EVERSOURCE

Program Release Form

Approved at June 9, 2021 EPAC

Link to Meeting Minutes

Date Prepared: 06/02/2021	**Project Title: DSCADA LTC Controls Upgrade** [redacted]
Company: Eversource CT	**Facility Name:** [redacted]
Organization: Asset Management	**Project Number: CS00430**
Project Initiator: [redacted]	**Class(es) of Plant: D SS**
Project Manager: [redacted]	**Project Category: Stations - SCADA**
Project Sponsor: [redacted]	**Project Type: Program**
Program Level Title: DSCADA LTC Receivers Program Upgrades	**Capital Investment Part of Original Operating Plan? Yes**
Program Level Project Number: CS00407	**O&M Expenses Part of the Original Operating Plan? N/A**
Total Request: $1.5M	**Estimated in service date(s): 12/27/21**
	Facility Type (check all that apply): ☐ PTF ☐ non-PTF ☒ Distribution

Executive Summary

This Program Release is requesting dollar authorization in accordance with the program level criteria specified in Program Level PAF - DSCADA Load Tap Changer (LTC) Receivers Program Upgrades - CS00407 (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 $1.5M to install [redacted]

The Program Level PAF had $250K of initial funding approved in PowerPlan on 5/25/2021. As of 5/18/2021, $51,940 has been charged to WO CS0009047, under the previously established program CS00090 as noted in the Program Level PAF, for engineering and design at [redacted] These funds will be journaled to a work order under this CS00430 Program Release upon approval.

Project Scope

[redacted]

Scope of Work

[redacted]

Major Material

1. Three (3) LTC DSCADA Cabinet RTUs, one for each transformer
2. Three (3) LTC tap position monitors, one for each transformer
3. Two (2) M2001C Beckwith tap changer controls

A constructability review was conducted on 8/19/2020 (see Attachment C).

Unitized Release Cost (Option #1 4R-1X, Option #3 4R-2X & 4R-3X, See Attachments B & C)

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	$8	$1	($7)
4. Siting Approvals / Permits	$	$	$
5. Engineering / Design	$46	$26	($20)
6. Materials (Eversource purchased)	$71	$61	($10)
7. Construction (incl matl's by contractors)	$322	$363	$41
8. Testing / Commissioning	$250	$309	$59
9. Project Mgmt Team	$32	$36	$4
10. Removals	$7	$6	($1)
11. Other	$	$	$
12. Risks	$205	$105	($100)
SUBTOTAL DIRECTS W/ RISKS	**$940**	**$907**	**($33)**
13. Indirects/Overhead	$494	$482	($12)
14. AFUDC	$39	$36	($3)
PROJECT TOTAL – BASELINE BUDGET	**$1,473**	**$1,425**	**($48K)**
15. Contingency	$	$75	$75
TOTAL CAPITAL REQUEST	**$1,473**	**$1,500**	**$27**
16. Reimbursables/Customer Contribution	$	$	$
PROJECT TOTAL (LESS REIMBURSABLES)	**$**	**$**	**$**
O&M	$	$	$
Total Request	**$1,473**	**$1,500**	**$27**

*CT program unit cost (Option #1) is $364,600 per transformer (upgrade, use existing control and conduit) and has been used in the unitized release PAF cost for the 4R-1X. CT program unit cost (Option #3) is $554,100 (upgrade, new control & conduit) and has been used in the unitized release PAF cost for the 4R-2X & 4R-3X. *Note: The existing conduit for the 4R-2X and 4R-3X has been deemed acceptable for use for this project. Since Option #3 is the only unitized option that includes the control replacement it was utilized for comparison; variance due to this scope differential is discussed in #7 below.

Justification for Modification

1. **ROW / Easements / Land Acquisition: $0 –**. No changes from the Program Level PAF.
2. **Environmental Approvals / Permits: $0 –** No changes from the Program Level PAF.
3. **Outreach: ($7K) –** Unit price per transformer reflects outreach required at one station. A savings is realized as any required outreach for all three transformers can be accomplished simultaneously.
4. **Siting Approvals / Permits: $0 –** No changes from the Program Level PAF.
5. **Engineering / Design: ($20K) –** Savings recognized in economies of scale and internal engineering. Utilizing the existing conduit for the 4R-2X and 4R-3X work also mitigates the need for civil engineering scope.
6. **Materials (by Eversource): ($10K) –** Variance is derived in estimate utilizing actual material costs from recently completed CT projects.
7. **Construction (including materials supplied by contractors): $41K –** Decrease in conduit installation costs offset by increased labor and materials for construction support based on vendor quotes.
8. **Testing / Commissioning: $59K –** Increased labor for testing/commissioning support based on vendor quotes.
9. **Project Management Team: $4K–** No major changes from the Program Level PAF.
10. **Removals: ($1) –** No major changes from the Program Level PAF
11. **Other: $0 –** No changes from the Program Level PAF.
12. **Risk: ($100) –** Savings recognized in economies of scale.
13. **Indirects/Overhead: ($12) –** Indirects are proportional to direct costs.
14. **AFUDC:** ($3) **–** Difference proportional to direct costs.
15. **Contingency: $75 –** Contingency included to account for project unknowns in each Release.
16. **Reimbursables/Customer Contribution: $0 –** No changes from the Program Level PAF.
17. **O&M: $0 -** No changes from the Program Level PAF.

Project Costs Summary

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2021	Total
1. ROW / Easements / Land Acquisition				
2. Environmental Approvals / Permits				
3. Outreach			$1	$1
4. Siting Approvals / Permits				
5. Engineering / Design		$18	$7	$26
6. Materials (Eversource purchased)			$61	$61
7. Construction (incl matl's by contractors)			$363	$363
8. Testing / Commissioning			$309	$309
9. Project Mgmt Team			$36	$36
10. Removals			$6	$6
11. Other				
12. Risks			$105	$105
SUBTOTAL DIRECTS W/ RISKS	**$250**	**$18**	**$888**	**$907**
13. Indirects/Overhead		$28	$454	$482
14. AFUDC		$4	$32	$36
PROJECT TOTAL – BASELINE BUDGET	**$250**	**$51**	**$1,374**	**$1,425**
15. Contingency			$75	$75
TOTAL CAPITAL REQUEST	**$250**	**$51**	**$1,449**	**$1,500**
16. Reimbursables/Customer Contribution				
PROJECT TOTAL (LESS REIMBURSABLES)	**$250**	**$51**	**$1,449**	**$1,500**
O&M				
TOTAL REQUEST	**$250**	**$51**	**$1,449**	**$1,500**

Risk of $105K included for: Severe weather, delays and OT

Breakout Costs

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2021	Total
ST Labor		$18	$25	$43
OT Labor				
Outside Services Labor			$695	$695
Materials*			$61	$61
Removals			$6	$6
Other			$177	$177
Indirects		$28	$454	$482
AFUDC		$4	$32	$36
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$250**	**$51**	**$1,449**	**$1,500**

Future Financial Impacts:

N/A

Provide below the estimated future costs that will result from the project:
Note: Dollar values are in thousands:

Future Costs	Year 2021__	Year 20__	Year20__	Year 20__+	Total Future Project Costs
Capital		$ -	$ -	$ -	$ -
O&M	-	-	-	-	-
Other	-	-	-	-	-
TOTAL	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Describe the estimated future Capital, O&M and/or Other costs noted above:
N/A

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

N/A
A representative from the respective functional area is required to be included as a project approver.

If this is other than a Reliability Project, please complete the section below.
This is a reliability project. This section is
N/A.
Provide below the estimated financial benefits that will result from the project:
Note: Dollar values are in thousands:

Future Benefits	Year 20__	Year 20__	Year20__	Year 20__+	Total Future Project Benefits
Capital	$ -	$ -	$ -	$ -	$ -
O&M	-	-	-	-	-
Other	-	-	-	-	-
TOTAL	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Describe the estimated future Capital, O&M and/or Other benefits noted above:

N/A

What functional area(s) will these benefits be reflected in?
N/A
A representative from the respective functional area is required to be included as a project approver.

Asset Retirement Obligation (ARO) and/ or Environmental Cleanup Costs (Environmental Liabilities):
None

Is there an ARO associated with this project?
N/A
Are there other environmental cleanup costs associated with this project?
No

Alternatives considered with cost Estimates

No changes from the Program Level PAF

Regulatory Approvals

N/A

Risks and Risk Mitigation Plans

Risks include severe weather, delays, and overtime.

Contingency

$75K contingency is included for project unknowns.

Project Schedule

Milestone/Phase Name	Estimated Date
Electrical IFC	11/12/2019
EPAC Meeting – Release Presentation	6/09/2021
Engineering Complete	7/23/2021
Material Received	9/12/2021
Release Construction Start	9/22/2021
Release Construction Completion	12/27/2021

See Attachment B for the P6 schedule.

References

N/A

Attachments

- Attachment A – [redacted] – DSCADA LTC UPGRADE – CS00430 Rev2 MJH
- Attachment B – CS00430 [redacted] DSCADA P6
- Attachment C - Substation Constructability Review Form [redacted]
- Attachment D – [redacted] Nomenclature Diagram
- Attachment E - Program Level PAF - DSCADA Load Tap Changer (LTC) Receivers Program Upgrades (CS00407), dated 5/11/2021

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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: DSCADA LTC Controls Upgrade [redacted]		**Project Number: CS00430**	
Facility Type: ☐ BPS ☐ BES ☐ PTF ☐ non-PTF ☐ CIP ☒ Distribution			
PLANNING			
Is a NX-9 required?	No		
Is an ISO-NE PAC presentation required?	No		
ISO-NE Presentation Date (if completed):	Enter Date		
Cost in ISO-NE Presentation ($M) (if completed):	Enter Cost ($M)		
Is a PPA required?	No		
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?	No		
Has an outage schedule been approved?	No		
Are Operations & Maintenance procedures/training required?	No		
STANDARDS			
Does the project include standard equipment and designs?	Yes		
SUBSTATION ENGINEERING			
Does this impact Revenue Metering	No		
Is preliminary short circuit/ breaker duty analysis required?	No		
Are there any changes to the baseline audible noise?	No		
Is there an impact to the existing ground grid?	No		
Is a Transient Over Voltage (TOV) analysis required?	No		

Project Checklist - Transmission & Substation Capital Project	
Project Name: DSCADA LTC Controls Upgrade [redacted]	**Project Number: CS00430**
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
SITING & CONSTRUCTION SERVICES (OUTREACH)	
What is the level of outreach expected?	None
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

Cost Estimate Backup Details

See Attachment A for the detailed cost backup file.

ESTIMATE SUMMARY

Project Title: [redacted] - DSCADA LTC UPGRADE
Project Mgr/Lead: [redacted]
Project Number: CS00430
WO & Task #: TBD
Est. Revision #
Estimate Type - Station work

Estimate By: [redacted]
Date of Estimate: 5/27/2021
ISD:12/31/2021
Estimate #

Template Revision # 01.61

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	$1,500	0.2%	0.1%		$1,500					
4	Siting Approvals / Permits										
5	Engineering / Design	$25,600	2.8%	1.7%	$18,500	$7,100					
6	Materials (Eversource purchased)	$60,800	6.7%	4.1%		$60,800					
7	Construction (incl matl's by	$363,300	40.1%	24.2%		$363,300					
8	Testing / Commissioning	$308,900	34.1%	20.6%		$308,900					
9	PMT Project Mgmt Team	$36,000	4.0%	2.4%		$36,000					
10	Removals	$5,800	0.6%	0.4%		$5,800					
11	Other										
12	Risks	$105,000	11.6%	7.0%		$105,000					
	Project Directs Total w/Risks	**$906,900**	100.0%	60.5%	**$18,500**	**$888,400**					
13	Indirects/Overhead	$481,900		32.1%	$28,200	$453,700					
14	AFUDC	$36,100		2.4%	$4,200	$31,900					
	Project Total - Baseline Budget	**$1,424,900**		95.0%	**$50,900**	**$1,374,000**					
15	Contingency	$75,000		5.0%		$75,000					
	Project Total - Funding Approval Level	**$1,499,900**		100.0%	**$50,900**	**$1,449,000**					
16	Reimbursables/Customer Contribution										
	Project Total (less reimbursables)	**$1,499,900**			**$50,900**	**$1,449,000**					
		-									
	Amount of Escalation included above										
6	Total materials - Eversource	$60,800				$60,800					
	Total materials - Contractor										
	Total materials	$60,800				$60,800					
	NOTE: Risk / Contingency is 13.6% of Project Total Costs (incl escal/indirects/AFUDC but excl reimb.)										

Estimate Range	-25%	-	25%
	$1,125,000	-	**$1,875,000**

COMMENTS:

[redacted]

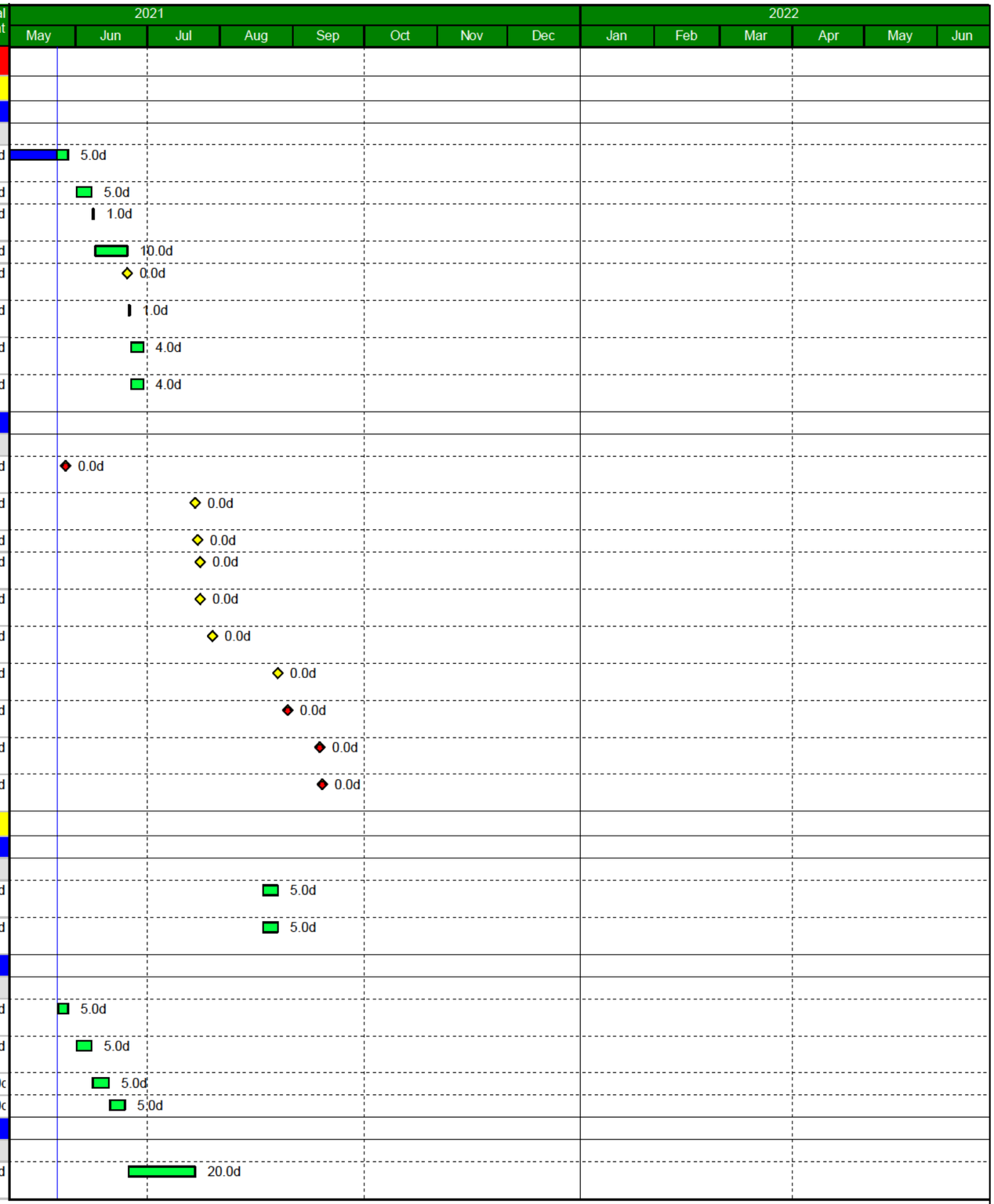
Assumptions/Clarifications:
Indirect rates based on: 11 - CT Station work

1. This estimate assumes all construction work (electrical, test and civil) will be outsourced.
2. The estimate include manhours for Lead Commission Engineer, Construction Representative, Electrical, Test and Civil
3. D-SCADA LTC commissioning and switching will be done in house
4. Each transformer will be taken out of service for few hours to complete testing
5. Estimate assumes existing communication are in good working condition.
6. Drawings have been issued and all material have been ordered
7. The transformer alarms will not be modified and will not be taken back to the SEL-2240 Axion.
8. The project assumes that existing conduits can be used to install fiber between the D-SCADA LTC cabinets and the D-SCADA cabinet. Substation operation confirmed that existing conduits can be used to run fiber
9. Estimated risks are assumed to be 7% of the project total cost as per the estimating group recommendations

RISKS

Potential UG Obstructions	$	-
Severe Weather. Delays. OT	$	105.000
Design development	$	-

Activity ID	Activity Name	Resources	RD	Start	Finish	Total Float
CS00430 [redacted] DSCADA LTC Controllers (Formerly CS009047)						
INITIALIZATION AND SCOPE DEVELOPEMENT						
Project Initiation						
CS00430.01.09.3 EPAC Full Funding						
PAFF2100	Incorporate Internal Review Comments & Submit Full Funding PAF to EPAC for Review	Project Initiator Generic	5.0d	03-May-21 A	28-May-21	11.0d
PAFF2200	Incorporate EPAC Full Funding PAF Review Comments	Project Initiator Generic	5.0d	01-Jun-21	07-Jun-21	11.0d
FF1000	EPAC Full Funding Approval	Eversource Project Approval Committee	1.0d	08-Jun-21	08-Jun-21	11.0d
A2190	Power Plan Approval		10.0d	09-Jun-21	22-Jun-21	11.0d
A00360	WO Issued & Fully Funded		0.0d		22-Jun-21	11.0d
DE1900	Conduct Detail Constructability Walk Down	CT- Project Manager Generic	1.0d	23-Jun-21	23-Jun-21	51.0d
DE1700	Conduct Initial Risk Management & SCLL Review (Project Initiator & PM)	Project Initiator Generic, CT- Project Manager Generic	4.0d	24-Jun-21	29-Jun-21	51.0d
DE2000	Project Constructability Review Complete	CT- Project Manager Generic, CT- Project Engineer Generic, Project	4.0d	24-Jun-21	29-Jun-21	51.0d
T-Minus Milestones						
CS00430.01.12.1 T-Minus Milestones "A" Group						
AT2404	N/R - A-T-24.04 DETERMINE / ASSIGN LCE (LEAD COMMISSIONING ENGINEER)		0.0d		27-May-21	-60.0d
AT0404	A-T-04.04 ALL FINAL RELAY PROTECTIVE SETTING ISSUED		0.0d		21-Jul-21	53.0d
AT1301	A-T-13.01 COMMISSIONING PLAN COMPLETE		0.0d		22-Jul-21	52.0d
A3570	T-08.05 - Final Engineering Issued for Construction W/BOM		0.0d		23-Jul-21	34.0d
AT1201	A-T-12.01 SCADA Date (Tab) Sheets/Signal List Sent to LCC		0.0d		23-Jul-21	51.0d
AT0409	A-T-04.09 ALL FIRM TOA APPLICATIONS DUE TO LCC (for DISTRIBUTION Non-transformer equipment)		0.0d		28-Jul-21	46.0d
AT1202	A-T-12.02 P/C DESCRIPTION / DRAFT OPERATING INSTRUCTIONS ISSUED		0.0d		25-Aug-21	18.0d
AT0203	A-T-02.03 CAN COMPLETE (CONSTRUCTION AUTHORIZATION NOTICE)		0.0d		29-Aug-21	0.0d
AT0401	A-T-04.01 ALL MATERIAL RECEIVED, STAGED, INVENTORIED, REVIEWED		0.0d		12-Sep-21	0.0d
AT00	A-T-00 - START OF CONSTRUCTION - WO#		0.0d	13-Sep-21*		0.0d
ENGINEERING & DESIGN						
Electrical Engineering						
CS00430.05.02 Electrical Engineering						
DSSE-460	Operating Instructions - SSED Review Draft Distribution OI	CT- Project Engineer Generic	5.0d	19-Aug-21	25-Aug-21	11.0d
DSSE-920	Operating Instructions - SSED Review Draft Convex OI	CT- Project Engineer Generic	5.0d	19-Aug-21	25-Aug-21	11.0d
Distribution Thermal Ratings NX-9						
CS00430.05.03.05 Non NX-9 Thermal Ratings						
NX9A-EM44	P&C Develops and Provides LTRC with P&C Checklist & Thermal Ratings Data	CT- P&C Engineer Generic	5.0d	24-May-21	28-May-21	129.0d
NX9A-EM54	LTRC Prepares and Sends Thermal Rating Data for TRC Review	[redacted]	5.0d	01-Jun-21	07-Jun-21	129.0d
NX9A-EM64	TRC Reviews and Approves Thermal Rating Data	[redacted]	5.0d	08-Jun-21	14-Jun-21	129.0d
NX9A-EM74	LTRC Files Capability Sheets	[redacted]	5.0d	15-Jun-21	21-Jun-21	129.0d
P&C Engineering						
CS00430.05.04 P&C Engineering						
DSSE-990	P&C INITIATE SCADA Data Sheets	CT- P&C Engineer Generic	20.0d	23-Jun-21	21-Jul-21	34.0d



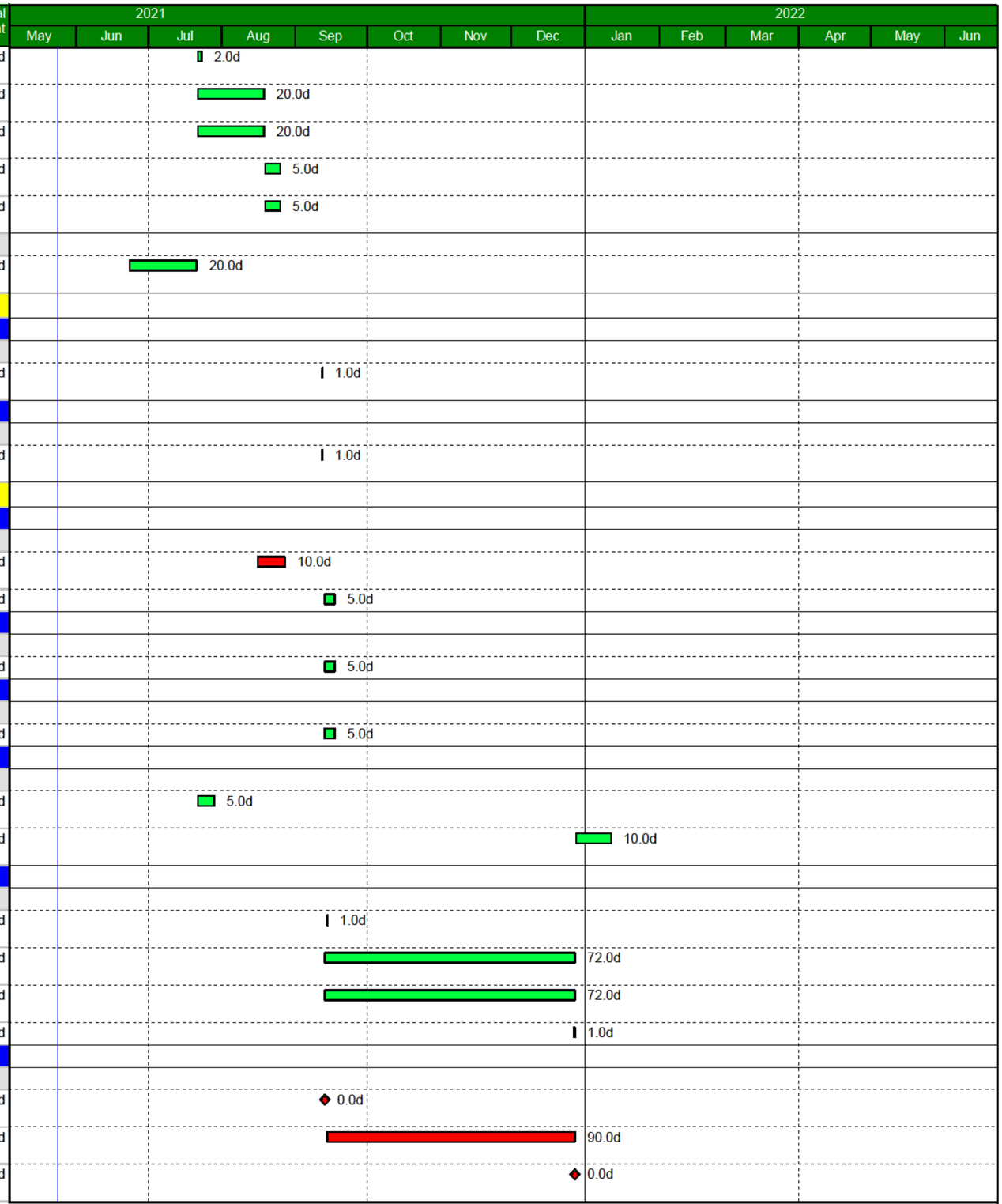
Remaining Work | Actual Work | Crit Milestone
Critical Remaining Work | Milestone | Actual Milestone

Data Date
24-May-21

28-May-21

Project Lead: [redacted]

Activity ID	Activity Name	Resources	RD	Start	Finish	Total Float
DSSE-220	SDS Complete	CT- P&C Engineer Generic	2.0d	22-Jul-21	23-Jul-21	34.0d
DSSE-450	Operating Instructions - Prepare and Issue Draft Distribution OI to Engineering		20.0d	22-Jul-21	18-Aug-21	11.0d
DSSE-480	P&C INITIATE CASCADE FORMS (Apenndix A) for Construction	CT- P&C Engineer Generic	20.0d	22-Jul-21	18-Aug-21	88.0d
DSSE-470	Operating Instructions - P&C Review Draft Distribution OI	CT- P&C Engineer Generic	5.0d	19-Aug-21	25-Aug-21	11.0d
DSSE-930	Operating Instructions - P&C Review Draft Convex OI	CT- P&C Engineer Generic	5.0d	19-Aug-21	25-Aug-21	11.0d
CS00430.05.04.1	**Relay Settings**					
DSSE-440	Relay Settings - Prepare and Issue Relay Settings IFC	CT- P&C Engineer Generic	20.0d	23-Jun-21	21-Jul-21	11.0d
MATERIAL PROCUREMENT						
MATERIAL FOR P&C						
CS00430.06.01	**MATERIAL FOR P&C**					
DSSE-1010	MATERIAL - P&C - Engineering Confirm Material Delivery to Site		1.0d	12-Sep-21	12-Sep-21	0.0d
MATERIAL FOR ELECTRICAL						
CS00430.06.02	**MATERIAL FOR ELECTRICAL**					
DSSE-550	MATERIAL - Electrical - Material Handler Confirms Material Delivery to Site		1.0d	12-Sep-21	12-Sep-21	0.0d
CONSTRUCTION						
CONSTRUCTION - ELECTRICAL						
CS00430.07.02	**CONSTRUCTION - ELECTRICAL**					
A1170	Prepare CAN (Construction Authorization Notice)	CT- Project Manager Generic	10.0d	16-Aug-21	27-Aug-21	0.0d
A1130	Construction - Electrical	Const Rep T Generic - SS	5.0d	13-Sep-21	17-Sep-21	67.0d
CONSTRUCTION - P&C						
CS00430.07.03	**CONSTRUCTION - P&C**					
A1140	Construction - P&C Implement Relay Settings	Const Rep T Generic - SS	5.0d	13-Sep-21	17-Sep-21	67.0d
CONSTRUCTION - COMMUNICATIONS						
CS00430.07.04	**CONSTRUCTION - COMMUNICATIONS**					
A1150	Construction - Communications	Const Rep T Generic - SS	5.0d	13-Sep-21	17-Sep-21	67.0d
CONSTRUCTION - CONST.REP TASKS						
CS00430.07.92	**CONSTRUCTION - CONST.REP TASKS**					
A1250	Construction Rep SUBMIT OUTAGE REQUESTS for NON-transformer equipment (4 weeks before outage)	Construction Rep Generic	5.0d	22-Jul-21	28-Jul-21	31.0d
A1260	Construction Rep Finalize CASCADE Forms (within 14 days folloiwng ISD)	Const Rep T Generic - SS	10.0d	28-Dec-21	11-Jan-22	6.0d
CONSTRUCTION RESOURCE TRACKING						
CS00430.07.94	**CONSTRUCTION RESOURCE TRACKING**					
A1070	RESOURCE ONLY ACTIVITY - CONSTRUCTION - SWITCH OUT	Distribution Switching Crew	1.0d	14-Sep-21	14-Sep-21	70.0d
ConRep-S	RESOURCE ONLY ACTIVITY - CONSTRUCTION - CONSTRUCTION REP	Construction Rep Generic	72.0d	13-Sep-21	27-Dec-21	0.0d
CONSTelec	RESOURCE ONLY ACTIVITY - CONSTRUCTION - ELECTRICIAN	Distribution - S/S Electrician	72.0d	13-Sep-21	27-Dec-21	0.0d
A1080	RESOURCE ONLY ACTIVITY - CONSTRUCTION - SWITCH	Distribution Switching Crew	1.0d	27-Dec-21	27-Dec-21	0.0d
CONSTRUCTION OUTAGES						
CS00430.07.96	**CONSTRUCTION OUTAGES**					
CSM	Construction Start Milestone		0.0d	13-Sep-21		0.0d
TOA-Const	OUTAGE / General Construction Work	Construction Resources	90.0d	14-Sep-21	27-Dec-21	0.0d
CFM	Construction Finish Milestone		0.0d		27-Dec-21	0.0d



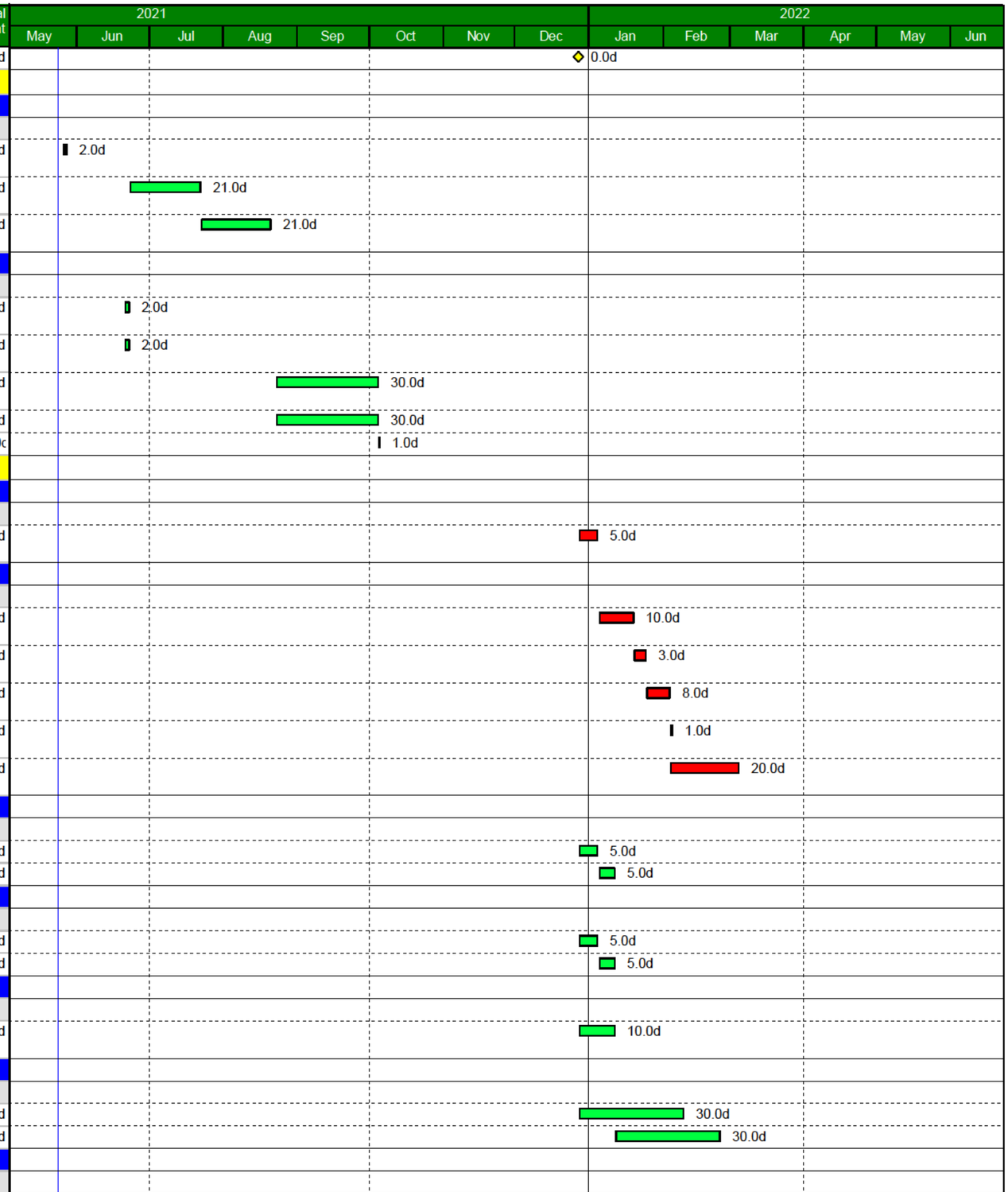
Remaining Work | Actual Work | Crit Milestone
Critical Remaining Work | Milestone | Actual Milestone

Data Date
24-May-21

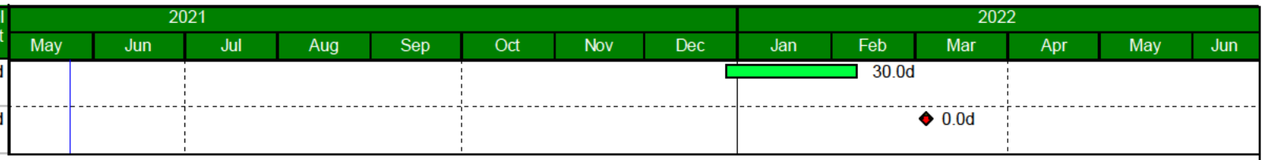
28-May-21

Project Lead: [redacted]

Activity ID	Activity Name	Resources	RD	Start	Finish	Total Float
ISD	EQUIPMENT IN SERVICE DATE (requires FOOB constraint		0.0d		27-Dec-21	44.0d
TEST AND COMMISSION						
LCE PLANNING						
CS00430.09.02 LCE PLANNING						
LCE200	N/R - Assign Lead Commissioning Engineer (Per PM 5/28/21)	[redacted]	2.0d	26-May-21*	27-May-21	-44.0d
LCE400	Develop Test and Commissioning Plan	CT/WMA Test Contractor-GENERIC	21.0d	23-Jun-21	22-Jul-21	35.0d
LCE500	N/R - LCE Review and Approve Vendor's Test and Commissioning Plan	CT - Lead Commissioning Engineer	21.0d	23-Jul-21	20-Aug-21	56.0d
TEST ACTIVITIES						
CS00430.09.04 TEST ACTIVITIES						
LCE310	N/R - Mobilize LCE Prior to Construction	CT - Lead Commissioning Engineer	2.0d	21-Jun-21	22-Jun-21	50.0d
LCE320	N/R - Mobilize Testing Vendor Prior to Construction	CT/WMA Test Contractor-GENERIC	2.0d	21-Jun-21	22-Jun-21	50.0d
LCE610	N/R - LCE Oversee Execution of Test and Commissioning Plan	CT - Lead Commissioning Engineer	30.0d	23-Aug-21	04-Oct-21	56.0d
LCE620	Execute Test and Commissioning Plan	Tester Not Assigned	30.0d	23-Aug-21	04-Oct-21	56.0d
LCE700	Test Group Prepare Electrical Field Mark Ups	CT - Lead Commissioning Engineer	1.0d	05-Oct-21	05-Oct-21	134.0d
PROJECT CLOSE OUT						
PROJECT CLOSE OUT						
CS00430.10 PROJECT CLOSE OUT						
DSSE-1100	Complete TD-707 Turnover Document / Forward to SOC & Mailing List	Construction Rep Generic, CT-Project Manager Generic	5.0d	28-Dec-21	04-Jan-22	0.0d
Electrical As-Builts						
CS00430.10.02 Electrical As-Builts						
DSSE-820	Eversource Engineering Verifies Electrical Mark Up As-Built Drawing Package	CT- Project Engineer Generic, CT-Substation Design Drafter Generic,	10.0d	05-Jan-22	19-Jan-22	0.0d
DSSE-940	Eversource Engineering Updates Electrical As-Built Drawing Package	CT- Project Engineer Generic, CT-Substation Design Drafter Generic,	3.0d	20-Jan-22	24-Jan-22	0.0d
DSSE-830	ES Create Transmittal, Approve Final As-Built Package, and EDC Files and Issue Drawings to Field	CT- Substation Design Drafter Generic, CT- Substation Designer	8.0d	25-Jan-22	03-Feb-22	0.0d
DSSE-840	PM to Document Electrical As-Built Drawings Complete	CT- Project Manager Generic	1.0d	04-Feb-22	04-Feb-22	19.0d
DSSE-1110	Complete TD-176 ELECTRICAL Design Prep & Issue As-Built Dwgs	CT- Substation Design Drafter Generic	20.0d	04-Feb-22	04-Mar-22	0.0d
P&C As-Builts						
CS00430.10.03 P&C As-Builts						
DSSE-960	P&C Submits Relay Setting As-Builts	CT- P&C Engineer Generic	5.0d	28-Dec-21	04-Jan-22	13.0d
DSSE-950	P&C Submits SDS As-Builts	CT- P&C Engineer Generic	5.0d	05-Jan-22	11-Jan-22	8.0d
Test Closout						
CS00430.10.04 Test Closout						
LCE800	Test Ensures Marked up Prints Ready for Pick-up	CT - Lead Commissioning Engineer	5.0d	28-Dec-21	04-Jan-22	35.0d
LCE900	Test Review Test Data and Issue Commissioning Report	CT - Lead Commissioning Engineer	5.0d	05-Jan-22	11-Jan-22	35.0d
SITE RESTORATION CLOSEOUT						
CS00430.10.05 SITE RESTORATION CLOSEOUT						
A1110	Restore / Remediate Site	CT/WMA.Construction Contractor-GENERIC	10.0d	28-Dec-21	11-Jan-22	36.0d
MATERIAL, EQUIPMENT, COST, AND ASSET MANAGEMENT CLOSEOUT						
CS00430.10.06 MATERIAL, EQUIPMENT, COST, AND ASSET MANAGEMENT CLOSEOUT						
A1020	Cost Analyst Prepares FINAL Units of Property	CT- Cost Analyst Generic	30.0d	28-Dec-21	09-Feb-22	16.0d
A1030	Asset Management Complete Asset Update(s) in CASCADE	[redacted]	30.0d	12-Jan-22	24-Feb-22	6.0d
PROJECT MANAGEMENT CLOSEOUT						
CS00430.10.07 PROJECT MANAGEMENT CLOSEOUT						



Activity ID	Activity Name	Resources	RD	Start	Finish	Total Float
A1040	PM Prepares Closeout Documentation, Lessons Learned Meeting, etc.	CT- Project Manager Generic	30.0d	28-Dec-21	09-Feb-22	15.0d
FINISH	Project / Work Order Complete (FINAL SCHEDULE TASK/MILESTONE)		0.0d		04-Mar-22	0.0d



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Constructability Review Form: **Substation**

Project Title: [redacted] DSCADA LTC Upgrade	☐	Prior Constructability Review Performed?
	☐	Program Related Site Specific Review?
Project Numbers(s): CS009047/CS00430	**Project Constructability Phase:**	
Date(s) of Constructability Review: **08/19/2020**	☐ Conceptual Engineering Design	
Click to enter a date	☐ Preliminary Engineering Design	
	☒ Detailed Engineering Design	

Project Scope Statement:

Install DSCADA equipment for the 4R-1X, 4R-2X and 4R-3X

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 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] *8/19/2020*_____*Name / Signature*

Date

EVERSOURCE

Constructability Review Form: **Substation**

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	Determine cable route from transformers to control house. Determine if existing conduits can be used to install crush proof fiber.	Substation Operations to make an electrician available to open pull boxes associated with the transformers to confirm if crush proof cables can be pulled through. Site visit result will determine if new conduits are needed. Engineering to issue drawings based on site visit result. *5/27/21 Update – existing conduits acceptable for use.
2	Determine if existing communication equipment can accommodate new installation	Existing communication equipment are adequate per communication group
3		
4		
5		

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

EVERSOURCE

Constructability Review Form: **Substation**

	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?		Materials ordered
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	

EVERSOURCE

Constructability Review Form: **Substation**

	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	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	
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.)		~~Cable route shown on issued drawings not buildable. Need new conduit route from engineering. Site work down will determine if existing conduits can be used to install fiber.~~ *5/27/21 Update – existing conduit acceptable for use.
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

EVERSOURCE

Constructability Review Form: **Substation**

	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

EVERSOURCE

Constructability Review Form: **Substation**

	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

EVERSOURCE

Constructability Review Form: **Substation**

	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	☐	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: **Substation**

	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
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, S&CS, and T&D Real Estate**		
1	**Any regulatory concerns or approvals needed?** - Consider scope/design alterations to mitigate concerns - Consider Visual screening considerations (feasibility or location) -Zoning Relief and Permits required	☐	N/A
2	**Neighbor/Abutter impacts:** - Any noise, visual impacts, or sensitive abutters - Any changes to lighting or additional lighting needed?	☐	N/A
3	Review for roadway, gate access, trailers, equip height, noise, weekend/night work, or any potential public disturbance related to work	☐	N/A
4	Installation within Eversource Rights - Is Rights and Restrictions Review required?	☐	N/A
5	Expanding Footprint / New Buildings or future Expansion Plans?	☐	N/A
6	Proposed Equipment on same property? - Any Encroachments	☐	N/A

EVERSOURCE

Constructability Review Form: **Substation**

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
F	**Protection & Controls**		
1	Panel Graphic additions and/or Modifications	☐	N/A
2	Space on existing panels for new equipment? (front & rear of panel fronts)	☐	N/A
3	Panel fronts conform to drawings	☐	N/A
4	Access to bring new panels into control enclosure	☐	N/A
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.	☐	N/A
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?		N/A
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
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

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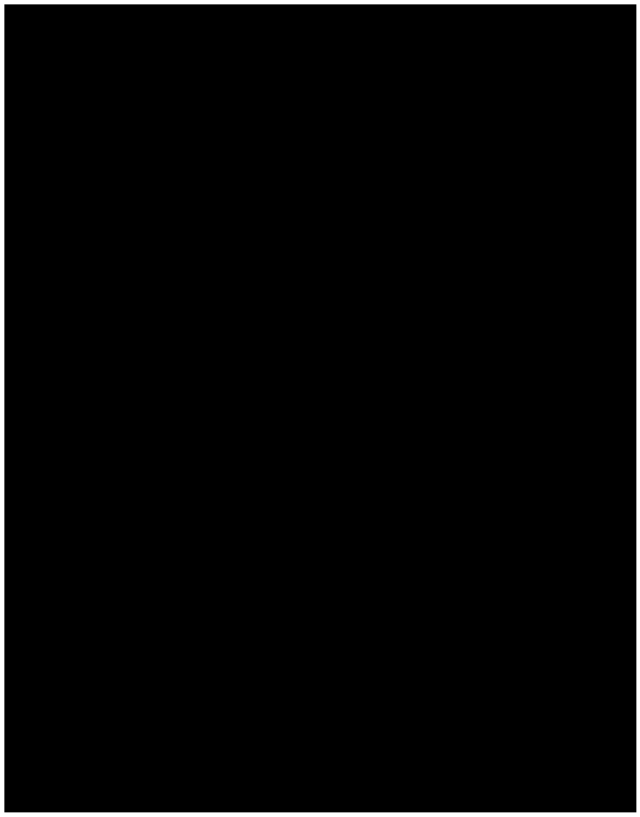
Constructability Review Form: **Substation**

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
8	Review space for any required additional communications cabinets which may be required to support additional telecommunications equipment installed	☐	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)

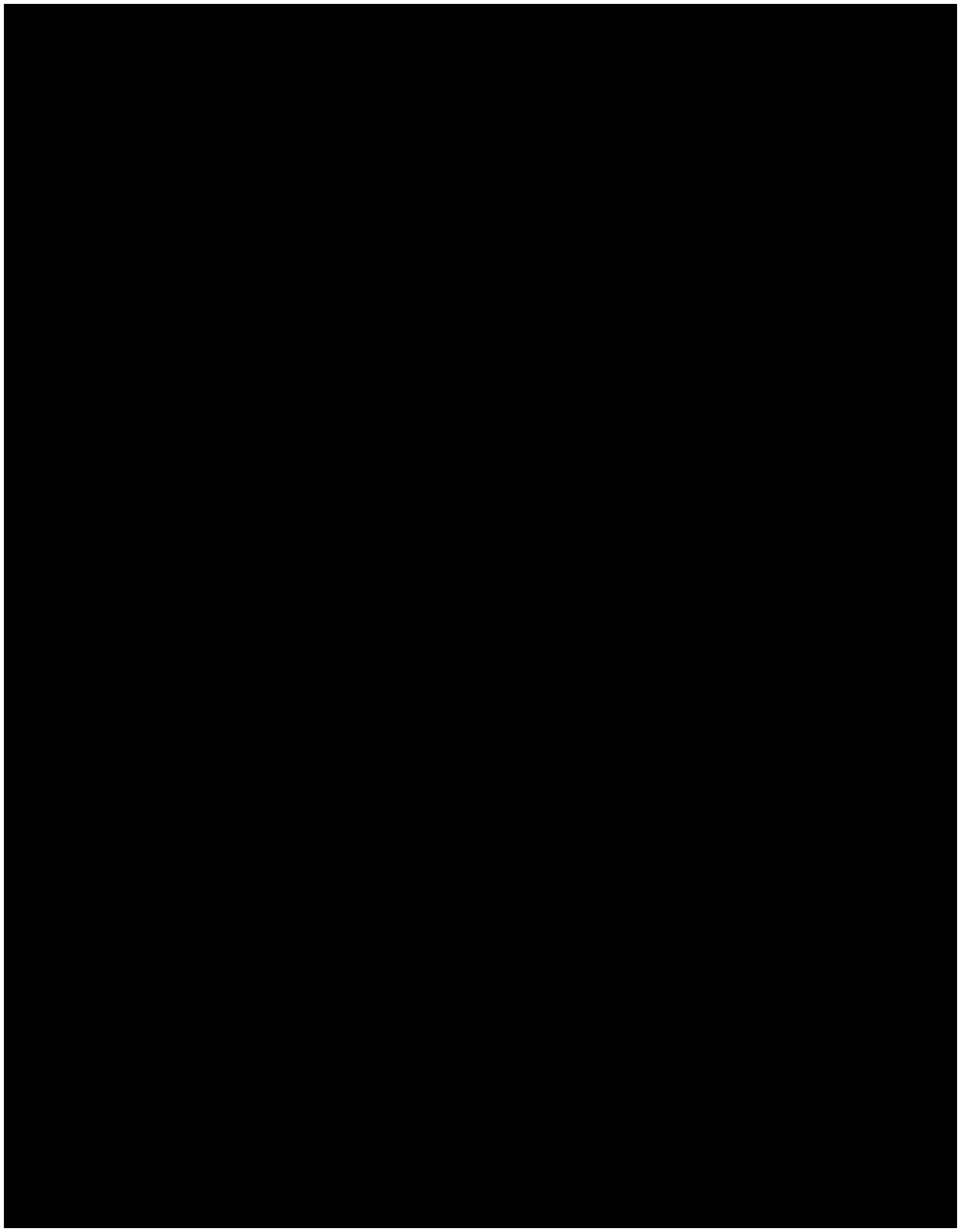


DSCADA Cabinet located inside the control house

EVERSOURCE

Constructability Review Form: **Substation**

4R-1X transformer LTC cabinet with 2001 Beckwith control



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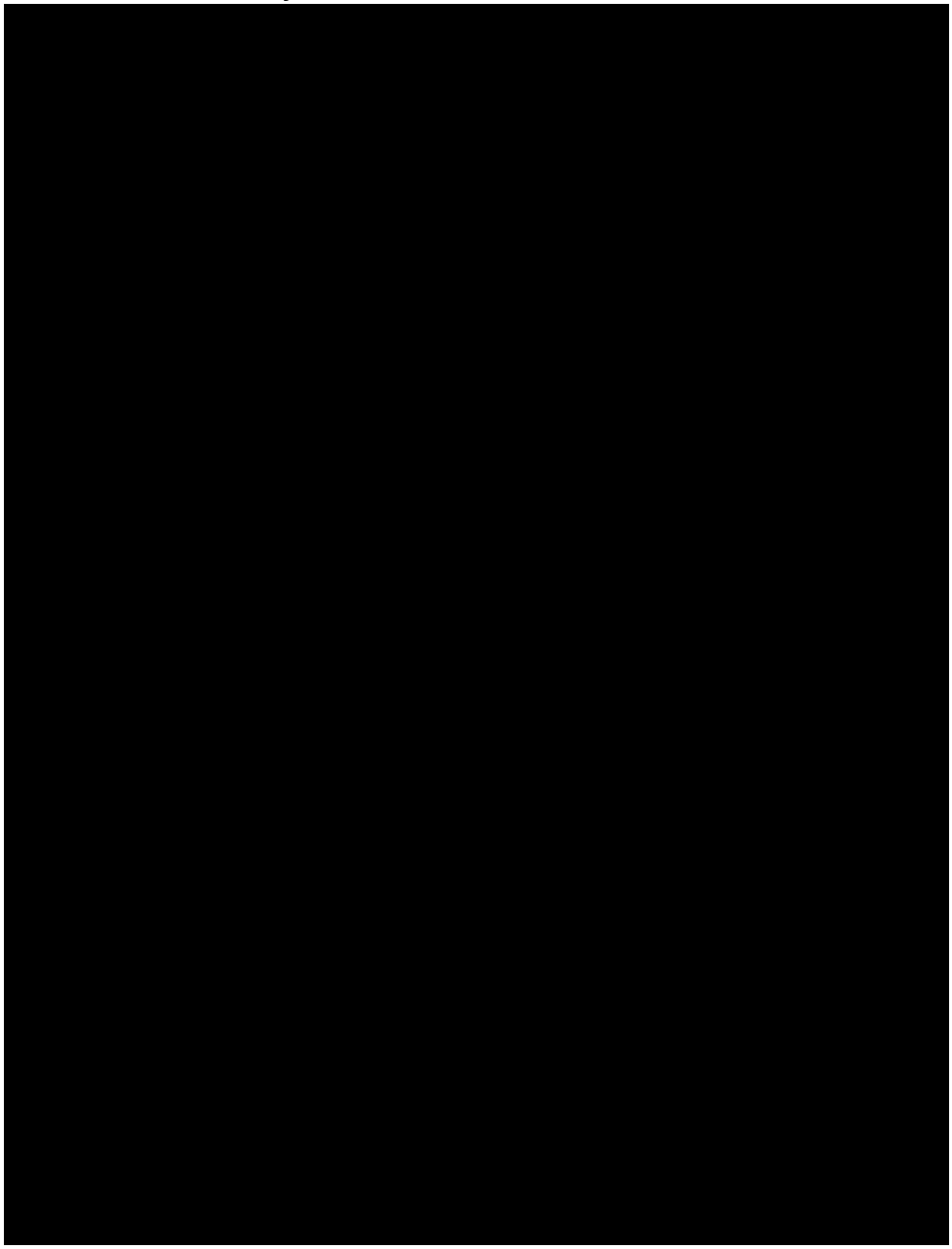
Constructability Review Form: **Substation**

4R-2X transformer LTC cabinet with M-0279 control



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EVERSOURCE

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 install Distribution Supervisory Control and Data Acquisition (DSCADA) Load Tap Changer (LTC) Automation at all remaining Eversource CT sites currently utilizing the obsolete radio-controlled system for substation LTC voltage reduction. The existing 1970's radio-controlled system is obsolete and failing. Replacement radio units are not available as the system components are no longer supported by the manufacturer. The existing radio-controlled system can no longer support the required voltage reduction capability. Therefore, the system needs replacement. Note that the $250K initial funding will cover through preliminary design, constructability review, full detailed schedules, estimate development and program release development/approval.

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. The proposed system design also provides System Operations Control (SOC) with the ability to raise/lower the voltage at an individual LTC. Currently only a “general” alarm is sent to the SOC when a transformer problem occurs. DSCADA will notify the SOC whether the raise or lower command was activated as intended with this new system.

There are 121 transformers in 57 stations identified by engineering for Distribution Substations remaining to be completed under the original CS00090 Program. Of these, 99 transformers in 46 stations will be completed 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 [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]

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:
    1. Upgrade the existing Tap Changer Controllers with new Beckwith DSCADA capable model M-2001D Digital Tap Changer Control. Not applicable to existing M-2001 controls

2. Install DCSADA LTC cabinet on the transformers. Grounding to be modified as necessary for the proper connections to the DSCADA cabinet
3. Install new conduit between transformer and control house switchgear. Not required if existing conduit can be used or if a spare conduit is available for a new crush resistant fiber cable
4. Install crush resistant fiber from DSCADA equipment in the control house / switchgear to the SEL-2240 Axion inside the LTC DSCADA cabinet
5. Install a new fiber patch panel
6. Install a new 43AMR three position switch ("AUTO/MAN/REMOTE"). LTC Auto/Manual control scheme to be updated to include this new switch
7. The LTC tap position monitor to be wired into the new LTC position indicator device and back to the SEL-2420 Axion
8. Available transformer alarms will be modified and rewired into the SEL-2420 Axion.

- 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

Eversource CT failed the Spring 2014 ISO mandated voltage reduction test due to the poor state of the existing radio system. The load was reduced by only 1.16% instead of the required 1.5%, indicating over 20% of receivers did not function properly. Subsequently, repairs were made so the test would pass in the Fall of 2014, the Spring/Fall of 2015, and the Spring of 2016. Repairs were done by using the few remaining spare units by replacing individual components, when it could be determined which component failed.

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] **(Preferred Solution)**

   Cost estimate $554,100 (planning grade)

2. [redacted]. **(This option is not recommended)**

3. [redacted]. **(This option is not recommended)**

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	Equip Position
[redacted]	CS00430	[redacted]	
	CS00430		
	CS00430		
	CS00433		
	CS00433		
	CS00433		
	CS00432		
	CS00432		
	CS00432		
TOTAL UNITS			

EVERSOURCE

Planned LTC Releases for 2022

Substation Name	Project Number	LTC Control	Equip Position
[redacted]	TBD	[redacted]	
	TBD		
	CS00495		
	CS00495		
	CS00496		
	CS00496		
	CS00499		
	CS00499		
	CS00500		
	CS00500		
	CS00501		
	CS00501		
	CS00501		
TOTAL UNITS			

Planned LTC Releases for 2023

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

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

Engineer and Upgrade LTC	Estimated In Service Date
[redacted]	
TOTAL UNITS	

Regulatory Approvals

No advance regulatory approval is required for this project.

Risks and Risk Mitigation Plans

[redacted]

[redacted]

As noted in Table - 1, an increased risk associated with Option 3 - Upgrade, New Control & Conduit is primarily because of unforeseen subgrade interferences or hazards associated with excavations in stations. Options 1 and 2 do not require excavation work in stations.

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
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	$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:

Project Scope:

[redacted]

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

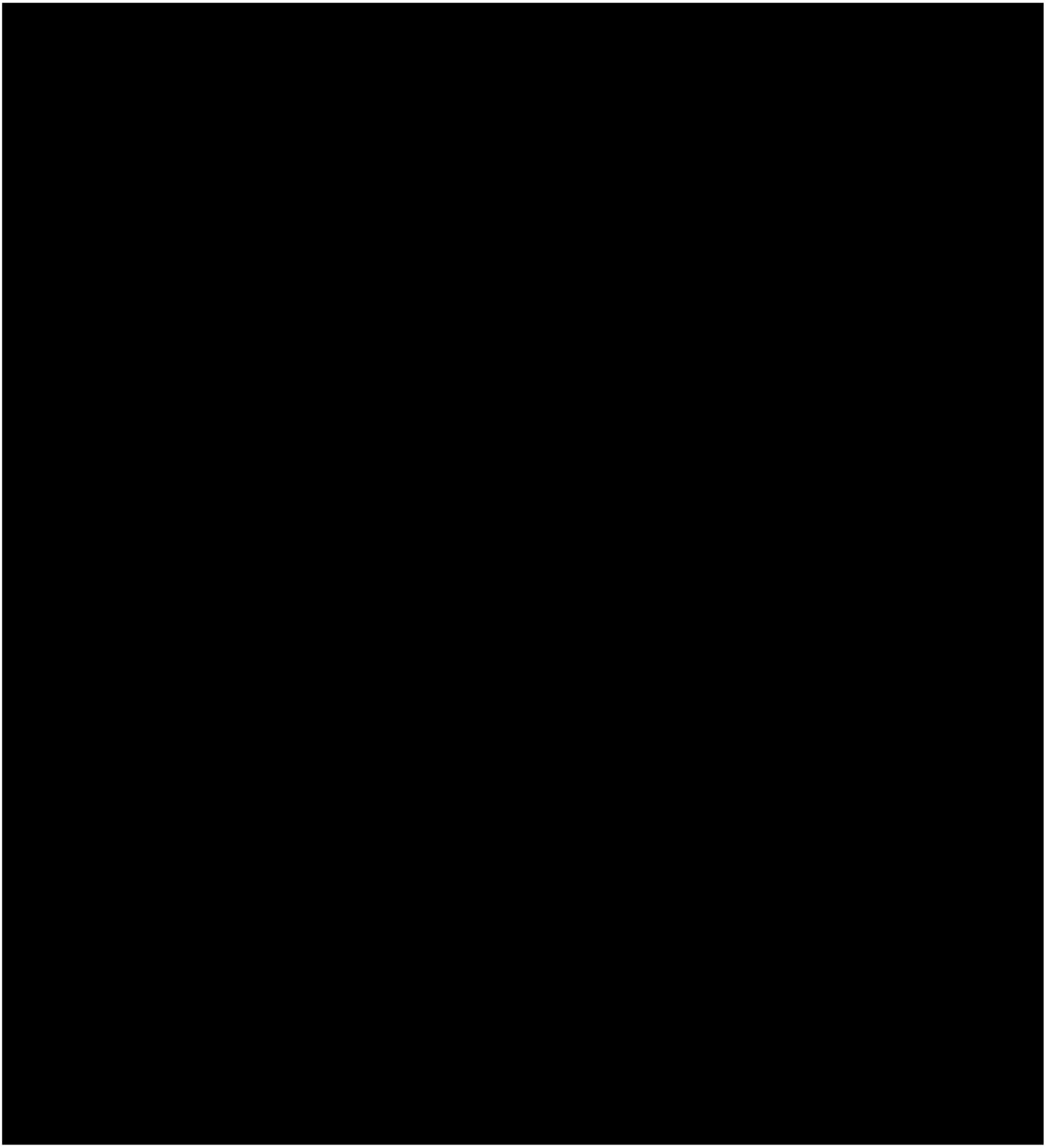
Check AFUDC rate minor drop in CT D rate.

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

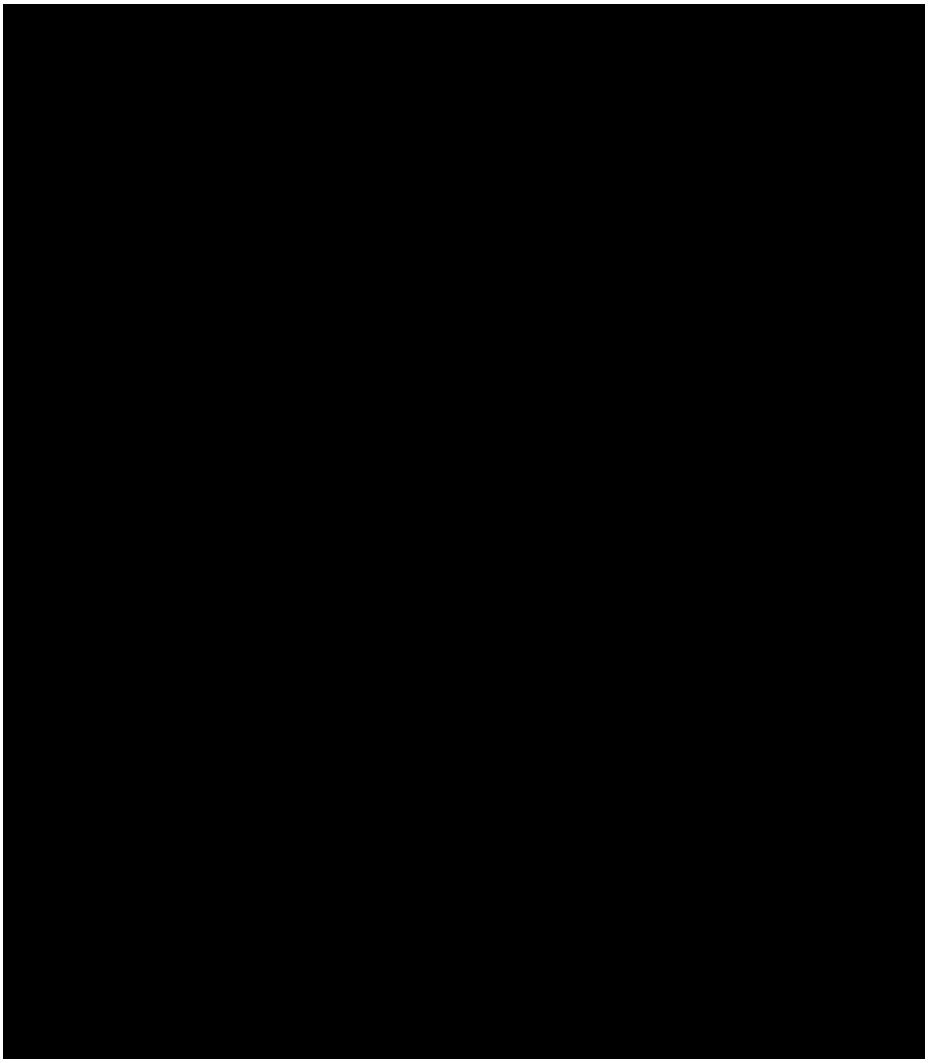


ATTACHMENT 3 - Photos

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:

