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Operations Project Authorization Form

Approved on March 16, 2022 EPAC

Link to Meeting Minutes

Project Title: [redacted] – 2nd Transformer, SWGR, & Circuit Breaker Addition	**Project Number: 404953, CS00284**
Date Prepared: 03/30/2022	**Company: Eversource CT**
Organization: System Planning	**Class(es) of Plant: T SS, D SS**
Project Initiator: [redacted]	**Project Category: Stations - Transformers, Stations – Circuit Breakers**
Managing Organization: Engineering	**Schedule ID#: 40495301 & CS002841**
Project Manager: [redacted]	**Project Type: Specific**
Project Sponsor: [redacted]	**Capital Investment part of original Op Plan: Yes**
Estimated in service date: June 2023 (D); December 2023 (T)	**Emergency Related Request? No**
Eng./Constr. Resources Budgeted? Yes	**Facility Type (check all that apply):** ☒ **PTF non -regional** ☐ **non-PTF** ☒ **Distribution** ☐ **N/A (General Plant)**
Total Capital Request: $24,388K (D - $17,570.9K, T - $6,816.8K)	**Authorization Type: Full Funding**

[1] Executive Summary

This project is seeking full funding approval of $24,388K ($5,666K for project ID# 40495301, $17,571K for project ID# CS002841, $575K for 80090791 and $576K for 80090988) to support material procurement, construction, and test services for upgrades to the [redacted].

[redacted]

[redacted]

Initial funding of $100K for 404953 and $100K for CS00284 was approved in PowerPlan on August 8, 2019. Partial funding of $1,000K was approved for 404953 in PowerPlan on February 22, 2021 and $1,277K was approved for CS00284 in PowerPlan on March 17, 2021. The project was presented to and approved by the Solution Design Committee (SDC) on July 8, 2020. Currently, $349K for 404953 and $861K for CS00284 has been spent to complete preliminary design, associated planning grade estimates, a constructability review, a baseline sound study of existing equipment, Single Contingency Load Loss (SCLL)/outage review and full funding PAF development.

A summary of the cost breakdown is provided in the table below.

Project Number/Work Order #	Class of Plant	Scope	Amount
404953/40495301	T SS – [redacted]	Install [redacted]	$5,666,000
CS00284/CS002841	D SS – [redacted]	Install a [redacted]	$17,571,000
404953/80090791	T SS – [redacted]	Transmission line relaying	$575,000
404953/80090988	T SS – [redacted]	Transmission line relaying	$576,000
Total			**$24,388,000**

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[2] PROJECT COSTS SUMMARY

Project Total Cost Summary

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2022 to Go	2023	2024	Total
1. ROW / Easements / Land Acquisition	$	$	$	$	$	$
2. Environmental Approvals / Permits	$	$5	$	$	$	$5
3. Outreach	$	$0	$	$13	$	$13
4. Siting Approvals / Permits	$	$5	$	$4	$	$9
5. Engineering / Design	$1,093	$108	$627	$207	$	$943
6. Materials (Eversource purchased)	$	$33	$3,972	$906	$	$4,911
7. Construction	$	$109	$2,483	$2,552	$	$5,144
8. Testing / Commissioning	$	$46	$286	$341	$	$673
9. Project Mgmt Team	$191	$181	$145	$153	$	$479
10. Removals	$	$	$90	$83	$	$173
11. Other	$	$19	$	$	$	$19
12. Risks	$	$	$1,085	$515	$	$1,600
SUBTOTAL DIRECTS W/ RISKS	**$1,284**	**$505**	**$8,688**	**$4,775**	**$**	**$13,969**
13. Indirects/Overhead	$912	$616	$4,545	$3,423	$	$8,585
14. AFUDC	$80	$89	$514	$534	$	$1,136
PROJECT TOTAL – BASELINE BUDGET	**$2,277**	**$1,210**	**$13,747**	**$8,732**	**$**	**$23,689**
15. Contingency	$	$	$433	$265	$	$698
TOTAL CAPITAL REQUEST	**$2,277**	**$1,210**	**$14,180**	**$8,998**	**$**	**$24,388**
16. Reimbursables/Customer Contribution	$	$	$	$	$	$
PROJECT TOTAL (LESS REIMBURSABLES)	**$2,277**	**$1,210**	**$14,180**	**$8,998**	**$**	**$24,388**
O&M	$	$	$	$	$	$
TOTAL REQUEST	**$2,277**	**$1,210**	**$14,180**	**$8,998**	**$**	**$24,388**

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Distribution Cost Summary (CS00284)

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2022 to Go	2023	2024	Total
1. ROW / Easements / Land Acquisition	$				$	
2. Environmental Approvals / Permits	$	$			$	$
3. Outreach	$	$			$	$
4. Siting Approvals / Permits	$				$	
5. Engineering / Design	$762	$51	$317	$6	$	$373
6. Materials (Eversource purchased)	$	$20	$3,970	$13	$	$4,003
7. Construction	$	$106	$2,276	$1,392	$	$3,774
8. Testing / Commissioning	$	$46	$204		$	$250
9. Project Mgmt Team	$2	$92	$63	$53	$	$207
10. Removals	$		$90		$	$90
11. Other	$	$9			$	$9
12. Risks	$		$890	$255	$	$1,145
SUBTOTAL DIRECTS W/ RISKS	$764	$324	$7,810	$1,719	**$**	$9,852
13. Indirects/Overhead	$474	$471	$3,956	$1,881	$	$6,308
14. AFUDC	$38	$67	$438	$412	$	$917
PROJECT TOTAL – BASELINE BUDGET	$1,277	$861	$12,204	$4,012	**$**	$17,077
15. Contingency	$		$412	$82	$	$494
TOTAL CAPITAL REQUEST	$1,277	$861	$12,616	$4,094	**$**	$17,571
16. Reimbursables/Customer Contribution	$				$	
PROJECT TOTAL (LESS REIMBURSABLES)	$1,277	$861	$12,616	$4,094	**$**	$17,571
O&M	$				$	
TOTAL REQUEST	$1,277	$861	$12,616	$4,094	**$**	$17,571

Risk	Allocation
1. Potential Underground Obstructions	$250,000
2. Severe Weather, Delays, OT	$200,000
3. Design Development	$50,000
4. External Crews Needed for Installation	$525,000
5. Upgrade Grounding and Lightning	$50,000
6. Post Study Upgrades	$70,000
Total	$1,145,000

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Transmission Cost Summary (404953)

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2022 to Go	2023	2024	Total
1. ROW / Easements / Land Acquisition	$				$	
2. Environmental Approvals / Permits	$	$4			$	$4
3. Outreach	$	$0			$	$0
4. Siting Approvals / Permits	$	$4			$	$4
5. Engineering / Design	$331	$58	$311	$2	$	$371
6. Materials (Eversource purchased)	$	$13	$2	$867	$	$882
7. Construction	$	$3	$207	$1,094	$	$1,304
8. Testing / Commissioning	$	$0	$82	$166	$	$248
9. Project Mgmt Team	$189	$90	$79	$55	$	$224
10. Removals	$			$37	$	$37
11. Other	$	$9			$	$9
12. Risks	$		$195	$190	$	$385
SUBTOTAL DIRECTS W/ RISKS	$520	$182	$875	$2,411	**$**	$3,468
13. Indirects/Overhead	$438	$145	$584	$1,097	$	$1,825
14. AFUDC	$42	$22	$75	$105	$	$203
PROJECT TOTAL – BASELINE BUDGET	$1,000	$349	$1,534	$3,612	**$**	$5,495
15. Contingency	$		$21	$150	$	$170
TOTAL CAPITAL REQUEST	$1,000	$349	$1,555	$3,762	**$**	$5,666
16. Reimbursables/Customer Contribution	$				$	
PROJECT TOTAL (LESS REIMBURSABLES)	$1,000	$349	$1,555	$3,762	**$**	$5,666
O&M	$				$	
TOTAL REQUEST	$1,000	$349	$1,555	$3,762	**$**	$5,666

Risk	Allocation
1. Potential Underground Obstructions	$40,000
2. Severe Weather, Delays, OT	$100,000
3. Design Development	$30,000
4. External Crews Needed for Installation	$15,000
5. Upgrade Grounding and Lightning	$200,000
Total	$385,000

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Transmission Cost Summary ([redacted] Remote End - 80090791)

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2022 to Go	2023	2024	Total
1. ROW / Easements / Land Acquisition	$	$			$	
2. Environmental Approvals / Permits	$	$			$	
3. Outreach	$	$		$7	$	$7
4. Siting Approvals / Permits	$	$		$2	$	$2
5. Engineering / Design	$	$		$100	$	$100
6. Materials (Eversource purchased)	$	$		$13	$	$13
7. Construction	$	$		$33	$	$33
8. Testing / Commissioning	$	$		$88	$	$88
9. Project Mgmt Team	$	$	$1	$22	$	$24
10. Removals	$	$		$23	$	$23
11. Other	$	$			$	
12. Risks	$	$		$35	$	$35
SUBTOTAL DIRECTS W/ RISKS	**$**	**$**	$1	$323	**$**	$324
13. Indirects/Overhead	$	$	$3	$223	$	$225
14. AFUDC	$	$	$0	$8	$	$8
PROJECT TOTAL – BASELINE BUDGET	**$**	**$**	$4	$554	**$**	$558
15. Contingency	$	$	$0	$17	$	$17
TOTAL CAPITAL REQUEST	**$**	**$**	$4	$570	**$**	$575
16. Reimbursables/Customer Contribution	$	$			$	
PROJECT TOTAL (LESS REIMBURSABLES)	**$**	**$**	$4	$570	**$**	$575
O&M	$	$			$	
TOTAL REQUEST	**$**	**$**	$4	$570	**$**	$575

Risk	Allocation
1. Additional Communication Panels Needed	$25,000
2. Severe Weather, Delays, OT	$5,000
3. Design Development	$5,000
Total	$35,000

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Transmission Cost Summary ([redacted] Remote End - 80090988)

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2022 to Go	2023	2024	Total
1. ROW / Easements / Land Acquisition	$	$			$	
2. Environmental Approvals / Permits	$	$			$	
3. Outreach	$	$		$7	$	$7
4. Siting Approvals / Permits	$	$		$2	$	$2
5. Engineering / Design	$	$		$100	$	$100
6. Materials (Eversource purchased)	$	$		$13	$	$13
7. Construction	$	$		$33	$	$33
8. Testing / Commissioning	$	$		$88	$	$88
9. Project Mgmt Team	$	$	$2	$22	$	$24
10. Removals	$	$		$23	$	$23
11. Other	$	$			$	
12. Risks	$	$		$35	$	$35
SUBTOTAL DIRECTS W/ RISKS	**$**	**$**	$2	$323	**$**	$325
13. Indirects/Overhead	$	$	$3	$223	$	$226
14. AFUDC	$	$	$0	$8	$	$8
PROJECT TOTAL – BASELINE BUDGET	**$**	**$**	$5	$554	**$**	$559
15. Contingency	$	$	$0	$17	$	$17
TOTAL CAPITAL REQUEST	**$**	**$**	$6	$571	**$**	$576
16. Reimbursables/Customer Contribution	$	$			$	
PROJECT TOTAL (LESS REIMBURSABLES)	**$**	**$**	$6	$571	**$**	$576
O&M	$	$			$	
TOTAL REQUEST	**$**	**$**	$6	$571	**$**	$576

Risk	Allocation
1. Additional Communication Panels Needed	$25,000
2. Severe Weather, Delays, OT	$5,000
3. Design Development	$5,000
Total	$35,000

Explain unique payment provisions, if applicable:

A Material Order Authorization form has been submitted and approved to proceed with major material purchasing prior to full funding approval in the amount of $3,597,258.

Identify and detail any unique O&M impacts resulting from this project:

Not applicable

[3] TECHNICAL JUSTIFICATION

Project Need, Objective and Justification

Project Need Statement

Distribution Needs:

This project will address local load serving reliability at the [redacted]

Transmission Needs:

[redacted]

Project Objectives

[redacted]

[redacted]



Figure 1: Simplified One-Line Diagram for Existing Arrangement



Figure 2: Simplified One-Line Diagram for Final Arrangement



II. Required Studies:

- The following studies are on-going with the engineering vendor; they will be completed prior to IFC completion
- DC Load Study and Battery Capacity Analysis
- AC Load Study
- Voltage Drop Calculations
- Station Lighting Level Study
- Grounding Study
- Lightning Protection Study
- Structural and Foundation Calculations
- Sound Study, pre-project sound study has been completed

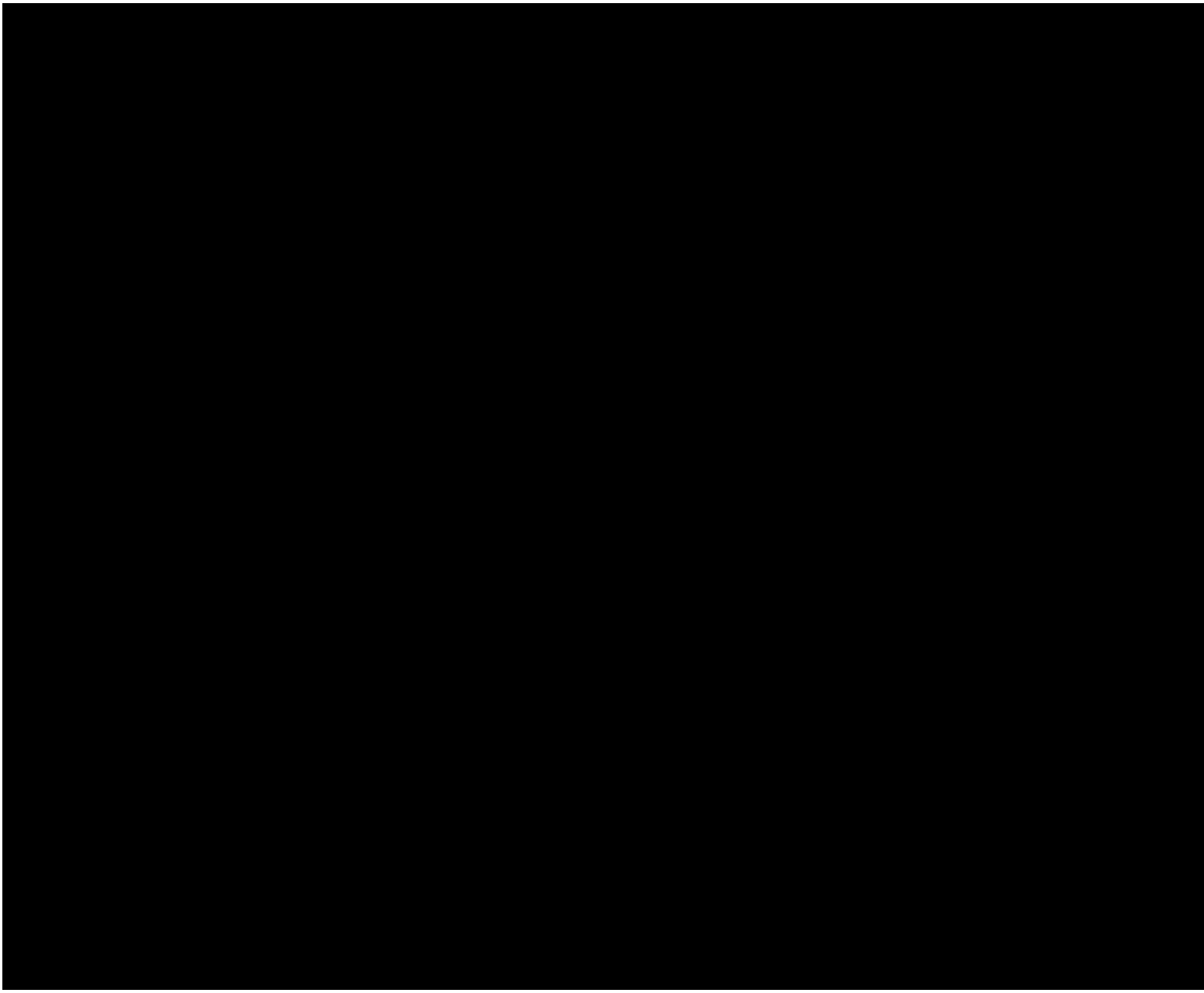
III. Other Site Considerations:

1. Real Estate/Siting & Permitting Considerations (i.e., acquisitions, offset encroachment, ROW impacts):
    a. Site modifications requiring permitting review includes the addition of lightning masts and lighting modifications to the station layout.
    b. An Exempt Modification has been submitted to and approved by the Connecticut Siting Council (CSC)
2. Environmental:
    a. Soil contamination analysis was performed and reported in the GZA Environmental Assessment Report dated October 7, 2021. In summary: Soil samples were taken and elevated arsenic levels were detected; site soil that is unable to be reused will be properly disposed of at an off-site location.
    b. Wetlands impact: There are no disruptions of wetlands as part of this project.
    c. Audible Noise Level Changes/Considerations:
        i. The new power transformer at the site is to be designed to meet applicable requirements without need for external mitigation measures. It is not expected that the new transformer will exceed audible noise levels set by the state of Connecticut and a sound wall is not expected to be needed; however, there is risk allocated to post study upgrades.
3. Transmission Line Considerations: Line outages will be necessary for moving the 115kV

capacitor coupled voltage transformer (CCVT) connection points.

4. Distribution Feeder Circuit Considerations: Distribution bus outage will be required for connection of the bus tie switch and conduit. Outages on distribution feeders may also be required when tying new feeders into existing distribution duct banks. The Project team has not yet determined if a mobile is needed at this time. Initial discussions with the SOC has indicated a mobile is not required.
5. This project scope does not include any IEC 61850 communications protocol.

WORK ORDER: 40495301 – Carmel Hill Transmission



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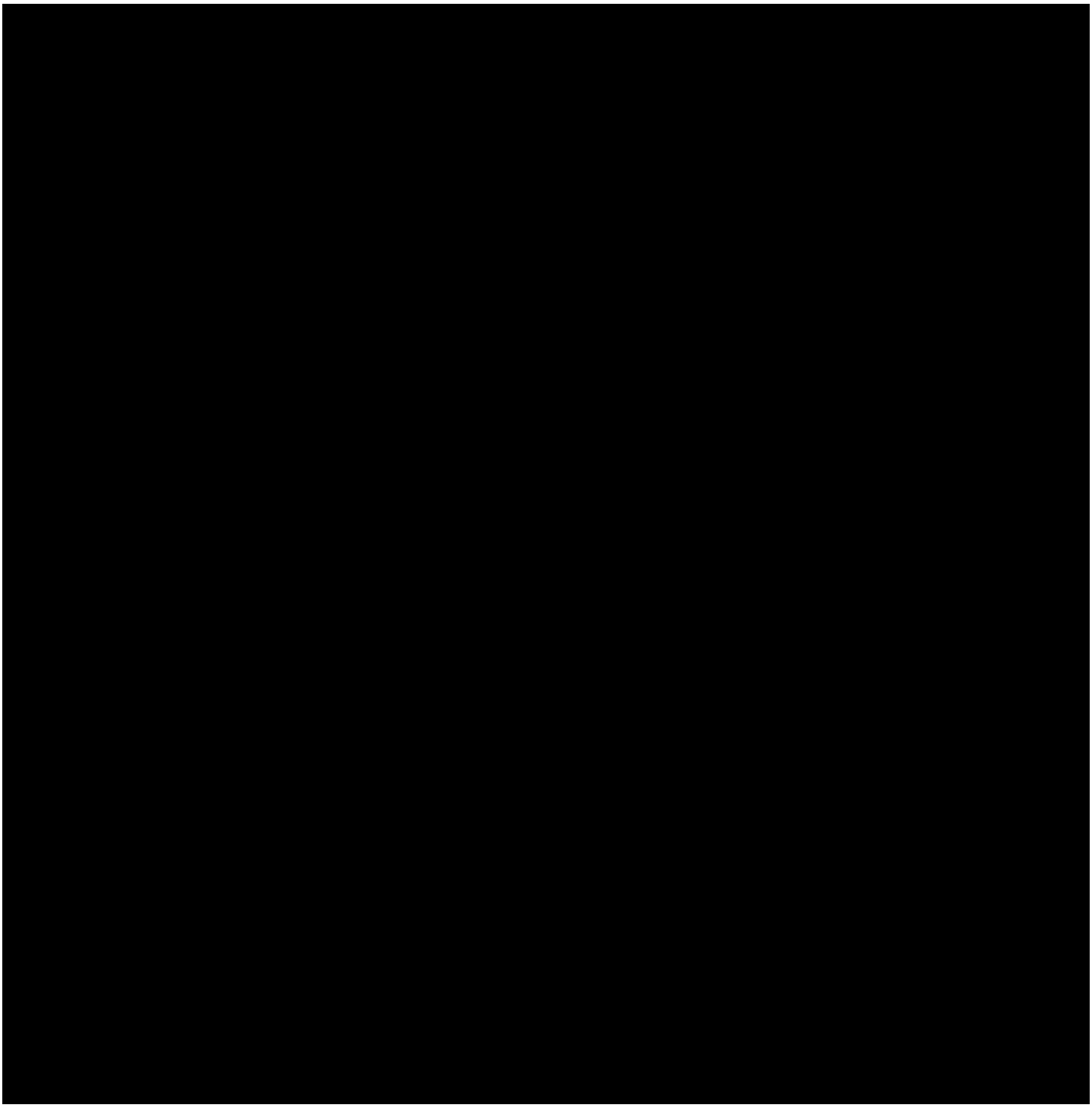
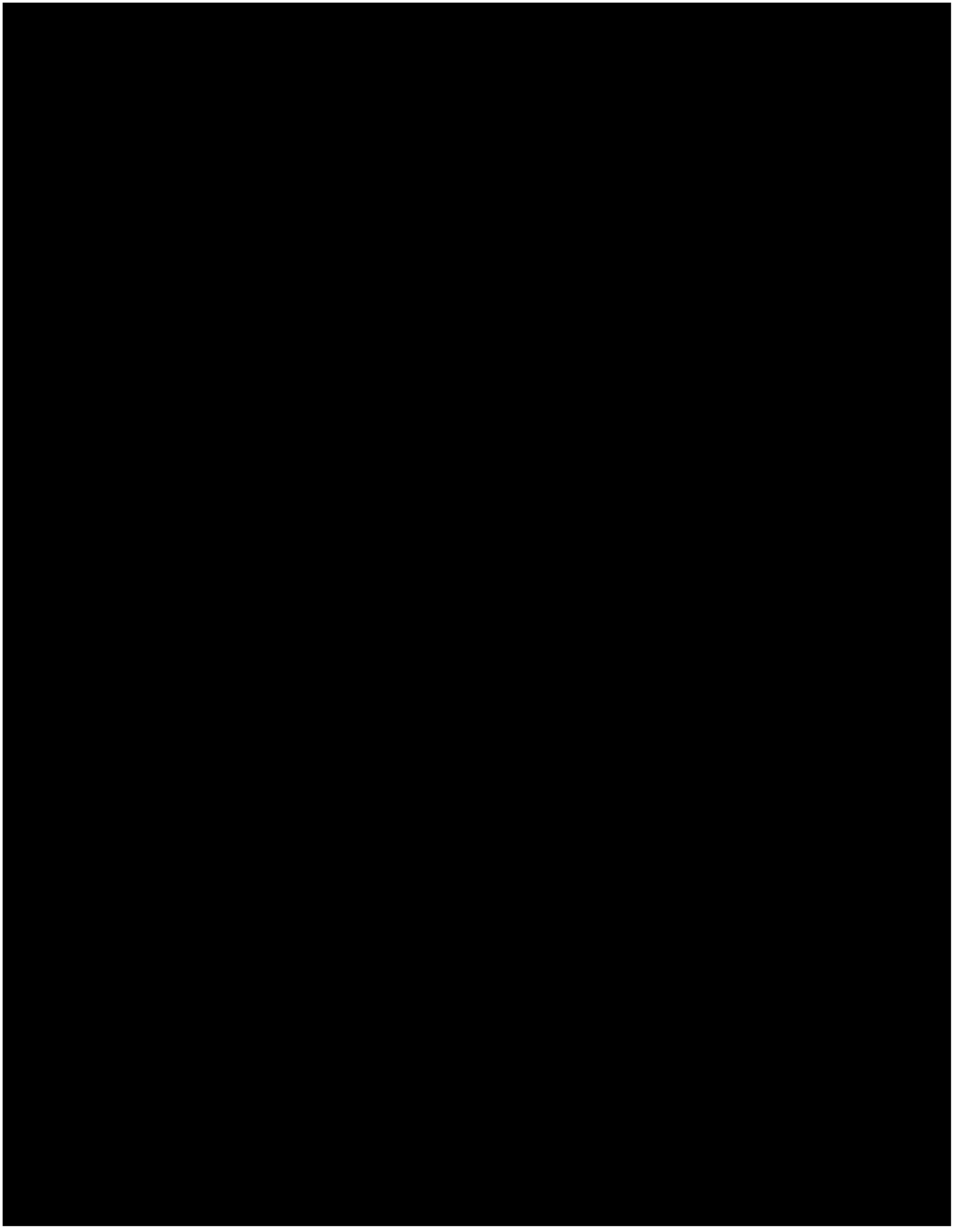
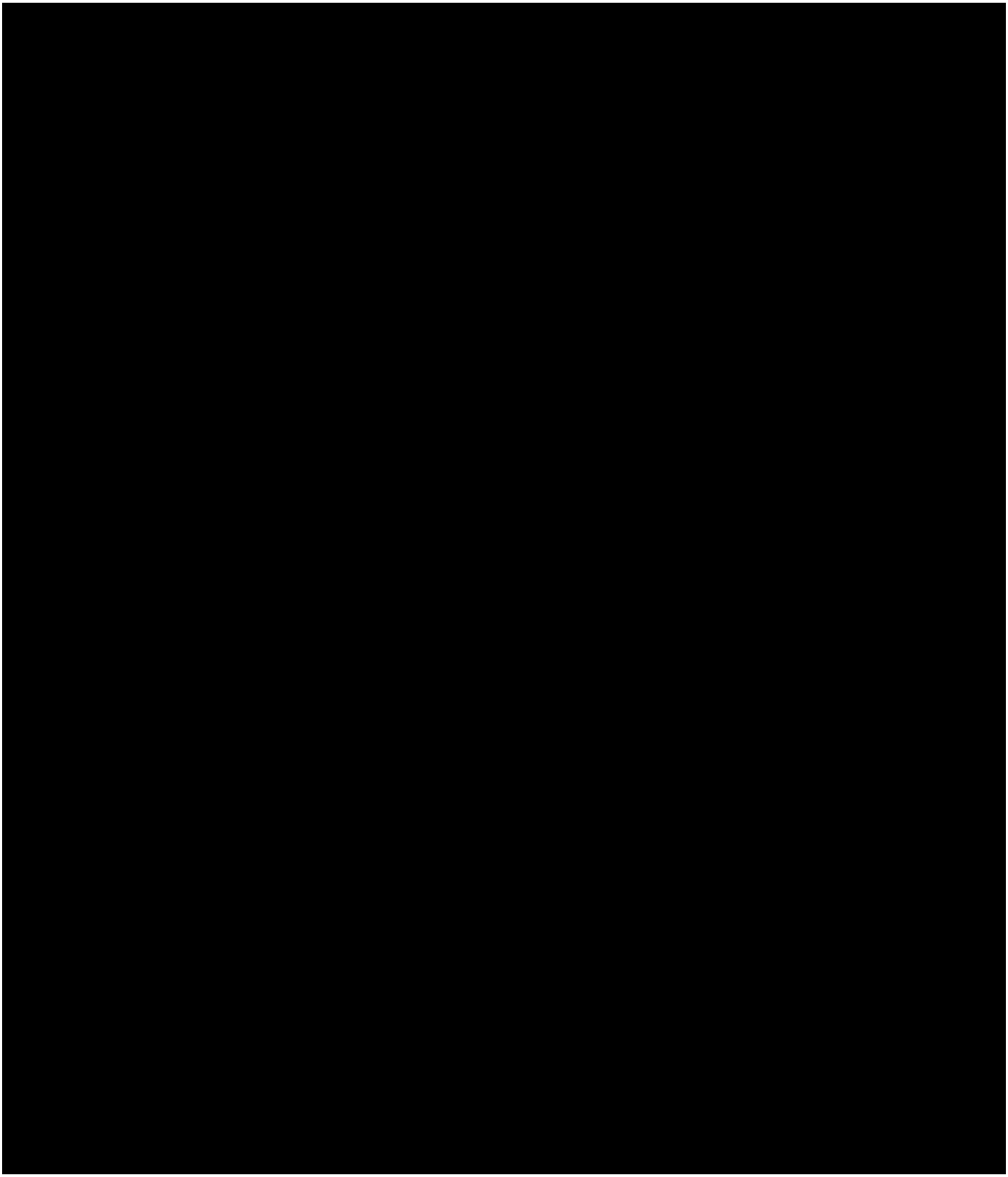






[redacted]





Substation Equipment

Station	Device Position / Nomenclature	Device Removals *include manufacturer*	Device Additions *include manufacturer*
[redacted]	[redacted]	[redacted]	[redacted]
		Remove existing Wave Trap	
		Remove existing Wave Trap	

A constructability review was performed on December 8, 2021. See Attachment C for the completed form.

Background

[redacted]

[redacted]

[redacted].

[4] ALTERNATIVES CONSIDERED

This project was presented to and approved by the Solution Design Committee (SDC) on July 8, 2020.

The costs in the Alternatives section below for the [redacted] Transformer Addition project reflect estimates presented at SDC. Since then, an updated estimate has been developed for the Preferred option which has experienced an increase in costs of approximately 85%. The other alternatives would have experienced a similar order of magnitude increase as did the Preferred solution.

Alternative #1 – Installation of [redacted] (This is the preferred Solution)

[redacted]

This alternative consists of the installation of [redacted]

[redacted]

[redacted]

[redacted]

All work for this alternative is expected to take place within the existing substation fence; physical space would be available within the yard fence for future expansion. A Notice of Exemption to the Connecticut Siting Council will be needed. There are no current Asset Management projects that would conflict with this project. To minimize outages, a majority of the construction will take place with transmission services in-service until connections to the transmission system are necessary.

This is the preferred option because it meets the Distribution System Planning Guide criteria. It also provides more protection than a single-tie circuit breaker since this solution will prevent a momentary outage seen by the customer in the event a stuck breaker occurs.

Planning grade (-25/+25%) cost estimate for the Transmission portion of this alternative is $5.65M.

Planning grade (-25/+25%) cost estimate for the Distribution portion of this alternative is $17.48M

Alternative #2– Installation of a [redacted] (This is not the preferred Solution)

[redacted]

[redacted]

[redacted]

[redacted]

Alternative #3 – [redacted] (This is not the preferred Solution)

[redacted]

All work for this alternative is expected to take place within the existing substation fence. Future expansion of the substation would require additional fence expansion as needed; there is no extra space accounted for as part of this project. A Notice of Exemption to the Connecticut Siting Council will be needed. There are no current Asset Management projects that would conflict with this project. To minimize outages, a majority of the construction will take place with transmission services in-service until connections to the transmission system are necessary.

This alternative is not the preferred solution because the transmission portion cost is over double the preferred alternative. This particular configuration will require the use of underground cable to complete the ring bus connection without the need to expand the fence line; using underground cable is not a standard method when constructing a ring bus.

Conceptual grade (-25/+50%) cost estimate at the time of the SDC presentation for the Transmission portion of this alternative was $8.2M.
Planning grade (-25/+25%) cost estimate at the time of the SDC presentation for the Distribution portion of this alternative was $9.7M.

Alternative #4 – [redacted] (This is not the preferred Solution)

[redacted]

Based on the existing control house drawings, there is sufficient space for new

[redacted]

This configuration will require a fence expansion to make room for a new line terminal structure and allow room for the three high-side circuit breakers; the existing bus will need to be demolished and new bus work installed. The expansion does not account for extra space for future expansion. The expansion will be to the west of the station and add an additional 7,120 square feet. A Petition for a Declaratory Ruling to the Connecticut Siting Council will be required due to the fence expansion. There are no current Asset Management projects that would conflict with this project. To minimize outages, a majority of the construction will take place with transmission services in-service until connections to the transmission system are necessary.

Compared to the preferred solution, this one provides better line protection due to the [redacted]

Conceptual grade (-25/+50%) cost estimate at the time of the SDC presentation for the Transmission portion of this alternative was
$6.4M.
Planning grade (-25/+25%) cost estimate at the time of the SDC presentation for the Distribution portion of this alternative was $9.7M.

[5] PROJECT SCHEDULE

Milestone	Scheduled Completion Date
1. Project Need by Date	12/31/2023
2. Date of IFR Approval	07/10/2019
3. Complete Conceptual design of Alternative(s)	06/01/2020
4. Initiator complete SSF form	07/01/2020
5. SDC Presentation Date(s)	07/08/2020
6. Conversion of Tx development costs, 183 to 107 (applicable to projects that require SSF approval but do not require ISO alternative selection)	N/A
7. Partial Funding approval in PowerPlan	February – March 2021
8. Preliminary Design Complete	01/03/2022
9. Preliminary Design Constructability review complete	12/08/2021
10. Full funding estimate complete	02/28/2022
11. Full funding estimate review	03/11/2022
12. Initiator complete PAF form	03/11/2022
13. EPAC Funding Dates (Full)	03/16/2022
14. Detail Design Complete	06/13/2022
15. Final Constructability Review Complete	TBD upon detail engineering completion
16. Targeted Milestone Dates:	
· Siting Approval (if applicable)	08/09/2021
· Env. Approvals (if applicable)	N/A
· Outage & Energization Plan Issued	TBD
· All Material on Site	10/04/2022
· Outage Permit(s) Approved	09/12/2022
17. IFC Design Complete	04/22/2022 (Civil) 07/19/2022 (Electrical)
18. Start of Civil Construction	04/25/2022
19. Project ISD	06/01/2023 (D); 12/31/2023 (T)
20. Relay Settings Issued (*Required for Full Funding requests)	08/14/2022
21: ISO Related Milestones (for applicable projects)	
· ISO Preferred Alternative Selected	N/A
· Conversion of Tx development costs, 183 to 107 (following ISO preferred alternative selection)	N/A
· PAC Presentation	N/A
· TCA Submittal	N/A
· PPA Approval	01/22/2021

See Attachments B1 and B2 for the P6 schedules.

[6] Regulatory Approvals

An Exempt Modification has been submitted to and approved by the Connecticut Siting Council. An amendment to the Exempt Modification will need to be filed due to the need of a retaining wall at the Substation.

A PPA has been submitted and approved from ISO-NE; approval date was 1/22/2021.

[7] Risk and Risk Mitigation Plans

Contingency:

A contingency amount of $698.2K has been included in the total project estimate to account for any unknowns. The table below shows the individual contingency contributions per work order number.

Project Number/Work Order #	Contingency Amount
404953/40495301	$170,300
CS00284/CS002841	$494,000
404953/80090791	$16,900
404953/80090988	$17,000
Total	**$698,200**

Risk Mitigation:

Risk	Mitigation
1. Severe Weather, Delays, OT	Construction delays caused by weather and storm duty are possible; try to be flexible with construction schedule. Risk is allocated in the project budget for delays.
2. Design Development	The design and review process will be done in detail as the project finals design is being completed. Risk is allocated to the project budget for any changes in detailed design.
3. Additional Communication Panel	Additional communication panels may be required at remote terminals; this risk is highly unexpected though. Risk has been allocated in the project budget is an additional panel is needed
4. Additional Pathways for Wiring	Conduit fill has been evaluated; however new wires may not fit as expected and new pathways will need to be developed. Risk is allocated in the project budget for additional pathways.
5. UG Obstructions	UG obstructions may be observed during Civil excavations and will be taken care of at that time. Have alternative paths for conduit. Risk is allocated in the project budget for unexpected UG obstructions
6. External Crews Needed for Installation	At this time, internal construction crews will be completing the installation. If this changes, risk is allocated in the project budget

Risk	Mitigation
7. Upgrade Grounding and Lightning	Grounding study has been completed and no adverse results have been found; however, the grounding grid may need updating once excavating occurs. Risk has been allocated for ground grid upgrades.
8. Post Study Upgrades	Pre-project studies show no signs of adverse effects post project. Risk is allocated in the project budget for post project upgrades.

Single Contingency Load Loss (SCLL) will exist during construction; however, it has been determined that a mobile transformer is not required during. Outages will be planned around the time of year when the station may be off-loaded to adjacent circuits.

[8] REFERENCES

References
1. Distribution System Planning Guide
2. [redacted] Expansion IFR, approved 7/25/2019
3. [redacted] Addition of 115-kV Circuit Breaker 62.5MVA Transformer and Switchgear -SSF, approved 07/08/2020
4. [redacted] – Partial Funding – PAF2, approved 12/22/2020

[9] ATTACHMENTS (One-Line Diagrams, Images, etc.)

Attachment	Included in Submittal?
A. Cost Estimate (A.1, A.2, A.3, A.4, A,5)	*YES*
B. P6 Schedule (B1, B2)	*YES*
C. Constructability Review	*YES*
D. Nomenclature Diagram 26801-91001-REV AM2 Additions	*YES*
E. Nomenclature Diagram 26801-91001-REV AN1 Additions	*YES*
F. Station Layout Removals 26801-3302-REV AM AN	*YES*
G. Station Layout Additions 26801-3302-REV AM AN	*YES*

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

Project Checklist - Transmission & Substation Capital Project			
Project Name: [redacted] **Transformer and SWGR**		**Project Number: 404953, CS00284**	
Facility Type: ☐BPS ☐BES ☐PTF ☒PTF non-regional ☐non-PTF ☐CIP ☒Distribution ☐General Plant			
PLANNING			
Is a NX-9 required?		Yes	
Is an ISO-NE PAC presentation required?		No	
ISO-NE Presentation Date (if completed):		Enter Date	
Cost in ISO-NE Presentation ($M) (if completed):		Enter Cost ($M)	
Is a PPA required?		Yes	
ISO-NE Approval Date (if completed):		01/22/2021	
Is a TCA Application Required?		No	
TCA Submittal Date (if submitted):		Enter Date	
Cost in TCA Submittal ($M) (if submitted):		Enter Cost ($M)	
Enter ISO-NE RSP / Asset Condition ID, if assigned:		Enter ISO-NE ID	
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?		Yes	
Are there any changes to the baseline audible noise?		TBD	
Is there an impact to the existing ground grid?		Yes	
Is a Transient Over Voltage (TOV) analysis required?		No	

Project Checklist - Transmission & Substation Capital Project	
Project Name: [redacted] Transformer and SWGR	**Project Number: 404953, CS00284**

P&C ENGINEERING	
OP-22 - Are PMUs and DDR required?	No
If BPS, is an NPCC Directory #4 presentation required?	No
Are ISO-NE OP-24 Appendix B updates necessary?	No
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
SITING	
Is a Siting filing required? *(If yes, list in regulatory approvals section)*	Yes
PERMITTING	
Is there any permitting required? *(If yes, list in regulatory approvals section)*	No
PROJECT SERVICES (OUTREACH) and ROW WORK COORDINATION	
What is the level of outreach expected?	Low
Is any part of this project in an Environmental Justice Community?	No
Has ROW Coordination reviewed this project?	No
Is this project coordinating with other existing scheduled work?	No
INITIATOR	
Has a field constructability review been completed?	Yes
INVESTMENT RECOVERY	
Does the project require development of an Investment Recovery plan?	No
COST ESTIMATING	
What team/firm prepared the cost estimate?	Estimate was prepared by the Eversource Estimating Team
Name of the person who prepared the estimate:	[redacted]
Was the estimate reviewed by Eversource Estimating?	Yes - Full Review

ESTIMATE SUMMARY

Project Title: [redacted]
Project Mgmt: [redacted]
Project Number: 404953
WO & Task #: 40495301
Estimate revision #: 01b
Estimate Type - Station work

Estimate #: C-21-844T
Date of Estimate:03/24/2022
Estimate done by: PAG
In Service date (ISD):06/01/2023

Template Revision # 01.66a

Alt Estimate Summary for PP4 Calc (escalation separate)

Estimate #: C-21-844T
Date of Estimate:03/24/2022

Project Number: 404953
WO & Task #: 40495301

ESTIMATE SUMMARY

Estimate Type: Planning

WBS	Description	TOTAL	% of Directs	% of Total	Priors	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
1	ROW / Easements / Land purchases														
2	Environmental Approvals / Permits	$4,400	0.1%	0.1%	$4,400										
3	Outreach	$100	0.0%	0.0%	$100										
4	Siting Approvals / Permits	$4,400	0.1%	0.1%	$4,400										
5	Engineering / Design	$370,600	10.7%	6.5%	$57,700	$310,600	$2,300								
6	Materials (Eversource purchased)	$881,700	25.4%	15.6%	$13,500	$1,600	$866,600								
7	Construction (incl matl's by contractors)	$1,303,600	37.6%	23.0%	$2,600	$207,000	$1,094,000								
8	Testing / Commissioning	$247,800	7.1%	4.4%	$300	$81,600	$165,900								
9	PMT Project Mgmt Team	$224,100	6.5%	4.0%	$89,700	$79,200	$55,200								
10	Removals	$36,600	1.1%	0.6%			$36,600								
11	Other	$9,300	0.3%	0.2%	$9,300										
12	Risks	$385,000	11.1%	6.8%		$195,000	$190,000								
125															
	Project Directs Total w/Risks	**$3,467,600**	100.0%	61.2%	**$182,000**	**$875,000**	**$2,410,600**								
13	Indirects/Overhead	$1,825,000		32.2%	$144,900	$583,500	$1,096,600								
14	AFUDC	$202,900		3.6%	$21,900	$75,500	$105,500								
125															
	Project Total - Baseline Budget	**$5,495,500**		97.0%	**$348,800**	**$1,534,000**	**$3,612,700**								
15	Contingency	$170,300		3.0%		$20,800	$149,500								
	Project Total - Funding Approval Level	**$5,665,800**		100.0%	**$348,800**	**$1,554,800**	**$3,762,200**								
16	Reimbursables/Customer Contribution														
	Project Total (less reimbursables)	**$5,665,800**			**$348,800**	**$1,554,800**	**$3,762,200**								
	Cost per key qty (if appl)	-	$'s / Eqiv. SF Substation expansion												
	Amount of Escalation included above	$82,600					$82,600								
6	Total materials - Eversource	$881,700			$13,500	$1,600	$866,600								
	Total materials - Contractor	$120,460			-$40		$120,500								
	Total materials	$1,002,160			$13,460	$1,600	$987,100								

NOTE: Risk / Contingency is 10.9% of Project Total Costs (incl escal/indirects/AFUDC but excl reimb.)

Estimate Range	**-25%**	**25%**
	$4,249,000	**$7,082,000**

	TOTAL w/ escal broken out
ROW / Easements / Land purchas	$ -
Environmental Approvals / Permi	$ 4,400
Outreach	$ 100
Siting Approvals / Permits	$ 4,400
Engineering / Design	$ 370,500
Materials (Eversource purchased	$ 868,700
Construction (incl matl's by cont	$ 1,273,400
Testing / Commissioning	$ 243,000
PMT Project Mgmt Team	$ 222,500
Removals	$ 35,600
Other	$ 9,300
Risks	$ 385,000
	$3,416,900
Indirects/Overhead	$ 1,793,100
AFUDC	$ 202,900
	$ -
	$5,412,900
	$ -
Continaencv	$ 170,300
	$5,583,200
	$ -
	$ -
	$5,583,200
	$ 82,600
Escal total	**$5,665,800**
Check total	

COMMENTS

Project Scope:

Key qty's and UOM (tie to inputs on est sheets) - Eqiv. SF Substation expansion

115kV Transformer, breaker, and switchgear installation, [redacted] 11S expansion, Woodbury Ct.
Install [redacted] 3P-6 Circuit breakers.
Install [redacted] 115kV Wave Traps
Replace [redacted] 3 phase manually operated disconnects
Installation of bus to accept new equipment.
Install cable jumpers between bussing and new equipment.
Relocate [redacted] CCVT tap/connection points.
Install conduit and trenwa from circuit breakers to control house.
repair/connect grounding to existing ground grid
Install [redacted] SEL-351 relays for breaker failure.
Install [redacted] SEL line relays for system 1 and system 2 protection.
Install [redacted] electro-mechanical breaker failure lock-out relays

Cont. Cover page 2.

Assumptions/Clarifications:

Indirect rates based on: 1T - CT - Station work

ISD of 6/1/2023 from schedule provided.
PP4 Dates from project schedule, dated 2/4/2022.
All work to take place within the existing footprint of the substation, no expansion of fenceline is expected.
50% rock excavation based on SOW and existing grading issues and surface rock in area of excavation.
All construction to be internal, non internal support.
Engineering to be external with internal review.
P&C panels and pathway installation is in estimate C-21-844D Distribution.
Not IEC61850 standard installation.
Prior costs as of 3/24/2022.

RISKS

Potential UG Obstructions	$ 40,000
Severe Weather Delays OT	$ 100,000
Design development	$ 30,000
Additional pathways for P&C wiring	$ 15,000
External crews for installation	$ 200,000

UNESCALATED LINE ITEM DOLLARS

Project Number 404953
Date of Estimate 03/24/2022
Estimate revision # 01b

Escalation Rate		E Rate $	53	Prior		23		2023 1		2024 2		2025 3		TOTAL	
				Mhrs	DOLLARS		DOLLARS		DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS
CSTXX-CONSTRUCTION	R														
Electrical Construction	LT						$40,918		$231,860					3,870	$272,798
General Construction	LT				$2,573										$2,573
SCADA / Automation	LT														
Telecom - Field	LT														
Construction Rags (Internal)	LT						$25,440		$25,440					960	$50,880
Support Switch/Tag	LT						$21,084		$21,084					756	$42,168
Other (specify)	LT														
Other (specify)	LT														
Other (specify)	LT														
LT Total					$2,573		$87,452		$278,402					5,726	$368,427
Employee Expenses	AE	5%					$4,373		$13,920						$18,293
Construction Purchased Material	AM	1%					$1,591		$8,847						$10,438
Outside Construction Vendor	AO						$115,300		$652,797					4,171	$767,947
Sales tax on Constr. Vendor															
Vehicles (now in Indirects section)	AV														
Inspection services (Outside Vendor)	AO														
Construction Reg (Outside vendor)	AO														
Rents and Leases	BR														
CSTXX Subtotal					$2,573		$206,596		$953,990						$1,165,125
Escalation					$9,334										$9,334
CSTXX Total					$11,907		$206,596		$953,990					9,997	$1,174,459
ENRXX-TG ENGINEERING/DESIGN															
Project Services/Drafting	LT						$6,480		$2,120					200	$10,600
T- Line Engineering/Design	LT														
D- Street Engineering/Design	LT														
Civil Engineering/Design	LT						$6,360							120	$6,360
Substation (T) Engineering/Design	LT				$50,744		$12,720							240	$63,464
Substation (D) Engineering/Design	LT														
Protection & Controls Engineering	LT						$4,240							80	$4,240
Survey Engineering	LT														
SCADA/ Automation Engineering	LT						$16,960							320	$16,960
Telecom Engineering	LT						$4,240							80	$4,240
Other - specify	LT														
Other - specify	LT														
LT Total					$50,744		$53,000		$2,120					1040	$105,864
Employee Expenses	AE	5%					$2,650		$106						$2,756
Contractor Engineering - T-Lines	AO														
Contractor Engineering - D-Street	AO														
Contractor Engineering - T -Station	AO				$6,913		$97,280							840	$104,193
Contractor Engineering - D-Station	AO														
Contractor Engineering - P&C	AO						$134,640							880	$134,640
Contractor Engineering - Survey	AO						$23,054							160	$23,054
Contractor Engineering - SCADA / Automation	AO														
Contractor Engineering - Telecom	AO														
Contractor Engineering - Other	AO														
Contractor Engineering - Taxes	AO														
Contractor Engineering - Specify	AO														
Vehicles (now in Indirects section)	AV														
ENRXX Subtotal					$57,657		$310,624		$2,226						$370,507
Escalation															
ENRXX Total					$57,657		$310,624		$2,226					2720	$370,507
LNDXX-TG LAND															
Real Estate	LT														
Employee Expenses	AE	5%													
Purchase Land	AM														
Vehicles (now in Indirects section)	AV														
Fees and Payments	BF														
LNDXX Subtotal															
Escalation															
LNDXX Total															
MATXX-TG MATERIAL															
Eversource	AM				$13,460				$909,891						$922,121
Outside Services	AM								$118,700						$118,700
	AM														
Freight															
Sales Tax Eversource/outside services	3.9%	3.9%							$36,200						$36,200
Other															
MATXX Subtotal					$13,460				$963,591						$977,021
Escalation															
MATXX Total					$13,460				$963,591						$977,021
PSMXX-PROJECT MANAGER & SUPPORT															
Project Management (PM)	LT				$32,466		$33,920		$33,920					1,280	$100,306
Project Planning/Cost (IP)	LT														
Contracts/Purchasing (C/P)	LT						$2,120							40	$2,120
System Planning	LT						$2,544							48	$2,544
Environmental	LT				$1,276										$1,276
SCS - None	LT				$51										$51
Legal	LT														
Estimating	LT						$2,544							48	$2,544
Siting - None	LT				$4,429										$4,429
Asset Management	LT														
Other -	LT														
Other -	LT														
Other -	LT														
Other -	LT														
LT Total					$38,222		$41,128		$33,920					1418	$113,270
Employee Expenses	AE	5%					$2,056		$1,696						$3,752
Project Support Vendor - PM	AO				$57,236		$36,000		$18,000					360	$111,236
Project Support Vendor - IP	AO														
Project Support Vendor - C/P	AO														
Project Support Vendor - System Planning	AO														
Project Support Vendor - Environmental	AO				$3,100										$3,100
Project Support Vendor - SCS - None	AO														
Project Support Vendor - Legal	AO														
Project Support Vendor - Estimating	AO														
Project Support Vendor - Siting - None	AO														
Project Support Vendor - Asset Management	AO														
Project Support Vendor - Other	AO														
Project Support Vendor - Other	AO														
Project Support Vendor - Other	AO														
Project Support Vendor - Other	AO														
Vehicles (now in Indirects section)	AV														
Property or CWIP tax large proj allowance	BR														
Builder All risk insurance excluding deductables(if project is over $50m)	BR														
Fees and Payments - Environmental	BF														
Fees and Payments - Siting	BF														
Fees and Payments - Other	BF														
PSMXX Subtotal					$96,559		$79,184		$53,616						$231,358
Escalation															
PSMXX Total					$96,559		$79,184		$53,616					1,778	$231,358
REMXX-TG REMOVAL															
Engineering/Design	LT														
Internal Construction	LT								$30,940					472	$30,940
LT Total									$30,940						$30,940
Employee Expenses	AE	18%							$4,641						$4,641
Outside Services	AO														
Contractor Labor	AO														
Vehicles (now in Indirects section)	AV														
Rents and Leases	BR														
REMXX Subtotal									$35,581						$35,581
Escalation															
REMXX Total									$35,581					472	$35,581
TSTXX-TG TEST															
Test / Field Engr. Labor (In House)	LT				$332		$49,440		$97,026					2,370	$146,798
Lead Commissioning Engr. (LCE) (Internal)	LT						$24,720		$49,440					1,300	$74,160
Employee Expenses	AE	18%					$7,416		$14,647						$22,066
Test / Field Engr. Labor (contractor)	AO														
Lead Commissioning Engr. (LCE) (contractor)	AO														
Vehicles (now in Indirects section)	AV														
TSTXX Subtotal					$332		$81,576		$161,113						$243,054
Escalation															
TSTXX Total					$332		$81,576		$161,113					3,570	$243,054
SUBTOTAL PROJECT DIRECT COST				-	$101,914		$679,970		$2,170,040					19,436	$3,091,860
Risk															
Risk							$195,000		$190,000						$385,000
						$	-	$	-	$	-	$	-		
						$	-	$	-	$	-	$	-		
Risk Total							$195,000		$190,000						$385,000
TOTAL PROJECT DIRECT COST (w/risk)				-	$101,914	6996	$874,970	11440	$2,360,040					19,436	$3,476,860
INDIRECTS															
Non-Productive Time Allocation (ZNP)	15.1%				$14,573		$38,489		$74,023						$127,085
Payroll Benefits Allocation (ZPB) Incl NPT	44.0%				$259		$91,811		$230,759						$312,799
Gen SVC CO Overhead (ZGB) Incl NPT	80.0%				$73,393		$86,635		$33,171						$193,199
E&S Allocations (ZEB,ZEL,ZES)	40.0%				$54,096		$347,540		$900,231						$1,301,869
AG&E Allocations (ZAG)	0.8%				$1,532		$8,078		$24,966						$34,574
Stores Expense Allocation (ZST)	8.0%								$64,893						$64,893
Lobby Stock															
MDDC (ZMI)															
Vehicles (ZVE)	7.5%				$765		$19,180		$36,889						$56,854
Indirects Subtotal					$144,620		$693,731		$1,064,812						$2,763,063
TOTAL PROJECT COST - Direct & Indirect (excl AFUDC)					$324,534		$1,488,591		$3,434,676						$5,210,543
AFUDC															
AFUDC (ZIX)					$21,937	7.00%	$75,462	7.00%	$105,463	7.00%		7.00%		1	$202,862
In Service Dollars															
Cumulative ISD							-		-		-		-		
AFUDC Subtotal					$21,937		$75,462		$105,463						$202,862
TOTAL PROJECT COST - Baseline Budget					$346,771		$1,564,053		$3,540,139						$5,413,405
Contingency															
Contingency							$20,811		$149,513						$170,325
Other					$ -		$ -		$ -		$ -		$ -		
Contingency SubTotal							$20,811		$149,513						$170,325
TOTAL PROJECT COST - Approved Funding					$346,771		$1,584,774		$3,676,691						$5,583,730
Reimbursables / Customer Contribution															
Reimbursables / Customer Contribution (enter as negative)					$ -		$ -		$ -		$ -		$ -		

ESTIMATE SUMMARY

Project Title [redacted]
Project Manager [redacted]
Project Number: CS00284
WO & Task #: CS002841
Estimate revision #: 01c
Estimate Type - Station work

Estimate #: C-21-844D
Date of Estimate:03/24/2022
Estimate done by: PAG
In Service date (ISD):06/01/2023

Template Revision # 01.60a

ESTIMATE SUMMARY

Estimate Type: Planning

WBS	Description	TOTAL	% of Directs	% of Total	Priors	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
1	ROW / Easements / Land purchases														
2	Environmental Approvals / Permits	$200	0 0%	0.0%	$200										
3	Outreach														
4	Siting Approvals / Permits	$100	0 0%	0.0%	$100										
5	Engineering / Design	$373,000	3 8%	2.1%	$50,700	$316,800	$5,500								
6	Materials (Eversource purchased)	$4 003 200	40 6%	22.8%	$19 700	$3 970 400	$13 100								
7	Construction (incl matl's by contractors)	$3,774,000	38 3%	21.5%	$106,200	$2,275,800	$1,392,000								
8	Testing / Commissioning	$249,500	2 5%	1.4%	$45,600	$203,900									
9	PMT Project Mgmt Team	$207.200	2.1%	1.2%	$91.600	$62.700	$52.900								
10	Removals	$89 900	0 9%	0.5%		$89 900									
11	Other	$9,300	0.1%	0.1%	$9,300										
12	Risks	$1,145,000	11 6%	6.5%		$890,000	$255,000								
125															
	Project Directs Total w/Risks	**$9,851,400**	100 0%	56.1%	**$323,400**	**$7,809,500**	**$1,718,500**								
13	Indirects/Overhead	$6,308,100		35.9%	$471,100	$3,955,700	$1,881,300								
14	AFUDC	$917,400		5.2%	$66,600	$438,400	$412,400								
125															
	Project Total - Baseline Budget	**$17,076,900**		97.2%	**$861,100**	**$12,203,600**	**$4,012,200**								
15	Contingency	$494,000		2.8%		$412,000	$82,000								
	Project Total - Funding Approval Level	**$17,570,900**		100.0%	**$861,100**	**$12,615,600**	**$4,094,200**								
16	Reimbursables/Customer Contribution														
	Project Total (less reimbursables)	**$17,570,900**			**$861,100**	**$12,615,600**	**$4,094,200**								
	Cost per key qty (If appl)	1,597	$'s / Eqiv. SF Substation expansion												
	Amount of Escalation included above	$97 400					$97 400								
6	Total materials - Eversource	$4 003 200			$19 700	$3 970 400	$13 100								
	Total materials - Contractor	$298,541			$41	$298,500									
	Total materials	$4 301 741			$19 741	$4 268 900	$13 100								

NOTE: Risk / Contingency is 10.3% of Project Total Costs (incl escal/indirects/AFUDC but excl reimb.)

Estimate Range	**-25%**	**25%**
	$13,178,000	**$21,964,000**

Alt Estimate Summary for PP4 Calc (escalation separate)

Estimate #: C-21-844D
Date of Estimate:03/24/2022

Project Number: CS00284
WO & Task #: CS002841

		TOTAL w/ escal broken out
ROW / Easements / Land purchas	$	-
Environmental Approvals / Permi	$	200
Outreach	$	-
Siting Approvals / Permits	$	100
Engineering / Design	$	372,800
Materials (Eversource purchased	$	4,002,900
Construction (incl matl's by cont	$	3,733,600
Testing / Commissioning	$	249,600
PMT Project Mgmt Team	$	205.700
Removals	$	89 900
Other	$	9,300
Risks	$	1,145,000
		$9,809,100
Indirects/Overhead	$	6,253,300
AFUDC	$	917,400
	$	-
		$16,979,800
	$	-
Contingency	$	494,000
		$17,473,800
	$	-
	$	-
		$17,473,800
	$	97,400
Escal total		**$17,571,200**
Check total		$300

COMMENTS:

Project Scope:

Key qty's and UOM (tie to inputs on est sheets) 11,000 Eqiv. SF Substation expansion

115kV Transformer, breaker, and switchgear installation [redacted] expansion, Woodbury Ct.
Replac[redacted] 3 phase motorized disconnects
Replac[redacted] Mobile transformer connection point
Remov[redacted]ociated bussing on 3X and install new associated bus for both 2X and 3X.
Instal[redacted] 3 phase circuit switchers
Instal[redacted] 115kV ~23kV 62.5 MVA Transformer.
Instal[redacted] SSVT, one on 2X and one 3X
Instal[redacted] 3 phase disconnect for distribution tie
Instal[redacted] set of slip over CT's on 3X.
Installation of (1) Primary and (1) backup relay for slip on CT's on 3X
Instal[redacted] PT on 2X
Install distribution 23kV Switchgear enclosure 42' X 27'
Install (150 ft) Conduit and (165 ft)trenwa to control house
Instal[redacted] lightning protection masts.

Assumptions/Clarifications:

Indirect rates based on: 11 - CT - Station work

Relays for P&C are located in Transmission Estimate C-21-844T
Remote end relay work are in separate Estimates.
ISD of 6/1/2023 from schedule provided.
All work to take place within the existing footprint of the substation, no expansion of fenceline is expected.
50% rock excavation based on SOW and existing grading issues and surface rock in area of excavation
Electrical construction to be internal.
Engineering to be external, with internal review.
Existing cabinets, pathways and wireways is for new relays is adequate.
Not IEC61850 standard installation.
Prior costs as of 3/24/2022 included in estimate.

RISKS

Potential UG Obstructions	$	250 000
Severe Weather, Delays, OT	$	200 000
Design development	$	50 000
External construction work crews	$	525 000
Upgrade grounding and lightning	$	50 000
Post study upgrades	$	70 000

UNESCALATED LINE ITEM DOLLARS

Project Number CS00284
Date of Estimate 03/24/2022
Estimate revision # 01c

	Escalation Rate	E Rate	$	02	Prior		2022		2023	1	2024	2	2025	3	2026	4	2027	5	2028	6	2029	7	2030	8	2031	9	TOTAL	
					Mhrs	DOLLARS		DOLLARS		DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS
CSTXX-CONSTRUCTION	R																											
Electrical Construction	LT							$811,378		$540,919																	3,412	$1,352,297
General Construction	LT					$102,888																						$102,888
SCADA / Automation	LT									$19,080																	360	$19,080
Telecom - Field	LT									$6,360																	120	$6,360
Construction Reps (internal)	LT							$21,200		$19,080																	760	$40,280
Support Switch/Tag	LT							$1,272		$2,120																	64	$3,392
Misc	LT					$3,542																						$3,542
Other (specify)	LT																											
Other (specify)	LT																											
LT Total						$106,210		$833,850		$567,559																	4,716	$1,527,619
Employee Expenses	AE	6%						$41,693		$29,378																		$71,071
Construction Purchased Material	AM	1%						$19,132		$12,795																		$31,867
Outside Construction Vendor	AO							$1,101,681		$734,567																	11,127	$1,836,418
Sales tax on Constr. Vendor																												
Vehicles (now in Indirects section)	AV																											
Inspection services (Outside Vendor)	AO																											
Construction fee (Outside vendor)	AO																											
Rents and Leases	BR																											
CSTXX Subtotal						$106,210		$1,996,826		$1,364,299																		$3,466,966
Escalation						$9,324																						$9,324
CSTXX Total						$115,544		$1,996,826		$1,364,299																	15,843	$3,476,329
ENRXX-TG ENGINEERING/DESIGN																												
Project Services/Drafting	LT							$3,180		$3,180																	120	$6,360
T- Line Engineering/Design	LT																											
D- Street Engineering/Design	LT																											
Civil Engineering/Design	LT							$6,360																			120	$6,360
Substation (T) Engineering/Design	LT																											
Substation (D) Engineering/Design	LT					$34,828		$9,540		$1,908																	216	$46,056
Protection & Controls Engineering	LT							$6,360																			120	$6,360
Survey Engineering	LT																											
SCADA / Automation Engineering	LT							$3,180																			60	$3,180
Telecom Engineering	LT							$1,908																			36	$1,908
Other - specify	LT																											
Other - specify	LT																											
LT Total						$34,828		$30,528		$6,088																	672	$79,224
Employee Expenses	AE	6%						$1,828		$954																		$1,782
Contractor Engineering - T-Lines	AO																											
Contractor Engineering - D-Street	AO																											
Contractor Engineering - T-Station	AO																											
Contractor Engineering - D-Station	AO					$18,115		$91,200																			600	$107,315
Contractor Engineering - P&C	AO							$76,500																			500	$76,500
Contractor Engineering - Survey	AO																											
Contractor Engineering - SCADA / Automation	AO							$64,000																			360	$64,000
Contractor Engineering - Telecom	AO							$27,000																			180	$27,000
Contractor Engineering - Civil	AO							$36,000																			240	$36,000
Contractor Engineering - Specify	AO																											
Contractor Engineering - Specify	AO																											
Vehicles (now in Indirects section)	AV																											
ENRXX Subtotal						$53,723		$316,764		$8,342																		$372,819
Escalation																												
ENRXX Total						$53,723		$316,764		$8,342																	3992	$372,819
LNDXX-TG LAND																												
Real Estate	LT																											
Employee Expenses	AE	6%																										
Purchase Land	AM																											
Vehicles (now in Indirects section)	AV																											
Fees and Payments	BF																											
LNDXX Subtotal																												
Escalation																												
LNDXX Total																												
MATXX-TG MATERIAL																												
Eversource	AM					$19,741		$3,791,799																				$3,811,540
Outside Services	AM							$396,449																				$396,449
	AM																											
Freight																												
Sales Tax Eversource/outside services	5.9%	5.9%						$159,500																				$159,500
Other																												
MATXX Subtotal						$19,741		$4,249,748																				$4,269,489
Escalation																												
MATXX Total						$19,741		$4,249,748																				$4,269,489
PMXX-PROJECT MANAGER & SUPPORT																												
Project Management (PM)	LT					$13,806		$25,440		$25,440																	960	$64,546
Project Planning/Cost (PI)	LT									$2,120																	40	$2,120
Contracts/Purchasing (CP)	LT									$2,120																	40	$2,120
System Planning	LT																											
Environmental	LT					$181																						$181
SCS - None	LT					$26																						$26
Legal	LT																											
Estimating	LT									$2,120																	40	$2,120
Siting - None	LT					$141																						$141
Asset Management	LT																											
Other -	LT																											
Other -	LT																											
Other -	LT																											
Other -	LT																											
LT Total						$14,213		$25,440		$31,800																	1080	$71,253
Employee Expenses	AE	6%						$1,272		$1,590																		$2,862
Project Support Vendor - PM	AO					$77,912		$36,000		$16,000																	360	$131,912
Project Support Vendor - IP	AO																											
Project Support Vendor - CP	AO																											
Project Support Vendor - System Planning	AO																											
Project Support Vendor - Environmental	AO																											
Project Support Vendor - SCS – None	AO																											
Project Support Vendor - Legal	AO																											
Project Support Vendor - Estimating	AO																											
Project Support Vendor - Siting – None	AO																											
Project Support Vendor - Asset Management	AO																											
Project Support Vendor - Other	AO																											
Project Support Vendor - Other	AO																											
Project Support Vendor - Other	AO																											
Vehicles (now in Indirects section)	AV																											
Property or OMP tax lease and allowance	BR																											
Subtot' All risk insurance excluding deductibles(if project is over $50m)	BR																											
Fees and Payments - Environmental	BF																											
Fees and Payments - Siting	BF																											
Fees and Payments - Other	BF																											
PMXX Subtotal						$91,925		$62,712		$51,390																		$206,027
Escalation																												
PMXX Total						$91,925		$62,712		$51,390																	1,440	$206,027
REMXX-TG REMOVAL																												
Engineering/Design	LT																											
Internal Construction	LT							$65,928																			984	$65,928
LT Total								$65,928																				$65,928
Employee Expenses	AE	10%						$9,859																				$9,859
Outside Services	AO																											
Contractor Labor	AO							$14,132																			104	$14,132
Vehicles (now in Indirects section)	AV																											
Rents and Leases	BR																											
REMXX Subtotal								$89,919																			$104	$89,919
Escalation																												
REMXX Total								$89,919																			1,088	$89,919
TSTXX-TG TEST																												
Test / Field Engr. Labor (In House)	LT					$45,818		$123,900																			2,000	$169,218
Lead Commissioning Engr. (LCE) (Internal)	LT							$61,800																			1,000	$61,800
Employee Expense	AE	10%						$18,540																				$23,102
Test / Field Engr. Labor (contractor)	AO																											
Lead Commissioning Engr. (LCE) (contractor)	AO																											
Vehicles (now in Indirects section)	AV																											
TSTXX Subtotal						$45,818		$203,240																				$254,120
Escalation																												
TSTXX Total						$45,818		$203,240																			3,000	$254,120
SUBTOTAL PROJECT DIRECT COST			-			$523,581		$8,818,889	7812	$1,430,991																	25,823	$9,949,705
Risk																												
Risk	LT							$840,000		$288,000																		$1,145,000
								$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -		
								$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -		
Risk Total								$840,000		$288,000																		$1,145,000
TOTAL PROJECT DIRECT COST (w risk)			-			$523,581		$9,658,889		$1,678,991																	25,823	$11,813,705
INDIRECTS																												
Non-Productive Time Allocation (2MP)	35.1%					$25,665		$121,743		$63,979																		$290,467
Payroll Benefits Allocation (2PB) Incl NPT	44.0%					$73,209		$249,339		$287,434																		$609,102
Gen SVC OD Overhead (2G6) Incl NPT	80.0%					$35,736		$61,813		$23,462																		$121,253
E&S Allocations (2EB,2EL,2ES)	60.0%					$279,918		$2,010,237		$1,081,427																		$3,371,582
AS&E Allocations (2AS)	1.8%					$10,961		$121,280		$36,587																		$168,868
Stores Expense Allocation (2ST)	8.0%					$3,930		$303,344																				$307,274
Lobby Stock																												
MDEC (2M)	6.0%					$18,023		$439,594		$156,253																		$854,975
Vehicles (2V6)	28.0%					$22,595		$319,521		$174,845																		$516,961
Indirects Subtotal						$471,149		$3,955,676		$1,826,467																		$6,953,212
TOTAL PROJECT COST - Direct & Indirect (excl AFUDC)						$794,730		$11,796,376		$3,502,478																		$16,097,316
AFUDC																												
AFUDC (2X)						$66,588	6.50%	$438,355	6.50%	$412,430	6.50%		6.50%		6.50%		6.50%		6.50%		6.50%		6.50%		6.50%		1	$917,373
In Service Dollars																												
Cumulative ISD						-		-		-		-		-		-		-		-		-		-		-		
AFUDC Subtotal						$66,588		$438,355		$412,430																		$917,373
TOTAL PROJECT COST - Baseline Budget						$861,280		$12,300,650		$3,914,908																		$18,964,589
Contingency																												
Contingency								$412,022		$61,975																		$493,997
Other						$ -		$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -		
Contingency SubTotal								$412,022		$61,975																		$493,997
TOTAL PROJECT COST - Approved Funding						$861,280		$12,918,682		$3,976,883																		$17,470,586
Reimbursables / Customer Contribution																												
Reimbursables / Customer Contribution (enter as negative)						$ -		$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -		

ESTIMATE SUMMARY

Project Title: Substation [redacted]
Project Mgr/Lead [redacted]
Project Number: 404953
WO & Task #: 80090988
Estimate revision #: 00
Estimate Type - Station work

Estimate #: C-21-844
Date of Estimate 02/17/2022
Estimate done by: PAG
In Service date (ISD):06/01/2023

Template Revision # 01.65d

Alt Estimate Summary for PP4 Calc (escalation separate)

Estimate #: C-21-844
Date of Estimate:02/17/2022

Project Number: 404953
WO & Task #: 40495301

ESTIMATE SUMMARY

Estimate Type: Planning

WBS	Description	TOTAL	% of Directs	% of Total	Priors	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
1	ROW / Easements / Land purchases														
2	Environmental Approvals / Permits														
3	Outreach	$6,600	2.0%	1.1%			$6,600								
4	Siting Approvals / Permits	$2,200	0.7%	0.4%			$2,200								
5	Engineering / Design	$99,600	30.7%	17.3%			$99,600								
6	Materials (Eversource purchased)	$12 900	4.0%	2.2%			$12 900								
7	Construction (incl matl's by contractors)	$33,200	10 2%	5.8%			$33,200								
8	Testing / Commissioning	$87 800	27 0%	15.2%			$87 800								
9	PMT Project Mgmt Team	$24,200	7.4%	4.2%		$1,800	$22,400								
10	Removals	$23,400	7.2%	4.1%			$23,400								
11	Other														
12	Risks	$35.000	10 8%	6.1%			$35.000								
125															
	Project Directs Total w/Risks	**$324,900**	100 0%	56.4%		**$1,800**	**$323,100**								
13	Indirects/Overhead	$226,200		39.3%		$3,400	$222,800								
14	AFUDC	$8 100		1.4%		$200	$7 900								
125															
	Project Total - Baseline Budget	**$559,200**		97.0%		**$5,400**	**$553,800**								
15	Contingency	$17 000		3.0%		$200	$16 800								
	Project Total - Funding Approval Level	**$576,200**		100.0%		**$5,600**	**$570,600**								
16	Reimbursables/Customer Contribution														
	Project Total (less reimbursables)	**$576,200**				**$5,600**	**$570,600**								
	Cost per key qty (if appl)	- $'s / Ckt. Ft													
	Amount of Escalation included above	$14 700					$14 700								
6	Total materials - Eversource	$12 900					$12 900								
	Total materials - Contractor														
	Total materials	$12.900					$12.900								

NOTE: Risk / Contingency is 9 9% of Project Total Costs (incl escal/indrects/AFUDC but excl reimb.)

Estimate Range	**-25%**	**25%**
	$432,000	**$720,000**

	TOTAL w/ escal broken out
ROW / Easements / Land purchas	$ -
Environmental Approvals / Permi	$ -
Outreach	$ 6,400
Siting Approvals / Permits	$ 2,100
Engineering / Design	$ 96,700
Materials (Eversource purchased	$ 12,700
Construction (incl matl's by cont	$ 32,200
Testing / Commissioning	$ 85 200
PMT Project Mgmt Team	$ 23,600
Removals	$ 22,700
Other	$ -
Risks	$ 35.000
	$316,600
Indirects/Overhead	$ 219,700
AFUDC	$ 8 100
	$ -
	$544,400
	$ -
Contingency	$ 17 000
	$561,400
	$ -
	$ -
	$ -
	$561,400
	$ 14,700
Escal total	**$576.100**
Check total	-$100

COMMENTS

Project Scope:
Key qty's and UOM (tie to inputs on est sheets)

- Ckt. Ft

[redacted] **expansion remote end line relay work and settings changes [redacted], New Milford, CT.**

Remove [redacted] SEL-321 line relay
Remove [redacted] TC-10B PLC device
Remove [redacted] TCF-10B PLC devices
Remove [redacted] Wave Trap
Remove [redacted] line tuning unit
Install [redacted] SEL-311C line relay and [redacted] auxillary back up
Install associated test switches.
Testing and commisioning.
update as-built drawings and schematics.

Assumptions/Clarifications:
Indirect rates based on: 1T - CT Station work

ISD of 6/1/2023 from schedule provided.
All work to take place within the existing footprint of the substation, no expansion of fenceline is expected.
All Construction to be internal.
Engineering to be external.
Existing communication panels have adequate space for new equipment

RISKS

additional communication panel required	$ 25,000
Severe Weather Delays OT	$ 5,000
Design development	$ 5,000

UNESCALATED LINE ITEM DOLLARS

Project Number 464953
Date of Estimate 02/17/2022
Estimate revision # 00

| | Escalation Rate | E Rate | $ | 53 | | |

ESTIMATE SUMMARY

Project Title: Substation Dis[redacted]
Project Mgr/Lead [redacted]
Project Number: 404953
WO & Task #: 80090791
Estimate revision #: 00
Estimate Type - Station work

Estimate #: C-21-844
Date of Estimate 02/17/2022
Estimate done by: PAG
In Service date (ISD):06/01/2023

Template Revision # 01.66d

Alt Estimate Summary for PP4 Calc (escalation separate)

Estimate #: C-21-844
Date of Estimate:02/17/2022

Project Number: 404953
WO & Task #: 404953301

ESTIMATE SUMMARY

Estimate Type: Planning

WBS	Description	TOTAL	% of Directs	% of Total	Priors	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
1	ROW / Easements / Land purchases														
2	Environmental Approvals / Permits														
3	Outreach	$6,600	2.0%	1.1%			$6,600								
4	Siting Approvals / Permits	$2,200	0.7%	0.4%			$2,200								
5	Engineering / Design	$99,600	30.7%	17.3%			$99,600								
6	Materials (Eversource purchased)	$12 900	4.0%	2.2%			$12 900								
7	Construction (incl matl's by contractors)	$33,200	10 2%	5.8%			$33,200								
8	Testing / Commissioning	$87 800	27.1%	15.3%			$87 800								
9	PMT Project Mgmt Team	$23,700	7.3%	4.1%		$1,300	$22,400								
10	Removals	$23,400	7.2%	4.1%			$23,400								
11	Other														
12	Risks	$35.000	10 8%	6.1%			$35.000								
125															
	Project Directs Total w/Risks	**$324,400**	100 0%	56.5%		**$1,300**	**$323,100**								
13	Indirects/Overhead	$225,300		39.2%		$2,500	$222,800								
14	AFUDC	$8 000		1.4%		$100	$7 900								
125															
	Project Total - Baseline Budget	**$557,700**		97.1%		**$3,900**	**$553,800**								
15	Contingency	$16 900		2.9%		$100	$16 800								
	Project Total - Funding Approval Level	**$574,600**		100.0%		**$4,000**	**$570,600**								
16	Reimbursables/Customer Contribution														
	Project Total (less reimbursables)	**$574,600**				**$4,000**	**$570,600**								
	Cost per key qty (if appl)	-	$'s / Ckt. Ft												
	Amount of Escalation included above	$14 700					$14 700								
6	Total materials - Eversource	$12 900					$12 900								
	Total materials - Contractor														
	Total materials	$12.900					$12.900								

NOTE: Risk / Contingency is 9 9% of Project Total Costs (incl escal/Indrects/AFUDC but excl reimb.)

Estimate Range	**-25%**	**25%**
	$431,000	**$718,000**

	TOTAL w/ escal broken out
ROW / Easements / Land purchas	$ -
Environmental Approvals / Permi	$ -
Outreach	$ 6,400
Siting Approvals / Permits	$ 2,100
Engineering / Design	$ 96,700
Materials (Eversource purchased	$ 12,700
Construction (incl matl's by cont	$ 32,200
Testing / Commissioning	$ 85 200
PMT Project Mgmt Team	$ 23,100
Removals	$ 22,700
Other	$ -
Risks	$ 35.000
	$316,100
Indirects/Overhead	$ 218,800
AFUDC	$ 8 000
	$ -
	$542,900
	$ -
Continaencv	$ 16 900
	$559,800
	$ -
	$ -
	$ -
	$559,800
	$ 14,700
Escal total	**$574.500**
Check total	-$100

COMMENTS

Project Scope:
Key qty's and UOM (tie to inputs on est sheets) - Ckt. Ft

[redacted] **expansion remote end line relay work and settings changes:** [redacted] **, Watertown, CT.**
Remove [redacted] EL-321 line relay
Remove [redacted] TC-10B PLC device
Remove [redacted] TCF-10B PLC devices
Remove [redacted] Wave Trap
Remove [redacted] line tuning unit
Install [redacted] EL-311C line relay and [redacted] auxillary back up
Install associated test switches.
Testing and commisioning.
update as-built drawings and schematics.

Assumptions/Clarifications:
Indirect rates based on: 1T - CT Station work

ISD of 6/1/2023 from schedule provided.
All work to take place within the existing footprint of the substation, no expansion of fenceline is expected.
All Construction to be internal.
Engineering to be external.
Existing communication panels have adequate space for new equipment

RISKS

additional communication panel required	$	25,000
Severe Weather Delays OT	$	5,000
Design development	$	5,000

UNESCALATED LINE ITEM DOLLARS

Project Number 404953
Date of Estimate 03/17/2022
Estimate revision # 00

	Escalation Rate	E Rate	$	53	Prior		2022		2023	1	2024	2	2025	3	2026	4	2027	5	2028	6	2029	7	2030	8	2031	9	TOTAL	
					Mhrs	DOLLARS	Mhrs	DOLLARS		DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS	Mhrs	DOLLARS
CSTXX-CONSTRUCTION		R																										
Electrical Construction		LT								$21,440																	320	$21,440
General Construction		LT																										
SCADA / Automation		LT																										
Telecom - Field		LT																										
Construction Reps (Internal)		LT								$6,360																	120	$6,360
Support Switch/Tag		LT								$1,272																	24	$1,272
Other (specify)		LT																										
Other (specify)		LT																										
Other (specify)		LT																										
LT Total										$29,072																	464	$29,072
Employee Expenses		AE	5%							$1,454																		$1,454
Construction Purchased Material		AM	1%							$231																		$231
Outside Construction Vendor		AQ								$1,672																		$1,672
Sales tax on Constr. Vendor																												
Vehicles (now in Indirects section)		AV																										
Inspection services (Outside Vendor)		AQ																										
Construction fees (Outside vendor)		AQ																										
Rents and Leases		BR																										
CSTXX Subtotal										$32,429																		$32,429
Escalation																												
CSTXX Total										$32,429																	464	$32,429
ENRXX-TG ENGINEERING/DESIGN																												
Project Services/Drafting		LT								$1,590																	30	$1,590
T- Line Engineering/Design		LT																										
D- Street Engineering/Design		LT																										
Civil Engineering/Design		LT																										
Substation (T) Engineering/Design		LT								$3,180																	60	$3,180
Substation (D) Engineering/Design		LT																										
Protection & Controls Engineering		LT								$2,120																	40	$2,120
Survey Engineering		LT																										
SCADA / Automation Engineering		LT																										
Telecom Engineering		LT								$1,484																	28	$1,484
Other - specify		LT																										
Other - specify		LT																										
LT Total										$8,374																	158	$8,374
Employee Expenses		AE	5%							$419																		$419
Contractor Engineering - T-Lines		AQ																										
Contractor Engineering - D-Street		AQ																										
Contractor Engineering - T -Station		AQ								$21,280																	140	$21,280
Contractor Engineering - D-Station		AQ																										
Contractor Engineering - P&C		AQ								$30,600																	200	$30,600
Contractor Engineering - Survey		AQ																										
Contractor Engineering - SCADA / Automation		AQ								$18,000																	120	$18,000
Contractor Engineering - Telecom		AQ								$18,000																	120	$18,000
Contractor Engineering - Specify		AQ																										
Contractor Engineering - Specify		AQ																										
Contractor Engineering - Specify		AQ																										
Vehicles (now in Indirects section)		AV																										
ENRXX Subtotal										$96,873																		$96,873
Escalation																												
ENRXX Total										$96,873																	738	$96,873
LNDXX-TG LAND																												
Real Estate		LT																										
Employee Expenses		AE	5%																									
Purchase Land		AM																										
Vehicles (now in Indirects section)		AV																										
Fees and Payments		BF																										
LNDXX Subtotal																												
Escalation																												
LNDXX Total																												
MATXX-TG MATERIAL																												
Eversource		AM								$12,000																		$12,000
Outside Services		AM																										
		AM																										
Freight																												
Sales Tax Eversource/outside services		5.0%	5.0%							$600																		$600
Other																												
MATXX Subtotal										$12,600																		$12,600
Escalation																												
MATXX Total										$12,600																		$12,600
PSMXX-PROJECT MANAGER & SUPPORT																												
Project Management (PM)		LT								$6,752																	104	$6,752
Project Planning/Cost (IP)		LT								$6,360																	120	$6,360
Contracts/Purchasing (CP)		LT								$4,240																	80	$4,240
System Planning		LT																										
Environmental		LT																										
SCR - None		LT								$6,360																	120	$6,360
Legal		LT																										
Estimating		LT				$1,272																					24	$1,272
Siting - None		LT								$2,120																	40	$2,120
Asset Management		LT																										
Other -		LT																										
Other -		LT																										
Other -		LT																										
Other -		LT																										
LT Total						$1,272				$26,832																	568	$26,104
Employee Expenses		AE	5%			$64				$1,442																		$1,506
Project Support Vendor - PM		AQ																										
Project Support Vendor - IP		AQ																										
Project Support Vendor - CP		AQ																										
Project Support Vendor - System Planning		AQ																										
Project Support Vendor - Environmental		AQ																										
Project Support Vendor - SCR – None		AQ																										
Project Support Vendor - Legal		AQ																										
Project Support Vendor - Estimating		AQ																										
Project Support Vendor - Siting - None		AQ																										
Project Support Vendor - Asset Management		AQ																										
Project Support Vendor - Other		AQ																										
Project Support Vendor - Other		AQ																										
Project Support Vendor - Other		AQ																										
Project Support Vendor - Other		AQ																										
Vehicles (now in Indirects section)		AV																										
Property or CWIP tax lease and allowance		BR																										
		BR																										
Fees and Payments - Environmental		BF																										
Fees and Payments - Siting		BF																										
Fees and Payments - Other		BF																										
PSMXX Subtotal						$1,336				$30,274																		$31,610
Escalation																												
PSMXX Total						$1,336				$30,274																	568	$31,610
REMXX-TG REMOVAL																												
Engineering/Design		LT																										
Manual Construction		LT								$19,778																	300	$19,778
LT Total										$19,778																		$19,778
Employee Expenses		AE	15%							$2,966																		$2,966
Outside Services		AQ																										
Contractor Labor		AQ																										
Vehicles (now in Indirects section)		AV																										
Rents and Leases		BR																										
REMXX Subtotal										$22,742																		$22,742
Escalation																												
REMXX Total										$22,742																	300	$22,742
TSTXX-TG TEST																												
Test / Field Engr. Labor (In House)		LT																										
Lead Commissioning Engr. (LCE) (Internal)		LT																										
Employee Expense		AE	15%																									
Test / Field Engr. Labor (contractor)		AQ								$54,000																	300	$54,000
Lead Commissioning Engr. (LCE) (contractor)		AQ								$31,200																	160	$31,200
Vehicles (now in Indirects section)		AV																										
TSTXX Subtotal										$85,200																		$85,200
Escalation																												
TSTXX Total										$85,200																	460	$85,200
SUBTOTAL PROJECT DIRECT COST				-		$1,336				$279,918																	2,820	$281,164
Risk																												
Risk										$35,000																		$35,000
						$ -		$ -			$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -			
						$ -		$ -			$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -			
Risk Total										$35,000																		$35,000
TOTAL PROJECT DIRECT COST (w risk)				-		$1,336				$314,918																	2,820	$316,164
INDIRECTS																												
Non-Productive Time Allocation (2NP)	15.3%					$191				$12,951																		$13,142
Payroll Benefits Allocation (2PB) Incl NPT	44.0%									$24,728																		$24,728
Gen SVC CO Overhead (2SG) Incl NPT	80.0%					$1,171				$34,244																		$35,415
E&S Allocations (2BB,2BL,2BN)	40.0%					$1,054				$123,092																		$124,146
AS&E Allocations (2AS)	0.8%					$30				$3,879																		$3,909
Stores Expense Allocation (2ST)	8.0%									$960																		$960
Lobby Stock																												
MDEC (2MI)																												
Vehicles (2VE)	7.5%					$95				$6,454																		$6,549
Indirects Subtotal						$2,541				$210,308																		$212,849
TOTAL PROJECT COST - Direct & Indirect (excl AFUDC)						$3,877				$601,126																		$605,003
AFUDC																												
AFUDC (2X)					7.00%	$136	7.00%	$7,866	7.00%		7.00%		7.00%		7.00%		7.00%		7.00%		7.00%		7.00%		7.00%		1	$8,002
In Service Dollars						-		-		-		-		-		-		-		-		-		-		-		
Cumulative ISS						-		-		-		-		-		-		-		-		-		-		-		
AFUDC Subtotal						$136		$7,866																				$8,002
TOTAL PROJECT COST - Baseline Budget						$4,013		$608,992																				$643,005
Contingency																												
Contingency						$118		$16,808																				$16,926
Other			$ -			$ -		$ -			$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -			
Contingency SubTotal						$118		$16,808																				$16,926
TOTAL PROJECT COST - Approved Funding						$4,131		$625,800																				$659,931
Reimbursables / Customer Contribution																												
Reimbursables / Customer Contribution (enter as negative)			$ -			$ -		$ -			$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -			

ESTIMATE SUMMARY

Project Title:
Project Mgr/Lead:

Template Revision 2.1.1a

SUMMARY OF ESTIMATES

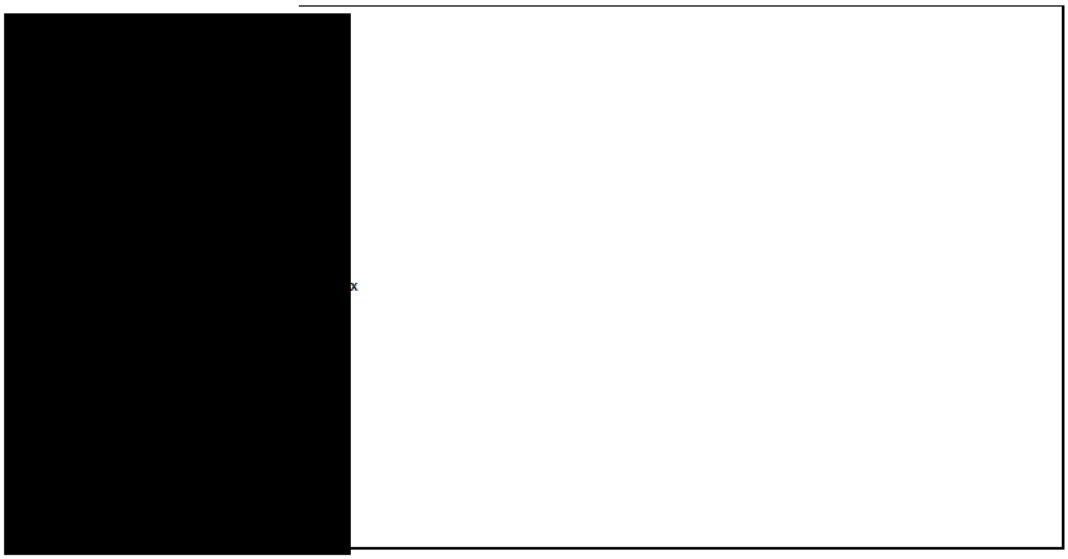
Select Estimate Type

WI	Description	TOTAL	% of Directs	% of Total	Planning C-21-844A	Planning C-21-844B	Planning C-21-844D	Planning C-21-844T
1	ROW / Easements / Land purchases							
2	Environmental Approvals / Permits	$4,600	0.0%	0.0%			$200	$4,400
3	Outreach	$13,300	0.1%	0.1%	$6,600	$6,600		$100
4	Siting Approvals / Permits	$8,900	0.1%	0.0%	$2,200	$2,200	$100	$4,400
5	Engineering / Design	$942,800	6.7%	3.9%	$99,600	$99,600	$373,000	$370,600
6	Materials (Eversource purchased)	$4,910,700	35.2%	20.1%	$12,900	$12,900	$4,003,200	$881,700
7	Construction (incl matl's by contractors)	$5,144,000	36.8%	21.1%	$33,200	$33,200	$3,774,000	$1,303,600
8	Testing / Commissioning	$672,900	4.8%	2.8%	$87,800	$87,800	$249,500	$247,800
9	PMT Project Mgmt Team	$479,200	3.4%	2.0%	$23,700	$24,200	$207,200	$224,100
10	Removals	$173,300	1.2%	0.7%	$23,400	$23,400	$89,900	$36,600
11	Other	$18,600	0.1%	0.1%			$9,300	$9,300
12	Risks	$1,600,000	11.5%	6.6%	$35,000	$35,000	$1,145,000	$385,000
	Project Directs Total w/Risks	**$13,968,300**	100.0%	57.3%	$324,400	$324,900	$9,851,400	$3,467,600
13	Indirects/Overhead	$8,584,600		35.2%	$225,300	$226,200	$6,308,100	$1,825,000
14	AFUDC	$1,136,400		4.7%	$8,000	$8,100	$917,400	$202,900
	Project Total - Baseline Budget	**$23,689,300**		97.1%	$557,700	$559,200	$17,076,900	$5,495,500
15	Contingency	$698,200		2.9%	$16,900	$17,000	$494,000	$170,300
	Project Total - Funding Approval Level	**$24,387,500**		100.0%	$574,600	$576,200	$17,570,900	$5,665,800
16	Reimbursables/Customer Contribution							
	Project Total (less reimbursables)	**$24,387,500**			$574,600	$576,200	$17,570,900	$5,665,800
	Cost per key qty (if appl)						$1,597	
	Amount of Escalation included above	$209,400			$14,700	$14,700	$97,400	$82,600
6	Total materials - Eversource	$4,910,700			$12,900	$12,900	$4,003,200	$881,700
	Total materials - Contractor	$419,001					$298,541	$120,460
	Total materials	$5,329,701			$12,900	$12,900	$4,301,741	$1,002,160

NOTE: Risk / Contingency is 10.4% of Project Total Costs (incl escal/indirects/AFUDC but excl reimb.)

Estimate Range Range (-) Range (+)

Project Scope:



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EVERSOURCE

Constructability Review Form: **Substation**

Project Title: [redacted] **2TXf and Switchgear Project**	☐	Prior Constructability Review Performed?
	☐	Program Related Site Specific Review?
Project Numbers(s): CS00284 / 404953	**Project Constructability Phase:** ☐ Conceptual Engineering Design ☒ Preliminary Engineering Design ☐ Detailed Engineering Design	
Date(s) of Constructability Review: **12/08/2021** 12/08/2021		

Project Scope Statement:

Distribution:

[redacted]

Type of equipment	Manufacturer Information	Location	Quantity	Scope of work
Circuit switcher	Switzer & Conrad (S&C), series 2000	Between the new 11S-2X and 11S-2X1-4	1 set (all three phase)	New installation
Circuit switcher	Switzer & Conrad (S&C), series 2000	Between 11S-3X and 11S-3X1-4 and	1 set (all three phase)	New installation
115/23kV, 62.5 MVA transformer	TBD*	11S-2X	1	New installation
11S-2X Switchgear	PowerCon/AZZ	Switchgear with relays	1	New Installation

Transmission:

A[redacted]

Type of equipment	Manufacturer Information	Location	Quantity	Scope of work
Wave Trap, 2000A	GE, LTO 0.265-3000-40-2	[redacted]		New installation
Wave Trap, 2000A	GE, LTO 0.265-3000-40-2			New installation
Wave Trap	N/A			Retired/Decommissioned
Wave Trap	N/A			Retired/Decommissioned
115kV series, circuit breaker	ABB, 3000A, 40			New installation
Manually Operated Disconnect Switches	Southern States, 2000A, EV-2-115-2000			Retired/Decommissioned
CCVTs	Trench Electric, TEMF-123			Tap/connection relocation. CCVTs remained in the same location/position.
CCVTs	Trench Electric, TEMF-123			Tap/connection relocation. CCVTs remained in the same location/position.
Protection Relays and Equipment	Various			See next section for detailed Protection & Control Scope of Work

EVERSOURCE

Constructability Review Form: **Substation**

Department Review/Walkdown Attendees*:

Required [X]	Attended [X]	Department	Name	Required [X]	Attended [X]	Department	Name
☒	☒	Project Management	[redacted]	☒	☒	S/S Engineering	[redacted]
☐	☐	Asset Management		☐	☐	P&C Engineering	
☐	☐	Constr. Management		☒	☒	Civil Engineering	
☐	☐	S/S Technical / LCE		☐	☐	Telecom	
☒	☒	S/S Operations**		☐	☐	Environmental	
☐	☐	Field Engineering		☐	☐	Real Estate	
☐	☐	Line Engineering		☐	☐	T&D ROW	
☐	☐	Vegetation Management		☐	☐	Survey Engineering	
☒	☒	Siting		☐	☐	Cost Estimating	
☐	☐	Safety		☐	☐	Outreach (SCS)	
☐	☐	SCADA		☐	☐	Material Procurement	

*** Sign-off in the table above for the Detailed Engineering Design Constructability Review indicates that all Action Items/Concerns from prior Constructability Reviews have been mitigated/resolved as documented in this form. Not every department is required to attend walkdowns for every project but should be consulted for project impact considerations**

** Internal Eversource Substation Operations must be included in review even if external construction resources are planned

Project Manager certifies that this review was performed to completeness, that all applicable departments were informed of the project and have had opportunity to provide input to this review:

___[redacted]_*12/08/2021*_____*Name /*

Signature *Date*

Documents available for use on Constructability Review					
[X]	**Deliverable**	**[X]**	**Deliverable**	**[X]**	**Deliverable**
☒	Initial Scope -Birdseye site plan -General Arrangement	☒	Preliminary Drawings -Civil Site Drawing -Electrical Drawing -Section Drawings	☐	Prints in hand for marking up -Panel Front/Read View -Control Enclosure Layout -Floor / Wall Plans
☐	Detailed Scope Document	☐	Previous Notes	☐	Identify Required Contractors
☐	Proposed Schedule	☐	Major Material List	☐	Replace / Reuse of equipment

EVERSOURCE

Constructability Review Form: **Substation**

☒	Construction Sequence/Timeline	☐	Major Equipment Items	☐	Pre-Walkdown Comments / Observations

Action Items and Resolutions:

Item No.	Const. Review Action Item/Concern	Design Resolution/Mitigation:
1	**Update drawing 33003 to show strain bus between 1238 and 1813.**	
2	**Structures 1238 and 1813 to be evaluated**	
3		
4		
5		

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
A	**General**		
1	**Any safety hazards specific to the facility? i.e. Low Bus, Deterioration, etc.**	☒	
2	**Prior known Site Specific Conditions - Common or Obvious station Issues**	☒	
3	**Scope Adequately Developed** Consider Physical Installation, P&C Scope, Civil Scope, Engineering studies, Design standard adherence	☒	
4	**Materials Identified/Ordered** Long Lead Equipment? Specialty material considerations? Review BOM lead times and project need dates Bids for Specialty Major Materials - Identify Specialty Equipment & Materials potentials - temporary/replacement Any Materials needed to facilitate construction access?	☐	Long lead material acquisition issues for switchgear, transformer, disconnect, cable trench
5	**Any impacts that would drive T-Line Eng Scope?**	☒	
6	**Any other known projects that could overlap or impact outage work?**	☒	
B	**Construction**		

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Constructability Review Form: **Substation**

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
1	**Site Plan / Access:** -Confirm maintenance access for proposed new or replaced equipment -Review station expansion areas (if needed) for structures, old foundations, etc. -Verify clear footprint for yard equipment / Property Plan -General access to site, can areas outside substation be utilized? -Substation Entry Plan (driveway and drive path modifications) -Site Development Plan (grading and drainage) with Cut/Fill -Existing Rock Conditions? Potential Impacts (rock quantity)? -Any Sanitary Civil Requirements? (Septic tanks, etc) -Assess condition of existing yard equipment foundations and viability for reuse (if proposed)	☒	
2	**Any Substation Access and site/yard access Limitations?** -Review turning radius for delivery trucks (if critical) -Identify Office Trailer / Container / Dumpster Space + source of utilities for construction trailer(s) if needed -Weather impacts to Site (Snow Placement) -Identify Material Laydown and Security -Construction permit for trailers outside substation fence?	☐	Remove hill and install retaining wall
3	**Outage Planning & Construction Sequence** -Working Clearances - Review electrical clearances for equipment during construction – Approach Distances – Outage Requirements to maintain electrical clearances throughout proposed installation -As-Built drawing review (contacts and contributions) -Outage boundaries -Phased approach needs for additional mobilizations -Detail Design package align with schedule and outage sequence? -Lead Commissioning Engineer (LCE), Substation Operations, and Outage Planner - Review or give input to planned construction sequence to insure it is reasonable and scheduled outages associated with the sequence -Review or give input to planned construction sequence to insure it is reasonable -Verify outage sequence supports the planned construction sequence	☐	Install strain bus between terminal structures to allow transmission bus outages for terminal rebuild
4	**Need for mobile generator and where connected (if needed)**	☒	

EVERSOURCE

Constructability Review Form: **Substation**

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
5	**Need for mobile battery and where connected (if needed)**	☐	
6	**Energization Plan** What outages are required, Detailed look at contributions to equipment, Detailed look at protection zone changes, Locked sequence or random outages, Outage durations minimized Mobile transformer, Additional outage requirements, Working clearance, Railroad Catenaries, Distribution overhead/underground/networks, Fiber outage, SCADA outage, Relay permissions	☐	Work must be planned for low load periods to allow complete station off load
7	**Identify Required Oversite Needed - Estimated level of CR and LCE support needed**	☐	
8	**OT work required or Notable Permit Conditions (special hours)?**	☐	OT required to meet in service dates
9	**Seasonal or weather conditions impacts?**	☐	Yes
10	**Identify Required Depts for Construction? (who is constructor ?)**	☐	Internal is performing work
11	**Specialty Contractors Required?**	☐	Civil contractor
12	**Unique Equipment Considerations, Gas insulated substation, Gas insulated line, Gas insulated bus, Pass Breaker, Statcom, Sync Condenser**	☒	
13	**Underground Obstructions** -Drawing review concerns? -Is preconstruction or test excavation needed? -Is reuse of underground control cables / Conduits /replace Non-Shielded Cable feasible (if applicable) -Are spare conduits available? Are they useable? -Review if any areas will need to be plated for increased load bearing for equipment access (i.e. large Xfmr, etc.)	☐	Possible rock included as a risk
14	**Any other items missing in scope or could be underfunded?**	☒	
15	Coordination of boundaries/seams (Identification of point of demarcation for connection to existing equipment and/or for coordination with other municipalities)	☒	
C	**Environmental**		
1	Soil Pre-Characterization or Grab Sampling Completed/Planned	☒	
2	Has Desktop investigation and EAD Review form been completed.	☒	
3	Dewatering requirements	☒	
4	Risk or presence of PCB's/Asbestos/Lead/SF6	☒	

EVERSOURCE

Constructability Review Form: **Substation**

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
5	Permit requirements (Wetlands, Rare Species, etc)	☒	
6	Stormwater Considerations	☐	Grading plan to address issues
7	Transformer Spill Containment Recommended?	☒	
8	Expanding Footprint / New Buildings or future Expansion Plans? (Enviro Impact)	☒	
D	**Siting, S&CS, and T&D Real Estate**		
1	Expanding Footprint / New Buildings or future Expansion Plans?	☒	
2	Installation is within Eversource Rights? - Rights and Restrictions Review	☒	
3	Proposed Equipment on same property? - Any Encroachments	☒	
4	Identify existing lighting and determine if additional lighting is needed?	☐	Increased station lighting
5	Review for roadway, gate access, trailers, equip height, noise, weekend/night work, or any potential public disturbance related to work	☒	
6	Visual mitigation screening considerations (feasibility or location)	☒	
7	Neighbor/Abutter impacts (noise, visual, sensitive abutters)	☒	
E	**Engineering**		
1	**Scope of Work** Identify if high level scope sufficiently detailed? Any remote station impacts? Does title match the project deliverable/intent?	☐	Scope ok but there are remote station impacts to Frost bridge and Rocky River included in engineering
2	**Ratings & Dimensions** for Major Equipment. Any concerns upon field review? Equipment Rating One Line (and/or equipment thermal ratings tables) - Review for any errors in field	☒	
3	**Materials** Any concerns with BOM/Major Materials Review? Where will new vs removed equipment go? Review for OH and UG Items	☒	
4	**Control House** - Review: Unmapped equipment interferences, Control/Battery Enclosure Layout, HVAC System (if equipment added), space for new or modified equipment, AC / DC station service and loading, Panel Space, Expansion, one-line and/or riser type panelboard drawings, other..	☒	

EVERSOURCE

Constructability Review Form: **Substation**

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
5	Identification of Unique Requirements, i.e. (access bridges, station service, etc.)	☒	
6	**BPS Separation Requirements** Is this BPS Substation? Y/N (part of PAF) Changes to pre-existing BPS standards?	☒	
7	IEC 61850 Substation Automation and Communication Requirements - Any Impacts/Retrofit needed?	☒	
8	Any Upgrades to ES Standards - Is retrofit needed to bring up to ES standards? Can that be done?	☒	
9	**Wall, Fence, Gate, and Foundation Considerations** -Any permanent / temporary alterations or relocations required? -Take measurements for Foundation quantities, dimensions and concrete volumes -CIP Review/Ballistic needs. Any Physical Security Requirement Consideration? -Any impacts to construction plan?	☒	
10	**Below Grade / Enclosure Raceway** - If possible, evaluate existing raceway and review spacing requirements. Review for any subsurface investigation needs or potential below grade obstructions. GPR/test pits needed? Geotechnical Investigation - is soil boring or resistivity investigation needed?	☐	BG concerns addressed by engineering vendor
11	**Grounding Plan (Ground Grid)** - Will footprint impact layout or other equipment? Identify locations to improve grounding. Impacts to foundations and ground grid plans. Observations on wetlands or ability to perform tests	☐	New grounding grid being installed with new equipment
12	Any Lighting Plan & Fixture Schedule Considerations?	☒	
13	Any Steel Structural Plan Considerations?	☒	
14	Sound Study Needed? Pre-Project Sound Measurements Needed? Sound Walls?	☐	Included in engineering
15	Engineering Estimates for Design and Technical Support? (EE and EOC) Total Project	☒	
16	Nomenclature / Switching One-Line Diagram -Any obvious deviations from diagrams provided?	☒	
17	Any design alterations or considerations to Eliminate SCLL Conditions, Reduce Recall Time, Reduce Outage durations, Special Conditions	☒	
F	**Protection & Controls**		

EVERSOURCE

Constructability Review Form: **Substation**

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
1	Panel Graphic additions and/or Modifications	☒	
2	Space on existing panels for new equipment? (front & rear of panel fronts)	☐	Confirmed
3	Panel fronts conform to drawings	☐	Confirmed
4	Access to bring new panels into control enclosure	☐	Confirmed – New panels to be procured
5	Nameplate list and location of nameplates	☐	Confirmed – Nameplate DR will be issued
6	Verifies that relays and meters that will be an interconnected project work are as shown on the drawings.	☐	Confirmed
7	Verify auxiliary panels have breaker available or space for new breakers (if needed)	☐	Confirmed
G	**Telecom Engineering**		
1	Review telecom equipment in existing control enclosure	☐	Completed
2	Review path to get telecom circuits into the station and determine whether new underground duct bank is needed.	☐	Confirmed
3	Review current or proposed Telecom equipment power connections and validate with P&C any need for system 1 and system 2 separation.	☐	Confirmed – The new relays will be on direct fiber
4	Review current Telecom fiber diversity and validate with P&C any fiber diversity requirements.	☐	Confirmed
5	Confirm whether correct interface equipment is available (i.e.) for fiber termination or multiplexor termination	☐	Confirmed
6	Confirm whether existing communications cabinets are enough to support additional telecommunications equipment installed	☐	Confirmed – There is enough space to install new SEL ICON MUX
7	Review space for any required additional communications cabinets which may be required to support additional telecommunications equipment installed	☒	
8	Review third party Telecommunications at substation and confirm whether additional capacity or Ground Potential Rise protection is required	☒	

Photos

(Ex. Equipment control cabinet, Breakers, MODs, CCVTs, PTs, Transformers)

EVERSOURCE

Constructability Review Form: **Substation**

[redacted]

[redacted]