloaded during summer peak load conditions. Because of heavy loading at the end of the 28H1 circuit, fuse coordination is lost and the only circuit protection is back to the substation breaker. This will cause an outage to the entire circuit for a fault near the end of the circuit. The Twombley Street transformer was been loaded to 91% during the summer of 2014 and up to 135% at other times of the year during underground failures of the 28H1. The Portland Street 34W3 transformer loading reached 97% in the summer of 2016.

Project Description

- The electrical system in downtown Rochester consists of three 4.16 kV substations:
  - Twombley St. (43H) – 2,800 kVA, 55 years, loaded to 91% nameplate, located on the west side of the downtown
  - Signal St. (28H) – 3,750 kVA, 62 years, loaded to 61% nameplate, located in the center of the downtown
  - Portland St. (34H) – 6,250 kVA, 7 years, located on the east side of the downtown (this transformer recently failed and was replaced with a dual voltage 4.16/12.47 kV unit for future use at 12.47 kV).
- There are 5, 4.16 kV circuits (43H1, 28H1, 28H2, 34H1 and 34H2) in downtown Rochester.
- There are 2 additional 12.47 kV circuits from Portland St. (34W3 and 34W4). (see Figure 1).

The proposed project eliminates Signal Street S/S, replaces Twombley St S/S with a 12.47 kV 12.5 MVA substation, and converts the line voltage in the area from 4kV to 12.47 kV.

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Project Authorization Policy
Operations Project Authorization

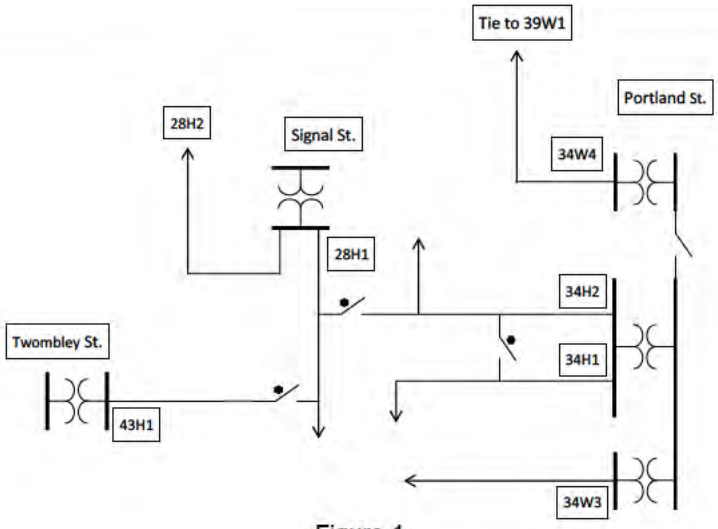

Figure 1

Project Objectives

This project will upgrade the distribution system in the city of Rochester including the following:

- Retire a 62 year old Signal St. substation transformer
- Create a 12.47 kV interconnected system between Portland St and Twombly St substations.
- Increase switching flexibility between two, 12.47 kV substations (Portland St and Twombley St.).
- This increased switching flexibility and substation capacity will allow for the increased use of distribution automation to increase reliability
- Improve the protection margins of the distribution system to improve system reliability.

Project Scope

Phase 1 – Convert the 34H1from 4.16 kV to 12.47 kV

- Install new spacer cable from Portland St. substation down Portland St. to School St. then south on Winter St.to Columbus Ave.
- Step and convert 34H1 4.16 kV load as needed
- Change the transformer voltage on (TB341) at Portland St from 4.16 kV to 12.47 kV

Phase 2 – Build a new 12.47 kV line from 34W3 to 43H1

- Extend 3-phase, 34W3 up Brock St. to 43H1 (0.5 mi)

Phase 3 – Convert 43H1

- Convert 43H1 from 4.16 kV to 12.47 kV along Brock St., Washington St., Roy St. and Walnut St. to Twombley St. substation (1.5 mi)
- Feed remaining 43H1 load from steps off the 340 line at North Main St.

Phase 4 – Substation Construction

- Take Twombley St. substation out-of-service and build a new 12.47 kV substation with a 34.5 kV breaker and three 12.47 kV breakers (1 transformer breaker and 2 line breakers)

Phase 5 – Convert 28H1

- Convert the remaining 4.16 kv, 28H1 circuit in Downtown Rochester

Phase 6 – Complete Conversion

- Continue 4.16 kv conversion on 43H1, 28H1, 34H1 & 34H2
- Retire Signal Street substation

Resulting proposed one-line is provided at back of TAF.

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Project Authorization Policy
Operations Project Authorization

Background / Justification

- The Signal St. transformer is 62 years old and is loaded to 61% of nameplate. The sister units in Berlin and Franklin have also recently failed
- The Twombly St. transformer is 55 years old and is loaded to 91% of nameplate
- The 4.16 kV 28H1circuit is overloaded to the point where circuit fusing is overloaded during peak times and the only protection is the substation breaker.
- An interconnected 12.47 kV system will increase reliability by creating new circuit ties between Portland St. and Twombley St. substations and allow for the use of distribution automation.

Business Process and / or Technical Improvements:

This project will improve the reliability of the distribution system in the city of Rochester. The imminent failure of a 62 year old transformer with sister units that have already failed will be eliminated. The reliability of the underlying distribution system will be improved by converting the system to a 12.47 kV voltage which will improve the protection margins and provide the ability to utilize distribution automation to effectively minimize the customer impact of unexpected outages.

Cost Estimate and Assumptions (+/- 25%)

Phase 1	Convert Portland St. 34H1	$1,279,000
Phase 2	Build 12.47 kv from 34W3 to 43H1	$808,000
Phase 3	Convert 43H1 to 12.47 & take Twombley St. out-of-service	$1,066,000
Phase 4	Build a new 34.5-12.47 kV substation at Twombley St.	$3,500,000
Phase 5	Convert 28H1from Signal St.	$1,057,000
Phase 6	Complete conversion & retire Signal St. substation	$1,484,500
Total		$9,194,500

Alternatives Considered with Cost Estimates

Alternatives Considered:

1)	Build a 4.16 kV Substation at Twombley St. and Signal St.	$7,950,000
2)	Retire Twombley and Signal St. , Convert downtown to 34.5 kV	$8,419,500

For a discussion of the options and the decision matrix, refer to the Rochester 4.16 kV Distribution System Study – January 2017 (see reference section of this TAF for the location of this report).

Project Schedule

Describe the project schedule and milestones. Include estimated start and end dates.

Milestone/Phase Name	Estimated Completion Date
Project Approval	02/01/17
Engineering	09/01/17
Phase 1 - Convert Portland St. 34H1	12/01/17
Phase 2 - Build 12.47 kv from 34W3 to 43H1	03/01/18
Phase 3 - Convert 43H1 to 12.47 & take Twombley St. out-of-service	06/01/18
Phase 4 - Build a new 34.5-12.47 kV substation at Twombley St	06/01/18
Phase 5 - Convert 28H1from Signal St.	04/01/19
Phase 6 - Complete conversion & retire Signal St. substation	11/01/19
In-Service date	11/01/19

EVERSOURCE

Project Authorization Policy
Operations Project Authorization

Regulatory Approvals
Permitting as required by the City of Rochester and the State of New Hampshire

Risks and Risk Mitigation Plans
Equipment failure (i.e. transformer) during construction may require the use of a mobile substation.

References
For a detailed description of this project, refer to the 'Rochester 4.16 kV Distribution System Study – January 2017'

One-Line Diagrams, Attachments, and Images

Proposed ultimate one-line of the Rochester interconnected 12.47 kV system between Portland St. and a new Twombley St. substations.

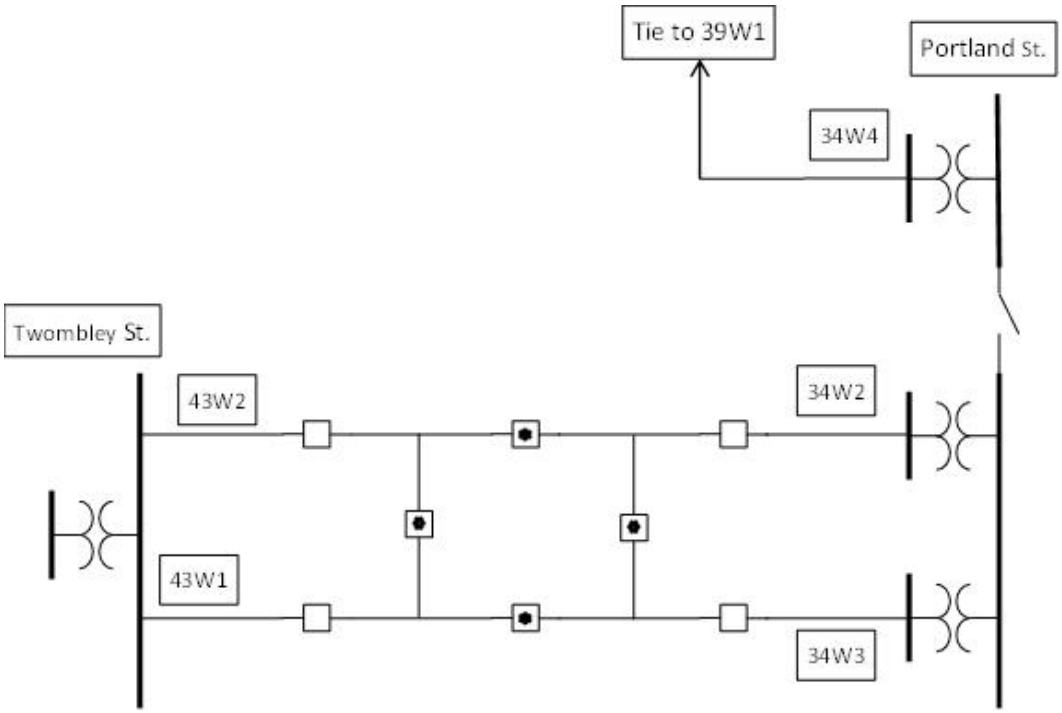

Figure 2

EVERSOURCE ENERGY

SYSTEM PLANNING & STRATEGY
NEW HAMPSHIRE

Rochester 4.16 kV
Distribution System Study

January, 2017

Approved: Russel D. Johnson

Confidential

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Table of Contents

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Executive Summary

This study looks at the Twombley Street, Signal Street and Portland St. Substations and other associated electric facilities in the Rochester downtown area. The 4.16 kV distribution system serves most of the central core of the city and is fed by Twombley Street, Signal Street, and Portland Street Substations, serving approximately 5,210 Eversource customers. The Rochester area historically has seen a 1.5% - 2.5% load growth.

This study is driven by obsolescence of equipment at Twombley Street and Signal Street Substations. The Signal Street transformer, 28H1, is the sister unit of the failed units that were at Franklin and Community Street Substations. An additional consideration is the Portland Street transformer 34W3 is above 97% of nameplate rating.

There are multiple limitations to circuit construction in Rochester. The Spaulding Turnpike and Cocheco River run though the city. These obstructions require crossings to reach the other side which increases the difficulty of constructing new lines.

In 2010, the 4.16 kV, 3,750 kVA transformer at Portland St. failed. The transformer was replaced with a 34.5 – 12.47 x 4.16 kV, 6,250 kVA dual voltage transformer. The goal was to temporarily maintain the 4.16 kV system while planning for 12.47 kV system in the future. The 12.47 kV conversion would occur at the time Signal St. and Twombley St. needed to be replaced. There are also multiple 12.47 kV lines in the downtown area that could be used for circuit ties to increase reliability.

It is recommended that Eversource replace Twombley St. with a 12.47 kV, 12.5 MVA transformer and substation, and retire the Signal St. substation. It is also recommended that the downtown area of Rochester be converted from 4.16 kV to 12.47 kV which will take several years to complete. This would create multiple circuit ties between Twombly St. substation on the west side of downtown Rochester and Portland St. substation on the east side of downtown Rochester. The available capacity would be increased, and would eliminate aging equipment. This solution allows for future growth while optimizing the potential for Distribution Automation which would increase system reliability in the downtown Rochester area.

I. Introduction

The downtown Rochester area is primarily served by three, 34.5 - 4.16 kV substations, Twombley Street substation on the west side of the downtown, Signal Street substation in the center of the downtown and Portland Street on the east side of the downtown (see an area map - Appendix A).

Twombley Street substation has one circuit (43H1) supplying the west side of the downtown. The Signal Street substation has two circuits (28H1 and 28H2). The 28H2 circuit supplies a primarily commercial/industrial area in the northern part of the downtown. The 28H1 supplies the central area of the downtown. This circuit ties to the 43H1 circuit thru a cable through the Cocheco River. The Portland Street substation has two 4.16 kV Circuits (34H1 and 34H2). The 34H1 supplies the eastern part of the downtown area. The 34H2 supplies part of the central downtown and has a tie to the 28H1 at Signal Street. (see the circuit map - Appendix B).

II. Study Background

Both the Twombley Street and Signal Street transformers are over 55 years old which is beyond their useful life.

The Signal Street transformer has two other sister units on the Eversource system (Franklin and Community Street) that have recently failed.

The Portland Street 34.5 - 4.16 kV transformer (TB341) has already failed and has been replaced. This transformer has been replaced with a dual voltage 34.5 - 4.16X12.47 kV unit. This was done to allow for future the downtown system to be converted to 12.47 kV.

Portland Street also has two 12.47 kv circuits supplied from two separate 34.5 – 12.47 kV transformers. The 34W4 supplies the area to the north and ties to the 39W1 circuit from the North Rochester substation. The 34W3 supplies load in the southeast of the Rochester downtown. This circuit is loaded to over 97% of the transformer nameplate rating.

III. System Analysis

Area Problems & Limitations

Obsolescence – The equipment at Twombley St. and Signal Street Substations are over 55 years old. The age is based off of the average age of transformers, switchgear, breakers and regulators as shown below in Table 3.1.

The Signal Street transformer is the sister unit of transformers at Franklin and Community Street Substations that have recently failed.

Useful life expectancy is typically 55 years for distribution substation equipment, while only 35-40 years is the expected for cables.

SUBSTATION	EQUIPMENT	POSITION	MANUFACTURER	YEAR	AGE
Twombley St.	Transformer (2.8 MVA)	43H1	Westinghouse	1961	55
Signal St.	LTC Transformer (3.75 MVA)	28H1	Allis Chalmers	1954	62
Portland St. (4kV)	LTC Transformer (6.25 MVA)	TB341	Niagara Transformer	2009	6
Portland St. (12kV)	LTC Transformer (5.25 MVA)	34W3	General Electric	1967	49
	LTC Transformer (5.25 MVA)	34W4	General Electric	1966	50

Table 3.1 - Equipment ages

Loading – Loading on the Twombley Street transformer is over 91% of its nameplate rating. Additionally the 34W3 transformer is loaded to over 96% of its rating. (see table 3.2)

SUBSTATION	EQUIPMENT	PEAK LOAD	PEAK MONTH	NORMAL RATING
Twombley St.	Transformer – 43H1	2.55 MW	Aug 10	2.80 MVA
Signal St.	LTC Transformer – 28H1	2.30 MW	Aug 13	3.75 MVA
Portland St. (4kV)	LTC Transformer – TB341	2.68 MW	Aug 11	6.25 MVA
Portland St. (12kV)	LTC Transformer – 34W3	5.02 MW	Aug 13	5.25 MVA

Table 3.2 – Transformer loading

Natural load growth is expected to cause some lines to reach their normal rating within five years. Also, various lines on the 4.16 kV are expected to have low voltage conditions during peak load under their current configuration. Additional load growth on the circuits reduces the remaining load capacity.

Protection Coordination – During the summer peak load periods and during the time when the Rochester Fair is being held, when the circuit load is higher, the protection coordination at the end of the 28H1 circuit is lost and the only circuit protection is back at the Signal Street substation breaker. Coordination could be improved by converting the 28H1 to a higher voltage. Improved protection coordination would also improve the reliability.

IV. Solution Options

Three solutions to address the Rochester area needs were developed.

1) Rebuild the 4.16kV Substations at Twombley St. and Signal St.
2) Build a 12.47kV Substation at Twombley St.
3) Convert downtown to 34.5kV

These options also include construction restrictions in the downtown area. A new roundabout is being planned for the intersections of Walnut, Washington and North Main streets and it is expected that any new construction may be restricted in this area. (See appendix C for a breakdown of cost estimates).

Option 1: Rebuild the 4.16 kV Substations at Twombley St. and Signal St. – ($7,950,000)

- Rebuild the existing 34.5 – 4.16 kV substations at Twombley Street and Signal Street with 6.25 MVA transformers.
- Build a second circuit from Twombley Street substation.

Positives
- Minimal line work would be required.
- Allows for construction with existing equipment remaining in service.

Negatives
- Loss of a single substation transformer results in isolated load.
- Does not help the protection coordination problem on the 28H1 circuit.
- Requires capacitor banks and voltage regulators to address future low voltage issues.
- Unable to utilize existing 12.47 kV circuits for contingencies and load swapping.
- Does not help offload the 34W3 at Portland St.

Option 2: Build a 12.47 kV Substation at Twombley St. – ($9,194,500)

- Construct a new 34.5 – 12.47 kV substation at Twombley Street with a 12.5 MVA transformer and two 12.47 kV circuits.
- Convert the 4.16 kV downtown to 12.47 kV
- Retire Signal Street substation.

Positives
- Allows for recovery of all load for a single contingency.
- Conversion of downtown allows for future load growth.
- Increases the number of possible circuit ties with other 12.47 kV circuits in the area.
- Utilize new circuit ties along with distribution automation to improved reliability
- Allows for offloading the 34W3 at Portland St. without additional new line construction.

Negatives
- Requires line work to convert the majority of 4.16 kV system to 12.47 kV.

Option 3: Convert Downtown to 34.5 kV – ($8,419,500)

- Convert the current 4.16 kV downtown circuits to 34.5 kV.
- Create 34.5 kV ties between the new 34.5 kV circuits
- Retire the existing substations at Twombley St. and Signal St. Substations.

Positives
- Eliminates the need for additional transformation in downtown Rochester.
- Allows for construction with existing equipment remaining in service.
- Conversion of downtown allows for greater future load growth.

Negatives
- Converts the downtown area to 34.5 kV which is undesirable.
- Leaves no backfeed capability for the existing 12.47 circuits out of Portland St. Substation.
- Would require additional conversion to help offload the 34W3 at Portland St.

Other Options Considered Implausible
The following options were not studied in detail due to implausibility. The projects and reasons for not being considered are described below.

Option 4: Distributed Generation
Since base case loading is not an issue and distributed generation does not address obsolescence, distributed generation was not considered.

Option 5: Conservation and Load Management
For the same reasoning that distributed generation in Option 4 was not considered, the same holds for conservation and load management programs as well.

Option 6: 115 – 12.47 or 4.16 kV Substation at Rochester
Replacing Twombley St. and Signal St. Substations with a 115 kV connected substation would be extremely costly. In addition the substation would need to be placed at Rochester and additional highway crossings would be needed. The cost is too significant for the amount of load that would be served by the substation and is unnecessary.

Option7: Build a 12.47 or 4.16 kV Substation at Signal St.
Retiring Twombley St. and building a substation at Signal St. is not a plausible option. A substation at Signal St. does not allow for backfeeding any of the circuits west of Signal St. This configuration also reduces the number of available circuit ties with Portland St. Substation when compared to the Twombley St. option.

V. Recommendations

Option 1, option 2 and option 3 would all address the loading in the downtown area. Option 1 would maintain the existing 4.16 kV system which would leave a mixture of 4.16 and 12.47 kV circuits. This will allow for switching between the 4.16 kV circuits but would leave a single 12.47 kV circuit with no backup during a contingency.

Option 2 would create a 12.47 k system between two substations (Twombley Street and Portland Street). This will allow for switching flexibility, for the use of distribution automation and resolve the protection coordination. This option would also provide for offloading the 34W3 circuit.

Option 3 would require creating 34.5 kV ties in the downtown area. This would also leave an isolated 12.47 kV circuit with no ties and reduce the reliability.

Based on the information contained in this report, it is recommended that Eversource select Option 2, Build new 12.47 kV substation at Twombley St. and retire Signal St (refer to appendix F – Decision Matrix). This Option includes:

1. Convert the Rochester downtown area from 4.16 kV to 12.47 kV with increased circuit ties to accommodate the use of distribution automation.
2. Switch TB341 over to 12.47 kV
3. Install a 3 phase segment down Walnut St. for a second Twombley St. circuit and create a tie to the Portland St. 34W3 circuit.
4. Build a new 34.5 – 12.47 kV substation at Twombley Street.

As part of an ongoing Reliability Enhancement program (REP), aging 4.16 kV substations are being retired and the system is being converted to a 12.47 kV when practicable. For outages in the downtown Rochester area the system would be able to be switched between two 12.47 kV substations, Twombley Street and Portland Street (see Appendix E – Proposed System Map and One-Line). Additionally, the use of Distribution Automation would increase reliability and minimize the number of customers affected.

With an existing 12.47 kV substation at Portland Street on the east side of Rochester, and an additional 12.47 kV substation at Twombley Street on the west side of Rochester, this would provide a firm capacity of 16,750 kVA of transformation. This system will also increase reliability by allowing for increased use of distribution automation with four 12.47 kV circuits between two substations.

Appendix A: Downtown Rochester - Area Map

Appendix B: Downtown Rochester - Circuit Map & One-Line

[ONE-LINE DIAGRAM REDACTED]

Circuit map of Downtown Rochester Black=43H1, Green 28 H1, 28H2, Blue 34H1, 34H2, Red=34W3, 34W2

The following is a one-line of the downtown Rochester electric system

[ONE-LINE DIAGRAM REDACTED]

Appendix C: Option Cost Estimates

Option 1: Build a 4.16 kV Substation at Twombley St. and Signal St. – $7,950,000

- Construction of an open-air 34.5-4.16 kV substation at Twombley St. with one 6.25 MVA transformer and three breakers. ($3,500,000)
- Construction of an open-air 34.5-4.16 kV substation at Signal St. with one 6.25 MVA transformer and three breakers. ($3,500,000)
- Install a short 3 phase segment down Walnut St. for a second Twombley St. circuit ($50,000)
- Distribution line work to remove thermal and voltage violations. ($800,000)
- Retirement of existing Twombley St. and Signal St. Substations. ($100,000)

Option 2: Build a 12.47 kV Substation at Twombley St. – $9,194,500

- Convert Portland St 34H1 ($1,279,000)
- Build 12.47 kV from Lowell St (34W3) to Washington St (43H1) ($808,000)
- Convert 43H1 to 12.47 kV and take Twombley Street substation out of service ($1,066,000)
- Build a new 34.5-12.47 kV, substation at Twombley Street with one 12.5 MVA transformer and three breakers ($3,500,000)
- Convert 28H1 and 28H2 from Signal St to Rochester URD. ($1,057,000)
- Complete the conversion of downtown Rochester and retire Signal St. ($1,484,500)

Option 3: Retire Twombley and Signal St., Convert Downtown to 34.5 kV – $8,419,500

- Convert Portland St 34H1 ($1,712,000)
- Build 34.5 kV from Lowell St (34W3) to Washington St (43H1) ($2,923,000)
- Convert 43H1 to 34.5 kV and take Twombley Street substation out of service ($1,066,000)
- Convert 28H1 and 28H2 from Signal St to Rochester URD. (6, $1,057,000)
- Complete the conversion of downtown Rochester and retire Signal St. ($1,484,500)
- Convert the Rochester URD to 34.5 kV. ($77,000)
- Retire Twombley St. and Signal St. substations ($100,000)

Appendix D: Property Information

Portland Street Substation

Figure D.1 – Aerial and parcel maps of the Portland Street Substation, property highlighted in yellow.

Property Information:

Address: 483 Portland St. Rochester, NH
Wetlands: None
Total Acres: 5.9
Land Value: 86600

Property adjacent to Portland Street Substation

Figure D.2 – Aerial and parcel maps of the property adjacent Portland Street Substation, property highlighted in yellow.

Property Information:

Address: 470 Portland St. Rochester, NH
Wetlands: Minimal
Total Acres: 2.7
Land Value: 71800

Signal Street Substation

Figure D.4 – Aerial and parcel maps of the Signal Street Substation, property highlighted in yellow.

Property Information:

Address: 23 Signal St. Rochester, NH
Wetlands: None

Total Acres: 1.96
Land Value: 68800

Twombley Street Substation

Figure D.5 – Aerial and parcel maps of the Twombley Street Substation, property highlighted in yellow.

Property Information:

Address: 33 Twombley St. Rochester, NH
Wetlands: Significant

Total Acres: 0.7
Land Value: 63800

Appendix E: Proposed System Map and One-Line

[ONE-LINE DIAGRAM REDACTED]

Proposed circuit map of Downtown Rochester Black=43W2, Green 43W1, Blue 34W2, Red=34W3

The following is a proposed one-line of the downtown Rochester electric system

[ONE-LINE DIAGRAM REDACTED]

Appendix F: Decision Matrix for Proposed Downtown Rochester Options

	Weight	Rating 4-5 = Superior, 2 -3 = Adequate, 0-1= Inferior		
		Option 1: 4kV S/S at Twombley St. & Signal St.	**Option 2:** 12kV S/S at Twombley St.	**Option 3:** Convert to 34kV
Addresses ED-3002 Design Criteria	8	3	3	3
Addresses Area Load Growth (Long Term, 10 Years)	8	1	5	5
Improves Reliability: SAIDI	8	0	5	2
Net Present Value (2015) [1]	7	4	2	3
Environmental Impact	5	3	3	4
Contingency Solution	5	0	5	3
Power Quality Improvement (SARFI-70)	4	4	4	2
Operating Cost	3	2	3	4
System Loss Savings	3	1	4	4
Total		100	195	168

Note 1: Since the implementation of the five options would occur at the same time, the net present value was not calculated. The total cost estimate in 2016 dollars was compared directly.

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--027 **Page 1 of 1**

Request from: Department of Energy

Witness: Plante, David L

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Pemi SS Upgrade No. A18N05

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-27 for the PAF for this project.

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Operations Project Authorization Form

Approved at February 14, 2018 EPAC

Link to Meeting Minutes

Date Prepared: 1/23/18	**Project Title: Replace Pemigewasset Transformer**
Company/ies: Eversource NH	**Project ID Number: A18N05**
Organization: NH Operations	**Class(es) of Plant: Distribution Substation**
Project Initiator: Robert Mission	**Project Category: Peak Load Capacity - Substation**
Project Manager: Russel Johnson	**Project Type: Specific**
Project Sponsor: George Wegh	**Project Purpose: Upgrade overloaded transformer**
Estimated in service date: June 1, 2019	**If Transmission Project: PTF? n/a**
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan? N/A**
Total Request: $4,063,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is requesting full funding of $4,063,000 to:

- Replace the existing 115-34.5 kV, 20 MVA Pemigewasset substation transformer (TB88) with a company standard 62.5 MVA transformer,
- Replace 2 (34.5 kV) line oil circuit breakers with vacuum circuit breakers on the 3114X and 3149 lines.
- Upgrade the protective relaying associated with the transformer and breakers being replaced.

The work to be performed consists of final engineering, site work, material purchasing and construction necessary to remove and replace the existing substation transformer.

The NH 2018 load forecast shows that the Pemigewasset Substation transformer (TB88) is overloaded during heavy load periods under normal operating conditions. The size of the existing Pemigewasset transformer also limits customer restoration capabilities for loss of transformers at adjacent substations. Replacing the existing Pemigewasset Substation transformer with a larger unit will resolve the normal (N-0) overload and provide additional transformer capacity so that all customers can be restored for loss of transformers (N-1) at adjacent substations (Ashland or Laconia).

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Project Costs Summary

	Prior Authorized	2018	2019	20__+	Totals
Capital Additions - Direct	$ -	$ 1,797	$ 2,048	$ -	$ 3,845
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage %	-	-	-	-	-
Total - Direct Spending	$ -	$ 1,797	$ 2,048	$ -	$ 3,845
Capital Additions - Indirect	-	100	115	-	215
Subtotal Request	$ -	$ 1,897	$ 2,163	$ -	$ 4,060
AFUDC	-	1	2	-	3
Total Capital Request	$ -	$ 1,898	$ 2,165	$ -	$ 4,063
O&M	-	-	-	-	-
Total Request	$ -	$ 1,898	$ 2,165	$ -	$ 4,063

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	2018	2019	2020+	Total
Straight Time Labor	60	50		110
Overtime Labor				
Outside Services	1,011	810		1,821
Materials	576	1,000		1,576
Other, including contingency amounts (describe)	150	188		338
Total	1,797	2,048		3,845

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	100	115		215
Capitalized interest or AFUDC, if any	1	2		3
Total	101	117		218

Total Capital Costs	1,898	2,165		4,063
Less Total Customer Contribution				
Total Capital Project Costs	**1,898**	**2,165**		**4,063**
Total O&M Project Costs				

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$338K of Contingency/Risk Allocation includes:

1. SS site expansion $248K
2. Soil disposal/trucking 60 tons $60K
3. Mobile SS installation $30K

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:

Future costs for these structure installations will be limited to regular inspections and minor maintenance as necessary.

What functional area(s) will these future costs be funded in? __NH Operations____
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? __NH Operations____
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__ If yes, please provide details:

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

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Technical Justification:

Project Need Statement

The NH 2018 load forecast shows that the existing 115-34.5 kV, 20 MVA Pemigewasset Substation transformer (TB88) is overloaded (forecast load of 23 MVA) for heavy load periods under normal operating conditions. The size of the existing Pemigewasset transformer also limits customer restoration capabilities for loss of transformers at adjacent substations. Replacing the existing Pemigewasset Substation transformer with a larger unit will resolve the normal (N-0) overload and provide additional transformer capacity so that all customers can be restored for loss of transformers (N-1) at adjacent substations (Ashland or Laconia).

Replacing the Pemigewasset transformer with a larger unit will require an outage(s) of the 34 kV bus at the substation. The existing 34 kV equipment was surveyed to determine if other equipment should be replaced based upon its condition. Two 34 kV distribution line breakers (3114X and 3149) and their associated relaying were identified as equipment that should be addressed at this time. Both breakers are oil circuit breakers that are approximately 65 years old.

Project Objectives

Increase Pemigewasset Substation transformer capacity to be able to supply the summer peak load in the area. Increased transformation capacity will also be utilized to restore customers during contingent loss of the adjacent substation transformers.

Replacing aging circuit breakers and protection equipment will improve system performance during fault detection and isolation along with reducing maintenance and testing work.

Project Scope

Replace the existing 115-34.5 kV, 20 MVA transformer at Pemigewasset substation with the standard 62.5 MVA transformer. The existing 34.5 kV, 3114X & 3149 line Oil Circuit Breakers (OCBs) will be replaced with new Siemens SDV7 vacuum circuit breakers. The existing relaying for the new transformer and the new line circuit breakers will also be upgraded to current standard relay packages.

Background / Justification

The Pemigewasset substation has a single 20 MVA transformer. This substation supplies the load on the 3114X and 345 lines. The 10.5 MW Ayers Island hydro station is connected to the 3149 line. The substation supplies the 3114X and 345 circuit loads, totaling 23.0 MW. This loading level requires that load be transferred from Pemigewasset substation to Laconia substation during high load periods. The capacity of the Pemigewasset transformer is also limiting the ability to restore the load for a loss of the Ashland transformer or loss of the 338 line between Ashland and Straits Road. (see attached area One-Line)

Currently for a loss of the Ashland transformer, cascading switching is required:

- Step #1; The 3196 line can be restored from Beebe River by opening the 3196 breaker at Ashland and closing the normally open tie switch 3196J11.
- Step #2; The NHEC substation at Moultonborough can be fed from White Lake by opening switch 338J10 and closing switch 338J50.
- Step #3 (Cascaded switching step); To restore the Ashland Municipal load from Pemi, a portion of the 345 line load (8.7 MW) needs to be transferred from Pemi to Laconia by opening 345R2 at Straits Rd and closing switch 345J90
- Step #4; Restore Ashland Municipal load by opening both breaker 3380 at Ashland and switch 338J7 at Straits Rd and closing switch 338J1 at Straits Rd.

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- After the four switching steps above, there would be 13.8 MW isolated at the NHEC substations at Meredith and Center Harbor. The ability to restore any additional load is limited by the existing Pemi transformer capacity.

Currently for loss of a transformer at Laconia, the remaining Laconia transformer is loaded above LTE. The existing Pemi transformer does not have any available capacity to pick up the 23 MW of customer load on the 368 line. The larger transformer at Pemi allows these customers to be restored. With the ability to transfer this load from Laconia to Pemi, this lowers the loading on the remaining Laconia transformer to below LTE.

A larger Pemigewasset transformer will allow the restoration of all customer load for the N-1 loss of the Ashland or Laconia transformers.

Business Process and / or Technical Improvements:
Eliminates the existing transformer overload during summer peak. Address concerns about reliability and removes the need to reconfigure the distribution system for summer heavy load conditions.

Alternatives Considered
Adding a second transformer at Pemigewasset was considered but found to be more expensive and impractical because of the substations hill top location. Factors considered include;

- Added costs of the 115 kV circuit switcher and expanding the 115 kV bus
- Added costs of the 34 kV transformer secondary breaker and expanding the 34 kV bus
- Added costs of control and protection work for the second transformer
- Extensive civil work needed to expand the existing hill top substation site.

Adding a second transformer at Ashland was considered however, the existing Ashland S/S is fed by a radial 115 kV tap from the E115 Line so that loss of the E115 line would result in loss of both Ashland transformers. Customer restoration would still be limited by the existing Pemigewasset transformer capacity. To resolve the N-0 loading issue at Pemigewasset load on the 345 line would need to be permanently transferred to Ashland.

Based upon the above, replacing the existing Pemigewasset Substation transformer with a larger unit is the preferred solution.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering (Start 3/18)	12/18
Construction (Start 9/18)	6/19
Material Procurement*	3/19
In-Service	6/19

* Transformer procurement may be earlier if decision is to use a transformer initially ordered for a project that has been delayed.

Regulatory Approvals
None

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Risks and Risk Mitigation Plans

Loading on Pemigewasset substation during construction requires that customers be transferred from Pemi to Laconia substation during the peak periods. Additionally, failure of the existing transformer may require that customers be transferred to Laconia and use of the 115-34.5 kV mobile to restore all customers.

Outage cancellation due to unplanned events on the system resulting in schedule delay and potential labor costs to remobilize.

1. Mitigation Plan – establish and manage outages using proven coordination teams such as
   a. construction management
   b. coordination meetings
   c. outage planning meetings.

Internal and external resources available for engineering.

1. Effort is being exercised to balance engineering and review work between internal and external resources.

References

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

Pemigewasset / Ashland Area One-Line

[ONE-LINE DIAGRAM REDACTED]

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Pemigewasset Substation One-Line Diagram

[ONE-LINE DIAGRAM REDACTED]

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Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project				
Project Name : Replace Pemigewasset Transformer				**PAF No: A18N05**
Facility Type: ☐ BPS ☒ BES ☒ PTF ☐ non-PTF ☐ CIP ☒ Distribution				
PLANNING				
Is a NX-9 required?				Yes
Is an ISO-NE PAC presentation required?				No
Is a PPA required?				Yes
Is a TCA Application Required?				No
PLANNING/PROTECTION & CONTROLS				
Are RAS/SPS/UVLs affected?				No
OPERATIONS				
Outage Required?	☒ Primary Equipment (Power Transfer)	☐ Secondary Equipment (P&C only)	☐ Outage Not Required	
Do SCLL Conditions Exist?				Yes
Has an outage schedule been approved?				No
Are Operations & Maintenance procedures/training required?				Yes
STANDARDS				
Does the project include standard equipment and designs?				Yes
SUBSTATION ENGINEERING				
Does this impact Revenue Metering				No
Is preliminary short circuit/ breaker duty analysis required?				No
Are there any changes to the baseline audible noise?				No
Is there an impact to the existing ground grid?				Yes
Is a Transient Over Voltage (TOV) analysis required?				No
P&C ENGINEERING				
OP-22 - Are PMUs and DDR required?				No
If BPS, is an NPCC Directory #4 presentation required?				No

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Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : Replace Pemigewasset Transformer	**PAF No: A18N05**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
Is there an impact to the existing ground grid?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
Siting & Construction Services (Outreach)	
What is the level of outreach expected?	Low
INITIATOR	
Has a field constructability review been completed?	Yes

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Cost Estimate Backup Details

Standard Estimate Report

Pemigewasset Upgrade

Project name	Pemigewasset Upgrade 731 Old Bristol Rd New Hampton NH 03256 USA
Labor rate table	L-16-US40
Equipment rate table	E-16-US
Report format	Sorted by 'BidPkg/Bid tem/Model' 'Model' summary

Standard Estimate Report

Pemigewasset Upgrade

Description	Quantity	Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Subcontract Amount	Equipment Amount	Other Amount	Total Amount
Contracted									
Bus Replacements									
G4010.1070	Substation Outdoor Hard Bus & Shielding: Bus, Disconnect Switch Replacement		1,048		1,632		6		2,686
G4010.1070					4,801				4,801
Bus Replacements			**1,048**		**6,433**		**6**		**7,487**
14.40	Labor hours								
5.76	Equipment hours								
Control House									
G4010.1070					50,000				50,000
Control House					**50,000**				**50,000**
0.000	Labor hours								
Equipment Additions									
G4010.1056	Substation Circuit Breaker: 2, CBs, 34 5kV, 1200A, Vacuum, 3114/3148		18,624		16,506		60		35,191
G4010.1060	Substation Transformer: 1, TX88 XFMR Installation, 115-34kV, 62.5MVA		37,998		48,822	25,000	1,165		112,986
G4010.1060			111,307						111,307
Equipment Additions			**167,929**		**65,328**	**25,000**	**1,226**		**259,483**
2,471.423	Labor hours								
32.174	Equipment hours								
Equipment Removals									
G4010.1050	Substation Disconnect Switch: 2, LA1110/LA1150 Switch Removal		18,148				882		19,030
G4010.1056	Substation Circuit Breaker: 2, CB Removal, 34.5kV, 1200A, Oil, 3114/3149		23,061				60		23,122
G4010.1060	Substation Transformer: 1, TB88 XFMR Removal, 115-34kV, 12/16/20 MVA		38,938				160		39,098
Equipment Removals			**80,147**				**1,103**		**81,250**
1,153.631	Labor hours								
42.183	Equipment hours								
Site Development									
G4010.1010	Site Development: Site Development, Expansion		10,574		6,073		617		17,264
G4010.1010			1,016		7,527				8,543
Site Development			**11,589**		**13,600**		**617**		**25,807**
169.914	Labor hours								
17.191	Equipment hours								

Standard Estimate Report

Pemigewasset Upgrade

Description	Quantity	Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Subcontract Amount	Equipment Amount	Other Amount	Total Amount
Contracted			***260,713***		***135,362***	***25,000***	***2,951***	***0***	***424,027***
	3,809.37 Labor hours								
	97.31 Equipment hours								
ES Procurement									
Equipment Additions									
G4010.1030	Metering, Protection and Controls: Protection and Controls Equipment				550,000				550,000
G4010.1056	Substation Circuit Breaker: 2, CBs, 34.5kV, 1200A, Vacuum, 3114/3148				32,240				32,240
G4010.1060	Substation Transformer: 1, TX88 XFMR Installation, 115-34kV, 62.5MVA				858,940				858,940
Equipment Additions					**1,441,180**				**1,441,180**
	1,529.000 Labor hours								
ES Procurement			***0***		***1,441,180***	***0***	***0***	***0***	***1,441,180***
	1,529.000 Labor hours								

Standard Estimate Report

Pemigewasset Upgrade

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	260,713		5,338.369 hrs				6.42%	
Material	1,576,542						38.80%	
Subcontract	25,000						0.62%	
Equipment	2,951		97.308 hrs				0.07%	
Other								
Subtotal (Before Overheads)	**1,865,206**	**1,865,206 USD**					**45.91**	**45.91%**
Contracted Labor Overhead	130,357			50.000 %	C		3.21%	
Contracted Material Overhead	144,118			10.000 %	C		3.55%	
Equipment Overhead	295			10.000 %	C		0.01%	
Temp. Construction Mobile XFMR	50,000				L		1.23%	
Profit	328,496			15.000 %	T		8.09%	
Contracted Overhead Subtotal	**653,266**	**2,518,472 USD**					**16.08**	**61.99%**
Substation Engineering	137,280				L		3.38%	
P&C Engineering	304,735				L		7.50%	
Testing & Commissioning	96,000				L		2.36%	
Sound Study	25,000				L		0.62%	
Thermal Limits Study	6,000				L		0.15%	
Engineering Subtotal	**569,015**	**3,087,487 USD**					**14.00**	**75.99%**
Supplemental Design Eng.	53,802				L		1.32%	
Supplemental Construction Eng.	26,900				L		0.66%	
ES Supplemental Eng. Subtotal	**80,702**	**3,168,189 USD**					**1.99**	**77.98%**
ES Material Overhead	201,765			14.000 %	C		4.97%	
AS&E	7,920			0.250 %	T		0.19%	
E&S	5,380				L		0.13%	
ES Overhead Subtotal	**215,065**	**3,383,254 USD**					**5.29**	**83.27%**
Project Management	338,326			10.000 %	T		8.33%	
Risk Allocation	338,326			10.000 %	T		8.33%	
AFUDC	3,045			0.090 %	T		0.07%	
Global Overhead Subtotal	**679,697**	**4,062,951 USD**					**16.73**	**100.00%**
Total		***4,062,951 USD***						

Supplement Request Form

Approved at June 10, 2020 EPAC
Link to Meeting Minutes

Date Prepared: 7/31/2020	**Project Title: Replace Pemigewasset Transformer**
Company/Companies: Eversource NH	**Project ID Number: A18N05**
Organization: NH Project Management	**Plant Class/ (F.P. Type): Distribution Substation**
Project Initiator: Robert Mission	**Project Type: Specific**
Project Manager: Walter Quinn	**Capital Investment Part of Original Operating Plan? Yes**
Project Sponsor: Digaunto Chatterjee	**O&M Expenses Part of the Original Operating Plan? N/A**
Current Authorized Amount: $4,063K	**Estimated in service date(s): December 30, 2020**
Supplement Request: $2,754K	**Other:**
Total Request: $6,817K	

Supplement Justification

Scope of Work

The Pemigewasset Transformer project proposes to replace the existing 20 MVA transformer with a 62.5 MVA transformer per the original scope and budget as well as replace the two (2) 34.5kV oil circuit breakers (OCBs) with vacuum circuit breakers (VCBs). New control panels will be installed in the newly expanded control house. The control house will contain the new protection and control equipment, HMI cabinet, RTU extension cabinet, and battery bank.

Background

This project received full funding approval for $4,063K in PowerPlan on March 7, 2018. This supplement requests an additional $2,754K for a revised project total of $6,817K.

Several items contribute to this additional funding request:

- Expansion of the control house which was determined to have insufficient space for the necessary equipment additions.
- Testing & Commissioning contracts higher than budget
- Modifications necessary to support Smart Grid implementation
- Installation of animal protection equipment
- Increase in indirect costs

The original scope did not include the control house expansion, the addition of animal protection, or modifications to support Smart Grid implementation which were added scope items.

The decision to expand the control house was made in May 2019 after it was determined that the existing Control House did not have enough space to insert ten (10) additional control cabinets when only four (4) existing control cabinets were being replaced.

Several benefits will be realized by expanding the control house:

- Safety during construction
- Safety during operation: elimination of human performance traps due to cabinets being placed in random locations (basically, wherever one could fit)
- Addition of much needed air conditioning system to cool the new solid-state equipment (ten cabinets)
- After removals, some of the existing control house space will be available for future additions.

The need for supplemental funding to cover the Control House addition was noted at each monthly Work Plan meetings from July 2019 on through April 2020. It was discussed that once the prime electrical contractor was selected, a fully informed estimate could be developed and presented to EPAC, which would include the control house expansion.

Smart Grid additional design was identified as the PAF documents were being developed for this supplement and due to the undefined design at the time, a contingency of $90k to implement was set. The Electric System Control Center (ESCC) needs the smart grid data from the feeder primary and secondary relays for their Distribution Management System (DMS).

Smart Grid implementation will be required prior to the new feeder breakers going into service. It's an ESCC requirement to have this data being sent to them, although three phase values MW, MVAR and kV are already in the design and being provided via the M650 meters, these smart grid points are still needed before the new breakers are in service.

Subsequent to this project approval, a program to install animal protection at NH substations was approved. That scope has been incorporated into this funding request. In retrospect, a separate funding program release should have been requested for Pemigewasset substation.

Indirect costs were underestimated in the prior authorization.

Project Status

Through the end of June 2020, the project has invested $4,522K. Work performed to date includes: engineering, material procurement, control house expansion, and associated indirects.

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The project in-service date has been extended from June 1, 2019 to December 30, 2020 due to outage availability.

Supplemental Cost Breakdown

The table below provides an overview of the line item categories from the initial authorization and the updated project estimate.

	Previously authorized	Current Project Forecast	Delta (request amt)
Internal labor	$110	$378	$268
Engineering/PSM	$907	$615	($292)
Construction/Removal	$653	$991	$338
Material	$1,576	$1,982	$406
Testing	$261	$677	$416
Contingency	$338	0	($338)
Other	$0	$9	$9
Subtotal Direct Costs	$3,845	$4,652	$807
Indirects	$215	$1,862	$1,647
AFUDC	$3	$303	$300
Total	**$4,063**	**$6,817**	**$2,754**

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Justification for Additional Resources

Supplemental funds of $2,754K are required for the following scope changes and items that were underestimated in the original Project Authorization Form (PAF) as follows:

Internal Labor - $268K

- Internal labor costs increased due to Internal staffing not originally budgeted for this level of support; Internal Engineering support higher than estimated and Internal line and station construction services associated with installing the mobile transformer and dressing out the new transformer were higher than anticipated.

OS Engineering/PSM – ($292K)

- Costs for the Project Manager and the Construction Representative were originally budgeted in outside services. The actual positions were staffed by Eversource employees.

Construction / Removal – $338K

The major cost driver for the additional investment of $338K was the Control House addition:

- Control House weather tight shell – increase of $115K
- The Prime Electrical estimate was originally budgeted at $395K and when the Control House additional scope was included the contract purchase order was $643K. This increase is attributed to the control house electrical, lights, HVAC, interior grounding, cable tray and animal protection. – increase of $248K

Materials – $406K

- The new pad-mount transformer is a 300kVA unit. This is not a standard size and the cost was greater than originally estimated. (Additional cost - $187K)
- Eversource requested to add animal protection into the design, which was not included in the original scope.
- Additional budget is required for temporary materials for rerouting the 34.5kV lines around the existing 34.5 bus to provide continuity during breaker replacements, which was not identified at the time of the original estimate.
- Additional materials driven primarily by the control house addition, i.e., cable trays, HVAC system, cable trench, wiring/conductor for control house fit out.

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Testing - $416K

- Testing and Commissioning were originally underestimated. Contractor proposals have been received to support the current forecast for these services. There is also additional budget associated with the control house expansion.

Contingency - ($338K)

Contingency was used to partially off-set overages in materials, construction and testing, as well as to address Smart Grid.

Other - $9K

- Additional employee expenses and property tax that were not accounted for in the original estimate.

Indirect - $1,647K

- Increased direct costs coupled with adjusted indirect rates, have increased the indirect costs by $1,647K since the original estimate.

AFUDC - $300K

- AFUDC was underestimated in original estimate. Extended in-service date coupled with overhead rate changes have increased the AFUDC by $300K.

See attached original authorization documentation.

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$3,845	$807	$4652
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage %	$0	$0	$0
Total Direct Spending	$3,845	$807	$4652
Capital Additions - Indirect	$215	$1,647	$1862
AFUDC	$3	$300	$303
Total Capital Request	$4,063	$2,754	$6,817
O&M	$0	$0	$0
Total Request	$4,063	$2,754	$6,817

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Supplement Request Form

Note: Dollar values are in thousands:

Total Supplement Request by Year View

	2019	2020+	Total
Capital Additions Direct	$0	$807	$807
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage	$0	$0	$0
Total Direct Spending	$0	$807	$807
Capital Additions - Indirect	$0	$1647	$1647
AFUDC	$0	$300	$300
Subtotal Request	$0	$2,754	$2,754
O&M	$0	$0	$0
Total Request	$0	$2,754	$2,754

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Project Authorization Form

Operations Project Authorization Form

Approved at February 14, 2018 EPAC

Link to Meeting Minutes

Date Prepared: 1/23/18	**Project Title: Replace Pemigewasset Transformer**
Company/ies: Eversource NH	**Project ID Number: A18N05**
Organization: NH Operations	**Class(es) of Plant: Distribution Substation**
Project Initiator: Robert Mission	**Project Category: Peak Load Capacity - Substation**
Project Manager: Russel Johnson	**Project Type: Specific**
Project Sponsor: George Wegh	**Project Purpose: Upgrade overloaded transformer**
Estimated in service date: June 1, 2019	**If Transmission Project: PTF? n/a**
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan? N/A**
Total Request: $4,063,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is requesting full funding of $4,063,000 to:

- Replace the existing 115-34.5 kV, 20 MVA Pemigewasset substation transformer (TB88) with a company standard 62.5 MVA transformer,
- Replace 2 (34.5 kV) line oil circuit breakers with vacuum circuit breakers on the 3114X and 3149 lines.
- Upgrade the protective relaying associated with the transformer and breakers being replaced.

The work to be performed consists of final engineering, site work, material purchasing and construction necessary to remove and replace the existing substation transformer.

The NH 2018 load forecast shows that the Pemigewasset Substation transformer (TB88) is overloaded during heavy load periods under normal operating conditions. The size of the existing Pemigewasset transformer also limits customer restoration capabilities for loss of transformers at adjacent substations. Replacing the existing Pemigewasset Substation transformer with a larger unit will resolve the normal (N-0) overload and provide additional transformer capacity so that all customers can be restored for loss of transformers (N-1) at adjacent substations (Ashland or Laconia).

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Project Costs Summary

	Prior Authorized	2018	2019	20__+	Totals
Capital Additions - Direct	$ -	$ 1,797	$ 2,048	$ -	$ 3,845
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage %	-	-	-	-	-
Total - Direct Spending	$ -	$ 1,797	$ 2,048	$ -	$ 3,845
Capital Additions - Indirect	-	100	115	-	215
Subtotal Request	$ -	$ 1,897	$ 2,163	$ -	$ 4,060
AFUDC	-	1	2	-	3
Total Capital Request	$ -	$ 1,898	$ 2,165	$ -	$ 4,063
O&M	-	-	-	-	-
Total Request	$ -	$ 1,898	$ 2,165	$ -	$ 4,063

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	2018	2019	2020+	Total
Straight Time Labor	60	50		110
Overtime Labor				
Outside Services	1,011	810		1,821
Materials	576	1,000		1,576
Other, including contingency amounts (describe)	150	188		338
Total	1,797	2,048		3,845

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	100	115		215
Capitalized interest or AFUDC, if any	1	2		3
Total	101	117		218

Total Capital Costs	1,898	2,165		4,063
Less Total Customer Contribution				
Total Capital Project Costs	**1,898**	**2,165**		**4,063**
Total O&M Project Costs				

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$338K of Contingency/Risk Allocation includes:

1. SS site expansion $248K
2. Soil disposal/trucking 60 tons $60K
3. Mobile SS installation $30K

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:

Future costs for these structure installations will be limited to regular inspections and minor maintenance as necessary.

What functional area(s) will these future costs be funded in? __NH Operations____
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? __NH Operations____
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__ If yes, please provide details:

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

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Technical Justification:

Project Need Statement

The NH 2018 load forecast shows that the existing 115-34.5 kV, 20 MVA Pemigewasset Substation transformer (TB88) is overloaded (forecast load of 23 MVA) for heavy load periods under normal operating conditions. The size of the existing Pemigewasset transformer also limits customer restoration capabilities for loss of transformers at adjacent substations. Replacing the existing Pemigewasset Substation transformer with a larger unit will resolve the normal (N-0) overload and provide additional transformer capacity so that all customers can be restored for loss of transformers (N-1) at adjacent substations (Ashland or Laconia).

Replacing the Pemigewasset transformer with a larger unit will require an outage(s) of the 34 kV bus at the substation. The existing 34 kV equipment was surveyed to determine if other equipment should be replaced based upon its condition. Two 34 kV distribution line breakers (3114X and 3149) and their associated relaying were identified as equipment that should be addressed at this time. Both breakers are oil circuit breakers that are approximately 65 years old.

Project Objectives

Increase Pemigewasset Substation transformer capacity to be able to supply the summer peak load in the area. Increased transformation capacity will also be utilized to restore customers during contingent loss of the adjacent substation transformers.

Replacing aging circuit breakers and protection equipment will improve system performance during fault detection and isolation along with reducing maintenance and testing work.

Project Scope

Replace the existing 115-34.5 kV, 20 MVA transformer at Pemigewasset substation with the standard 62.5 MVA transformer. The existing 34.5 kV, 3114X & 3149 line Oil Circuit Breakers (OCBs) will be replaced with new Siemens SDV7 vacuum circuit breakers. The existing relaying for the new transformer and the new line circuit breakers will also be upgraded to current standard relay packages.

Background / Justification

The Pemigewasset substation has a single 20 MVA transformer. This substation supplies the load on the 3114X and 345 lines. The 10.5 MW Ayers Island hydro station is connected to the 3149 line. The substation supplies the 3114X and 345 circuit loads, totaling 23.0 MW. This loading level requires that load be transferred from Pemigewasset substation to Laconia substation during high load periods. The capacity of the Pemigewasset transformer is also limiting the ability to restore the load for a loss of the Ashland transformer or loss of the 338 line between Ashland and Straits Road. (see attached area One-Line)

Currently for a loss of the Ashland transformer, cascading switching is required:

- Step #1; The 3196 line can be restored from Beebe River by opening the 3196 breaker at Ashland and closing the normally open tie switch 3196J11.
- Step #2; The NHEC substation at Moultonborough can be fed from White Lake by opening switch 338J10 and closing switch 338J50.
- Step #3 (Cascaded switching step); To restore the Ashland Municipal load from Pemi, a portion of the 345 line load (8.7 MW) needs to be transferred from Pemi to Laconia by opening 345R2 at Straits Rd and closing switch 345J90
- Step #4; Restore Ashland Municipal load by opening both breaker 3380 at Ashland and switch 338J7 at Straits Rd and closing switch 338J1 at Straits Rd.

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- After the four switching steps above, there would be 13.8 MW isolated at the NHEC substations at Meredith and Center Harbor. The ability to restore any additional load is limited by the existing Pemi transformer capacity.

Currently for loss of a transformer at Laconia, the remaining Laconia transformer is loaded above LTE. The existing Pemi transformer does not have any available capacity to pick up the 23 MW of customer load on the 368 line. The larger transformer at Pemi allows these customers to be restored. With the ability to transfer this load from Laconia to Pemi, this lowers the loading on the remaining Laconia transformer to below LTE.

A larger Pemigewasset transformer will allow the restoration of all customer load for the N-1 loss of the Ashland or Laconia transformers.

Business Process and / or Technical Improvements:
Eliminates the existing transformer overload during summer peak. Address concerns about reliability and removes the need to reconfigure the distribution system for summer heavy load conditions.

Alternatives Considered
Adding a second transformer at Pemigewasset was considered but found to be more expensive and impractical because of the substations hill top location. Factors considered include;

- Added costs of the 115 kV circuit switcher and expanding the 115 kV bus
- Added costs of the 34 kV transformer secondary breaker and expanding the 34 kV bus
- Added costs of control and protection work for the second transformer
- Extensive civil work needed to expand the existing hill top substation site.

Adding a second transformer at Ashland was considered however, the existing Ashland S/S is fed by a radial 115 kV tap from the E115 Line so that loss of the E115 line would result in loss of both Ashland transformers. Customer restoration would still be limited by the existing Pemigewasset transformer capacity. To resolve the N-0 loading issue at Pemigewasset load on the 345 line would need to be permanently transferred to Ashland.

Based upon the above, replacing the existing Pemigewasset Substation transformer with a larger unit is the preferred solution.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering (Start 3/18)	12/18
Construction (Start 9/18)	6/19
Material Procurement*	3/19
In-Service	6/19

* Transformer procurement may be earlier if decision is to use a transformer initially ordered for a project that has been delayed.

Regulatory Approvals
None

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Risks and Risk Mitigation Plans

Loading on Pemigewasset substation during construction requires that customers be transferred from Pemi to Laconia substation during the peak periods. Additionally, failure of the existing transformer may require that customers be transferred to Laconia and use of the 115-34.5 kV mobile to restore all customers.

Outage cancellation due to unplanned events on the system resulting in schedule delay and potential labor costs to remobilize.

1. Mitigation Plan – establish and manage outages using proven coordination teams such as
   a. construction management
   b. coordination meetings
   c. outage planning meetings.

Internal and external resources available for engineering.

1. Effort is being exercised to balance engineering and review work between internal and external resources.

References

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

Pemigewasset / Ashland Area One-Line

[ONE-LINE DIAGRAM REDACTED]

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Pemigewasset Substation One-Line Diagram

[ONE-LINE DIAGRAM REDACTED]

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Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project			
Project Name : Replace Pemigewasset Transformer			**PAF No: A18N05**
Facility Type: ☐ BPS ☒ BES ☒ PTF ☐ non-PTF ☐ CIP ☒ Distribution			
PLANNING			
Is a NX-9 required?			Yes
Is an ISO-NE PAC presentation required?			No
Is a PPA required?			Yes
Is a TCA Application Required?			No
PLANNING/PROTECTION & CONTROLS			
Are RAS/SPS/UVLs affected?			No
OPERATIONS			
Outage Required?	☒ Primary Equipment (Power Transfer)	☐ Secondary Equipment (P&C only)	☐ Outage Not Required
Do SCLL Conditions Exist?			Yes
Has an outage schedule been approved?			No
Are Operations & Maintenance procedures/training required?			Yes
STANDARDS			
Does the project include standard equipment and designs?			Yes
SUBSTATION ENGINEERING			
Does this impact Revenue Metering			No
Is preliminary short circuit/ breaker duty analysis required?			No
Are there any changes to the baseline audible noise?			No
Is there an impact to the existing ground grid?			Yes
Is a Transient Over Voltage (TOV) analysis required?			No
P&C ENGINEERING			
OP-22 - Are PMUs and DDR required?			No
If BPS, is an NPCC Directory #4 presentation required?			No

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Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : Replace Pemigewasset Transformer	**PAF No: A18N05**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
Is there an impact to the existing ground grid?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
Siting & Construction Services (Outreach)	
What is the level of outreach expected?	Low
INITIATOR	
Has a field constructability review been completed?	Yes

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Cost Estimate Backup Details

Standard Estimate Report

Pemigewasset Upgrade

Project name	Pemigewasset Upgrade 731 Old Bristol Rd New Hampton NH 03256 USA
Labor rate table	L-16-US40
Equipment rate table	E-16-US
Report format	Sorted by 'BidPkg/Bid tem/Model' 'Model' summary

Standard Estimate Report

Pemigewasset Upgrade

Description	Quantity	Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Subcontract Amount	Equipment Amount	Other Amount	Total Amount
Contracted									
Bus Replacements									
G4010.1070	Substation Outdoor Hard Bus & Shielding: Bus, Disconnect Switch Replacement		1,048		1,632		6		2,686
G4010.1070					4,801				4,801
Bus Replacements			**1,048**		**6,433**		**6**		**7,487**
14.40	Labor hours								
5.76	Equipment hours								
Control House									
G4010.1070					50,000				50,000
Control House					**50,000**				**50,000**
0.000	Labor hours								
Equipment Additions									
G4010.1056	Substation Circuit Breaker: 2, CBs, 34 5kV, 1200A, Vacuum, 3114/3148		18,624		16,506		60		35,191
G4010.1060	Substation Transformer: 1, TX88 XFMR Installation, 115-34kV, 62.5MVA		37,998		48,822	25,000	1,165		112,986
G4010.1060			111,307						111,307
Equipment Additions			**167,929**		**65,328**	**25,000**	**1,226**		**259,483**
2,471.423	Labor hours								
32.174	Equipment hours								
Equipment Removals									
G4010.1050	Substation Disconnect Switch: 2, LA1110/LA1150 Switch Removal		18,148				882		19,030
G4010.1056	Substation Circuit Breaker: 2, CB Removal, 34.5kV, 1200A, Oil, 3114/3149		23,061				60		23,122
G4010.1060	Substation Transformer: 1, TB88 XFMR Removal, 115-34kV, 12/16/20 MVA		38,938				160		39,098
Equipment Removals			**80,147**				**1,103**		**81,250**
1,153.631	Labor hours								
42.183	Equipment hours								
Site Development									
G4010.1010	Site Development: Site Development, Expansion		10,574		6,073		617		17,264
G4010.1010			1,016		7,527				8,543
Site Development			**11,589**		**13,600**		**617**		**25,807**
169.914	Labor hours								
17.191	Equipment hours								

Standard Estimate Report

Pemigewasset Upgrade

Description	Quantity	Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Subcontract Amount	Equipment Amount	Other Amount	Total Amount
Contracted			***260,713***		***135,362***	***25,000***	***2,951***	***0***	***424,027***
	3,809.37 Labor hours								
	97.31 Equipment hours								
ES Procurement									
Equipment Additions									
G4010.1030	Metering, Protection and Controls: Protection and Controls Equipment				550,000				550,000
G4010.1056	Substation Circuit Breaker: 2, CBs, 34.5kV, 1200A, Vacuum, 3114/3148				32,240				32,240
G4010.1060	Substation Transformer: 1, TX88 XFMR Installation, 115-34kV, 62.5MVA				858,940				858,940
Equipment Additions					**1,441,180**				**1,441,180**
	1,529.000 Labor hours								
ES Procurement			***0***		***1,441,180***	***0***	***0***	***0***	***1,441,180***
	1,529.000 Labor hours								

Standard Estimate Report

Pemigewasset Upgrade

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	260,713		5,338.369 hrs				6.42%	
Material	1,576,542						38.80%	
Subcontract	25,000						0.62%	
Equipment	2,951		97.308 hrs				0.07%	
Other								
Subtotal (Before Overheads)	**1,865,206**	**1,865,206 USD**					**45.91**	**45.91%**
Contracted Labor Overhead	130,357			50.000 %	C		3.21%	
Contracted Material Overhead	144,118			10.000 %	C		3.55%	
Equipment Overhead	295			10.000 %	C		0.01%	
Temp. Construction Mobile XFMR	50,000				L		1.23%	
Profit	328,496			15.000 %	T		8.09%	
Contracted Overhead Subtotal	**653,266**	**2,518,472 USD**					**16.08**	**61.99%**
Substation Engineering	137,280				L		3.38%	
P&C Engineering	304,735				L		7.50%	
Testing & Commissioning	96,000				L		2.36%	
Sound Study	25,000				L		0.62%	
Thermal Limits Study	6,000				L		0.15%	
Engineering Subtotal	**569,015**	**3,087,487 USD**					**14.00**	**75.99%**
Supplemental Design Eng.	53,802				L		1.32%	
Supplemental Construction Eng.	26,900				L		0.66%	
ES Supplemental Eng. Subtotal	**80,702**	**3,168,189 USD**					**1.99**	**77.98%**
ES Material Overhead	201,765			14.000 %	C		4.97%	
AS&E	7,920			0.250 %	T		0.19%	
E&S	5,380				L		0.13%	
ES Overhead Subtotal	**215,065**	**3,383,254 USD**					**5.29**	**83.27%**
Project Management	338,326			10.000 %	T		8.33%	
Risk Allocation	338,326			10.000 %	T		8.33%	
AFUDC	3,045			0.090 %	T		0.07%	
Global Overhead Subtotal	**679,697**	**4,062,951 USD**					**16.73**	**100.00%**
Total		***4,062,951 USD***						

Supplement Request Form

Approved by EPAC Chairmen external to meeting on 04/05/2021
Link to 04/14/2021 EPAC Meeting Minutes

Date Prepared: 1/22/2021	**Project Title:** Replace Pemigewasset Transformer
Company/Companies: Eversource NH	**Project ID Number:** A18N05 (D) **Work Order Number:** TSNN2014 (T)
Organization: NH Project Management	**Plant Class/ (F.P. Type):** Distribution S/S; Transmission S/S
Project Initiator: Robert Mission	**Project Type:** Specific
Project Manager: Walter Quinn	**Capital Investment Part of Original Operating Plan?** Yes
Project Sponsor: Digaunto Chatterjee	**O&M Expenses Part of the Original Operating Plan?** N/A
Current Authorized Amount: D- $4,063K/T-$0	**Estimated in service date(s):** December 31, 2020
Supplement Request: D-$3,666K/T-$89K	**Other:**
Total Request: D-$7,729K/T-$89K	

Supplement Justification

Scope of Work

The Pemigewasset Transformer project proposes to replace the existing 20 MVA transformer with a 62.5 MVA transformer per the original scope and budget as well as replace the two (2) 34.5kV oil circuit breakers (OCBs) with vacuum circuit breakers (VCBs). New control panels will be installed in the newly expanded control house. The control house will contain the new protection and control equipment, HMI cabinet, RTU extension cabinet, and battery bank. Also, Webster A111 required a transfer trip scheme to be installed, which is a transmission asset, requiring a transmission project which was not part of the original authorization.

Background

This project received full funding approval for $4,063K in PowerPlan on March 7, 2018. This supplement requests an additional $3,755K for a revised project total of $7,818K.

Several items contribute to this additional funding request:

- Expansion of the control house which was determined to have insufficient space for the necessary equipment additions.

- Testing & Commissioning contracts higher than budget
- Internal support services higher than estimated
    - Additional support for all disciplines for control house addition
    - Additional work with Engineering Contractor on layout of equipment in control house addition.
- Installation of animal protection equipment
- Increase in indirect costs

The original scope did not include the control house expansion or the addition of animal protection

The decision to expand the control house was made in May of 2019 after it was determined that the original layout's remove and replace sequence would cause unacceptable reliability risk.

Several benefits will be realized by expanding the control house:

- Safety during construction
- Safety during operation: elimination of human performance traps due to cabinets being placed in random locations
- Addition of much needed air conditioning system to cool the new solid-state equipment (ten cabinets)
- After removals, some of the existing control house space will be available for future additions.

The need for supplemental funding to cover the Control House addition was noted at each monthly Work Plan meetings from July 2019 on through April 2020. It was discussed that once the prime electrical contractor was selected, a fully informed estimate could be developed and presented to EPAC, which would include the control house expansion.

The A111 tripping relay at Webster could not detect all transformer faults. To ensure that the Webster A111 terminal trips for all transformer faults coincident with circuit switcher failure, a transfer trip scheme needed to be installed. This requirement was known but not budgeted separately to a Transmission work order.

Subsequent to this project approval, a program to install animal protection at NH substations was approved. That scope has been incorporated into this funding request. In retrospect, a separate funding program release should have been requested for Pemigewasset substation.

During the energization of the Transformer, the team encountered issues that pushed the ISD from 15 December to 31 December 2020.

Indirect rates were updated based on the direct cost changes and in alignment with current rates.

Project Status

Work performed to date includes: engineering, material procurement, control house expansion, electrical construction and associated indirects. The project in-service date has been extended from June 1, 2019 to December 31, 2020 due to budget constraints, outage availability, storm delays and late breaking design issues. The Project reached In-Service December 31, 2020. Some additional work remains to remove a redundant switch on the new transformer, which is not needed in the protection system. P&C Engineering wants the switch removed to avoid confusion and to clean-up drawings.

Supplemental Cost Breakdown

The table below provides an overview of the line item categories from the initial authorization and the updated project estimate.

Summary Distribution & Transmission

	Previously authorized	Current Project Forecast	Delta (request amt)
Internal labor	$110	$693	$583
Engineering/PSM	$907	$664	($243)
Construction/Removal	$653	$1,042	$389
Material	$1,576	$2,022	$446
Testing	$261	$897	$636
Contingency	$338	$15	($323)
Other	$0	$172	$172
Subtotal Direct Costs	$3,845	$5,505	$1,660
Indirects	$215	$2,053	$1,838
AFUDC	$3	$260	$257
Total	**$4,063**	**$7,818**	**$3,755**

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Supplement Request Form

A18N05 Pemigewasset Transformer

	Previously authorized	Current Project Forecast	Delta (request amt)
Internal labor	$110	$675	$565
Engineering/PSM	$907	$664	($243)
Construction/Removal	$653	$1,041	$388
Material	$1,576	$1,990	$414
Testing	$261	$895	$634
Contingency	$338	$10	($328)
Other	$0	$172	$172
Subtotal Direct Costs	$3,845	$5,447	$1,602
Indirects	$215	$2,024	$1,809
AFUDC	$3	$258	$255
Total	**$4,063**	**$7,729**	**$3,666**

TSNN2014 Webster A111 Transfer Trip

	Previously authorized	Current Project Forecast	Delta (request amt)
Internal labor	$0	$18	$18
Engineering/PSM	$0	$0	$0
Construction/Removal	$0	$1	$1
Material	$0	$32	$32
Testing	$0	$2	$2
Contingency	$0	$5	$5
Other	$0	$0	$0
Subtotal Direct Costs	$0	$58	$58
Indirects	$0	$29	$29
AFUDC	$0	$2	$2
Total	**$0**	**$89**	**$89**

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Justification for Additional Resources

Supplemental funds of $3,755K are required for the following scope changes and items that were underestimated in the original Project Authorization Form (PAF) as follows:

Internal Labor - $583K

- Internal labor costs increased due to Internal staffing not originally budgeted for this level of support; Internal Engineering support higher than estimated and Internal line and station construction services associated with installing the mobile transformer and dressing out the new transformer were higher than anticipated as well as overall Area Work Center support to complete the project. Additional costs were required by Eversource Engineering, Electrical Maintenance, Transformer Testing when the energization of the new transformer was delayed.

OS Engineering/PSM – ($243K)

- Costs for Project Management & Support were estimated at $338K. The actuals have run considerably less at $145K for a savings of $193K. The Engineering was estimated at $569K and the actuals are $519K for additional savings of $50K.

Construction / Removal – $389K

- The major cost driver for the additional investment of $389K was the Control House addition:
  - Control House weather tight shell – increase of $115K
  - The prime electrical estimate was originally budgeted at $395K and when the Control House additional scope was included, the contract purchase order was increased to $643K. This increase is attributed to the control house electrical, lights, HVAC, interior grounding, cable tray and animal protection. – increase of $248K and additional testing support of $26K.

Materials – $446K

- The new pad-mount transformer is a 300kVA unit. This is not a standard size and the cost was greater than originally estimated. (Additional cost - $187K)
- Add animal protection into the design, which was not included in the original scope.
- Additional budget is required for temporary materials for rerouting the 34.5kV lines around the existing 34.5 bus to provide continuity during breaker replacements, which was not identified at the time of the original estimate.

- Additional materials driven primarily by the control house addition, i.e., cable trays, HVAC system, cable trench, wiring/conductor for control house fit out.

Testing - $636K

- Testing and Commissioning were originally underestimated. Contractor proposals have been received to support the current forecast for these services. There is also additional budget associated with the control house expansion, extended schedule and the completion of the testing for the Transformer energization.

Contingency - ($323K)

- Contingency was used to partially off-set overages in materials, construction and testing, as well as to address Smart Grid.

Other - $172K

- Due to property tax that was not accounted for in the original estimate.

Indirect - $1,838K

- Increased direct costs coupled with proper allocation of overhead rates to the original direct costs have increased the indirect costs by $1,838K since the original estimate,

AFUDC - $257K

- AFUDC was underestimated in original estimate. Extended in-service date coupled with overhead rate changes have increased the AFUDC by $257K.

See attached original authorization documentation.

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Supplement Request Form

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$3,845	$1,660	$5,505
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage %	$0	$0	$0
Total Direct Spending	$3,845	$1,660	$5,505
Capital Additions - Indirect	$215	$1,838	$2,053
AFUDC	$3	$257	$260
Total Capital Request	$4,063	$3,755	$7,818
O&M	$0	$0	$0
Total Request	$4,063	$3,755	$7,818

Total Supplement Request by Year View

Note: Dollar values are in thousands:

	2019	2020+	Total
Capital Additions Direct	$0	$1,660	$1,660
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage	$0	$0	$0
Total Direct Spending	$0	$1,660	$1,660
Capital Additions - Indirect	$0	$1,838	$1,838
AFUDC	$0	$257	$257
Subtotal Request	$0	$3,755	$3,755
O&M	$0	$0	$0
Total Request	$0	$3,755	$3,755

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Supplement Request Form

Supplement Cost - Pemi S/S Transformer – A18N05

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$3,845	$1,602	$5,447
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage %	$0	$0	$0
Total Direct Spending	$3,845	$1,602	$5,447
Capital Additions - Indirect	$215	$1,809	$2,024
AFUDC	$3	$255	$258
Total Capital Request	$4,063	$3,666	$7,729
O&M	$0	$0	$0
Total Request	$4,063	$3,666	$7,729

Total Supplement Request by Year View

Note: Dollar values are in thousands:

	2019	2020+	Total
Capital Additions Direct	$0	$1,602	$1,602
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage	$0	$0	$0
Total Direct Spending	$0	$1,602	$1,602
Capital Additions - Indirect	$0	$1,809	$1,809
AFUDC	$0	$255	$255
Subtotal Request	$0	$3,666	$3,666
O&M	$0	$0	$0
Total Request	$0	$3,666	$3,666

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Supplement Request Form

Supplement Cost – Webster Transfer Trip – TSNN2014

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$0	$58	$58
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage %	$0	$0	$0
Total Direct Spending	$0	$58	$58
Capital Additions - Indirect	$0	$29	$29
AFUDC	$0	$2	$2
Total Capital Request	$0	$89	$89
O&M	$0	$0	$0
Total Request	$0	$89	$89

Total Supplement Request by Year View

Note: Dollar values are in thousands:

	2019	2020+	Total
Capital Additions Direct	$0	$58	$58
Less Customer Contribution	$0	$0	$0
Removals Net of Salvage	$0	$0	$0
Total Direct Spending	$0	$58	$58
Capital Additions - Indirect	$0	$29	$29
AFUDC	$0	$2	$2
Subtotal Request	$0	$89	$89
O&M	$0	$0	$0
Total Request	$0	$89	$89

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Project Authorization Form

Operations Project Authorization Form

Approved at February 14, 2018 EPAC

Link to Meeting Minutes

Date Prepared: 1/23/18	**Project Title: Replace Pemigewasset Transformer**
Company/ies: Eversource NH	**Project ID Number: A18N05**
Organization: NH Operations	**Class(es) of Plant: Distribution Substation**
Project Initiator: Robert Mission	**Project Category: Peak Load Capacity - Substation**
Project Manager: Russel Johnson	**Project Type: Specific**
Project Sponsor: George Wegh	**Project Purpose: Upgrade overloaded transformer**
Estimated in service date: June 1, 2019	**If Transmission Project: PTF? n/a**
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan? N/A**
Total Request: $4,063,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is requesting full funding of $4,063,000 to:

- Replace the existing 115-34.5 kV, 20 MVA Pemigewasset substation transformer (TB88) with a company standard 62.5 MVA transformer,
- Replace 2 (34.5 kV) line oil circuit breakers with vacuum circuit breakers on the 3114X and 3149 lines.
- Upgrade the protective relaying associated with the transformer and breakers being replaced.

The work to be performed consists of final engineering, site work, material purchasing and construction necessary to remove and replace the existing substation transformer.

The NH 2018 load forecast shows that the Pemigewasset Substation transformer (TB88) is overloaded during heavy load periods under normal operating conditions. The size of the existing Pemigewasset transformer also limits customer restoration capabilities for loss of transformers at adjacent substations. Replacing the existing Pemigewasset Substation transformer with a larger unit will resolve the normal (N-0) overload and provide additional transformer capacity so that all customers can be restored for loss of transformers (N-1) at adjacent substations (Ashland or Laconia).

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Project Costs Summary

	Prior Authorized	2018	2019	20__+	Totals
Capital Additions - Direct	$ -	$ 1,797	$ 2,048	$ -	$ 3,845
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage %	-	-	-	-	-
Total - Direct Spending	$ -	$ 1,797	$ 2,048	$ -	$ 3,845
Capital Additions - Indirect	-	100	115	-	215
Subtotal Request	$ -	$ 1,897	$ 2,163	$ -	$ 4,060
AFUDC	-	1	2	-	3
Total Capital Request	$ -	$ 1,898	$ 2,165	$ -	$ 4,063
O&M	-	-	-	-	-
Total Request	$ -	$ 1,898	$ 2,165	$ -	$ 4,063

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	2018	2019	2020+	Total
Straight Time Labor	60	50		110
Overtime Labor				
Outside Services	1,011	810		1,821
Materials	576	1,000		1,576
Other, including contingency amounts (describe)	150	188		338
Total	1,797	2,048		3,845

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	100	115		215
Capitalized interest or AFUDC, if any	1	2		3
Total	101	117		218

Total Capital Costs	1,898	2,165		4,063
Less Total Customer Contribution				
Total Capital Project Costs	**1,898**	**2,165**		**4,063**
Total O&M Project Costs				

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$338K of Contingency/Risk Allocation includes:

1. SS site expansion $248K
2. Soil disposal/trucking 60 tons $60K
3. Mobile SS installation $30K

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:

Future costs for these structure installations will be limited to regular inspections and minor maintenance as necessary.

What functional area(s) will these future costs be funded in? __NH Operations____
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? __NH Operations____
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__ If yes, please provide details:

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

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Technical Justification:

Project Need Statement

The NH 2018 load forecast shows that the existing 115-34.5 kV, 20 MVA Pemigewasset Substation transformer (TB88) is overloaded (forecast load of 23 MVA) for heavy load periods under normal operating conditions. The size of the existing Pemigewasset transformer also limits customer restoration capabilities for loss of transformers at adjacent substations. Replacing the existing Pemigewasset Substation transformer with a larger unit will resolve the normal (N-0) overload and provide additional transformer capacity so that all customers can be restored for loss of transformers (N-1) at adjacent substations (Ashland or Laconia).

Replacing the Pemigewasset transformer with a larger unit will require an outage(s) of the 34 kV bus at the substation. The existing 34 kV equipment was surveyed to determine if other equipment should be replaced based upon its condition. Two 34 kV distribution line breakers (3114X and 3149) and their associated relaying were identified as equipment that should be addressed at this time. Both breakers are oil circuit breakers that are approximately 65 years old.

Project Objectives

Increase Pemigewasset Substation transformer capacity to be able to supply the summer peak load in the area. Increased transformation capacity will also be utilized to restore customers during contingent loss of the adjacent substation transformers.

Replacing aging circuit breakers and protection equipment will improve system performance during fault detection and isolation along with reducing maintenance and testing work.

Project Scope

Replace the existing 115-34.5 kV, 20 MVA transformer at Pemigewasset substation with the standard 62.5 MVA transformer. The existing 34.5 kV, 3114X & 3149 line Oil Circuit Breakers (OCBs) will be replaced with new Siemens SDV7 vacuum circuit breakers. The existing relaying for the new transformer and the new line circuit breakers will also be upgraded to current standard relay packages.

Background / Justification

The Pemigewasset substation has a single 20 MVA transformer. This substation supplies the load on the 3114X and 345 lines. The 10.5 MW Ayers Island hydro station is connected to the 3149 line. The substation supplies the 3114X and 345 circuit loads, totaling 23.0 MW. This loading level requires that load be transferred from Pemigewasset substation to Laconia substation during high load periods. The capacity of the Pemigewasset transformer is also limiting the ability to restore the load for a loss of the Ashland transformer or loss of the 338 line between Ashland and Straits Road. (see attached area One-Line)

Currently for a loss of the Ashland transformer, cascading switching is required:

- Step #1; The 3196 line can be restored from Beebe River by opening the 3196 breaker at Ashland and closing the normally open tie switch 3196J11.
- Step #2; The NHEC substation at Moultonborough can be fed from White Lake by opening switch 338J10 and closing switch 338J50.
- Step #3 (Cascaded switching step); To restore the Ashland Municipal load from Pemi, a portion of the 345 line load (8.7 MW) needs to be transferred from Pemi to Laconia by opening 345R2 at Straits Rd and closing switch 345J90
- Step #4; Restore Ashland Municipal load by opening both breaker 3380 at Ashland and switch 338J7 at Straits Rd and closing switch 338J1 at Straits Rd.

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- After the four switching steps above, there would be 13.8 MW isolated at the NHEC substations at Meredith and Center Harbor. The ability to restore any additional load is limited by the existing Pemi transformer capacity.

Currently for loss of a transformer at Laconia, the remaining Laconia transformer is loaded above LTE. The existing Pemi transformer does not have any available capacity to pick up the 23 MW of customer load on the 368 line. The larger transformer at Pemi allows these customers to be restored. With the ability to transfer this load from Laconia to Pemi, this lowers the loading on the remaining Laconia transformer to below LTE.

A larger Pemigewasset transformer will allow the restoration of all customer load for the N-1 loss of the Ashland or Laconia transformers.

Business Process and / or Technical Improvements:
Eliminates the existing transformer overload during summer peak. Address concerns about reliability and removes the need to reconfigure the distribution system for summer heavy load conditions.

Alternatives Considered
Adding a second transformer at Pemigewasset was considered but found to be more expensive and impractical because of the substations hill top location. Factors considered include;

- Added costs of the 115 kV circuit switcher and expanding the 115 kV bus
- Added costs of the 34 kV transformer secondary breaker and expanding the 34 kV bus
- Added costs of control and protection work for the second transformer
- Extensive civil work needed to expand the existing hill top substation site.

Adding a second transformer at Ashland was considered however, the existing Ashland S/S is fed by a radial 115 kV tap from the E115 Line so that loss of the E115 line would result in loss of both Ashland transformers. Customer restoration would still be limited by the existing Pemigewasset transformer capacity. To resolve the N-0 loading issue at Pemigewasset load on the 345 line would need to be permanently transferred to Ashland.

Based upon the above, replacing the existing Pemigewasset Substation transformer with a larger unit is the preferred solution.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Engineering (Start 3/18)	12/18
Construction (Start 9/18)	6/19
Material Procurement*	3/19
In-Service	6/19

* Transformer procurement may be earlier if decision is to use a transformer initially ordered for a project that has been delayed.

Regulatory Approvals
None

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Risks and Risk Mitigation Plans

Loading on Pemigewasset substation during construction requires that customers be transferred from Pemi to Laconia substation during the peak periods. Additionally, failure of the existing transformer may require that customers be transferred to Laconia and use of the 115-34.5 kV mobile to restore all customers.

Outage cancellation due to unplanned events on the system resulting in schedule delay and potential labor costs to remobilize.

1. Mitigation Plan – establish and manage outages using proven coordination teams such as
   a. construction management
   b. coordination meetings
   c. outage planning meetings.

Internal and external resources available for engineering.

1. Effort is being exercised to balance engineering and review work between internal and external resources.

References

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

Pemigewasset / Ashland Area One-Line

[ONE-LINE DIAGRAM REDACTED]

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Pemigewasset Substation One-Line Diagram

[ONE-LINE DIAGRAM REDACTED]

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Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project				
Project Name : Replace Pemigewasset Transformer				**PAF No: A18N05**
Facility Type: ☐ BPS ☒ BES ☒ PTF ☐ non-PTF ☐ CIP ☒ Distribution				
PLANNING				
Is a NX-9 required?				Yes
Is an ISO-NE PAC presentation required?				No
Is a PPA required?				Yes
Is a TCA Application Required?				No
PLANNING/PROTECTION & CONTROLS				
Are RAS/SPS/UVLs affected?				No
OPERATIONS				
Outage Required?	☒ Primary Equipment (Power Transfer)	☐ Secondary Equipment (P&C only)	☐ Outage Not Required	
Do SCLL Conditions Exist?				Yes
Has an outage schedule been approved?				No
Are Operations & Maintenance procedures/training required?				Yes
STANDARDS				
Does the project include standard equipment and designs?				Yes
SUBSTATION ENGINEERING				
Does this impact Revenue Metering				No
Is preliminary short circuit/ breaker duty analysis required?				No
Are there any changes to the baseline audible noise?				No
Is there an impact to the existing ground grid?				Yes
Is a Transient Over Voltage (TOV) analysis required?				No
P&C ENGINEERING				
OP-22 - Are PMUs and DDR required?				No
If BPS, is an NPCC Directory #4 presentation required?				No

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Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : Replace Pemigewasset Transformer	**PAF No: A18N05**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
Is there an impact to the existing ground grid?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
Siting & Construction Services (Outreach)	
What is the level of outreach expected?	Low
INITIATOR	
Has a field constructability review been completed?	Yes

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Cost Estimate Backup Details

Standard Estimate Report
Pemigewasset Upgrade
1/19/2018 2:02 PM

Project name	Pemigewasset Upgrade 731 Old Bristol Rd New Hampton NH 03256 USA
Labor rate table	L-16-US40
Equipment rate table	E-16-US
Report format	Sorted by 'BidPkg/Bid tem/Model' 'Model' summary

Standard Estimate Report

Pemigewasset Upgrade

Description	Quantity	Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Subcontract Amount	Equipment Amount	Other Amount	Total Amount
Contracted									
Bus Replacements									
G4010.1070	Substation Outdoor Hard Bus & Shielding: Bus, Disconnect Switch Replacement		1,048		1,632		6		2,686
G4010.1070					4,801				4,801
Bus Replacements			**1,048**		**6,433**		**6**		**7,487**
14.40	Labor hours								
5.76	Equipment hours								
Control House									
G4010.1070					50,000				50,000
Control House					**50,000**				**50,000**
0.000	Labor hours								
Equipment Additions									
G4010.1056	Substation Circuit Breaker: 2, CBs, 34 5kV, 1200A, Vacuum, 3114/3148		18,624		16,506		60		35,191
G4010.1060	Substation Transformer: 1, TX88 XFMR Installation, 115-34kV, 62.5MVA		37,998		48,822	25,000	1,165		112,986
G4010.1060			111,307						111,307
Equipment Additions			**167,929**		**65,328**	**25,000**	**1,226**		**259,483**
2,471.423	Labor hours								
32.174	Equipment hours								
Equipment Removals									
G4010.1050	Substation Disconnect Switch: 2, LA1110/LA1150 Switch Removal		18,148				882		19,030
G4010.1056	Substation Circuit Breaker: 2, CB Removal, 34.5kV, 1200A, Oil, 3114/3149		23,061				60		23,122
G4010.1060	Substation Transformer: 1, TB88 XFMR Removal, 115-34kV, 12/16/20 MVA		38,938				160		39,098
Equipment Removals			**80,147**				**1,103**		**81,250**
1,153.631	Labor hours								
42.183	Equipment hours								
Site Development									
G4010.1010	Site Development: Site Development, Expansion		10,574		6,073		617		17,264
G4010.1010			1,016		7,527				8,543
Site Development			**11,589**		**13,600**		**617**		**25,807**
169.914	Labor hours								
17.191	Equipment hours								

Standard Estimate Report

Pemigewasset Upgrade

Description	Quantity	Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Subcontract Amount	Equipment Amount	Other Amount	Total Amount
Contracted			***260,713***		***135,362***	***25,000***	***2,951***	***0***	***424,027***
	3,809.37 Labor hours								
	97.31 Equipment hours								
ES Procurement									
Equipment Additions									
G4010.1030	Metering, Protection and Controls: Protection and Controls Equipment				550,000				550,000
G4010.1056	Substation Circuit Breaker: 2, CBs, 34.5kV, 1200A, Vacuum, 3114/3148				32,240				32,240
G4010.1060	Substation Transformer: 1, TX88 XFMR Installation, 115-34kV, 62.5MVA				858,940				858,940
Equipment Additions					**1,441,180**				**1,441,180**
	1,529.000 Labor hours								
ES Procurement			***0***		***1,441,180***	***0***	***0***	***0***	***1,441,180***
	1,529.000 Labor hours								

Standard Estimate Report

Pemigewasset Upgrade

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	260,713		5,338.369 hrs				6.42%	
Material	1,576,542						38.80%	
Subcontract	25,000						0.62%	
Equipment	2,951		97.308 hrs				0.07%	
Other								
Subtotal (Before Overheads)	**1,865,206**	**1,865,206 USD**					**45.91**	**45.91%**
Contracted Labor Overhead	130,357			50.000 %	C		3.21%	
Contracted Material Overhead	144,118			10.000 %	C		3.55%	
Equipment Overhead	295			10.000 %	C		0.01%	
Temp. Construction Mobile XFMR	50,000				L		1.23%	
Profit	328,496			15.000 %	T		8.09%	
Contracted Overhead Subtotal	**653,266**	**2,518,472 USD**					**16.08**	**61.99%**
Substation Engineering	137,280				L		3.38%	
P&C Engineering	304,735				L		7.50%	
Testing & Commissioning	96,000				L		2.36%	
Sound Study	25,000				L		0.62%	
Thermal Limits Study	6,000				L		0.15%	
Engineering Subtotal	**569,015**	**3,087,487 USD**					**14.00**	**75.99%**
Supplemental Design Eng.	53,802				L		1.32%	
Supplemental Construction Eng.	26,900				L		0.66%	
ES Supplemental Eng. Subtotal	**80,702**	**3,168,189 USD**					**1.99**	**77.98%**
ES Material Overhead	201,765			14.000 %	C		4.97%	
AS&E	7,920			0.250 %	T		0.19%	
E&S	5,380				L		0.13%	
ES Overhead Subtotal	**215,065**	**3,383,254 USD**					**5.29**	**83.27%**
Project Management	338,326			10.000 %	T		8.33%	
Risk Allocation	338,326			10.000 %	T		8.33%	
AFUDC	3,045			0.090 %	T		0.07%	
Global Overhead Subtotal	**679,697**	**4,062,951 USD**					**16.73**	**100.00%**
Total		***4,062,951 USD***						

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--028 **Page 1 of 1**

Request from: Department of Energy

Witness: Johnson, Russel D

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Distribution Automation Pole Top No. A20DA

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-28 for the PAF for this project.

EVERSOURCE
Project Authorization Form

Operations Project Authorization Form

Date Prepared: 12/11/2019	**Project Title:** DISTRIBUTION AUTOMATION **- POLE TOP**
Company/ies: NH	**Project ID Number: A20DA**
Organization: System Resiliency	**Class(es) of Plant: Distribution**
Project Initiator: Lee Lajoie	**Project Category:** Reliability - Distribution Automation
Project Manager: Lee Lajoie	**Project Type: Specific**
Project Sponsor: Paul Renaud	**Project Purpose: Improve Reliability**
Estimated in service date: 12/31/2020	**If Transmission Project: PTF? n/a**
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Engineering and Construction	**O&M Expenses Part of the Original Operating Plan? Yes**
Total Request: $12,000,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project will fund the installation of approximately 150 pole top SCADA controlled devices in 2020. These devices provide indication of circuit conditions and allow for remote operation to sectionalize the system and restore power remotely. Installation of these devices over the last four years have resulted in significant savings in the impact and duration of outages on the distribution system. Installations in 2020 should meet the original objective of breaking the distribution system into zones of no more than 1,000 customers. Total project cost based on an average of $80,000 per device installation.

EVERSOURCE
Project Authorization Form

Project Costs Summary (000s)

	Prior Authorized	2020	20__	Totals
Capital Additions - Direct	$ -	$ 7,948	$ -	$ 7,948
Less Customer Contribution	-	-	-	-
Removals net of Salvage %	-	37	-	37
Total - Direct Spending	$ -	$ 7,985	$ -	$ 7,985
Capital Additions - Indirect	-	4,015	-	4,015
Subtotal Request	$ -	$ 12,000	$ -	$ 12,000
AFUDC	-	-	-	-
Total Capital Request	$ -	$ 12,000	$ -	$ 12,000
O&M	-		-	-
Total Request	$ -	$ 12,000	$ -	$ 12,000

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	802			
Overtime Labor				
Outside Services	2,076			
Materials	5,107			
Other, including contingency amounts (describe)				
Total	7,985			

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	4,015			
Capitalized interest or AFUDC, if any				
Total	12,000			

Total Capital Costs	12,000			
Less Total Customer Contribution				
Total Capital Project Costs	12,000			
Total O&M Project Costs				

Note: Explain unique payment provisions, if applicable

EVERSOURCE
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 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:

n/a

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? If yes, please provide details: No.

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement
This project is a part of Eversource's NH Distribution Automation strategy. The 2020 work scope will be to complete the process of adding pole top SCADA controlled devices to complete the process of breaking up the system into zones of no more than 1,000 customers, in accordance with the original project plan.

Project Objectives
Installation of pole top SCADA controlled devices has proven to enhace reliability by reducing the number of customers affected by outages and reducing the duration of outages.

Project Scope
This project is to fund the 2020 installation and commissioning of approximately 150 devices on Eversource NH's distribution system.

Background / Justification
The installation of pole top SCADA controlled devices has been a point of emphasis for Eversource NH since 2014. In 2017, the 1,000th device installed under this program was commissioned. The cumulative impact of these devices resulted in a projected savings of approximately 21,000,000 customer minutes and 40 minutes of SAIDI in 2018.

Business Process and / or Technical Improvements:
Installation of pole top SCADA controlled devices provides information to ISOC operators, allowing them to quickly analyze data when outages occur and sectionalize down to the smallest possible area of impact. These devices will also be integrated into the Company's Distribution Management System which will allow even quicker response to outages that may occur.

Alternatives Considered with Cost Estimates
None.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Project designs in STORMS	3/1/2020
Construction Complete	9/1/2020

Regulatory Approvals
None

Risks and Risk Mitigation Plans
This work has been successfully planned and implemented on a scale larger than the 2020 program since 2014. The only significant risk identified is the availability of Cooper reclosers with SEL controls, as SEL will no longer provide relays to Cooper as of first quarter 2020. Most of the devices needed for 2020 are already on order and Procurement is initiating discussions with Cooper to come up with a plan to address this issue.

References
None.

Attachments (One-Line Diagrams, Images, etc.)
None.

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--029 **Page 1 of 1**

Request from: Department of Energy

Witness: Yergeau, Jason M

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

2020 Circuit Patrol Repairs No. A20X38

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-29 for the PAF for this project.

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 06/02/2020	**Project Title:** 2020 Circuit Patrol Repairs
Company: Eversource NH	**Project Number:** A20X38
Organization: Electric System Operations	**Class(es) of Plant:** D Line
Project Initiator: Pat Sullivan	**Project Category:** Lines - General
Project Manager: Pat Sullivan	**Project Type:** Specific
Project Sponsor: Mark Sandler	**Project Purpose:** Reliability – Repair of various facilities
Estimated in service date: 9/1/20	**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)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request: $2,195,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is intended to repair or replace distribution plant discovered to be deficient as a result of the circuit patrols completed in April and May of 2020. A total of approximately 900 items are to be repaired or replaced including broken, leaning, or damaged poles, broken or decayed crossarms and braces, damaged primary conductors, broken or loose guy wires and anchors, damaged insulators or bent pins, and broken insulator ties. Work is to be performed by contractors at unit prices.

EVERSOURCE

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	$	$	$	$	$	$	$	$	$
2. Environmental Approvals / Permits	$	$	$	$	$	$	$	$	$
3. Outreach	$	$	$	$	$	$	$	$	$
4. Siting Approvals / Permits	$	$	$	$	$	$	$	$	$
5. Engineering / Design	$	$	$	$	$	$	$	$	$
6. Materials (Eversource purchased)	$	$	$166	$	$	$	$	$	$
7. Construction (incl matl's by contractors)	$	$	$1,164	$	$	$	$	$	$
8. Testing / Commissioning	$	$	$	$	$	$	$	$	$
9. Project Mgmt Team	$	$	$20	$	$	$	$	$	$
10. Removals	$	$	$	$	$	$	$	$	$
11. Other	$	$	$	$	$	$	$	$	$
12. Risks	$	$	$	$	$	$	$	$	$
SUBTOTAL DIRECTS W/ RISKS	**$**	**$**	**$1,350**	**$**	**$**	**$**	**$**	**$**	**$**
13. Indirects/Overhead	$	$	$836	$	$	$	$	$	$
14. AFUDC	$	$	$9	$	$	$	$	$	$
PROJECT TOTAL – BASELINE BUDGET	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**
15. Contingency	$	$	$	$	$	$	$	$	$
TOTAL CAPITAL REQUEST	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**
16. Reimbursables/Customer Contribution	$	$	$	$	$	$	$	$	$
PROJECT TOTAL (LESS REIMBURSABLES)	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**
O&M	$	$	$	$	$	$	$	$	$
TOTAL REQUEST	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**

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

EVERSOURCE

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	$	$	$20	$	$	$	$	$	$
OT Labor	$	$	$	$	$	$	$	$	$
Outside Services Labor	$	$	$1,164	$	$	$	$	$	$
Materials*	$	$	$166	$	$	$	$	$	$
Removals	$	$	$	$	$	$	$	$	$
Other	$	$	$	$	$	$	$	$	$
Indirects	$	$	$836	$	$	$	$	$	$
AFUDC	$	$	$9	$	$	$	$	$	$
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**

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

EVERSOURCE
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 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? No.

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

EVERSOURCE
Project Authorization Form

Technical Justification

Project Need Statement

Circuit patrols of overhead distribution circuits were completed in April and May of 2020 following a spring storm looking for damaged equipment which may result in future outages. The list of items found was assembled and prioritized. A total of approximately 900 items are to be repaired or replaced including broken, leaning, or damaged poles, broken or decayed crossarms and braces, damaged primary conductors, broken or loose guy wires and anchors, damaged insulators or bent pins, broken insulator ties, and missing spacer cable spacers.

Items which were reported but are not likely to caused outages such as clearance issues and double poles will be addressed through the normal course of business and are not part of this project.

Project Objectives

Improve reliability by repairing items which, if left unaddressed, could cause outages

Project Scope

Repair approximately 900 reported issues on 225 circuits throughout the state of NH.

Background / Justification

Circuit patrols were completed after the April 13, 2020 storm. Approximately 1,200 items were reported. These were prioritized based on the likelihood of the potential for an outage, based on the issue reported.

Item	Priority	Count
BROKEN / CRACKED CROSSARM	1	142
BROKEN / LOOSE GUY WIRE	1	146
BROKEN POLE	1	192
BROKEN TIE	1	139
CONDUCTOR	1	6
CROSSARM BRACE	1	6
DAMAGED SECONDARY BOX	1	1
DAMAGED/BROKEN INSULATOR	1	20
FLOATING PRIMARY	1	53
KNEE BRACE	1	1
MULTIPLE	1	0
ROTTED CROSSARM	1	15
TEMP POLE REPAIR	1	16
BENT PIN	2	97
LEANING POLE	2	15
REPL POLE	2	12
CLEARANCE	3	8
COMMUNICATION	3	1
DOUBLE POLE	3	3
FUSE OPEN (cap bank)	3	0
POLE GROUND	3	1
PORCELAIN	3	2
RMV EQUIP	3	5
UNFUSED LATERAL	3	8
CIRCUIT NOTE	4	1
UNFUSED TRANSFORMERS	4	267

Priority one and two items are to be addressed by this project. Priority three and four items will be addressed through the normal course of business.

EVERSOURCE
Project Authorization Form

Business Process and / or Technical Improvements
Improved reliability through the repair of known defective distribution equipment.

Alternatives Considered with Cost Estimates
None.

Project Schedule

Milestone/Phase Name	Estimated Date
Design Completion	6/22/20
Construction Start	6/22/20
In Service Date	9/1/20

Regulatory Approvals
None required.

Risks and Risk Mitigation Plans
Cost control on this project is being implemented through the use of unit rates from contractors. Eversource employees will be supervising the contractors' work.

Contingency
None.

References
None.

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

None.

Cost Estimate Backup Details

Cost estimate based on contractor unit price bids.

EVERSOURCE

Supplement Request Form

Date Prepared: 05/03/2021	**Project Title:** 2020 Circuit Patrol Repairs
Company: Eversource NH	**Project Number:** A20X38
Organization: Electric System Operations	**Class(es) of Plant:** D Line
Project Initiator: Pat Sullivan	**Project Category:** Lines - General
Project Manager: Pat Sullivan	**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: $2,195,000	**Estimated in service date:** 12/1/20
Supplement Request: $707,000	**ISO-NE Approvals Required** (check all that apply)**:** ☐ PAC ☐ TCA
Total Request: $2,902,000	

Background

This project is intended to repair or replace distribution plant discovered to be deficient as a result of the circuit patrols completed in April and May of 2020. A total of approximately 900 items are to be repaired or replaced including broken, leaning, or damaged poles, broken or decayed crossarms and braces, damaged primary conductors, broken or loose guy wires and anchors, damaged insulators or bent pins, and broken insulator ties. Work is to be performed by contractors at unit prices.

Supplement Justification Overview

Supplemental funding is requested due to the additional items found during the repair process which required replacement. While working to make repairs as identified during initial patrols, additional items were found that needed replacement. These resulted in additional unit costs. These costs were reviewed and discussed during the monthly budget meetings. Project oversight also increased on this project as a result of additional repairs and clearances being necessary.

Supplement Justification Detail

The reasons for the project authorization supplement of $707,000 are summarized below.

1. Construction (Contractor Labor): $281,000. This item increased because the original PAF assumed the project would only capture the initial items identified on the patrols. Additional items were found when working on the initially identified item.
2. Indirects/Overhead: $441,000. Indirects/Overheads increased due to the increase in Direct costs.
3. Materials decrease of $15,000

Total Supplement Request: $707,000

EVERSOURCE

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. Materials (Eversource purchased)	$166	$151	$(15)
2. Construction (incl matl's by contractors)	$1,164	$1,445	$281
3. Other	$20	$20	$0
SUBTOTAL DIRECTS W/ RISKS	**$1,350**	**$1616**	**$281**
13. Indirects/Overhead	$836	$1,277	$441
14. AFUDC	$9	$9	$0
PROJECT TOTAL – BASELINE BUDGET	**$2,195**	**$2,902**	**$707**
15. Contingency	$	$	$
TOTAL CAPITAL REQUEST	**$2,195**	**$2,902**	**$707**

Lessons Learned

Often when one item is identified on a patrol upon further investigation multiple issues are found and repairs are needed. This should be taken into account when establishing funding for these programs.

EVERSOURCE

Operations Project Authorization Form

Date Prepared: 06/02/2020	**Project Title:** 2020 Circuit Patrol Repairs
Company: Eversource NH	**Project Number:** A20X38
Organization: Electric System Operations	**Class(es) of Plant:** D Line
Project Initiator: Pat Sullivan	**Project Category:** Lines - General
Project Manager: Pat Sullivan	**Project Type:** Specific
Project Sponsor: Mark Sandler	**Project Purpose:** Reliability – Repair of various facilities
Estimated in service date: 9/1/20	**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)**:** ☐ PTF ☐ non-PTF ☒ Distribution
Total Request: $2,195,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is intended to repair or replace distribution plant discovered to be deficient as a result of the circuit patrols completed in April and May of 2020. A total of approximately 900 items are to be repaired or replaced including broken, leaning, or damaged poles, broken or decayed crossarms and braces, damaged primary conductors, broken or loose guy wires and anchors, damaged insulators or bent pins, and broken insulator ties. Work is to be performed by contractors at unit prices.

EVERSOURCE

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	$	$	$	$	$	$	$	$	$
2. Environmental Approvals / Permits	$	$	$	$	$	$	$	$	$
3. Outreach	$	$	$	$	$	$	$	$	$
4. Siting Approvals / Permits	$	$	$	$	$	$	$	$	$
5. Engineering / Design	$	$	$	$	$	$	$	$	$
6. Materials (Eversource purchased)	$	$	$166	$	$	$	$	$	$
7. Construction (incl matl's by contractors)	$	$	$1,164	$	$	$	$	$	$
8. Testing / Commissioning	$	$	$	$	$	$	$	$	$
9. Project Mgmt Team	$	$	$20	$	$	$	$	$	$
10. Removals	$	$	$	$	$	$	$	$	$
11. Other	$	$	$	$	$	$	$	$	$
12. Risks	$	$	$	$	$	$	$	$	$
SUBTOTAL DIRECTS W/ RISKS	**$**	**$**	**$1,350**	**$**	**$**	**$**	**$**	**$**	**$**
13. Indirects/Overhead	$	$	$836	$	$	$	$	$	$
14. AFUDC	$	$	$9	$	$	$	$	$	$
PROJECT TOTAL – BASELINE BUDGET	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**
15. Contingency	$	$	$	$	$	$	$	$	$
TOTAL CAPITAL REQUEST	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**
16. Reimbursables/Customer Contribution	$	$	$	$	$	$	$	$	$
PROJECT TOTAL (LESS REIMBURSABLES)	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**
O&M	$	$	$	$	$	$	$	$	$
TOTAL REQUEST	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**

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 to Go	2021	2022	2023	2024	2025	Total
ST Labor	$	$	$20	$	$	$	$	$	$
OT Labor	$	$	$	$	$	$	$	$	$
Outside Services Labor	$	$	$1,164	$	$	$	$	$	$
Materials*	$	$	$166	$	$	$	$	$	$
Removals	$	$	$	$	$	$	$	$	$
Other	$	$	$	$	$	$	$	$	$
Indirects	$	$	$836	$	$	$	$	$	$
AFUDC	$	$	$9	$	$	$	$	$	$
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$**	**$**	**$2,195**	**$**	**$**	**$**	**$**	**$**	**$**

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

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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? No.

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

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Technical Justification

Project Need Statement

Circuit patrols of overhead distribution circuits were completed in April and May of 2020 following a spring storm looking for damaged equipment which may result in future outages. The list of items found was assembled and prioritized. **A total of approximately 900 items are to be repaired or replaced including broken, leaning, or damaged poles, broken or decayed crossarms and braces, damaged primary conductors, broken or loose guy wires and anchors, damaged insulators or bent pins, broken insulator ties, and missing spacer cable spacers.**

Items which were reported but are not likely to caused outages such as clearance issues and double poles will be addressed through the normal course of business and are not part of this project.

Project Objectives

Improve reliability by repairing items which, if left unaddressed, could cause outages

Project Scope

Repair approximately 900 reported issues on 225 circuits throughout the state of NH.

Background / Justification

Circuit patrols were completed after the April 13, 2020 storm. Approximately 1,200 items were reported. These were prioritized based on the likelihood of the potential for an outage, based on the issue reported.

Item	Priority	Count
BROKEN / CRACKED CROSSARM	1	142
BROKEN / LOOSE GUY WIRE	1	146
BROKEN POLE	1	192
BROKEN TIE	1	139
CONDUCTOR	1	6
CROSSARM BRACE	1	6
DAMAGED SECONDARY BOX	1	1
DAMAGED/BROKEN INSULATOR	1	20
FLOATING PRIMARY	1	53
KNEE BRACE	1	1
MULTIPLE	1	0
ROTTED CROSSARM	1	15
TEMP POLE REPAIR	1	16
BENT PIN	2	97
LEANING POLE	2	15
REPL POLE	2	12
CLEARANCE	3	8
COMMUNICATION	3	1
DOUBLE POLE	3	3
FUSE OPEN (cap bank)	3	0
POLE GROUND	3	1
PORCELAIN	3	2
RMV EQUIP	3	5
UNFUSED LATERAL	3	8
CIRCUIT NOTE	4	1
UNFUSED TRANSFORMERS	4	267

Priority one and two items are to be addressed by this project. Priority three and four items will be addressed through the normal course of business.

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Business Process and / or Technical Improvements
Improved reliability through the repair of known defective distribution equipment.

Alternatives Considered with Cost Estimates
None.

Project Schedule

Milestone/Phase Name	Estimated Date
Design Completion	6/22/20
Construction Start	6/22/20
In Service Date	9/1/20

Regulatory Approvals
None required.

Risks and Risk Mitigation Plans
Cost control on this project is being implemented through the use of unit rates from contractors. Eversource employees will be supervising the contractors' work.

Contingency
None.

References
None.

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

None.

Cost Estimate Backup Details

Cost estimate based on contractor unit price bids.

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--030 **Page 1 of 1**

Request from: Department of Energy

Witness: Devereaux, James J

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

HN Full Width ROW Clearing No. C18ROW

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-30 for the PAF for this project.

EVERSOURCE
Project Authorization Policy

Appendix 5
Subsidiary Board Approval Package Template

Operations Project Authorization Form

Date Prepared: November 28, 2017	Project Title: **Distribution Vegetation Management** Program – Enhanced Tree Trimming (ETT) Program and Enhanced Tree Removal (ETR)/Hazard Tree Removal Program, and Full Width Distribution ROW Clearing
Company/ies: Eversource Energy	Project ID Number(s): ETT2018, ETR2018, ETTCF18, CTROW18, R18HAZ, R18ETT, C18ETT, C18ROW, R18ROW, C18HAZ, ETREM18, ETRWM18, ETTWM18
Organization: Operations Services	Class(es) of Plant: Outside Services
Project Initiator: Sean Redding – CT Robert Allen – MA, NH	Project Category: Enhanced Tree Trimming/Removals
Project Owner/Manager: Vera Admore-Sakyi	Project Type: *Annual*
Project Sponsor: Leanne Landry	Project Purpose: part of regulatory tracked program? CT Resiliency: ETT2018, ETR2018 NH REP: R18HAZ, R18ETT, R18ROW
Estimated in service date: Jan 01, 2018	If Transmission Project: PTF / Non-PTF / NA
Supplement to Existing Authorization? No	Capital Investment Part of Original Operating Plan? Yes
Eng./Constr. Resources Budgeted? Yes	O&M Expenses Part of the Original Operating Plan? Yes

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Chief Executive Officer or Subsidiary Board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

An authorization of $95,606,000 is requested for the Enhanced Tree Trimming (ETT), Enhanced Tree Removal (ETR), Hazard tree removal, and full width clearing of rights-of-way portion of Eversource's annual distribution vegetation maintenance plan. The overall vegetation management program is designed to provide safe, reliable and cost effective distribution line clearance. The ETT Program is designed to prevent power outages by removing branches or trees that are either too close to power lines, or pose a risk of falling on power lines. NH (REP 3) and CT (Resiliency) have regulatory programs with targets for activity investment.

The ETR/Hazard Tree Removal Programs strategically remove trees to proactively improve system resiliency and mitigate long term costs for the distribution cycle trimming programs. Tree removals, in conjunction with cycle pruning drive improved reliability performance. Additionally, the service area has experienced drought conditions and insect infestations that have negatively impacted tree health and there are signs of increased tree mortality for the coming years. The ETR/Hazard Tree Programs have been increased to further address these concerns.

The distribution vegetation management program provides for line clearance of 25% of the Eversource total primary system overhead distribution miles annually. The ETT program running, is a subset of this, and varies per Operating Company regulatory programs. Risk/hazard tree removals are performed annually as a complement to the program pruning activities. CT and NH have regulator supported programs that target removals, primarily focused on circuit backbones. In MA removals are prioritized on the backbone of circuits, based on reliability performance across the distribution system and the scheduled cycle prune. In MA this activity is tracked and reported annually on a per circuit basis to the Department of Public Utilities, but there are currently no specific targets for investment level established by the regulators.

Distribution ROW clearing is a separate category under NH REP program. In CY, this is an included activity under the ETR Program.

Project Costs Summary

See APS3 and APS8 requirements and consult with Plant Accounting for capital/O&M determination. Use published loaders for benefits, materials, and invoices, maintained by the Director, Budget and Internal Reporting.
Note: Dollar values are in thousands

	Prior Authorized	2018	2019	2020	Total
Capital Additions - Direct		94,171.9			94,171.9
Less Customer Contribution					
Removals net of salvage _____%					
Total - Direct Spending		94,171.9	-	-	94,171.9
Capital Additions - Indirect		1,434.1			1,434.1
Subtotal Request		95,606.0			95,606.0
AFUDC					
Total Capital Request		95,606.0			
O&M					
Total Request		**95,606.0**	-	-	**95,606.0**

The requested funding is allocated among the operating company programs/projects as follows:

Op Co	Project ID	Project Title	2018 Funding ($K)	Budget CCC
CT	ETR2018	Enhanced Tree Removals - Resiliency	$19,706.0	15G
	ETT2018	Enhanced Tree Trimming - Resiliency	$23,400.0	15G
	ETTCF18	Customer Focused ETT	$5,000.0	15G
	CTROW18	Distribution ROW Tree Removals	$2,500.0	15G
		Total CT Program	**$50,606.0**	
NH	R18ETT	Enhanced Tree Trimming - REP 3	$3,087.9	7WA
	R18ROW	Full Width ROW Clearing - REP 3	$1,647.6	7WA
	R18HAZ	Hazard Tree Removal - REP 3	$2,264.5	7WA
	C18ETT	ETT - Base	$6,319.0	7WA
	C18HAZ	Hazard Tree Removal - Base	$8,839.5	7WA
	C18ROW	Full Width ROW Clearing - Base	$2,841.5	7WA
		Total NH Program	**$25,000.0**	
MA East	ETRME18	Enhanced Tree Removal	$10,000.0	N44
		Total MA East Program	**$10,000.0**	
MA West	ETRWM18	Enhanced Tree Removals	$5,000.0	6AD
	ETTWM18	Enhanced Tree Trimming	$5,000.0	6AD
		Total MA West Program	**$10,000.0**	
		Total Distribution Vegetation Management	**$95,606.0**	

ETT goes beyond the level of O&M pruning in significantly improving reliability (functionality) for normal operations, and providing a greater level of resiliency during emergent events, and extending the useful life of the related conductor. The ETR/hazard tree programs remove trees that have the potential to impact the utility plant thereby extending the life of the plant. Both ETT and ETR programs meet the three tests for capitalization:

- Substantial investment towards asset life extension
- One time program cost as the activity can only be performed once
- Standalone program which will be budgeted, charged and tracked separately

Justification:
The 2018 distribution prune program requires expenditures across all Eversource operating companies to address maintenance pruning and hazardous tree removals. These activities improve the system's ability to survive major storms with less extensive damage. This will improve reliability performance across the service area.

Alternatives Considered:
Eversource has delineated the benefits of enhanced tree trimming and enhanced/hazard tree removal programs to regulatory bodies in CT, MA and NH as an important component of the vegetation management program for both day to day reliability improvement and increasing system resiliency for adverse weather events. Additionally, the majority of our customer and community officials have come to appreciate the impact of these programs and expect the Eversource companies to have robust line clearance efforts. The deferral of this proactive maintenance approach to address only specific instances of insufficient clearance runs counter to the goals of improved reliability and system resiliency.

Risk Assessment:
The Company has made commitments to customers and regulators to improve reliability and system resiliency. In the case of CT, there are specific vegetation management program goals for ETT and ETR as part of the System Resiliency Program, which is scheduled to expire December 31, 2017. The MA companies are required to report annually on the hazard tree removal programs volume and investment. In NH, as part of the Reliability Enhancement Program the Company committed to perform risk tree removal and distribution ROW reclaim.

- CT PURA 12-01-10 specified risk tree removal and the recapture of Enhanced Tree Trimming (ETT) clearances on backbones and large laterals.
- MA DPU Order 11-85-B/11-119-B includes the requirement to track and report both the volume and cost of hazard tree removals, by circuit.
- MA DPU 10-70 Rate Settlement includes requirements for ETT and ETR at WMECO.
- NH DE Order DE-09-035, Order No. 25, 123 specifies annual spend and program requirements for risk tree removal, distribution ROW reclaim.

There are both operational and regulatory risks associated with a failure to approve these programs. Operationally, there is an increased risk of more vegetation caused outages, both on normal days and during adverse weather. The Company is required to report on both program pruning cost and volume and

risk/hazard tree removals on an annual basis in all three states. The Vegetation Management programs also receive intense scrutiny during storm cost recovery hearings and rate case proceedings, creating a regulatory risk for the Company.

Financial Evaluation

Provide the following financial information (attach additional detail if summarized items are significant or additional information is needed). Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor				
Overtime Labor				
Outside Services	94,171.9			94,171.9
Materials				
Other, including contingency amounts (describe)				
Total				

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	1,434.1			1,434.1
Capitalized interest or AFUDC, if any				
Total				

Total Capital Costs	95,606.0			95,606.0
Less Total Customer Contribution				
Total Capital Project Costs	95,606.0			95,606.0
Total O&M Project Costs				

Note: Explain unique payment provisions, if applicable

If this is a new business project, is a customer contribution required? If yes, please note the contribution amount.

In addition, for all electric and gas growth / new business projects, please attach the CIAC calculation

Provide other financial documentation as warranted by management and / or regulatory precedent. When performing financial analysis, use appropriate discount rate by company (can be provided by Budgeting and Internal Reporting or Financial Planning and Analysis).

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? Vegetation Management_____
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):

An ARO is a current legal obligation to remove or retire property, plant or equipment at some point in the future. Please refer to APS8 or contact Plant Accounting for further detail.

Is there an ARO associated with this project? If yes, please provide details:

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--031 **Page 1 of 1**

Request from: Department of Energy

Witness: Johnson, Russel D

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Southern Region 2015 DA No. A15SDA

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-31 for the PAF for this project.

PSNH
2015 Capital Construction Budget
Project Authorization Form

Project Title:	PSNH 2015 DA Poletop Program				
Business Group:	Distribution		**Project Area:**	Statewide	
Project Category:	Reliability		**Project ID:**	A15EDA, A15CDA, A15NDA, A15SDA	
Project Cost:			**Budgeted** ☑	**Unbudgeted** ☐	
Current Year	**Capital:**	$6,742,423	**Expense:**	$0	
Total Project	**Capital:**	$6,742,423	**Expense:**	$0	
Start Date: (mm/yy)		Jan-15	**In-service Date: (mm/yy)**		Dec-15
Project Initiator:	PSNH DA plan				
Project Owner/Manager	Brian Dickie				

Project Description:

Project includes the following:
Installation and comissioning of the following:
Eastern - Installation and commissioning of 4 SCADA devices on the 34.5 kV system
Central - Installation and commissioning of 25 SCADA devices on the 34.5 kV system
Northern - Installation and comissioning of 59 SCADA devices on the 34.5 kV system and
Installation of 3 12.47 kV SCADA devices at Lancaster substation
Southern - Installation of 21 12.47 kV SCADA devices at Scobie, High, and Ash Street substations
All associated line work deemed to be minor in detail to support the DA deployment

Project Justification:

Problem Statement

• *Program is part of the long term Distribution Automation strategy. There are 4 sub-projects in 2015 focused on the Easterm, Central, Northern and Southern areas.*

Project Objectives

Increase system awareness
Increase reliability
Increase customer satisfaction
Decrease large customer impacts per single outage event and outage duration

PSNH 2015 Capital Construction Budget Project Authorization Form

(co plete if over $200K Capital, including contingency and indirects

Risk: (describe the risk of not doing the work)

• Not completing the PSNH DA strategy

*continued reliability issues associated with large single contingency outage events

Benefit:

*System reliability increase

*Customer satisfication will increase

*efficiencies in line operations and increased system awareness

Alternatives Considered: (if applicable)

N/A

Financial Evaluation: (Describe the project schedule and milestones)

Ongoing yearly five year project

devices installs complete by May 30, 2105.

SCADA comissioning by October 2015

Direct Capital Costs	Year 1	Year 2	Year 3	Total Direct Capital Costs
NU Labor	$738,000			$738,000
Contract Labor	$180,000			$180,000
Outside Services	$0			$0
Materials & Supplies	$3,405,800			$3,405,800
Other (Fees & Payments, Rents & Leases, Emp Exp, Salvage)	$66,990			$66,990
Contingency				$0
Total	$4,390,790	$0	$0	$4,390,790

Indirect Capital Costs	Year 1	Year 2	Year 3	Total Indirect Capital Costs
Benefits	$484,592			$484,592
Loaders	$1,328,262			$1,328,262
AFUDC	$38,230			$38,230
Other	$500,549			$500,549
Total	$2,351,633	$0	$0	$2,351,633

Total Capital Costs	$6,742,423	$0	$0	$6,742,423
Total O&M Costs				$0

Other Comments:

Project Approval Form - CBRC 2015

Project # A15EDA, A15CDA, A15NDA, A15SDA	**Project Title:** PSNH 2015 DA Poletop Program	**Revision #** 0-14	**Revision Date:**
Final ISD: Dec-15	**Project Mgr:** Brian Dickie	**Business Group:** Distribution	

Project Description and Justification:

Project includes the following:
Installation and comissioning of the following:
Eastern Installation and commissioning of 4 SCADA devices on the 34 5 kV system
Central - Installation and commissioning of 25 SCADA devices on the 34.5 kV system
Northern - Installation and comissioning of 59 SCADA devices on the 34.5 kV system and Installation of 3 12.47 kV SCADA devices at Lancaster substation
• Program is part of the long term Distribution Automation strategy. There are 4 sub projects in 2015 focused on the Easterm, Central, Northern and Southern areas.

Increase system awareness
Increase reliability
Increase customer satisfaction
Decrease large customer impacts per single outage event and outage duration

Financial Evaluation: Project Schedule and Milestones: (if over $200K)

Ongoing yearly five year project
devices installs complete by May 30, 2105.
SCADA comissioning by October 2015

All $ in (x000)	Prior	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	CY Total	Future	Proj Total
Capital/Removal																
Trustee Approved	0.0	764.0	759.0	759.0	924.0	924.0	924.0	439.0	414.0	401.0	356.0	78.0	0.0	6,742.0	0.0	6,742.0
Proposed	0.0	764.0	759.0	759.0	924.0	924.0	924.0	439.0	414.0	401.0	356.0	78.0	0.0	6,742.0	0.0	6,742.0
Difference	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

Approval Summary	CY Total	Proj Total
Trustee Approved	6,742.0	6,742.0
Proposed	6,742.0	6,742.0
Difference	0.0	0.0
% + inc / dec	0%	0%

First Level Approval	Brian Dickie	Date: 01/06/15
VP PSNH Engineering	Paul E. Carpenter	Date: 1/6/15
PSNH President	William H. Smagula	Date: 1/7/15
CBRC Chairman		Date:

Cost Estimate	Estimate Date	Estimate Source

Capital Project Status

FUT - Order of magnitude estimate for feasibility and planning studies
ENG Scope defined, pre engineering to develop a WO estimate and order materials
ACT - Project Total defined, Work Order written for full scope of work
Final Actual Project Cost when closed

EVERSOURCE

APS 1 - Project Authorization Policy

Supplement Request Form

Date Prepared: 10/2/17	Project Title: Southern Region 2015 DA
Company/Companies: NH	Project ID Number: A15SDA
Organization: NH Engineering	Plant Class/(F.P.Type): Distribution
Project Initiator: Ryan West	Project Type: Specific
Project Manager: Lee Lajoie	Capital Investment Part of Original Operating Plan? N
Project Sponsor: James Eilenberger	O&M Expenses Part of the Original Operating Plan? N
Current Authorized Amount: $1,157,000	Estimated in service date(s): 12/31/2017
Supplement Request: $2,313,000	Other:
Total Request: $3,470,000	

Supplement Justification

Supplement Request Forms must be completed for projects in accordance with the Project Authorization Policy and approval levels in the Delegation of Authority Policy (DOA) as follows:

For Corporate Shared Services Projects:
For projects $500K to $10M - An increase in total authorized cost > 15% or;
For projects > $10M - An increase in total authorized cost > $1.5M

For Distribution Operations Projects:
For projects <= $250K - An increase in direct costs >= $25K or;
For projects >$250K - An increase in direct costs >10%

For Transmission Operations Projects:
For projects <= $500K – An increase in total authorized cost >= $75K
For projects $500K to $16.5M- An increase in total authorized cost > 15% or;
For projects > $16.5M - An increase in total authorized cost > $2.5M

Justification for Additional Resources

In this section, please provide a detailed and comprehensive justification for the additional resources. Please include, scope changes, dollar changes, the reasons for the changes, etc.

In addition, please attach a copy of the prior authorized PAF as reference

Total Request figure of $3,470,000 reflects total anticipated expenditures to meet targeted installations of pole top Distribution Automation devices in Southern Region under Base Budget. When this project was approved, the Company expected the REP to be extended at its existing funding level through the end of 2017. In July of 2017 the NHPUC approved a funding level for REP for the remainder of 2017 at half its previous level. In order to maintain the pole top DA installations at the planned level, the decision was made to change the funding source for non-REP installations to base budget. Original Authorized Amount did not include funding for installations in the July 1 2017 to December 31, 2017 time period. Expenditures have been approved as part of the capital budget tracking process.

EVERSOURCE

APS 1 - Project Authorization Policy

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 1,157	$ 1,781	$ 2,938
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	-	-
Total Direct Spending	$ 1,157	$ 1,781	$ 2,938
Capital Additions - Indirect	-	509	509
AFUDC	-	23	23
Total Capital Request	$ 1,157	$ 2,313	$ 3,470
O&M	-	-	-
Total Request	**$ 1,157**	**$ 2,313**	**$ 3,470**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2017	Year 20__	Year 20__+	Total
Capital Additions - Direct	$ 1,781	$ -	$ -	$ 1,781
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	-	-	-	-
Total Direct Spending	$ 1,781	$ -	$ -	$ 1,781
Capital Additions - Indirect	509	-	-	509
AFUDC	23	-	-	23
Total Capital Request	$ 2,313	$ -	$ -	$ 2,313
O&M	-	-	-	-
Total Request	**$ 2,313**	**$ -**	**$ -**	**$ 2,313**

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--032 **Page 1 of 1**

Request from: Department of Energy

Witness: Plante, David L

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Laconia SS Equipment Repl No. A17N18

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-32 for the PAF for this project.

EVERSOURCE
APS 1 - Project Authorization Policy

Operations Project Authorization Form

Approved at March 06, 2019 EPAC
Link to Meeting Minutes

Date Prepared: February 20, 2019	**Project Title: Laconia SS Equipment Replacement**
Company/ies: Eversource NH	**Project ID Number: A17N18**
Organization: NH Operations	**Class(es) of Plant: Distribution Substation**
Project Initiator: Thelma Brown	**Project Category: Stations – Breakers, Stations - Switches**
Project Manager: Sam Harris	**Project Type: Specific**
Project Sponsor: John Zicko	**Project Purpose: Replace OCB and Capacitor Switch at Laconia SS due to aging infrastructure**
Estimated in service date: 6/1/2020	**If Transmission Project, PTF/Non-PTF: N/A**
Eng. / Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan: Yes**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan: No**
Total Request: $3,550,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This PAF requests full funding of $3,550,000 for the replacement of six (6) Oil Circuit Breakers (OCBs) and a Capacitor Switch at Laconia SS in Laconia, NH. This project was approved for preliminary engineering in the amount of $400,000 on July 20,2017 in PowerPlan. The 30% phase of Engineering is complete and $199K has been spent to date through February 20, 2019. Construction is scheduled to begin in 3rd Quarter 2019.

This project is to replace aging equipment at Laconia SS. This includes six OCBs and a capacitor bank switch. These types of equipment have been targeted for removal and replacement from the Eversource NH system.

There is an OCB replacement program A19X36. This project which was originally approved in 2017 is not included in that program but funded separately.

A Constructability Review has been completed to validate the scope of work for this project. ESCC and System Planning have reviewed this, and an O&E plan has been submitted. The outages have been submitted in the TOA system.

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APS 1 - Project Authorization Policy

Project Costs Summary
Note: Dollar values are in thousands

	Prior Authorized	Spend to Date	2019 (remaining)	2020	Totals
Capital Additions - Direct	$360	$102	$1,025	$1,633	$2,760
Less Customer Contribution	$0	$0	$0	$0	$0
Removals net of Salvage __%	$0	$19	$66	$0	$85
Total - Direct Spending	$360	$121	$1,091	$1,633	$2,845
Capital Additions - Indirect	$39	$78	$223	$254	$555
Subtotal Request	$399	$199	$1,314	$1,887	$3,400
AFUDC	$1	$0	$46	$104	$150
Total Capital Request	$400	$199	$1,360	$1,991	$3,550
O&M	$0	$0	$0	$0	$0
Total Request	$400	$199	$1,360	$1,991	$3,550

Financial Evaluation
Note: Dollar values are in thousands

Direct Capital Costs	Spend to Date	2019 (remaining)	2020	Totals
Straight Time Labor	$27	$40	$21	$88
Overtime Labor	$0	$0	$0	$0
Outside Services	$94	$902	$1,130	$2,140
Materials	$0	$145	$348	$493
Other, including contingency amounts (describe)	$1	$4	$134	$139
Total Direct Costs	**$121**	**$1,091**	**$1,633**	**$2,845**
Indirect Capital Costs	**2018**	**2019**	**2020**	**Totals**
Indirects/Overheads (including benefits)	$78	$223	$254	$555
Capitalized interest or AFUDC, if any	$0	$46	$104	$150
Total Indirect Costs	**$78**	**$269**	**$358**	**$705**
Total Capital Costs	**$199**	**$1,360**	**$1,991**	**$3,550**
Less Total Customer Contribution	$0	$0	$0	$0
Total Capital Project Costs	**$199**	**$1,360**	**$1,991**	**$3,550**
Total O&M Project Costs	$0	$0	$0	$0

Note: Explain unique payment provisions, if applicable:

Contingency/Risks include: potential underground obstructions ($50,000) and canceled outages/storms/delays ($75,000). The remaining other costs include: taxes, permits, mileage, and employee expenses ($14K).

EVERSOURCE
APS 1 - Project Authorization Policy

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? N/A

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	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:
N/A

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: No

Technical Justification:

Project Need Statement

This project is to replace equipment at Laconia as defined by specific programs established to replace 34.5kV Oil Circuit Breakers (OCBs) (Project A07X44A) and 34.5kV Capacitor Bank Switches (Project UB0830). The equipment being replaced includes six (6) OCBs at Laconia SS. This will also eliminate 23 Type U-Bushings that contain PCB oil from the system.

The program for 34.5kV Substation Breaker Replacement is a specific program that was established in 2007. Seventy-eight (78) OCBs have been removed from the system since this program started, either with funding from this program or as a part of larger projects at the substations. There are 91 OCB remaining on the Eversource NH system scheduled for removal and/or replacement over the next ten years. A NH OCB Replacement Program Level PAF and Release PAFs will address most of the remaining replacements.

The Laconia SS 34.5kV capacitor bank switch has failed and requires replacement. This is one of the switches targeted by the program for 34.5kV Capacitor Bank Switch Replacements (Project UB0830) established in 2008. At that time twenty-one (21) vacuum switches were identified for replacement and prioritized based on age, condition, operating problems and uniqueness. Seven (7) have been removed from the system since this program started either with funding from this program or as a part of larger projects at the substations. A Capacitor Switch Replacement Program Level PAF and Release PAFs will address most of the remaining replacements.

Project Objectives

The overall project objectives are to replace obsolete equipment to increase system reliability, increase employee safety, and reduce maintenance intervals. The following proposed replacements include:

1. Oil Circuit Breaker Replacement:

Replacement of six 34.5kV OCB at Laconia SS. These breakers and their priority rating of the 91 OCB remaining are:

Breaker	Age (years)	Priority (1)	# U-Bushings
OCB 310	42	43	6
OCB 3680	42	44	
OCB TB125	42	45	6
OCB TB24	42	46	
OCB 3222	42	53	5
OCB 3980	42	54	6

(1) Oil Circuit Breaker (OCB) priority is based on a current list of 91 OCB scheduled to retire over the next 10 years. Those with Type U-Bushings are also targeted for earlier replacement. All six of the breakers at Laconia SS are scheduled for replacement to take advantage of construction efficiencies.

2. Capacitor Bank Switch Replacement

This project is to replace the 34.5kV capacitor bank switch and associated equipment targeted for replacement at Laconia SS. The Joslyn VBM existing switch has failed and is out of service. The 34.5kV capacitor bank protection and control scheme will be replaced as part of this project.

Project Scope

The project scope includes replacement of the following equipment:

Major Equipment To Be Removed (See Figure – One-Line Removals)

1. Six (6) 38kV Oil Circuit Breakers
2. Five (5) 34.5kV Potential Transformers (PTs)
3. Eighteen (18) 34.5kV Lightning Arresters (LAs)
4. Twelve (12) 34.5kV Breaker disconnect switches
5. One (1) 34.5kV Joslyn Vacuum Switch
6. One (1) Relay and Relay Cabinet
7. Three (3) fuse disconnect switches
8. Control Cables
9. A deteriorated relay and control junction box in the yard
10. Existing Capacitor Switch support structure

Major Equipment To Be Added (See Figure – One-Line Additions)

1. Six (6) 38kV Siemens Type SDV7 Vacuum Breakers
2. Five (5) PTs
3. Twelve (12) LAs
4. Thirteen (13) sets Disconnect Switches
5. One (1) SF6 Southern States Capacitor Switch
6. Six (6) Current Transformers (part of Capacitor Switch)
7. Five (5) Bus PTs
8. One (1) Capacitor Bank Control Cabinet
9. Control Cables

10. Trench and conduits, as required
11. Ground grid upgrades and modifications as required
12. 34kV Breaker foundations, cap switcher foundation, PT stand foundation
13. Animal Protection systems
14. A relay and control junction box in the yard
15. HVAC for the control house
16. Various wire, mounting brackets and connectors
17. Labeling of new and existing equipment

The full scope of work includes construction of the project including testing and commissioning of new systems.

Background / Justification

The program for 34.5kV Substation Breaker Replacement is a specific program established in 2007 to remove OCBs from the Eversource system. The oldest 34.5kV OCB is 69 years old with the youngest OCB at 32 years old. Many of the breakers are one of a kind on the system and the maintenance and repair of older breakers can be problematic.

When the program was started several things were examined to evaluate and prioritize the replacement of the breakers. In addition to age, each breaker was rated based on: 1) the number of same unit models or uniqueness; 2) if there are issues with maintenance such as no parts available because of age; 3) known maintenance issues particular to the unit; and 4) number of customers fed from the breaker which would lose power in the event of a failure. An additional emphasis has also been placed on the removal of type U-Bushings from the system. A failure of the breaker could spread PCB oil from the U-Bushing which would require environmental cleanup and associated costs.

Based on ranking, this program prioritizes the replacement of OCBs. Another consideration is if there is a major project planned in the substation which can include OCB replacements. This project is focusing on replacing all six OCB at Laconia SS. This is considered a cost-effective way of addressing the OCB replacement.

The program for 34.5kV Capacitor Bank Switch Replacements is a specific program established in 2008. The Laconia SS capacitor bank switch has failed and requires replacement. The availability to switch this capacitor bank by the ESCC is required for summer peak loading.

HVAC is being added to the control house as a part of this project. Climate control is recommended for existing control houses when constructing major projects in order to address temperature and humidity conditions that will improve the long-term performance of electronic equipment such as relays, SCADA, telecommunication, etc. The HVAC will meet the requirements of SUB 022.5 standard including having a hydrogen sensor.

Business Process and / or Technical Improvements:

Replacement of obsolete OCB equipment prior to failure will improve system reliability and decrease environmental risk while benefiting customers. This benefit will be realized by replacing aging oil filled equipment, which presents an environmental concern. The maintenance on the OCBs is more than on vacuum OCBs thereby resulting in new equipment with less maintenance costs. This reduces the need to maintain spare parts for multiple types of breakers. Failure of the capacitor switch limits the operation of the system. The ESCC uses capacitor banks during high load periods to control the system losses, distribution voltage and transmission voltage. Replacement of the capacitor switch will increase system reliability.

Alternatives Considered with Cost Estimates

The alternative to targeting a specific substation is to wait for another capital project and address OCB or capacitor switch replacement at that time. The expectation is that there is cost savings by targeting multiple 34.5kV circuit breakers and other equipment in a substation.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Full Funding approval	March 15, 2019
Engineering IFC	July 1, 2019
Material Procurement – Start 4/1/19	November 1, 2019
Permitting – Start 4/1/19	September 1, 2019
Construction – Start 9/1/19	June 1, 2020

Regulatory Approvals

Permitting required by the Laconia Planning Board.

Risks and Risk Mitigation Plans

Outage cancelled due to unplanned events on the system resulting in schedule delay and potential labor cost to remobilize.

- Be flexible – review with contractors to determine availability.
- Build float time into the construction schedule.

SCLL Conditions

- Utilize existing circuit ties as part of project scope

- Schedule outages during light load period
- Keep schedule flexible to work with ESCC and limit restoration times

References
N/A

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

- Figure - One-line Removals
- Figure - One-line Additions
- TAF NH 170033 Laconia SS Equipment Replacement
- Detailed Backup Cost Estimate

EVERSOURCE
Project Authorization Form

Project Checklist – Transmission and Substation

INSTRUCTIONS:
It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project						
Project Name: Laconia SS Equipment Replacement			**Project ID Number: A17N18**			
Facility Type: ☐ BPS	☐ BES	☐ PTF	☒ non-PTF	☐ CIP	☒ Distribution	
PLANNING						
Is a NX-9 required?					No	
Is an ISO-NE PAC presentation required?					No	
Is a PPA required?					No	
Is a TCA Application Required?					No	
PLANNING/PROTECTION & CONTROLS						
Are RAS/SPS/UVLs affected?					No	
OPERATIONS						
Outage Required?	☒ Primary Equipment (Power Transfer)		☒ Secondary Equipment (P&C only)		☐ Outage Not Required	
Do SCLL Conditions Exist?					Yes	
Has an outage schedule been approved?					No	
Are Operations & Maintenance procedures/training required?					No	
STANDARDS						
Does the project include standard equipment and designs?					Yes	
SUBSTATION ENGINEERING						
Does this impact Revenue Metering					No	
Is preliminary short circuit/ breaker duty analysis required?					No	
Are there any changes to the baseline audible noise?					No	
Is there an impact to the existing ground grid?					No	
Is a Transient Over Voltage (TOV) analysis required?					No	
P&C ENGINEERING						
OP-22 - Are PMUs and DDR required?					No	
If BPS, is an NPCC Directory #4 presentation required?					No	

EVERSOURCE
Project Authorization Form

Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name: Laconia SS Equipment Replacement	**Project ID Number: A17N18**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	Yes
SITING & CONSTRUCTION SERVICES (OUTREACH)	
What is the level of outreach expected?	Low
INITIATOR	
Has a field constructability review been completed?	Yes
INVESTMENT RECOVERY	
Does the project require development of an Investment Recovery plan?	No
COST ESTIMATING	
How was the cost estimate prepared?	Estimate was prepared by the Eversource Estimating Team
Who prepared the estimate?	Craig Scrivano
Was the estimate reviewed by Eversource Estimating?	Yes

Cost Estimate Backup Details

ESTIMATE SUMMARY

Project Title: Laconia 34.5V Replace OCB's with VCB's

Project Mgr/Lead: S. Harris

Project Number: AN17N18

Est. Revision # 00

Estimate By: CSS

Date of Estimate: 01/28/2019

ISD: 06/30/20

Estimate # P-18-418

ESTIMATE SUMMARY

Estimate Type: Planning

	TOTAL	% of Total	Prior	2019	2020	2021	2022	2023
Construction	$1,203,295	33.9%		$412,308	$790,987			
Engineering / Design	$260,142	7.3%	$102,000	$149,771	$8,371			
Land								
Material	$460,054	13.0%		$138,016	$322,038			
Project Mgmt. & Sppt.	$23,760	0.7%		$12,960	$10,800			
Removal	$85,000	2.4%	$19,000	$66,000				
Test	$564,000	15.9%		$282,000	$282,000			
Risk / Contingency	$125,000	3.5%			$125,000			
Escalation	$123,591	3.5%		$29,853	$93,737			
Indirects	$554,541	15.6%	$78,000	$222,740	$253,801			
AFUDC	$150,110	4.2%		$46,103	$104,007			
Total Cost	**$3,549,493**	100.0%	**$199,000**	**$1,359,752**	**$1,990,741**			
Estimate Range	**-25%**		**25%**					
	$2,660,000		**$4,440,000**					

COMMENTS:

Project Scope:
Replace six (6) 34.5kV oil circuit breakers and C29 capacitor circuit switcher at Laconia substation.
The six breakers, 3680,310,3222,3980, TB24 and TB125 will be replaced with six new vacuum breakers
Replace the associated disconnect switches (13), LA's (12) and PT's/CT's (11).
Replace C29 capacitor vacuum circuit switcher, CT's, fuse disconnect and relays.
Upgade the control house HVAC by replacing the existing HVAC unit.
Relocate C29 Capacitor Bank
Replace the bus differential junction box.
Replace equipment labels as needed during each outage.

Assumptions/Clarifications;
Indirect rates based on; 6D - NH , Station work
Engineering in house, construction and test by vendor.
Based on four weeks construction per breaker and circuit switcher
Construction representative for twenty eight weeks is included.
Snow plowing is included in the equipent allowance.

RISKS

Potential UG Obstructions	$ 50,000
Severe Weather, Delays, OT	$ -
Contractor Change Orders	$ -
Standby due to cancelled outage	$ 75,000

Project Number: AN17N18

Project Title: Laconia 34.5V Replace OCB's with VCB's

Escalated Line Item Dollars

Project Number: AN17N18
Date of Estimate: 01/28/2019
Est. Revision # 00

			Prior		2018		2019		2020		TOTAL	
			Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS
CSTXX-CONSTRUCTION	R											
Electrical Construction	LT											
General Construction	LT											
Transmission Automation	LT											
Construction Reps	LT											
Support Switch/Tag	LT						40	$2,060	40	$2,122	80	$4,182
LT Total							40	$2,060	40	$2,122	80	$4,182
Employee Expenses	AE	5%						$103		$106		$209
Construction Purchased Material	AM	1%						$2,636		$6,334		$8,970
Outside Construction Vendor	AO						1,560	$263,539	3,816	$333,370	5,165	$596,912
Sales tax on Constr. Vendor		10.0%						$26,354		$63,339		$89,692
Vehicles	AV	10%						$204		$212		$416
BHI Construction Rep (vendor)	AO						840	$129,780	840	$133,673	1,680	$263,453
Rents and Leases	BR											
CSTXX Subtotal								$424,678		$539,158		$1,263,836
Escalation inc above					$	-		$ -		$ -		$ -
Contingency & Risk	P1									$132,613		$132,613
CSTXX Total							2,480	$424,678	4,496	$671,771	6,925	$1,396,449
ENRXX-TG ENGINEERING/DESIGN												
Project Services/Drafting	LT						40	$2,060	10	$530	50	$2,590
Transmission Engineering/Design	LT											
Civil Engineering/Design	LT						35	$1,803	5	$265	40	$2,068
Substation Engineering/Design	LT			$27,000			200	$10,300	40	$2,122	240	$39,422
Distribution SS Engineering/Design	LT											
Protection & Controls Engineering	LT						200	$10,300	40	$2,122	240	$12,422
Survey Engineering	LT											
Telecom Engineering	LT						20	$1,545	60	$3,183	80	$4,728
LT Total				$27,000			495	$26,008	155	$8,222	650	$61,230
Employee Expenses	AE	5%						$1,301		$412		$1,713
Contractor Engineering Inc sales tax	AO			$75,000				$126,175				$201,175
Vehicles	AV	3%						$781		$247		$1,028
ENRXX Subtotal			-	$102,000	-		695	$154,265	155	$8,881	850	$265,146
Escalation inc above												
Contingency	P1											
ENRXX Total				$102,000			695	$154,265	155	$8,881	850	$265,146
LNDXX-TG LAND												
Real Estate	LT											
Employee Expenses	AE	5%										
Purchase Land	AM											
Vehicles	AV	3%										
Fees and Payments	BR											
LNDXX Subtotal			-		-		-		-		-	
Escalation inc above												
Contingency	P1											
LNDXX Total							-		-		-	
MATXX-TG MATERIAL												
Eversource	AM											
Outside Services	AM							$142,157		$341,650		$483,807
	AM											
Freight												
Sales Tax												
Other												
MATXX Subtotal								$142,157		$341,650		$483,807
Escalation inc above												
Contingency	P1											
MATXX Total								$142,157		$341,650		$483,807
PSMXX-PROJECT MANAGER & SUPPORT												
Project Planning	LT						48	$2,472	40	$2,122	88	$4,594
Project Management	LT						192	$9,888	160	$8,487	352	$18,375
Contracts/Purchasing	LT											
Legal	LT											
Transmission Planning	LT											
Environmental	LT											
LT Total							240	$12,360	200	$10,609	440	$22,969
Employee Expenses	AE	5%						$618		$530		$1,148
Legal Vendor	AO											
Project Support Vendor Inc Sales Tax	AO				-		-		-		-	
Vehicles	AV	3%						$371		$318		$689
Indirect allowance for Property tax true-up	BR											
Fees and Payments	BF											
PSMXX Subtotal			-		-		240	$13,349	200	$11,457	440	$24,806
Escalation inc above												
Contingency	P1											
PSMXX Total			-		-		240	$13,349	200	$11,457	440	$24,806
REMXX-TG REMOVAL												
Engineering/Design	LT											
General Construction	LT											
LT Total												
Employee Expenses	AE	15%										
Outside Services Inc Sales Tax	AO											
Contractor Labor Inc sales Tax	AO			$19,000				$66,000				$85,000
Vehicles	AV	10%										
Rents and Lease	BR											
REMXX Subtotal			-	$19,000	-		-	$66,000	-		-	$85,000
Escalation inc above												
Contingency	P1											
REMXX Total			-	$19,000	-		-	$66,000	-		-	$85,000
TSTXX-TG TEST												
Test Labor-In House	LT											
Employee Expense	AE	10%										
Contractor Test Labor	AO						1,200	$185,400	1,200	$190,962	2,400	$376,362
Lead Commissioning Engr. (LCE)	AO						600	$105,060	600	$108,212	1,200	$213,272
Vehicles	AV	10%										
TSTXX Subtotal								$290,460		$299,174		$589,634
Escalation inc above												
Contingency	P1											
TSTXX Total							1,800	$290,460	1,800	$299,174	3,600	$589,634
TOTAL PROJECT DIRECT COST			-	**$121,000**	-		**4,975**	**$1,999,809**	**6,651**	**$1,632,933**	**11,625**	**$2,844,842**
INDIRECTS												
Non-Productive Time Allocation (ZB)	58	13%						$5,256		$2,724		$7,980
Payroll Benefits Allocation (ZE)	59	34%						$15,642		$8,107		$23,749
Gen SVC CO Overhead Allow (ZF)	60											
E&S Allocations (ZI)	61	20%		$78,000				$166,839		$197,959		$442,799
AS&E Allocations (ZJ)	62	1%						$6,404		$9,209		$15,613
Stores Expense Allocation (ZC)	6Z	13%										
Lobby Stock Basis		20%										
MDEC Basis		3%						$17,796		$30,204		$48,000
Vehicles OH Basis		27%						$10,803		$5,598		$16,401
AFUDC (ZK)	63	9%						$46,103		$104,007		$150,110
Indirects Subtotal				$78,000				$268,843		$357,808		$764,651
TOTAL PROJECT COST			-	**$199,000**	-		**4,975**	**$1,350,752**	**6,651**	**$1,990,741**	**11,625**	**$3,549,493**

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PAF (dollars in thousands)

	Prior Authorized	2018	2019	2020	2021	2022	2023	Totals
Capital Additions - Direct	$ 102	$ -	$ 1,025	$ 1,633	$ -	$ -	$ -	$ 2,760
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Removals net of Salvage ____%	$ 19	$ -	$ 66	$ -	$ -	$ -	$ -	$ 85
Total - Direct Spending	$ 121	$ -	$ 1,091	$ 1,633	$ -	$ -	$ -	$ 2,845
Capital Additions - Indirect	$ 78	$ -	$ 223	$ 254	$ -	$ -	$ -	$ 555
Subtotal Request	$ 199	$ -	$ 1,314	$ 1,887	$ -	$ -	$ -	$ 3,399
AFUDC	$ -	$ -	$ 46	$ 104	$ -	$ -	$ -	$ 150
Total Capital Request	$ 199	$ -	$ 1,360	$ 1,991	$ -	$ -	$ -	$ 3,549
O&M	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Request	$ 199	$ -	$ 1,360	$ 1,991	$ -	$ -	$ -	$ 3,549

Direct Capital Costs	Prior Actuals	2018	2019	2020	2021	2022	2023	Total
Straight Time Labor	$ 27	$ -	$ 40	$ 21	$ -	$ -	$ -	$ 88
Overtime Labor	$ -	$ -						$ -
Outside Services	$ 94	$ -	$ 902	$ 1,130	$ -	$ -	$ -	$ 2,126
Materials	$ -	$ -	$ 145	$ 348	$ -	$ -	$ -	$ 493
Other – Vehicles, expenses, Contingency	$ -	$ -	$ 3	$ 134	$ -	$ -	$ -	$ 138
Total	$ 121	$ -	$ 1,091	$ 1,633	$ -	$ -	$ -	$ 2,845

Indirect Capital Costs		2018	2019	2020	2021	2022	2023	Total
Indirects/Overheads (including benefits)	$ 78	$ -	$ 223	$ 254	$ -	$ -	$ -	$ 555
Capitalized interest or AFUDC, if any	$ -	$ -	$ 46	$ 104	$ -	$ -	$ -	$ 150
Total	$ 78	$ -	$ 269	$ 358	$ -	$ -	$ -	$ 705

Total Capital Costs	$ 199	$ -	$ 1,360	$ 1,991	$ -	$ -	$ -	$ 3,549
Less Total Customer Contribution	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ 199	$ -	$ 1,360	$ 1,991	$ -	$ -	$ -	$ 3,549
Total O&M Project Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

\\nu.com\data\SharedData\Estimating-R\2) Estimates_2018\P-18-418 Laconia VCB Switches and Cap Bank\01) Estimate Summary\01) Current\[Laconia OCB's Rev7 022719.xlsx]PAF summary

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--033 **Page 1 of 1**

Request from: Department of Energy

Witness: Johnson, Russel D

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

CAIDI Improvement No. A16X04

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-33 for the PAF for this project.

Project Authorization Form

General Information

Date Prepared: 03/16/2016	Project Title: CAIDI Improvement
Company: Eversource NH	Project ID Number: A16X04
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Russel Johnson	Project Category: Reliability
Project Owner/Manager: Marc Geaumont	Project Type: Specific
Project Sponsor: Joseph Purington	Project Purpose: part of regulatory tracked program? N
Estimated in service date: 12/31/2016	Capital Investment Part of Original Operating Plan? Y
If Transmission Project: N/A	Supplement to Existing Authorization? N
	O&M Expenses Part of the Original Operating Plan? Y

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project will support the completion of work to address situations that have the potential to negatively impact CAIDI. The objective of the identified projects is the reduction of restoration times based on operational circumstances. This will include locations that are difficult to access, patrol, and/or repair resulting in extended outages.

Project Costs Summary

Note: Dollar values are in thousands

	2016	2017	2018	Totals
Capital Additions - Direct	$1,000	$0	$0	$1,000
Customer Contribution	$0	$0	$0	$0
Removals net of Salvage	$0	$0	$0	$0
Total - Direct Spending	$1,000	$0	$0	$1,000
Capital Additions - Indirect	$0.00	$0	$0	$0
Subtotal Request	$1,000	$0	$0	$1,000
AFUDC (half-year convention)	$11	$0	$0	$11
Total Request	$1,011	$0	$0	$1,011

Summary Project Description

This project will support the completion of work to address situations that have the potential to negatively impact CAIDI. This will include locations that are difficult to access, patrol, and/or repair resulting in extended outages. Typical jobs include relocating narrow off-road shunts to the roadway.

Projects have been identified for the 377X7, 360X2, 14X126A, 313, 3615x2 and 32W3 circuits to relocate approximately 14,000 feet of three-phase primary conductor from off-road shunts to accessible, roadside locations. There are greater than 1,200 total customers that are at risk of being impacted by long duration outages associated with any repairs needed in the difficult to access off-road locations on these six circuits.

The 377X7 tap has a section that is off road near the beginning of the tap off of Ladd's Lane, Epping. Outages in this section are problematic because crews cannot access this portion of the circuit with standard equipment. This project would move off road shunt onto Rte 27. The length of new span would be 2000 feet and the project cost would be $315,000. There are 643 customers beyond these off-road sections. The total cost of this project is estimated to be $215,000

The 360X2 circuit has 1,250 feet of copper primary in a shunt off of Greer Road, Goffstown that feeds 33 customers, including the Goffstown Police Department and the State Prison for Woman. Outages in this section are problematic because crews cannot access this portion of the circuit with standard equipment. This project would move this off-road shunt onto Mast Road. The total cost of this project is estimated to be $100,000.

The 14X126A circuit has 2,000 feet of primary conductor in a shunt off of Karatzas Avenue, Manchester that feeds 11 customers. Outages in this section are problematic because crews cannot access this portion of the circuit with standard equipment. This project would move this off-road shunt onto Karatzas Avenue. The total cost of this project is estimated to be $25,000.

The 313 circuit has 17 sections of overhead primary conductor in a shunt which feeds Monadnock Paper. Outages in this section are problematic because crews cannot access this portion of the circuit with standard equipment. This project would install approximately 900' of new underground conductor to retire the move this off-road shunt. The total cost of this project is estimated to be $150,000.

The 3615x2 circuit has 7 sections of overhead primary conductor in a shunt off of Old Candia Road in Auburn. Recent outages have been difficult to find and repair and abbuters are not allowing adequate tree trimming. The total cost of this project is estimated to be $170,000.

The 32W3 circuits main line runs through a wetland shunt and it is problematic to access. This project would relocate portions of this circuit along the roadside (includes 4,260' of new main line construction), relocate the 32W3J1 from A Street to Franklin Street Ext for DA purposes. Recent outages have been difficult to find and repair and abbuters are not allowing adequate tree trimming. The total cost of this project is estimated to be $340,000.

Note: Dollar values are in thousands

	Total Project Costs	Amount in Operating Plan	Difference
Capital	$1,011	$1,011	$0
O&M	$0	$0	$0
Total	$1,011	$1,011	$0

Project Authorization

Approver	Approver Name	Approver Signature	Date
Project Initiator	Russel Johnson		
Project Manager	Marc Geaumont		
Manager	Eric Sutton		
Plant Accounting	Michele Roncaioli		
Director	Marc Geaumont		
Vice President	Joseph Purington		
President	William Quinlan		

Overall Justification

Typically cost per saved customer minute is used to evaluate proposed reliability projects. For some projects this measure does not justify the project based on the number of customers impacted or the frequency at which events occur, however, the difficulty to access and make repairs results in extended outages impacting customer satisfaction and CAIDI metrics.

Project Scope

This project will include relocating narrow off-road shunts to road-side as well as other projects which address events that negatively impact CAIDI.

Project Objectives

Eliminate situations that result in extended outages to customers that generally don't meet the cost per saved customer minute criteria.

Business Process and / or Technical Improvements:

Improve CAIDI, customer satisfaction. Moving span to roadside would allow line crews access without having to call in off-road crews.

Assumptions

Assumes licenses for poles are granted.

Alternatives Considered

Significant ETT needed.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Various projects designed and completed throughout the year.	12/31/16

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	**2016**	**2017**	**2018**	**Totals**
Straight Time Labor	$0	$0	$0	$0
Overtime	$0	$0	$0	$0
Outside Services	$0	$0	$0	$0
Materials	$0	$0	$0	$0
Other, including contingency amounts (describe)	$1,000	$0	$0	$1,000
Total	$1,000	$0	$0	$1,000
Indirect Capital Costs	**2016**	**2017**	**2018**	**Totals**
Benefits/Loaders	$0	$0	$0	$0
Capitalized interest or AFUDC, if any	$11	$0	$0	$11
Total	$11	$0	$0	$11
Total Capital Costs	$1,011	$0	$0	$1,011
Total O&M Costs	$0	$0	$0	$0

Total Project Costs	$1,011	$0	$0	$1,011

Regulatory Approvals

N/A

Risks and Risk Mitigation Plans

None

Supplement Request Form

Date Prepared: 2/8/18	**Project Title: CAIDI Improvement Projects**
Company/Companies: Eversource NH	**Project ID Number: A16X04**
Organization: NH Operations	**Plant Class/(F.P.Type): Distribution Line**
Project Initiator: Russel Johnson	**Project Type: Specific**
Project Manager: Marc Geaumont	**Capital Investment Part of Original Operating Plan? Yes**
Project Sponsor: Joseph Purington	**O&M Expenses Part of the Original Operating Plan? Yes**
Current Authorized Amount: $ 1,011,363	**Estimated in service date(s): 1/8/18**
Supplement Request: $948,000	**Other:**
Total Request: $ 1,959,363	

Supplement Justification

Justification for Additional Resources

This project was initially authorized in 2016 to complete the work shown on the attached Project Authorization Form. All work was completed in 2016 and 2017, with the exception of the 32W3 which was cancelled. Total expended on the completed projects was $596,000.

In an effort to address poor reliability results for the company in 2016, two additional CAIDI Improvement Project jobs, on the 336X circuit in Chocorua and the 3133X circuit in Derry, were proposed by NH Field Operations and completed in 2017. Both jobs were completed under this project but a supplemental request was not submitted at that time. In total, $1,959,363 was spent under this project so this request is for an additional $948,000 in funding. No additional work is planned under this project.

The 336X work was to rebuild 65 sections of bare conductor single phase line in ROW in Chatham NH with new pole plant and 1/0 ACSR tree wire. Work was completed in March, 2017 for a total of $623,000.

The 3133X work was to replace approximately one mile of 336 MCM open wire three phase line along North Lowell Rd. in Windham, NH with 477 MCM spacer cable. This area has a history of tree and limb-related outages even after completing Enhanced Tree Trimming. Work was completed December 29, 2017 for a total of $701,000. Some charges on this job rolled over into 2018 so this request includes funds in 2018.

Descriptions of all other work can be found in the attached Project Authorization Form.

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 1,000	$ 400	$ 1,400
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	-	-
Total Direct Spending	$ 1,000	$ 400	$ 1,400
Capital Additions - Indirect	-	539	-
AFUDC	11	-	11
Total Capital Request	$ 1,011	$ 939	$ 1,950
O&M	-	9	9
Total Request	**$ 1,011**	**$ 948**	**$ 1,959**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2017	Year 2018	Year 20__+	Total
Capital Additions - Direct	$ 325	$ 75	$ -	$ 400
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	-	-	-	-
Total Direct Spending	$ 325	$ 75	$ -	$ 400
Capital Additions - Indirect	439	100	-	539
AFUDC	-	-	-	-
Total Capital Request	$ 939	$ 175	$ -	$ 939
O&M	9	-	-	9
Total Request	**$ 948**	**$ 175**	**$ -**	**$ 948**

Original Project Authorization Form attached:

Project Authorization Form

General Information

Date Prepared: 03/16/2016	Project Title: CAIDI Improvement
Company: Eversource NH	Project ID Number: A16X04
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Russel Johnson	Project Category: Reliability
Project Owner/Manager: Marc Geaumont	Project Type: Specific
Project Sponsor: Joseph Purington	Project Purpose: part of regulatory tracked program? N
Estimated in service date: 12/31/2016	Capital Investment Part of Original Operating Plan? Y
If Transmission Project: N/A	Supplement to Existing Authorization? N
	O&M Expenses Part of the Original Operating Plan? Y

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

This project will support the completion of work to address situations that have the potential to negatively impact CAIDI. The objective of the identified projects is the reduction of restoration times based on operational circumstances. This will include locations that are difficult to access, patrol, and/or repair resulting in extended outages.

Project Costs Summary

Note: Dollar values are in thousands

	2016	2017	2018	Totals
Capital Additions - Direct	$1,000	$0	$0	$1,000
Customer Contribution	$0	$0	$0	$0
Removals net of Salvage	$0	$0	$0	$0
Total - Direct Spending	$1,000	$0	$0	$1,000
Capital Additions - Indirect	$0.00	$0	$0	$0
Subtotal Request	$1,000	$0	$0	$1,000
AFUDC (half-year convention)	$11	$0	$0	$11

Total Request	$1,011	$0	$0	$1,011

Summary Project Description

This project will support the completion of work to address situations that have the potential to negatively impact CAIDI. This will include locations that are difficult to access, patrol, and/or repair resulting in extended outages. Typical jobs include relocating narrow off-road shunts to the roadway.

Projects have been identified for the 377X7, 360X2, 14X126A, 313, 3615x2 and 32W3 circuits to relocate approximately 14,000 feet of three-phase primary conductor from off-road shunts to accessible, roadside locations. There are greater than 1,200 total customers that are at risk of being impacted by long duration outages associated with any repairs needed in the difficult to access off-road locations on these six circuits.

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The 14X126A circuit has 2,000 feet of primary conductor in a shunt off of Karatzas Avenue, Manchester that feeds 11 customers. Outages in this section are problematic because crews cannot access this portion of the circuit with standard equipment. This project would move this off-road shunt onto Karatzas Avenue. The total cost of this project is estimated to be $25,000.

The 313 circuit has 17 sections of overhead primary conductor in a shunt which feeds Monadnock Paper. Outages in this section are problematic because crews cannot access this portion of the circuit with standard equipment. This project would install approximately 900' of new underground conductor to retire the move this off-road shunt. The total cost of this project is estimated to be $150,000.

The 3615x2 circuit has 7 sections of overhead primary conductor in a shunt off of Old Candia Road in Auburn. Recent outages have been difficult to find and repair and abbuters are not allowing adequate tree trimming. The total cost of this project is estimated to be $170,000.

The 32W3 circuits main line runs through a wetland shunt and it is problematic to access. This project would relocate portions of this circuit along the roadside (includes 4,260' of new main line construction), relocate the 32W3J1 from A Street to Franklin Street Ext for DA purposes. Recent outages have been difficult to find and repair and abbuters are not allowing adequate tree trimming. The total cost of this project is estimated to be $340,000.

Note: Dollar values are in thousands

	Total Project Costs	Amount in Operating Plan	Difference
Capital	$1,011	$1,011	$0
O&M	$0	$0	$0
Total	$1,011	$1,011	$0

Project Authorization

Approver	Approver Name	Approver Signature	Date
Project Initiator	Russel Johnson		
Project Manager	Marc Geaumont		
Manager	Eric Sutton		
Plant Accounting	Michele Roncaioli		
Director	Marc Geaumont		
Vice President	Joseph Purington		
President	William Quinlan		

Overall Justification

Typically cost per saved customer minute is used to evaluate proposed reliability projects. For some projects this measure does not justify the project based on the number of customers impacted or the frequency at which events occur, however, the difficulty to access and make repairs results in extended outages impacting customer satisfaction and CAIDI metrics.

Project Scope

This project will include relocating narrow off-road shunts to road-side as well as other projects which address events that negatively impact CAIDI.

Project Objectives

Eliminate situations that result in extended outages to customers that generally don't meet the cost per saved customer minute criteria.

Business Process and / or Technical Improvements:

Improve CAIDI, customer satisfaction. Moving span to roadside would allow line crews access without having to call in off-road crews.

Assumptions

Assumes licenses for poles are granted.

Alternatives Considered

Significant ETT needed.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Various projects designed and completed throughout the year.	12/31/16

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	**2016**	**2017**	**2018**	**Totals**
Straight Time Labor	$0	$0	$0	$0
Overtime	$0	$0	$0	$0
Outside Services	$0	$0	$0	$0
Materials	$0	$0	$0	$0
Other, including contingency amounts (describe)	$1,000	$0	$0	$1,000
Total	$1,000	$0	$0	$1,000
Indirect Capital Costs	**2016**	**2017**	**2018**	**Totals**
Benefits/Loaders	$0	$0	$0	$0
Capitalized interest or AFUDC, if any	$11	$0	$0	$11
Total	$11	$0	$0	$11
Total Capital Costs	$1,011	$0	$0	$1,011
Total O&M Costs	$0	$0	$0	$0
Total Project Costs	$1,011	$0	$0	$1,011

Regulatory Approvals

N/A

Risks and Risk Mitigation Plans

None

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--034 **Page 1 of 1**

Request from: Department of Energy

Witness: Johnson, Russel D

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

Rye Area 4kV Study No. A17E01

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-34 for the PAF for this project.

EVERSOURCE
Project Authorization Form

Operations Project Authorization Form

Date Prepared: 8/1/18	**Project Title:** : Rye Area 4kV Study
Company/ies: Eversource (NH)	**Project ID Number:** A17E01
Organization: Field Engineering	**Class(es) of Plant:** Distribution
Project Initiator: Michael J Busby	**Project Category:** Reliability- Distribution Lines
Project Manager: Michael J Busby	**Project Type:** Specific
Project Sponsor: James C. Eilenberger	**Project Purpose:** Support Load Growth, Improve Reliability
Estimated in service date: 12/1/19	**If Transmission Project: PTF?** N/A
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Construction	**O&M Expenses Part of the Original Operating Plan?** Yes
Total Request: $1,911,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project will convert all 4kV load fed from Foyes Corner #2 1950's vintage 4kV metal clad substations. It is the final project in a siuite of projects recommended by the Rye Area 4kV study. This multiyear project will eliminate two 1950's vintage 4 kV substations with metal clad switchgear and replaces them with a modern fully automated 12 kV substation. The new 12 kV circuits will significantly increase capacity, address all voltage and fuse coordination issues, and allow for distribution automation to be implemented. See attached TAF below for full details of the other projects completed in support of the Rye Area 4kV study.

Project Costs Summary

	Prior Authorized	2018	2019	20 +	Totals
Capital Additions - Direct	$ -	$ 726	$ 523	$ -	$ 1,249
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage %	-	44	32	-	76
Total - Direct Spending	$ -	$ 770	$ 555	$ -	$ 1,325
Capital Additions - Indirect	-	299	215	-	514
Subtotal Request	$ -	$ 1,069	$ 770	$ -	$ 1,839
AFUDC	-	10	10	-	20
Total Capital Request	$ -	$ 1,079	$ 780	$ -	$ 1,859
O&M	-	32	20	-	52
Total Request	$ -	$ 1,111	$ 800	$ -	1,911

EVERSOURCE
Project Authorization Form

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor				
Overtime Labor				
Outside Services	599	431		1030
Materials	171	123		295
Other, including contingency amounts (describe)				
Total	770	555		1324

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	299	215		514
Capitalized interest or AFUDC, if any	10	10		20
Total	309	225		534

Total Capital Costs	1079	780		1859
Less Total Customer Contribution				
Total Capital Project Costs	1079	780		1859
Total O&M Project Costs	32	20		52

Note: Explain unique payment provisions, if applicable

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.

EVERSOURCE
Project Authorization Form

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? If yes, please provide details: **No**

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

EVERSOURCE
Project Authorization Form

Technical Authorization Form

Date Prepared: 9/27/16	Project Title: Rye Area 4kV Study
Company/ies: Eversource	Project ID Number:
Organization: Field Engineering	Class(es) of Plant:
Project Initiator: Mike Busby	Project Category:
Project Owner/Manager: Mike Busby	Project Type: *Annual / Specific / Prelim-Phase1*
Project Sponsor: Jim Eilenberger	Project Purpose: part of regulatory tracked program?
Estimated in service date: 12/1/18	If Transmission Project: *PTF / Non-PTF / NA*

Project Need Statement *(Description of Issue)*

The Rye area 4kV metal clad substations were built and installed in the late 1950s. Foyes #2 (1956) West Rye #70 (1956) and Rye # 5 (1957) are over 55 years old and have exceeded their normal life expectancy with replacement parts no longer available. Currently the 70H1 LTC transformer is gassing and needs to be repaired or retired. In addition, area load growth has exceeded the capacity of the 4kV system to efficiently serve. Load centers have shifted away from the existing substations making it difficult to maintain voltages within PUC limits. Pole mounted regulators and capacitors have been utilized in the attempt to resolve low voltage issue during peak periods. Protection and sensitivity criteria between protective devices must be sacrificed in order to serve customers at the tail end of the 4kV system. In numerous locations coordination between protective devices must be sacrificed and same sized fuses in series are required to supply larger loads located at the tail end of the circuits. The Rye area 4kV system has numerous tie points between circuits and substations but few can be utilized due to a lack of capacity and voltages issues.

Project Objectives

Engineering recommended a multiyear project to retire West Rye #70 and Foyes Corner #2 1950's vintage 4kV metal clad substations and installing a new 34.5 to 12kV substations at West Rye. It includes converting as much of the 4kV to 12kV as possible. Numerous 12 to 4kV stepdown transformers will be utilized where it is not practical or economically feasible to convert at this time. This project resolves 70H1 transformer gassing issues and substation transformer loading issues (> 85% of TFRAT rating) for both Rye #5 and West Rye #70 substations. The project also significantly increase capacity and resolve voltage and protection issue currently plaguing the 4kV system.

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Project Scope

2013 - Relieve 70H1& 5H1 TFRAT issues – Install 6-500KVA, 19.9 to 7.2kV transformers (Lang Rd.) and Convert approximately 3.2 miles from 4.16/2.4 to 12.47/7.2 kV – **Approved Project A13N01- $515,050 - Completed 2014.**

2016 - Convert the remainder of 70H1 (1.9 miles) and approximately 0.4 miles of 70H2 (Rte. 1) to 12 kV and temporarily transferred load to the Lang Rd stepdown transformers. The remainder of West Rye's 4kV load will be transferred to 6H2 – **Approved Project A16E01 – $1,261,100 - Completed 2016.**

2017 – Remove West Rye 4kV substation and install new 12kV substation with 10/12MVA transformer with two 12kV circuit positions **– Approved Project A16E06 - $1,303,800 – Completed 2017.**

2018 – Convert 2H2 (Sagamore & Wallis Rd- Rye) and Install approximately 2.5 Miles of 477 SPCA to create a 12kV tie between new West Rye SS and Foyes Corner SS –**Project A17E01 Needs Approval – $1,100,000**

2019 – Convert 2H1 (Pioneer Rd & Brackett Rd) and Install approximately 1.6 miles of 1/0 SPCA and install numerous 12 to 4kV stepdown transformers where it is not practical or economically feasible to convert. Remove and Retire Foyes Corner 4 kV transformer, 4 kV metal clad switchgear, getaway cables, and associated equipment – **Project A17E01 Needs Approval – $800,000**

Background / Justification

Area Load growth caused the Rye #5 substation transformer and the 70H1 transformer to reach 96% and 92% of TFRAT, respectively. During peak periods, both transformers have exceeded Eversource's threshold of 85% of TFRAT. In addition, the 5H1 current transformers (CT's) reached 128% of their nameplate rating. Most of the Rye load growth has occurred at the tail-end of long 4kV circuits (4-6 miles), resulting in low voltages. In an attempt to maintain acceptable voltage levels, pole top regulators, capacitors banks, and adding additional phases have been utilized. Another concern is the inability to utilize existing 4kV circuit ties due to lack of capacity and voltage issues. Most recently the 70H1 LTC has started gassing and will need major repairs or needs to be retired.

Business Process and / or Technical Improvements:

This multiyear project will eliminate two 1950's vintage 4 kV substations with metal clad switchgear and replaces them with a modern fully automated 12 kV substation. The new 12 kV circuits will significantly increase capacity, address all voltage and fuse coordination issues, and allow for distribution automation to be implemented.

Cost Estimate and Assumptions

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Alternatives Considered with Cost Estimates

A second option to convert the 4 kV to 34.5 kV was explored. Option II also recommended retiring the two 1950's vintage 4kV metal clad substations (West Rye #70 and Foyes Corner #2) but recommends installing a new 34.5kV recloser (3105X3) at West Rye. Option II extends the 34.5kV system into the 4kV area by re-conductoring the existing open wire with 35kV Spacer Cable (SPCA) and converting as much of the 4kV to 34kV as possible. Similar to option I, numerous 34.5 to 4kV stepdown transformers will be utilized where it is not practical or economically feasible to convert to 34.5kV. Option II's estimated net present value (NPV) in 2013 dollars was approximately $700,000 more expensive then Option I. In addition, option II was not selected because Engineering would like to limit the expansion of 34.5 kV into heavily treed rural areas due to its inherent sensitivity to tree outages and historically 34.5 kV is more expensive to operate and maintain on a long term basis.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Install 6-500KVA, 19.9 to 7.2kV transformers (Lang Rd.) and Convert approximately 3.2 miles from 4.16/2.4 to 12.47/7.2 kV	Approved Project A13N01 Completed 2014.
Convert the remainder of 70H1 (1.9 miles) and approx. 0.4 miles of 70H2 (Rte. 1) to 12 kV and temporarily transferred load to the Lang Rd stepdown transformers. The remainder of West Rye's 4kV load will be transferred to 6H2 so West Rye substation can be de-energized and rebuilt at 12 kV	Approved Project A16E01 Completed 2016
Remove West Rye 4kV substation and install new 12kV substation with 10/12MVA transformer with two 12kV circuit positions –	Approved Project A16E06 Completed 2017
Convert 2H2 (Sagamore & Wallis Rd- Rye) and Install approximately 2.5 Miles of 477 SPCA to create a 12kV tie between new West Rye SS and Foyes Corner SS	Project A17E01 – $1,100,000 Start date 9/1/18 Planned completion date 12/1/18.
Convert 2H1 (Pioneer Rd & Brackett Rd) and Install approximately 1.6 miles of 1/0 SPCA and install numerous 12 to 4kV stepdown transformers where it is not practical or economically feasible to convert. Remove and Retire Foyes Corner 4 kV transformer, 4 kV metal clad switchgear, getaway cables, and associated 4 kV equipment.	Project A17E01 – $800,000 Start date 3/1/19 Planned Completion date 12/1/19

Regulatory Approvals - N/A

Risks and Risk Mitigation Plans

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Project Authorization Form

References

Rye Area 4kV Distribution Study – March 1st 2013

One-Line Diagrams, Attachments, and Images

Rye Area 4 kV (before)

[ONE-LINE DIAGRAM REDACTED]

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Project Authorization Form

Rye Area 4 kV (After Option I is completed)

[ONE-LINE DIAGRAM REDACTED]

Supplement Request Form

Date Prepared: 04/16/2020	**Project Title:** Rye Area 4kV Study
Company/Companies: Eversource NH	**Project ID Number:** A17E01
Organization: Operations	**Plant Class/(F.P.Type):** Distribution Line
Project Initiator: Michael Busby	**Project Type:** Specific
Project Manager: Thomas Davis	**Capital Investment Part of Original Operating Plan?** Yes
Project Sponsor: James C. Eilenberger	**O&M Expenses Part of the Original Operating Plan?** Yes
Current Authorized Amount: $1,859,000	**Estimated in service date(s):** 9/1/20
Supplement Request: $2,813,000	**Other:**
Total Request: $4,672,000	

Supplement Justification

Justification for Additional Resources

A request of $2,813,000 supplemental dollars is being requested to account for multiple project changes. A breakdown of total project charges are as follows:

Direct Costs
Bolded figures represent direct charges for the project from inception to completion.

Internal Labor **$108,485.** Approved funding for Internal Labor was $0. Break down of cost increases are as follows:

- Two work requests not part of the original PAF were written for Eversource crews to remove 2W5 open wire and to switch 2W4 and 2W5 to their final configuration outside Foyes Corner substation. $31,460
- A Construction Representative was assigned to the project and the local AWC provided supplemental project oversight = $77,025

Outside Service **$2,289,512.** Approved funding for outside services was $1,030,000.
Break down of cost increases are as follows:

- Change orders on the 2H1 totaling $159,358 (See Appendix)
- Change orders on the 2H2 totaling $356,766 (See Appendix)
- The original STORMS jobs assumed Consolidated Communications, as custodian, would replace approximately 100 poles and anchors which they failed to do. These poles were eventually set by Eversource's contractor at a unit price as solely owned poles. Many poles required ledge sets which are costlier than an excavation set: $163,320
- Tree trimming for these poles not set by Consolidated Communications: $339,806
- Conversion of 2H1 was not part of the contractor's bid due to various unknowns and was performed as T&M (work not completed): $28,436
- Police detail costs were not included in the original estimate. These were billed directly to the project and not applied through the spreader: $163,650
- Property Taxes: $44,110
- Lease of storage trailer to protect Eversource materials on site: $4,066

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APS 1 - Project Authorization Policy

Supplement Request Form

Materials **$378,780**. Approved funding for materials was $295,000. Break down of cost increases are as follows:

- Due to the changes in the scope work from project inception to completion, material costs were higher than authorized amount: $83,780

Remaining Direct Costs **$200,000.** Estimated direct capital remaining, including Internal Labor, Outside Services, Materials, & Other.

Indirect Costs = **$1,694,985** Approved funding for indirect costs was $534,000. Indirect costs increased with the increase in Direct costs. Supplemental request is for $1,160,000

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 1,249	$ 1,367	$ 2,616
Less Customer Contribution	-	-	
Removals net of Salvage ____%	76	286	362
Total Direct Spending	$ 1,325	$ 1,653	$ 2,978
Capital Additions - Indirect	514	1,110	1,624
AFUDC	20	50	70
Total Capital Request	$ 1,859	$ 2,813	$ 4,672
O&M			
Total Request	**$ 1,859**	**$ 2,813**	**$ 4,672**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2019	Year 2020	Year 20__+	Total
Capital Additions - Direct	$ 708	$ 659	$ -	$ 1,367
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	239	47	-	286
Total Direct Spending	$ 947	$ 706	$ -	$ 1,653
Capital Additions - Indirect	637	473	-	1,110
AFUDC	50	-	-	50
Total Capital Request	$ 1,634	$ 1,179	$ -	$ 2,813
O&M	-	-	-	-
Total Request	**$ 1,634**	**$ 1,179**	**$ -**	**$ 2,813**

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APS 1 - Project Authorization Policy

Supplement Request Form

Appendix to Supplemental Request

2H1 Change Orders

Change Order #	Amount	Out of Scope Work Notes
CO1	$2,949	Cover and make-ready for ledge pole set by others
CO2	$28,307	Multiple setup changes due to heavy tree growth which prevented temporary primary relocations until trees were removed
CO3	$24,768	Lost time due to close quarters on this job with tree crews on site
CO4	$4,718	Installation of cover for crane used for tree removals
CO5	$4,428	Circuit patrol in response to outage on 2H1
CO6	$11,794	Delays in rigging due to ledge pole sets being delayed
CO7	$13,564	Pole relocations/reframing due to landowner disputes with locations
CO8	$24,768	Delays due to labor shortage and support provided for other priority jobs
CO9	$4,423	Circuit patrols after major storm events
CO10	$14,743	Change in schedule from 4-10 hour days to 5-8 hours days
CO11	$5,897	Several safety stand downs due to events on the Eversource system
CO12	$19,000	Installation of Tripsavers, which was not part of original bid package
Total	$159,358	

2H2 Change Orders

Change Order #	Week Ending Date	Amount	Out of Scope Work Notes
CO1	11/15/2018	$140,736	Poles and anchors that were not set by telephone company, and labor dollars associated with the work.
CO2	06/19/2019	$54,052	Poles and anchors that were not set by the telephone company; material costs: additional triplex replacements; service replacements, concrete transformer pad installation; metal plate installation
CO3 & CO6 Combined	07/11/2019	$72,596	Underground services that needed to be dug up and spliced; loam and seeding; traffic control; phone company pole set replacements
CO4	07/11/2019	$5,466	Primary cables spliced out and re-terminated; 1-day outage
CO5	07/11/2019	$45,063	Pole structures changed from tangent to corner framing; tree trimming; traffic control
CO7	07/11/2019	$18,572	Out of scope work resulted from Control Center requesting circuit patrol before clearance on the line could be issued.
CO9	07/31/2019	$20,281	Three phase flat construction installation was needed due to trimming restrictions, and property o ner permissions for anchor placement.
Total Direct Charges		$356,766	

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APS 1 - Project Authorization Policy

Supplement Request Form

Operations Project Authorization Form

Date Prepared: 8/1/18	**Project Title:** Rye Area 4kV Study
Company/ies: Eversource (NH)	**Project ID Number:** A17E01
Organization: Field Engineering	**Class(es) of Plant:** Distribution
Project Initiator: Michael J Busby	**Project Category:** Reliability- Distribution Lines
Project Manager: Michael J Busby	**Project Type:** Specific
Project Sponsor: James C. Eilenberger	**Project Purpose:** Support Load Growth, Improve Reliability
Estimated in service date: 12/1/19	**If Transmission Project: PTF?** N/A
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Construction	**O&M Expenses Part of the Original Operating Plan?** Yes
Total Request: $1,911,000	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project will convert all 4kV load fed from Foyes Corner #2 1950's vintage 4kV metal clad substations. It is the final project in a suite of projects recommended by the Rye Area 4kV study. This multiyear project will eliminate two 1950's vintage 4 kV substations with metal clad switchgear and replaces them with a modern fully automated 12 kV substation. The new 12 kV circuits will significantly increase capacity, address all voltage and fuse coordination issues, and allow for distribution automation to be implemented. See attached TAF below for full details of the other projects completed in support of the Rye Area 4kV study.

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APS 1 - Project Authorization Policy

Supplement Request Form

Project Costs Summary

	Prior Authorized	2018	2019	20__+	Totals
Capital Additions - Direct	$ -	$ 726	$ 523	$ -	$ 1,249
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage ____%	-	44	32	-	76
Total - Direct Spending	$ -	$ 770	$ 555	$ -	$ 1,325
Capital Additions - Indirect	-	299	215	-	514
Subtotal Request	$ -	$ 1,069	$ 770	$ -	$ 1,839
AFUDC	-	10	10	-	20
Total Capital Request	$ -	$ 1,079	$ 780	$ -	$ 1,859
O&M	-			-	-
Total Request	$ -	$ 1,079	$ 780	$ -	1,859

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor				
Overtime Labor				
Outside Services	599	431		1030
Materials	171	123		295
Other, including contingency amounts (describe)				
Total	770	555		1324

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	299	215		514
Capitalized interest or AFUDC, if any	10	10		20
Total	309	225		534

Total Capital Costs	1079	780		1859
Less Total Customer Contribution				
Total Capital Project Costs	1079	780		1859
Total O&M Project Costs	32	20		52

Note: Explain unique payment provisions, if applicable

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APS 1 - Project Authorization Policy

Supplement Request 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 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? If yes, please provide details: **No**

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

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APS 1 - Project Authorization Policy

Supplement Request Form

Technical Authorization Form

Date Prepared: 9/27/16	Project Title: Rye Area 4kV Study
Company/ies: Eversource	Project ID Number:
Organization: Field Engineering	Class(es) of Plant:
Project Initiator: Mike Busby	Project Category:
Project Owner/Manager: Mike Busby	Project Type: *Annual / Specific / Prelim-Phase1*
Project Sponsor: Jim Eilenberger	Project Purpose: part of regulatory tracked program
Estimated in service date: 12/1/18	If Transmission Project: *PTF / Non-PTF / NA*

Project Need Statement *(Description of Issue)*
The Rye area 4kV metal clad substations were built and installed in the late 1950s. Foyes #2 (1956) West Rye #70 (1956) and Rye # 5 (1957) are over 55 years old and have exceeded their normal life expectancy with replacement parts no longer available. Currently the 70H1 LTC transformer is gassing and needs to be repaired or retired. In addition, area load growth has exceeded the capacity of the 4kV system to efficiently serve. Load centers have shifted away from the existing substations making it difficult to maintain voltages within PUC limits. Pole mounted regulators and capacitors have been utilized in the attempt to resolve low voltage issue during peak periods. Protection and sensitivity criteria between protective devices must be sacrificed in order to serve customers at the tail end of the 4kV system. In numerous locations coordination between protective devices must be sacrificed and same sized fuses in series are required to supply larger loads located at the tail end of the circuits. The Rye area 4kV system has numerous tie points between circuits and substations but few can be utilized due to a lack of capacity and voltages issues.

Project Objectives
Engineering recommended a multiyear project to retire West Rye #70 and Foyes Corner #2 1950's vintage 4kV metal clad substations and installing a new 34.5 to 12kV substations at West Rye. It includes converting as much of the 4kV to 12kV as possible. Numerous 12 to 4kV stepdown transformers will be utilized where it is not practical or economically feasible to convert at this time. This project resolves 70H1 transformer gassing issues and substation transformer loading issues (> 85% of TFRAT rating) for both Rye #5 and West Rye #70 substations. The project also significantly increase capacity and resolve voltage and protection issue currently plaguing the 4kV system.

Project Scope
2013 - Relieve 70H1& 5H1 TFRAT issues – Install 6-500KVA, 19.9 to 7.2kV transformers (Lang Rd.) and Convert approximately 3.2 miles from 4.16/2.4 to 12.47/7.2 kV – **Approved Project A13N01- $515,050 - Completed 2014.**
2016 - Convert the remainder of 70H1 (1.9 miles) and approximately 0.4 miles of 70H2 (Rte. 1) to 12 kV and temporarily transferred load to the Lang Rd stepdown transformers. The remainder of West Rye's 4kV load will be transferred to 6H2 – **Approved Project A16E01 – $1,261,100 - Completed 2016.**

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APS 1 - Project Authorization Policy

Supplement Request Form

2017 – Remove West Rye 4kV substation and install new 12kV substation with 10/12MVA transformer with two 12kV circuit positions **– Approved Project A16E06 - $1,303,800 – Completed 2017.**

2018 – Convert 2H2 (Sagamore & Wallis Rd- Rye) and Install approximately 2.5 Miles of 477 SPCA to create a 12kV tie between new West Rye SS and Foyes Corner SS –**Project A17E01 Needs Approval – $1,100,000**

2019 – Convert 2H1 (Pioneer Rd & Brackett Rd) and Install approximately 1.6 miles of 1/0 SPCA and install numerous 12 to 4kV stepdown transformers where it is not practical or economically feasible to convert. Remove and Retire Foyes Corner 4 kV transformer, 4 kV metal clad switchgear, getaway cables, and associated equipment – **Project A17E01 Needs Approval – $800,000**

Background / Justification
Area Load growth caused the Rye #5 substation transformer and the 70H1 transformer to reach 96% and 92% of TFRAT, respectively. During peak periods, both transformers have exceeded Eversource's threshold of 85% of TFRAT. In addition, the 5H1 current transformers (CT's) reached 128% of their nameplate rating. Most of the Rye load growth has occurred at the tail-end of long 4kV circuits (4-6 miles), resulting in low voltages. In an attempt to maintain acceptable voltage levels, pole top regulators, capacitors banks, and adding additional phases have been utilized. Another concern is the inability to utilize existing 4kV circuit ties due to lack of capacity and voltage issues. Most recently the 70H1 LTC has started gassing and will need major repairs or needs to be retired.

Business Process and / or Technical Improvements:
This multiyear project will eliminate two 1950's vintage 4 kV substations with metal clad switchgear and replaces them with a modern fully automated 12 kV substation. The new 12 kV circuits will significantly increase capacity, address all voltage and fuse coordination issues, and allow for distribution automation to be implemented.

Cost Estimate and Assumptions

Alternatives Considered with Cost Estimates
A second option to convert the 4 kV to 34.5 kV was explored. Option II also recommended retiring the two 1950's vintage 4kV metal clad substations (West Rye #70 and Foyes Corner #2) but recommends installing a new 34.5kV recloser (3105X3) at West Rye. Option II extends the 34.5kV system into the 4kV area by re-conductoring the existing open wire with 35kV Spacer Cable (SPCA) and converting as much of the 4kV to 34kV as possible. Similar to option I, numerous 34.5 to 4kV stepdown transformers will be utilized where it is not practical or economically feasible to convert to 34.5kV. Option II's estimated net present value (NPV) in 2013 dollars was approximately $700,000 more expensive then Option I. In addition, option II

was not selected because Engineering would like to limit the expansion of 34.5 kV into heavily treed rural areas due to its inherent sensitivity to tree outages and historically 34.5 kV is more expensive to operate and maintain on a long term basis.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Install 6-500KVA, 19.9 to 7.2kV transformers (Lang Rd.) and Convert approximately 3.2 miles from 4.16/2.4 to 12.47/7.2 kV	Approved Project A13N01 Completed 2014.
Convert the remainder of 70H1 (1.9 miles) and approx. 0.4 miles of 70H2 (Rte. 1) to 12 kV and temporarily transferred load to the Lang Rd stepdown transformers. The remainder of West Rye's 4kV load will be transferred to 6H2 so West Rye substation can be de-energized and rebuilt at 12 kV	Approved Project A16E01 Completed 2016
Remove West Rye 4kV substation and install new 12kV substation with 10/12MVA transformer with two 12kV circuit positions –	Approved Project A16E06 Completed 2017
Convert 2H2 (Sagamore & Wallis Rd- Rye) and Install approximately 2.5 Miles of 477 SPCA to create a 12kV tie between new West Rye SS and Foyes Corner SS	Project A17E01 – $1,100,000 Start date 9/1/18 Planned completion date 12/1/18.
Convert 2H1 (Pioneer Rd & Brackett Rd) and Install approximately 1.6 miles of 1/0 SPCA and install numerous 12 to 4kV stepdown transformers where it is not practical or economically feasible to convert. Remove and Retire Foyes Corner 4 kV transformer, 4 kV metal clad switchgear, getaway cables, and associated 4 kV equipment.	Project A17E01 – $800,000 Start date 3/1/19 Planned Completion date 12/1/19

Regulatory Approvals - N/A
Risks and Risk Mitigation Plans
References
Rye Area 4kV Distribution Study – March 1st 2013
One-Line Diagrams, Attachments, and Images

Rye Area 4 kV (before)

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APS 1 - Project Authorization Policy

Supplement Request Form

[ONE-LINE DIAGRAM REDACTED]

Rye Area 4 kV (After Option I is completed)

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APS 1 - Project Authorization Policy

Supplement Request Form

[ONE-LINE DIAGRAM REDACTED]

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

Date Request Received: May 26, 2022 **Date of Response: June 08, 2022**
Data Request No. DOE 1--035 **Page 1 of 1**

Request from: Department of Energy

Witness: Devereaux, James J

Request:

For the project listed below, please provide the Pre-construction Authorization PAF and any Supplemental PAF. If not listed on the PAFs, indicate and describe what alternatives were considered, including NWAs. Additionally, please specify the percentage of total project costs contributed by each of the following: competitively bid, sole sourced, preferred supplier contracts, internal resources, internal indirect charges, and other.

NH Training Annual Cap Proj No. NHTRN20

Response:

Please see Attachment DOE 1-7 (A), Table 1 for the detail on specific total project costs contributed by each of the required cost classifications. Table 2 in Attachment DOE 1-7 (A) provides a description of the alternatives considered, including NWAs, if applicable.

Please see Attachment DOE 1-35 for the PAF for this project.

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Project Authorization Policy

Operations Project Authorization Form

Date Prepared: October 31, 2020	Project Title: 2020 Technical Training Capital Program
Company: CL&P Distribution Connecticut NSTAR Distribution Eastern MA WMECO Distribution Western MA PSNH Distr bution New Hampshire EESCO Eversource Energy Service Co. Yankee Gas Connecticut NSTAR Gas Eastern MA	Project ID Number: CTTRN20 CT Training Annual Capital Project MAETRN20 EMA Training Annual Capital Project MAWTRN20 WMA Training Annual Capital Project NHTRN20 NH Training Annual Capital Project NUTRN20 NUSCO Training Annual Capital Project CTGASTRN20 CT Gas Training Annual Capital Project MAEGASTRN20 EMA Training Annual Capital Project
Organization: Operations Services	Class(es) of Plant: Material
Project Initiator: Alexandria Chasson-Colebourn	Project Category: Material
Project Owner/Manager: Alexandria Chasson-Colebourn	Project Type: *Annual Program*
Project Sponsor: Alexandria Chasson-Colebourn	Project Purpose: part of regulatory tracked program? No
Estimated in service date: 12/31/2020	If Transmission Project: PTF / Non-PTF / NA N/A
Supplement to Existing Authorization? No	Capital Investment Part of Original Operating Plan? Yes
Eng./Constr. Resources Budgeted? N/A	O&M Expenses Part of the Original Operating Plan? N/A

Project Authorization

Project authorization must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

If Chief Executive Officer or Subsidiary Board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

An authorization of $1,750,000 is requested for Eversource's annual Technical Training capital budget. This funding is required in order to upgrade and further enhance the organization's training capabilities through the introduction of additional technology, tools, and infrastructure.

EVERSOURCE
Project Authorization Policy

Operations Services/Technical Training Operations					
2020 Capital Budget					
Op Co	Program	Project ID	Project Title	Project Budget	Budget CCC
CT	Dist	CTTRN20	CT Training Annual Capital Project	$ 63,000	2T3
MA East	Dist	MAETRN20	MA E Training Annual Capital Project	$ 663,000	N60
MA West	Dist	MAWTRN20	MA W Training Annual Capital Project	$ 162,000	036
NH	Dist	NHTRN20	NH Training Annual Capital Project	$ 163,000	7XC
Svc Co	Dist	NUTRN20	NUSCO W Training Annual Project	$ 375,000	034
CT	Gas	CTGASTRN20	YG/CT Gas Training Annual Capital	$ 162,000	G49
MA East	Gas	MAEGASTRN20	MA E/ NSTAR Gas Annual Capital Project	$ 162,000	G50
Technical Training Total				**$ 1,750,000**	

Project Costs Summary

See APS3 and APS8 requirements and consult with Plant Accounting for capital/O&M determination. Use published loaders for benefits, materials, and invoices, maintained by the Director, Budget and Internal Reporting.
Note: Dollar values are in thousands

Subtotal Request	$	-	$	1,750	$	-	$	-	$	1,750		
AFUDC		-		-		-		-		-		
Total Capital Request	$	-	$	1,750	$	-	$	-	$	1,750		
O&M		-		-		-		-		-		
Total Request	$	-	$	1,750	$	-	$	-	$	1,750		

Financial Evaluation

Provide the following financial information (attach additional detail if summarized items are significant or additional information is needed). Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Materials	1,544			1,544
Outside Services	119			119
Other, including contingency amounts (describe)				
Total	1,663			1,662

Indirect Capital Costs	Year 1	Year 2	Year 3+	Total
Indirects/Overheads (including benefits)	87			87
Capitalized interest or AFUDC, if any				

EVERSOURCE
Project Authorization Policy

Total				
Total Capital Costs	1,750			1,750
Less Total Customer Contribution				
Total Capital Project Costs	1,750			1,750
Total O&M Project Costs				

Note: Explain unique payment provisions, if applicable

If this is a new business project, is a customer contribution required? If yes, please note the contribution amount.

In addition, for all electric and gas growth / new business projects, please attach the CIAC calculation

Provide other financial documentation as warranted by management and / or regulatory precedent. When performing financial analysis, use appropriate discount rate by company (can be provided by Budgeting and Internal Reporting or Financial Planning and Analysis).