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Operations Program Release Form

Approved on March 29, 2022 EPAC

Link to Meeting Minutes

Project Title: DSCADA LTC Controls Upgrade [redacted]	**Project Number: CS00520**
Date Prepared: 03/21/2022	**Company: Eversource CT**
Organization: Asset Management	**Class(es) of Plant: D SS**
Project Initiator: [redacted]	**Project Category: Stations - SCADA**
Managing Organization: Engineering	**Schedule ID#: 80134678**
Project Manager: [redacted]	**Project Type: Program**
Project Sponsor: [redacted]	**Capital Investment part of original Op Plan: Yes**
Estimated in service date: October 20, 2022	**Program Level Title: DSCADA LTC Upgrades**
Eng./Constr. Resources Budgeted? Yes	**Program Level Project Number: CS00407**
Total Capital Request: $954K	**Facility Type (check all that apply):** ☐ **PTF** ☐ **non-PTF** ☒ **Distribution** ☐ **N/A (General**

[1] Executive Summary

This Program Release is requesting dollar authorization in accordance with the program level criteria specified in Program Level Project Authorization Form (PAF) - DSCADA LTC Receivers Program Upgrades (CS00407) (see Attachment E) and this document for this specific location. The scope for this Program Release is defined in the Program Level PAF and in this document with modifications necessary that address this location. Location/site modification from the Program Level PAF shall be fully described herein for scope and unit cost.

This Program Release is requesting $954K to [redacted]

[redacted]

The Program Level PAF CS00407 had $250K of initial funding approved in PowerPlan on May 25, 2021. As of December 28, 2021, no charges have accrued under the old CS00090 program on WO CS009058. However, as of March 18, 2022, minimal charges have accrued under the new CS00407 program on WO 80134678 for engineering and design of the [redacted]. These prior labor charges will be journaled to this new release upon approval.

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[2] Program Release Cost Summary

Unitized Release Cost

Note: Dollar values are in thousands

Line item Category	*Unitized Program Level PAF Cost	Release Cost	Delta
1. ROW / Easements / Land Acquisition	$	$	$
2. Environmental Approvals / Permits	$	$	$
3. Outreach	$4	$	($4)
4. Siting Approvals / Permits	$	$	$
5. Engineering / Design	$21	$59	$38
6. Materials (Eversource purchased)	$37	$44	$7
7. Construction (incl matl's by contractors)	$140	$193	$53
8. Testing / Commissioning	$123	$152	$29
9. Project Mgmt Team	$21	$14	($7)
10. Removals	$5	$15	$10
11. Other	$		$
12. Risks	$126	$64	($62)
SUBTOTAL DIRECTS W/ RISKS	**$477**	**$541**	**$64**
13. Indirects/Overhead	$234	$357	$123
14. AFUDC	$19	$27	$8
PROJECT TOTAL – BASELINE BUDGET	**$730**	**$925**	**$195**
15. Contingency	$	$28	$28
TOTAL CAPITAL REQUEST	**$730**	**$954**	**$224**
16. Reimbursables/Customer Contribution	$		$
PROJECT TOTAL (LESS REIMBURSABLES)	**$730**	**$954**	**$224**
O&M	**$**		$
Total Request	**$730**	**$954**	**$224**

* CT Program unit cost is based on Program Option #1, "LTC control upgrade only", for transformers 12B-3X & 12B-4X. In Option #1, existing conduits are used. Unitized program Level PAF Cost column values are calculated for two (2) transformer upgrades.

Justification for Modification

1. **ROW / Easements / Land Acquisition: $0K –** No changes from the Program Level PAF.
2. **Environmental Approvals / Permits: $0K –** No changes from the Program Level PAF.
3. **Outreach: ($4K) –** Unit price per transformer reflects outreach required at one (1) station. A savings is realized as any required outreach for two (2) transformers at the same station can be accomplished simultaneously.
4. **Siting Approvals / Permits: $0K –** No changes from the Program Level PAF.
5. **Engineering / Design: $38K –** Engineering includes site specific work to upgrade two Westinghouse™ LTC position indicators at [redacted] This additional work is not covered in the Program Option #1 detail and is specific to this substation DSCADA features.
6. **Materials (by Eversource): $7 –** Replacing push button indicators and retrofit hardware to modify older Westinghouse™ transformer LTC position indicators increases the cost of materials. This is a site specific need.
7. **Construction (including materials supplied by contractors): $53K –** includes site specific work to upgrade two older Westinghouse™ LTC position indicators at [redacted] This additional work on the two transformers position indicators is not covered in the Program detail Option #1. The LTC position indicator work is specific to this substation and is the cause for the increase.
8. **Testing / Commissioning: $29 –** Additional testing of modifications to Westinghouse™ LTC position indicators at [redacted] is required. LTC position indicators on the two (2) transformers will need re-calibration. This added calibration work is not included in the Program Option #1 and is specific to this station.
9. **Project Management Team: ($7K) –** Savings in economies of scale.
10. **Removals: $10K –** Minor additional removal costs associated with transformer Tap Position Indicators not included in DSCADA Program Option #1.
11. **Other: $0K –** No changes from the Program Level PAF.
12. **Risk: ($62K) –** Savings recognized in economies of scale, and repetitive scope.
13. **Indirects/Overhead: $123K –** Indirects are proportional to direct costs and rates used at the time of the estimate.
14. **AFUDC: $8K –** No major changes from the Program Level PAF.
15. **Contingency: $28K –** Contingency was not included in the Program Level unitized cost but is included to account for project unknowns and is site specific.
16. **Reimbursables/Customer Contribution: $0K –** No changes from the Program Level PAF.

O&M: $0K – No changes from the Program Level PAF.

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Project Costs 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						
3. Outreach						
4. Siting Approvals / Permits						
5. Engineering / Design	$250	$31	$20	$7		$59
6. Materials (Eversource purchased)			$44			$44
7. Construction (incl matl's by contractors)			$193			$193
8. Testing / Commissioning			$152			$152
9. Project Mgmt Team			$14			$14
10. Removals			$15			$15
11. Other						
12. Risks			$64			$64
SUBTOTAL DIRECTS W/ RISKS	**$250**	$31	**$502**	**$7**		**$541**
13. Indirects/Overhead			$344	$14		$357
14. AFUDC			$27			$27
PROJECT TOTAL – BASELINE BUDGET	**$250**	$31	**$873**	**$21**		**$925**
15. Contingency			$28			$28
TOTAL CAPITAL REQUEST	**$250**	$31	**$902**	**$21**		**$954**
16. Reimbursables/Customer Contribution						
PROJECT TOTAL (LESS REIMBURSABLES)	**$250**	$31	**$902**	**$21**		**$954**
O&M						
TOTAL REQUEST	**$250**	$31	**$902**	**$21**		**$954**

Risk	Allocation
1. Potential UG obstructions	$20K
2. Severe weather delays, OT	$30K
3. Design Development & Field Mark-up changes	$14K
Total	$64K

* Value of "Actuals to Date" column is the amount recorded in Power Plan on the preparation date of the Engineering Estimate.

Explain unique payment provisions, if applicable: N/A

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

[3] project scope

[redacted] This substation has been selected by Eversource Engineering for upgrade under the CS00407 program.

To comply with the Independent System Operator - New England (ISO-NE) requirement to reliably raise and or lower the distribution voltage when requested, the DSCADA LTC Upgrade to transformers [redacted] will provide this capability. Provisions will be incorporated in the design to enable lowering the voltage at this substation alone or as part of a group. [redacted] is included as Attachment D.

[redacted]

[redacted]

Scope of Work Details

[redacted]



Major Material

1. Two (2) LTC DSCADA Cabinet RTUs, one (1) for each transformer
2. Two (2) LTC tap position monitors, one (1) for each transformer
3. Two (2) M-2001D Beckwith tap changer controls with M-2280B Adapter Panels
4. Two (2) Franklin Electric™ model 1265 transmitter retrofit kits (for older Westinghouse Transformers
5. Two (2) SEL-2533 annunciators, one (1) per transformer

A constructability review was completed on November 19, 2021. A revised constructability review form is included as Attachment C. Adequate space for the DSCADA installation was confirmed during the constructability review.

[4] Alternatives Considered

No changes from the DSCADA Program Level PAF CS00407.

[5] Project Schedule

Milestone	Scheduled Completion Date
Project Need by Date	N/R
Date of Program IFR Approval	May 25, 2021
Complete Conceptual Design	N/R
Initiator complete SSF form	N/R
SDC Presentation Date(s)	N/R
Conversion of Tx development costs, 183 to 107 (applicable to projects that require SSF approval but do not require ISO alternative selection)	N/R
Preliminary Design Constructability review complete	November 19, 2021
Final Constructability Review Complete	January 21, 2022
Full funding estimate complete	March 8, 2022
Preliminary Design Complete	April 15, 2022
Full funding estimate review	March 18, 2022 Completed
Initiator complete PAF form	March 21, 2022
Detail Design Complete	May 6, 2022
IFC Design Complete	July 20, 2022
EPAC Full Funding Meeting Date	March 30, 2022
Relay Settings Issued (*Required for Full Funding requests)	May 13, 2022
Targeted Milestone Dates:	
· Siting Approval (if applicable)	N/R
· Env. Approvals (if applicable)	N/R
· Outage & Energization Plan Issued	July 28, 2022
· All Material on Site	August 23, 2022
· Outage Permit(s) Approved	August 28, 2022
Start of Construction Elec, Comm, P&C	August 28, 2022
Project ISD	October 20, 2022
ISO Related Milestones (for applicable projects)	
· ISO Preferred Alternative Selected	N/R
· Conversion of Tx development costs, 183 to 107 · (following ISO preferred alternative selection)	N/R
· PAC Presentation	N/R
· TCA Submittal	N/R

A P6 schedule is included as Attachment B.

[6] Regulatory Approvals

No regulatory approvals are required for this project.

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[7] Risk and Risk Mitigation Plans

Contingency:
Contingency of $28K is included in the estimate for project unknowns.

Risk Mitigation:

Risk	Mitigation
1. Potential UG obstructions	$20K is allocated for potential obstructions during re-use of existing conduits. Integrity of existing conduits will be verified first to avoid possible delays.
2. Severe weather delays, OT	$30K is allocated for possible dewatering and delays in the event of severe weather. Delays from the reallocation of project resources for storm restoration work that may require overtime for schedule recovery.
3. Design Development & Field Mark-up changes	$14K is allocated for additional engineering and design resulting from unforeseen scope.
4. SCLL Conditions	SCLL conditions will be mitigated utilizing the short recall time if needed.

[8] References

References
1. OP-13 Standards for Voltage Reduction and Load Shedding ISO New England Operating Procedure 08022019
2.
3.
4.
5.

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

Attachments	Included in Submittal?
Attachment A - CS00520-ES DME-[redacted]-DSCADA LTC UPGRADES rev1 SLT cost estimate	*YES*
Attachment B - [redacted] CS00520 Full Schedule 1 Apr 2022	*YES*
Attachment C - [redacted] CS00520 Constructability Review rev 02	*YES*
D. [redacted] Nomenclature Diagram	*YES*
E. Attachment E - CS00407 - DSCADA LTC Receivers Prgm Upgrades - Prgm Level Initial Funding - PAF	*YES*

Project Checklist - Transmission & Substation Capital Project			
Project Name: [redacted]		**Project Number: CS00520**	
Facility Type: ☐BPS ☐BES ☐PTF ☐PTF non-regional ☐non-PTF ☐CIP ☒Distribution ☐General Plant			
PLANNING			
Is a NX-9 required?	No		
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?	No		
ISO-NE Approval Date (if completed):	Enter Date		
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?	No		
Are there any changes to the baseline audible noise?	No		
Is there an impact to the existing ground grid?	No		
Is a Transient Over Voltage (TOV) analysis required?	No		

Project Checklist - Transmission & Substation Capital Project

Project Name: [redacted]	Project Number: CS00520

P&C ENGINEERING	
OP-22 - Are PMUs and DDR required?	No
If BPS, is an NPCC Directory #4 presentation required?	No
Are ISO-NE OP-24 Appendix B updates necessary?	No
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
SITING	
Is a Siting filing required? *(If yes, list in regulatory approvals section)*	No
PERMITTING	
Is there any permitting required? *(If yes, list in regulatory approvals section)*	No
PROJECT SERVICES (OUTREACH) and ROW WORK COORDINATION	
What is the level of outreach expected?	None
Is any part of this project in an Environmental Justice Community?	Yes
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 Eversource Engineering
Name of the person who prepared the estimate:	[redacted]
Was the estimate reviewed by Eversource Estimating?	Yes - Full Review

ESTIMATE SUMMARY

Project Title [redacted] - DSCADA LTC UPGRADES
Project Mgr/Lead [redacted]

Project Number: CS00520
WO & Task #: 80134678
Estimate revision #: 00
Estimate Type - Station work

Estimate #: C-22-98

Date of Estimate 03/08/2022

Estimate done by [redacted]
In Service date (ISD) 12/31/2022

Template Revision # 01.70a

Alt Estimate Summary for PP4 Calc (escalation separate)

Estimate #: C-22-98
Date of Estimate:03/08/2022

Project Number: CS00520
WO & Task #: 80134678

ESTIMATE SUMMARY

Estimate Type: Planning

Description	TOTAL	% of Directs	% of Total	Priors	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
ROW / Easements / Land purchases														
Environmental Approvals / Permits														
Outreach														
Siting Approvals / Permits														
Engineering / Design	$58,600	10 8%	6.1%	$31,200	$20,300	$7,100								
Materials (Eversource purchased)	$44,200	8 2%	4.6%		$44,200									
Construction (incl matl's by contractors)	$192 800	35.7%	20.2%		$192,800									
Testing / Commissioning	$151 800	28.1%	15.9%		$151 800									
PMT Project Mgmt Team	$14,400	2.7%	1.5%		$14,400									
Removals	$14,800	2.7%	1.6%		$14,800									
Other														
Risks	$64,000	11 8%	6.7%		$64,000									
Project Directs Total w/Risks	**$540,600**	100 0%	56.7%	**$31,200**	**$502,300**	**$7,100**								
Indirects/Overhead	$357,400		37.5%		$343,700	$13,700								
AFUDC	$27,100		2.8%		$27,100									
Project Total - Baseline Budget	**$925,100**		97.0%	**$31,200**	**$873,100**	**$20,800**								
Contingency	$28,400		3.0%		$28,400									
Project Total - Funding Approval Level	**$953,500**		100.0%	**$31,200**	**$901,500**	**$20,800**								
Reimbursables/Customer Contribution														
Project Total (less reimbursables)	**$953,500**			**$31,200**	**$901,500**	**$20,800**								
Cost per key qty (if appl)	476,750 $'s / EA													
Amount of Escalation included above	$600					$600								
Total materials - Eversource	$44 200				$44 200									
Total materials - Contractor														
Total materials	$44 200				$44 200									
NOTE: Risk / Contingency is 10.7% of Project Total Costs (incl escal/indirects/AFUDC but excl reimb.)														
Estimate Range	**-25%**			**25%**										
	$715,000			**$1,192,000**										

	TOTAL w/ escal broken out
ROW / Easements / Land purchas	$ -
Environmental Approvals / Permi	$ -
Outreach	$ -
Siting Approvals / Permits	$ -
Engineering / Design	$ 58,400
Materials (Eversource purchased	$ 44,200
Construction (incl matl's by cont	$ 192,800
Testing / Commissioning	$ 151 800
PMT Project Mgmt Team	$ 14,400
Removals	$ 14,800
Other	$ -
Risks	$ 64,000
	$540,400
Indirects/Overhead	$ 357,000
AFUDC	$ 27,100
	$ -
	$924,500
Contingency	$ 28,400
	$952,900
	$ -
	$ -
	$952,900
	$ 600
Escal total	**$953,500**
Check total	

COMMENTS:

Project Scope:
Key qty's and UOM (tie to inputs on est sheets) 2 EA

[redacted]

Major Materials
- Two (02) CABINETS, ENCLOSURE, LTC DSCADA, AL, 24 IN X 18 IN X 14 IN .
- Two (02) MONITORS, LTC TAP POS, PROGRAMMABLE, 120VAC, 4 TO 20 MA ANALOG OUTPUT, RS-232.
- **Two** (02) M-2001D Beckwith tap changer controls with **Two** new *Adapter Panels i.e.* Two (2) M-2067B .
- Two (02) SEL 2533 New Annunciators on both Xfmrs for Bunker Hill 55.

Assumptions/Clarifications:
Indirect rates based on: 11 - CT Station work

1. All construction, test and Engineering(electrical, P&C and civil) will be outsourced. each transformer will need to be de-energized for 5 days for installation, and testing will take place partially during the outage and upon energization.
2.The Manhours are included for Lead Commission Engineer, Construction Representative, Electrical, Test and Civil.
3.Estimated risks are 7% and contingency 3% of the project total cost per estimating group recommendations.
4.DSCADA commissioning and switching will performed by Eversource personnel.
5.Estimate assumes existing communication are in good working condition.
6. Major Material have been ordered.
7.The transformer alarms will be modified and will be taken back to the SEL-2240 Axion.
8. Priors **of 528k** posted on Initial Funding Project/Work Order; CS009058/80134678 will be journaled to this Program Release Project"
9. Existing 3 *conduit lengths* will be used for both 3X and 4X transformers for fiber installation from DSCADA Cabinet in Control House to LTC cabinets mounted on Tranformers.
* On the 12B-3X replace the existing **Westinghouse control** with a new Beckwith 2001D control. Will need **new adapter plate.**
* On the 12B-4X replace the existing Beckwith **M-0067E control** with a new Beckwith 2001D control. Will need **new adapter plate**.
10. Estimate assumes Fiber optic cable install in existing conduits each 550ft of length.

RISKS

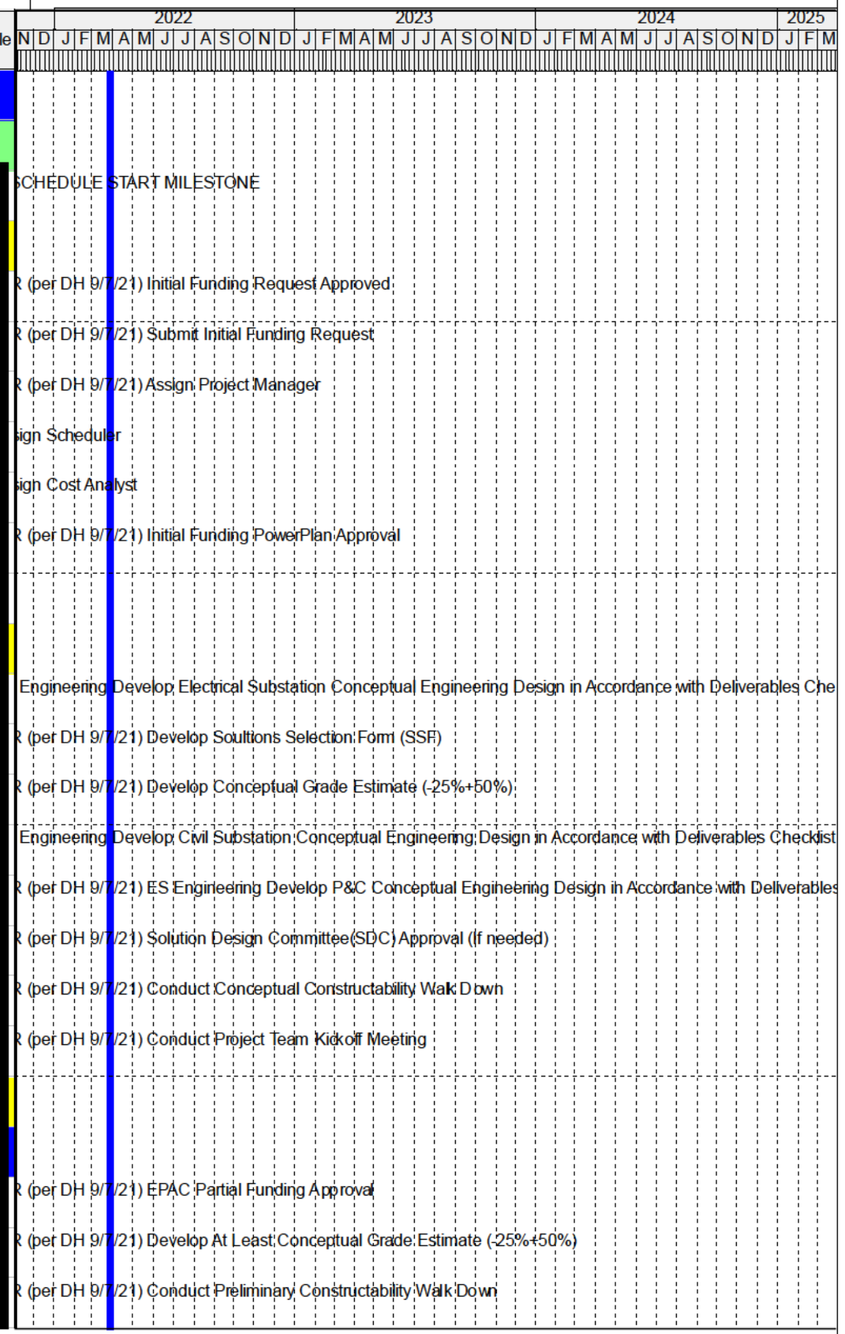
Potential UG Obstructions	$ 20,000
Severe Weather Delays OT	$ 30,000
Design development & Field mark Up	$ 14,000

UNESCALATED LINE ITEM DOLLARS

Project Number CS00620
Date of Estimate 03/08/2022
Estimate revision # 00

Escalation Rate		E Rate	$	05		2022		2023	1	TOTAL
			Prior							
			Mhrs	DOLLARS		DOLLARS	Mhrs	DOLLARS		DOLLARS
CSTXX-CONSTRUCTION	R									
Electrical Construction	LT									
General Construction	LT									
SCADA / Automation	LT					$4,200				$4,200
Telecom - Field	LT									
Construction Reps (Internal)	LT					$1,890				$1,890
Support Switch/Tag	LT					$4,404				$4,404
Other (specify)	LT									
Other (specify)	LT	$ -								
Other (specify)	LT	$ -								
LT Total						$10,494				$10,494
Employee Expenses	AE	8%				$835				$835
Construction Purchased Material	AM	1%				$1,746				$1,746
Outside Construction Vendor	AQ					$174,626				$174,626
Sales tax on Constr. Vendor										
Vehicles (now in Indirects section)	AV									
Inspection services (Outside Vendor)	AQ									
Construction Rep (Outside vendor)	AQ					$7,104				$7,104
Rents and Leases	BR									
CSTXX Subtotal						$194,505				$194,505
Escalation										
CSTXX Total						$194,505				$194,505
ENPXX-TG ENGINEERING/DESIGN										
Project Services/Drafting						$3,098		$774		$3,872
T- Line Engineering/Design										
D- Street Engineering/Design										
Civil Engineering/Design						$1,162		$387		$1,549
Substation (T) Engineering/Design										
Substation (D) Engineering/Design						$4,200		$1,260		$5,460
Protection & Controls Engineering						$3,629		$907		$4,536
Survey Engineering										
SCADA / Automation Engineering										
Telecom Engineering						$1,334		$890		$2,224
Other - PF Actuals				$91,300						$91,302
Other - Project Engineer										
LT Total				$91,300		$13,423		$4,218		$48,843
Employee Expenses						$671		$211		$882
Contractor Engineering - T-Lines										
Contractor Engineering - D-Street										
Contractor Engineering - T -Station										
Contractor Engineering - D-Station										
Contractor Engineering - P&C										
Contractor Engineering - Survey										
Contractor Engineering - SCADA / Automation										
Contractor Engineering - Telecom										
Contractor Engineering - AM						$6,200		$2,480		$8,680
Contractor Engineering - Specify										
Contractor Engineering - Specify										
Vehicles (now in Indirects section)										
ENPXX Subtotal				$91,300		$20,294		$6,909		$58,405
Escalation										
ENPXX Total				$91,300		$20,294		$6,909		$58,405
LNDXX-TG LAND										
Real Estate										
Employee Expenses	AE	8%								
Purchase Land	AM									
Vehicles (now in Indirects section)	AV									
Fees and Payments	BF									
LNDXX Subtotal										
Escalation										
LNDXX Total										
MATXX-TG MATERIAL										
Eversource	AM					$40,900				$40,900
Outside Services	AM									
AM										
Freight										
Sales Tax Eversource/outside services	3.8%	3.8%				$1,900				$1,900
Other										
MATXX Subtotal						$42,800				$42,800
Escalation										
MATXX Total						$42,800				$42,800
PSMXX-PROJECT MANAGER & SUPPORT										
Project Management (PM)	LT					$8,736				$8,736
Project Planning/Cost (IP)	LT									
Contracts/Purchasing (CIP)	LT					$1,286				$1,286
System Planning	LT									
Environmental	LT									
SCS - None	LT									
Legal	LT									
Estimating	LT					$2,368				$2,368
Siting - None	LT									
Asset Management	LT					$1,361				$1,361
Other -	LT									
Other -	LT									
Other -	LT									
Other -	LT									
LT Total						$13,751				$13,751
Employee Expenses	AE					$688				$688
Project Support Vendor - PM	AQ									
Project Support Vendor - IP	AQ									
Project Support Vendor - CIP	AQ									
Project Support Vendor - System Planning	AQ									
Project Support Vendor - Environental	AQ									
Project Support Vendor - SCS - 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									
Vehicles (now in Indirects section)	AV									
Property or CMIP tax large proj allowance	BR									
Builder All risk insurance excluding deductables(if project is over $50m)	BR									
Fees and Payments - Environental	BF									
Fees and Payments - Siting	BF									
Fees and Payments - Other	BF									
PSMXX Subtotal						$14,439				$14,439
Escalation										
PSMXX Total						$14,439				$14,439
RSMXX-TG REMOVAL										
Engineering/Design	LT									
Internal Construction	LT									
LT Total										
Employee Expenses	AE									
Outside Services	AQ									
Contractor Labor	AQ					$14,800				$14,800
Vehicles (now in Indirects section)	AV									
Rents and Leases	BR									
RSMXX Subtotal						$14,800				$14,800
Escalation										
RSMXX Total						$14,800				$14,800
TSTXX-TG TEST										
Test / Field Engr. Labor (In House)	LT									
Lead Commissioning Engr. (LCE) (Internal)	LT									
Employee Expense	AE									
Test / Field Engr. Labor (contractor)	AQ					$96,300				$96,300
Lead Commissioning Engr. (LCE) (contactor)	AQ					$55,840				$55,840
Vehicles (now in Indirects section)	AV									
TSTXX Subtotal						$151,640				$151,640
Escalation										
TSTXX Total						$151,640				$151,640
SUBTOTAL PROJECT DIRECT COST			-	$91,300		$438,578	112	$6,909	2,706	$476,489
Risk										
Risk						$64,000				$64,000
						$ -		$ -		
						$ -		$ -		
Risk Total						$64,000				$64,000
TOTAL PROJECT DIRECT COST (w risk)			-	$91,300		$502,578	112	$6,909	2,706	$540,489
INDIRECTS										
Non-Productive Time Allocation (SNP)	15.1%					$5,969		$835		$6,804
Payroll Benefits Allocation (SPB) Incl NPT	44.0%					$5,312				$5,312
Gen SVC CO Overhead (SGR) Incl NPT	80.0%					$25,011		$3,882		$28,893
E&S Allocations (SER,SIL,SBN)	60.0%					$356,944		$6,729		$363,673
AG&E Allocations (SNA)	1.3%					$9,141		$227		$9,368
Stores Expense Allocation (SIF)	8.0%					$3,272				$3,272
Lobby Stock										
MOEC (SMI)	6.0%					$27,804		$656		$28,460
Vehicles (SVE)	28.0%					$10,547		$1,191		$11,738
Indirects Subtotal						$343,700		$13,340		$357,040
TOTAL PROJECT COST - Direct & Indirect (excl APUDC)				$91,300		$846,278		$20,249		$897,529
APUDC										
APUDC (DI)					6.50%	$27,066	6.50%		1	$27,066
In Service Dollars						-		-		
Cumulative ISS										
APUDC Subtotal						$27,066				$27,066
TOTAL PROJECT COST - Baseline Budget				$91,300		$873,143		$20,249		$924,594
Contingency										
Contingency						$28,421				$28,421
Other			$ -			$ -		$ -		
Contingency SubTotal						$28,421				$28,421
TOTAL PROJECT COST - Approved Funding				$91,300		$901,564		$20,249		$953,015
Reimbursables / Customer Contribution										
Reimbursables / Customer Contribution (enter as negative)			$ -			$ -		$ -		
TOTAL PROJECT COST				$91,300		$901,564		$20,249		$953,015

Activity Flag	Activity ID	Activity Name	Start	Original Duration	Finish	Resources	Activity Schedule
80134678 [redacted] 1 [redacted] DSCADA LTC Automation (CS00520)			07-Sep-21 A	329	29-Dec-22		
80134678.01 INITIALIZATION AND SCOPE DEVELOPEMENT			07-Sep-21 A	245	28-Aug-22		
	START	SCHEDULE START MILESTONE	04-Oct-21 A	0			
80134678.01.01 Initial Funding			07-Sep-21 A	20	07-Sep-21 A		
EPAC-I	PI1300	N/R (per DH 9/7/21) Initial Funding Request Approved		0	07-Sep-21 A		
	PI1000	N/R (per DH 9/7/21) Submit Initial Funding Request		0	07-Sep-21 A		
PM-AM	PI1400	N/R (per DH 9/7/21) Assign Project Manager	07-Sep-21 A	1	07-Sep-21 A		
	PI1500	Assign Scheduler	07-Sep-21 A	5	07-Sep-21 A		
	PI1600	Assign Cost Analyst	07-Sep-21 A	5	07-Sep-21 A		
PPA-IF	PI1010	N/R (per DH 9/7/21) Initial Funding PowerPlan Approval	07-Sep-21 A	10	07-Sep-21 A	Project	
	PI1200	N/R (per DH 9/7/21) Project Initiator Develop Intitial Funding Request	07-Sep-21 A	10	07-Sep-21 A		
80134678.01.02 SDC Approval			07-Sep-21 A	47	07-Sep-21 A		
ES-CONCPT	CE1100	ES Engineering Develop Electrical Substation Conceptual Engineering Design in Accordance with Deliverables Checklist	07-Sep-21 A	15	07-Sep-21 A	SUBSTATI ENGINEER	
	SSF1000	N/R (per DH 9/7/21) Develop Soultions Selection Form (SSF)	07-Sep-21 A	20	07-Sep-21 A		
EST-SDC	CGE1000	N/R (per DH 9/7/21) Develop Conceptual Grade Estimate (-25%+50%)	07-Sep-21 A	10	07-Sep-21 A	Generic Estimating	
ES-CONCPT	CE1000	ES Engineering Develop Civil Substation Conceptual Engineering Design in Accordance with Deliverables Checklist	07-Sep-21 A	15	07-Sep-21 A	CT-SS Civil Designer Generic	
ES-CONCPT	CE1400	N/R (per DH 9/7/21) ES Engineering Develop P&C Conceptual Engineering Design in Accordance with Deliverables Checklist	07-Sep-21 A	15	07-Sep-21 A	CT- P&C Engineer Generic	
SDC	SDC1000	N/R (per DH 9/7/21) Solution Design Committee(SDC) Approval (If needed)		0	07-Sep-21 A		
	CE1710	N/R (per DH 9/7/21) Conduct Conceptual Constructability Walk Down	07-Sep-21 A	1	07-Sep-21 A		
	CE1600	N/R (per DH 9/7/21) Conduct Project Team Kickoff Meeting	07-Sep-21 A	1	07-Sep-21 A		
80134678.01.09 Project Initiation			07-Sep-21 A	120	29-Apr-22		
80134678.01.09.2 EPAC Partial Funding			07-Sep-21 A	47	07-Sep-21 A		
EPAC-P	PF1000	N/R (per DH 9/7/21) EPAC Partial Funding Approval	07-Sep-21 A	1	07-Sep-21 A	Eversource Project Approval	
EST-PART	ATCGE1010	N/R (per DH 9/7/21) Develop At Least Conceptual Grade Estimate (-25%+50%)	07-Sep-21 A	10	07-Sep-21 A	Generic Estimating	
	PE1700	N/R (per DH 9/7/21) Conduct Preliminary Constructability Walk Down	07-Sep-21 A	1	07-Sep-21 A		



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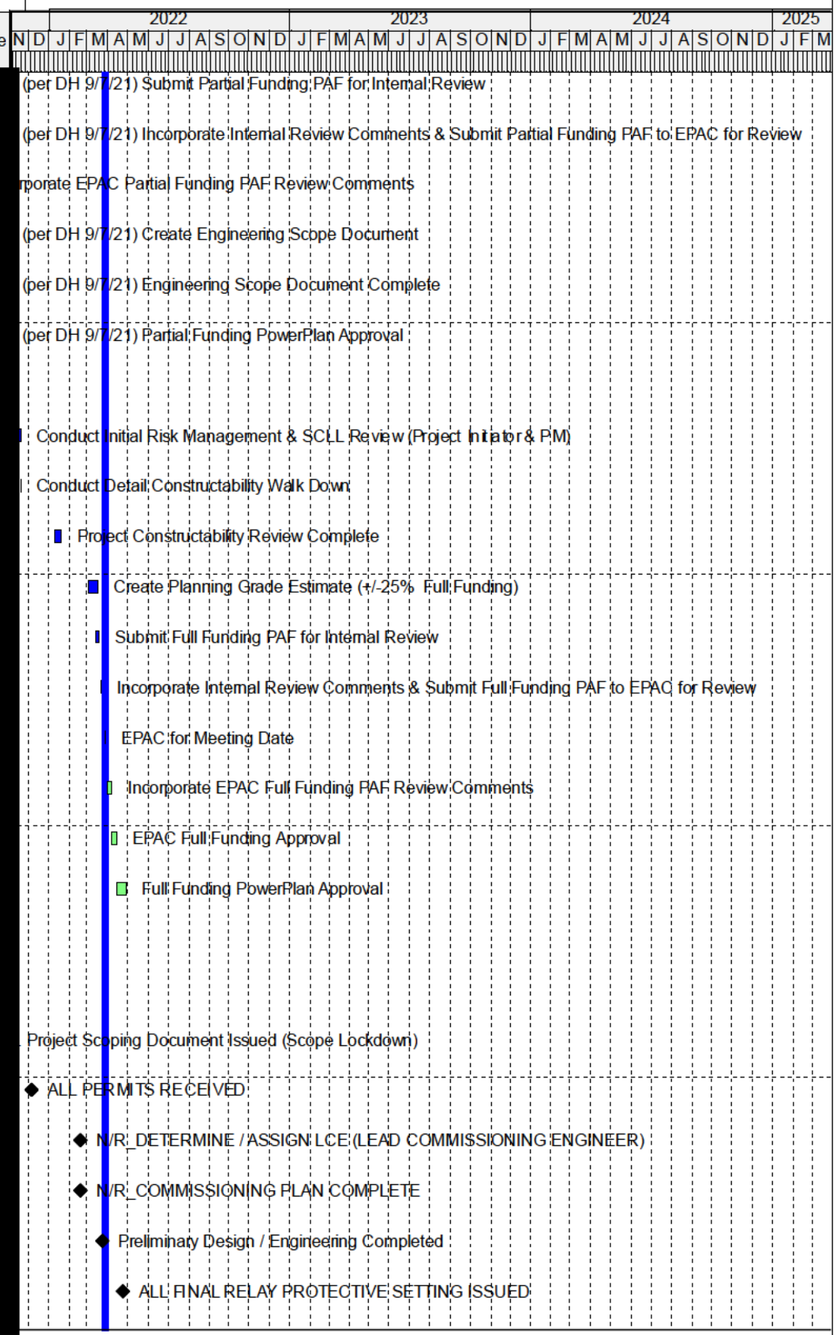
Activity Flag	Activity ID	Activity Name	Start	Original Duration	Finish	Resources	Activity Schedule
	PAFP1000	N/R (per DH 9/7/21) Submit Partial Funding PAF for Internal Review	07-Sep-21 A	10	07-Sep-21 A		
	PAFP1100	N/R (per DH 9/7/21) Incorporate Internal Review Comments & Submit Partial Funding PAF to EPAC for Review	07-Sep-21 A	5	07-Sep-21 A		
	PAFP1200	Incorporate EPAC Partial Funding PAF Review Comments	07-Sep-21 A	5	07-Sep-21 A		
	PE1710	N/R (per DH 9/7/21) Create Engineering Scope Document	07-Sep-21 A	5	07-Sep-21 A	CT- Project Engineer	
Scope Comp	PE1720	N/R (per DH 9/7/21) Engineering Scope Document Complete		0	07-Sep-21 A		
PPA-PF	PF1010	N/R (per DH 9/7/21) Partial Funding PowerPlan Approval	07-Sep-21 A	10	07-Sep-21 A	Eversource Project	
80134678.01.09.3 EPAC Full Funding			05-Nov-21 A	120	29-Apr-22		
	DE1700	Conduct Initial Risk Management & SCLL Review (Project Initiator & PM)	05-Nov-21 A	10	19-Nov-21 A		
	DE1900	Conduct Detail Constructability Walk Down	19-Nov-21 A	1	19-Nov-21 A		
Construct	DE2000	Project Constructability Review Complete	12-Jan-22 A	7	21-Jan-22 A		
EST-FULL	DE1600	Create Planning Grade Estimate (+/-25% Full Funding)	01-Mar-22 A	11	15-Mar-22 A		
	PAFF2000	Submit Full Funding PAF for Internal Review	15-Mar-22 A	4	18-Mar-22 A		
PAF Submit	PAFF2100	Incorporate Internal Review Comments & Submit Full Funding PAF to EPAC for Review	21-Mar-22 A	1	21-Mar-22 A		
PAF Submit	PAFF2105	EPAC for Meeting Date	29-Mar-22*	1	29-Mar-22		
	PAFF2200	Incorporate EPAC Full Funding PAF Review Comments	30-Mar-22*	7	07-Apr-22		
EPAC-F	FF1000	EPAC Full Funding Approval	08-Apr-22*	5	14-Apr-22	Eversource Project	
PPA-FF	FF1010	Full Funding PowerPlan Approval	15-Apr-22*	11	29-Apr-22	Eversource Project	
80134678.01.12 T-Minus Milestones			07-Sep-21 A	182	28-Aug-22		
80134678.01.12.1 T-Minus Milestones "A"Electrical			07-Sep-21 A	182	28-Aug-22		
ENG-SCOPE	A1100	Eng. Project Scoping Document Issued (Scope Lockdown)		0	07-Sep-21 A		
	AT0801	ALL PERMITS RECEIVED		0	07-Dec-21 A		
	AT2404	N/R_DETERMINE / ASSIGN LCE (LEAD COMMISSIONING ENGINEER)		0	18-Feb-22 A		
	AT1301	N/R_COMMISSIONING PLAN COMPLETE		0	18-Feb-22 A		
ENG-PRELIM	A1090	Preliminary Design / Engineering Completed		0	24-Mar-22 A		
	AT0404	ALL FINAL RELAY PROTECTIVE SETTING ISSUED		0	22-Apr-22		



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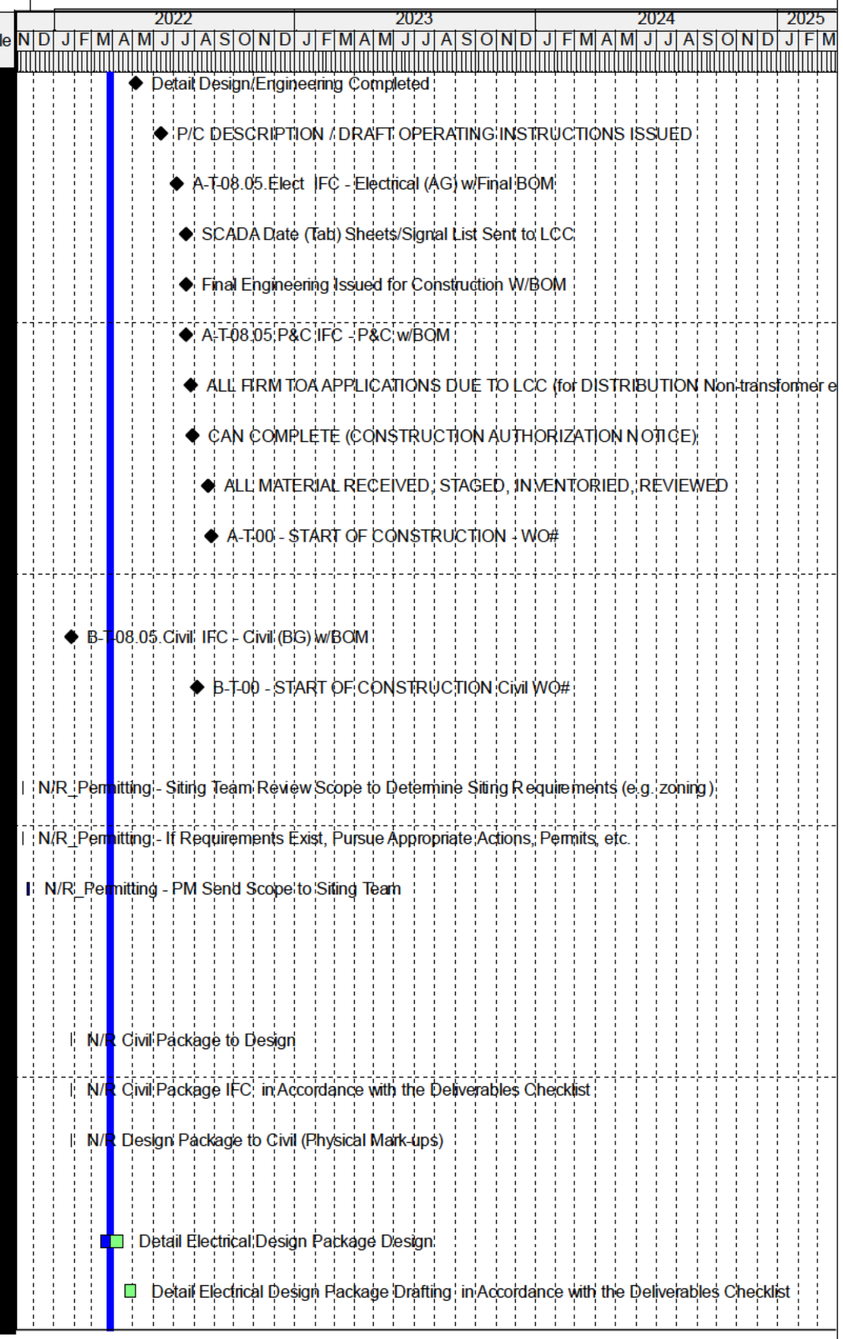
Activity Flag	Activity ID	Activity Name	Start	Original Duration	Finish	Resources
ENG-DTL	A3560	Detail Design/Engineering Completed		0	06-May-22	
	AT1202	P/C DESCRIPTION / DRAFT OPERATING INSTRUCTIONS ISSUED		0	13-Jun-22	
AG-IFC	AT0805E	A-T-08.05.Elect IFC - Electrical (AG) w/Final BOM		0	05-Jul-22	
	AT1201	SCADA Date (Tab) Sheets/Signal List Sent to LCC		0	20-Jul-22	
ENG-IFC	A3570	Final Engineering Issued for Construction W/BOM		0	20-Jul-22	
BG-IFC	AT0805P	A-T-08.05.P&C IFC - P&C w/BOM		0	20-Jul-22	
	AT0409	ALL FIRM TOA APPLICATIONS DUE TO LCC (for DISTRIBUTION Non-transformer equipment)		0	28-Jul-22	
	AT0203	CAN COMPLETE (CONSTRUCTION AUTHORIZATION NOTICE)		0	29-Jul-22	
	AT0401	ALL MATERIAL RECEIVED, STAGED, INVENTORIED, REVIEWED		0	23-Aug-22	
SOC	AT00	A-T-00 - START OF CONSTRUCTION - WO#	28-Aug-22*	0		
80134678.01.12.2 T-Minus Milestones "B" Civil			28-Jan-22 A	190	07-Aug-22	
BG-IFC	BT0805C	B-T-08.05.Civil IFC - Civil (BG) w/BOM		0	28-Jan-22 A	
SOC	BT00	B-T-00 - START OF CONSTRUCTION Civil WO#	07-Aug-22*	0		
80134678.04 SITING APPROVALS AND PERMITS			15-Nov-21 A	7	23-Nov-21 A	
	A3600	N/R_Permitting - Siting Team Review Scope to Determine Siting Requirements (e.g. zoning)	15-Nov-21 A	1	15-Nov-21 A	Siting Lead Generic
	A3610	N/R_Permitting - If Requirements Exist, Pursue Appropriate Actions, Permits, etc.	15-Nov-21 A	1	15-Nov-21 A	Siting Lead Generic
	A3590	N/R_Permitting - PM Send Scope to Siting Team	23-Nov-21 A	1	23-Nov-21 A	
80134678.05 ENGINEERING & DESIGN			18-Nov-21 A	172	26-Jul-22	
80134678.05.01 Civil Engineering			28-Jan-22 A	1	28-Jan-22 A	
	DSSE-110	N/R Civil Package to Design	28-Jan-22 A	1	28-Jan-22 A	
ES-IFC	DSSE-120	N/R Civil Package IFC in Accordance with the Deliverables Checklist	28-Jan-22 A	1	28-Jan-22 A	
	DSSE-100	N/R Design Package to Civil (Physical Mark-ups)	28-Jan-22 A	1	28-Jan-22 A	
80134678.05.02 Electrical Engineering			14-Mar-22 A	80	05-Jul-22	
	DSSE-200	Detail Electrical Design Package Design	14-Mar-22 A	20	15-Apr-22	
ES-DTL	DSSE-205	Detail Electrical Design Package Drafting in Accordance with the Deliverables Checklist	18-Apr-22	15	06-May-22	



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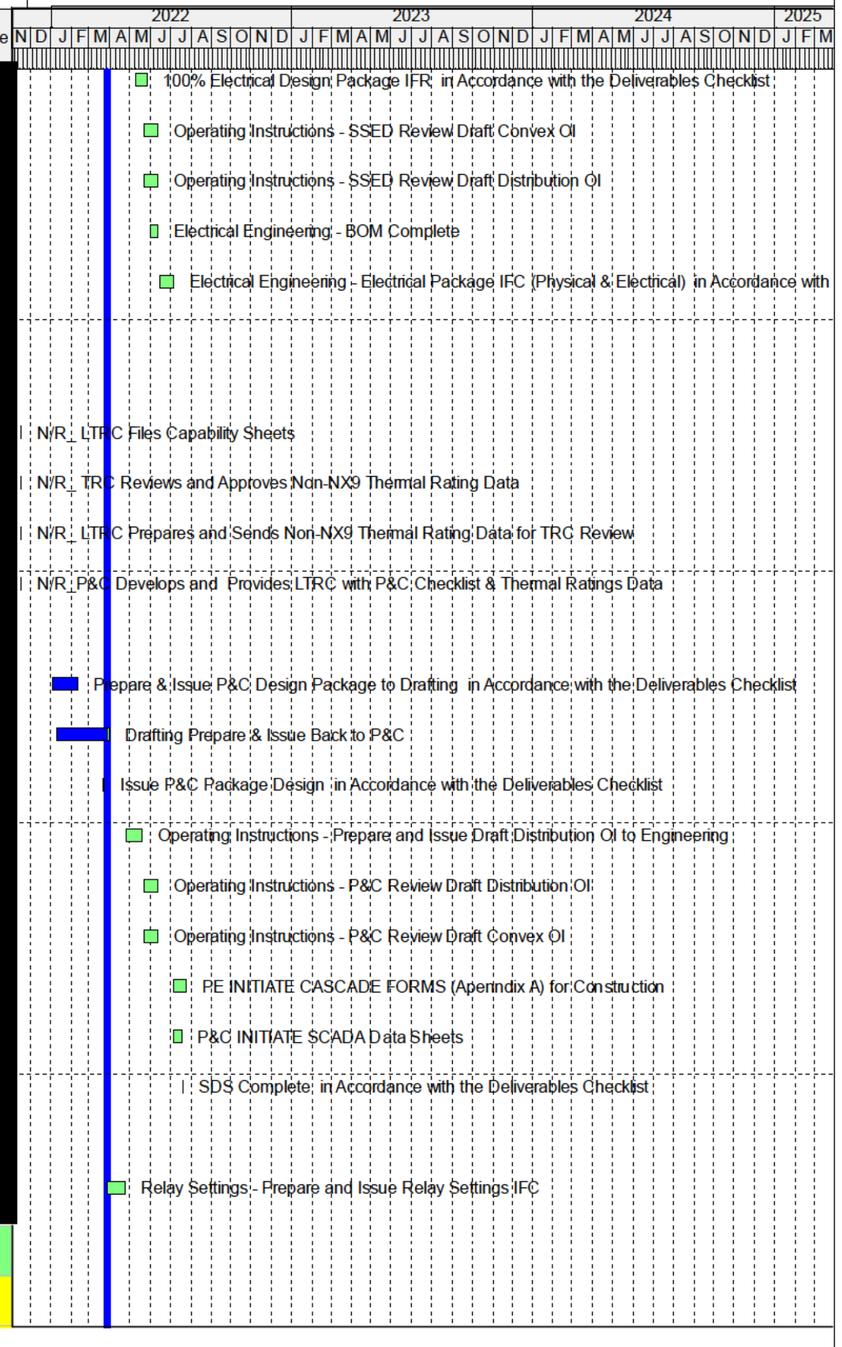
Activity Flag	Activity ID	Activity Name	Start	Original Duration	Finish	Resources	Activity Schedule
ES-100%	DSSE-210	100% Electrical Design Package IFR in Accordance with the Deliverables Checklist	09-May-22	15	27-May-22		
	DSSE-920	Operating Instructions - SSED Review Draft Convex OI	23-May-22	15	13-Jun-22		
	DSSE-460	Operating Instructions - SSED Review Draft Distribution OI	23-May-22	15	13-Jun-22		
	DSSE-230	Electrical Engineering - BOM Complete	31-May-22	10	13-Jun-22		
ES-IFC	DSSE-240	Electrical Engineering - Electrical Package IFC (Physical & Electrical) in Accordance with the Deliverables Checklist	14-Jun-22	15	05-Jul-22		
80134678.05.03 Distribution Thermal Ratings NX-9			18-Nov-21 A	10	18-Nov-21 A		
80134678.05.03.05 Non NX-9 Thermal Ratings			18-Nov-21 A	10	18-Nov-21 A		
	NX9A-EM74	N/R_ LTRC Files Capability Sheets	18-Nov-21 A	10	18-Nov-21 A		
	NX9A-EM64	N/R_ TRC Reviews and Approves Non-NX9 Thermal Rating Data	18-Nov-21 A	10	18-Nov-21 A		
	NX9A-EM54	N/R_ LTRC Prepares and Sends Non-NX9 Thermal Rating Data for TRC Review	18-Nov-21 A	10	18-Nov-21 A		
	NX9A-EM44	N/R_P&C Develops and Provides LTRC with P&C Checklist & Thermal Ratings Data	18-Nov-21 A	10	18-Nov-21 A	CT- P&C Engineer Generic	
80134678.05.04 P&C Engineering			03-Jan-22 A	143	26-Jul-22		
ES-CONCPT	DSSE-400	Prepare & Issue P&C Design Package to Drafting in Accordance with the Deliverables Checklist	03-Jan-22 A	20	11-Feb-22 A		
	DSSE-410	Drafting Prepare & Issue Back to P&C	10-Jan-22 A	7	31-Mar-22		
ES-PRELIM	A3380	Issue P&C Package Design in Accordance with the Deliverables Checklist	21-Mar-22 A	20	24-Mar-22 A		
	DSSE-450	Operating Instructions - Prepare and Issue Draft Distribution OI to Engineering	25-Apr-22	20	20-May-22		
	DSSE-470	Operating Instructions - P&C Review Draft Distribution OI	23-May-22	15	13-Jun-22		
	DSSE-930	Operating Instructions - P&C Review Draft Convex OI	23-May-22	15	13-Jun-22		
	DSSE-480	PE INITIATE CASCADE FORMS (Apenndix A) for Construction	06-Jul-22	15	26-Jul-22		
	DSSE-990	P&C INITIATE SCADA Data Sheets	06-Jul-22	10	19-Jul-22		
ES-IFC	DSSE-220	SDS Complete in Accordance with the Deliverables Checklist	20-Jul-22	1	20-Jul-22		
80134678.05.04.1 Relay Settings			28-Mar-22	20	22-Apr-22		
ES-RSET	DSSE-440	Relay Settings - Prepare and Issue Relay Settings IFC	28-Mar-22	20	22-Apr-22	CT- P&C Engineer Generic	
80134678.06 MATERIAL PROCUREMENT			23-Nov-21 A	189	23-Aug-22		
80134678.06.01 MATERIAL FOR P&C			02-May-22	80	23-Aug-22		



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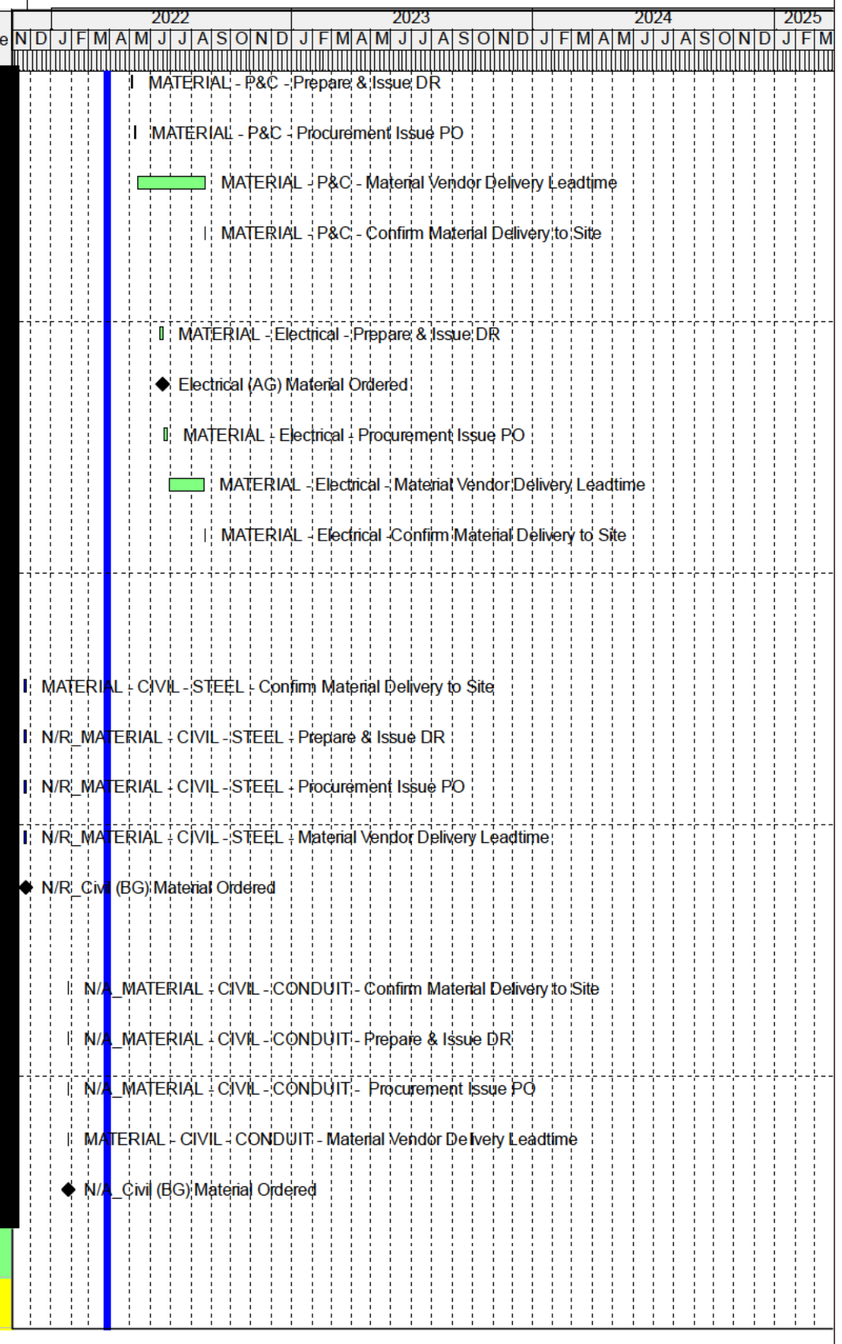
Activity Flag	Activity ID	Activity Name	Start	Original Duration	Finish	Resources
DR-ENG	DSSE-510	MATERIAL - P&C - Prepare & Issue DR	02-May-22	5	06-May-22	CT- P&C Engineer
	DSSE-980	MATERIAL - P&C - Procurement Issue PO	07-May-22	5	11-May-22	Purchasing Department
	DSSE-1000	MATERIAL - P&C - Material Vendor Delivery Leadtime	12-May-22	103	22-Aug-22	Purchasing Department
M-DELIV	DSSE-1010	MATERIAL - P&C - Confirm Material Delivery to Site	23-Aug-22	1	23-Aug-22	Purchasing Department
80134678.06.02 MATERIAL FOR ELECTRICAL			14-Jun-22	49	22-Aug-22	
DR-ENG	DSSE-520	MATERIAL - Electrical - Prepare & Issue DR	14-Jun-22	5	20-Jun-22	CT- Project Engineer
DR-AGMAT	DSSE-530	Electrical (AG) Material Ordered		0	20-Jun-22	
	DSSE-1020	MATERIAL - Electrical - Procurement Issue PO	21-Jun-22	5	27-Jun-22	Purchasing Department
	DSSE-1030	MATERIAL - Electrical - Material Vendor Delivery Leadtime	28-Jun-22	55	21-Aug-22	Purchasing Department
M-DELIV	DSSE-550	MATERIAL - Electrical -Confirm Material Delivery to Site	22-Aug-22	1	22-Aug-22	Purchasing Department
80134678.06.03 MATERIAL FOR CIVIL			23-Nov-21 A	45	28-Jan-22 A	
80134678.06.03.01 MATERIAL FOR CIVIL - STEEL			23-Nov-21 A	1	23-Nov-21 A	
M-DELIV	DSSE-560	MATERIAL - CIVIL - STEEL - Confirm Material Delivery to Site	23-Nov-21 A	1	23-Nov-21 A	Purchasing Department
DR-ENG	DSSE-500	N/R_MATERIAL - CIVIL - STEEL - Prepare & Issue DR	23-Nov-21 A	1	23-Nov-21 A	
	DSSE-1040	N/R_MATERIAL - CIVIL - STEEL - Procurement Issue PO	23-Nov-21 A	1	23-Nov-21 A	Purchasing Department
	DSSE-1050	N/R_MATERIAL - CIVIL - STEEL - Material Vendor Delivery Leadtime	23-Nov-21 A	1	23-Nov-21 A	Purchasing Department
DR-BGMAT	DSSE-540	N/R_Civil (BG) Material Ordered		0	23-Nov-21 A	
80134678.06.03.02 MATERIAL FOR CIVIL - CONDUIT			28-Jan-22 A	1	28-Jan-22 A	
M-DELIV	DSSE-1130	N/A_MATERIAL - CIVIL - CONDUIT - Confirm Material Delivery to Site	28-Jan-22 A	1	28-Jan-22 A	Purchasing Department
DR-ENG	DSSE-1140	N/A_MATERIAL - CIVIL - CONDUIT - Prepare & Issue DR	28-Jan-22 A	1	28-Jan-22 A	
	DSSE-1150	N/A_MATERIAL - CIVIL - CONDUIT - Procurement Issue PO	28-Jan-22 A	1	28-Jan-22 A	Purchasing Department
	DSSE-1160	MATERIAL - CIVIL - CONDUIT - Material Vendor Delivery Leadtime	28-Jan-22 A	1	28-Jan-22 A	Purchasing Department
DR-BGMAT	DSSE-1170	N/A_Civil (BG) Material Ordered		0	28-Jan-22 A	
80134678.07 CONSTRUCTION			28-Jan-22 A	191	30-Oct-22	
80134678.07.01 CONSTRUCTION - CIVIL			28-Jan-22 A	1	28-Jan-22 A	



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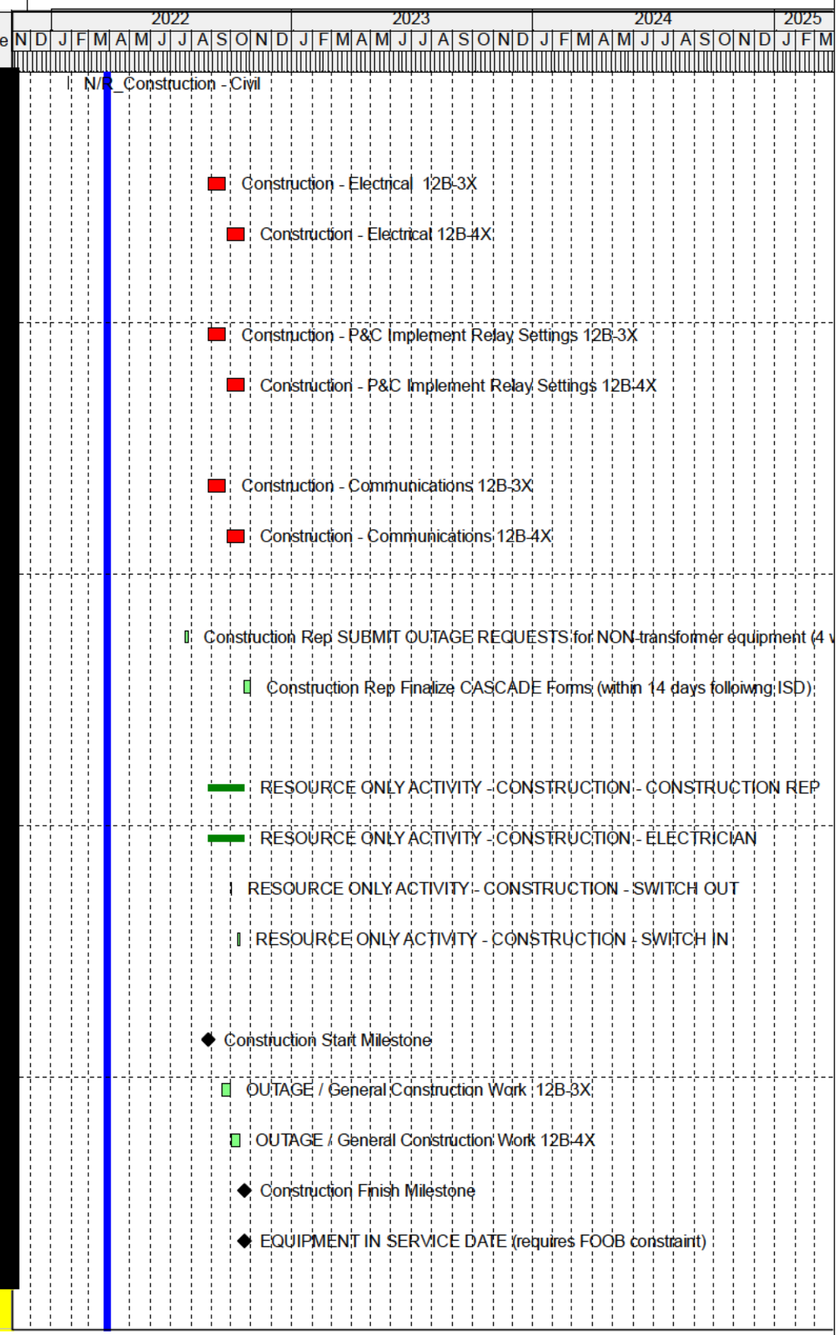
Activity Flag	Activity ID	Activity Name	Start	Original Duration	Finish	Resources
	A1120	N/R_Construction - Civil	28-Jan-22 A	1	28-Jan-22 A	Const Rep Field Sup - Civil
80134678.07.02 CONSTRUCTION - ELECTRICAL			28-Aug-22	54	20-Oct-22	
	A1130	Construction - Electrical [redacted]	28-Aug-22*	26	22-Sep-22	Const Rep Field Sup - S/S
	A1135	Construction - Electrical	25-Sep-22*	26	20-Oct-22	Const Rep Field Sup - S/S
80134678.07.03 CONSTRUCTION - P&C			28-Aug-22	54	20-Oct-22	
	A1140	Construction - P&C Implement Relay Settings [redacted]	28-Aug-22*	26	22-Sep-22	Constructio Rep Generic
	A1145	Construction - P&C Implement Relay Settings	25-Sep-22*	26	20-Oct-22	Constructio Rep Generic
80134678.07.04 CONSTRUCTION - COMMUNICATIONS			28-Aug-22	54	20-Oct-22	
	A1150	Construction - Communications [redacted]	28-Aug-22*	26	22-Sep-22	Constructio Rep Generic
	A1155	Construction - Communications	25-Sep-22*	26	20-Oct-22	Constructio Rep Generic
80134678.07.92 CONSTRUCTION - CONSTREP TASKS			24-Jul-22	99	30-Oct-22	
	A1250	Construction Rep SUBMIT OUTAGE REQUESTS for NON-transformer equipment (4 weeks before outage)	24-Jul-22*	5	28-Jul-22	Constructio Rep Generic
	A1260	Construction Rep Finalize CASCADE Forms (within 14 days folloiwng ISD)	21-Oct-22	10	30-Oct-22	Constructio Rep Generic
80134678.07.94 CONSTRUCTION RESOURCE TRACKING			28-Aug-22	54	20-Oct-22	
	ConRep-S	RESOURCE ONLY ACTIVITY - CONSTRUCTION - CONSTRUCTION REP	28-Aug-22	54	20-Oct-22	Constructio Rep Generic
	CONSTelec	RESOURCE ONLY ACTIVITY - CONSTRUCTION - ELECTRICIAN	28-Aug-22	54	20-Oct-22	Distribution - S/S Electrician
	A1070	RESOURCE ONLY ACTIVITY - CONSTRUCTION - SWITCH OUT	02-Oct-22*	1	02-Oct-22	Distribution Switching Crew
	A1080	RESOURCE ONLY ACTIVITY - CONSTRUCTION - SWITCH IN	13-Oct-22*	1	13-Oct-22	Distribution Switching Crew
80134678.07.96 CONSTRUCTION OUTAGES			28-Aug-22	54	20-Oct-22	
CRH	CSM	Construction Start Milestone	28-Aug-22	0		
OUT	TOA-Const 12B-3X	OUTAGE / General Construction Work 12B-3X	18-Sep-22*	12	29-Sep-22	Constructio Resources
OUT	TOA-Const 12B-4X	OUTAGE / General Construction Work 12B-4X	02-Oct-22*	12	13-Oct-22	Constructio Resources
	CFM	Construction Finish Milestone		0	20-Oct-22	
ISD	ISD	EQUIPMENT IN SERVICE DATE (requires FOOB constraint)		0	20-Oct-22*	
80134678.07.98 CONSTRUCTION CLOSEOUT			21-Oct-22	2	24-Oct-22	



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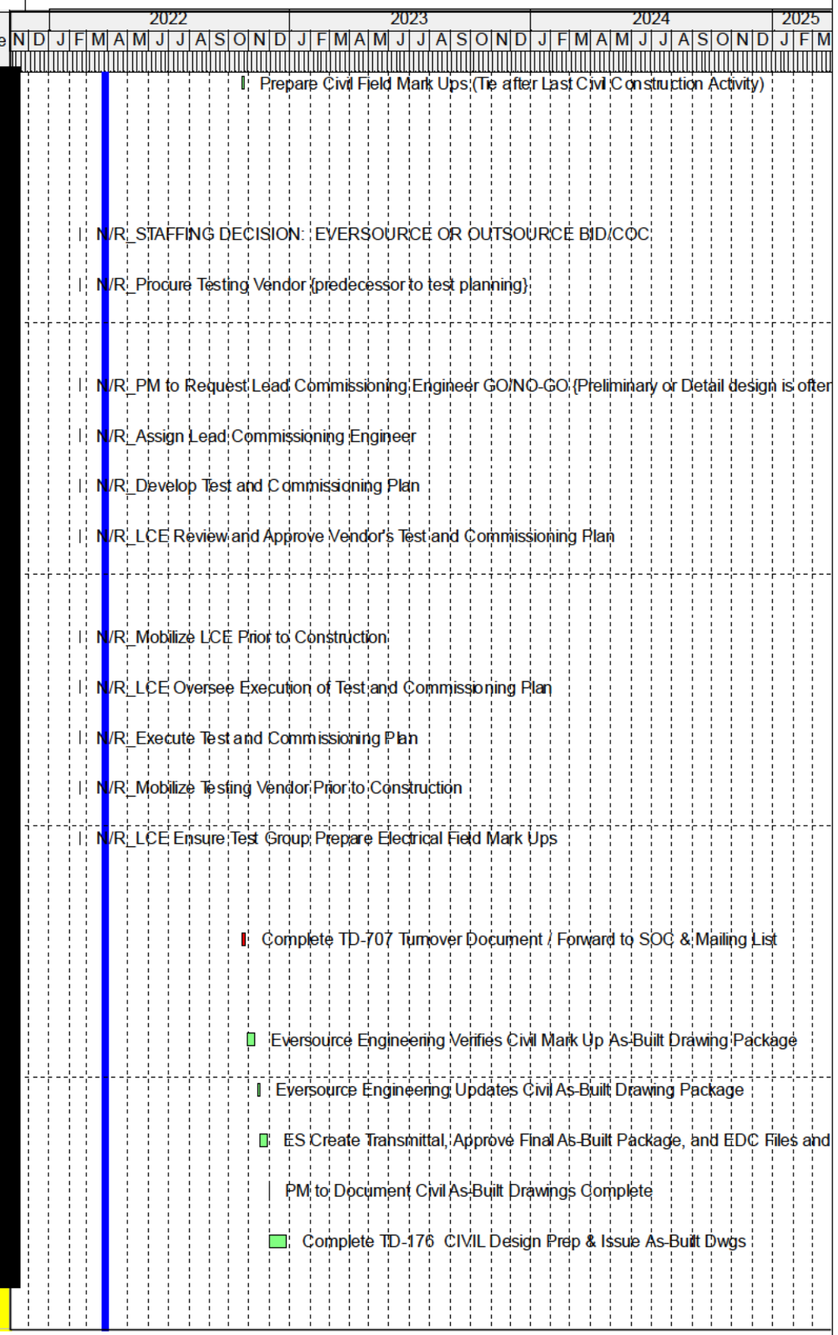
Activity Flag	Activity ID	Activity Name	Start	Original Duration	Finish	Resources
	DSSE-900	Prepare Civil Field Mark Ups (Tie after Last Civil Construction Activity)	21-Oct-22	2	24-Oct-22	Constructio Resources
80134678.09 TEST AND COMMISSION			18-Feb-22 A	1	18-Feb-22 A	
80134678.09.01 TEST - SERVICES STAFFING DECISION			18-Feb-22 A	1	18-Feb-22 A	
	A1010	N/R_STAFFING DECISION: EVERSOURCE OR OUTSOURCE BID/COC	18-Feb-22 A	1	18-Feb-22 A	Constructio Rep
	A3250	N/R_Procure Testing Vendor {predecessor to test planning}	18-Feb-22 A	1	18-Feb-22 A	[redacted]
80134678.09.02 LCE PLANNING			18-Feb-22 A	1	18-Feb-22 A	
	LCE100	N/R_PM to Request Lead Commissioning Engineer GO/NO-GO {Preliminary or Detail design is often the predecessor}	18-Feb-22 A	1	18-Feb-22 A	
	LCE200	N/R_Assign Lead Commissioning Engineer	18-Feb-22 A	1	18-Feb-22 A	
	LCE400	N/R_Develop Test and Commissioning Plan	18-Feb-22 A	1	18-Feb-22 A	CT/WMA Test Contractor
	LCE500	N/R_LCE Review and Approve Vendor's Test and Commissioning Plan	18-Feb-22 A	1	18-Feb-22 A	LEAD COMMISSI ENGINEER
80134678.09.04 TEST ACTIVITIES			18-Feb-22 A	1	18-Feb-22 A	
	LCE310	N/R_Mobilize LCE Prior to Construction	18-Feb-22 A	1	18-Feb-22 A	LEAD COMMISSI ENGINEER
	LCE610	N/R_LCE Oversee Execution of Test and Commissioning Plan	18-Feb-22 A	1	18-Feb-22 A	LEAD COMMISSI ENGINEER
	LCE620	N/R_Execute Test and Commissioning Plan	18-Feb-22 A	1	18-Feb-22 A	Engineering Contractor
	LCE320	N/R_Mobilize Testing Vendor Prior to Construction	18-Feb-22 A	1	18-Feb-22 A	CT/WMA Test Contractor
	LCE700	N/R_LCE Ensure Test Group Prepare Electrical Field Mark Ups	18-Feb-22 A	1	18-Feb-22 A	LEAD COMMISSI ENGINEER
80134678.10 PROJECT CLOSE OUT			18-Feb-22 A	217	29-Dec-22	
	DSSE-1100	Complete TD-707 Turnover Document / Forward to SOC & Mailing List	21-Oct-22	5	27-Oct-22	
80134678.10.01 Civil As-Builts			28-Oct-22	41	28-Dec-22	
	DSSE-860	Eversource Engineering Verifies Civil Mark Up As-Built Drawing Package	28-Oct-22	10	10-Nov-22	CT-Substation Designer
	DSSE-970	Eversource Engineering Updates Civil As-Built Drawing Package	14-Nov-22	3	16-Nov-22	CT- Project Engineer Generic
ES-ASB	DSSE-870	ES Create Transmittal, Approve Final As-Built Package, and EDC Files and Issue Drawings to Field	17-Nov-22	8	29-Nov-22	CT-Substation
	DSSE-880	PM to Document Civil As-Built Drawings Complete	30-Nov-22	1	30-Nov-22	
	DSSE-1120	Complete TD-176 CIVIL Design Prep & Issue As-Built Dwgs	30-Nov-22	20	28-Dec-22	CT-Substation Design
80134678.10.02 Electrical As-Builts			28-Oct-22	42	29-Dec-22	



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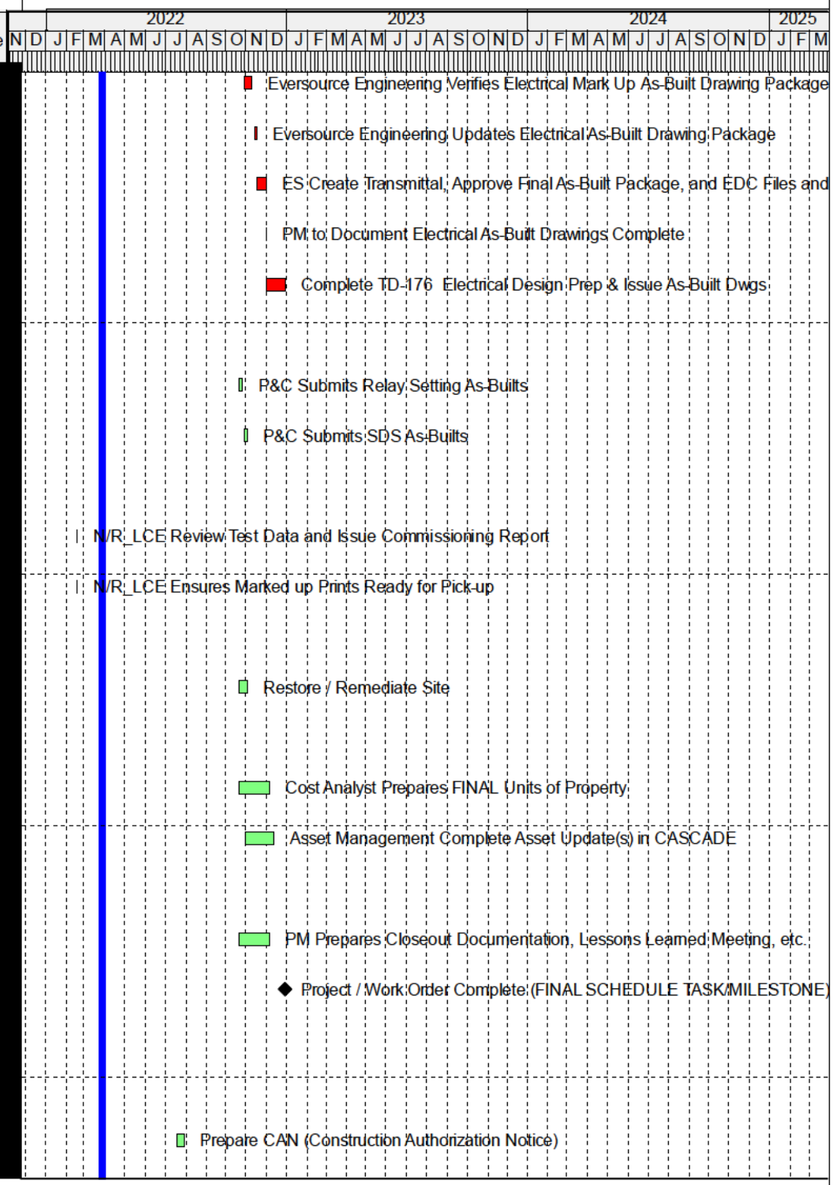
Activity Flag	Activity ID	Activity Name	Start	Original Duration	Finish	Resources
	DSSE-820	Eversource Engineering Verifies Electrical Mark Up As-Built Drawing Package	28-Oct-22	10	10-Nov-22	CT-Substation Designer
	DSSE-940	Eversource Engineering Updates Electrical As-Built Drawing Package	14-Nov-22	3	16-Nov-22	CT-Substation Designer
ES-ASB	DSSE-830	ES Create Transmittal, Approve Final As-Built Package, and EDC Files and Issue Drawings to Field	17-Nov-22	9	30-Nov-22	CT-Substation
	DSSE-840	PM to Document Electrical As-Built Drawings Complete	01-Dec-22	1	01-Dec-22	
	DSSE-1110	Complete TD-176 Electrical Design Prep & Issue As-Built Dwgs	01-Dec-22	20	29-Dec-22	CT-Substation Design
80134678.10.03 P&C As-Builts			21-Oct-22	10	03-Nov-22	
	DSSE-960	P&C Submits Relay Setting As-Builts	21-Oct-22	5	27-Oct-22	CT- P&C Engineer Generic
	DSSE-950	P&C Submits SDS As-Builts	28-Oct-22	5	03-Nov-22	CT- P&C Engineer Generic
80134678.10.04 Test Closout			18-Feb-22 A	1	18-Feb-22 A	
	LCE900	N/R_LCE Review Test Data and Issue Commissioning Report	18-Feb-22 A	1	18-Feb-22 A	LEAD COMMISSI ENGINEER
	LCE800	N/R_LCE Ensures Marked up Prints Ready for Pick-up	18-Feb-22 A	1	18-Feb-22 A	LEAD COMMISSI ENGINEER
80134678.10.05 SITE RESTORATION CLOSEOUT			21-Oct-22	10	03-Nov-22	
	A1110	Restore / Remediate Site	21-Oct-22	10	03-Nov-22	CT/WMA.C Contractor-
80134678.10.06 MATERIAL, EQUIPMENT, COST, AND ASSET MANAGEMENT CLOSEOUT			21-Oct-22	36	13-Dec-22	
	A1020	Cost Analyst Prepares FINAL Units of Property	21-Oct-22	30	05-Dec-22	CT- Cost Analyst
	A1030	Asset Management Complete Asset Update(s) in CASCADE	31-Oct-22	30	13-Dec-22	
80134678.10.07 PROJECT MANAGEMENT CLOSEOUT			21-Oct-22	47	29-Dec-22	
	A1040	PM Prepares Closeout Documentation, Lessons Learned Meeting, etc.	21-Oct-22	30	05-Dec-22	
	FINISH	Project / Work Order Complete (FINAL SCHEDULE TASK/MILESTONE)		0	29-Dec-22	
80134678.13 OVERHEAD / INDIRECTS			18-Jul-22	10	29-Jul-22	
80134678.13.01 PROJECT MANAGEMENT			18-Jul-22	10	29-Jul-22	
	A1170	Prepare CAN (Construction Authorization Notice)	18-Jul-22*	10	29-Jul-22	

Activity Schedule



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Constructability Review Form: **M6-PM-2012 - Eversource**

Substation Constructability Review

Project Title: 2022 DSCADA LTC Program - [redacted]	☐	Prior Constructability Review Performed?
	☒	Program Related Site Specific Review?
Project Numbers(s): CS00520 (Program # CS00407)	**Project Constructability Phase:**	
Date(s) of Constructability Review: 11/19/2021	☒ Conceptual Engineering Design	
Click to enter a date	☐ Preliminary Engineering Design	
	☐ Detailed Engineering Design	

Project Scope Statement:

Install Distribution Supervisory Control and Data Acquisition (DSCADA) Load Tap Changer (LTC) Automation at Bunker Hill 12B to replace the obsolete radio-controlled system for substation LTC voltage reduction.

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	[redacted]
☐	☒	Constr. Management	[redacted]	☐	☐	Civil Engineering	
☐	☐	S/S Technical / LCE		☐	☐	Telecom	
☐	☐	S/S Operations**	[redacted]	☐	☐	Environmental	
☐	☐	Field Engineering		☐	☐	Real Estate	
☐	☐	Line Engineering		☐	☐	ROW T&D Rights & Survey	
☐	☐	Vegetation Management		☐	☐	Survey Engineering	
☐	☐	Siting		☐	☐	Cost Estimating	
☐	☐	Safety		☐	☐	Project Services (Outreach)	
☐	☐	SCADA		☐	☐	Material Procurement	

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

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

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

[redacted]_____1/21/2022_____Name / Signature

Date

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Constructability Review Form: **M6-PM-2012 - Eversource**

Substation Constructability Review

Documents available for use prior to Constructability Review					
[X]	Document	[X]	Document	[X]	Document
☐	Initial Scope -Birdseye site plan -General Arrangement	☐	Preliminary Drawings -Civil Site Drawing -Electrical Drawing -Section Drawings	☒	Prints in hand for marking up -Panel Front/Read View -Control Enclosure Layout -Floor / Wall Plans
☐	Detailed Scope Document	☒	Proposed Schedule	☐	Construction Sequence/Timeline
☐	Previous Notes / Comments / Observations	☒	Major Material / Equipment List	☐	Replace / Reuse of equipment

Action Items and Resolutions:

Item No.	Const. Review Action Item/Concern	Design Resolution/Mitigation:
1	Verify Availability of BG Conduits	Determine conduit routing between the control house manholes and transformers 3X and 4X. Physically check current utilization of conduits to determine whether existing conduits can be used, or new must be installed.
2	Confirm existing tap changer controls on both 12B-3X and 12B-4X transformers.	[redacted] Westinghouse controls – will need new Beckwith 2001D controls w new adapter plate. [redacted]: Beckwith M-0067E controls – will need new Beckwith 2001D controls w new adapter plate.
3	Annunciators	New SEL-2533 annunciators will have to be installed on both [redacted]
4		
5		

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
A	**Engineering & Asset Management**		

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Constructability Review Form: **M6-PM-2012 - Eversource**

Substation Constructability Review

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
1	**Scope of Work** - Is scope adequately developed and sufficiently detailed for intended deliverable? - Any complimentary projects or other adjacent obsolete equipment for inclusion? - Any overlapping projects that could impact work/outages? - Consider Physical Installation, P&C Scope, Civil Scope, Engineering studies, Design standard adherence - Any remote station impacts? - Engineering Estimates for Design and Technical Support? (EE and EOC) Total Project	☐	Scope adequate
2	**Materials Identified/Ordered** -Any concerns with BOM/Major Materials? Review BOM lead times and project need dates -Specialty Major Materials: Identify Specialty Equipment & Materials potentials - temporary/replacement - long lead items? -Any Materials needed to facilitate construction access?	☐	Major materials identified as: - Two (2) LTC DSCADA Cabinet RTUs, one for each transformer - Two (2) LTC tap position monitors, one for each transformer - Two (2) M-2001D Beckwith tap changer controls - Two (2) M-2067B Beckwith Adapter Panels, one for each transformer - Two (2) SEL-2533 Annunciators, one for each transformer - Two (2) AMR (Auto Manual Remote) Switches, one for each transformer
3	**Control House** - Review Unmapped equipment interferences, Control/Battery Enclosure Layout, HVAC System (if equipment added), space for new or modified equipment, AC / DC station breaker availability and service loading, Panel Space, Expansion, one-line and/or riser type panelboard drawings, other..	☐	Adequate space for DSCADA addition
4	**Ratings & Dimensions** for Major Equipment. Any concerns upon field review? Equipment Rating One Line (and/or equipment thermal ratings tables) - Review for any errors in field	☐	N/A

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Constructability Review Form: **M6-PM-2012 - Eversource**

Substation Constructability Review

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
5	**Wall, Fence, Gate, and Foundation Considerations** -Any permanent / temporary alterations or relocations required? -Pre-Project Sound Measurements Needed? Sound Walls? -Take measurements for Foundation quantities, dimensions and concrete volumes -CIP Review/Ballistic needs. Any Physical Security Requirement Consideration? -Assess condition of existing yard equipment foundations and viability for reuse (if proposed) -Review station expansion areas (if needed) for structures, old foundations, etc. -Any Steel Structural Plan Considerations? -Any impacts to construction plan?	☐	N/A
6	**Below Grade / Enclosure Raceway** - If possible, evaluate existing raceway and review spacing requirements. Review for any subsurface investigation needs or potential below grade obstructions. GPR/test pits needed? Geotechnical Investigation - is soil boring or resistivity investigation needed?	☐	N/A – Engineering & Construction verified on site that project can utilize existing BG conduits for both 12B-3X and 12B-4X
7	**Underground Obstructions** -Drawing review concerns? -Is preconstruction or test excavation needed? -Is reuse of underground control cables / Conduits /replace Non-Shielded Cable feasible (if applicable) -Are spare conduits available? Are they useable? -Review if any areas will need to be plated for increased load bearing for equipment access (i.e., large Xfmr, etc.)	☐	N/A – Engineering & Construction verified on site that project can utilize existing BG conduits for both [redacted]
8	**Grounding Plan (Ground Grid)** - Will footprint impact layout or other equipment? Identify locations to improve grounding. Impacts to foundations and ground grid plans. Observations on wetlands or ability to perform tests	☐	N/A

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Constructability Review Form: **M6-PM-2012 - Eversource**

Substation Constructability Review

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
9	Nomenclature / Switching One-Line Diagram -Any obvious deviations from diagrams provided?	☐	N/A
10	BPS Separation Requirements - Is this BPS Substation? Y/N (part of PAF) - Changes to pre-existing BPS standards?	☐	N/A
11	IEC 61850 Substation Automation and Communication Requirements - Any Impacts/Retrofit needed?	☐	N/A
12	Any Upgrades to ES Standards - Is retrofit needed to bring up to ES standards? Can that be done?	☐	N/A
B	**Construction**		
1	**Any safety hazards specific to the facility? i.e., Low Bus, Deterioration, etc.**	☐	N/A
2	**Prior known Site Specific Conditions** -Common or Obvious station Issues -Missing scope items that could impact costs?	☐	
3	**Identify/Consider Required Depts for Construction?** -Who is constructor: Internal vs External Resources -S/S Ops, GO, Test, Field Engineering, etc. -Specialty Contractors Required? -Required Oversite Needed - Estimated level of CR and LCE support needed	☐	N/A

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Constructability Review Form: **M6-PM-2012 - Eversource**

Substation Constructability Review

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
4	**Site Plan, Access, and Temporary Construction Facilities:** -Confirm maintenance access for proposed new or replaced equipment -Verify clear footprint for yard equipment / Property Plan -General access to site, can areas outside substation be utilized? -Substation Entry Plan (driveway and drive path modifications) - Identification of Unique Requirements, i.e. (access bridges, station service, etc.) -Site Development Plan (grading and drainage) with Cut/Fill -Existing Rock Conditions? Potential Impacts (rock quantity)? -Any police details needed for deliveries, restricted hours, and/or need for extended hour approvals -Any Sanitary Civil Requirements? (Septic tanks, etc.) -Review turning radius for delivery trucks (if critical) -Any Substation Access and site/yard access Limitations? -Office Trailer Needs: Facilities, Utilities, Restroom, Container, Dumpster Space -Weather impacts to Site (Snow Placement) -Identify Material Laydown and Security -Where will new vs removed equipment go? -Construction permit for trailers outside substation fence?	☐	No issues
5	Unique Equipment Considerations: Gas insulated substation, Gas insulated line, Gas insulated bus, Pass Breaker, Statcom, Sync Condenser		N/A

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Constructability Review Form: **M6-PM-2012 - Eversource**

Substation Constructability Review

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
6	**Outage & Energization Plan and Construction Sequence:** *Review electrical working clearances for equipment during construction, Detailed look at protection zone changes, Locked sequence or random outages, Outage durations minimized.* ***Considerations:*** -Approach Distances – Outage Requirements to maintain electrical clearances throughout proposed installation -Distribution Clearances -Clearance Holder Assignments -Drawings vs Field Conditions -Outage boundaries and interconnections -Phased approach needs for additional mobilizations -Verify outage sequence supports the planned construction sequence and timeline. (Lead Commissioning Engineer "LCE", Substation Operations, and Outage Planner input) -Any design alterations or considerations to Eliminate SCLL Conditions, Reduce Recall Time, Reduce Outage durations, Special Conditions -Additional outage requirements: Railroad Catenaries, Fiber outage, SCADA outage, Relay permissions -Seasonal or weather conditions impacts	☐	Transformer outages determined by construction
7	**Equipment Testing & Acceptance** -Grounding plans / Resources? Will we need grounds hung? -Hi-pot testing and where will the equipment be set up?	☐	N/A
8	Need for mobile generator and where connected (if needed)	☐	N/A
9	Need for mobile battery and where connected (if needed)	☐	N/A
10	OT work required or Notable Permit Conditions (special hours)?	☐	N/A
11	Coordination of boundaries/seams (Identification of point of demarcation for connection to existing equipment and/or for coordination with other municipalities)	☐	N/A

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Constructability Review Form: **M6-PM-2012 - Eversource**

Substation Constructability Review

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
C	**Environmental**		
1	Soil Pre-Characterization or Grab Sampling Completed/Planned	☐	N/R – Project will utilize existing BG conduits
2	**Desktop investigation and EAD Review** -Required Permits -Stormwater Considerations -Dewatering requirements -Wetland and buffer review	☐	N/A
3	Risk or presence of PCB's/Asbestos/Lead/SF6	☐	N/A
4	Transformer Spill Containment Recommended?	☐	N/A
5	Expanding Footprint / New Buildings or future Expansion Plans? (Enviro Impact)	☐	N/A
6	Environmental oversight considerations? (Inspection type/Interval)	☐	N/A
7	Environmental mitigations - Any matting or seasonal needs? Review D&M Plan with CR.	☐	N/A
D	**Siting, Project Services, and ROW T&D Rights & Survey**		
1	**Any regulatory concerns or approvals needed?** - Any concerns noted that could be mitigated by scope/design alterations? - Likely to require visual screening? What considerations (feasibility or location)? -Zoning Relief and Permits required?	☐	N/A
2	Other siting considerations?	☐	N/A
3	**Neighbor/Abutter impacts:** - Any noise, visual impacts, or sensitive abutters - Any changes to lighting or additional lighting needed?	☐	N/A
4	Review for roadway, gate access, trailers, equip height, noise, weekend/night work, or any potential public disturbance related to work	☐	N/A
5	Installation within Eversource Rights - Is Rights and Restrictions Review required?	☐	N/A

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Constructability Review Form: **M6-PM-2012 - Eversource**

Substation Constructability Review

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
6	Expanding Footprint / New Buildings / Fence line or future Expansion Plans?	☐	N/A
7	Proposed Equipment on same property? - Any Encroachments	☐	N/A
F	**Protection & Controls**		
1	Panel Graphic additions and/or Modifications	☐	N/A
2	Space on existing panels for new equipment? (front & rear of panel fronts)	X	N/C DSCADA LTC will house new RTU, annunciators, terminal blocks and existing DSCADA panel in the house has space for fiber patch panel.
3	Panel fronts conform to drawings	X	4X transformer Control Schematic does not match what is in the field current LTC is a Beckwith M-0067E. 3X transformer matches the drawing package.
4	Access to bring new panels into control enclosure	☐	N/A - No new panels in control house
5	Nameplate list and location of nameplates	☐	N/A
6	Verifies that relays and meters that will be an interconnected project work are as shown on the drawings.	X	See note above about panel fronts.
7	Temporary protection, relays, control cable needed? How long will they be required?	☐	N/A
8	Will relay setting changes be needed? Any additional outage requirements for changes?	X	Setting changes to the newly installed 90/3X, 90/4X, and settings for both90BU relays will be required. No outage changes for relay settings.
G	**Telecom Engineering**		
1	Review telecom equipment in existing control enclosure	☐	N/A
2	Review path to get telecom circuits into the station and paths within the control house. Determine whether new underground duct or overhead tray work is needed.	☐	N/A
3	Review current or proposed Telecom equipment power connections and validate with P&C any need for system 1 and system 2 separation.	☐	N/A
4	Review current Telecom fiber diversity and validate with P&C any fiber diversity requirements.	☐	N/A
5	Review and list any remote station impacts/updates	☐	N/A

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Constructability Review Form: **M6-PM-2012 - Eversource**

Substation Constructability Review

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
6	Confirm whether correct interface equipment is available (i.e.) for fiber termination or multiplexor termination	☐	N/A
7	Confirm whether existing communications cabinets are enough to support additional telecommunications equipment installed	☐	N/A
8	Review space for any required additional communications cabinets which may be required to support additional telecommunications equipment installed	☐	Space for additional cabinet
9	Review third party Telecommunications at substation and confirm whether additional capacity or Ground Potential Rise protection is required	☐	N/A

Photos

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

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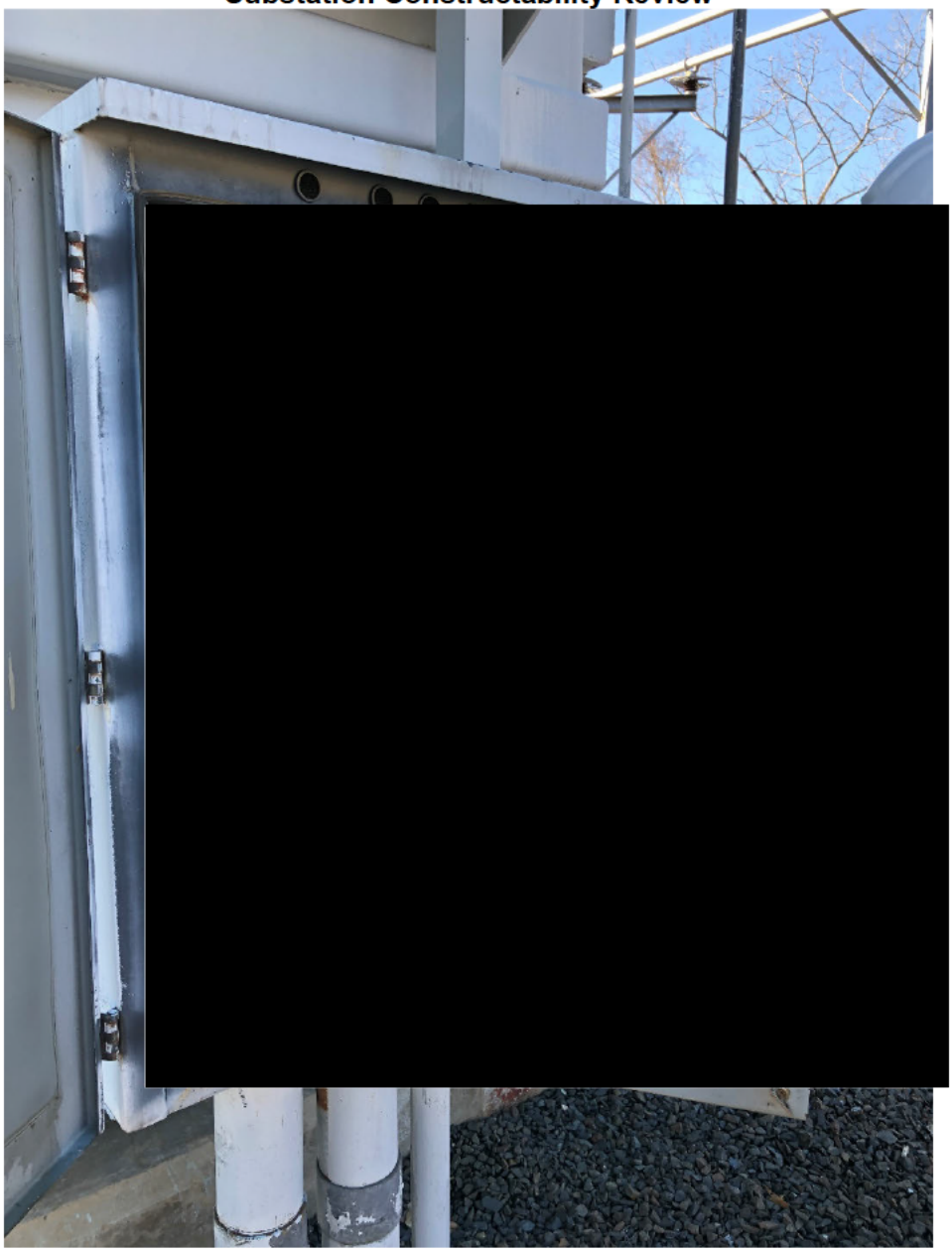
Constructability Review Form: **M6-PM-2012 - Eversource**

Substation Constructability Review



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Constructability Review Form: **M6-PM-2012 - Eversource**

Substation Constructability Review



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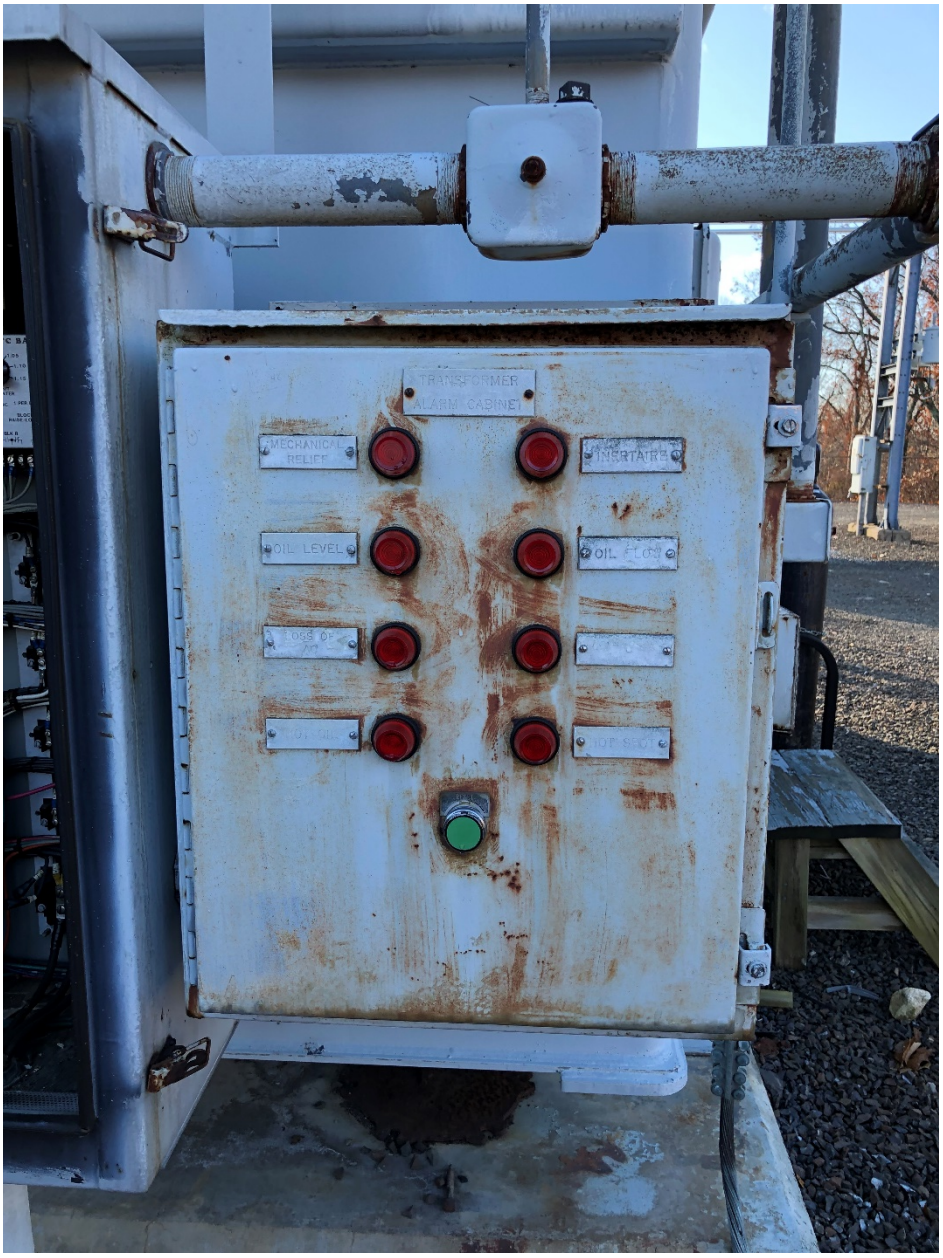
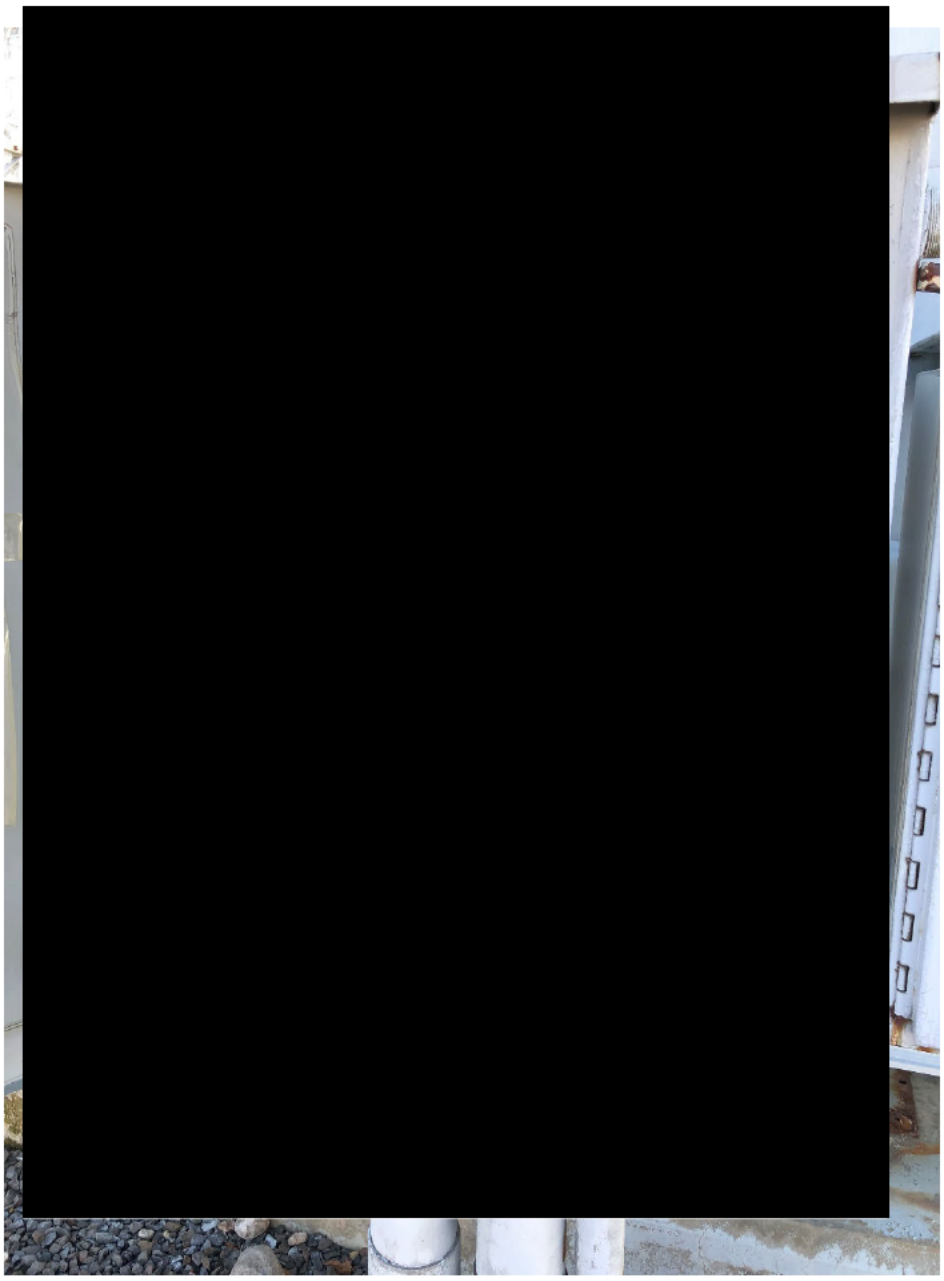


3X Transformer Annunciator Panel



4X transformer control cabinet

Note: [redacted] *controller replacing the older SVR unit like that is on the 3X*

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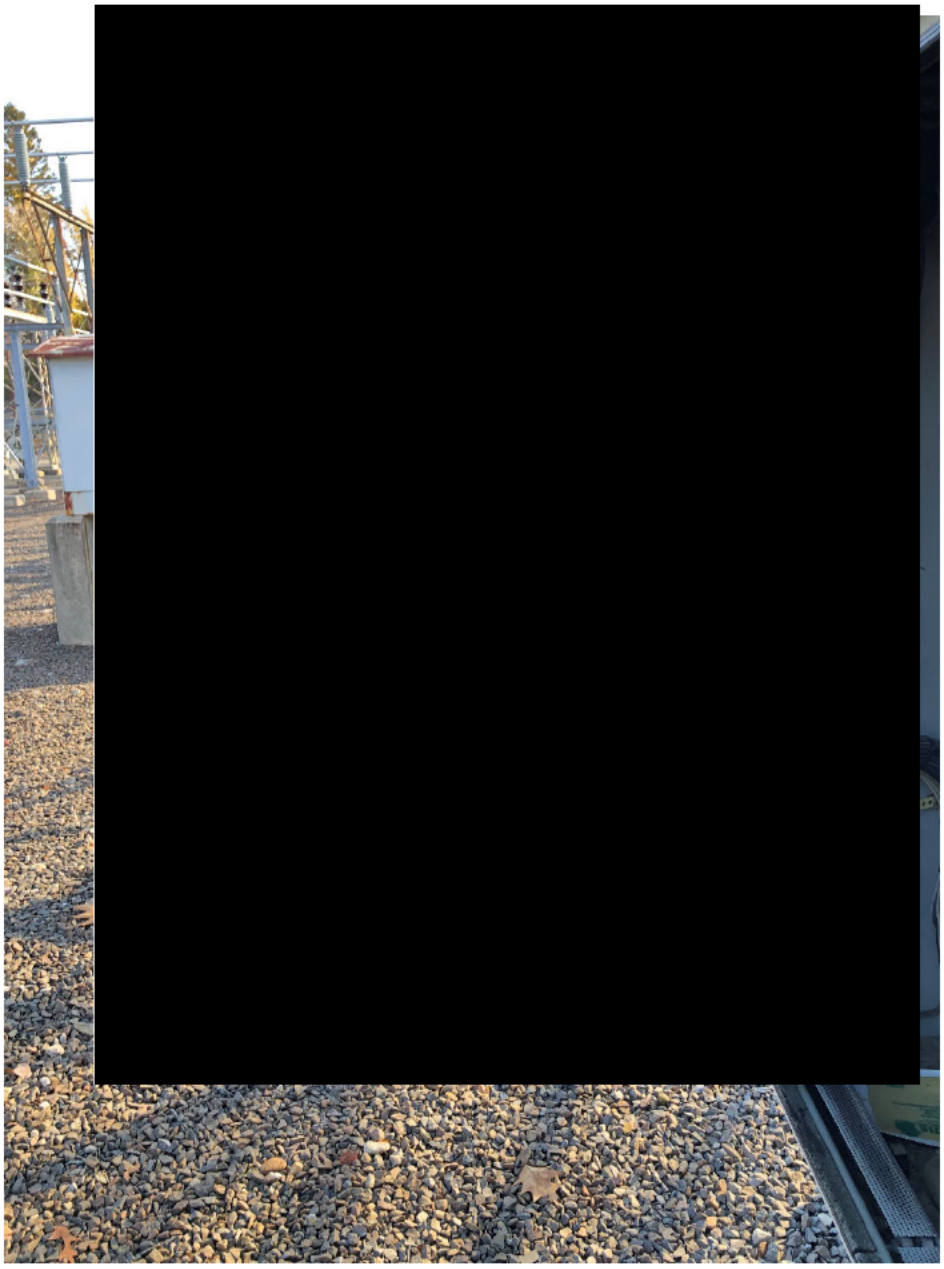
Constructability Review Form: **M6-PM-2012 - Eversource**

Substation Constructability Review





4X Transformer Annunciator Panel



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Operations Program Level Project Authorization Form

Approved at March 17, 2021 SDC

Link to Meeting Minutes

Date Prepared: 05/11/2021	**Program Title**: DSCADA LTC Receivers Program Upgrades
Company: Eversource CT	**Program Number:** CS00407
Organization: Asset Management	**Class(es) of Plant:** D SS
Project Initiator: [redacted]	**Project Category:** Stations - SCADA
Project Manager: [redacted]	**Project Type:** Program
Project Sponsor: [redacted]	**Project Purpose:** Replace Obsolete Radio System
Estimated in service date: Q4 2030	**If Transmission Project: PTF/Non-PTF? N/A**
Eng. / Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?** Yes
Authorization Type: Program Approval with Initial Funding	**O&M Expenses Part of the Original Operating Plan?** N/A
Initial Funding Request: $250K	**Estimated Program value (CT):** $45M

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This Initial Funding Request of $250K is to establish a program to [redacted]

The new DSCADA controlled LTC Voltage Reduction System provides the capability to remotely reduce distribution voltage by 5% during system contingencies to help stabilize the transmission system. [redacted]

[redacted] under the new CS00407 Program. The list of substations and associated LTC transformers is provided in Attachment 1. The new program transitions 46 stations to a program of individual project releases scoped, engineered, and funded specifically for each individual station. Accordingly, the "old" CS00090 will coordinate with the new CS00407 program going forward.

Background details:

$8.5M in total prior costs were charged under the original 2015 CS00090 general one-time approval program through 2020. Sixty-six (66) workorders remain open or in service in Power Plan™. Eighteen (18) of the original work orders were completed for a total direct cost of $4.5M. The total direct cost budget approved for CS00090 was $5.808M, so total direct costs had not exceeded the +/- 10% limit of the APS-1 procedure. As construction, system operations control, and regulatory scope requirements grew, costs per unit increased substantially. Therefore, it was determined that the remainder of the work would be completed as a new program with release documentation to better provide comparable data for each remaining station's scope for improved control and tracking. Accordingly, units / stations with completed construction on the previous CS00090 will remain on that project.

The original program's scope creep was primarily the result of SOC requirements and expectations for voltage tap changer control and position indication. As originally proposed, the scope for the program was primarily for relay and DSCADA connectivity to abandon the obsolete and failing radio control system. The estimate did not account for these additional SOC requirements. CS00090 program documentation is attached for reference.

Transitioning to a DSCADA LTC Automation program with subsequently funded project releases mitigates the need for a high dollar supplemental request to the original CS00090 program. The transitioning moved remaining work to new Program CS00407 for the primary purpose of tracking specific station costs of a release based on redefined detailed scope from an Engineering Checklist. The checklist that follows in the "Project Scope" section defines all possible scope (worst case) that could be required for a station LTC transformer. Release estimates going forward will be established against what most remaining transformers will require based on a revised/updated unitized cost. Extra scope (e.g. conduit, and/or controllers) will follow a pre-established tiered cost range/benchmark developed from current CS00407 Program Substation Engineering and Design's Decision-Making Estimates that follow.

Planned Releases

Upon approval of this Initial Funding, three releases are planned for three substations with a total of nine transformers, [redacted] CS00433, [redacted] CS00432 and [redacted]. Additionally, all planned releases will be coordinated with other programs and work conflicts (where possible) that might arise in the selected substations. Coordination with other station activities not currently identified entailing switching, repairs etc. will be considered when identifying and planning subsequent releases.

Project Costs Summary

Estimates include man-days for outsourced Lead Commissioning Engineer (LCE), and Construction Representative. Material estimates, labor estimates, and vendor quotes are based on recently completed work in 2020. All new equipment shall be installed within the confines of the existing fenced stations. Estimate for an individual substation will be developed during initial funding based on existing infrastructure at a substation. For example : the type of tap changer control, ability to reuse existing conduits to pull fiber, and the capability to use existing communication device to communicate with new device will all be identified to improve the accuracy of the estimate and control costs going forward.

The LTC DSCADA upgrade for each substation / transformer location is expected to follow one of three possible cost scenarios. Accordingly, the cost for each scenario will vary depending on the actual infrastructure and equipment condition. The funding provided by this Initial PAF will facilitate work scope definition at each substation. Some may need conduit installation; some may simply only need wiring and some a new tap changer control and / or combination of this items. All will require testing and commissioning. As a result of these scenarios, there are three (DME) estimates that reflect the different costs in cost ascending value:

1. LTC control upgrade only, existing control & conduit (least cost)
2. LTC control upgrade, new conduit, existing control
3. LTC Control upgrade, new control & conduit (most cost)

Table -1

Cost of D-SCADA LTC Project Scenarios

Description	1. Upgrade Only – existing Control & Conduit	2. Upgrade & Conduit – existing Control	3. Upgrade, New Control & Conduit
ROW / Easements / Land purchases			
Environmental Approvals / Permits			
Outreach	$1,900	$2,200	$3,200
Siting Approvals / Permits			
Engineering / Design	$10,400	$12,600	$17,600
Materials (Eversource purchased)	$18,400	$18,600	$26,200
Construction (incl. matl's by contractors)	$69,800	$90,900	$126,100
Testing / Commissioning	$61,300	$61,300	$94,200
PMT Project Mgmt Team	$10,500	$10,500	$10,500
Removals	$2,300	$2,300	$2,300
Other			
Risks	$63,200	$63,200	$71,000
Project Directs Total w/Risks	**$237,800**	**$261,600**	**$351,100**
Indirects/Overhead	$117,200	$134,000	$188,400
AFUDC	$9,600	$10,700	$14,600
Project Total - Baseline Budget	**$364,600**	**$406,300**	**$554,100**
Contingency			
Project Total - Funding Approval Level	**$364,600**	**$406,300**	**$554,100**
Reimbursables/Customer Contribution	**Not applicable**	**Not applicable**	**Not applicable**
Project Total (less reimbursables)	**$364,600**	**$406,300**	**$554,100**

Technical Justification:

Project Need Statement

[redacted] A simplified one-line of the radio system (CONVEX LMS system) can be found in Figure 1. Pictures of the obsolete radio receivers can be found in Attachment 2.

Project Objectives

[redacted]

Project Scope

[redacted]

The work at each proposed station requires further evaluation to finalize scope, project details, and cost estimates. The $250K will be used for Substation Engineering, P&C Engineering, Asset Management, Estimating, Project Management, and Field Engineering at a cost on average of $50K per station. Individual release PAF's for each substation will be written and proposed for EPAC review and approval.

- Detailed scoping and evaluation checklist for substation transformers will determine the need for the following:

[redacted]



- Development of Engineering Project Approval Committee (EPAC) documents
- Constructability Walkdowns including qualified representatives from Engineering (Field/SCADA/Telecom), Project Management, Operations, and Construction departments
- Outage planning and the development of single contingency load loss (SCLL) mitigation plans as needed

Background / Justification



Comverge™, the company that provides Eversource with replacement software and hardware for the radio system, has limited availability of system components used by Eversource. They cannot guarantee future logistic and technical support. Hubbell™ that supplies hardware to organize the handshake mechanism for our phone lines is discontinuing availability and support for the system currently in use.

Business Process and / or Technical Improvements:

As the future of the grid evolves, remote voltage control will become critical to meet the requirements for Distributed Generation systems and provide energy savings. In addition to the ability to remotely control voltage at the LTCs, it is anticipated that remote control of the distribution capacitors and regulators will become necessary in the future (not part of this project). Adding this functionality to the LTCs as part of this DSCADA project is the most cost-effective manner for this work to be done.

Alternatives Considered

Eversource evaluated the following three alternatives:

1. [redacted]

   Cost estimate $554,100 (planning grade)

2. [redacted]

3. Continue to operate the obsolete radio system until it fails permanently. **(This option is** [redacted]

Project Schedule

All project releases in the program will have station specific P6 schedules. The following program schedule lists milestones leading to the start of construction.

Milestone/Phase Name	Estimated Date
SDC Meeting – Operations Program Level Approval with Initial Funding	3/17/2021
Revised with Comments – Operations Program Level Approval with Initial Funding	5/11/2021
SDC / EPAC Meeting Program Approval (email)	5/11/2021
Program Construction Start	Q3 2021
Program Construction Completion	Q4 2030

Due to potential financial and man-hour restrictions, this project will spread 99 LTC transformers over ten years for construction from 2021 – 2030. Engineering and material purchase will be done annually. Each transformer LTC upgrade on average may cost approximately $450K per unit. Justification for the length of this proposed 10-year program is cost. The program's duration can be adjusted if it is determined that the cost per unit is acceptable, and an increased investment in the program over other system needs is justified.

Planned LTC Upgrade Releases for 2021

Substation Name	Project Number	LTC Control Count	Equip Position
[redacted]			
TOTAL UNITS		9	

EVERSOURCE

Planned LTC Releases for 2022

Substation Name	Project Number	LTC Control	Equip Position
[redacted]			
TOTAL UNITS		13	

Planned LTC Releases for 2023

Substation Name	Project Number	LTC Control	Equip Position
[redacted]			
TOTAL UNITS		8	

Planned Number of LTC Releases (Unspecified Stations) for Years 2024 – 2030

Engineer and Upgrade LTC	Estimated In Service Date
10 Transformers	12/31/2024
10 Transformers	12/31/2025
10 Transformers	12/31/2026
10 Transformers	12/31/2027
10 Transformers	12/31/2028
10 Transformers	12/31/2029
9 Transformers	12/31/2030
69 Transformers	TOTAL UNITS

Regulatory Approvals

No advance regulatory approval is required for this project.

Risks and Risk Mitigation Plans

[redacted]

Contingency

None at the Program level.

References

ISO-NE Operating Procedure No. 13 – Standards for Voltage Reduction and Load Shedding Capability.

Attachments

Figure1
CONVEX LMS System



ESTIMATE SUMARY

Project Title: EVERSOURCE CT - DSCADA LTC CONTROLS UPGRADE
Proiect Mar/Lead:
Project Number:CS00407
WO & Task #:
Est. Revision #
Estimate Type - Station work

Estimate By: [redacted]
Date of Estimate: 02/09/2021

ISD:12/31/2021

Estimate #

Template Revision # 01.53

ESTIMATE SUMMARY

Estimate Type: Planning

WBS	Description	TOTAL	% of Directs	% of Total	Priors	2021	2022	2023	2024	2025	2026
1	ROW / Easements / Land purchases										
2	Environmental Approvals / Permits										
3	Outreach	$1,900	0.8%	0.5%		$1,900					
4	Siting Approvals / Permits										
5	Engineering / Design	$10,400	4.4%	2.9%		$10,400					
6	Materials (Eversource purchased)	$18,400	7.7%	5.0%		$18,400					
7	Construction (incl matl's by	$69,800	29.4%	19.1%		$69,800					
8	Testing / Commissioning	$61,300	25.8%	16.8%		$61,300					
9	PMT Project Mgmt Team	$10,500	4.4%	2.9%		$10,500					
10	Removals	$2,300	1.0%	0.6%		$2,300					
11	Other										
12	Risks	$63,200	26.6%	17.3%		$63,200					
	Project Directs Total w/Risks	**$237,800**	100.0%	65.2%		**$237,800**					
13	Indirects/Overhead	$117,200		32.1%		$117,200					
14	AFUDC	$9,600		2.6%		$9,600					
	Project Total - Baseline Budget	**$364,600**		100.0%		**$364,600**					
15	Contingency										
	Project Total - Funding Approval Level	**$364,600**		100.0%		**$364,600**					
16	Reimbursables/Customer Contribution										
	Project Total (less reimbursables)	**$364,600**				**$364,600**					
	Amount of Escalation included above										
6	Total materials - Eversource	$18,400				$18,400					
	Total materials - Contractor	$5,600				$5,600					
	Total materials	$24,000				$24,000					
	NOTE: Risk / Contingency is 21% of Project Total Costs (incl escal/indirects/AFUDC but excl reimb.)										

Estimate Range	**-25%**	-	**25%**	
	$273,000	-	**$456,000**	

COMMENTS:

Project Scope:

[redacted]

Assumptions/Clarifications:
Indirect rates based on: 11 - CT . Station work

Major material
1. One (1) CABINET, ENCLOSURE, LTC DSCADA, AL,24 IN X 18 IN X 14 IN, ANNUNCIATOR
2. One (1) MONITOR, LTC Tap position indicator device
3. 43AMR 3 position switch ("AUTO/MAN/REMOTE")

Notes:
1. Test manhours based on test contractor quote per LTC/transformer
2. Electrical construction manhours based on electrical contractor quote per LTC/transformer
3. Estimate assumes existing conduits can be used to install crush proof fiber between the transformer and the control house or switchgear. An estimated cost of $1,322 per ft to install conduit between transformer and control house or switchgear should be added to the estimate if required
4. Material quote based on previous projects

RISKS

Severe Weather, Delays, OT	$	13.200
Communication System Upgrade	$	50.000

ESTIMATE SUMARY

Project Title: EVERSOURCE CT - DSCADA LTC CONTROLS UPGRADE
Proiect Mar/Lead:
Project Number:CS00407
WO & Task #:
Est. Revision #
Estimate Type - Station work

Estimate By: [redacted]
Date of Estimate: 02/09/2021
ISD:12/31/2021
Estimate #

Template Revision # 01.53

ESTIMATE SUMMARY

Estimate Type: Planning

WBS	Description	TOTAL	% of Directs	% of Total	Priors	2021	2022	2023	2024	2025	2026
1	ROW / Easements / Land purchases										
2	Environmental Approvals / Permits										
3	Outreach	$2,200	0.8%	0.5%		$2,200					
4	Siting Approvals / Permits										
5	Engineering / Design	$12,600	4.8%	3.1%		$12,600					
6	Materials (Eversource purchased)	$18,600	7.1%	4.6%		$18,600					
7	Construction (incl matl's by	$90,900	34.7%	22.4%		$90,900					
8	Testing / Commissioning	$61,300	23.4%	15.1%		$61,300					
9	PMT Project Mgmt Team	$10,500	4.0%	2.6%		$10,500					
10	Removals	$2,300	0.9%	0.6%		$2,300					
11	Other										
12	Risks	$63,200	24.2%	15.6%		$63,200					
	Project Directs Total w/Risks	**$261,600**	100.0%	64.4%		**$261,600**					
13	Indirects/Overhead	$134,000		33.0%		$134,000					
14	AFUDC	$10,700		2.6%		$10,700					
	Project Total - Baseline Budget	**$406,300**		100.0%		**$406,300**					
15	Contingency										
	Project Total - Funding Approval Level	**$406,300**		100.0%		**$406,300**					
16	Reimbursables/Customer Contribution										
	Project Total (less reimbursables)	**$406,300**				**$406,300**					
	Amount of Escalation included above										
6	Total materials - Eversource	$18,600				$18,600					
	Total materials - Contractor	$7,800				$7,800					
	Total materials	$26,400				$26,400					
	NOTE: Risk / Contingency is 18.4% of Project Total Costs (incl escal/indirects/AFUDC but excl reimb.)										

Estimate Range	**-25%**	-	**25%**	
	$305,000	-	**$508,000**	

COMMENTS:

[redacted]

Assumptions/Clarifications:
Indirect rates based on: 11 - CT . Station work

Major material
1. One (1) CABINET, ENCLOSURE, LTC DSCADA, AL,24 IN X 18 IN X 14 IN, ANNUNCIATOR
2. One (1) MONITOR, LTC Tap position indicator device
3. 43AMR 3 position switch ("AUTO/MAN/REMOTE")

Notes:
1. Test manhours based on test contractor quote per LTC/transformer
2. Electrical construction manhours based on electrical contractor quote per LTC/transformer
3. Estimate assumes existing conduits can be used to install crush proof fiber between the transformer and the control house or switchgear. An estimated cost of $1,322 per ft to install conduit between transformer and control house or switchgear should be added to the estimate if required
4. Material quote based on previous projects

RISKS

Severe Weather, Delays, OT	$	13.200
Communication System Upgrade	$	50.000

ESTIMATE SUMMARY

Project Title: EVERSOURCE CT - DSCADA LTC CONTROLS UPGRADE
Project Mgr/Lead:
Project Number:CS00407
WO & Task #:
Est. Revision #
Estimate Type - Station work

Estimate By: [redacted]
Date of Estimate: 02/09/2021
ISD:12/31/2021
Estimate #

Template Revision # 01.53

ESTIMATE SUMMARY

Estimate Type: Planning

WBS	Description	TOTAL	% of Directs	% of Total	Priors	2021	2022	2023	2024	2025	2026
1	ROW / Easements / Land purchases										
2	Environmental Approvals / Permits										
3	Outreach	$3,200	0.9%	0.6%		$3,200					
4	Siting Approvals / Permits										
5	Engineering / Design	$17,600	5.0%	3.2%		$17,600					
6	Materials (Eversource purchased)	$26,200	7.5%	4.7%		$26,200					
7	Construction (incl matl's by	$126,100	35.9%	22.8%		$126,100					
8	Testing / Commissioning	$94,200	26.8%	17.0%		$94,200					
9	PMT Project Mgmt Team	$10,500	3.0%	1.9%		$10,500					
10	Removals	$2,300	0.7%	0.4%		$2,300					
11	Other										
12	Risks	$71,000	20.2%	12.8%		$71,000					
	Project Directs Total w/Risks	**$351,100**	100.0%	63.4%		**$351,100**					
13	Indirects/Overhead	$188,400		34.0%		$188,400					
14	AFUDC	$14,600		2.6%		$14,600					
	Project Total - Baseline Budget	**$554,100**		100.0%		**$554,100**					
15	Contingency										
	Project Total - Funding Approval Level	**$554,100**		100.0%		**$554,100**					
16	Reimbursables/Customer Contribution										
	Project Total (less reimbursables)	**$554,100**				**$554,100**					
	Amount of Escalation included above										
6	Total materials - Eversource	$26,200				$26,200					
	Total materials - Contractor	$9,500				$9,500					
	Total materials	$35,700				$35,700					
	NOTE: Risk / Contingency is 14.7% of Project Total Costs (incl escal/indirects/AFUDC but excl reimb.)										

Estimate Range	**-25%**	-	**25%**	
	$416,000	-	**$693,000**	

COMMENTS:

Project Scope:

[redacted]

Assumptions/Clarifications:
Indirect rates based on: 11 - CT . Station work

Major material

1. One (1) CABINET, ENCLOSURE, LTC DSCADA, AL,24 IN X 18 IN X 14 IN, ANNUNCIATOR
2. One (1) MONITOR, LTC Tap position indicator device
3. One (1) Beckwith M-2001D Digital Tapchanger Control and adapter panel
4. 43AMR 3 position switch ("AUTO/MAN/REMOTE")

Notes:

1. Test manhours based on test contractor quote per LTC/transformer
2. Electrical construction manhours based on electrical contractor quote per LTC/transformer
3. Civil manhours based on civil contractor quote to excavate 100 ft between transformer and control house or switchgear
4. Material quote based on previous projects

RISKS

Severe Weather, Delays, OT	$	21,000
Communication System Upgrade	$	50,000

Estimate Review Checklist

Type Project to be reviewed: Replace obsolete Radio Controlled sytem on the Transformer. Substation work no conduit, no controls alternative 1

Job Order: CS00407

Requestor: [redacted]

Work Order:

Date of Est: 2/9/21

Est#: Review Number C-21-136

Revsion of Est: 0

Job Description: Replace obsolete Radio controlled equipment.

Date of Review: 3/4/21

Estimator: [redacted]

Level of Estimate: Planning

Substation type project	Recommended Risk
Bus, Switch, Insulator, Misc Eqt Upgrades	Planning 7-12%

OH Project	Underground Project

Level Of Review	Purpose of Estimate
Full Review	Planning Study

Items Checked

Indirect Rates Correct? ☐ Yes ☑ No
Minor increases in some rates in new template.

Manpower/Mandays sufficient for project? ☑ Yes ☐ No
If No, explain:

AFUDC rates are current and correctly applied? ☐ Yes ☑ No
Minor changes in AFUDC rate on new template.

Scope deliverables match expectations for est. class? ☑ Yes ☐ No
If No, explain:

PM Support sufficient for proj? ☑ Yes ☐ No
If No System planning or scheduling required.

Milestones and schedule ISD match scope? ☐ Yes ☑ No
Milestones not completed.

Prior spending accounted for? ☐ Yes ☑ No
No priors reported to date.

Escalation allocated correctly across project time frame? ☐ Yes ☑ No
No escalation included project program will be for next ten years and estimate is for work done this year only.

Contingency and Risk in line with est. type? ☐ Yes ☑ No
No contingrency applied.

Construction Rep and LCE sufficient for project? ☑ Yes ☐ No
If No, explain:

Recommendations

Check AFUDC rate minor drop in CT D rate.

Check indirect rates to see if adjustment would increase accuracy.

Add Project management planning and system scheduling.

Adjust risk and contingency. Risk is at 17.3% of total change by moving 5.3% to Contingency and adjusting risk to 12%

Estimate Review Checklist

Type Project to be reviewed: Replace obsolete Radio Controlled sytem on the Transformer. Substation work new conduit, no controls alternative 2

Job Order: CS00407

Requestor: [redacted]

Work Order:

Date of Est: 2/9/21

Est#: Review Number C-21-136

Revsion of Est: 0

Job Description: Replace obsolete Radio controlled equipment.

Date of Review: 3/4/21

Estimator: [redacted]

Level of Estimate: Planning

Substation type project	Recommended Risk
Bus, Switch, Insulator, Misc Eqt Upgrades	Planning 7-12%

OH Project	Underground Project

Level Of Review	Purpose of Estimate
Full Review	Planning Study

Items Checked

Indirect Rates Correct? ☐ Yes ☑ No
Minor increases in some rates in new template.

Manpower/Mandays sufficient for project? ☑ Yes ☐ No
If No, explain:

AFUDC rates are current and correctly applied? ☐ Yes ☑ No
Minor changes in AFUDC rate on new template.

Scope deliverables match expectations for est. class? ☑ Yes ☐ No
If No, explain:

PM Support sufficient for proj? ☑ Yes ☐ No
If No System planning or scheduling required.

Milestones and schedule ISD match scope? ☐ Yes ☑ No
Milestones not completed.

Prior spending accounted for? ☐ Yes ☑ No
No priors reported to date.

Escalation allocated correctly across project time frame? ☐ Yes ☑ No
No escalation included project program will be for next ten years and estimate is for work done this year only.

Contingency and Risk in line with est. type? ☐ Yes ☑ No
No contingrency applied.

Construction Rep and LCE sufficient for project? ☑ Yes ☐ No
If No, explain:

Recommendations

Check AFUDC rate minor drop in CT D rate.

Check indirect rates to see if adjustment would increase accuracy.

Add Project management planning and system scheduling.

Adjust risk and contingency. Risk presently at 15.6% adjust risk to 11% and adjust contingency to 4.6% of total project.

Estimate Review Checklist

Type Project to be reviewed: Replace obsolete Radio Controlled sytem on the Transformer. Substation work new conduit and controls alternative 3

Job Order: CS00407

Requestor: [redacted]

Work Order:

Date of Est: 2/9/21

Est#: Review Number C-21-136

Revsion of Est: 0

Job Description: Replace obsolete Radio controlled equipment.

Date of Review: 3/4/21

Estimator: [redacted]

Level of Estimate: Planning

Substation type project	Recommended Risk
Bus, Switch, Insulator, Misc Eqt Upgrades	Planning 7-12%

OH Project	Underground Project

Level Of Review	Purpose of Estimate
Full Review	Planning Study

Items Checked

Indirect Rates Correct? ☐ Yes ☑ No
Minor increases in some rates in new template.

AFUDC rates are current and correctly applied? ☐ Yes ☑ No
Minor changes in AFUDC rate on new template.

PM Support sufficient for proj? ☑ Yes ☐ No
If No System planning or scheduling required.

Prior spending accounted for? ☐ Yes ☑ No
No priors reported to date.

Contingency and Risk in line with est. type? ☐ Yes ☑ No
No contingrency applied.

Manpower/Mandays sufficient for project? ☑ Yes ☐ No
If No, explain:

Scope deliverables match expectations for est. class? ☑ Yes ☐ No
If No, explain:

Milestones and schedule ISD match scope? ☐ Yes ☑ No
Milestones not completed.

Escalation allocated correctly across project time frame? ☐ Yes ☑ No
No escalation included project program will be for next ten years and estimate is for work done this year only.

Construction Rep and LCE sufficient for project? ☑ Yes ☐ No
If No, explain:

Recommendations

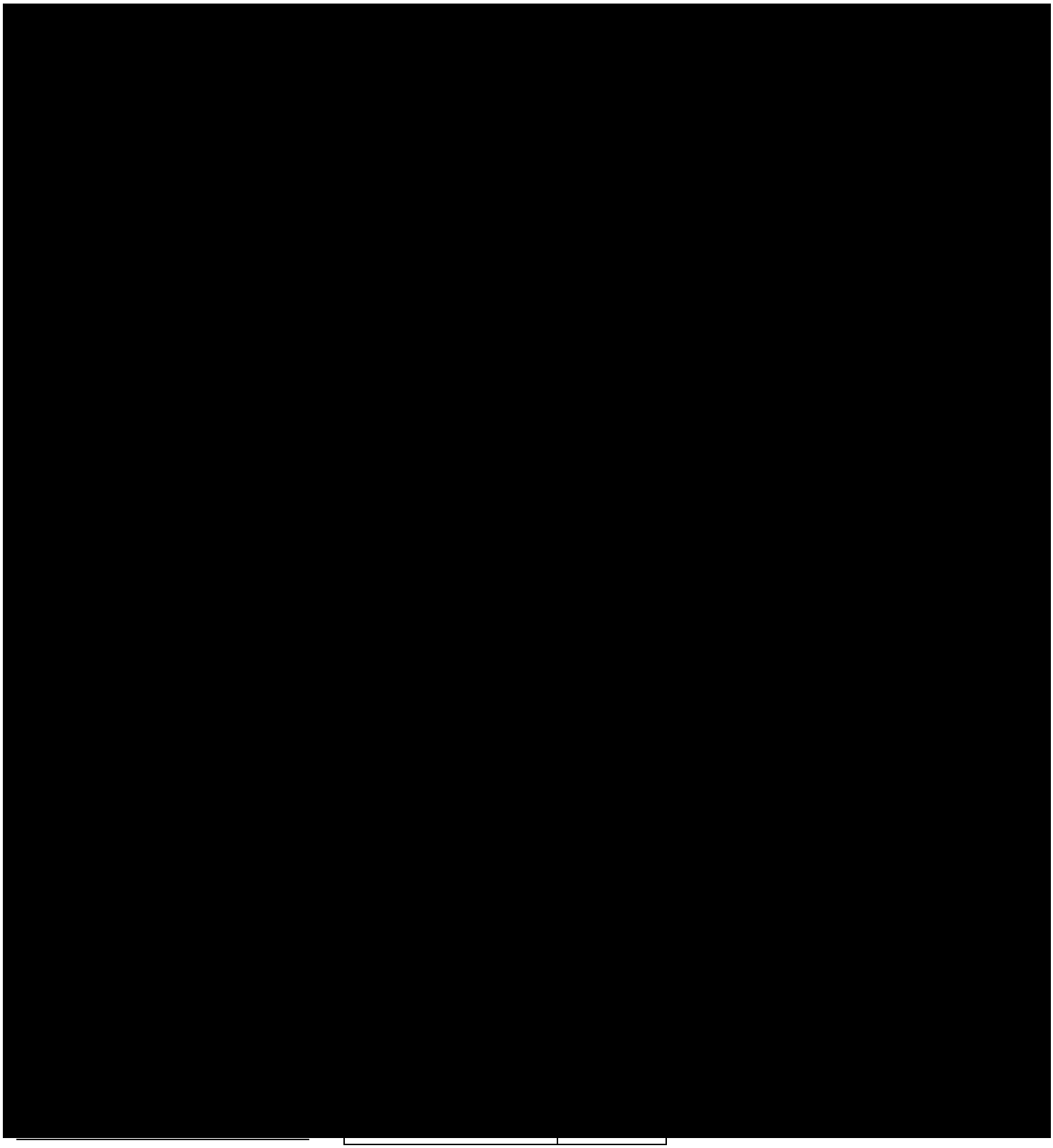
Check AFUDC rate minor drop in CT D rate.

Check indirect rates to see if adjustment would increase accuracy.

Add Project management planning and system scheduling.

Adjust risk and contingency. Risk currently at 12.8% adjust risk to 10% of total and add contingency to 4% of total.

Attachment 2 – Substation – Transformer List

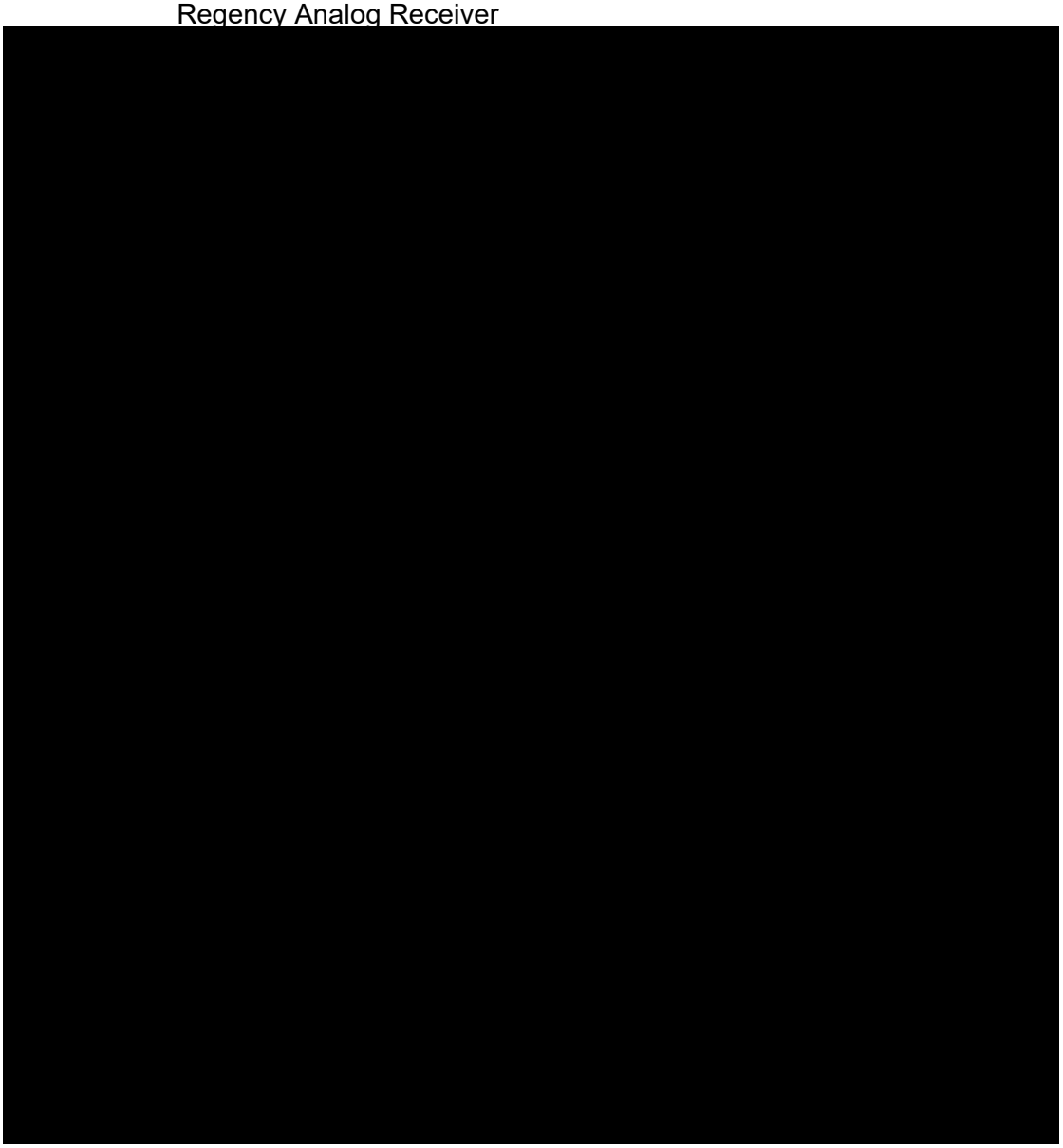


ATTACHMENT 3 - Photos

Pictures of an existing radio receiver that is mounted on the LTCs:



Regency Analog Receiver



New D-DSCADA LTC (RTU) Cabinet that is mounted on the Transformer:

[redacted]