EVERSOURCE

Supplement Request Form

Approved at August 18, 2021 EPAC
Link to Meeting Minutes

Date Prepared: 08/11/2021	**Project Title: [redacted] Replace [redacted] Transformer**
Company: Eversource CT	**Project Number: CS00115**
Organization: Transmission Project Management	**Class(es) of Plant: D SS**
Project Initiator [redacted]	**Project Category: Stations - Transformers**
Project Manager: [redacted]	**Project Type: Specific**
Project Sponsor: [redacted]	**Capital Investment Part of Original Oper. Plan: Yes**
Project Manager's Director: [redacted]	**O&M Expenses Part of the Original Oper. Plan: No**
Current Authorized Amount: $2,569K	**Estimated in service date: 04/15/2021**
Supplement Request: $1,838K	**ISO-NE Approvals Required (check all that apply):**
Total Request: $4,407K	**☐ PAC ☐ TCA**

Background

This project was approved in Power Plan on 04/26/2017 for full funding authorization of $2,569K to complete the replacement of the [redacted] transformer at Newington Substation located in Newington, CT. As of 04/15/2021, all construction requirements were met, the project was placed in service and the project close-out requirements will be completed by 08/30/2021.

Supplement Justification Overview

The primary driver for the cost overruns for this project can be attributed to added scope that was not covered in the original authorization. The added scope includes replacing the 10T-6 switch, which was yellow tagged, current transformer (CT), along with the existing annunciator and new human machine interface (HMI). Also, the existing foundation was planned to be only modified but the detailed civil designs included a new foundation installation. The existing foundation removal required disposal of contaminated soils, as well as asbestos piping removal and disposal. The removal of the contaminated soils required extra depth excavation which required shoring to be designed and installed. The civil work pushed out the schedule by four (4) - six (6) weeks. The additional scope items also added a few weeks and then the warranty repairs with the transformer caused further delay in the ISD from December 2018 to April 2021. These delays and added scope items resulted in an overall project budget increase of $1,838K, of which more than half $954K is due to overheads, for a new project total of $4,407K. A breakdown of the various cost overruns is provided below.

Supplement Justification Detail

The reasons for the project authorization supplement of $1,838K are summarized below.

1. **Engineering / Design: $62 –** Additional engineering was required to install the new annunciator to ensure the operation of the DSCADA load tap changer (LTC) relays with the latest software upgrades. Also, engineering was required to replace the defective 10T-6 switch, which had been yellow tagged after the initial walkdown. Furthermore, additional engineering was required to address the detailed civil design of the new foundation installation verses the modification/extension that had been originally planned. The test pit threshold of 5'-0 shown on the drawings was not indicative of the conditions in the field, and the threshold was adjusted to 6'-7", which in turn affected the forms, rebar, and concrete pour requirements.

2. **Materials (by Eversource): $239 –** Additional materials included the new annunciator, 10T-6 switch, CT, concrete, and rebar required. Also, there was an additional cost to vacuum fill the transformer with oil before arrival on the project site. This also contributed to the increased cost of the material budget.

3. **Construction: $228 –** The additional cost to the construction budget was due to the increased project scope to replace the annunciator, CT and 10T-6 switch. Also, changes to the civil scope for the transformer pad installation contributed to the increased cost.

    a. **Environmental: $94 –** As subset of the Construction cost, the existing foundation removal required disposal of contaminated concrete and soils, additionally asbestos pipe was removed and disposed. The removal of the contaminated soils required extra depth excavation which required shoring to be designed and installed. The $94k includes the Outside Environmental Services for Testing, Analysis and Disposal Cost but not the internal labor or rental of equipment.

4. **Testing / Commissioning: $206 –** The testing and commissioning cost was not originally broken out separately and there was an increase due to the added scope for the annunciator, switches, and software upgrades. Also, additional testing to resolve CT failure issues, which was resolved under warranty from ABB, also contributed to the cost increase.

5. **Project Management Team: $27 –** Additional costs were incurred due to more effort to coordinate and manage the revised scope and change requirements. The extension of the ISD, the warranty issues with the [redacted] Transformer and effort to prepare the Supplemental Documentation required effort that was not originally anticipated.

6. **Removals: $84 –** The removal cost were higher than the original estimate due to the increase in project scope, especially as it related to the foundation which was originally planned for modification not removal.

7. **Indirects/Overhead: $954** – Indirect rates are a calculation of the real-time applied rates to direct costs. The indirect rates applied over the life of the project to the higher than expected direct costs yielded higher indirect costs.

8. **AFUDC: $38** – AFUDC actuals are expected to be greater than initially estimated due to the extended project duration associated with the complexities of the foundation work and extending the ISD.

Total Supplement Request: $1,838

See the original authorization documentation attached.

Supplement Cost Summary

Note: Dollar values are in thousands:

Line item Category	Prior Authorized	New Total Request	Variance (Supplemental Request)
1. ROW / Easements / Land Acquisition	$	$	$
2. Environmental Approvals / Permits	$	$	$
3. Outreach	$	$	$
4. Siting Approvals / Permits	$	$	$
5. Engineering / Design	$	$62	$62
6. Materials (Eversource purchased)	$1,444	$1,683	$239
7. Construction (incl matl's by contractors)	$505	$733	$228
8. Testing / Commissioning	$	$206	$206
9. Project Mgmt Team	$	$27	$27
10. Removals	$82	$166	$84
11. Other	$	$	$
12. Risks	$	$	$
SUBTOTAL DIRECTS W/ RISKS	**$2,031**	**$2,877**	**$846**
13. Indirects/Overhead	$470	$1,424	$954
14. AFUDC	$68	$106	$38
PROJECT TOTAL – BASELINE BUDGET	**$2,569**	**$4,407**	**$1,838**
15. Contingency	$0	$0	$
TOTAL CAPITAL REQUEST	**$**	**$**	**$**
16. Reimbursables/Customer Contribution	$0	$0	$
PROJECT TOTAL (LESS REIMBURSABLES)	**$2,569**	**$4,407**	**$1,838**

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Total Supplement Request by Year

Note: Dollar values are in thousands:

Line item Category	Year 2020	Year 2021	Year 20__ +	Total
1. ROW / Easements / Land Acquisition	$	$	$	$
2. Environmental Approvals / Permits	$	$	$	$
3. Outreach	$	$	$	$
4. Siting Approvals / Permits	$	$	$	$
5. Engineering / Design	$46	$16	$	$62
6. Materials (Eversource purchased)	$231	$8	$	$239
7. Construction (incl matl's by contractors)	$	$228	$	$228
8. Testing / Commissioning	$79	$127	$	$206
9. Project Mgmt Team	$21	$6	$	$27
10. Removals	$	$84	$	$84
11. Other	$	$	$	$
12. Risks	$	$	$	$
SUBTOTAL DIRECTS W/ RISKS	**$377**	**$469**	**$**	**$846**
13. Indirects/Overhead	$293	$661	$	$954
14. AFUDC	$	$38	$	$38
PROJECT TOTAL – BASELINE BUDGET	**$670**	**$1,168**	**$**	**$1,838**
15. Contingency	$0	$0	$	$0
TOTAL CAPITAL REQUEST	**$670**	**$1,168**	**$**	**$1,838**
16. Reimbursables/Customer Contribution	$0	$0	$	$0
PROJECT TOTAL (LESS REIMBURSABLES)	**$670**	**$1,168**	**$**	**$1,838**

Superceded Project Authorization Forms & Estimates

Project Authorization Form

Date Prepared:	3/21/2017	Project Title: [redacted] Replace [redacted]	
Company:	EE-CT	Project ID Number:	CS00115
Organization:	Strategy&Perform	Class(es) of Plant:	Distribution
Project Initiator:	[redacted]	Project Category: S/S Transformer Reliability	
Project Owner/Manager:	[redacted]	Project Type:	Specific
Project Sponsor:	[redacted]	Project Purpose: Replace the 4A-1X transformer	
Estimated in service date:	12/31/2018	If Transmission Project:	N/A
Supplement to Existing Authorization?	ENG	Capital Investment Part of Original Operating Plan?	Yes
Eng./Constr. Resources Budgeted?	Yes	O&M Expenses Part of the Original Operating Plan?	No

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

The scope is to proactively replace the [redacted] transformer. The [redacted] is a 45 MVA transformer, 115 - 23 kV, grounded wye-delta, installed in 1953. It will be replaced with a new 60 MVA, 115 - 23 kV, delta-grounded wye unit. The existing grounding transformer, the [redacted], will be removed since it will no longer be needed.

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized*	2017	2018	2019+	Total
Capital Additions Direct		38	1,911	0	$1,949
Less Customer Contribution		0	0	0	$0
Removals Net of Salvage		2	80	0	$81
Total - Direct Spending		$40	$1,991	$0	$2,031
Capital Additions - Indirect		51	419	0	$470
Subtotal Request		$91	$2,410	$0	$2,501
AFUDC		0	68	0	$68
Total Request		$91	$2,478	$0	$2,569

Financial Evaluation

Direct Capital Costs	2017	2018	2019+	Total
Straight Time Labor	40	292	0	$332
Overtime Labor	0	0	0	$0
Outside Services	0	55	0	$55
Materials	0	1,444	0	$1,444
Other, including contingency amounts	0	200	0	$200
Total	$40	$1,991	$0	$2,031

Indirect Capital Costs	2017	2018	2019+	Total
Indirects/Overheads (including benefits)	51	419	0	$470
Capitalized interest or AFUDC, if any	0	68	0	$68
Total	$51	$487	$0	$538

Total Capital Costs	$91	$2,478	$0	$2,569

Less Total Customer Contribution	0	0	0	$0

Total Capital Project Costs	$91	$2,478	$0	$2,569

Total O&M Project Costs	$0	$0	$0	$0

** to be completed if supplemental authorization is required*

Technical Authorization Form

Date Prepared: August 1, 2016	Project Title: [redacted] – Replace [redacted] Transformer
Company/ies: Eversource CT	Project ID Number: CS00115
Organization: S[redacted]	Class(es) of Plant: Distribution
Project Initiator: [redacted]	Project Category: General Modernization
Project Owner/Ma[redacted]	Project Type: *Specific*
Project Sponsor: [redacted]	Project Purpose: Proactively replace the [redacted]
Estimated in service date: 5/31/19	If Transmission Project: *NA*
Authorization Type: Detailed Engineering	Authorization Amount: $250,000

Project Need Statement

The Eversource CT bulk power transformers are aging. Several are over 60 years old and well past their design life. Rather than wait for a failure, an emergency replacement and the subsequent risk to customer load, some units are being replaced proactively to lessen the risk, and the financial and resource impact.

Project Objective

Replace the [redacted] transformer with an Eversource standard, new, 115 kV – 23 kV, delta-grounded wye, 60 MVA transformer.

Project Scope

The scope is to proactively replace the [redacted] transformer. The [redacted] is a 45 MVA transformer, 115 - 23 kV, grounded wye-delta, installed in 1953. It will be replaced with a new 60 MVA, 115 - 23 kV, delta-grounded wye unit. The existing grounding transformer, the [redacted], will be removed since it will no longer be needed.

Background / Justification

In 2014, Eversource CT began a proactive substation transformer replacement program. It was recognized that the bulk power transformers are an aging asset and a failure is a financial and customer reliability risk. Although replacement of a single transformer on an emergency basis can be absorbed, more than one failure at the same time would present a significant challenge. This program seeks to proactively replace the transformers determined to be most at risk, to lessen the potential of multiple failures occurring in the same time frame in the future. A rash of failures in a short period of time will challenge financial, engineering and construction resources.

Business Process and / or Technical Improvements:

Improvements due to this project include: replacement of an aging, non-standard bulk power transformer with a new, standard transformer; additional substation capacity due to replacing a 45 MVA unit with a 60 MVA unit; and removal of a grounding transformer which will no longer be necessary once the grounded wye-delta transformer is replaced with a delta-grounded wye unit.

Cost Estimate and Assumptions

The estimated cost is $2,839k with an in-service date of May 2019. The estimate is based on actual costs incurred for similar transformer replacements in the past at other substations, and incorporating any differences noted for this project, such as removal of the grounding transformer. Estimated man-hours for engineering, construction and test were considered with input from each group. The appropriate cost loaders and overheads are included in the estimate. Material costs include the current cost of similar transformers with costs escalated for delivery in 2019. The estimate scope includes installation of a new transformer foundation and oil sump, as well as anticipated environmental remediation costs.

Alternatives Considered with Cost Estimates

The alternative to this project is to wait until the transformer fails to replace it, or needs to be replaced for load reasons. This has been the past practice, however, since a large percentage of the power transformers are reaching end of life and load growth has slowed, a planned, proactive approach is preferred to waiting until failure occurs. Costs for emergency replacement would be 10% – 20% higher since some work would be done on overtime. This cost does not include the impact on resources and the work plan that result from an unplanned failure.

Project Schedule

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

Milestone/Phase Name	Estimated Completion Date
Engineering	September 2018
Begin Construction	January 2019
Complete Construction	May 2019

Regulatory Approvals

CT Siting Council will be notified by letter. A hearing is not required.

Risks and Risk Mitigation Plans

The replacement should present few risks. It is straightforward and similar to other recent transformer replacements, including the Bloomfield 3B-3X which was replaced in 2014, and the Manchester 3A-2X which was replaced in 2015. The primary risk is the impact of a failure of one of the other transformers at [redacted] while the [redacted] is out of service. This risk will be mitigated by not deenergizing the [redacted] until after the summer of 2018 and completing the project before the summer of 2019. Also, if necessary to limit the load to what the smaller of the two remaining transformers can carry, a mobile transformer will be installed while the [redacted] is out of service.

One-Line Diagrams, Attachments, and Images



[redacted].pdf