West Rye Substation Rebuild - Project #A16E06

Discussed in Response to Staff 18-001

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Date Prepared: July 3, 2017	Project Title: West Rye SS Rebuild
Company/Companies: Eversource NH	Project ID Number: A16E06
Organization: NH Operations	Plant Class/(F.P.Type):Substation
Project Initiator: Charles Christensen, PE	Project Type: Specific
Project Manager: Thelma Brown	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:$1,304,000	Estimated in service date(s): 12/31/17
Supplement Request: $286,000	Other:
Total Request: $1,590,000	

Supplement Justification

This project is to replace the existing 1950's vintage 3MVA 34.5-4.16kV substation with a 10/12MVA 34.5-12.47kV substation

The PAF for this project was approved in Powerplan in April 2016 for $1,304,000. The original PAF is attached. Removal and Addition one-lines are attached which confirm the scope of the project is the same but much more detail and engineering is complete.

The expected cost to complete the project is now $1,590,000 which is $286,000 above the approved project amount.

	PAF Approved Budget	Current Forecast
Direct	$1,040,000	$1,395,000
Indirect	$246,000	$204,000
AFUDC	$18,000	$1,000
Total	$1,304,000	$1,590,000
Difference	$286,000	

The approved direct costs for this project were $1,040,000. It is estimated that the final direct costs associated with this project will be $1,395,000 or 134% of the approved estimate. This increase in direct costs are based on increased internal and external labor and higher than planned material costs.

Justification for Additional Resources

The cost estimate for this project originally was based on all engineering in-house and minor changes to the site from what exists today. Engineering design has been completed by a contractor which is higher than the labor costs originally forecast. The site design went through several iterations and which also increased the amount of engineering contractor labor. The actual material costs are higher than originally budgeted. All major items were identified but many items such as steel and foundations were not in the original estimate.

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The 34.5kV ROW work has also been added to the scope of the project. This includes building 4 new poles and associated equipment for a mobile SS high side connection.

Explanation for Cost Increase

Labor – A consultant was utilized for all engineering and design. This costs more than utilizing internal engineering. Several site iterations also increased engineering, siting, and permitting costs. Internal labor did decrease by $95,000. Outside services, including the contingency budget increased by $245,000

Estimated Cost Increase $150,000

Material – Major material was included in the original estimate but costs for the transformer, reclosers, and switches is higher than the $589,000 budgeted. Station service, PTs, site expansion, fencing, grounding, and stoning was not included in the original estimate. Many of these items were identified throughout the design process

Estimated Cost Increase $196,000

Indirects / AFUDC - Indirect and AFUDC charges have are estimated to decrease. Some of the decrease in indirects associated with direct labor. Material stock indirects decreased because of the direct material order items that are limited for overhead costs. Other decreases may be accounted for by calculations in the Powerplan system

Estimated Cost Decrease $59,000

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 1,040	$ 345	$ 1,385
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	-	-
Total Direct Spending	$ 1,040	$ 345	$ 1,385
Capital Additions - Indirect	246	(42)	204
AFUDC	18	(17)	1
Total Capital Request	$ 1,304	$ 286	$ 1,590
O&M	-	-	-
Total Request	**$ 1,304**	**$ 286**	**$ 1,590**

Note: Dollar values are in thousands:

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Supplement Request Form

Total Supplement Request by year view:

	Year 2017	Year 20__	Year 20__+	Total
Capital Additions - Direct	$ 345	$ -		$ 345
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	-	-	-	-
Total Direct Spending	$ 345	$ -	$ -	$ 345
Capital Additions - Indirect	(42)	-		(42)
AFUDC	(17)	-		(17)
Total Capital Request	$ 286	$ -	$ -	$ 286
O&M	-	-	-	-
Total Request	**$ 286**	**$ -**	**$ -**	**$ 286**

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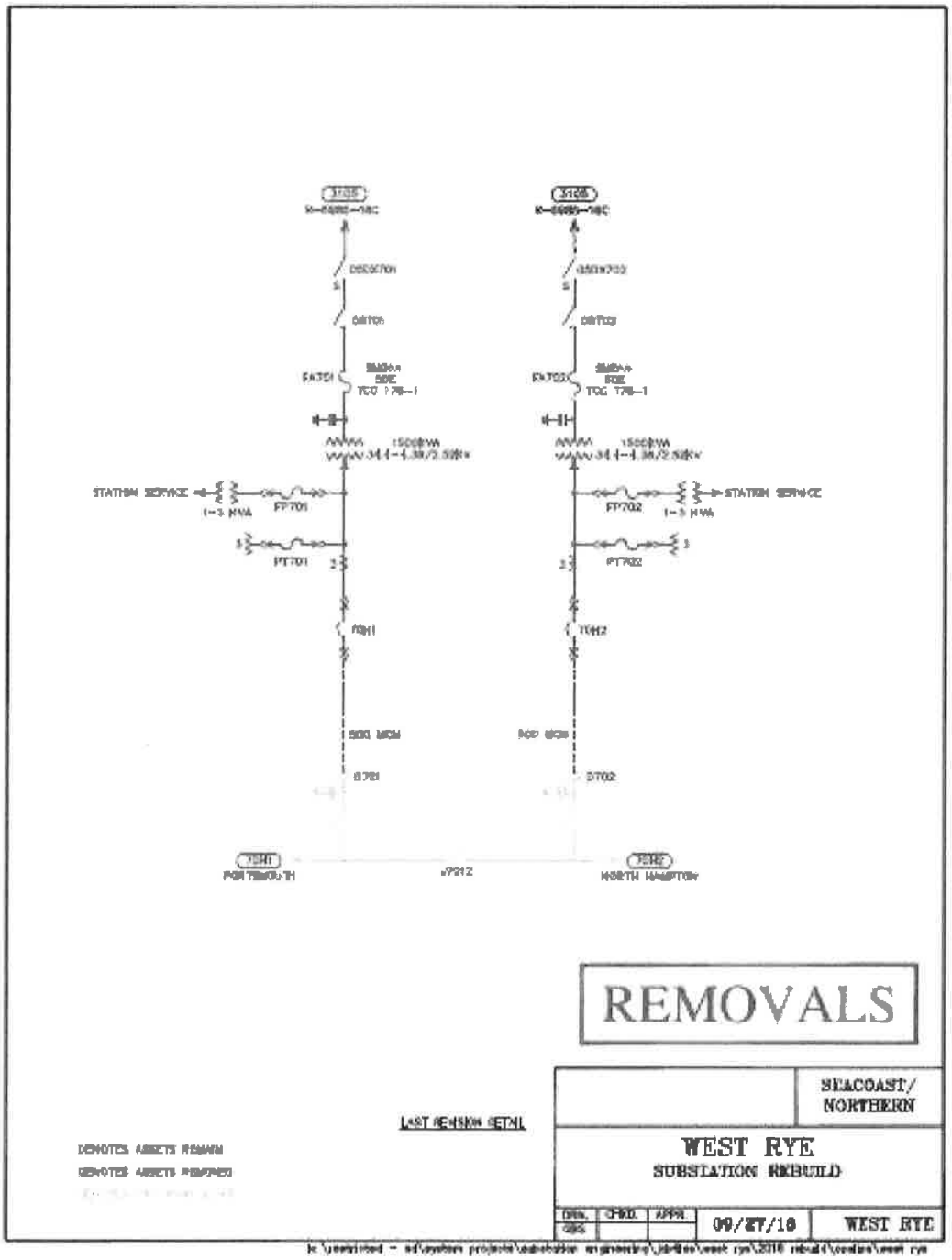
Supplement Request Form



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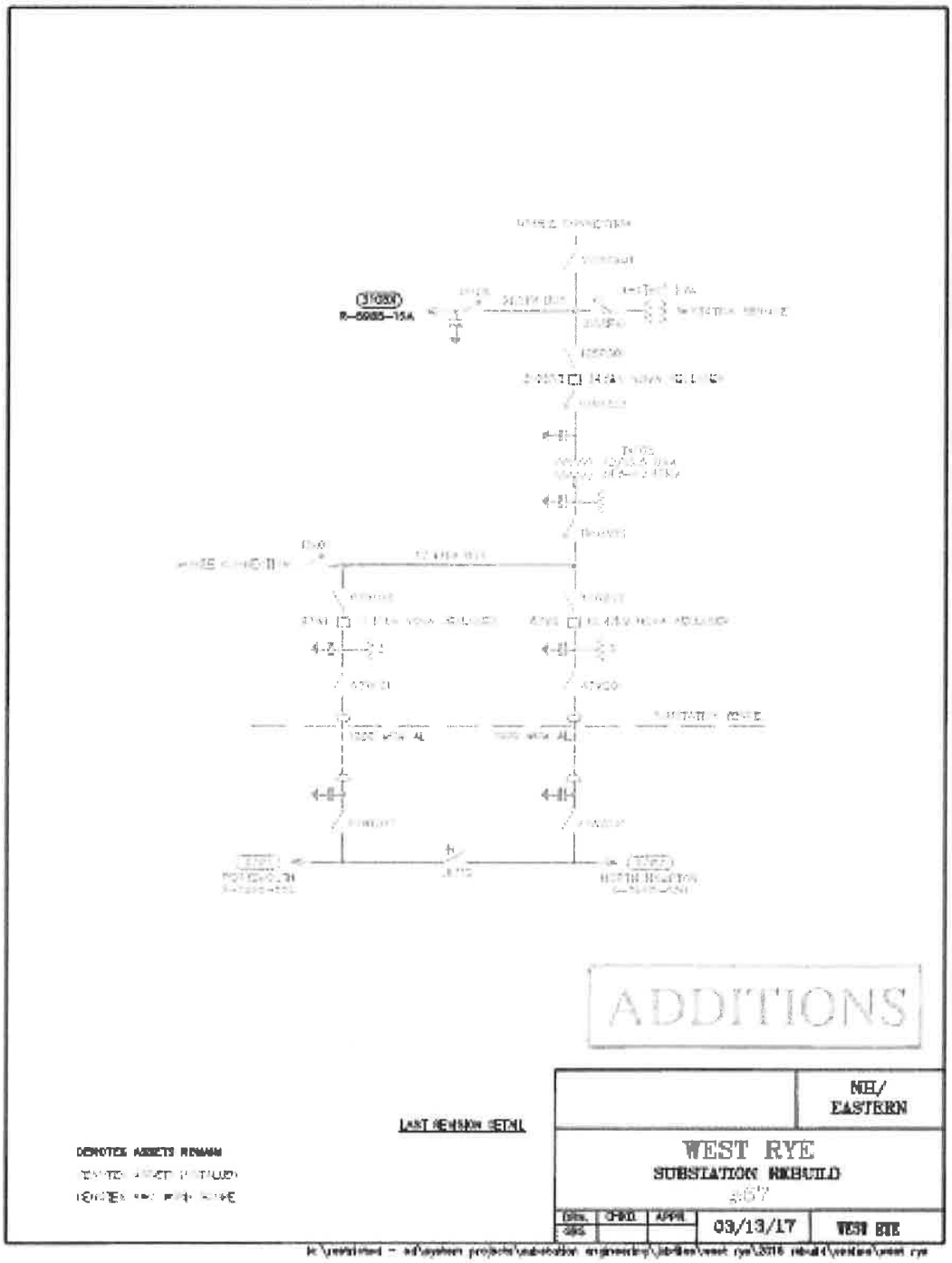
Supplement Request Form



ESTIMATE SUMMARY
PSNH

Project Title: West Rye Substation 70H1 & 70H2Transformer Replacement
Project Mgr/Lead: Natacha Morales
Project Number: A16E06
TAF # XYZ

Estimate By: MPD
Date of Estimate: 7/4/17
ISD: 12/31/17
Estimate # P17-040

ESTIMATE SUMMARY

ESTIMATE TYPE: Engineering

	TOTAL	Prior to 6/1/17	2017 after 5/31/17	2018	2019	2020	2021 and FUTURE
CONSTRUCTION	$177,009	$2,398	$174,611	$0	$0	$0	$0
ENGINEERING/DESIGN	$261,058	$239,166	$21,892	$0	$0	$0	$0
LAND	$0	$0	$0	$0	$0	$0	$0
MATERIAL	$784,788	$117,410	$667,378	$0	$0	$0	$0
PROJECT MGR & SUPPORT	$64,711	$46,467	$18,244	$0	$0	$0	$0
REMOVAL	$50,000	$0	$50,000	$0	$0	$0	$0
TEST	$19,990	$0	$19,990	$0	$0	$0	$0
CONTINGENCY	$25,853	$0	$25,853	$0	$0	$0	$0
ESCALATION	$0	$0	$0	$0	$0	$0	$0
INDIRECTS	$204,333	$79,015	$125,318	$0	$0	$0	$0
AFUDC	$1,209	$216	$993	$0	$0	$0	$0
Total Cost	**$1,588,952**	**$484,672**	**$1,104,279**	**$0**	**$0**	**$0**	**$0**

	-10%	-	**10%**
Engineering Range	**$1,430,056**	-	**$1,747,847**

COMMENTS:

Project Scope:

The West Rye Substation Rebuild project is being constructed in support of the recommendations presented from the Rye Area Distribution System Study dated March 01, 2013.

The existing West Rye substation currently referred to as #70 will be renamed to West Rye #67 due to a naming conflict with another 34.5-12.47kV substation currently called #70. The two 12.47kV lines emitting from West Rye substation will be named 67W1 & 67W2.

The existing configuration of West Rye substation consisting of two separate 34.5–4.16kV transformers will be replaced with a single 34.5–12.47kV 10/12.5 MVA transformer. The two existing 34.5kV taps of the 3105 line feeding the existing transformers will be removed and a single tap of the **3105X** will feed the new transformer.

The station service for the substation will be provided from a single phase 34.5kV-120/240V pole mount transformer tapped to the 34.5kV bus.

Assumptions:

Engineering to be outsourced with in-house review, construction to be outsourced.
This estimate is based on Project Scope Document only, actual quantities may vary during detailed engineering.
Material estimates based on previous work, vendor quotes, and RS Means.
Labor estimates based on previous work, J. Bifulco S/S labor units, R.S. Means, and NECA labor units.
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 15% contingency on Construction direct costs which equates to 1.5% contingency of total cost.

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Accounting Policy Statement No. 2
Operations Project Authorization

Project Authorization Form

General Information

Date Prepared: 02/26/16	Project Title: West Rye S/S Rebuild
Company: Eversource - NH	Project ID Number: A16E06
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Mike Busby	Project Category: Reliability
Project Owner/Manager: Celine Bilodeau	Project Purpose: part of regulatory tracked program? No
Project Sponsor: Jim Eilenberger	Project Type: Specific
Estimated in service date: 12/31/17	Capital Investment Part of Original Operating Plan? Yes
If Transmission Project: No	Supplement to Existing Authorization? No
	O&M Expenses Part of the Original Operating Plan? No

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

The existing West Rye substation was built in the late 1950's and is a 34.5kV to 4kV substation with two 1.5MVA transformers and switchgear equipment that have exceeded their life expectancy. Replacement parts for the switchgear air breakers are no longer available. The 1.5MVA transformers have exceeded the 85% of maximum load (TFRAT) ratings and test indicate that gas has been generated within the transformers.

A study was completed for the area in March 2013 (Rye Area Study) which identified the area having loading, low voltage and coordination issues. In order to improve the reliability and voltage issues for the area the substation will be converted to a 34.5kV to 12kV substation. Converting from 4kV to 12kV increases the ability to provide contingent coverage for adjacent circuits. The study looked at maintaining the 4kV system but this was eliminated due to the cost of getting right-of-ways in this affluent area.

The scope of work includes installing a 10MVA transformer and three reclosers. One recloser will be installed on the high side of the transformer providing protection and fault isolation. Two reclosers will be installed on each outgoing 12kV circuit. The scope includes installing a RTU for Distribution Automation.

This PAF covers the substation potion of the overall project. A second PAF (A16E01) has been submitted to cover the line portion of the conversion for $1,261,108.

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Accounting Policy Statement No. 2
Operations Project Authorization

Project Costs Summary

Cost ($000)	Prior Authorized*	2016	2017	2018 +	Totals
Capital Additions - Direct		69	921		990
Customer Contribution					
Removals net of Salvage			50		50
Total - Direct Spending	$ -	69	971		1,040
Capital Additions - Indirect		13	233		246
Subtotal Request	$ -	81	1,204		1,285
AFUDC (half-year convention)		1	18		18
Total Request	$ -	82	1,222		1,304

Summary Project Description

The reason for the work at West Rye is to remove the existing obsolete equipment, address the growth, improve the low voltage and reliability. The area will be converted from 4kV to 12kV in the footprint of the existing substation. The two 1.5MVA transformers will be replaced with a single 10/12 MVA transformer. Three (3) Reclosers will be installed; one for the high side transformer protection and one on each (renamed 70W1 & 70W2) 12kV circuits along with a RTU for Distribution Automation.

Cost ($000)	Total Project Costs	Amount in Operating Plan	Difference
Capital	$ 1,304	$1,304	$0
O&M	$	$0	$
Total	$1,304	$1,304	$0

Project Authorization

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

Approver	Approver Name	Approver Signature	Date
Project initiator	Mike Busby		
Project manager	Celine Bilodeau		
Plant Accounting	Michelle Roncaioli		
Director	James Eilenberger		
Sr. Vice President	Peter Clarke		

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Accounting Policy Statement No. 2
Operations Project Authorization

Overall Justification

The West Rye S/S is a 1955 vintage 34.5kV to 4.16kV nominal substation. The transformers, 70H1 & 70H2, at West Rye are loaded to 109.3% and 94.7% of their nameplate rating. The load exceeds the TFRAT threshold of 85% to 96% and 92% respectively. Both transformers have been generating gas within the transformers for a number of years.

70H1 (1955 Transformer's vintage) shows a sharp jump of carbon monoxide, & methane and high levels of ethane. Possibly due to a thermal fault of 300 to 700C.

70H2 (1955 Transformer's vintage) shows high levels of Ethylene, Acetylene, Nitrogen and Oxygen; possibly from contact heating.

These gas-in-oil results indicate both transformers potentially have internal concerns that may lead to failure. Based on the age, gassing and loading the transformers should be replaced.

The circuits in the area have been experiencing low voltages. The rebuilt substation will be 34.5kV to 12.47kV. Between the larger transformer and voltage conversion, the voltage issues will be addressed. This project removes obsolete equipment, converts the area to 12kV and adds Distribution Automation.

Project Scope

Remove two (2) 1.5MVA, 34.4-4.36kV transformers
Remove two (2) 4kV breakers
Install one (1) 10/12 MVA, 34.5-12kV transformer
Install three (3) Reclosers
Install Distribution Automation

Project Objectives

Increase capacity at the West Rye S/S
Convert the substation from 4kV to 12kV
Improve relay protection and coordination
Remove obsolete equipment
Add Distribution Automation

Business Process and / or Technical Improvements:

Remove obsolete equipment
Increase capacity
Improve reliability
Improve voltage levels
Implement Distribution Automation

Assumptions

Loads on the West Rye substation will be off loaded to other circuits during construction.

Alternatives Considered

Convert area to 34.5kV instead of 12kV; this option was eliminated because this is a heavily treed area with most roads designated as "Scenic" making it difficult to obtain the desired level of tree trimming clearance required for 34.5 kV circuits.

Project Schedule

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

Milestone/Phase Name	Estimated Completion Date
Engineering – start	5/1/16
Engineering – complete	9/1/16
Construction - start	4/1/17
In Service	6/1/17

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Accounting Policy Statement No. 2
Operations Project Authorization

Financial Evaluation

Direct Capital Costs ($000)	2016	2017	2018	Total
Straight Time Labor	$15	$156	$	$170
Overtime Labor				$
Outside Services	$	$50	$	$ 50
Materials	$	$589	$	$589
Other, including contingency amounts (describe)	$54	$176	$	$230
Total	$69	$971	$	$1,040

Indirect Capital Costs ($000)	2016	2017	2018	Total
Benefits / Loaders	$13	$233	$	$246
Capitalized interest or AFUDC, if any	$1	$18	$	$18
Total	$13	251	$	264

Total Capital Costs	$82	$1,222	$	$1,304
Total O&M Costs				
Total Project Costs ($000)	$82	$1,222	$	$1,304

The project includes contingency funds approximately 17% for cost of removing possible contaminated soils or hazardous foundations as well as the potential increase of contractor cost.

Regulatory Approvals

Permitting required by the Town of Rye, N.H.

Risks and Risk Mitigation Plans

The plan is to build the substation during the lightly loaded time of the year and off load to other circuits. A mobile substation can be installed if needed.

The soil will be tested near the sample valves for the transformers; cost of soil remediation is included in contingency costs.

The concrete foundations will be tested for asbestos and oil staining; cost of removals is included in the contingency costs.

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Supplement Request Form

Approved at January 17, 2018 EPAC

Link to Meeting Minutes

Date Prepared: November 28th, 2017	Project Title: West Rye Substation Re-build
Company/Companies: Eversource, NH	Project ID Number: A16E06
Organization: NH Operations	Plant Class/(F.P.Type): Distribution Substation
Project Initiator: Charles Christensen, PE	Project Type: *Specific*
Project Manager: Thelma Brown/Natacha Morales	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: $1,590,000	Estimated in service date(s): 2/1/2018
Supplement Request: $712,385	Other:
Total Request: $2,302,385	

Supplement Justification

This project is to replace the existing 1950's vintage 3MVA 34.5 – 4.16kV substation with a 10/12MVA 34.5 – 12.47kV substation.

The PAF for this project was approved in Powerplan in April 2016 for $1,304,000. The original PAF is attached as well as the first supplemental which was approved in Powerplan in July of 2017 for a supplement request of $286,000 and a new total request of $1,590,000. The expected cost to complete the project is now $2,302,385 which is $712,385 above the approved project amount.

Since the first supplemental approval, there have been some engineering changes, construction contract was competitively bid and properly awarded and proposals for testing and commissioning have been received. Construction estimates (electrical, substation, P&C) were significantly low in the first supplemental (about $500,000). Other projects with the same scope of work have averaged construction contracts between $600,000 – $750,000, the estimate for the first supplemental only had $177,009. This was the most significant oversight on the first supplemental and the estimate did not include enough funding for test and commissioning ($19,990).

ROW clearing and environmental monitoring were not accounted for in the previous supplemental. Please see table below for a breakdown of additional expenses from the first supplemental request.

The first supplemental was presented and written by someone other than the Project Manager and these oversights were not caught during the meeting, which resulted in this additional funding request.

As of the end of November, engineering is complete, major materials were received and the substation is under construction. The substation will be wired and ready for test and commissioning by the end of December. The ISD has been pushed out to the middle of February due to delays related to the 10/30 wind storm restoration and construction issues including steel delivery, transformer delivery, materials being altered in the field, parts of the transformer being replaced, and some wiring re-configurations.

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Supplement Request Form

	Cost Summary for Supplemental Request	Change
Engineering (Internal)	Design of tap poles to S/S.	$30,801
Engineering (contractor)	• Modification of GA elevations to include the 3105X line. (not in original scope of work) • Additional strain bus off the 12kV mobile connection to provide a tap to the 12kV bus (not in original scope of work). • Change of conductor specs. • Relocation of reclosers. • Additional conduits for powering reclosers (not in original scope of work). • Modification of grounding. • Equipment vendor information not available. • Drawing modifications due to existing field conditions not being accurate on Eversource provided drawings.	$31,650
Trimming & ROW clearing		$9,000
Construction	Construction left out of the original estimate and underestimated in the first supplemental	$304,981
Soil and sound testing		$41,000
Permitting & environmental monitoring		$29,000
Surveying		$7,500
Testing and commissioning	Estimate significantly higher than previous estimate	$240,100
Loaders		$72,034
Materials		($24,079)
PM		($4,069)
Contingency		($25,853)
Total Supplemental Request		**$712,065**

Justification for Additional Resources

After engineering was completed and proposals received for construction, test and commissioning, it was apparent that the previous estimate significantly underestimated the value for these services.

Explanation for Cost Increase

Labor – Most of the increase in labor was for construction as well as test and commissioning. The construction contract went through a competitive bidding process and it was awarded to IC Reed for a total amount of $481,990. The first supplemental estimated construction to be $177,009. The award is about $304,981 more than estimated. Test and commissioning proposals total $260,000. The cost for other outside services including tree clearing, ROW mowing, surveying and environmental monitoring was increased by $86,500. Project Manager and support as well as contingency reduced by approximately $30,000. After the start of construction, there were some changes in engineering which increased the

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Supplement Request Form

engineering cost to approximately $62,000. This covers both internal and external engineering. There were some field conditions that were not captured prior to issuing the IFCs.

Materials – This cost was decreased by $24,000.

Indirects/AFUDC – Indirects and AFUDC have also increased by $72,034. This increase is associated with direct labor and material stock which has overhead costs.

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 1,385	$ 588	$ 1,973
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	50.00	50.00
Total Direct Spending	$ 1,385	$ 638	$ 2,023
Capital Additions - Indirect	204.00	72.00	276.00
AFUDC	1.00	1.60	2.60
Total Capital Request	$ 1,590	$ 712	$ 2,302
O&M	-	-	-
Total Request	**$ 1,590**	**$ 712**	**$ 2,302**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2017	Year 20__	Year 20__+	Total
Capital Additions - Direct		$ 588		$ 588
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	50.00	-		50.00
Total Direct Spending	$ -	$ 638	$ -	$ 638
Capital Additions - Indirect		72.00		72.00
AFUDC		1.60		1.60
Total Capital Request	$ -	$ 712	$ -	$ 712
O&M	-	-	-	-
Total Request	**$ -**	**$ 712**	**$ -**	**$ 712**

ESTIMATE SUMMARY
PSNH

Project Title: West Rye Substation 70H1 & 70H2Transformer Replacement
Estimate By: MPD
Project Mgr/Lead: Natacha Morales
Date of Estimate: 11/07/17
Project Number: A16E06
ISD: 12/31/17
TAF # XYZ
Estimate # P17-040 Rev 1

ESTIMATE SUMMARY

ESTIMATE TYPE: Engineering

	TOTAL	Prior	2017	2018	2019	2020	2021 and FUTURE
CONSTRUCTION	$568,490	$282,349	$286,141	$0	$0	$0	$0
ENGINEERING/DESIGN	$323,509	$323,509	$0	$0	$0	$0	$0
LAND	$0	$0	$0	$0	$0	$0	$0
MATERIAL	$760,709	$154,709	$606,000	$0	$0	$0	$0
PROJECT MGR & SUPPORT	$60,642	$60,642	$0	$0	$0	$0	$0
REMOVAL	$50,000	$0	$50,000	$0	$0	$0	$0
TEST	$260,000	$0	$260,000	$0	$0	$0	$0
CONTINGENCY	$0	$0	$0	$0	$0	$0	$0
ESCALATION	$0	$0	$0	$0	$0	$0	$0
INDIRECTS	$276,367	$190,928	$85,439	$0	$0	$0	$0
AFUDC	$2,667	$1,080	$1,587	$0	$0	$0	$0
Total Cost	**$2,302,385**	**$1,013,218**	**$1,289,167**	**$0**	**$0**	**$0**	**$0**

	-10%	-	**10%**
Engineering Range	**$2,072,146**	-	**$2,532,623**

COMMENTS:

Project Scope:

Revision 1: Revised estimate for additional costs the result of higher costs than originall yestimated for Construction, Testing, Commissioning and indirects.
Testing primarily with the addition of a Commissioning engineer inreased $240k from original estimate.
Construction with the addition of ROW trimming, clearing and environmental monitoring and mitigation increased by $390k above original estimate.
The indirect costs due to these increases are $64k.

The West Rye Substation Rebuild project is being constructed in support of the recommendations presented from the Rye Area Distribution System Study dated March 01, 2013.

The existing West Rye substation currently referred to as #70 will be renamed to West Rye #67 due to a naming conflict with another 34.5-12.47kV substation currently called #70. The two 12.47kV lines emitting from West Rye substation will be named 67W1 & 67W2.

The existing configuration of West Rye substation consisting of two separate 34.5–4.16kV transformers will be replaced with a single 34.5–12.47kV 10/12.5 MVA transformer. The two existing 34.5kV taps of the 3105 line feeding the existing transformers will be removed and a single tap of the **3105X** will feed the new transformer.

The station service for the substation will be provided from a single phase 34.5kV-120/240V pole mount transformer tapped to the 34.5kV bus.

Assumptions:
Engineering to be outsourced with in-house review, construction to be outsourced.
This estimate is based on Actual costs to date and bid costs from outside source contractors, engineers and testing and commissioning , actual quantities may vary during detailed engineering.
Material estimates based on actuals and vendor quotes..
Labor estimates based on actuals to date and vendor cost estimate quotes.
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.

Project Number: A16E06

UNESCALATED LINE ITEM DOLLAI

Project Title: West Rye Substation 70H1 & 70H2Transformer Replacement

Escalation Rate 3%			Rate $ 416		0		1		2		3		4			
			Prior		2017		2018		2019		2020		2021 and FUTURE		TOTAL	
			MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS
CSTXX-CONSTRUCTION	**R**															
Electrical Construction	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
General Construction	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Transmission Automation	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Construction Reps	LT		0	$2,168	20	$8,329	0	$0	0	$0	0	$0	0	$0	20	$10,497
Support Switch/Tag	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
LT Total			0	$2,168	20	$8,329	0	$0	0	$0	0	$0	0	$0	20	$10,497
Employee Expenses	AE	**5%**		$134		$416		$0		$0		$0		$0		$550
Construction Purchased Material	AM	**1%**		$0		$2,730		$0		$0		$0		$0		$2,730
Construction Vendor	AQ			$279,112		$273,000		$0		$0		$0		$0		$552,112
Vehicles	AV	**20%**		$937		$1,666		$0		$0		$0		$0		$2,603
Fees and Payments	BF			$0		$0		$0		$0		$0		$0		$0
Rents and Leases	BR			$0		$0		$0		$0		$0		$0		$0
CSTXX Total			0	$282,349	20	$286,141	0	$0	0	$0	0	$0	0	$0		$568,490
ENRXX-TG ENGINEERING/DESIGN																
Project Services/Drafting	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Transmission Engineering/Design	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Civil Engineering/Design	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Substation Engineering/Design	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Distribution SS Engineering/Design	LT		0	$63,287	0	$0	0	$0	0	$0	0	$0	0	$0	0	$63,287
Protection & Controls Engineering	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Survey Engineering	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Telecom Engineering	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
LT Total			0	$63,287	0	$0	0	$0	0	$0	0	$0	0	$0	0	$63,287
Employee Expenses	AE	**5%**		$622		$0		$0		$0		$0		$0		$622
Contractor Engineering	AQ			$256,402		$0		$0		$0		$0		$0		$256,402
Vehicles	AV	**3%**		$3,199		$0		$0		$0		$0		$0		$3,199
ENRXX Total			0	$323,509	0	$0	0	$0	0	$0	0	$0	0	$0		$323,509
LNDXX-TG LAND																
Real Estate	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Employee Expenses	AE	**5%**		$0		$0		$0		$0		$0		$0		$0
Purchase Land	AM			$0		$0		$0		$0		$0		$0		$0
Vehicles	AV	**3%**		$0		$0		$0		$0		$0		$0		$0
Fees and Payments	BF			$0		$0		$0		$0		$0		$0		$0
LNDXX Total			0	$0	0	$0	0	$0	0	$0	0	$0	0	$0		$0
MATXX-TG MATERIAL																
See attached	AM			$142,309		$600,000		$0		$0		$0		$0		$742,309
	AM			$0		$0		$0		$0		$0		$0		$0
	AM			$0		$0		$0		$0		$0		$0		$0
Freight		**0%**		$0		$0		$0		$0		$0		$0		$0
Sales Tax		**0%**		$0		$0		$0		$0		$0		$0		$0
Stores Expense Allocation (ZC)		**1%**		$12,400		$6,000		$0		$0		$0		$0		$18,400
MATXX Total				$154,709		$606,000		$0		$0		$0		$0		$760,709
PSMXX-PROJECT MANAGER & SUPPORT																
Project Planning	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Project Management	LT		0	$10,408	0	$0	0	$0	0	$0	0	$0	0	$0	0	$10,408
Contracts/Purchasing	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Legal	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Transmission Planning	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Environmental	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
LT Total				$10,408		$0		$0		$0		$0		$0	0	$10,408
Employee Expenses	AE	**5%**		$318		$0		$0		$0		$0		$0		$318
Legal Vendor	AV	**0%**		$0		$0		$0		$0		$0		$0		$0
Project Support Vendor Inc Sales Tax	AQ			$44,794		$0		$0		$0		$0		$0		$44,794
Vehicles	AV			$1,198		$0		$0		$0		$0		$0		$1,198
Include allowance for Property tax large proj.	AM			$3,665		$0		$0		$0		$0		$0		$3,665
Fees and Payments	BF			$259		$0		$0		$0		$0		$0		$259
PSMXX Total				$60,642		$0		$0		$0		$0		$0	0	$60,642
REMXX-TG REMOVAL																
Engineering/Design	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
General Construction	LT			$0		$0		$0		$0		$0		$0		$0
LT Total			0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Employee Expenses	AE	**15%**		$0		$0		$0		$0		$0		$0		$0
Outside Services	AO			$0		$0		$0		$0		$0		$0		$0
Contractor Labor	AQ			$0		$50,000		$0		$0		$0		$0		$50,000
Vehicles	AV	**20%**		$0		$0		$0		$0		$0		$0		$0
Rents and Leases	BR			$0		$0		$0		$0		$0		$0		$0
REMXX Total				$0		$50,000		$0		$0		$0		$0		$50,000
TSTXX-TG TEST																
Test Labor-In House	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Employee Expense	AE	**10%**		$0		$0		$0		$0		$0		$0		$0
Contractor Test & Commissioning Labor	AQ			$0		$260,000		$0		$0		$0		$0		$260,000
Vehicles	AV	**10%**		$0		$0		$0		$0		$0		$0		$0
TSTXX Total				$0		$260,000		$0		$0		$0		$0		$260,000
Project Escalation				$0		$0		$0		$0		$0		$0	0	$0
Project Contingency				$0		$0		$0		$0		$0		$0		$0
TOTAL PROJECT DIRECT COST				**$821,209**		**$1,202,141**		**$0**		**$0**		**$0**		**$0**		**$2,023,350**
INDIRECTS																
Non-Productive Time Allocation (ZB)		**17%**		$12,657		$1,391		$0		$0		$0		$0		$14,048
Payroll Benefits Allocation (ZE)		**32%**		$26,373		$0		$0		$0		$0		$0		$26,373
Gen SVC CO OVRHD ALLOC (ZF)		**3%**		$22,073		$292		$0		$0		$0		$0		$22,365
E&S Allocations (ZI) (25%<20M<3%)		**12%**		$114,553		$71,008		$0		$0		$0		$0		$185,561
AS&E Allocations (ZJ)		**1%**		$15,272		$12,748		$0		$0		$0		$0		$28,020
AFUDC (ZK)		**0%**		$1,080		$1,587		$0		$0		$0		$0	0	$2,667
Indirects Subtotal				$192,008		$87,026		$0		$0		$0		$0		$279,034
TOTAL PROJECT COST				**$1,013,218**		**$1,289,167**		**$0**		**$0**		**$0**		**$0**	**0**	**$2,302,385**

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Date Prepared: July 3, 2017	Project Title: West Rye SS Rebuild
Company/Companies: Eversource NH	Project ID Number: A16E06
Organization: NH Operations	Plant Class/(F.P.Type):Substation
Project Initiator: Charles Christensen, PE	Project Type: Specific
Project Manager: Thelma Brown	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:$1,304,000	Estimated in service date(s): 12/31/17
Supplement Request: $286,000	Other:
Total Request: $1,590,000	

Supplement Justification

This project is to replace the existing 1950's vintage 3MVA 34.5-4.16kV substation with a 10/12MVA 34.5-12.47kV substation

The PAF for this project was approved in Powerplan in April 2016 for $1,304,000. The original PAF is attached. Removal and Addition one-lines are attached which confirm the scope of the project is the same but much more detail and engineering is complete.

The expected cost to complete the project is now $1,590,000 which is $286,000 above the approved project amount.

	PAF Approved Budget	Current Forecast
Direct	$1,040,000	$1,395,000
Indirect	$246,000	$204,000
AFUDC	$18,000	$1,000
Total	$1,304,000	$1,590,000
Difference	$286,000	

The approved direct costs for this project were $1,040,000. It is estimated that the final direct costs associated with this project will be $1,395,000 or 134% of the approved estimate. This increase in direct costs are based on increased internal and external labor and higher than planned material costs.

Justification for Additional Resources

The cost estimate for this project originally was based on all engineering in-house and minor changes to the site from what exists today. Engineering design has been completed by a contractor which is higher than the labor costs originally forecast. The site design went through several iterations and which also increased the amount of engineering contractor labor. The actual material costs are higher than originally budgeted. All major items were identified but many items such as steel and foundations were not in the original estimate.

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APS 1 - Project Authorization Policy

Supplement Request Form

The 34.5kV ROW work has also been added to the scope of the project. This includes building 4 new poles and associated equipment for a mobile SS high side connection.

Explanation for Cost Increase

Labor – A consultant was utilized for all engineering and design. This costs more than utilizing internal engineering. Several site iterations also increased engineering, siting, and permitting costs. Internal labor did decrease by $95,000. Outside services, including the contingency budget increased by $245,000

Estimated Cost Increase $150,000

Material – Major material was included in the original estimate but costs for the transformer, reclosers, and switches is higher than the $589,000 budgeted. Station service, PTs, site expansion, fencing, grounding, and stoning was not included in the original estimate. Many of these items were identified throughout the design process

Estimated Cost Increase $196,000

Indirects / AFUDC - Indirect and AFUDC charges have are estimated to decrease. Some of the decrease in indirects associated with direct labor. Material stock indirects decreased because of the direct material order items that are limited for overhead costs. Other decreases may be accounted for by calculations in the Powerplan system

Estimated Cost Decrease $59,000

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 1,040	$ 345	$ 1,385
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	-	-
Total Direct Spending	$ 1,040	$ 345	$ 1,385
Capital Additions - Indirect	246	(42)	204
AFUDC	18	(17)	1
Total Capital Request	$ 1,304	$ 286	$ 1,590
O&M	-	-	-
Total Request	**$ 1,304**	**$ 286**	**$ 1,590**

Note: Dollar values are in thousands:

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APS 1 - Project Authorization Policy

Supplement Request Form

Total Supplement Request by year view:

	Year 2017	Year 20__	Year 20__+	Total
Capital Additions - Direct	$ 345	$ -		$ 345
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	-	-	-	-
Total Direct Spending	$ 345	$ -	$ -	$ 345
Capital Additions - Indirect	(42)	-		(42)
AFUDC	(17)	-		(17)
Total Capital Request	$ 286	$ -	$ -	$ 286
O&M	-	-	-	-
Total Request	**$ 286**	**$ -**	**$ -**	**$ 286**

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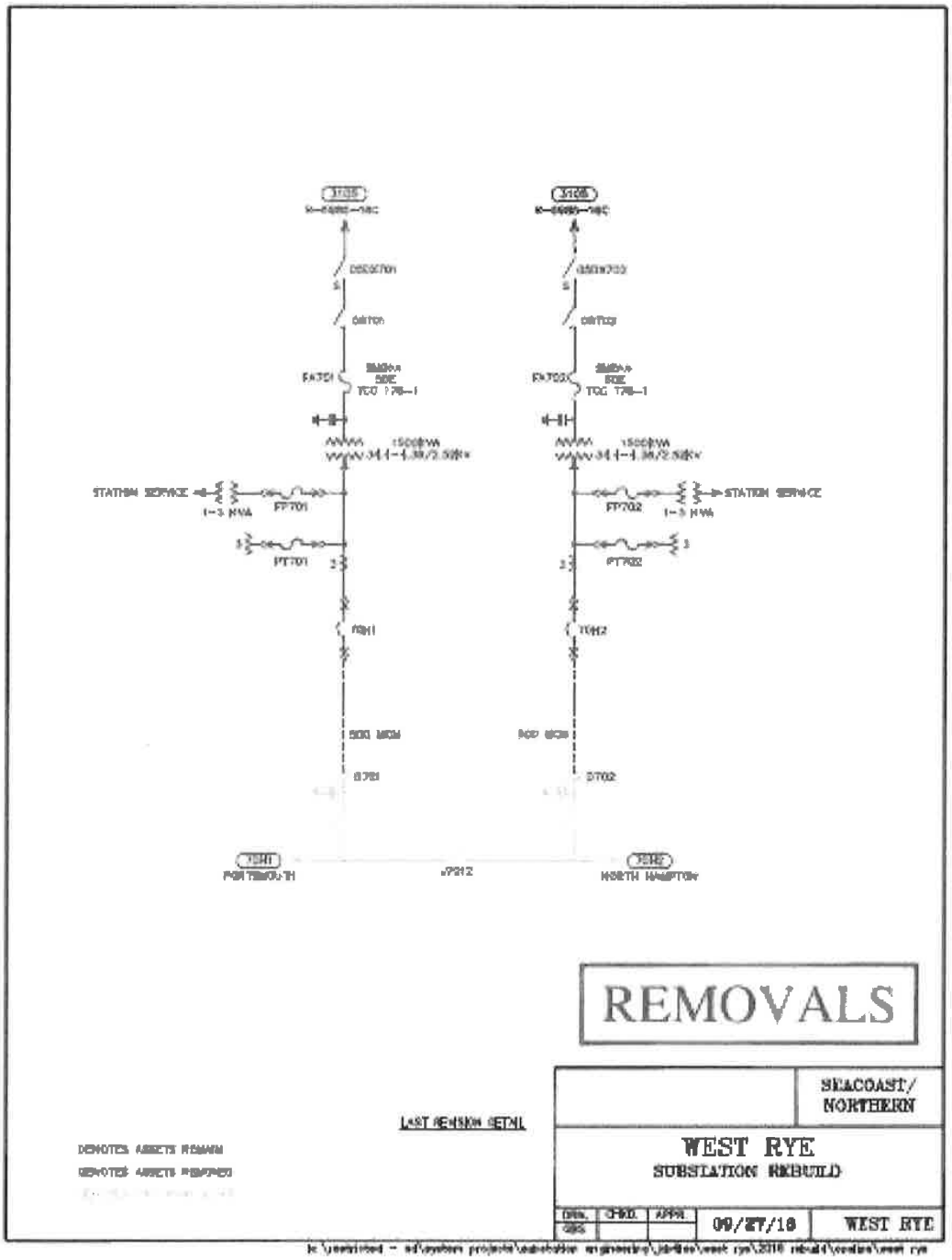
APS 1 - Project Authorization Policy

Supplement Request Form



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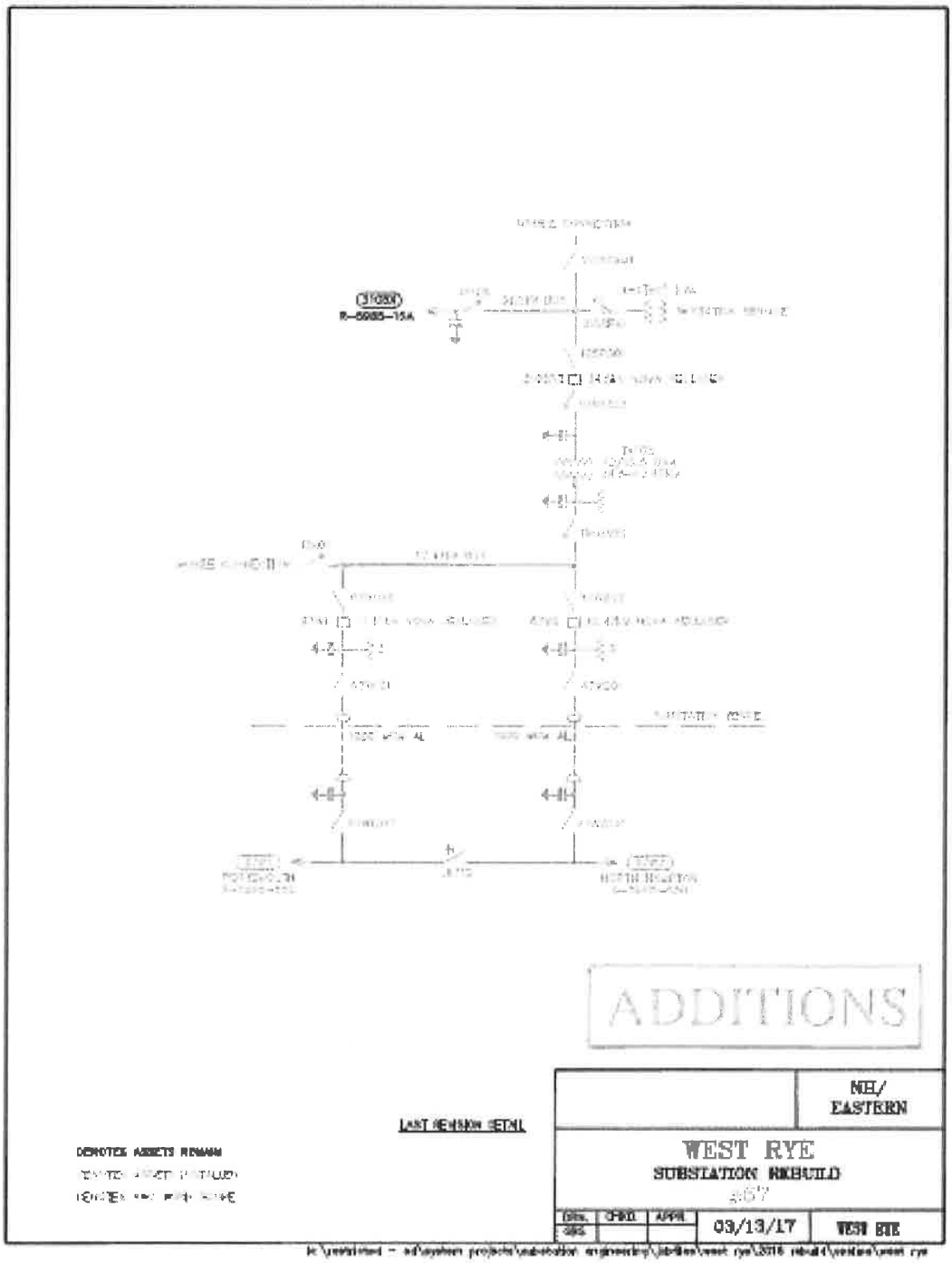
APS 1 - Project Authorization Policy

Supplement Request Form



ESTIMATE SUMMARY
PSNH

Project Title: West Rye Substation 70H1 & 70H2Transformer Replacement | **Estimate By: MPD**
Project Mgr/Lead: Natacha Morales | **Date of Estimate: 7/4/17**
Project Number: A16E06 | **ISD: 12/31/17**
TAF # XYZ | **Estimate # P17-040**

ESTIMATE SUMMARY

ESTIMATE TYPE: Engineering

	TOTAL	Prior to 6/1/17	2017 after 5/31/17	2018	2019	2020	2021 and FUTURE
CONSTRUCTION	$177,009	$2,398	$174,611	$0	$0	$0	$0
ENGINEERING/DESIGN	$261,058	$239,166	$21,892	$0	$0	$0	$0
LAND	$0	$0	$0	$0	$0	$0	$0
MATERIAL	$784,788	$117,410	$667,378	$0	$0	$0	$0
PROJECT MGR & SUPPORT	$64,711	$46,467	$18,244	$0	$0	$0	$0
REMOVAL	$50,000	$0	$50,000	$0	$0	$0	$0
TEST	$19,990	$0	$19,990	$0	$0	$0	$0
CONTINGENCY	$25,853	$0	$25,853	$0	$0	$0	$0
ESCALATION	$0	$0	$0	$0	$0	$0	$0
INDIRECTS	$204,333	$79,015	$125,318	$0	$0	$0	$0
AFUDC	$1,209	$216	$993	$0	$0	$0	$0
Total Cost	**$1,588,952**	**$484,672**	**$1,104,279**	**$0**	**$0**	**$0**	**$0**

	-10%	-	**10%**
Engineering Range	**$1,430,056**	-	**$1,747,847**

COMMENTS:

Project Scope:

The West Rye Substation Rebuild project is being constructed in support of the recommendations presented from the Rye Area Distribution System Study dated March 01, 2013.

The existing West Rye substation currently referred to as #70 will be renamed to West Rye #67 due to a naming conflict with another 34.5-12.47kV substation currently called #70. The two 12.47kV lines emitting from West Rye substation will be named 67W1 & 67W2.

The existing configuration of West Rye substation consisting of two separate 34.5–4.16kV transformers will be replaced with a single 34.5–12.47kV 10/12.5 MVA transformer. The two existing 34.5kV taps of the 3105 line feeding the existing transformers will be removed and a single tap of the **3105X** will feed the new transformer.

The station service for the substation will be provided from a single phase 34.5kV-120/240V pole mount transformer tapped to the 34.5kV bus.

Assumptions:
Engineering to be outsourced with in-house review, construction to be outsourced.
This estimate is based on Project Scope Document only, actual quantities may vary during detailed engineering.
Material estimates based on previous work, vendor quotes, and RS Means.
Labor estimates based on previous work, J. Bifulco S/S labor units, R.S. Means, and NECA labor units.
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 15% contingency on Construction direct costs which equates to 1.5% contingency of total cost.

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Project Authorization Form

General Information

Date Prepared: 02/26/16	Project Title: West Rye S/S Rebuild
Company: Eversource - NH	Project ID Number: A16E06
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Mike Busby	Project Category: Reliability
Project Owner/Manager: Celine Bilodeau	Project Purpose: part of regulatory tracked program? No
Project Sponsor: Jim Eilenberger	Project Type: Specific
Estimated in service date: 12/31/17	Capital Investment Part of Original Operating Plan? Yes
If Transmission Project: No	Supplement to Existing Authorization? No
	O&M Expenses Part of the Original Operating Plan? No

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

The existing West Rye substation was built in the late 1950's and is a 34.5kV to 4kV substation with two 1.5MVA transformers and switchgear equipment that have exceeded their life expectancy. Replacement parts for the switchgear air breakers are no longer available. The 1.5MVA transformers have exceeded the 85% of maximum load (TFRAT) ratings and test indicate that gas has been generated within the transformers.

A study was completed for the area in March 2013 (Rye Area Study) which identified the area having loading, low voltage and coordination issues. In order to improve the reliability and voltage issues for the area the substation will be converted to a 34.5kV to 12kV substation. Converting from 4kV to 12kV increases the ability to provide contingent coverage for adjacent circuits. The study looked at maintaining the 4kV system but this was eliminated due to the cost of getting right-of-ways in this affluent area.

The scope of work includes installing a 10MVA transformer and three reclosers. One recloser will be installed on the high side of the transformer providing protection and fault isolation. Two reclosers will be installed on each outgoing 12kV circuit. The scope includes installing a RTU for Distribution Automation.

This PAF covers the substation potion of the overall project. A second PAF (A16E01) has been submitted to cover the line portion of the conversion for $1,261,108.

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Accounting Policy Statement No. 2
Operations Project Authorization

Project Costs Summary

Cost ($000)	Prior Authorized*	2016	2017	2018 +	Totals
Capital Additions - Direct		69	921		990
Customer Contribution					
Removals net of Salvage			50		50
Total - Direct Spending	$ -	69	971		1,040
Capital Additions - Indirect		13	233		246
Subtotal Request	$ -	81	1,204		1,285
AFUDC (half-year convention)		1	18		18
Total Request	$ -	82	1,222		1,304

Summary Project Description

The reason for the work at West Rye is to remove the existing obsolete equipment, address the growth, improve the low voltage and reliability. The area will be converted from 4kV to 12kV in the footprint of the existing substation. The two 1.5MVA transformers will be replaced with a single 10/12 MVA transformer. Three (3) Reclosers will be installed; one for the high side transformer protection and one on each (renamed 70W1 & 70W2) 12kV circuits along with a RTU for Distribution Automation.

Cost ($000)	Total Project Costs	Amount in Operating Plan	Difference
Capital	$ 1,304	$1,304	$0
O&M	$	$0	$
Total	$1,304	$1,304	$0

Project Authorization

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

Approver	Approver Name	Approver Signature	Date
Project initiator	Mike Busby		
Project manager	Celine Bilodeau		
Plant Accounting	Michelle Roncaioli		
Director	James Eilenberger		
Sr. Vice President	Peter Clarke		

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Accounting Policy Statement No. 2
Operations Project Authorization

Overall Justification

The West Rye S/S is a 1955 vintage 34.5kV to 4.16kV nominal substation. The transformers, 70H1 & 70H2, at West Rye are loaded to 109.3% and 94.7% of their nameplate rating. The load exceeds the TFRAT threshold of 85% to 96% and 92% respectively. Both transformers have been generating gas within the transformers for a number of years.

70H1 (1955 Transformer's vintage) shows a sharp jump of carbon monoxide, & methane and high levels of ethane. Possibly due to a thermal fault of 300 to 700C.

70H2 (1955 Transformer's vintage) shows high levels of Ethylene, Acetylene, Nitrogen and Oxygen; possibly from contact heating.

These gas-in-oil results indicate both transformers potentially have internal concerns that may lead to failure. Based on the age, gassing and loading the transformers should be replaced.

The circuits in the area have been experiencing low voltages. The rebuilt substation will be 34.5kV to 12.47kV. Between the larger transformer and voltage conversion, the voltage issues will be addressed. This project removes obsolete equipment, converts the area to 12kV and adds Distribution Automation.

Project Scope

Remove two (2) 1.5MVA, 34.4-4.36kV transformers
Remove two (2) 4kV breakers
Install one (1) 10/12 MVA, 34.5-12kV transformer
Install three (3) Reclosers
Install Distribution Automation

Project Objectives

Increase capacity at the West Rye S/S
Convert the substation from 4kV to 12kV
Improve relay protection and coordination
Remove obsolete equipment
Add Distribution Automation

Business Process and / or Technical Improvements:

Remove obsolete equipment
Increase capacity
Improve reliability
Improve voltage levels
Implement Distribution Automation

Assumptions

Loads on the West Rye substation will be off loaded to other circuits during construction.

Alternatives Considered

Convert area to 34.5kV instead of 12kV; this option was eliminated because this is a heavily treed area with most roads designated as "Scenic" making it difficult to obtain the desired level of tree trimming clearance required for 34.5 kV circuits.

Project Schedule

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

Milestone/Phase Name	Estimated Completion Date
Engineering – start	5/1/16
Engineering – complete	9/1/16
Construction - start	4/1/17
In Service	6/1/17

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Financial Evaluation

Direct Capital Costs ($000)	2016	2017	2018	Total
Straight Time Labor	$15	$156	$	$170
Overtime Labor				$
Outside Services	$	$50	$	$ 50
Materials	$	$589	$	$589
Other, including contingency amounts (describe)	$54	$176	$	$230
Total	$69	$971	$	$1,040

Indirect Capital Costs ($000)	2016	2017	2018	Total
Benefits / Loaders	$13	$233	$	$246
Capitalized interest or AFUDC, if any	$1	$18	$	$18
Total	$13	251	$	264

Total Capital Costs	$82	$1,222	$	$1,304
Total O&M Costs				
Total Project Costs ($000)	$82	$1,222	$	$1,304

The project includes contingency funds approximately 17% for cost of removing possible contaminated soils or hazardous foundations as well as the potential increase of contractor cost.

Regulatory Approvals

Permitting required by the Town of Rye, N.H.

Risks and Risk Mitigation Plans

The plan is to build the substation during the lightly loaded time of the year and off load to other circuits. A mobile substation can be installed if needed.

The soil will be tested near the sample valves for the transformers; cost of soil remediation is included in contingency costs.

The concrete foundations will be tested for asbestos and oil staining; cost of removals is included in the contingency costs.

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Approved at August 29, 2018 EPAC

Link to Meeting Minutes

Date Prepared: August 10th, 2018	Project Title: West Rye Substation Re-build
Company/Companies: Eversource, NH	Project ID Number: A16E06
Organization: NH Operations	Plant Class/(F.P.Type): Substation
Project Initiator: Charles Christensen, PE	Project Type: *Specific*
Project Manager: Thelma Brown/Natacha Morales	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: $2,302,118	In service date(s): 2/14/2018
Supplement Request: $364,000	Other:
Total Request: $2,666,118	

Supplement Justification

This project is to replace the existing 1950's vintage 3MVA 34.5 – 4.16kV substation with a 10/12MVA 34.5 – 12.47kV substation. The substation was put in service in February 2018.

The latest supplement was approved in PowerPlan on 2/28 which brought the authorized budget to $2,302,118,. As of end of June, the project has spent $2,298,342. The last supplemental did not include the IC Reed's change order due to different factors:

1. The supplement was submitted for the first time in November. There were a couple of iterations to the document between EPAC and the Project team. The supplemental was approved on January 17th and approved in PowerPlan on February 28th.
2. IC Reed's change order was not submitted until February right before the substation went in service.
3. The change order had to be reviewed by the project team, procurement, steel fabricator, and outside engineering to understand the charges. These reviews were time consuming and were necessary to pursue any kind of refund from outside vendors that caused some of these charges in the change order.

During the last months of construction (Mid-December through February), there were significant issues with the steel for the substation (transformers and other equipment), materials ordered that had different specification from the prints, materials poor handling, and internal/external design. The following factors contributed to the issues mentioned above:

1. Engineering deficiencies both internal and external ($138,000)
    a. Switches on high side had unacceptable clearance.
    b. Steel racks were not designed to hold the pole mounted reclosers.
    c. Bus was not at correct elevation.
    d. Poor design/review of the runs from riser to riser.
    e. Pad design was based on wrong information from transformer vendor.

2. Poor fit of fabricated structural steel by vendor ($23,000)

3. Installation of animal protection coverage, which was not part of the original scope of work. This directive was a late addition to the project by Operations Management ($23,000)

4. Discrepancies in stock coded materials ordered for the project resulting in parts delivered that were different than expected ($11,500). Some of these materials include:
    a. Connectors for reclosers.
    b. Connectors for the bus switch taps.
    c. Lightning arresters.
    d. Station service Transformer.

5. Wiring discrepancies in pre-wired junction boxes ordered by Eversource. These junction boxes were ordered pre-wired to the original Eversource drawings which were subsequently redesigned. ($11,500).

6. True up of P&C construction cost from bid docs to IFC scope, including re – IFC of P&C. The original contract was issued as fixed price for civil and electrical construction. After the IFC's were issued, there were additions to the P&C scope of work which resulted in a re – IFC of the P&C two (2) months later, extending the construction duration and delaying the completion of the project ($75,000).

    The following scope items were not included in the original proposal request:
    a. Installation of the fiber patch panel for communication.
    b. Antenna for radio communications.
    c. Re-wiring of reclosers for the 67W1 and 67W2 lines.
    d. Configuration of the auto – man – remote switch as well as voltage reduction.
    e. Configuration of the station monitoring system.
    f. Animal protection.

All of which were remedied during construction by the construction vendor.

The team and procurement have short paid the engineering firm to compensate for their deficient performance and the engineering firm has re-IFC'd at no cost. Materials management has been notified of the issue of multiple non-identical parts associated with the same stock code and how this can adversely affect project design and construction.

To remedy all the issues mentioned above, extra materials were procured by the contractor ($26,890).

- Substation: Sheet metal, nuts, washers, pipe, bus support, animal protection.
- P&C: Wall mounted enclosure and latch, panels, couplings, channels, data cable, nylon cable, plastic bushings, conduit, galvanized steel, lighting.

Construction	• Above grade construction ($207,000) • P&C extra construction ($75,000) • Materials ($26,890)	$308,890
Loaders		$55,110
Total		**$364,000**

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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	$ 1,973	$ 309	$ 2,282
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	50		50
Total Direct Spending	$ 2,023	$ 309	$ 2,332
Capital Additions - Indirect	276	55	331
AFUDC	3		3
Total Capital Request	$ 2,302	$ 364	$ 2,666
O&M	-	-	-
Total Request	**$ 2,302**	**$ 364**	**$ 2,666**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2017	Year 2018	Year 20__+	Total
Capital Additions - Direct		$ 309		$ 309
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%		-		50
Total Direct Spending	$ -	$ 309	$ -	$ 309
Capital Additions - Indirect		55		55
AFUDC		-		-
Total Capital Request		$ 364	$ -	$ 364
O&M	-	-	-	-
Total Request	**$ -**	**$ 364**	**$ -**	**$ 364**

Actions to prevent recurrence:

The importance of monitoring the status of planned project spend and comparing against the authorized budget is reinforced to all project management staff at weekly staff meetings. Project Managers need to work with project cost analysts on a regular basis to impede projects from exceeding authorized budgets. A proactive approach in controlling project costs is imperative.
Management receives reports on a regular basis to identify projects that are approaching authorized spend amounts to facilitate a proactive approach to controlling project costs. Some steps to improve on this:

1. Project Manager to be involved in the estimating process along with Engineering.
2. All DR's must be approved by the Project Manager.
3. Cost Analyst to make sure that overheads and loaders are up to date.
4. Contractors to provide UVL's and invoice in a timely manner.

5. Project Manager to request supplemental funds before approving any field changes that have not been budgeted in the approved estimate.

Project Manager will be more involved in the estimates created by Engineering as well as the scope of work for projects. Project costs and spend projections will be closely monitored, particularly once updated to include construction bids, bill of materials, and other vendor costs including permitting, environmental, monitoring, testing and commissioning. This will facilitate a more accurate budget for the project. Project Managers need to identify potential budgetary issues and resolve by appropriate means as early as possible. Project Manager will also be more involved in the “In Service Date” proposal with engineering, there needs to be a discussion when the project is in its early stages to discuss the availability of resources, weather, outages, etc. This will avoid having to rush the project deliverables and construction to meet the ISD.

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APS 1 - Project Authorization Policy

Supplement Request Form

Approved at January 17, 2018 EPAC

Link to Meeting Minutes

Date Prepared: November 28th, 2017	Project Title: West Rye Substation Re-build
Company/Companies: Eversource, NH	Project ID Number: A16E06
Organization: NH Operations	Plant Class/(F.P.Type): Distribution Substation
Project Initiator: Charles Christensen, PE	Project Type: *Specific*
Project Manager: Thelma Brown/Natacha Morales	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: $1,590,000	Estimated in service date(s): 2/1/2018
Supplement Request: $712,385	Other:
Total Request: $2,302,385	

Supplement Justification

This project is to replace the existing 1950's vintage 3MVA 34.5 – 4.16kV substation with a 10/12MVA 34.5 – 12.47kV substation.

The PAF for this project was approved in Powerplan in April 2016 for $1,304,000. The original PAF is attached as well as the first supplemental which was approved in Powerplan in July of 2017 for a supplement request of $286,000 and a new total request of $1,590,000. The expected cost to complete the project is now $2,302,385 which is $712,385 above the approved project amount.

Since the first supplemental approval, there have been some engineering changes, construction contract was competitively bid and properly awarded and proposals for testing and commissioning have been received. Construction estimates (electrical, substation, P&C) were significantly low in the first supplemental (about $500,000). Other projects with the same scope of work have averaged construction contracts between $600,000 – $750,000, the estimate for the first supplemental only had $177,009. This was the most significant oversight on the first supplemental and the estimate did not include enough funding for test and commissioning ($19,990).

ROW clearing and environmental monitoring were not accounted for in the previous supplemental. Please see table below for a breakdown of additional expenses from the first supplemental request.

The first supplemental was presented and written by someone other than the Project Manager and these oversights were not caught during the meeting, which resulted in this additional funding request.

As of the end of November, engineering is complete, major materials were received and the substation is under construction. The substation will be wired and ready for test and commissioning by the end of December. The ISD has been pushed out to the middle of February due to delays related to the 10/30 wind storm restoration and construction issues including steel delivery, transformer delivery, materials being altered in the field, parts of the transformer being replaced, and some wiring re-configurations.

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APS 1 - Project Authorization Policy

Supplement Request Form

	Cost Summary for Supplemental Request	Change
Engineering (Internal)	Design of tap poles to S/S.	$30,801
Engineering (contractor)	• Modification of GA elevations to include the 3105X line. (not in original scope of work) • Additional strain bus off the 12kV mobile connection to provide a tap to the 12kV bus (not in original scope of work). • Change of conductor specs. • Relocation of reclosers. • Additional conduits for powering reclosers (not in original scope of work). • Modification of grounding. • Equipment vendor information not available. • Drawing modifications due to existing field conditions not being accurate on Eversource provided drawings.	$31,650
Trimming & ROW clearing		$9,000
Construction	Construction left out of the original estimate and underestimated in the first supplemental	$304,981
Soil and sound testing		$41,000
Permitting & environmental monitoring		$29,000
Surveying		$7,500
Testing and commissioning	Estimate significantly higher than previous estimate	$240,100
Loaders		$72,034
Materials		($24,079)
PM		($4,069)
Contingency		($25,853)
Total Supplemental Request		**$712,065**

Justification for Additional Resources

After engineering was completed and proposals received for construction, test and commissioning, it was apparent that the previous estimate significantly underestimated the value for these services.

Explanation for Cost Increase

Labor – Most of the increase in labor was for construction as well as test and commissioning. The construction contract went through a competitive bidding process and it was awarded to IC Reed for a total amount of $481,990. The first supplemental estimated construction to be $177,009. The award is about $304,981 more than estimated. Test and commissioning proposals total $260,000. The cost for other outside services including tree clearing, ROW mowing, surveying and environmental monitoring was increased by $86,500. Project Manager and support as well as contingency reduced by approximately $30,000. After the start of construction, there were some changes in engineering which increased the

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APS 1 - Project Authorization Policy

Supplement Request Form

engineering cost to approximately $62,000. This covers both internal and external engineering. There were some field conditions that were not captured prior to issuing the IFCs.

Materials – This cost was decreased by $24,000.

Indirects/AFUDC – Indirects and AFUDC have also increased by $72,034. This increase is associated with direct labor and material stock which has overhead costs.

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 1,385	$ 588	$ 1,973
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	50.00	50.00
Total Direct Spending	$ 1,385	$ 638	$ 2,023
Capital Additions - Indirect	204.00	72.00	276.00
AFUDC	1.00	1.60	2.60
Total Capital Request	$ 1,590	$ 712	$ 2,302
O&M	-	-	-
Total Request	**$ 1,590**	**$ 712**	**$ 2,302**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2017	Year 20__	Year 20__+	Total
Capital Additions - Direct		$ 588		$ 588
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	50.00	-		50.00
Total Direct Spending	$ -	$ 638	$ -	$ 638
Capital Additions - Indirect		72.00		72.00
AFUDC		1.60		1.60
Total Capital Request	$ -	$ 712	$ -	$ 712
O&M	-	-	-	-
Total Request	**$ -**	**$ 712**	**$ -**	**$ 712**

ESTIMATE SUMMARY
PSNH

Project Title: West Rye Substation 70H1 & 70H2Transformer Replacement
Estimate By: MPD
Project Mgr/Lead: Natacha Morales
Date of Estimate: 11/07/17
Project Number: A16E06
ISD: 12/31/17
TAF # XYZ
Estimate # P17-040 Rev 1

ESTIMATE SUMMARY

ESTIMATE TYPE: Engineering

	TOTAL	Prior	2017	2018	2019	2020	2021 and FUTURE
CONSTRUCTION	$568,490	$282,349	$286,141	$0	$0	$0	$0
ENGINEERING/DESIGN	$323,509	$323,509	$0	$0	$0	$0	$0
LAND	$0	$0	$0	$0	$0	$0	$0
MATERIAL	$760,709	$154,709	$606,000	$0	$0	$0	$0
PROJECT MGR & SUPPORT	$60,642	$60,642	$0	$0	$0	$0	$0
REMOVAL	$50,000	$0	$50,000	$0	$0	$0	$0
TEST	$260,000	$0	$260,000	$0	$0	$0	$0
CONTINGENCY	$0	$0	$0	$0	$0	$0	$0
ESCALATION	$0	$0	$0	$0	$0	$0	$0
INDIRECTS	$276,367	$190,928	$85,439	$0	$0	$0	$0
AFUDC	$2,667	$1,080	$1,587	$0	$0	$0	$0
Total Cost	**$2,302,385**	**$1,013,218**	**$1,289,167**	**$0**	**$0**	**$0**	**$0**

	-10%	-	**10%**
Engineering Range	**$2,072,146**	-	**$2,532,623**

COMMENTS:

Project Scope:

Revision 1: Revised estimate for additional costs the result of higher costs than originall yestimated for Construction, Testing, Commissioning and indirects.
Testing primarily with the addition of a Commissioning engineer inreased $240k from original estimate.
Construction with the addition of ROW trimming, clearing and environmental monitoring and mitigation increased by $390k above original estimate.
The indirect costs due to these increases are $64k.

The West Rye Substation Rebuild project is being constructed in support of the recommendations presented from the Rye Area Distribution System Study dated March 01, 2013.

The existing West Rye substation currently referred to as #70 will be renamed to West Rye #67 due to a naming conflict with another 34.5-12.47kV substation currently called #70. The two 12.47kV lines emitting from West Rye substation will be named 67W1 & 67W2.

The existing configuration of West Rye substation consisting of two separate 34.5–4.16kV transformers will be replaced with a single 34.5–12.47kV 10/12.5 MVA transformer. The two existing 34.5kV taps of the 3105 line feeding the existing transformers will be removed and a single tap of the **3105X** will feed the new transformer.

The station service for the substation will be provided from a single phase 34.5kV-120/240V pole mount transformer tapped to the 34.5kV bus.

Assumptions:
Engineering to be outsourced with in-house review, construction to be outsourced.
This estimate is based on Actual costs to date and bid costs from outside source contractors, engineers and testing and commissioning , actual quantities may vary during detailed engineering.
Material estimates based on actuals and vendor quotes..
Labor estimates based on actuals to date and vendor cost estimate quotes.
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.

Project Number: A16E06

UNESCALATED LINE ITEM DOLLAI

Project Title: West Rye Substation 70H1 & 70H2Transformer Replacement

Escalation Rate 3%			Rate $ 416		0		1		2		3		4			
			Prior		2017		2018		2019		2020		2021 and FUTURE		TOTAL	
			MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS
CSTXX-CONSTRUCTION	**R**															
Electrical Construction	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
General Construction	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Transmission Automation	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Construction Reps	LT		0	$2,168	20	$8,329	0	$0	0	$0	0	$0	0	$0	20	$10,497
Support Switch/Tag	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
LT Total			0	$2,168	20	$8,329	0	$0	0	$0	0	$0	0	$0	20	$10,497
Employee Expenses	AE	5%		$134		$416		$0		$0		$0		$0		$550
Construction Purchased Material	AM	1%		$0		$2,730		$0		$0		$0		$0		$2,730
Construction Vendor	AQ			$279,112		$273,000		$0		$0		$0		$0		$552,112
Vehicles	AV	20%		$937		$1,666		$0		$0		$0		$0		$2,603
Fees and Payments	BF			$0		$0		$0		$0		$0		$0		$0
Rents and Leases	BR			$0		$0		$0		$0		$0		$0		$0
CSTXX Total			0	$282,349	20	$286,141	0	$0	0	$0	0	$0	0	$0		$568,490
ENRXX-TG ENGINEERING/DESIGN																
Project Services/Drafting	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Transmission Engineering/Design	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Civil Engineering/Design	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Substation Engineering/Design	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Distribution SS Engineering/Design	LT		0	$63,287	0	$0	0	$0	0	$0	0	$0	0	$0	0	$63,287
Protection & Controls Engineering	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Survey Engineering	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Telecom Engineering	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
LT Total			0	$63,287	0	$0	0	$0	0	$0	0	$0	0	$0	0	$63,287
Employee Expenses	AE	5%		$622		$0		$0		$0		$0		$0		$622
Contractor Engineering	AQ			$256,402		$0		$0		$0		$0		$0		$256,402
Vehicles	AV	3%		$3,199		$0		$0		$0		$0		$0		$3,199
ENRXX Total			0	$323,509	0	$0	0	$0	0	$0	0	$0	0	$0		$323,509
LNDXX-TG LAND																
Real Estate	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Employee Expenses	AE	5%		$0		$0		$0		$0		$0		$0		$0
Purchase Land	AM			$0		$0		$0		$0		$0		$0		$0
Vehicles	AV	3%		$0		$0		$0		$0		$0		$0		$0
Fees and Payments	BF			$0		$0		$0		$0		$0		$0		$0
LNDXX Total			0	$0	0	$0	0	$0	0	$0	0	$0	0	$0		$0
MATXX-TG MATERIAL																
See attached	AM			$142,309		$600,000		$0		$0		$0		$0		$742,309
	AM			$0		$0		$0		$0		$0		$0		$0
	AM			$0		$0		$0		$0		$0		$0		$0
Freight		0%		$0		$0		$0		$0		$0		$0		$0
Sales Tax		0%		$0		$0		$0		$0		$0		$0		$0
Stores Expense Allocation (ZC)		1%		$12,400		$6,000		$0		$0		$0		$0		$18,400
MATXX Total				$154,709		$606,000		$0		$0		$0		$0		$760,709
PSMXX-PROJECT MANAGER & SUPPORT																
Project Planning	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Project Management	LT		0	$10,408	0	$0	0	$0	0	$0	0	$0	0	$0	0	$10,408
Contracts/Purchasing	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Legal	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Transmission Planning	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Environmental	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
LT Total				$10,408		$0		$0		$0		$0		$0	0	$10,408
Employee Expenses	AE	5%		$318		$0		$0		$0		$0		$0		$318
Legal Vendor	AV	0%		$0		$0		$0		$0		$0		$0		$0
Project Support Vendor Inc Sales Tax	AQ			$44,794		$0		$0		$0		$0		$0		$44,794
Vehicles	AV			$1,198		$0		$0		$0		$0		$0		$1,198
Include allowance for Property tax large proj.	AM			$3,665		$0		$0		$0		$0		$0		$3,665
Fees and Payments	BF			$259		$0		$0		$0		$0		$0		$259
PSMXX Total				$60,642		$0		$0		$0		$0		$0	0	$60,642
REMXX-TG REMOVAL																
Engineering/Design	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
General Construction	LT			$0		$0		$0		$0		$0		$0		$0
LT Total			0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Employee Expenses	AE	15%		$0		$0		$0		$0		$0		$0		$0
Outside Services	AO			$0		$0		$0		$0		$0		$0		$0
Contractor Labor	AQ			$0		$50,000		$0		$0		$0		$0		$50,000
Vehicles	AV	20%		$0		$0		$0		$0		$0		$0		$0
Rents and Leases	BR			$0		$0		$0		$0		$0		$0		$0
REMXX Total				$0		$50,000		$0		$0		$0		$0		$50,000
TSTXX-TG TEST																
Test Labor-In House	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Employee Expense	AE	10%		$0		$0		$0		$0		$0		$0		$0
Contractor Test & Commissioning Labor	AQ			$0		$260,000		$0		$0		$0		$0		$260,000
Vehicles	AV	10%		$0		$0		$0		$0		$0		$0		$0
TSTXX Total				$0		$260,000		$0		$0		$0		$0		$260,000
Project Escalation				$0		$0		$0		$0		$0		$0	0	$0
Project Contingency				$0		$0		$0		$0		$0		$0		$0
TOTAL PROJECT DIRECT COST				**$821,209**		**$1,202,141**		**$0**		**$0**		**$0**		**$0**		**$2,023,350**
INDIRECTS																
Non-Productive Time Allocation (ZB)		17%		$12,657		$1,391		$0		$0		$0		$0		$14,048
Payroll Benefits Allocation (ZE)		32%		$26,373		$0		$0		$0		$0		$0		$26,373
Gen SVC CO OVRHD ALLOC (ZF)		3%		$22,073		$292		$0		$0		$0		$0		$22,365
E&S Allocations (ZI) (25%<20M<3%)		12%		$114,553		$71,008		$0		$0		$0		$0		$185,561
AS&E Allocations (ZJ)		1%		$15,272		$12,748		$0		$0		$0		$0		$28,020
AFUDC (ZK)		0%		$1,080		$1,587		$0		$0		$0		$0	0	$2,667
Indirects Subtotal				$192,008		$87,026		$0		$0		$0		$0		$279,034
TOTAL PROJECT COST				**$1,013,218**		**$1,289,167**		**$0**		**$0**		**$0**		**$0**	**0**	**$2,302,385**

EVERSOURCE

APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Date Prepared: July 3, 2017	Project Title: West Rye SS Rebuild
Company/Companies: Eversource NH	Project ID Number: A16E06
Organization: NH Operations	Plant Class/(F.P.Type):Substation
Project Initiator: Charles Christensen, PE	Project Type: Specific
Project Manager: Thelma Brown	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:$1,304,000	Estimated in service date(s): 12/31/17
Supplement Request: $286,000	Other:
Total Request: $1,590,000	

Supplement Justification

This project is to replace the existing 1950's vintage 3MVA 34.5-4.16kV substation with a 10/12MVA 34.5-12.47kV substation

The PAF for this project was approved in Powerplan in April 2016 for $1,304,000. The original PAF is attached. Removal and Addition one-lines are attached which confirm the scope of the project is the same but much more detail and engineering is complete.

The expected cost to complete the project is now $1,590,000 which is $286,000 above the approved project amount.

	PAF Approved Budget	Current Forecast
Direct	$1,040,000	$1,395,000
Indirect	$246,000	$204,000
AFUDC	$18,000	$1,000
Total	$1,304,000	$1,590,000
Difference	$286,000	

The approved direct costs for this project were $1,040,000. It is estimated that the final direct costs associated with this project will be $1,395,000 or 134% of the approved estimate. This increase in direct costs are based on increased internal and external labor and higher than planned material costs.

Justification for Additional Resources

The cost estimate for this project originally was based on all engineering in-house and minor changes to the site from what exists today. Engineering design has been completed by a contractor which is higher than the labor costs originally forecast. The site design went through several iterations and which also increased the amount of engineering contractor labor. The actual material costs are higher than originally budgeted. All major items were identified but many items such as steel and foundations were not in the original estimate.

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The 34.5kV ROW work has also been added to the scope of the project. This includes building 4 new poles and associated equipment for a mobile SS high side connection.

Explanation for Cost Increase

Labor – A consultant was utilized for all engineering and design. This costs more than utilizing internal engineering. Several site iterations also increased engineering, siting, and permitting costs. Internal labor did decrease by $95,000. Outside services, including the contingency budget increased by $245,000

Estimated Cost Increase $150,000

Material – Major material was included in the original estimate but costs for the transformer, reclosers, and switches is higher than the $589,000 budgeted. Station service, PTs, site expansion, fencing, grounding, and stoning was not included in the original estimate. Many of these items were identified throughout the design process

Estimated Cost Increase $196,000

Indirects / AFUDC - Indirect and AFUDC charges have are estimated to decrease. Some of the decrease in indirects associated with direct labor. Material stock indirects decreased because of the direct material order items that are limited for overhead costs. Other decreases may be accounted for by calculations in the Powerplan system

Estimated Cost Decrease $59,000

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 1,040	$ 345	$ 1,385
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	-	-
Total Direct Spending	$ 1,040	$ 345	$ 1,385
Capital Additions - Indirect	246	(42)	204
AFUDC	18	(17)	1
Total Capital Request	$ 1,304	$ 286	$ 1,590
O&M	-	-	-
Total Request	**$ 1,304**	**$ 286**	**$ 1,590**

Note: Dollar values are in thousands:

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Supplement Request Form

Total Supplement Request by year view:

	Year 2017	Year 20__	Year 20__+	Total
Capital Additions - Direct	$ 345	$ -		$ 345
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	-	-	-	-
Total Direct Spending	$ 345	$ -	$ -	$ 345
Capital Additions - Indirect	(42)	-		(42)
AFUDC	(17)	-		(17)
Total Capital Request	$ 286	$ -	$ -	$ 286
O&M	-	-	-	-
Total Request	**$ 286**	**$ -**	**$ -**	**$ 286**

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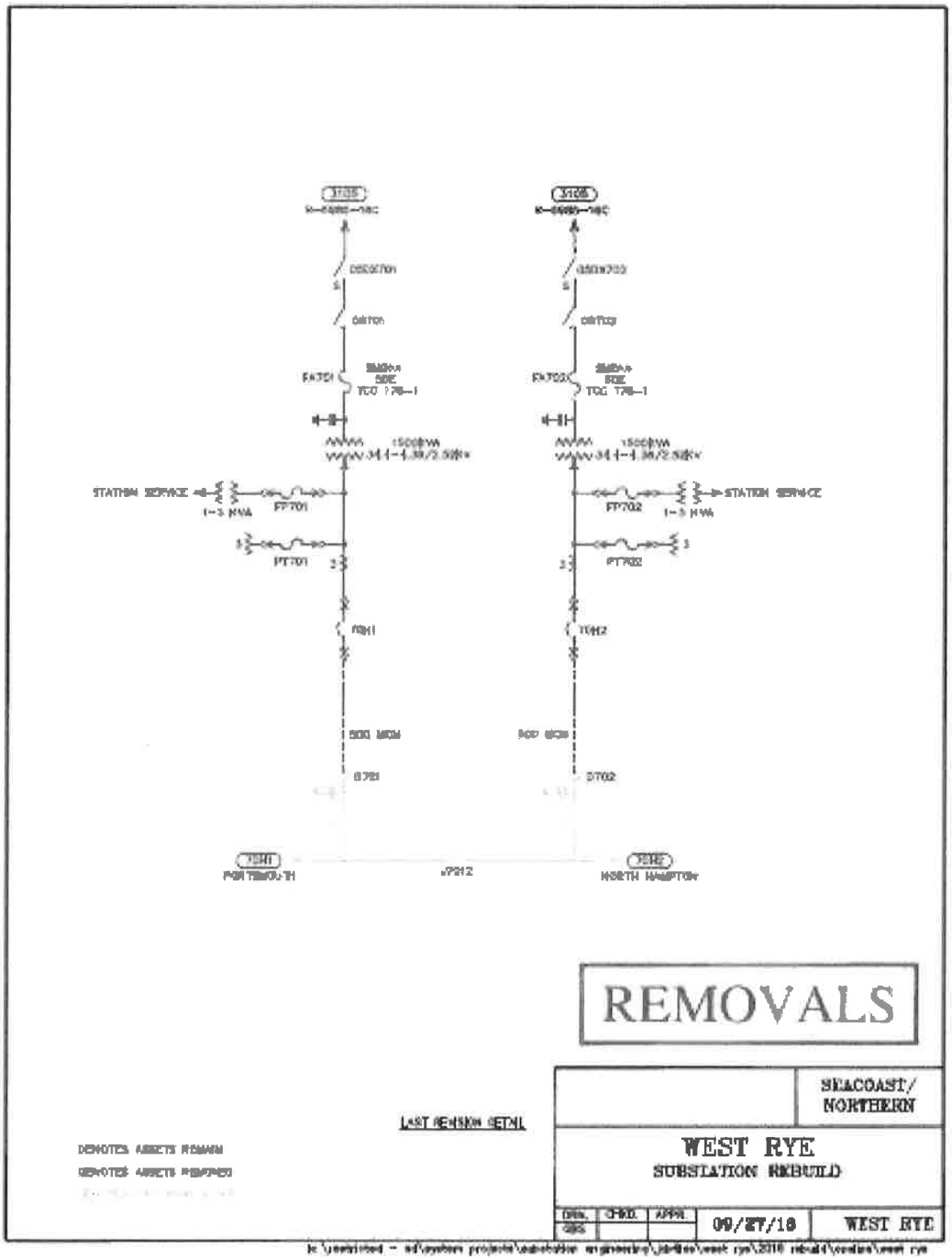

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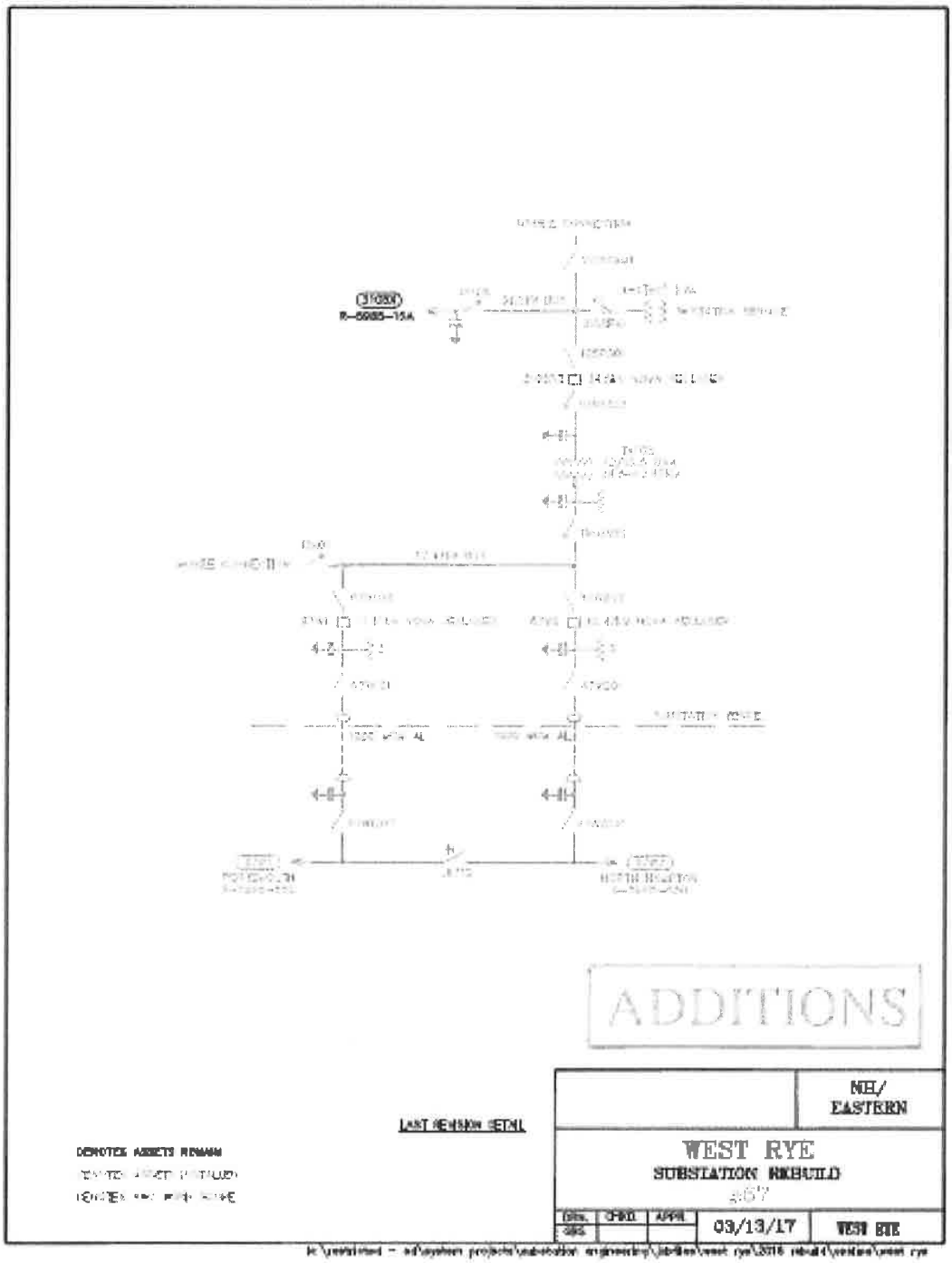

ESTIMATE SUMMARY
PSNH

Project Title: West Rye Substation 70H1 & 70H2Transformer Replacement
Project Mgr/Lead: Natacha Morales
Project Number: A16E06
TAF # XYZ

Estimate By: MPD
Date of Estimate: 7/4/17
ISD: 12/31/17
Estimate # P17-040

ESTIMATE SUMMARY

ESTIMATE TYPE: Engineering

	TOTAL	Prior to 6/1/17	2017 after 5/31/17	2018	2019	2020	2021 and FUTURE
CONSTRUCTION	$177,009	$2,398	$174,611	$0	$0	$0	$0
ENGINEERING/DESIGN	$261,058	$239,166	$21,892	$0	$0	$0	$0
LAND	$0	$0	$0	$0	$0	$0	$0
MATERIAL	$784,788	$117,410	$667,378	$0	$0	$0	$0
PROJECT MGR & SUPPORT	$64,711	$46,467	$18,244	$0	$0	$0	$0
REMOVAL	$50,000	$0	$50,000	$0	$0	$0	$0
TEST	$19,990	$0	$19,990	$0	$0	$0	$0
CONTINGENCY	$25,853	$0	$25,853	$0	$0	$0	$0
ESCALATION	$0	$0	$0	$0	$0	$0	$0
INDIRECTS	$204,333	$79,015	$125,318	$0	$0	$0	$0
AFUDC	$1,209	$216	$993	$0	$0	$0	$0
Total Cost	**$1,588,952**	**$484,672**	**$1,104,279**	**$0**	**$0**	**$0**	**$0**

	-10%	-	**10%**
Engineering Range	**$1,430,056**	-	**$1,747,847**

COMMENTS:

Project Scope:

The West Rye Substation Rebuild project is being constructed in support of the recommendations presented from the Rye Area Distribution System Study dated March 01, 2013.

The existing West Rye substation currently referred to as #70 will be renamed to West Rye #67 due to a naming conflict with another 34.5-12.47kV substation currently called #70. The two 12.47kV lines emitting from West Rye substation will be named 67W1 & 67W2.

The existing configuration of West Rye substation consisting of two separate 34.5–4.16kV transformers will be replaced with a single 34.5–12.47kV 10/12.5 MVA transformer. The two existing 34.5kV taps of the 3105 line feeding the existing transformers will be removed and a single tap of the **3105X** will feed the new transformer.

The station service for the substation will be provided from a single phase 34.5kV-120/240V pole mount transformer tapped to the 34.5kV bus.

Assumptions:

Engineering to be outsourced with in-house review, construction to be outsourced.
This estimate is based on Project Scope Document only, actual quantities may vary during detailed engineering.
Material estimates based on previous work, vendor quotes, and RS Means.
Labor estimates based on previous work, J. Bifulco S/S labor units, R.S. Means, and NECA labor units.
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 15% contingency on Construction direct costs which equates to 1.5% contingency of total cost.

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Accounting Policy Statement No. 2
Operations Project Authorization

Project Authorization Form

General Information

Date Prepared: 02/26/16	Project Title: West Rye S/S Rebuild
Company: Eversource - NH	Project ID Number: A16E06
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Mike Busby	Project Category: Reliability
Project Owner/Manager: Celine Bilodeau	Project Purpose: part of regulatory tracked program? No
Project Sponsor: Jim Eilenberger	Project Type: Specific
Estimated in service date: 12/31/17	Capital Investment Part of Original Operating Plan? Yes
If Transmission Project: No	Supplement to Existing Authorization? No
	O&M Expenses Part of the Original Operating Plan? No

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

The existing West Rye substation was built in the late 1950's and is a 34.5kV to 4kV substation with two 1.5MVA transformers and switchgear equipment that have exceeded their life expectancy. Replacement parts for the switchgear air breakers are no longer available. The 1.5MVA transformers have exceeded the 85% of maximum load (TFRAT) ratings and test indicate that gas has been generated within the transformers.

A study was completed for the area in March 2013 (Rye Area Study) which identified the area having loading, low voltage and coordination issues. In order to improve the reliability and voltage issues for the area the substation will be converted to a 34.5kV to 12kV substation. Converting from 4kV to 12kV increases the ability to provide contingent coverage for adjacent circuits. The study looked at maintaining the 4kV system but this was eliminated due to the cost of getting right-of-ways in this affluent area.

The scope of work includes installing a 10MVA transformer and three reclosers. One recloser will be installed on the high side of the transformer providing protection and fault isolation. Two reclosers will be installed on each outgoing 12kV circuit. The scope includes installing a RTU for Distribution Automation.

This PAF covers the substation potion of the overall project. A second PAF (A16E01) has been submitted to cover the line portion of the conversion for $1,261,108.

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Accounting Policy Statement No. 2
Operations Project Authorization

Project Costs Summary

Cost ($000)	Prior Authorized*	2016	2017	2018 +	Totals
Capital Additions - Direct		69	921		990
Customer Contribution					
Removals net of Salvage			50		50
Total - Direct Spending	$ -	69	971		1,040
Capital Additions - Indirect		13	233		246
Subtotal Request	$ -	81	1,204		1,285
AFUDC (half-year convention)		1	18		18
Total Request	$ -	82	1,222		1,304

Summary Project Description

The reason for the work at West Rye is to remove the existing obsolete equipment, address the growth, improve the low voltage and reliability. The area will be converted from 4kV to 12kV in the footprint of the existing substation. The two 1.5MVA transformers will be replaced with a single 10/12 MVA transformer. Three (3) Reclosers will be installed; one for the high side transformer protection and one on each (renamed 70W1 & 70W2) 12kV circuits along with a RTU for Distribution Automation.

Cost ($000)	Total Project Costs	Amount in Operating Plan	Difference
Capital	$ 1,304	$1,304	$0
O&M	$	$0	$
Total	$1,304	$1,304	$0

Project Authorization

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

Approver	Approver Name	Approver Signature	Date
Project initiator	Mike Busby		
Project manager	Celine Bilodeau		
Plant Accounting	Michelle Roncaioli		
Director	James Eilenberger		
Sr. Vice President	Peter Clarke		

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Accounting Policy Statement No. 2
Operations Project Authorization

Overall Justification

The West Rye S/S is a 1955 vintage 34.5kV to 4.16kV nominal substation. The transformers, 70H1 & 70H2, at West Rye are loaded to 109.3% and 94.7% of their nameplate rating. The load exceeds the TFRAT threshold of 85% to 96% and 92% respectively. Both transformers have been generating gas within the transformers for a number of years.

70H1 (1955 Transformer's vintage) shows a sharp jump of carbon monoxide, & methane and high levels of ethane. Possibly due to a thermal fault of 300 to 700C.

70H2 (1955 Transformer's vintage) shows high levels of Ethylene, Acetylene, Nitrogen and Oxygen; possibly from contact heating.

These gas-in-oil results indicate both transformers potentially have internal concerns that may lead to failure. Based on the age, gassing and loading the transformers should be replaced.

The circuits in the area have been experiencing low voltages. The rebuilt substation will be 34.5kV to 12.47kV. Between the larger transformer and voltage conversion, the voltage issues will be addressed. This project removes obsolete equipment, converts the area to 12kV and adds Distribution Automation.

Project Scope

Remove two (2) 1.5MVA, 34.4-4.36kV transformers
Remove two (2) 4kV breakers
Install one (1) 10/12 MVA, 34.5-12kV transformer
Install three (3) Reclosers
Install Distribution Automation

Project Objectives

Increase capacity at the West Rye S/S
Convert the substation from 4kV to 12kV
Improve relay protection and coordination
Remove obsolete equipment
Add Distribution Automation

Business Process and / or Technical Improvements:

Remove obsolete equipment
Increase capacity
Improve reliability
Improve voltage levels
Implement Distribution Automation

Assumptions

Loads on the West Rye substation will be off loaded to other circuits during construction.

Alternatives Considered

Convert area to 34.5kV instead of 12kV; this option was eliminated because this is a heavily treed area with most roads designated as "Scenic" making it difficult to obtain the desired level of tree trimming clearance required for 34.5 kV circuits.

Project Schedule

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

Milestone/Phase Name	Estimated Completion Date
Engineering – start	5/1/16
Engineering – complete	9/1/16
Construction - start	4/1/17
In Service	6/1/17

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Accounting Policy Statement No. 2
Operations Project Authorization

Financial Evaluation

Direct Capital Costs ($000)	2016	2017	2018	Total
Straight Time Labor	$15	$156	$	$170
Overtime Labor				$
Outside Services	$	$50	$	$ 50
Materials	$	$589	$	$589
Other, including contingency amounts (describe)	$54	$176	$	$230
Total	$69	$971	$	$1,040

Indirect Capital Costs ($000)	2016	2017	2018	Total
Benefits / Loaders	$13	$233	$	$246
Capitalized interest or AFUDC, if any	$1	$18	$	$18
Total	$13	251	$	264

Total Capital Costs	$82	$1,222	$	$1,304
Total O&M Costs				
Total Project Costs ($000)	$82	$1,222	$	$1,304

The project includes contingency funds approximately 17% for cost of removing possible contaminated soils or hazardous foundations as well as the potential increase of contractor cost.

Regulatory Approvals

Permitting required by the Town of Rye, N.H.

Risks and Risk Mitigation Plans

The plan is to build the substation during the lightly loaded time of the year and off load to other circuits. A mobile substation can be installed if needed.

The soil will be tested near the sample valves for the transformers; cost of soil remediation is included in contingency costs.

The concrete foundations will be tested for asbestos and oil staining; cost of removals is included in the contingency costs.

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Approved at October 04, 2019 EPAC

Link to Meeting Minutes

Date Prepared: September 17, 2019 (Revision 4)	**Project Title: West Rye Substation Rebuild**
Company/Companies: Eversource NH	**Project ID Number: A16E06**
Organization: NH Operations	**Plant Class/(F.P. Type): Distribution Substation**
Project Initiator: Charles Christensen, PE	**Project Type: Specific**
Project Manager: Thelma Brown/Natacha Morales	**Capital Investment Part of Original Operating Plan? Yes**
Project Sponsor: James Eilenberger	**O&M Expenses Part of the Original Operating Plan? N/A**
Current Authorized Amount: $2,666,118	**Estimated in service date(s): 2/1/2018 – In service**
Supplement Request: $524,597	**Other: N/A**
Total Request: $3,190,715	

Supplement Justification

This project is part of the Rye, NH conversion from 4kV to 12kV, it included the replacement of the 1950s vintage 3MVA 34.5 – 4.16kV substation with a 10/12MVA 34.5 – 12.47kV substation. The new station has a 10MVA transformer and three (3) reclosers. One (1) recloser is installed on the high side of the transformer providing protection and fault isolation. Two (2) reclosers are installed on each outgoing 12kV circuit. The new substation also has an RTU for Distribution Automation. This project was placed in service February 1, 2018.

This supplemental request comes after the discovery of charges related to the tie in (tap) into the 67W1 and 67W2 lines to the project. These charges were initially planned to be included in the budget for the voltage conversion project (A16E01). After some investigation and accounting reconciliation, the final cost of the project has increased to include the actual costs (direct and indirect) for the additional materials and engineering related to the tie into the 67W1 and 67W2 lines and additional materials for P&C, antenna/radio connections and animal protection. These charges were not accounted for until the project was going through the financial closeout process and the transformer was properly allocated to the correct accounting for this project This supplement does not include any scope changes.

Project funding history (see attached prior authorization documentation):

1. The original PAF for this project was approved in PowerPlan on April 12, 2016 for $1,303,811 and covered substation scope only. The subsequent line scope of work was not originally included in the scope of work. The original PAF did not include any design/materials or construction for a future mobile transformer tap on the 3105X line.
2. Supplemental Request Form #1 was approved in PowerPlan on July 20, 2017 for $286,189 bringing the project total to $1,590,000. This supplemental request covered incremental costs for outsourced engineering and site design, additional materials, and

an overall reduction in indirect costs. This supplemental request also included the previously omitted scope of work for the mobile transformer tap on the 3105X line.

3. Supplemental Request Form #2 was approved in PowerPlan on February 28, 2018 for $712,118 bringing the project's total to $2,302,118. This supplemental request covered increased costs for construction, testing, and commissioning based upon actual bid pricing, the first supplemental's estimate for this work was lower than expected. Some of the cost increase was also due to the distribution 67W1 and 67W2 lines tap work that was not originally part of the project scope and was not captured in the Supplemental Request Form #1. The scope of work for the line taps was not appropriately defined between the two projects until the very end of the project. The project team captured some of this cost (based on estimates) during the project but due to the fact that the responsible parties were not clearly identified, all costs related to this scope was ultimately charged to the West Rye re-build project.
4. Supplemental Request Form #3 was approved in PowerPlan on September 28, 2018 for $364,000 bringing the project total to $2,666,118. This supplemental request covered costs that were accrued by the construction vendor to remedy civil and electrical design issues in the field as well as true up of P&C construction costs from bid plan set to IFC plan set.

This supplemental request includes the following:

- The 3105X line work under the A16E0602 Work Order and associated indirect costs which had higher actuals than estimated in the Supplemental #1 request. The line work (WO# A16E0602) scope was added after the start of construction of the substation. The line work scope included the design, construction, and materials needed to install four (4) poles and associated equipment for a mobile substation on the high side. The, supplement request #1 included funds to cover this scope described above. However, the actual costs for materials were higher than estimated in Supplemental #1 request and are included in this current supplement request.
- The riser poles, cross arms, guys, and underground conductor used to tap into both the 67W1 and 67W2 lines. Supplemental #2 had $30K allocated for line design, construction, and materials to complete the street tapping (67W1 and 67W2). The additional scope of work was due to a lack of clarity on demarcation between line costs tied to the substation and line costs associated with the voltage conversion project. This includes the cost of materials such as underground conduits, switches, and vaults. The engineering actuals and materials to complete both the 3105X line work and the tapping of both the 67W1 and the 67W2 were higher than estimated in prior supplementals and is captured in this supplement request.
- Antenna/radio materials which were not included in the original scope of work.
- P&C materials purchased by the construction contractor. The Protection and Controls issued – for – construction (IFC) with its respective bill of materials was not available until after the construction contractor had been awarded.

- Animal protection materials. SRF#3 included the labor costs associated to install the animal protection, however it did not include the materials.

The current project spent to date as of September 17, 2019 is $3,190,715 and the project is in service. This supplement request is for $524,597 bringing the project total to $3,190,715. The total increase in direct costs is $249,053 (10.68% above the approved budget) and indirect cost is $275,544 (52.5% of the supplemental request).

Justification for Additional Resources

The following describes in detail, the contributing factors to the $524,597 increase in total project cost.

1. **Construction: ($34,446)**

   The decrease is the reflection of charges being reconciled. Materials were mistakenly accounted as construction charges instead of materials.

2. **Engineering: $101,782**

   The increase of $101,782 is due to additional design for the tapping in the 67W1 and 67W2 lines, and more P&C commissioning support than anticipated at the end of the project.

3. **Materials: $147,262**

   This increase is due to the materials used to tap into the 67W1 and 67W2 lines, materials previously missed during the bidding process. Animal protection and antenna/radio materials.

4. **PM & Support: $17,379**

   Siting and construction services (formerly known as Outreach), as well as some permitting actuals, were higher than anticipated.

5. **Test and commissioning: $10,572**

   Test and commissioning services were needed a little longer than expected, bringing the actuals higher than anticipated.

6. **Property Taxes: $6,504**

   Property taxes were not included in neither supplementals or original PAF.

7. **Indirects: $275,100**

   The indirect costs increased by $275,100. There are two factors that increased the indirect costs:
   - Direct cost increases for engineering and materials (internal and external).
   - E&S overhead rate changes and increased rates between 2017 and 2018.

8. **AFUDC: $444**

   AFUDC charges were higher than estimated.

Supplement Cost Breakdown

The table below provides an overview of the line item categories from the current authorization and the actual project costs:

	Current Authorized Budget	Actuals	Delta
Construction	$850,490	$816,044	($34,446)
Engineering	$323,509	$425,291	$101,782
Material	$787,599	$934,861	$147,262
PM &Support	$60,642	$78,021	$17,379
Removals	$50,000	$50,000	$ -
Test and commissioning	$260,000	$270,572	$10,572
Property Taxes	$ -	$6,504	$6,504
Subtotal Direct Costs	**$2,332,240**	**$2,581,293**	**$249,053**
Indirects	$331,477	$606,577	$275,100
AFUDC	$2,401	$2,845	$444
Total	**$2,666,118**	**$3,190,715**	**$524,597**

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$2,282,240	$249,053	$2,531,293
Less Customer Contribution	$ -	$ -	$ -
Removals Net of Salvage ___%	$50,000	$ -	$50,000
Total Direct Spending	$2,332,240	$249,053	$2,581,293
Capital Additions - Indirect	$331,477	$275,100	$606,577
AFUDC	$2,401	$444	$2,845
Total Capital Request	$2,666,118	$524,597	$3,190,715
O&M	$ -	$ -	$ -
Total Request	$2,666,118	$524,597	$3,190,715

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APS 1 - Project Authorization Policy

Supplement Request Form

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2018	Year 2019	Total
Capital Additions Direct	$ -	$249,053	$249,053
Less Customer Contribution	$ -	$ -	$ -
Removals Net of Salvage ___%	$ -	$ -	$ -
Total Direct Spending	$ -	$249,053	$249,053
Capital Additions - Indirect	$ -	$275,100	$275,100
AFUDC	$ -	$444	$444
Subtotal Request	$ -	$524,597	$524,597
O&M	$ -	$ -	$ -
Total Request	$ -	$524,597	$524,597

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APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Approved at August 29, 2018 EPAC

Link to Meeting Minutes

Date Prepared: August 10th, 2018	Project Title: West Rye Substation Re-build
Company/Companies: Eversource, NH	Project ID Number: A16E06
Organization: NH Operations	Plant Class/(F.P.Type): Substation
Project Initiator: Charles Christensen, PE	Project Type: *Specific*
Project Manager: Thelma Brown/Natacha Morales	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: $2,302,118	In service date(s): 2/14/2018
Supplement Request: $364,000	Other:
Total Request: $2,666,118	

Supplement Justification

This project is to replace the existing 1950's vintage 3MVA 34.5 – 4.16kV substation with a 10/12MVA 34.5 – 12.47kV substation. The substation was put in service in February 2018.

The latest supplement was approved in PowerPlan on 2/28 which brought the authorized budget to $2,302,118,. As of end of June, the project has spent $2,298,342. The last supplemental did not include the IC Reed's change order due to different factors:

1. The supplement was submitted for the first time in November. There were a couple of iterations to the document between EPAC and the Project team. The supplemental was approved on January 17th and approved in PowerPlan on February 28th.
2. IC Reed's change order was not submitted until February right before the substation went in service.
3. The change order had to be reviewed by the project team, procurement, steel fabricator, and outside engineering to understand the charges. These reviews were time consuming and were necessary to pursue any kind of refund from outside vendors that caused some of these charges in the change order.

During the last months of construction (Mid-December through February), there were significant issues with the steel for the substation (transformers and other equipment), materials ordered that had different specification from the prints, materials poor handling, and internal/external design. The following factors contributed to the issues mentioned above:

1. Engineering deficiencies both internal and external ($138,000)
    a. Switches on high side had unacceptable clearance.
    b. Steel racks were not designed to hold the pole mounted reclosers.
    c. Bus was not at correct elevation.
    d. Poor design/review of the runs from riser to riser.
    e. Pad design was based on wrong information from transformer vendor.

2. Poor fit of fabricated structural steel by vendor ($23,000)

3. Installation of animal protection coverage, which was not part of the original scope of work. This directive was a late addition to the project by Operations Management ($23,000)

4. Discrepancies in stock coded materials ordered for the project resulting in parts delivered that were different than expected ($11,500). Some of these materials include:
    a. Connectors for reclosers.
    b. Connectors for the bus switch taps.
    c. Lightning arresters.
    d. Station service Transformer.

5. Wiring discrepancies in pre-wired junction boxes ordered by Eversource. These junction boxes were ordered pre-wired to the original Eversource drawings which were subsequently redesigned. ($11,500).

6. True up of P&C construction cost from bid docs to IFC scope, including re – IFC of P&C. The original contract was issued as fixed price for civil and electrical construction. After the IFC's were issued, there were additions to the P&C scope of work which resulted in a re – IFC of the P&C two (2) months later, extending the construction duration and delaying the completion of the project ($75,000).

    The following scope items were not included in the original proposal request:
    a. Installation of the fiber patch panel for communication.
    b. Antenna for radio communications.
    c. Re-wiring of reclosers for the 67W1 and 67W2 lines.
    d. Configuration of the auto – man – remote switch as well as voltage reduction.
    e. Configuration of the station monitoring system.
    f. Animal protection.

All of which were remedied during construction by the construction vendor.

The team and procurement have short paid the engineering firm to compensate for their deficient performance and the engineering firm has re-IFC'd at no cost. Materials management has been notified of the issue of multiple non-identical parts associated with the same stock code and how this can adversely affect project design and construction.

To remedy all the issues mentioned above, extra materials were procured by the contractor ($26,890).

- Substation: Sheet metal, nuts, washers, pipe, bus support, animal protection.
- P&C: Wall mounted enclosure and latch, panels, couplings, channels, data cable, nylon cable, plastic bushings, conduit, galvanized steel, lighting.

Construction	• Above grade construction ($207,000) • P&C extra construction ($75,000) • Materials ($26,890)	$308,890
Loaders		$55,110
Total		**$364,000**

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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	$ 1,973	$ 309	$ 2,282
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	50		50
Total Direct Spending	$ 2,023	$ 309	$ 2,332
Capital Additions - Indirect	276	55	331
AFUDC	3		3
Total Capital Request	$ 2,302	$ 364	$ 2,666
O&M	-	-	-
Total Request	**$ 2,302**	**$ 364**	**$ 2,666**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2017	Year 2018	Year 20__+	Total
Capital Additions - Direct		$ 309		$ 309
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%		-		50
Total Direct Spending	$ -	$ 309	$ -	$ 309
Capital Additions - Indirect		55		55
AFUDC		-		-
Total Capital Request		$ 364	$ -	$ 364
O&M	-	-	-	-
Total Request	**$ -**	**$ 364**	**$ -**	**$ 364**

Actions to prevent recurrence:

The importance of monitoring the status of planned project spend and comparing against the authorized budget is reinforced to all project management staff at weekly staff meetings. Project Managers need to work with project cost analysts on a regular basis to impede projects from exceeding authorized budgets. A proactive approach in controlling project costs is imperative.
Management receives reports on a regular basis to identify projects that are approaching authorized spend amounts to facilitate a proactive approach to controlling project costs. Some steps to improve on this:

1. Project Manager to be involved in the estimating process along with Engineering.
2. All DR's must be approved by the Project Manager.
3. Cost Analyst to make sure that overheads and loaders are up to date.
4. Contractors to provide UVL's and invoice in a timely manner.

5. Project Manager to request supplemental funds before approving any field changes that have not been budgeted in the approved estimate.

Project Manager will be more involved in the estimates created by Engineering as well as the scope of work for projects. Project costs and spend projections will be closely monitored, particularly once updated to include construction bids, bill of materials, and other vendor costs including permitting, environmental, monitoring, testing and commissioning. This will facilitate a more accurate budget for the project. Project Managers need to identify potential budgetary issues and resolve by appropriate means as early as possible. Project Manager will also be more involved in the “In Service Date” proposal with engineering, there needs to be a discussion when the project is in its early stages to discuss the availability of resources, weather, outages, etc. This will avoid having to rush the project deliverables and construction to meet the ISD.

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APS 1 - Project Authorization Policy

Supplement Request Form

Approved at January 17, 2018 EPAC

Link to Meeting Minutes

Date Prepared: November 28th, 2017	Project Title: West Rye Substation Re-build
Company/Companies: Eversource, NH	Project ID Number: A16E06
Organization: NH Operations	Plant Class/(F.P.Type): Distribution Substation
Project Initiator: Charles Christensen, PE	Project Type: *Specific*
Project Manager: Thelma Brown/Natacha Morales	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: $1,590,000	Estimated in service date(s): 2/1/2018
Supplement Request: $712,385	Other:
Total Request: $2,302,385	

Supplement Justification

This project is to replace the existing 1950's vintage 3MVA 34.5 – 4.16kV substation with a 10/12MVA 34.5 – 12.47kV substation.

The PAF for this project was approved in Powerplan in April 2016 for $1,304,000. The original PAF is attached as well as the first supplemental which was approved in Powerplan in July of 2017 for a supplement request of $286,000 and a new total request of $1,590,000. The expected cost to complete the project is now $2,302,385 which is $712,385 above the approved project amount.

Since the first supplemental approval, there have been some engineering changes, construction contract was competitively bid and properly awarded and proposals for testing and commissioning have been received. Construction estimates (electrical, substation, P&C) were significantly low in the first supplemental (about $500,000). Other projects with the same scope of work have averaged construction contracts between $600,000 – $750,000, the estimate for the first supplemental only had $177,009. This was the most significant oversight on the first supplemental and the estimate did not include enough funding for test and commissioning ($19,990).

ROW clearing and environmental monitoring were not accounted for in the previous supplemental. Please see table below for a breakdown of additional expenses from the first supplemental request.

The first supplemental was presented and written by someone other than the Project Manager and these oversights were not caught during the meeting, which resulted in this additional funding request.

As of the end of November, engineering is complete, major materials were received and the substation is under construction. The substation will be wired and ready for test and commissioning by the end of December. The ISD has been pushed out to the middle of February due to delays related to the 10/30 wind storm restoration and construction issues including steel delivery, transformer delivery, materials being altered in the field, parts of the transformer being replaced, and some wiring re-configurations.

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APS 1 - Project Authorization Policy

Supplement Request Form

	Cost Summary for Supplemental Request	Change
Engineering (Internal)	Design of tap poles to S/S.	$30,801
Engineering (contractor)	• Modification of GA elevations to include the 3105X line. (not in original scope of work) • Additional strain bus off the 12kV mobile connection to provide a tap to the 12kV bus (not in original scope of work). • Change of conductor specs. • Relocation of reclosers. • Additional conduits for powering reclosers (not in original scope of work). • Modification of grounding. • Equipment vendor information not available. • Drawing modifications due to existing field conditions not being accurate on Eversource provided drawings.	$31,650
Trimming & ROW clearing		$9,000
Construction	Construction left out of the original estimate and underestimated in the first supplemental	$304,981
Soil and sound testing		$41,000
Permitting & environmental monitoring		$29,000
Surveying		$7,500
Testing and commissioning	Estimate significantly higher than previous estimate	$240,100
Loaders		$72,034
Materials		($24,079)
PM		($4,069)
Contingency		($25,853)
Total Supplemental Request		**$712,065**

Justification for Additional Resources

After engineering was completed and proposals received for construction, test and commissioning, it was apparent that the previous estimate significantly underestimated the value for these services.

Explanation for Cost Increase

Labor – Most of the increase in labor was for construction as well as test and commissioning. The construction contract went through a competitive bidding process and it was awarded to IC Reed for a total amount of $481,990. The first supplemental estimated construction to be $177,009. The award is about $304,981 more than estimated. Test and commissioning proposals total $260,000. The cost for other outside services including tree clearing, ROW mowing, surveying and environmental monitoring was increased by $86,500. Project Manager and support as well as contingency reduced by approximately $30,000. After the start of construction, there were some changes in engineering which increased the

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APS 1 - Project Authorization Policy

Supplement Request Form

engineering cost to approximately $62,000. This covers both internal and external engineering. There were some field conditions that were not captured prior to issuing the IFCs.

Materials – This cost was decreased by $24,000.

Indirects/AFUDC – Indirects and AFUDC have also increased by $72,034. This increase is associated with direct labor and material stock which has overhead costs.

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 1,385	$ 588	$ 1,973
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	50.00	50.00
Total Direct Spending	$ 1,385	$ 638	$ 2,023
Capital Additions - Indirect	204.00	72.00	276.00
AFUDC	1.00	1.60	2.60
Total Capital Request	$ 1,590	$ 712	$ 2,302
O&M	-	-	-
Total Request	**$ 1,590**	**$ 712**	**$ 2,302**

Note: Dollar values are in thousands:

Total Supplement Request by year view:

	Year 2017	Year 20__	Year 20__+	Total
Capital Additions - Direct		$ 588		$ 588
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	50.00	-		50.00
Total Direct Spending	$ -	$ 638	$ -	$ 638
Capital Additions - Indirect		72.00		72.00
AFUDC		1.60		1.60
Total Capital Request	$ -	$ 712	$ -	$ 712
O&M	-	-	-	-
Total Request	**$ -**	**$ 712**	**$ -**	**$ 712**

ESTIMATE SUMMARY
PSNH

Project Title: West Rye Substation 70H1 & 70H2Transformer Replacement
Estimate By: MPD
Project Mgr/Lead: Natacha Morales
Date of Estimate: 11/07/17
Project Number: A16E06
ISD: 12/31/17
TAF # XYZ
Estimate # P17-040 Rev 1

ESTIMATE SUMMARY

ESTIMATE TYPE: Engineering

	TOTAL	Prior	2017	2018	2019	2020	2021 and FUTURE
CONSTRUCTION	$568,490	$282,349	$286,141	$0	$0	$0	$0
ENGINEERING/DESIGN	$323,509	$323,509	$0	$0	$0	$0	$0
LAND	$0	$0	$0	$0	$0	$0	$0
MATERIAL	$760,709	$154,709	$606,000	$0	$0	$0	$0
PROJECT MGR & SUPPORT	$60,642	$60,642	$0	$0	$0	$0	$0
REMOVAL	$50,000	$0	$50,000	$0	$0	$0	$0
TEST	$260,000	$0	$260,000	$0	$0	$0	$0
CONTINGENCY	$0	$0	$0	$0	$0	$0	$0
ESCALATION	$0	$0	$0	$0	$0	$0	$0
INDIRECTS	$276,367	$190,928	$85,439	$0	$0	$0	$0
AFUDC	$2,667	$1,080	$1,587	$0	$0	$0	$0
Total Cost	**$2,302,385**	**$1,013,218**	**$1,289,167**	**$0**	**$0**	**$0**	**$0**

	-10%	-	**10%**
Engineering Range	**$2,072,146**	-	**$2,532,623**

COMMENTS:

Project Scope:

Revision 1: Revised estimate for additional costs the result of higher costs than originall yestimated for Construction, Testing, Commissioning and indirects.
Testing primarily with the addition of a Commissioning engineer inreased $240k from original estimate.
Construction with the addition of ROW trimming, clearing and environmental monitoring and mitigation increased by $390k above original estimate.
The indirect costs due to these increases are $64k.

The West Rye Substation Rebuild project is being constructed in support of the recommendations presented from the Rye Area Distribution System Study dated March 01, 2013.

The existing West Rye substation currently referred to as #70 will be renamed to West Rye #67 due to a naming conflict with another 34.5-12.47kV substation currently called #70. The two 12.47kV lines emitting from West Rye substation will be named 67W1 & 67W2.

The existing configuration of West Rye substation consisting of two separate 34.5–4.16kV transformers will be replaced with a single 34.5–12.47kV 10/12.5 MVA transformer. The two existing 34.5kV taps of the 3105 line feeding the existing transformers will be removed and a single tap of the **3105X** will feed the new transformer.

The station service for the substation will be provided from a single phase 34.5kV-120/240V pole mount transformer tapped to the 34.5kV bus.

Assumptions:
Engineering to be outsourced with in-house review, construction to be outsourced.
This estimate is based on Actual costs to date and bid costs from outside source contractors, engineers and testing and commissioning , actual quantities may vary during detailed engineering.
Material estimates based on actuals and vendor quotes..
Labor estimates based on actuals to date and vendor cost estimate quotes.
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.

Project Number: A16E06

UNESCALATED LINE ITEM DOLLAI

Project Title: West Rye Substation 70H1 & 70H2Transformer Replacement

Escalation Rate 3%			Rate $ 416		0		1		2		3		4			
			Prior		2017		2018		2019		2020		2021 and FUTURE		TOTAL	
			MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS	MDYS	DOLLARS
CSTXX-CONSTRUCTION	**R**															
Electrical Construction	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
General Construction	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Transmission Automation	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Construction Reps	LT		0	$2,168	20	$8,329	0	$0	0	$0	0	$0	0	$0	20	$10,497
Support Switch/Tag	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
LT Total			0	$2,168	20	$8,329	0	$0	0	$0	0	$0	0	$0	20	$10,497
Employee Expenses	AE	5%		$134		$416		$0		$0		$0		$0		$550
Construction Purchased Material	AM	1%		$0		$2,730		$0		$0		$0		$0		$2,730
Construction Vendor	AQ			$279,112		$273,000		$0		$0		$0		$0		$552,112
Vehicles	AV	20%		$937		$1,666		$0		$0		$0		$0		$2,603
Fees and Payments	BF			$0		$0		$0		$0		$0		$0		$0
Rents and Leases	BR			$0		$0		$0		$0		$0		$0		$0
CSTXX Total			0	$282,349	20	$286,141	0	$0	0	$0	0	$0	0	$0		$568,490
ENRXX-TG ENGINEERING/DESIGN																
Project Services/Drafting	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Transmission Engineering/Design	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Civil Engineering/Design	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Substation Engineering/Design	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Distribution SS Engineering/Design	LT		0	$63,287	0	$0	0	$0	0	$0	0	$0	0	$0	0	$63,287
Protection & Controls Engineering	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Survey Engineering	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Telecom Engineering	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
LT Total			0	$63,287	0	$0	0	$0	0	$0	0	$0	0	$0	0	$63,287
Employee Expenses	AE	5%		$622		$0		$0		$0		$0		$0		$622
Contractor Engineering	AQ			$256,402		$0		$0		$0		$0		$0		$256,402
Vehicles	AV	3%		$3,199		$0		$0		$0		$0		$0		$3,199
ENRXX Total			0	$323,509	0	$0	0	$0	0	$0	0	$0	0	$0		$323,509
LNDXX-TG LAND																
Real Estate	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Employee Expenses	AE	5%		$0		$0		$0		$0		$0		$0		$0
Purchase Land	AM			$0		$0		$0		$0		$0		$0		$0
Vehicles	AV	3%		$0		$0		$0		$0		$0		$0		$0
Fees and Payments	BF			$0		$0		$0		$0		$0		$0		$0
LNDXX Total			0	$0	0	$0	0	$0	0	$0	0	$0	0	$0		$0
MATXX-TG MATERIAL																
See attached	AM			$142,309		$600,000		$0		$0		$0		$0		$742,309
	AM			$0		$0		$0		$0		$0		$0		$0
	AM			$0		$0		$0		$0		$0		$0		$0
Freight		0%		$0		$0		$0		$0		$0		$0		$0
Sales Tax		0%		$0		$0		$0		$0		$0		$0		$0
Stores Expense Allocation (ZC)		1%		$12,400		$6,000		$0		$0		$0		$0		$18,400
MATXX Total				$154,709		$606,000		$0		$0		$0		$0		$760,709
PSMXX-PROJECT MANAGER & SUPPORT																
Project Planning	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Project Management	LT		0	$10,408	0	$0	0	$0	0	$0	0	$0	0	$0	0	$10,408
Contracts/Purchasing	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Legal	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Transmission Planning	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Environmental	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
LT Total				$10,408		$0		$0		$0		$0		$0	0	$10,408
Employee Expenses	AE	5%		$318		$0		$0		$0		$0		$0		$318
Legal Vendor	AV	0%		$0		$0		$0		$0		$0		$0		$0
Project Support Vendor Inc Sales Tax	AQ			$44,794		$0		$0		$0		$0		$0		$44,794
Vehicles	AV			$1,198		$0		$0		$0		$0		$0		$1,198
Include allowance for Property tax large proj.	AM			$3,665		$0		$0		$0		$0		$0		$3,665
Fees and Payments	BF			$259		$0		$0		$0		$0		$0		$259
PSMXX Total				$60,642		$0		$0		$0		$0		$0	0	$60,642
REMXX-TG REMOVAL																
Engineering/Design	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
General Construction	LT			$0		$0		$0		$0		$0		$0		$0
LT Total			0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Employee Expenses	AE	15%		$0		$0		$0		$0		$0		$0		$0
Outside Services	AO			$0		$0		$0		$0		$0		$0		$0
Contractor Labor	AQ			$0		$50,000		$0		$0		$0		$0		$50,000
Vehicles	AV	20%		$0		$0		$0		$0		$0		$0		$0
Rents and Leases	BR			$0		$0		$0		$0		$0		$0		$0
REMXX Total				$0		$50,000		$0		$0		$0		$0		$50,000
TSTXX-TG TEST																
Test Labor-In House	LT		0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Employee Expense	AE	10%		$0		$0		$0		$0		$0		$0		$0
Contractor Test & Commissioning Labor	AQ			$0		$260,000		$0		$0		$0		$0		$260,000
Vehicles	AV	10%		$0		$0		$0		$0		$0		$0		$0
TSTXX Total				$0		$260,000		$0		$0		$0		$0		$260,000
Project Escalation				$0		$0		$0		$0		$0		$0	0	$0
Project Contingency				$0		$0		$0		$0		$0		$0		$0
TOTAL PROJECT DIRECT COST				**$821,209**		**$1,202,141**		**$0**		**$0**		**$0**		**$0**		**$2,023,350**
INDIRECTS																
Non-Productive Time Allocation (ZB)		17%		$12,657		$1,391		$0		$0		$0		$0		$14,048
Payroll Benefits Allocation (ZE)		32%		$26,373		$0		$0		$0		$0		$0		$26,373
Gen SVC CO OVRHD ALLOC (ZF)		3%		$22,073		$292		$0		$0		$0		$0		$22,365
E&S Allocations (ZI) (25%<20M<3%)		12%		$114,553		$71,008		$0		$0		$0		$0		$185,561
AS&E Allocations (ZJ)		1%		$15,272		$12,748		$0		$0		$0		$0		$28,020
AFUDC (ZK)		0%		$1,080		$1,587		$0		$0		$0		$0	0	$2,667
Indirects Subtotal				$192,008		$87,026		$0		$0		$0		$0		$279,034
TOTAL PROJECT COST				**$1,013,218**		**$1,289,167**		**$0**		**$0**		**$0**		**$0**	**0**	**$2,302,385**

EVERSOURCE

APS 1 - Project Authorization Policy

Supplement Request Form

Supplement Request Form

Date Prepared: July 3, 2017	Project Title: West Rye SS Rebuild
Company/Companies: Eversource NH	Project ID Number: A16E06
Organization: NH Operations	Plant Class/(F.P.Type):Substation
Project Initiator: Charles Christensen, PE	Project Type: Specific
Project Manager: Thelma Brown	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:$1,304,000	Estimated in service date(s): 12/31/17
Supplement Request: $286,000	Other:
Total Request: $1,590,000	

Supplement Justification

This project is to replace the existing 1950's vintage 3MVA 34.5-4.16kV substation with a 10/12MVA 34.5-12.47kV substation

The PAF for this project was approved in Powerplan in April 2016 for $1,304,000. The original PAF is attached. Removal and Addition one-lines are attached which confirm the scope of the project is the same but much more detail and engineering is complete.

The expected cost to complete the project is now $1,590,000 which is $286,000 above the approved project amount.

	PAF Approved Budget	Current Forecast
Direct	$1,040,000	$1,395,000
Indirect	$246,000	$204,000
AFUDC	$18,000	$1,000
Total	$1,304,000	$1,590,000
Difference	$286,000	

The approved direct costs for this project were $1,040,000. It is estimated that the final direct costs associated with this project will be $1,395,000 or 134% of the approved estimate. This increase in direct costs are based on increased internal and external labor and higher than planned material costs.

Justification for Additional Resources

The cost estimate for this project originally was based on all engineering in-house and minor changes to the site from what exists today. Engineering design has been completed by a contractor which is higher than the labor costs originally forecast. The site design went through several iterations and which also increased the amount of engineering contractor labor. The actual material costs are higher than originally budgeted. All major items were identified but many items such as steel and foundations were not in the original estimate.

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APS 1 - Project Authorization Policy

Supplement Request Form

The 34.5kV ROW work has also been added to the scope of the project. This includes building 4 new poles and associated equipment for a mobile SS high side connection.

Explanation for Cost Increase

Labor – A consultant was utilized for all engineering and design. This costs more than utilizing internal engineering. Several site iterations also increased engineering, siting, and permitting costs. Internal labor did decrease by $95,000. Outside services, including the contingency budget increased by $245,000

Estimated Cost Increase $150,000

Material – Major material was included in the original estimate but costs for the transformer, reclosers, and switches is higher than the $589,000 budgeted. Station service, PTs, site expansion, fencing, grounding, and stoning was not included in the original estimate. Many of these items were identified throughout the design process

Estimated Cost Increase $196,000

Indirects / AFUDC - Indirect and AFUDC charges have are estimated to decrease. Some of the decrease in indirects associated with direct labor. Material stock indirects decreased because of the direct material order items that are limited for overhead costs. Other decreases may be accounted for by calculations in the Powerplan system

Estimated Cost Decrease $59,000

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$ 1,040	$ 345	$ 1,385
Less Customer Contribution	-	-	-
Removals net of Salvage ____%	-	-	-
Total Direct Spending	$ 1,040	$ 345	$ 1,385
Capital Additions - Indirect	246	(42)	204
AFUDC	18	(17)	1
Total Capital Request	$ 1,304	$ 286	$ 1,590
O&M	-	-	-
Total Request	**$ 1,304**	**$ 286**	**$ 1,590**

Note: Dollar values are in thousands:

EVERSOURCE

APS 1 - Project Authorization Policy

Supplement Request Form

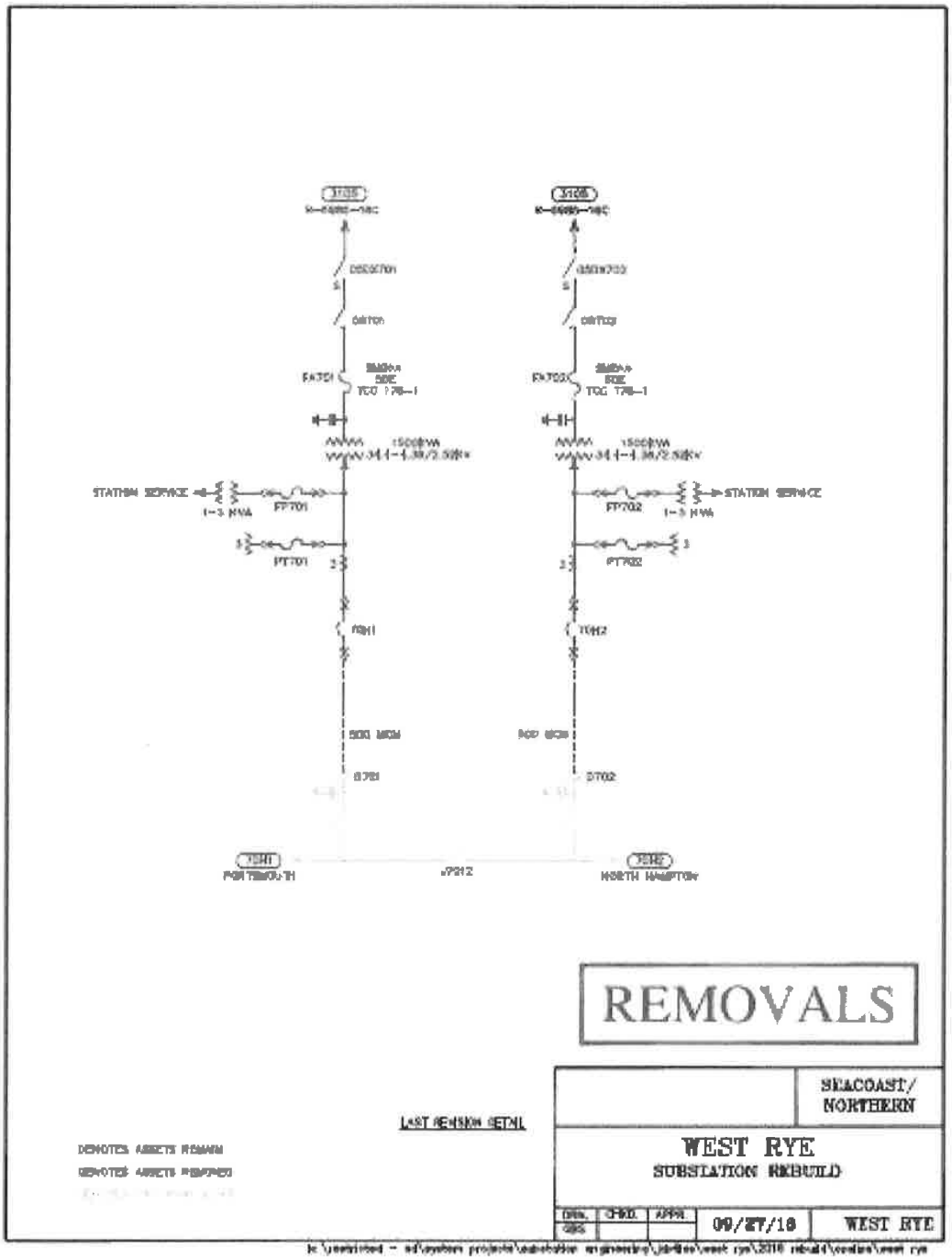
Total Supplement Request by year view:

	Year 2017	Year 20__	Year 20__+	Total
Capital Additions - Direct	$ 345	$ -		$ 345
Less Customer Contribution	-	-	-	-
Removals net of Salvage ____%	-	-	-	-
Total Direct Spending	$ 345	$ -	$ -	$ 345
Capital Additions - Indirect	(42)	-		(42)
AFUDC	(17)	-		(17)
Total Capital Request	$ 286	$ -	$ -	$ 286
O&M	-	-	-	-
Total Request	**$ 286**	**$ -**	**$ -**	**$ 286**

EVERSOURCE

APS 1 - Project Authorization Policy

Supplement Request Form



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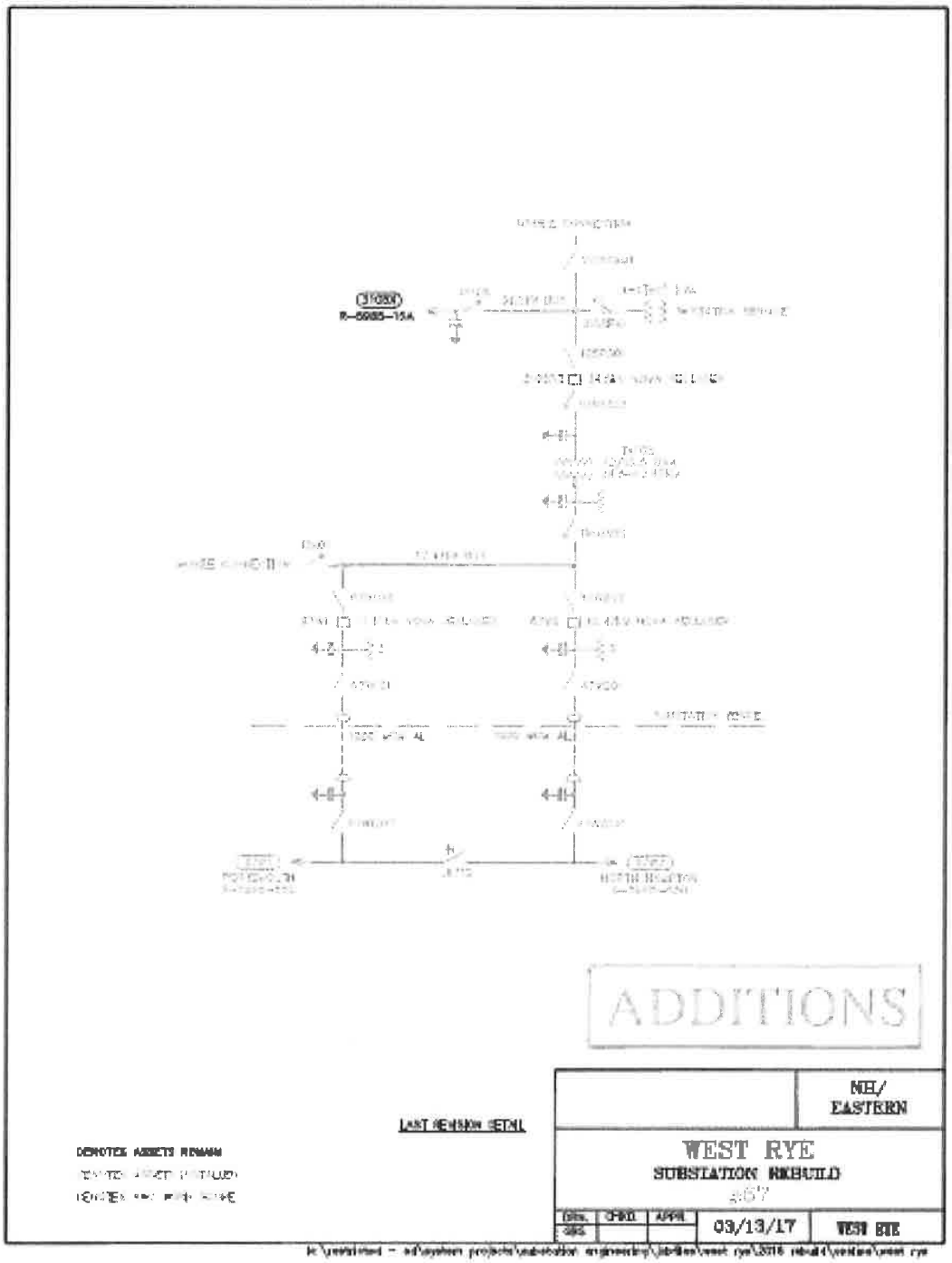
APS 1 - Project Authorization Policy

Supplement Request Form



ESTIMATE SUMMARY
PSNH

Project Title: West Rye Substation 70H1 & 70H2Transformer Replacement
Project Mgr/Lead: Natacha Morales
Project Number: A16E06
TAF # XYZ

Estimate By: MPD
Date of Estimate: 7/4/17
ISD: 12/31/17
Estimate # P17-040

ESTIMATE SUMMARY

ESTIMATE TYPE: Engineering

	TOTAL	Prior to 6/1/17	2017 after 5/31/17	2018	2019	2020	2021 and FUTURE
CONSTRUCTION	$177,009	$2,398	$174,611	$0	$0	$0	$0
ENGINEERING/DESIGN	$261,058	$239,166	$21,892	$0	$0	$0	$0
LAND	$0	$0	$0	$0	$0	$0	$0
MATERIAL	$784,788	$117,410	$667,378	$0	$0	$0	$0
PROJECT MGR & SUPPORT	$64,711	$46,467	$18,244	$0	$0	$0	$0
REMOVAL	$50,000	$0	$50,000	$0	$0	$0	$0
TEST	$19,990	$0	$19,990	$0	$0	$0	$0
CONTINGENCY	$25,853	$0	$25,853	$0	$0	$0	$0
ESCALATION	$0	$0	$0	$0	$0	$0	$0
INDIRECTS	$204,333	$79,015	$125,318	$0	$0	$0	$0
AFUDC	$1,209	$216	$993	$0	$0	$0	$0
Total Cost	**$1,588,952**	**$484,672**	**$1,104,279**	**$0**	**$0**	**$0**	**$0**

	-10%	-	**10%**
Engineering Range	**$1,430,056**	-	**$1,747,847**

COMMENTS:

Project Scope:

The West Rye Substation Rebuild project is being constructed in support of the recommendations presented from the Rye Area Distribution System Study dated March 01, 2013.

The existing West Rye substation currently referred to as #70 will be renamed to West Rye #67 due to a naming conflict with another 34.5-12.47kV substation currently called #70. The two 12.47kV lines emitting from West Rye substation will be named 67W1 & 67W2.

The existing configuration of West Rye substation consisting of two separate 34.5–4.16kV transformers will be replaced with a single 34.5–12.47kV 10/12.5 MVA transformer. The two existing 34.5kV taps of the 3105 line feeding the existing transformers will be removed and a single tap of the **3105X** will feed the new transformer.

The station service for the substation will be provided from a single phase 34.5kV-120/240V pole mount transformer tapped to the 34.5kV bus.

Assumptions:

Engineering to be outsourced with in-house review, construction to be outsourced.
This estimate is based on Project Scope Document only, actual quantities may vary during detailed engineering.
Material estimates based on previous work, vendor quotes, and RS Means.
Labor estimates based on previous work, J. Bifulco S/S labor units, R.S. Means, and NECA labor units.
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 15% contingency on Construction direct costs which equates to 1.5% contingency of total cost.

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Project Authorization Form

General Information

Date Prepared: 02/26/16	Project Title: West Rye S/S Rebuild
Company: Eversource - NH	Project ID Number: A16E06
Organization: NH Operations	Class(es) of Plant: Distribution
Project Initiator: Mike Busby	Project Category: Reliability
Project Owner/Manager: Celine Bilodeau	Project Purpose: part of regulatory tracked program? No
Project Sponsor: Jim Eilenberger	Project Type: Specific
Estimated in service date: 12/31/17	Capital Investment Part of Original Operating Plan? Yes
If Transmission Project: No	Supplement to Existing Authorization? No
	O&M Expenses Part of the Original Operating Plan? No

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

The existing West Rye substation was built in the late 1950's and is a 34.5kV to 4kV substation with two 1.5MVA transformers and switchgear equipment that have exceeded their life expectancy. Replacement parts for the switchgear air breakers are no longer available. The 1.5MVA transformers have exceeded the 85% of maximum load (TFRAT) ratings and test indicate that gas has been generated within the transformers.

A study was completed for the area in March 2013 (Rye Area Study) which identified the area having loading, low voltage and coordination issues. In order to improve the reliability and voltage issues for the area the substation will be converted to a 34.5kV to 12kV substation. Converting from 4kV to 12kV increases the ability to provide contingent coverage for adjacent circuits. The study looked at maintaining the 4kV system but this was eliminated due to the cost of getting right-of-ways in this affluent area.

The scope of work includes installing a 10MVA transformer and three reclosers. One recloser will be installed on the high side of the transformer providing protection and fault isolation. Two reclosers will be installed on each outgoing 12kV circuit. The scope includes installing a RTU for Distribution Automation.

This PAF covers the substation potion of the overall project. A second PAF (A16E01) has been submitted to cover the line portion of the conversion for $1,261,108.

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Accounting Policy Statement No. 2
Operations Project Authorization

Project Costs Summary

Cost ($000)	Prior Authorized*	2016	2017	2018 +	Totals
Capital Additions - Direct		69	921		990
Customer Contribution					
Removals net of Salvage			50		50
Total - Direct Spending	$ -	69	971		1,040
Capital Additions - Indirect		13	233		246
Subtotal Request	$ -	81	1,204		1,285
AFUDC (half-year convention)		1	18		18
Total Request	$ -	82	1,222		1,304

Summary Project Description

The reason for the work at West Rye is to remove the existing obsolete equipment, address the growth, improve the low voltage and reliability. The area will be converted from 4kV to 12kV in the footprint of the existing substation. The two 1.5MVA transformers will be replaced with a single 10/12 MVA transformer. Three (3) Reclosers will be installed; one for the high side transformer protection and one on each (renamed 70W1 & 70W2) 12kV circuits along with a RTU for Distribution Automation.

Cost ($000)	Total Project Costs	Amount in Operating Plan	Difference
Capital	$ 1,304	$1,304	$0
O&M	$	$0	$
Total	$1,304	$1,304	$0

Project Authorization

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

Approver	Approver Name	Approver Signature	Date
Project initiator	Mike Busby		
Project manager	Celine Bilodeau		
Plant Accounting	Michelle Roncaioli		
Director	James Eilenberger		
Sr. Vice President	Peter Clarke		

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Overall Justification

The West Rye S/S is a 1955 vintage 34.5kV to 4.16kV nominal substation. The transformers, 70H1 & 70H2, at West Rye are loaded to 109.3% and 94.7% of their nameplate rating. The load exceeds the TFRAT threshold of 85% to 96% and 92% respectively. Both transformers have been generating gas within the transformers for a number of years.

70H1 (1955 Transformer's vintage) shows a sharp jump of carbon monoxide, & methane and high levels of ethane. Possibly due to a thermal fault of 300 to 700C.

70H2 (1955 Transformer's vintage) shows high levels of Ethylene, Acetylene, Nitrogen and Oxygen; possibly from contact heating.

These gas-in-oil results indicate both transformers potentially have internal concerns that may lead to failure. Based on the age, gassing and loading the transformers should be replaced.

The circuits in the area have been experiencing low voltages. The rebuilt substation will be 34.5kV to 12.47kV. Between the larger transformer and voltage conversion, the voltage issues will be addressed. This project removes obsolete equipment, converts the area to 12kV and adds Distribution Automation.

Project Scope

Remove two (2) 1.5MVA, 34.4-4.36kV transformers
Remove two (2) 4kV breakers
Install one (1) 10/12 MVA, 34.5-12kV transformer
Install three (3) Reclosers
Install Distribution Automation

Project Objectives

Increase capacity at the West Rye S/S
Convert the substation from 4kV to 12kV
Improve relay protection and coordination
Remove obsolete equipment
Add Distribution Automation

Business Process and / or Technical Improvements:

Remove obsolete equipment
Increase capacity
Improve reliability
Improve voltage levels
Implement Distribution Automation

Assumptions

Loads on the West Rye substation will be off loaded to other circuits during construction.

Alternatives Considered

Convert area to 34.5kV instead of 12kV; this option was eliminated because this is a heavily treed area with most roads designated as "Scenic" making it difficult to obtain the desired level of tree trimming clearance required for 34.5 kV circuits.

Project Schedule

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

Milestone/Phase Name	Estimated Completion Date
Engineering – start	5/1/16
Engineering – complete	9/1/16
Construction - start	4/1/17
In Service	6/1/17

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Financial Evaluation

Direct Capital Costs ($000)	2016	2017	2018	Total
Straight Time Labor	$15	$156	$	$170
Overtime Labor				$
Outside Services	$	$50	$	$ 50
Materials	$	$589	$	$589
Other, including contingency amounts (describe)	$54	$176	$	$230
Total	$69	$971	$	$1,040

Indirect Capital Costs ($000)	2016	2017	2018	Total
Benefits / Loaders	$13	$233	$	$246
Capitalized interest or AFUDC, if any	$1	$18	$	$18
Total	$13	251	$	264

Total Capital Costs	$82	$1,222	$	$1,304
Total O&M Costs				
Total Project Costs ($000)	$82	$1,222	$	$1,304

The project includes contingency funds approximately 17% for cost of removing possible contaminated soils or hazardous foundations as well as the potential increase of contractor cost.

Regulatory Approvals

Permitting required by the Town of Rye, N.H.

Risks and Risk Mitigation Plans

The plan is to build the substation during the lightly loaded time of the year and off load to other circuits. A mobile substation can be installed if needed.

The soil will be tested near the sample valves for the transformers; cost of soil remediation is included in contingency costs.

The concrete foundations will be tested for asbestos and oil staining; cost of removals is included in the contingency costs.

North Rd Substation - Project #A17W19

Discussed in Response to Staff 18-003

EVERSOURCE

APS 1 - Project Authorization Policy

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**

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APS 1 - Project Authorization Policy

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**

EVERSOURCE
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.

EVERSOURCE
Project Authorization Form

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

EVERSOURCE
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

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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

- 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.

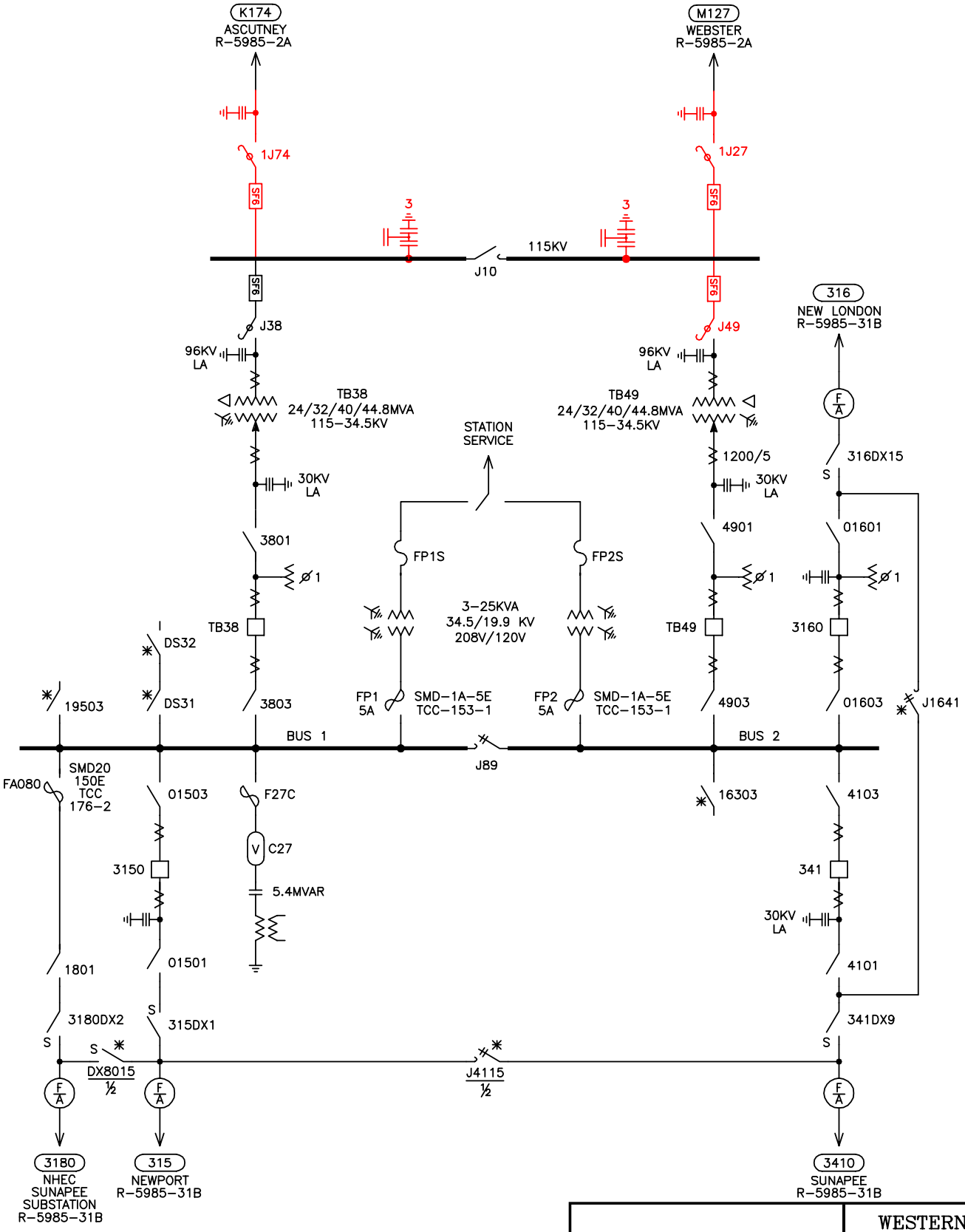
References

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



REMOVALS

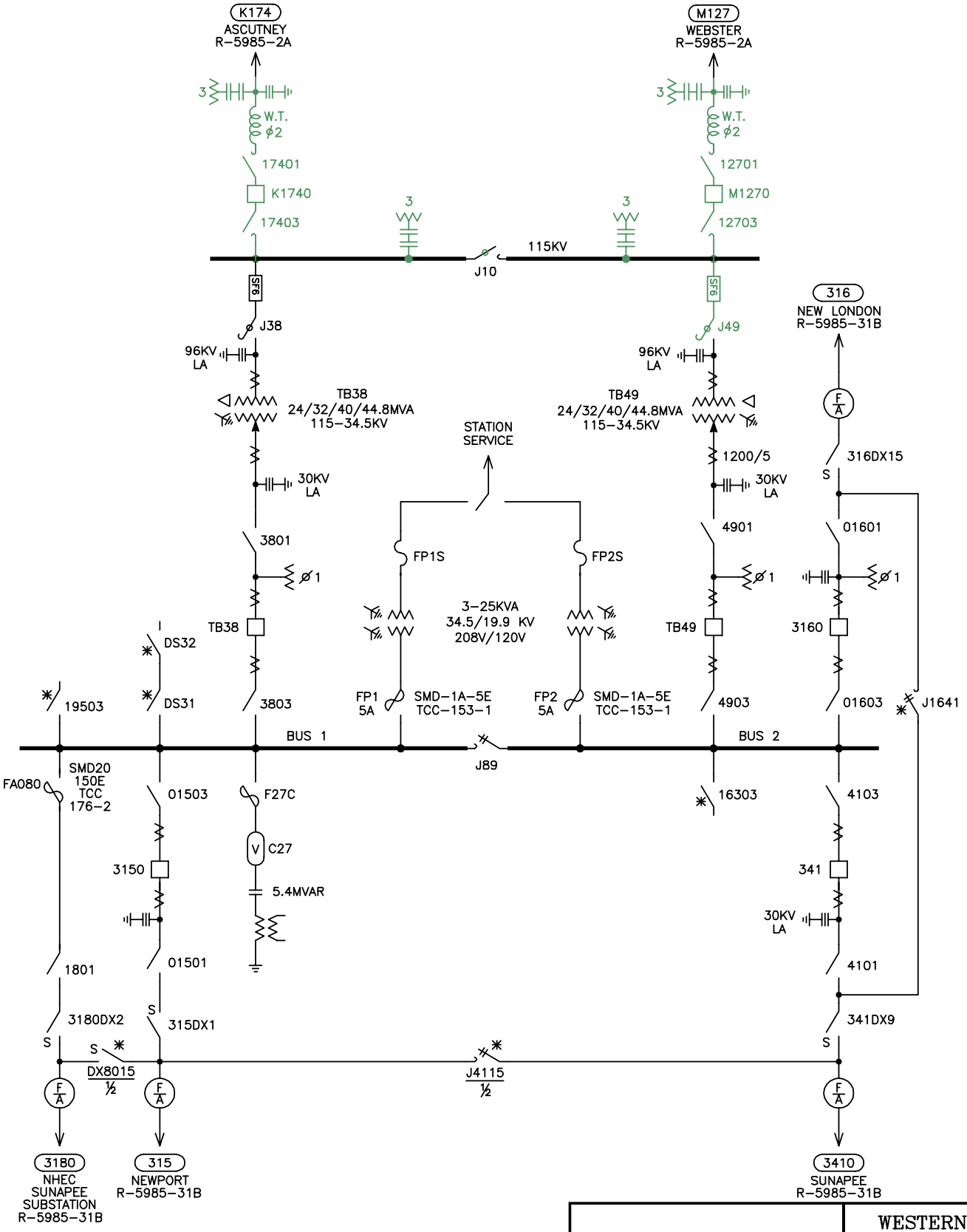
LAST REVISION DETAIL

WESTERN/
CENTRAL

NORTH ROAD

NORTH ROAD, SUNAPEE, NH
763-5821

DRN.	CHKD.	APPR.		
LJG			3/16/18	SKT-NORTHRD



ADDITIONS

LAST REVISION DETAIL

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	Distribution		Transmission	Distribution	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

Re-Classification of Assets as Transmission v. Distribution

Discussed in Response to Staff 18-008

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 19-057

Date Request Received: 11/20/2020 **Date of Response: 11/24/2020**
Request No. TS 4-002 **Page 1 of 1**
Request from: **New Hampshire Public Utilities Commission Staff**

Witness: **Erica L. Menard, David L. Plante**

Request:
Regarding Staff 17-001 and Staff 18-008. Please explain the projects the charges in NT006 relate to and the accounting for those projects.

Response:
The charges of $276,837.47 from Staff 17-001 and Staff 18-008 are related to the transfer of assets from Transmission to Distribution at three Distribution only locations. During the closeout of three Transmission work orders, the Plant Accounting department's review of the assets identified certain charges were deemed to be Distribution assets and not Transmission assets. The standard practice for transferring charges between Transmission and Distribution is to use the NT006 project, specifically the NFMAWO06 work order which does not have a pre-determined FERC account association and therefore can be used for asset transfers. The $276,837.47 is comprised of the following:

1) $165,980.47 charged to transmission work order T1340ASM for receivers and instrument transformers installed as part of the South Milford substation project.
2) $105,508.74 charged to transmission work order T1188A2 for insulators installed as part of the Peaslee substation project.
3) $5,348.26 charged to transmission work order TL9R7084 for insulators related to work at the Laconia substation

As a result of this data request and upon further review of the specific assets, Plant Accounting has worked with the Engineering and Project Management teams and has determined that these assets are in fact Transmission assets and not Distribution assets and therefore should not have been transferred from Transmission to Distribution. As a result, $276,837.47 will be removed from the 2019 Plant in Service step adjustment request.