Operations Project Authorization Form

Approved at May 12, 2021 EPAC
Link to Meeting Minutes

Date Prepared: 05/06/2021	**Project Title: 1465 Line 1% Series Reactor at** [redacted]
Company: Eversource CT	**Project Number: 404959 (T), CS00505 (D)**
Organization: Transmission Project Management	**Class(es) of Plant: T Line, T SS**
Project Initiator: [redacted]	**Project Category: Stations - Reactor**
Project Manager: [redacted]	**Project Type: Specific**
Project Sponsor: [redacted]	**Project Purpose: Eliminate thermal and voltage violations identified in the 2029 Eastern Connecticut Needs Assessment**
Estimated in service date: March 2022	**Capital Investment part of original Oper. Plan: Yes**
Eng./Constr. Resources Budgeted? Yes	**O&M Expenses part of original Oper. Plan: No**
Authorization Type: Full Funding	**Facility Type (check all that apply):** ☒ **PTF** ☐ **non-PTF** ☒ **Distribution**
Total Request: $5.749M **$4.778M (404959)** **$971K (CS00505)**	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project is requesting full funding of $5.749M for the installation of a 1% series reactor, and its ancillary equipment, on the 1465 line at [redacted] as part of the overall Eastern Connecticut 2029 (ECT 2029) Reliability project. [redacted]

This project was presented to the Solution Design Committee and approved on March 2, 2020 as part of the larger ECT 2029 Reliability Project (404957 and 404959). This project, 404959, had partial funding of $0.5M approved in PowerPlan on April 7, 2020. As of May 5, 2021, the project has spent $452K to complete preliminary engineering and design, an outage and energization plan, a siting plan, preliminary environmental review and mapping.

Independent System Operator - New England (ISO-NE), as part of their area review, has identified and presented to the ISO-NE Planning Advisory Committee (PAC) in May of 2020, a

preferred solution to the ECT 2029 Needs Assessment. The preferred solution identifies new facilities and upgrades to existing facilities.

The ECT Working Group, comprised of Eversource, ISO-NE, and Connecticut Municipal Electric Energy Cooperative (CMEEC), divided the solutions into four (4) groups. The four (4) groups provided a means to compare similar electrical solutions with one another. Ultimately the four (4) solution groups satisfy all of the ECT 2029 needs.

The four (4) solution groups are:



This project is part of the solution for the Transfer Limit Analysis Related Upgrades (part of group 4 above). The other solution within this group and the other groups are addressed in separate Project Authorization Forms (PAFs). The total cost for the preferred solution for all solution groups, as of May 3, 2021 is $200M (+50/-25% conceptual grade estimate) and was selected because of steady-state system performance, future expandability, and load serving ability in the CMEEC territory.

Project Costs Summary – (404959)

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2021 to Go	2022	2023	2024	2025	2026	Total
1. ROW / Easements / Land Acquisition	$	$	$	$	$	$	$	$	$
2. Environmental Approvals / Permits	$20	$	$2	$1	$	$	$	$	$3
3. Outreach	$	$	$3	$3	$	$	$	$	$6
4. Siting Approvals / Permits	$	$5	$8	$8	$	$	$	$	$20
5. Engineering / Design	$20	$55	$94	$21	$	$	$	$	$170
6. Materials (Eversource purchased)	$	$	$316	$113	$	$	$	$	$429
7. Construction (incl matl's by contractors)	$354	$28	$805	$951	$	$	$	$	$1,784
8. Testing / Commissioning	$	$	$87	$311	$	$	$	$	$398
9. Project Mgmt Team	$8	$66	$66	$38	$	$	$	$	$170
10. Removals	$	$	$64	$	$	$	$	$	$64
11. Other	$	$	$	$	$	$	$	$	$
12. Risks	$	$	$275	$268	$	$	$	$	$543
SUBTOTAL DIRECTS W/ RISKS	**$402**	**$153**	**$1,719**	**$1,714**	**$**	**$**	**$**	**$**	**$3,586**
13. Indirects/Overhead	$91	$109	$360	$486	$	$	$	$	$956
14. AFUDC	$7	$5	$78	$33	$	$	$	$	$116
PROJECT TOTAL – BASELINE BUDGET	**$500**	**$268**	**$2,156**	**$2,233**	**$**	**$**	**$**	**$**	**$4,657**
15. Contingency	$	$	$60	$61	$	$	$	$	$121
TOTAL CAPITAL REQUEST	**$500**	**$268**	**$2,216**	**$2,294**	**$**	**$**	**$**	**$**	**$4,778**
16. Reimbursables/Customer Contribution	$	$	$	$	$	$	$	$	$
PROJECT TOTAL (LESS REIMBURSABLES)	**$500**	**$268**	**$2,216**	**$2,294**	**$**	**$**	**$**	**$**	**$4,778**
O&M	$	$	$	$	$	$	$	$	$
TOTAL REQUEST	**$500**	**$268**	**$2,216**	**$2,294**	**$**	**$**	**$**	**$**	**$4,778**

Note: Explain unique payment provisions, if applicable: *Risks identified are: Potential UG obstructions ($80k), Severe weather delays and additional OT ($215k), Contractor Change Orders ($220k) and Material Costs ($28k).*

Breakout Costs – (404959)

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2021 to Go	2022	2023	2024	2025	2026	Total
ST Labor	$40	$69	$37	$28	$	$	$	$	$134
OT Labor	$	$	$	$	$	$	$	$	$
Outside Services Labor	$362	$83	$747	$1,209	$	$	$	$	$2,039
Materials*	$	$	$595	$207	$	$	$	$	$802
Removals	$	$	$64	$	$	$	$	$	$64
Other (includes contingency)	$	$	$337	$331	$	$	$	$	$668
Indirects	$91	$109	$360	$486	$	$	$	$	$955
AFUDC	$7	$5	$78	$33	$	$	$	$	$116
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$500**	**$268**	**$2,216**	**$2,294**	**$**	**$**	**$**	**$**	**$4,778**

*All materials including Eversource purchased and outside service purchased. Note that outside service purchased material included in construction in project cost summary above.

Project Costs Summary - (CS00505)

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2021 to Go	2022	2023	2024	2025	2026	Total
1. ROW / Easements / Land Acquisition	$	$	$	$	$	$	$	$	$
2. Environmental Approvals / Permits	$	$	$	$	$	$	$	$	$1
3. Outreach	$	$	$	$1	$	$	$	$	$1
4. Siting Approvals / Permits	$	$1	$1	$2	$	$	$	$	$3
5. Engineering / Design	$	$20	$2	$2	$	$	$	$	$24
6. Materials (Eversource purchased)	$	$	$27	$10	$	$	$	$	$37
7. Construction (incl matl's by contractors)	$	$3	$196	$185	$	$	$	$	$385
8. Testing / Commissioning	$	$	$21	$72	$	$	$	$	$93
9. Project Mgmt Team	$	$6	$6	$5	$	$	$	$	$17
10. Removals	$	$	$	$	$	$	$	$	$
11. Other	$	$	$	$	$	$	$	$	$
12. Risks	$	$	$50	$42	$	$	$	$	$92
SUBTOTAL DIRECTS W/ RISKS	**$**	**$29**	**$304**	**$319**	**$**	**$**	**$**	**$**	**$653**
13. Indirects/Overhead	$	$12	$107	$149	$	$	$	$	$268
14. AFUDC	$	$1	$12	$6	$	$	$	$	$18
PROJECT TOTAL – BASELINE BUDGET	**$**	**$42**	**$424**	**$474**	**$**	**$**	**$**	**$**	**$939**
15. Contingency	$	$	$16	$17	$	$	$	$	$33
TOTAL CAPITAL REQUEST	**$**	**$42**	**$439**	**$490**	**$**	**$**	**$**	**$**	**$971**
16. Reimbursables/Customer Contribution	$	$	$	$	$	$	$	$	$
PROJECT TOTAL (LESS REIMBURSABLES)	**$**	**$42**	**$439**	**$490**	**$**	**$**	**$**	**$**	**$971**
O&M	$	$	$	$	$	$	$	$	$
TOTAL REQUEST	**$**	**$42**	**$439**	**$490**	**$**	**$**	**$**	**$**	**$971**

Note: Explain unique payment provisions, if applicable: *Risks identified are: Potential UG obstructions ($20k), Severe weather delays and additional OT ($35k), Contractor Change Orders ($30k) and Material Costs ($7k).*

Breakout Costs - (CS00505)

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2021 to Go	2022	2023	2024	2025	2026	Total
ST Labor	$	$7	$4	$4	$	$	$	$	$16
OT Labor	$	$	$	$	$	$	$	$	$
Outside Services Labor	$	$22	$165	$243	$	$	$	$	$430
Materials*	$	$	$85	$30	$	$	$	$	$115
Removals	$	$	$	$	$	$	$	$	$
Other (includes contingency)	$	$	$66	$59	$	$	$	$	$125
Indirects	$	$12	$107	$149	$	$	$	$	$268
AFUDC	$	$1	$12	$6	$	$	$	$	$18
TOTAL CAPITAL REQUEST - W/O REIMBURSABLES	**$**	**$42**	**$439**	**$490**	**$**	**$**	**$**	**$**	**$971**

*All materials including Eversource purchased and outside service purchased. Note that outside service purchased material included in construction in project cost summary above.

Future Financial Impacts:

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

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

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

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.

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

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

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

What functional area(s) will these benefits be reflected in?_____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):

Is there an ARO associated with this project? No
If yes, please provide details:

Are there other environmental cleanup costs associated with this project? No. The expansion area is within existing Eversource property and not near any wetlands. All soil generated on site will be repurposed on site. There is no old piping or conduit in the area with lead or polychlorinated biphenyls (PCBs). There are no Enviance reports of spills at this substation.
If yes, please provide details:

Technical Justification:

Project Need Statement

The 2029 Eastern Connecticut (ECT) Reliability Needs Assessment conducted by ISO-NE identified multiple thermal overloads and low voltage violations in the [redacted]

Project Objectives

The project objective is to improve transmission system reliability and [redacted]

[redacted]

Station	Line	Device Designation	Device Removals	Panel
[redacted]				

[redacted]

D Project Scope

[redacted]

Background / Justification

The 2029 Eastern Connecticut (ECT) Reliability Needs Assessment conducted by ISO-NE identified multiple thermal overloads and [redacted]

[redacted]

Business Process and / or Technical Improvements

This project will be completed to address the needs identified in the ECT 2029 Needs Assessment and improve transmission system reliability.

Alternatives Considered with Cost Estimates

This project was presented to the Solution Design Committee and approved on March 2, 2020 as part of the larger ECT 2029 Reliability Project Authorization Form (PAF) (404957 and 404959). The alternatives proposed are provided below.

Transfer Limit Analysis Related Upgrades:

[redacted] In order to eliminate the adverse impact, the following competing solution components were proposed. Alternative 2 was chosen as the preferred solution.

Alternative 1: (**This is not the preferred solution)** [redacted]

($12.89M)

- [redacted]

- Construct access roads, swamp mats, and crane pads as required
- Install all necessary insulation and hardware associated with the reconductoring.

Alternative 2: (**This is the preferred solution.**) [redacted]

- [redacted]

[redacted] and it was the least cost alternative.

Project Schedule

Milestone/Phase Name	Estimated Date
Partial Funding	March 2020
PAC Presentation	May 2020
Engineering Design Started	January 2021
Preliminary Engineering Completed	April 2021
Siting Council Filing	May 2021
Full Funding Request to EPAC	May 2021
Major Materials Ordered	June 2021
Engineering IFC	July 2021
Construction Start	September 2021
In Service Date	March 2022

See Attachment C for the P6 schedule.

Regulatory Approvals

The following approvals are required:

- CSC Petition

Environmental mapping is completed and no permitting is required.

Risks and Risk Mitigation Plans

The following risks have been identified and risk allocation is included to address:

1) Potential underground (UG) obstructions
2) Sever weather delays or OT
3) Contractor change orders
4) Material costs
5) [redacted].

Contingency

Contingency of $145K is included in the estimate to address unknowns that may develop during the project.

References

- ISO-NE 2029 Eastern Connecticut Needs Assessment Report, dated May 2018
- PAF titled “404957-404959 – ECT 2027 Reliability Project – Partial Funding - PAF”
- PAF titled “405121-405122-405123-405124-405125-405133-CS00401 - ECT 2029 Reliability Project – 69-kV Conversion Partial Funding – Partial Funding - PAF”

Attachments (One-Line Diagrams, Images, etc.)

- Figure 1 – Planning One Line Diagram Mystic Series Reactor
- Figure 2 – Proposed Mystic Preliminary Layout
- Attachment A – Cost Estimate
- Attachment B – Constructability Review Form
- Attachment C – Project Primavera (P6) Schedule
- Attachment D – Outage Sequence Rev. 6

Figure 1

Proposed One Line Diagram for [redacted]

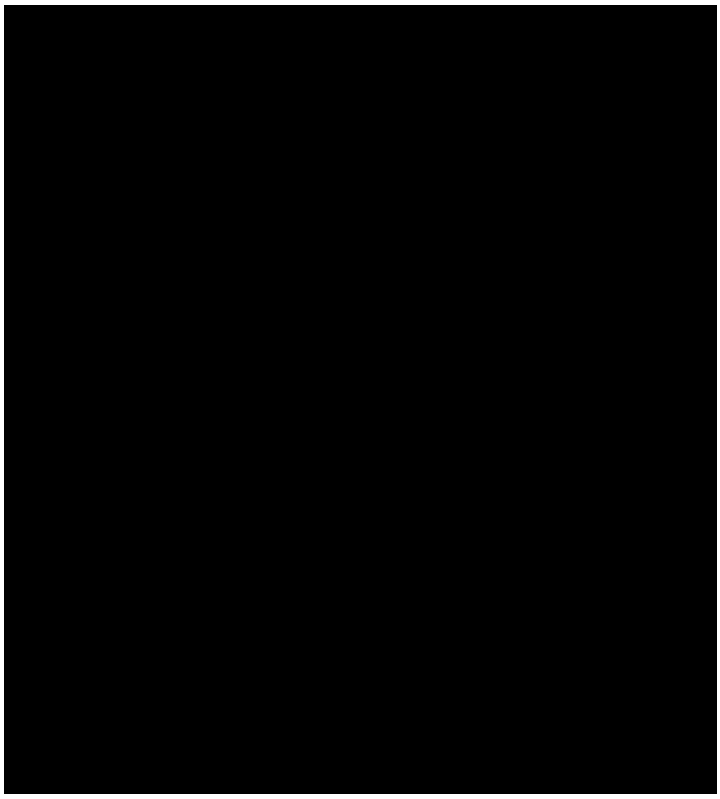


Figure 2
Proposed [redacted] Preliminary Layout



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: Line 1465 1% Series Reactor at [redacted]				**Project Number: 404959 (T), CS00505 (D)**	
Facility Type: ☐ BPS ☒ BES ☒ PTF ☐ non-PTF ☐ CIP ☒ Distribution					
PLANNING					
Is a NX-9 required?				Yes	
Is an ISO-NE PAC presentation required?				Yes	
ISO-NE Presentation Date (if completed):				May 21, 2020	
Cost in ISO-NE Presentation ($M) (if completed):				$5.7M	
Is a PPA required?				Yes*	
Is a TCA Application Required?				Yes*	
TCA Submittal Date (if submitted):				Enter Date	
Cost in TCA Submittal ($M) (if submitted):				Enter Cost ($M)	
Enter ISO-NE RSP / Asset Condition ID, if assigned:				1863	
*One PPA/TCA will be submitted for all ECT projects.					
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				Yes	
Is preliminary short circuit/ breaker duty analysis required?				Yes	
Are there any changes to the baseline audible noise?				Yes	
Is there an impact to the existing ground grid?				Yes	
Is a Transient Over Voltage (TOV) analysis required?				No	

Contains Critical Energy Infrastructure Information – Do Not Release

Project Checklist - Transmission & Substation Capital Project	
Project Name: Line 1465 1% Series Reactor at [redacted]	**Project Number: 404959 (T), TBD (D)**
P&C ENGINEERING	
OP-22 - Are PMUs and DDR required?	Yes
If BPS, is an NPCC Directory #4 presentation required?	No
Are ISO-NE OP-24 Appendix B updates necessary?	Yes
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	Yes
Are there any changes that affect the baseline EMI?	Yes
SITING	
Is a Siting filing required? *(If yes, list in regulatory approvals section)*	Yes
PERMITTING	
Is there any permitting required? *(If yes, list in regulatory approvals section)*	Yes
SITING & CONSTRUCTION SERVICES (OUTREACH)	
What is the level of outreach expected?	Medium
INITIATOR	
Has a field constructability review been completed?	Yes
INVESTMENT RECOVERY	
Does the project require development of an Investment Recovery plan?	No
COST ESTIMATING	
What team/firm prepared the cost estimate?	Estimate was prepared by the Eversource Estimating Team
Name of the person who prepared the estimate:	[redacted]
Was the estimate reviewed by Eversource Estimating?	Yes - Full Review

Cost Estimate Backup Details

Please see Attachment A for the detailed cost estimate backup.

Contains Critical Energy Infrastructure Information – Do Not Release

ESTIMATE SUMMARY

Project Title: ECT-Mystic Series Reactor Transmission portion
Project Mgr/Lead: [redacted]
Project Number: 404959
WO & Task #: 40495901
Est. Revision #
Estimate Type - Station work

Estimate By:
Date of Estimate:
ISD:03/30/2022
Estimate # C-21-386B

Template Revision # 01.65a

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	$2,600	0.1%	0.1%		$1,800	$800				
3	Outreach	$5,500	0.2%	0.1%		$2,700	$2,800				
4	Siting Approvals / Permits	$20,200	0.6%	0.4%	$5,000	$7,500	$7,700				
5	Engineering / Design	$169,500	4.7%	3.5%	$54,500	$93,800	$21,200				
6	Materials (Eversource purchased)	$428,700	12.0%	9.0%		$315,800	$112,900				
7	Construction (incl matl's by contractors)	$1,784,100	49.8%	37.3%	$27,800	$805,200	$951,100				
8	Testing / Commissioning	$398,000	11.1%	8.3%		$87,400	$310,600				
9	PMT Project Mgmt Team	$169,700	4.7%	3.6%	$65,900	$65,500	$38,300				
10	Removals	$64,200	1.8%	1.3%		$64,200					
11	Other										
12	Risks	$543,000	15.1%	11.4%		$275,000	$268,000				
	Project Directs Total w/Risks	**$3,585,500**	100.0%	75.0%	**$153,200**	**$1,718,900**	**$1,713,400**				
13	Indirects/Overhead	$955,500		20.0%	$109,500	$359,800	$486,200				
14	AFUDC	$116,200		2.4%	$5,300	$77,800	$33,100				
	Project Total - Baseline Budget	**$4,657,200**		97.5%	**$268,000**	**$2,156,500**	**$2,232,700**				
15	Contingency	$121,200		2.5%		$59,900	$61,300				
	Project Total - Funding Approval Level	**$4,778,400**		100.0%	**$268,000**	**$2,216,400**	**$2,294,000**				
16	Reimbursables/Customer Contribution										
	Project Total (less reimbursables)	**$4,778,400**			**$268,000**	**$2,216,400**	**$2,294,000**				
		-									
	Amount of Escalation included above	-$87,287			-$140,687		$53,400				
6	Total materials - Eversource	$428,700				$315,800	$112,900				
	Total materials - Contractor	$373,200				$278,800	$94,400				
	Total materials	$801,900				$594,600	$207,300				
	NOTE: Risk / Contingency is 16.1% of Project Total Costs (incl escal/indirects/AFUDC but excl reimb.)										

Estimate Range	**-25%**	-	**25%**
	$3,584,000	-	**$5,973,000**

COMMENTS:

[redacted]

Assumptions/Clarifications:

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

Indirect rates based on; 1T - CT , Station work
The equipment quantities and ratings, and the estimated lengths and dimensions, etc. are based on assumptions from past projects with typical layouts. The exact quantities and ratings will be finalized by Transmission Substation Engineering & Design, Civil Engineering and Protection and Controls Engineering during the preliminary engineering and design phase of the project.
It is assumed that the fault current will not exceed the ratings of the existing equipment and bus/structural design.
The proposed substation expansion is within existing Eversource property no impact is anticipated for the expansion of the eastern fence line to encroach on the property line.
Soil contamination and wetlands in the area of the proposed fence line are not anticipated.
This estimate covers Transmission cost only.
Existing control house has available space for new relay and control equipment.
New foundations included in estimate.

RISKS

Potential UG Obstructions	$ 80.000
Severe Weather. Delays. OT	$ 215.000
Contractor Change Orders	$ 220.000
Material Costs	$ 28.000

Escalated Line Item Dollars

Project Number: 404959
Date of Estimate:
Est. Revision #
Template Revision # 01.65a

CSTXX-CONSTRUCTION	R		Prior actuals to date Mhrs	Prior actuals to date DOLLARS	2021 DOLLARS	1 Mhrs	1 2022 DOLLARS	2 Mhrs	2 2023 DOLLARS	3 Mhrs	3 2024 DOLLARS	4 Mhrs	4 2025 DOLLARS	2026 Mhrs	2026 DOLLARS	TOTAL DOLLARS
Electrical Construction	LT															
General Construction	LT															
SCADA / Automation	LT				$2,120											$2,120
Telecom - Field	LT															
Construction Reps (internal)	LT															
Support Switch/Tag	LT				$2,120											$2,120
Other (specify)	LT															
Other (specify)	LT															
Other (specify)	LT															
LT Total					$4,240											$4,240
Employee Expenses	AE	5%			$212											$212
Construction Purchased Material	AM	1%			$4,297		$7,537									$11,834
Outside Construction Vendor	AQ				$429,745	4,356	$753,680									$1,183,425
Sales tax on Constr. Vendor																
Vehicles (now in indirects section)	AV															
Inspection services (Outside Vendor)	AQ															
Construction Rep (Randstad & CHAROAUT)	AQ			$27,841	$92,160	695	$103,082									$223,083
Rents and Leases	BR															
CSTXX Subtotal				$27,841	$530,654		$864,299									$1,422,793
Escalation					$ -		$ -		$ -		$ -		$ -		$ -	$ -
	P1															
CSTXX Total				$27,841	$530,654	5,051	$864,299									$1,422,793
ENRXX-TG ENGINEERING/DESIGN																
Project Services/Drafting	LT															
T- Line Engineering/Design	LT															
D- Street Engineering/Design	LT															
Civil Engineering/Design	LT			$93	$2,120	40	$2,184									$4,397
Substation (T) Engineering/Design	LT			$10,728	$2,120	40	$2,184									$15,032
Substation (D) Engineering/Design	LT															
Protection & Controls Engineering	LT			$2,266	$11,660	220	$12,010									$25,936
Survey Engineering	LT															
SCADA / Automation Engineering	LT															
Telecom Engineering	LT															
Other - Transferred charges from ETC WO de	LT			$41,415												$41,415
Other - specify	LT															
LT Total				$54,501	$15,900	300	$16,378									$86,779
Employee Expenses	AE	6%		$40	$795		$819									$1,654
Contractor Engineering - T-Lines	AQ															
Contractor Engineering - D-Street	AQ															
Contractor Engineering - T-Station	AQ															
Contractor Engineering - D-Station	AQ															
Contractor Engineering - P&C	AQ															
Contractor Engineering - Survey	AQ				$4,500											$4,500
Contractor Engineering - SCADA / Automatior	AQ															
Contractor Engineering - Telecom	AQ															
Contractor Engineering - Transferred charges from ETC WO developing project.	AQ				$72,600	26	$4,017									$76,617
Contractor Engineering - Power Grid Engineering	AQ															
Contractor Engineering - LRC Engineering	AQ															
Vehicles (now in indirects section)	AV															
ENRXX Subtotal			-	$54,540	$93,795	326	$21,214	-	-	-	-	-	-			$169,549
Escalation																
	P1															
ENRXX Total			-	$54,540	$93,795	326	$21,214	-	-	-	-	-	-			$169,549
LNDXX-TG LAND																
Real Estate	LT															
Employee Expenses	AE	5%														
Purchase Land	AM															
Vehicles (now in indirects section)	AV															
Fees and Payments	BF															
LNDXX Subtotal			-			-		-		-		-				
Escalation																
	P1															
LNDXX Total			-			-		-		-		-				
MATXX-TG MATERIAL																
Eversource	AM				$289,291		$97,877									$387,167
Outside Services	AM				$278,824		$94,335									$373,159
	AM															
Freight																
Sales Tax Eversource/outside services		4%			$22,200		$7,511									$29,711
Other																
MATXX Subtotal					$590,315		$199,723									$790,038
Escalation																
	P1															
MATXX Total					$590,315		$199,723									$790,038
PSMXX-PROJECT MANAGER & SUPPORT																
Project Management (PM)	LT			$4,511	$4,240	100	$5,459									$14,210
Project Planning/Cost (IP)	LT			$3,267	$1,378	22	$1,201									$5,846
Contracts/Purchasing (C/P)	LT				$1,590	10	$546									$2,136
System Planning	LT				$1,060	30	$1,638									$2,698
Environmental	LT				$1,781	14	$786									$2,567
SCS - Notification	LT				$137		$140									$277
Legal	LT				$1,060	10	$546									$1,606
Estimating	LT				$2,120											$2,120
Siting - Local Zoning	LT			$4,982	$400		$412									$5,794
Asset Management	LT				$530	10	$546									$1,076
Other - T+D Rights + Survey - Svc Co	LT			$1,995	$2,120											$4,115
Other -	LT			$50												$50
Other -	LT															
Other -	LT															
LT Total				$14,805	$16,416	196	$11,274									$42,495
Employee Expenses	AE	5%		$405	$821		$563									$1,789
Project Support Vendor - PM	AQ			$6,543		-		-	-	-	-	-	-			$6,543
Project Support Vendor - IP	AQ					-		-	-	-	-	-	-			
Project Support Vendor - C/P	AQ					-		-	-	-	-	-	-			
Project Support Vendor - System Planning	AQ					-		-	-	-	-	-	-			
Project Support Vendor - Enviromental	AQ					-		-	-	-	-	-	-			
Project Support Vendor - SCS - Notification	AQ				$2,600	-	$2,657	-	-	-	-	-	-			$5,257
Project Support Vendor - Legal	AQ					-		-	-	-	-	-	-			
Project Support Vendor - Estimating	AQ					-		-	-	-	-	-	-			
Project Support Vendor - Siting - Local Zoning	AQ				$7,100	-	$7,313	-	-	-	-	-	-			$14,413
Project Support Vendor - Asset Management	AQ					-		-	-	-	-	-	-			
Project Support Vendor - Transferred charges from ETC WO developing project.	AQ			$3,409		-		-	-	-	-	-	-			$3,409
Project Support Vendor - Burns & McDonnell	AQ			$10,875		-		-	-	-	-	-	-			$10,875
Project Support Vendor - BSC Group	AQ			$4,475	$7,850	-		-	-	-	-	-	-			$12,325
Project Support Vendor - Randstad	AQ			$30,326	$42,773	-	$27,810	-	-	-	-	-	-			$100,909
Vehicles (now in indirects section)	AV															
Property or CWIP tax large proj. allowance	BR															
	BR															
Fees and Payments - Enviromental	BF															
Fees and Payments - Siting	BF															
Fees and Payments - Other	BF															
PSMXX Subtotal			-	$70,836	$77,560	196	$49,617	-	-	-	-	-	-			$198,013
Escalation																
	P1															
PSMXX Total			-	$70,836	$77,560	196	$49,617	-	-	-	-	-	-			$198,013
REMXX-TG REMOVAL																
Engineering/Design	LT															
Internal Construction	LT															
LT Total																
Employee Expenses	AE	15%														
Outside Services	AQ															
Contractor Labor	AQ				$64,160											$64,160
Vehicles (now in indirects section)	AV															
Rents and Leases	BR															
REMXX Subtotal			-		$64,160	-		-		-		-				$64,160
Escalation																
	P1															
REMXX Total			-		$64,160	-		-		-		-				$64,160
TSTXX-TG TEST																
Test / Field Engr. Labor (In House)	LT															
Lead Commissioning Engr. (LCE) (internal)	AQ															
Employee Expense	AE	10%														
Test / Field Engr. Labor (contractor)	AQ					1,040	$192,816									$192,816
Lead Commissioning Engr. (LCE) (contactor)	AQ				$87,360	550	$117,832									$205,192
Vehicles (now in indirects section)	AV															
TSTXX Subtotal					$87,360		$310,648									$398,008
Escalation																
	P1															
TSTXX Total					$87,360	1,590	$310,648									$398,008
SUBTOTAL PROJECT DIRECT COST			-	**$153,217**	**$1,443,844**	**7,164**	**$1,445,501**	-	-	-	-	-	-			**$3,042,561**
Risk																
Risk					$275,000		$268,000									$543,000
Risk Total					$275,000		$268,000									$543,000
TOTAL PROJECT DIRECT COST			-	**$153,217**	**$1,718,844**	**7,164**	**$1,713,501**	-	-	-	-	-	-			**$3,585,561**
INDIRECTS																
Non-Productive Time Allocation (ZNP)	58	15.1%		$10,913	$5,502		$4,161									$20,576
Payroll Benefits Allocation (ZPB) incl NPT	59	44.0%		$26,538	$2,146											$28,684
Gen SVC CO Overhead (ZGS) incl NPT	60	75.0%		$13,228	$27,885		$23,859									$64,972
E&S Allocations (ZEB,ZEL,ZES)	61	35.0%		$56,500	$309,028		$442,707									$808,235
AS&E Allocations (ZAS)	62	0.7%		$1,772	$12,519		$13,434									$27,725
Stores Expense Allocation (ZST)	62															
Lobby Stock																
MDEC (ZMI)																
Vehicles (ZVE)		7.8%		$542	$2,742		$2,073									$5,357
	63															
Indirects Subtotal				$109,493	$359,822		$486,234									$955,549
TOTAL PROJECT COST - Direct & Indirect (excl AFUDC)				**$262.710**	**$2.078.666**		**$2.199.735**									**$4.541.110**
AFUDC																
AFUDC (ZK)				$5,282	$77,758	0	$33,099	0	0	0	0	0	0	0	0	$116,139
In Service Dollars																
Cumulative IS$																
AFUDC Subtotal				$5,282	$77,758		$33,099									$116,139
TOTAL PROJECT COST - Baseline Budget				**$267.991**	**$2.156.424**		**$2.232.834**									**$4.657.249**
Contingency																
Contingency					$59,903		$61,278									$121,181
Other																
Contingency SubTotal					**$59.903**		**$61.278**									**$121.181**
TOTAL PROJECT COST - Approved Funding				$408,678	**$2.216.327**		**$2.294.112**									**$4.778.430**
Reimbursables / Customer Contribution																
Reimbursables / Customer Contribution (enter as negative)	59															
TOTAL PROJECT COST				**$408,678**	**$2,216,327**		**$2,294,112**									**$4,778,430**

ESTIMATE SUMMARY

Project Title: ECT-Mystic Series Reactor Dstribution Portion
Project Mgr/Lead: [redacted]

Estimate By: [redacted]
Date of Estimate: 05/28/2021

Project Number: 404959
WO & Task #: 40495901
Est. Revision # 00
Estimate Type - Station work

ISD:03/30/2022

Estimate # C-21-386A

Template Revision # 01.65a

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	$600	0.1%	0.1%		$400	$200				
3	Outreach	$1,000	0.2%	0.1%		$500	$500				
4	Siting Approvals / Permits	$3,400	0.5%	0.4%	$500	$1,400	$1,500				
5	Engineering / Design	$24,100	3.7%	2.5%	$19,600	$2,200	$2,300				
6	Materials (Eversource purchased)	$36,700	5.6%	3.8%		$26,700	$10,000				
7	Construction (incl matl's by contractors)	$384,600	59.0%	39.6%	$3,000	$196,200	$185,400				
8	Testing / Commissioning	$93,100	14.3%	9.6%		$20,800	$72,300				
9	PMT Project Mgmt Team	$16,900	2.6%	1.7%	$6,000	$6,200	$4,700				
10	Removals										
11	Other										
12	Risks	$92,000	14.1%	9.5%		$50,000	$42,000				
	Project Directs Total w/Risks	**$652,400**	100.0%	67.2%	**$29,100**	**$304,400**	**$318,900**				
13	Indirects/Overhead	$267,800		27.6%	$11,900	$107,100	$148,800				
14	AFUDC	$18,300		1.9%	$600	$12,000	$5,700				
	Project Total - Baseline Budget	**$938,500**		96.7%	**$41,600**	**$423,500**	**$473,400**				
15	Contingency	$32,500		3.3%		$15,800	$16,700				
	Project Total - Funding Approval Level	**$971,000**		100.0%	**$41,600**	**$439,300**	**$490,100**				
16	Reimbursables/Customer Contribution										
	Project Total (less reimbursables)	**$971,000**			**$41,600**	**$439,300**	**$490,100**				
		-									
	Amount of Escalation included above	-$10,300			-$22,300		$12,000				
6	Total materials - Eversource	$36,700				$26,700	$10,000				
	Total materials - Contractor	$78,000				$58,300	$19,700				
	Total materials	$114,700				$85,000	$29,700				
	NOTE: Risk / Contingency is 14.7% of Project Total Costs (incl escal/indirects/AFUDC but excl reimb.)										

Estimate Range	**-25%**	-	**25%**	
	$728,000	-	**$1,214,000**	

COMMENTS:

Project Scope:

[redacted]

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

Indirect rates based on; 11 - CT , Station work
The equipment quantities and ratings, and the estimated lengths and dimensions, etc. are based on assumptions from past projects with typical layouts. The exact quantities and ratings will be finalized by Engineering.
Distribution Substation Engineering & Design and Civil Engineering during the preliminary engineering and design phase of the project.
The proposed substation expansion is within existing Eversource property no impact is anticipated for the expansion of the eastern fence line to encroach on the property line. Per Project Team.
Soil contamination and wetlands in the area of the proposed fence line are not anticipated. Per Project Team.
This estimate covers Distribution cost only.
Existing control house has available space for new relay and control equipment. Per Project Team.

RISKS

Potential UG Obstructions	$	20,000
Severe Weather, Delays, OT	$	35,000
Contractor Change Orders	$	30,000
Material Costs	$	7,000

Project Number: 404959
Date of Estimate: 05/28/2021
Est. Revision # 00
Template Revision # 01.65a

CSTXX-CONSTRUCTION	R		Prior actuals to date Mhrs	Prior actuals to date DOLLARS	2021 Mhrs	2021 DOLLARS	2022 Mhrs	2022 DOLLARS	2023 Mhrs	2023 DOLLARS	2024 Mhrs	2024 DOLLARS	2025 Mhrs	2025 DOLLARS	2026 Mhrs	2026 DOLLARS	TOTAL Mhrs	TOTAL DOLLARS
Electrical Construction	LT																	
General Construction	LT																	
SCADA / Automation	LT																	
Telecom - Field	LT																	
Construction Reps (internal)	LT																	
Support Switch/Tag	LT					$424		$437										$861
Other (specify)	LT																	
Other (specify)	LT																	
Other (specify)	LT																	
LT Total						$424		$437										$861
Employee Expenses	AE	**5%**				$21		$22										$43
Construction Purchased Material	AM	**1%**				$1,145		$1,408										$2,553
Outside Construction Vendor	AQ					$114,475		$140,765										$255,240
Sales tax on Constr. Vendor																		
Vehicles (now in indirects section)	AV																	
Inspection services (Outside Vendor)	AQ																	
Construction Rep (Outside vendor)	AQ			$3,000		$23,040		$24,473										$50,513
Rents and Leases	BR																	
CSTXX Subtotal				$3,000		$139,105		$167,105										$309,210
Escalation						$ -		$ -		$ -		$ -		$ -		$ -		$ -
	P1																	
CSTXX Total				$3,000		$139,105		$167,105										$309,210
ENRXX-TG ENGINEERING/DESIGN																		
Project Services/Drafting	LT																	
T- Line Engineering/Design	LT																	
D- Street Engineering/Design	LT																	
Civil Engineering/Design	LT					$1,060		$1,092										$2,152
Substation (T) Engineering/Design	LT																	
Substation (D) Engineering/Design	LT			$1,000		$1,060		$1,092										$3,152
Protection & Controls Engineering	LT																	
Survey Engineering	LT																	
SCADA / Automation Engineering	LT																	
Telecom Engineering	LT																	
Other - Transferred charges from ETC WO dev	LT			$4,600														$4,600
Other - specify	LT																	
LT Total				$5,600		$2,120		$2,184										$9,904
Employee Expenses	AE	**5%**				$106		$109										$215
Contractor Engineering - T-Lines	AQ																	
Contractor Engineering - D-Street	AQ																	
Contractor Engineering - T -Station	AQ																	
Contractor Engineering - D-Station	AQ																	
Contractor Engineering - P&C	AQ																	
Contractor Engineering - Survey	AQ																	
Contractor Engineering - SCADA / Automatior	AQ																	
Contractor Engineering - Telecom	AQ																	
Contractor Engineering - Transferred charges from ETC WO developing project.	AQ			$14,000														$14,000
Contractor Engineering - Power Grid Engineering	AQ																	
Contractor Engineering - LRC Engineering	AQ																	
Vehicles (now in indirects section)	AV																	
ENRXX Subtotal			-	$19,600		$2,226		40 $2,293	-		-		-		-			$24,119
Escalation																		
	P1																	
ENRXX Total			-	$19,600		$2,226		40 $2,293	-		-		-		-			$24,119
LNDXX-TG LAND																		
Real Estate	LT																	
Employee Expenses	AE	**5%**																
Purchase Land	AM																	
Vehicles (now in indirects section)	AV																	
Fees and Payments	BF																	
LNDXX Subtotal			-						-		-		-		-			
Escalation																		
	P1																	
LNDXX Total			-						-		-		-		-			
MATXX-TG MATERIAL																		
Eversource	AM					$22,500		$7,613										$30,113
Outside Services	AM					$58,229		$19,701										$77,930
	AM																	
Freight																		
Sales Tax Eversouce/outside services		**4%**				$3,100		$1,015										$4,115
Other																		
MATXX Subtotal						$83,829		$28,328										$112,158
Escalation																		
	P1																	
MATXX Total						$83,829		$28,328										$112,158
PSMXX-PROJECT MANAGER & SUPPORT																		
Project Management (PM)	LT			$400		$1,060		$1,092										$2,552
Project Planning/Cost (IP)	LT			$300		$212		$437										$949
Contracts/Purchasing (C/P)	LT																	
System Planning	LT																	
Environmental	LT					$445		$197										$642
SCS - Notification	LT					$25		$27										$52
Legal	LT																	
Estimating	LT																	
Siting - Local Zoning	LT			$500		$100		$103										$703
Asset Management	LT																	
Other - T+D Rights + Survey - Svc Co	LT			$200														$200
Other -	LT																	
Other -	LT																	
Other -	LT																	
LT Total				$1,400		$1,842		$1,856										$5,098
Employee Expenses	AE	**5%**				$92		$93										$185
Project Support Vendor - PM	AQ								-		-		-		-			
Project Support Vendor - IP	AQ								-		-		-		-			
Project Support Vendor - C/P	AQ								-		-		-		-			
Project Support Vendor - System Planning	AQ								-		-		-		-			
Project Support Vendor - Enviromental	AQ								-		-		-		-			
Project Support Vendor - SCS - Notification	AQ					$470		$515	-		-		-		-			$985
Project Support Vendor - Legal	AQ								-		-		-		-			
Project Support Vendor - Estimating	AQ								-		-		-		-			
Project Support Vendor - Siting - Local Zoning	AQ					$1,300		$1,442	-		-		-		-			$2,742
Project Support Vendor - Asset Management	AQ								-		-		-		-			
Project Support Vendor - Transferred charges	AQ			$400					-		-		-		-			$400
Project Support Vendor - Burns & McDonnell	AQ			$1,200					-		-		-		-			$1,200
Project Support Vendor - BSC Group	AQ			$500		$800			-		-		-		-			$1,300
Project Support Vendor - Randstad	AQ			$3,000		$4,000		$3,090	-		-		-		-			$10,090
Vehicles (now in indirects section)	AV																	
Property or CWIP tax large proj. allowance	BR																	
	BR																	
Fees and Payments - Enviromental	BF																	
Fees and Payments - Siting	BF																	
Fees and Payments - Other	BF																	
PSMXX Subtotal			-	$6,500		$8,504		32 $6,996	-		-		-		-			$22,000
Escalation																		
	P1																	
PSMXX Total			-	$6,500		$8,504		32 $6,996	-		-		-		-			$22,000
REMXX-TG REMOVAL																		
Engineering/Design	LT																	
Internal Construction	LT																	
LT Total																		
Employee Expenses	AE	**15%**																
Outside Services	AO																	
Contractor Labor	AQ																	
Vehicles (now in indirects section)	AV																	
Rents and Leases	BR																	
REMXX Subtotal			-						-		-		-		-			
Escalation																		
	P1																	
REMXX Total			-						-		-		-		-			
TSTXX-TG TEST																		
Test / Field Engr. Labor (In House)	LT																	
Lead Commissioning Engr. (LCE) (internal)	AQ																	
Employee Expense	AE	**10%**																
Test / Field Engr. Labor (contractor)	AQ							$44,496										$44,496
Lead Commissioning Engr. (LCE) (contactor)	AQ					$20,800		$27,851										$48,651
Vehicles (now in indirects section)	AV																	
TSTXX Subtotal						$20,800		$72,347										$93,147
Escalation																		
	P1																	
TSTXX Total						$20,800		$72,347										$93,147
SUBTOTAL PROJECT DIRECT COST			**-**	**$29,100**		**$254,464**		**32 $277,069**	**-**		**-**		**-**		**-**			**$560,634**
Risk																		
Risk						$50,000		$42,000										$92,000
Risk Total						$50,000		$42,000										$92,000
TOTAL PROJECT DIRECT COST			**-**	**$29,100**		**$304,464**		**32 $319,069**	**-**		**-**		**-**		**-**			**$652,634**
INDIRECTS																		
Non-Productive Time Allocation (ZNP)	58	**15.1%**		$1,200		$660		$674										$2,534
Payroll Benefits Allocation (ZPB) incl NPT	59	**44.0%**		$3,000		$215		$221										$3,436
Gen SVC CO Overhead (ZGS) incl NPT	60	**75.0%**		$1,400		$3,419		$3,484										$8,303
E&S Allocations (ZEB,ZEL,ZES)	61	**50.0%**		$6,000		$86,783		$125,743										$218,526
AS&E Allocations (ZAS)	62	**1.3%**		$200		$4,319		$5,095										$9,614
Stores Expense Allocation (ZST)	62	**8.0%**				$1,800		$618										$2,418
Lobby Stock																		
MDEC (ZMI)		**5.0%**				$8,661		$11,747										$20,408
Vehicles (ZVE)		**28.0%**		$50		$1,228		$1,254										$2,532
	63																	
Indirects Subtotal				$11,850		$107,085		$148,836										$267,771
TOTAL PROJECT COST - Direct & Indirect (excl AFUDC)				**$40,950**		**$411,549**		**$467,905**										**$920,405**
AFUDC																		
AFUDC (ZK)				$600		$11,961	0	$5,693	0		0		0		0		0	$18,254
In Service Dollars																		
Cumulative IS$																		
AFUDC Subtotal				$600		$11,961		$5,693										$18,254
TOTAL PROJECT COST - Baseline Budget				**$41,550**		**$423,510**		**$473,598**										**$938,659**
Contingecy																		
Contingency						$15,798		$16,713										$32,511
Other																		
Contingency SubTotal						**$15,798**		**$16,713**										**$32,511**
TOTAL PROJECT COST - Approved Funding				$42,900		**$439,308**		**$490,311**										**$971,170**
Reimbursables / Customer Contribution																		
Reimbursables / Customer Contribution (enter as negative)	59																	
TOTAL PROJECT COST				**$42,900**		**$439,308**		**$490,311**										**$971,170**

EVERSOURCE

Constructability Review Form: **Substation**

Project Title: [redacted] 1% Current Limiting Reactor	☒	Prior Constructability Review Performed?
	☐	Program Related Site Specific Review?
Project Numbers(s): 404957	**Project Constructability Phase:** ☒ Conceptual Engineering Design ☒ Preliminary Engineering Design ☐ Detailed Engineering Design	
Date(s) of Constructability Review: 07/24/2020 04/27/2021		

Project Scope Statement:
Install a new 115kV 1% current limiting reactor in series with a by-pass switch on the1465 Line terminal at Mystic 13K. Scope requires fence to be expanded out on the east side of the yard in to the ROW and beneath the conductors of Line 1465.

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	
☐	☒	PGE Reps		☐	☐	Real Estate	
☐	☐	Line Engineering		☐	☐	T&D ROW	
☐	☐	Vegetation Management		☐	☐	Survey Engineering	
☐	☒	Siting		☐	☒	Outage Planning	
☐	☐	Safety		☐	☒	Outreach (SCS)	
☐	☐	SCADA		☐	☐	Material Procurement	

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

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

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

EVERSOURCE

Constructability Review Form: **Substation**

[redacted] 4/27/21

Name / Signature *Date*

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

Action Items and Resolutions:

Item No.	Const. Review Action Item/Concern	Design Resolution/Mitigation:
1		
2		
3		
4		
5		

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
A	**General**		
1	**Any safety hazards specific to the facility? i.e. Low Bus, Deterioration, etc.**	☐	Low bus very well defined within the station. Ground relatively level.
2	**Prior known Site Specific Conditions - Common or Obvious station Issues**	☒	
3	**Scope Adequately Developed** Consider Physical Installation, P&C Scope, Civil Scope, Engineering studies, Design standard adherence	☐	[redacted]

EVERSOURCE

Constructability Review Form: **Substation**

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
4	**Materials Identified/Ordered** Long Lead Equipment? Specialty material considerations? Review BOM lead times and project need dates Bids for Specialty Major Materials - Identify Specialty Equipment & Materials potentials - temporary/replacement Any Materials needed to facilitate construction access?	☐	Already identified long lead time materials.
5	**Any impacts that would drive T-Line Eng Scope?**	☐	Current wire tension will not be used for terminal structure design. [redacted]
6	**Any other known projects that could overlap or impact outage work?**	☐	Line 1280 OPGW, Line 1465 OPGW
B	**Construction**		
1	**Site Plan / Access:** -Confirm maintenance access for proposed new or replaced equipment -Review station expansion areas (if needed) for structures, old foundations, etc. -Verify clear footprint for yard equipment / Property Plan -General access to site, can areas outside substation be utilized? -Substation Entry Plan (driveway and drive path modifications) -Site Development Plan (grading and drainage) with Cut/Fill -Existing Rock Conditions? Potential Impacts (rock quantity)? -Any Sanitary Civil Requirements? (Septic tanks, etc) -Assess condition of existing yard equipment foundations and viability for reuse (if proposed)	☒	
2	**Any Substation Access and site/yard access Limitations?** -Review turning radius for delivery trucks (if critical) -Identify Office Trailer / Container / Dumpster Space + source of utilities for construction trailer(s) if needed -Weather impacts to Site (Snow Placement) -Identify Material Laydown and Security -Construction permit for trailers outside substation fence?	☐	Maintain minimum approach clearances

EVERSOURCE

Constructability Review Form: **Substation**

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
3	**Outage Planning & Construction Sequence** -Working Clearances - Review electrical clearances for equipment during construction – Approach Distances – Outage Requirements to maintain electrical clearances throughout proposed installation -As-Built drawing review (contacts and contributions) -Outage boundaries -Phased approach needs for additional mobilizations -Detail Design package align with schedule and outage sequence? -Lead Commissioning Engineer (LCE), Substation Operations, and Outage Planner - Review or give input to planned construction sequence to insure it is reasonable and scheduled outages associated with the sequence -Review or give input to planned construction sequence to insure it is reasonable -Verify outage sequence supports the planned construction sequence	☐	LCE assigned already, have outage sequence and construction plan in place. Meeting the dates depends upon equipment delivery and temporary bypass 1465 to A2 bus work.
4	**Need for mobile generator and where connected (if needed)**	☒	
5	**Need for mobile battery and where connected (if needed)**	☐	Yes, battery cart needed at [redacted]. Battery upgrade/replacement (larger) needed at [redacted]
6	**Energization Plan** What outages are required, Detailed look at contributions to equipment, Detailed look at protection zone changes, Locked sequence or random outages, Outage durations minimized Mobile transformer, Additional outage requirements, Working clearance, Railroad Catenaries, Distribution overhead/underground/networks, Fiber outage, SCADA outage, Relay permissions	☐	CR and LCE working on this now. ESOP 24/OP24 for outages in progress.
7	**Identify Required Oversite Needed - Estimated level of CR and LCE support needed**	☐	Completed, LCE and CR assigned.
8	**OT work required or Notable Permit Conditions (special hours)?**	☐	OT during outage in December (3 weeks) and spring 2022.
9	**Seasonal or weather conditions impacts?**	☐	Weather possible as December outage.
10	**Identify Required Depts for Construction? (who is constructor ?)**	☐	RFP for construction is planned.
11	**Specialty Contractors Required?**	☐	Testing for reactor and circuit switcher.
12	**Unique Equipment Considerations, Gas insulated substation, Gas insulated line, Gas insulated bus, Pass Breaker, Statcom, Sync Condenser**	☒	

EVERSOURCE

Constructability Review Form: **Substation**

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
13	**Underground Obstructions** -Drawing review concerns? -Is preconstruction or test excavation needed? -Is reuse of underground control cables / Conduits /replace Non-Shielded Cable feasible (if applicable) -Are spare conduits available? Are they useable? -Review if any areas will need to be plated for increased load bearing for equipment access (i.e. large Xfmr, etc.)	☐	Soil borings with Welti completed, Charter Oaks exploratory excavation completed showing MH and duct bank in expansion area. Will show possible duct bank interference with foundation. (TBD)
14	**Any other items missing in scope or could be underfunded?**	☒	
15	Coordination of boundaries/seams (Identification of point of demarcation for connection to existing equipment and/or for coordination with other municipalities)	☒	
C	**Environmental**		
1	Soil Pre-Characterization or Grab Sampling Completed/Planned	☐	Enviance information used from the past.
2	Has Desktop investigation and EAD Review form been completed.	☐	Yes.
3	Dewatering requirements	☒	
4	Risk or presence of PCB's/Asbestos/Lead/SF6	☒	
5	Permit requirements (Wetlands, Rare Species, etc)	☐	None, no permitting required outside of Siting Petition
6	Stormwater Considerations	☒	
7	Transformer Spill Containment Recommended?	☒	
8	Expanding Footprint / New Buildings or future Expansion Plans? (Enviro Impact)	☒	No environmental impact from the expansion.
D	**Siting, S&CS, and T&D Real Estate**		
1	Expanding Footprint / New Buildings or future Expansion Plans?	☐	Yes.
2	Installation is within Eversource Rights? - Rights and Restrictions Review	☐	Yes, ROW.
3	Proposed Equipment on same property? - Any Encroachments	☐	Yes.
4	Identify existing lighting and determine if additional lighting is needed?	☐	Illumination analysis under way. New lightin will be added to the new terminal structure.
5	Review for roadway, gate access, trailers, equip height, noise, weekend/night work, or any potential public disturbance related to work	☐	Access from within the substation. No noise or other disturbance expected above general construction noise.

EVERSOURCE

Constructability Review Form: **Substation**

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
6	Visual mitigation screening considerations (feasibility or location)	☐	Vegetation outreach and landscape plans needed as part of project. Added $150k to budget/estimate.
7	Neighbor/Abutter impacts (noise, visual, sensitive abutters)	☐	Will have noise, visual and sensitive abutters, will work with them throughout the project.
E	**Engineering**		
1	**Scope of Work** Identify if high level scope sufficiently detailed? Yes Any remote station impacts? Does title match the project deliverable/intent? Yes	☐	No changes to overall scope, remote station impacts at Shunock. (relays and settings)
2	**Ratings & Dimensions** for Major Equipment. Any concerns upon field review? Equipment Rating One Line (and/or equipment thermal ratings tables) - Review for any errors in field	☒	
3	**Materials** Any concerns with BOM/Major Materials Review? Where will new vs removed equipment go? Review for OH and UG Items	☐	[redacted]
4	**Control House** - Review: Unmapped equipment interferences, Control/Battery Enclosure Layout, HVAC System (if equipment added), space for new or modified equipment, AC / DC station service and loading, Panel Space, Expansion, one-line and/or riser type panelboard drawings, other..	☐	No separation of Primary/Back up. Sufficient space to add. The two tiered battery system will be reviewed to see if the footprint of the batteries will change.
5	Identification of Unique Requirements, i.e. (access bridges, station service, etc.)	☒	
6	**BPS Separation Requirements** Is this BPS Substation? Y/N (part of PAF) Changes to pre-existing BPS standards?	☐	Not BPS, but will keep Primary/Back up separate as much as possible.
7	IEC 61850 Substation Automation and Communication Requirements - Any Impacts/Retrofit needed?	☒	
8	Any Upgrades to ES Standards - Is retrofit needed to bring up to ES standards? Can that be done?	☐	Add new tray to pull primary cables for new equipment for separation.
9	**Wall, Fence, Gate, and Foundation Considerations** -Any permanent / temporary alterations or relocations required? -Take measurements for Foundation quantities, dimensions and concrete volumes -CIP Review/Ballistic needs. Any Physical Security Requirement Consideration? -Any impacts to construction plan?	☐	There is an existing gate that leads to ROW, another gate will be added going to ROW.

EVERSOURCE

Constructability Review Form: **Substation**

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
10	**Below Grade / Enclosure Raceway** - If possible, evaluate existing raceway and review spacing requirements. Review for any subsurface investigation needs or potential below grade obstructions. GPR/test pits needed? Geotechnical Investigation - is soil boring or resistivity investigation needed?	☐	New cable trench will be added, no new soil borings are needed for this.
11	**Grounding Plan (Ground Grid)** - Will footprint impact layout or other equipment? Identify locations to improve grounding. Impacts to foundations and ground grid plans. Observations on wetlands or ability to perform tests	☐	No impact.
12	Any Lighting Plan & Fixture Schedule Considerations?	☐	For new structure only
13	Any Steel Structural Plan Considerations?	☐	Adding new structures, steel planning accordingly.
14	Sound Study Needed? Pre-Project Sound Measurements Needed? Sound Walls?	☒	
15	Engineering Estimates for Design and Technical Support? (EE and EOC) Total Project	☐	Contracted out to PGE.
16	Nomenclature / Switching One-Line Diagram -Any obvious deviations from diagrams provided?	☐	Thanh has already completed the nomenclature diagram.
17	Any design alterations or considerations to Eliminate SCLL Conditions, Reduce Recall Time, Reduce Outage durations, Special Conditions	☐	Temporary by-pass run from 1465 to A2 bus to build reactor area.
F	**Protection & Controls**		
1	Panel Graphic additions and/or Modifications	☒	
2	Space on existing panels for new equipment? (front & rear of panel fronts)	☐	Yes. When we install the ICON and patch panel, we will need to determine which panel this goes in.
3	Panel fronts conform to drawings	☐	
4	Access to bring new panels into control enclosure	☐	Yes.
5	Nameplate list and location of nameplates	☐	Yes.
6	Verifies that relays and meters that will be an interconnected project work are as shown on the drawings.	☐	Existing relays will be reused, moving to fiber instead of PLC, will require the purchase of a f/o converter.
7	Verify auxiliary panels have breaker available or space for new breakers (if needed)	☐	AC/DC spares
G	**Telecom Engineering**		
1	Review telecom equipment in existing control enclosure	☐	[redacted] purchased under 1465 OPGW project.

EVERSOURCE

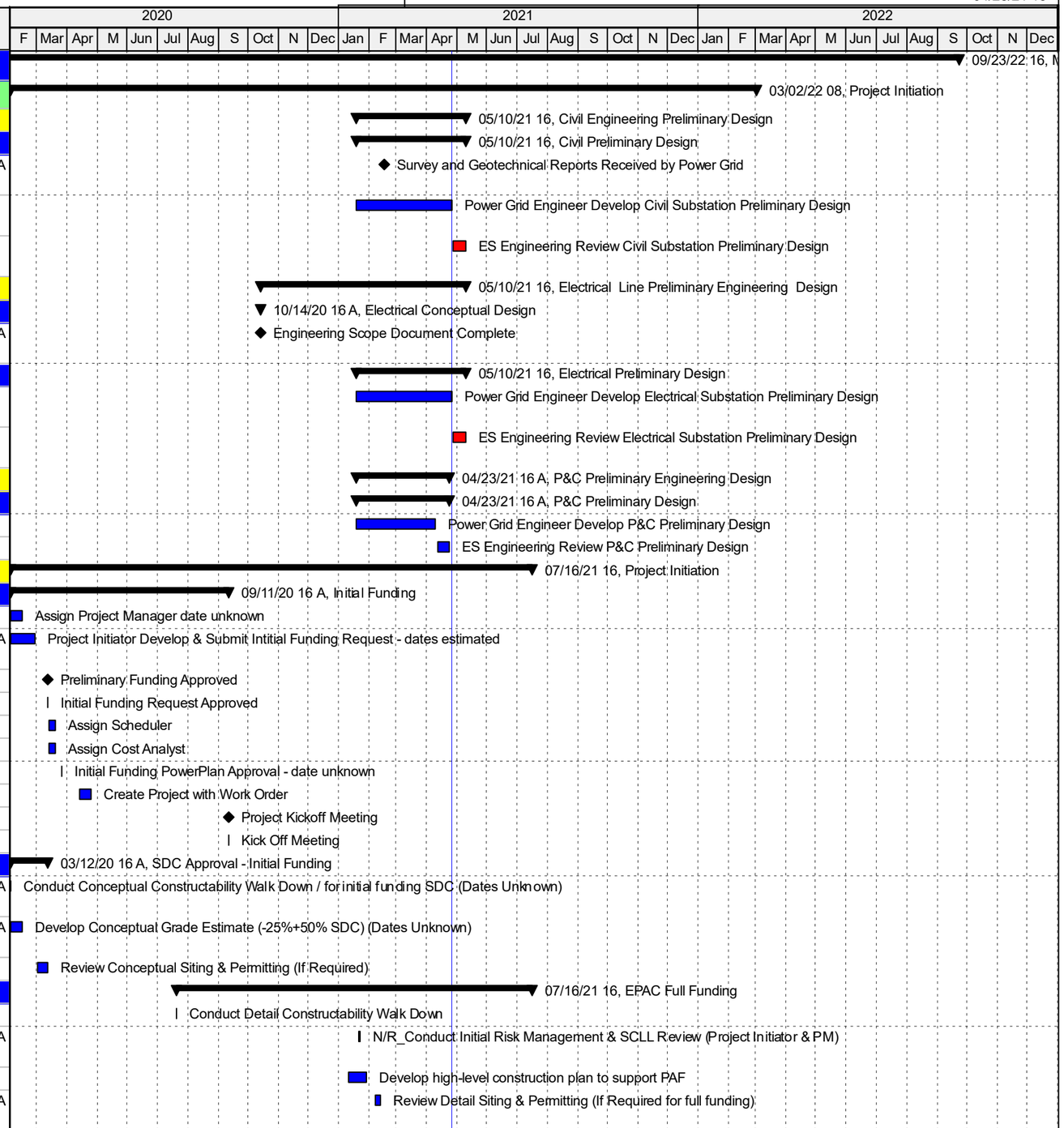
Constructability Review Form: **Substation**

	Key Review Item Description	N/A or No Concern	Review Notes, Concerns, or Additional Info Needed
2	Review path to get telecom circuits into the station and determine whether new underground duct bank is needed.	☐	
3	Review current or proposed Telecom equipment power connections and validate with P&C any need for system 1 and system 2 separation.	☐	
4	Review current Telecom fiber diversity and validate with P&C any fiber diversity requirements.	☐	Not using PLC. Only 1 fiber path needed.
5	Confirm whether correct interface equipment is available (i.e.) for fiber termination or multiplexor termination	☐	
6	Confirm whether existing communications cabinets are enough to support additional telecommunications equipment installed	☐	
7	Review space for any required additional communications cabinets which may be required to support additional telecommunications equipment installed	☐	
8	Review third party Telecommunications at substation and confirm whether additional capacity or Ground Potential Rise protection is required	☐	

Photos

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

Activity ID	Activity Flag	Activity Name	Original Duration	Start	Finish
[redacted] Line 1% Series Reactor (40495901)					
Project Initiation					
Civil Engineering Preliminary Design					
Civil Preliminary Design					
DE2015		Survey and Geotechnical Reports Received by Power Grid	0		02/16/21 08 A
DE2010	V-PRELIM	Power Grid Engineer Develop Civil Substation Preliminary Design	39	01/19/21 08 A	04/26/21 16
DE2020	ES-PRELIM	ES Engineering Review Civil Substation Preliminary Design	10	04/27/21 08	05/10/21 16
Electrical Line Preliminary Engineering Design					
Electrical Conceptual Design					
PE1720	Scope Comp	Engineering Scope Document Complete	0		10/14/20 16 A
Electrical Preliminary Design					
DE2030	V-PRELIM	Power Grid Engineer Develop Electrical Substation Preliminary Design	39	01/19/21 08 A	04/26/21 16
DE2040	ES-PRELIM	ES Engineering Review Electrical Substation Preliminary Design	10	04/27/21 08	05/10/21 16
P&C Preliminary Engineering Design					
P&C Preliminary Design					
DE2090	V-PRELIM	Power Grid Engineer Develop P&C Preliminary Design	39	01/19/21 08	04/09/21 16
DE2100	ES-PREL	ES Engineering Review P&C Preliminary Design	10	04/12/21 08	04/23/21 16
Project Initiation					
Initial Funding					
PI1400	PM-AM	Assign Project Manager date unknown	10	02/03/20 08	02/14/20 16
PI1200		Project Initiator Develop & Submit Initial Funding Request - dates estimated	10	02/03/20 08 A	02/28/20 16 A
Start		Preliminary Funding Approved	0	03/12/20 08	
PI1300	EPAC-I	Initial Funding Request Approved	1	03/12/20 08	03/12/20 16
PI1500		Assign Scheduler	5	03/13/20 08	03/19/20 16
PI1600		Assign Cost Analyst	5	03/13/20 08	03/19/20 16
PI1610	PPA-IF	Initial Funding PowerPlan Approval - date unknown	1	03/26/20 08	03/26/20 16
K1000		Create Project with Work Order	10	04/13/20 08	04/24/20 16
PI1000	PM	Project Kickoff Meeting	0	09/11/20 08	
K1005		Kick Off Meeting	1	09/11/20 08	09/11/20 16
SDC Approval - Initial Funding					
CE1600		Conduct Conceptual Constructability Walk Down / for initial funding SDC (Dates Unknown)	1	02/03/20 08 A	02/03/20 16 A
CGE1000	EST-SDC	Develop Conceptual Grade Estimate (-25%+50% SDC) (Dates Unknown)	10	02/03/20 08 A	02/14/20 16 A
CE1700		Review Conceptual Siting & Permitting (If Required)	9	03/02/20 08	03/12/20 16
EPAC Full Funding					
DE1900		Conduct Detail Constructability Walk Down	1	07/20/20 08	07/20/20 16
DE1700		N/R_Conduct Initial Risk Management & SCLL Review (Project Initiator & PM)	1	01/22/21 08 A	01/22/21 16 A
K1010		Develop high-level construction plan to support PAF	10	01/11/21 08	01/29/21 16
DE1800		Review Detail Siting & Permitting (If Required for full funding)	5	02/08/21 08 A	02/12/21 16 A



Remaining Level of Effort | Actual Work | Critical Remaining Work
Actual Level of Effort | Remaining Work | Milestone

TASK filter: All Activities

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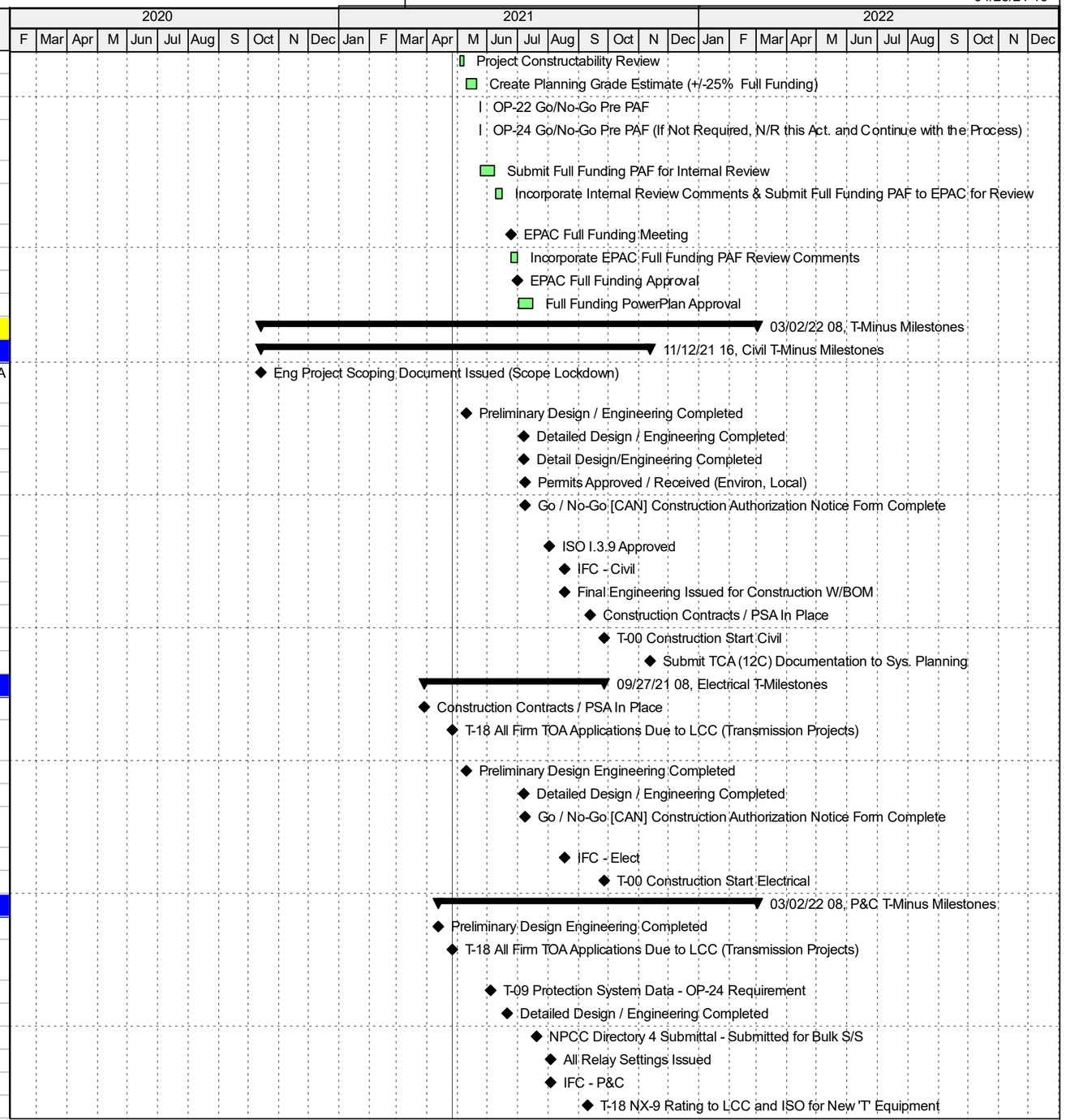
Activity ID	Activity Flag	Activity Name	Original Duration	Start	Finish
DE2000	Construct	Project Constructability Review	4	05/04/21 08	05/07/21 16
DE1600	EST-FULL	Create Planning Grade Estimate (+/-25% Full Funding	10	05/10/21 08	05/21/21 16
OP221000		OP-22 Go/No-Go Pre PAF	1	05/24/21 08	05/24/21 16
OP241040		OP-24 Go/No-Go Pre PAF (If Not Required, N/R this Act. and Continue with the Process)	1	05/24/21 08	05/24/21 16
PAFF2000		Submit Full Funding PAF for Internal Review	10	05/25/21 08	06/08/21 16
PAFF2100	PAF Submit	Incorporate Internal Review Comments & Submit Full Funding PAF to EPAC for Review	5	06/09/21 08	06/15/21 16
PAFF2200		EPAC Full Funding Meeting	0		06/24/21 16
PAFF2210		Incorporate EPAC Full Funding PAF Review Comment	5	06/25/21 08	07/01/21 16
FF1010	EPAC-F	EPAC Full Funding Approval	0		07/01/21 16
FF1000	PPA-FF	Full Funding PowerPlan Approval	10	07/02/21 08	07/16/21 16
T-Minus Milestones					
Civil T-Minus Milestones					
AT3001	ENG-SCOF	Eng Project Scoping Document Issued (Scope Lockdown)	0		10/14/20 16 A
AT2605	ENG-PRI	Preliminary Design / Engineering Completed	0		05/10/21 16
AT1811C	ENG-DTL	Detailed Design / Engineering Completed	0		07/07/21 16
AT1811	ENG-DTL	Detail Design/Engineering Completed	0		07/07/21 16
AT0801	REG	Permits Approved / Received (Environ, Local)	0		07/08/21 16
AT0203		Go / No-Go [CAN] Construction Authorization Notice Form Complete	0		07/09/21 16
AT1030		ISO I.3.9 Approved	0		08/02/21 16*
AT1805C	BG-IFC	IFC - Civil	0		08/18/21 16
AT0805	OH-IFC	Final Engineering Issued for Construction W/BOM	0		08/18/21 16
AT0814	CONSTS	Construction Contracts / PSA In Place	0		09/13/21 16
AT00	SOC	T-00 Construction Start Civil	0	09/27/21 08*	
AT0408		Submit TCA (12C) Documentation to Sys. Planning	0		11/12/21 16
Electrical T-Milestones					
BT0814	CONSTS	Construction Contracts / PSA In Place	0		03/29/21 08
BT1801		T-18 All Firm TOA Applications Due to LCC (Transmission Projects)	0		04/26/21 16*
BT2605	ENG-PRI	Preliminary Design Engineering Completed	0		05/10/21 16
BT1811	ENG-DTL	Detailed Design / Engineering Completed	0		07/07/21 16
BT0203		Go / No-Go [CAN] Construction Authorization Notice Form Complete	0		07/09/21 16
BT0805E	AG-IFC	IFC - Elect	0		08/18/21 16
BT00	SOC	T-00 Construction Start Electrical	0	09/27/21 08*	
P&C T-Minus Milestones					
ET2605	ENG-PRI	Preliminary Design Engineering Completed	0		04/12/21 16
ET1801		T-18 All Firm TOA Applications Due to LCC (Transmission Projects)	0		04/26/21 16*
ET0901		T-09 Protection System Data - OP-24 Requirement	0		06/03/21 16
ET1811	ENG-DTL	Detailed Design / Engineering Completed	0		06/21/21 16
ET0814		NPCC Directory 4 Submittal - Submitted for Bulk S/S	0		07/20/21 16
ET0404	ES-RSET	All Relay Settings Issued	0		08/03/21 16
ET0805	P&C-IFC	IFC - P&C	0		08/03/21 16
ET1805	NX9-NE	T-18 NX-9 Rating to LCC and ISO for New 'T' Equipme	0		09/10/21 16*



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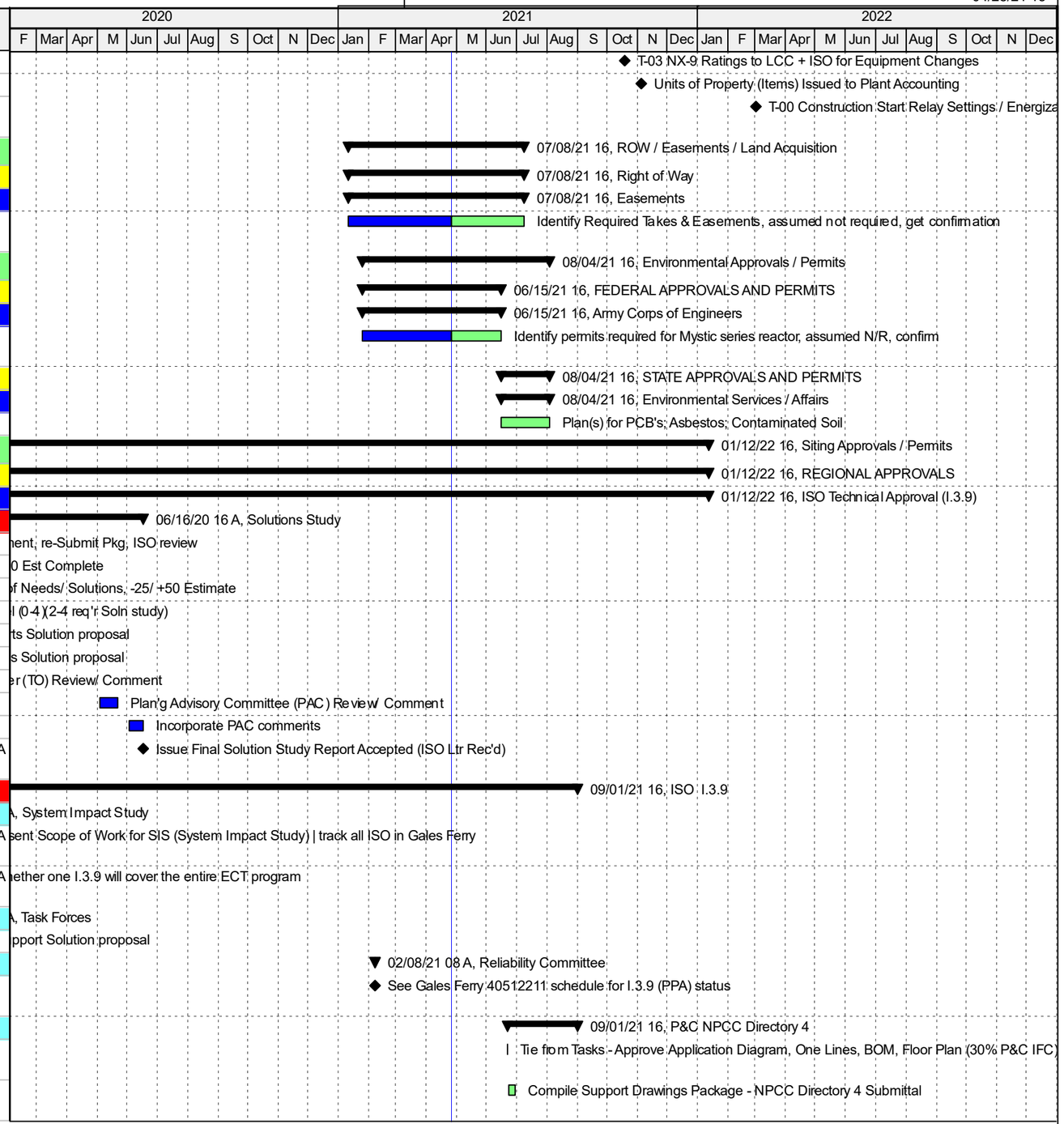
Activity ID	Activity Flag	Activity Name	Original Duration	Start	Finish
ET0301	NX9-EE	T-03 NX-9 Ratings to LCC + ISO for Equipment Chang	0		10/19/21 16*
ET0602		Units of Property (Items) Issued to Plant Accounting	0		11/05/21 16
ET00	SOC	T-00 Construction Start Relay Settings / Energization Mystic 40495901	0	03/02/22 08*	
ROW / Easements / Land Acquisition					
Right of Way					
Easements					
PRE1000		Identify Required Takes & Easements, assumed not required, get confirmation	60	01/11/21 08 A	07/08/21 16
Environmental Approvals / Permits					
FEDERAL APPROVALS AND PERMITS					
Army Corps of Engineers					
PP1000		Identify permits required for Mystic series reactor, assumed N/R, confirm	100	01/25/21 08 A	06/15/21 16
STATE APPROVALS AND PERMITS					
Environmental Services / Affairs					
PHZ1000		Plan(s) for PCB's; Asbestos; Contaminated Soil	35	06/16/21 08	08/04/21 16
Siting Approvals / Permits					
REGIONAL APPROVALS					
ISO Technical Approval (I.3.9)					
Solutions Study					
ISO1030		ISO review/ comment, re-Submit Pkg, ISO review	60	07/15/19 08	10/07/19 16
ISO1020		Soln Pkg, -25/ +50 Est Complete	0		10/09/19 08
ISO1010		Create Rpt Pkg of Needs/ Solutions, -25/ +50 Estimate	63	07/12/19 08	10/09/19 16
ISO1000		Define PPA Level (0-4)(2-4 req'r Soln study)	0	10/11/19 08	
ISO1040		ISO supports Solution proposal	0		11/15/19 16
ISO1060		TO supports Solution proposal	0		11/15/19 16
ISO1050		Trans Owner (TO) Review/ Comment	10	11/01/19 08	11/15/19 16
ISO1070		Plan'g Advisory Committee (PAC) Review/ Comment	15	05/04/20 08	05/22/20 16
ISO1080		Incorporate PAC comments	10	06/03/20 08	06/16/20 16
ISO1090		Issue Final Solution Study Report Accepted (ISO Ltr Rec'd)	0		06/16/20 16 A
ISO I.3.9					
System Impact Study					
ISO1100		Develop/ Present Scope of Work for SIS (System Impact Study) | track all ISO in Gales Ferry	0	11/01/19 08 A	11/01/19 08 A
ISO1105		Determine whether one I.3.9 will cover the entire ECT program	1	11/01/19 08 A	11/01/19 16 A
Task Forces					
ISO1150		TTF & STF support Solution proposal	0		11/01/19 08
Reliability Committee					
ISO1160		See Gales Ferry 40512211 schedule for I.3.9 (PPA) status	0	02/08/21 08 A	
P&C NPCC Directory 4					
NPCC1090		Tie from Tasks - Approve Application Diagram, One Lines, BOM, Floor Plan (30% P&C IFC)	1	06/22/21 08	06/22/21 16
NPCC1000		Compile Support Drawings Package - NPCC Directory 4 Submittal	5	06/23/21 08	06/29/21 16



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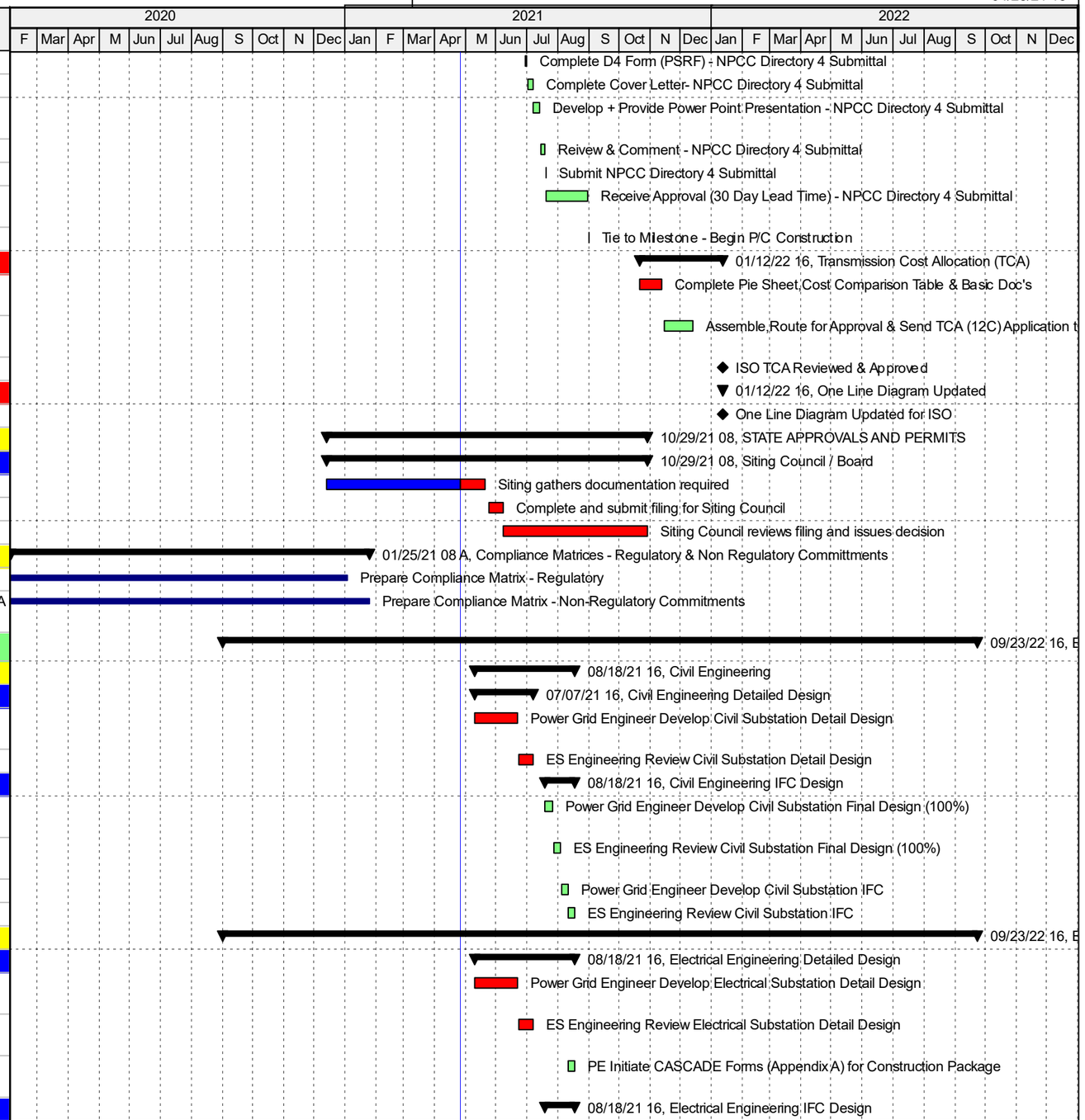
Activity ID	Activity Flag	Activity Name	Original Duration	Start	Finish
NPCC1010		Complete D4 Form (PSRF) - NPCC Directory 4 Submi	2	06/30/21 08	07/01/21 16
NPCC1020		Complete Cover Letter- NPCC Directory 4 Submittal	3	07/02/21 08	07/07/21 16
NPCC1030		Develop + Provide Power Point Presentation - NPCC Directory 4 Submittal	5	07/08/21 08	07/14/21 16
NPCC1040		Reivew & Comment - NPCC Directory 4 Submittal	3	07/15/21 08	07/19/21 16
NPCC1050		Submit NPCC Directory 4 Submittal	1	07/20/21 08	07/20/21 16
NPCC1060		Receive Approval (30 Day Lead Time) - NPCC Directory 4 Submittal	30	07/21/21 08	08/31/21 16
NPCC1080		Tie to Milestone - Begin P/C Construction	1	09/01/21 08	09/01/21 16
Transmission Cost Allocation (TCA)					
APP1000		Complete Pie Sheet,Cost Comparison Table & Basic Doc's	15	10/22/21 08	11/12/21 16
APP1010		Assemble,Route for Approval & Send TCA (12C) Application to ISO-NE	20	11/15/21 08	12/13/21 16
APP1020		ISO TCA Reviewed & Approved	0		01/12/22 16
One Line Diagram Updated					
OLD1000		One Line Diagram Updated for ISO	0		01/12/22 16
STATE APPROVALS AND PERMITS					
Siting Council / Board					
A3550		Siting gathers documentation required	5	12/14/20 08	05/21/21 16
A3555		Complete and submit filing for Siting Council	10	05/24/21 08	06/07/21 16
A3560		Siting Council reviews filing and issues decision	431	06/07/21 16	10/29/21 08
Compliance Matrices - Regulatory & Non Regulatory Committments					
CMPL1010	REG	Prepare Compliance Matrix - Regulatory	585	02/03/20 16	01/04/21 08
CMPL1000	COM	Prepare Compliance Matrix - Non-Regulatory Commitments	585	02/03/20 16 A	01/25/21 08 A
Engineering / Design					
Civil Engineering					
Civil Engineering Detailed Design					
CE1200	V-DTL	Power Grid Engineer Develop Civil Substation Detail Design	30	05/11/21 08	06/22/21 16
CE1210	ES-DTL	ES Engineering Review Civil Substation Detail Design	10	06/23/21 08	07/07/21 16
Civil Engineering IFC Design					
CE1300	V-100%	Power Grid Engineer Develop Civil Substation Final Design (100%)	7	07/19/21 08	07/27/21 16
CE1310	ES-100%	ES Engineering Review Civil Substation Final Design (100%)	6	07/28/21 08	08/04/21 16
CE1705	V-IFC	Power Grid Engineer Develop Civil Substation IFC	5	08/05/21 08	08/11/21 16
CE1710	ES-IFC	ES Engineering Review Civil Substation IFC	5	08/12/21 08	08/18/21 16
Electrical Engineering					
Electrical Engineering Detailed Design					
EE1200	V-DTL	Power Grid Engineer Develop Electrical Substation Detail Design	30	05/11/21 08	06/22/21 16
EE1210	ES-DTL	ES Engineering Review Electrical Substation Detail Design	10	06/23/21 08	07/07/21 16
CSD1000	CASCADE	PE Initiate CASCADE Forms (Appendix A) for Construction Package	5	08/12/21 08	08/18/21 16
Electrical Engineering IFC Design					



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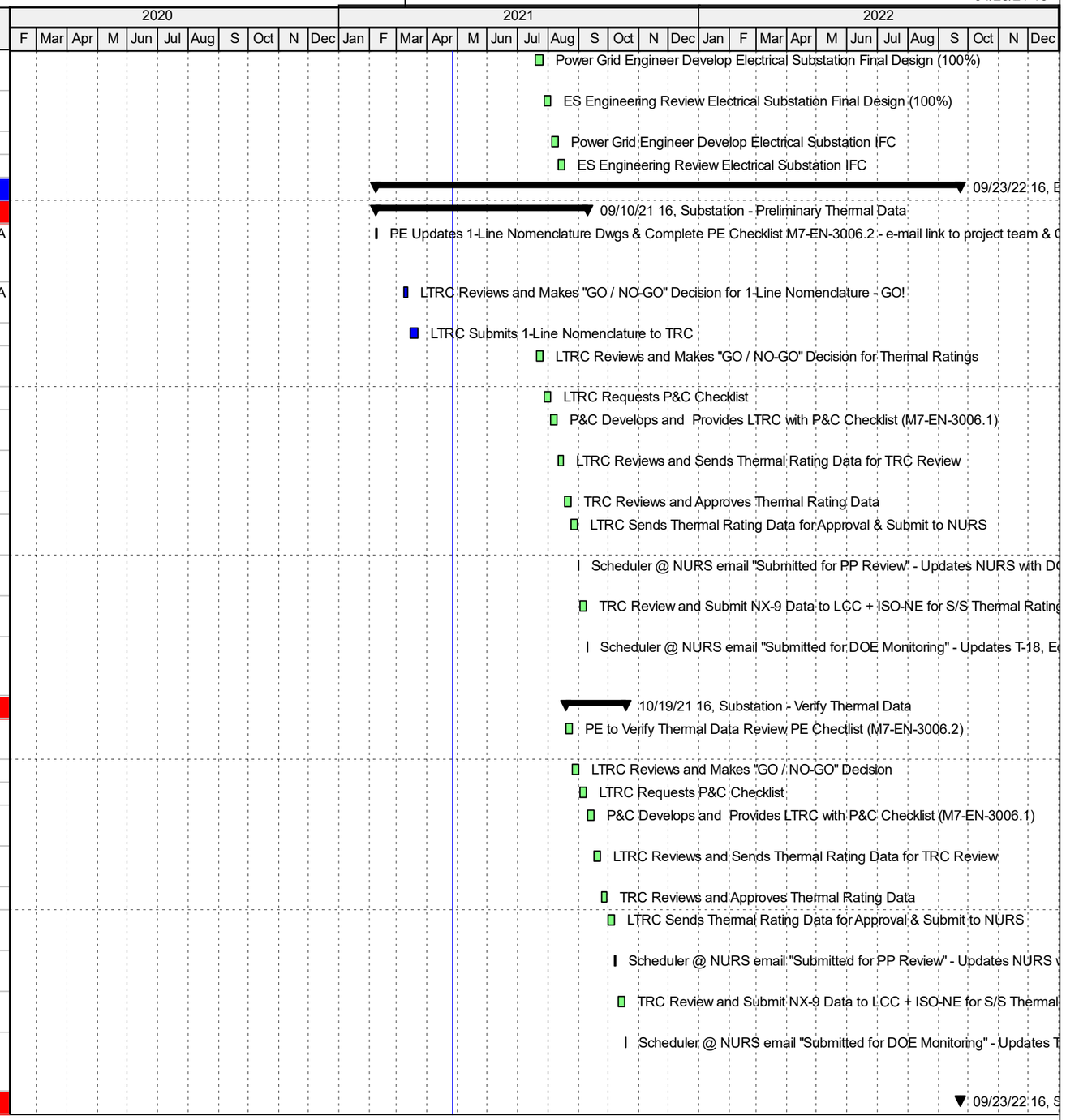
Activity ID	Activity Flag	Activity Name	Original Duration	Start	Finish
EE1300	V-100%	Power Grid Engineer Develop Electrical Substation Final Design (100%)	7	07/19/21 08	07/27/21 16
EE1310	ES-100%	ES Engineering Review Electrical Substation Final Design (100%)	6	07/28/21 08	08/04/21 16
EE1315	V-IFC	Power Grid Engineer Develop Electrical Substation IFC	5	08/05/21 08	08/11/21 16
EE1320	ES-IFC	ES Engineering Review Electrical Substation IFC	5	08/12/21 08	08/18/21 16
Electrical Engineering NX-9					
Substation - Preliminary Thermal Data					
NX9A-NC01		PE Updates 1-Line Nomenclature Dwgs & Complete PE Checklist M7-EN-3006.2 - e-mail link to project team & CONVEX	1	02/08/21 08 A	02/08/21 16 A
NX9A-NC03		LTRC Reviews and Makes "GO / NO-GO" Decision for 1-Line Nomenclature - GO!	5	03/08/21 08 A	03/12/21 16 A
NX9A-NC05		LTRC Submits 1-Line Nomenclature to TRC	5	03/15/21 08	03/22/21 16
NX9A-NC07		LTRC Reviews and Makes "GO / NO-GO" Decision for Thermal Ratings	5	07/21/21 08	07/27/21 16
NX9A-NC09		LTRC Requests P&C Checklist	5	07/28/21 08	08/03/21 16
NX9A-NC11		P&C Develops and Provides LTRC with P&C Checklist (M7-EN-3006.1)	5	08/04/21 08	08/10/21 16
NX9A-NC13		LTRC Reviews and Sends Thermal Rating Data for TRC Review	5	08/11/21 08	08/17/21 16
NX9A-NC15		TRC Reviews and Approves Thermal Rating Data	5	08/18/21 08	08/24/21 16
NX9A-NC17	NX-9	LTRC Sends Thermal Rating Data for Approval & Submit to NURS	5	08/25/21 08	08/31/21 16
NX9A-NC19		Scheduler @ NURS email "Submitted for PP Review" - Updates NURS with DOE	1	09/01/21 08	09/01/21 16
NX9A-NC21		TRC Review and Submit NX-9 Data to LCC + ISO-NE for S/S Thermal Rating	5	09/02/21 08	09/09/21 16
NX9A-NC23		Scheduler @ NURS email "Submitted for DOE Monitoring" - Updates T-18, EquipDOE, Revs DOE per M7-EN-3006	1	09/10/21 08	09/10/21 16
Substation - Verify Thermal Data					
NX9A-NC31		PE to Verify Thermal Data Review PE Chectlist (M7-EN-3006.2)	5	08/19/21 08	08/25/21 16
NX9A-NC33		LTRC Reviews and Makes "GO / NO-GO" Decision	5	08/26/21 08	09/01/21 16
NX9A-NC35		LTRC Requests P&C Checklist	5	09/02/21 08	09/09/21 16
NX9A-NC37		P&C Develops and Provides LTRC with P&C Checklist (M7-EN-3006.1)	5	09/10/21 08	09/16/21 16
NX9A-NC39		LTRC Reviews and Sends Thermal Rating Data for TRC Review	5	09/17/21 08	09/23/21 16
NX9A-NC41		TRC Reviews and Approves Thermal Rating Data	5	09/24/21 08	09/30/21 16
NX9A-NC43	NX-9	LTRC Sends Thermal Rating Data for Approval & Submit to NURS	5	10/01/21 08	10/07/21 16
NX9A-NC45		Scheduler @ NURS email "Submitted for PP Review" - Updates NURS with DOE	1	10/08/21 08	10/08/21 16
NX9A-NC47		TRC Review and Submit NX-9 Data to LCC + ISO-NE for S/S Thermal Rating	5	10/12/21 08	10/18/21 16
NX9A-NC49		Scheduler @ NURS email "Submitted for DOE Monitoring" - Updates T-3, EquipDOE, Revs DOE per M7-EN-3006	1	10/19/21 08	10/19/21 16
Substation - NX-9 Pre NX9-DOE					



Remaining Level of Effort | Actual Work | Critical Remaining Work
Actual Level of Effort | Remaining Work | Milestone

TASK filter: All Activities

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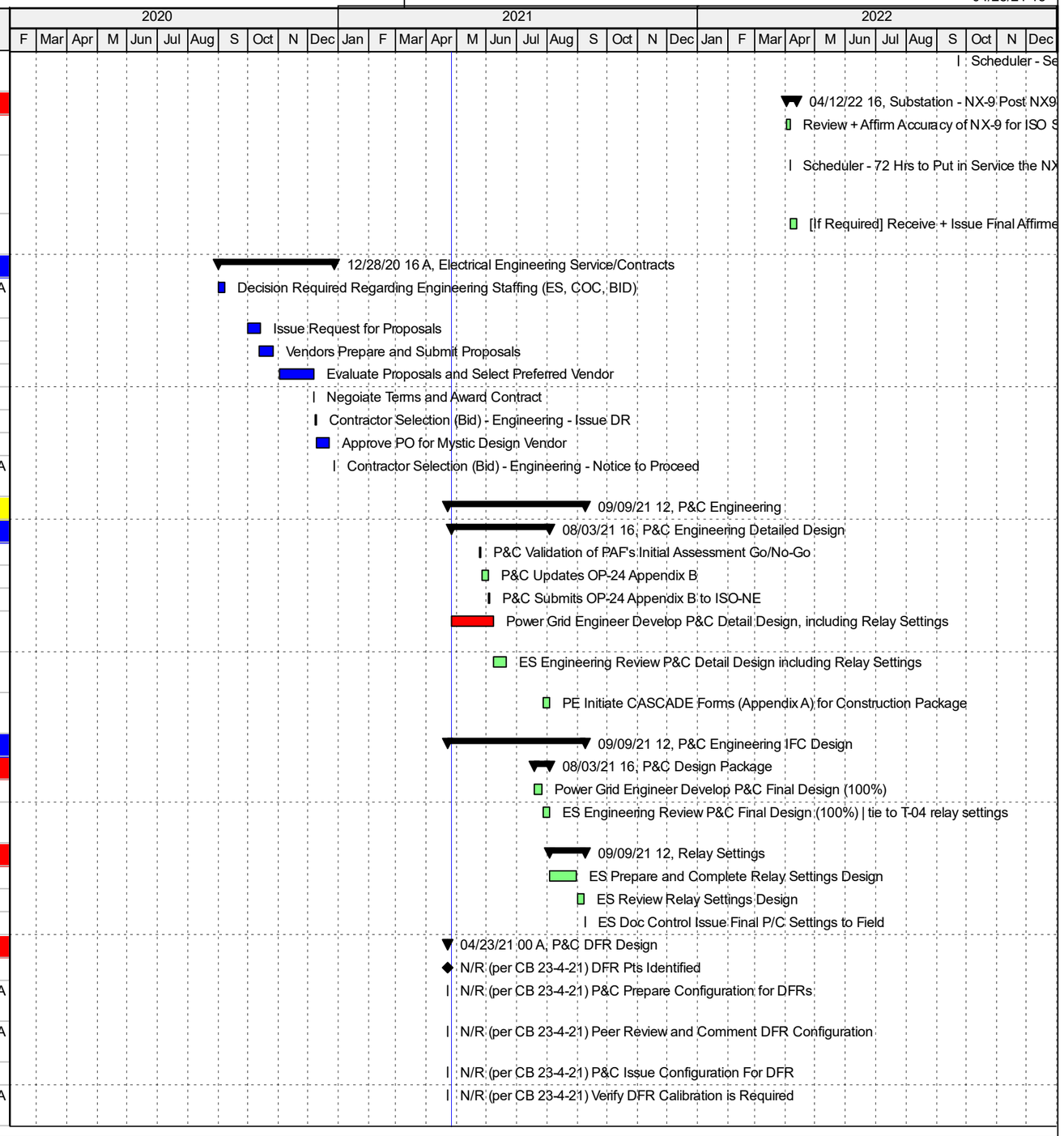
Activity ID	Activity Flag	Activity Name	Original Duration	Start	Finish
NX9500		Scheduler - Send Email for 48Hrs Notification before DOE.	1	09/23/22 08	09/23/22 16
Substation - NX-9 Post NX9-DOE/ISD					
NX9FINAL50		Review + Affirm Accuracy of NX-9 for ISO Submission (Tie after Equip DOE or ISD)	3	04/01/22 08	04/05/22 16
NX9A600		Scheduler - 72 Hrs to Put in Service the NX-9 and Send to TOP Director in NURS after DOE/PM Note of Complition.	1	04/05/22 08	04/05/22 16
NX9FINAL60		[If Required] Receive + Issue Final Affirmed NX-9 Data to NURS	5	04/06/22 08	04/12/22 16
Electrical Engineering Service/Contracts					
A3370		Decision Required Regarding Engineering Staffing (ES, COC, BID)	5	09/01/20 08 A	09/08/20 16 A
K1039		Issue Request for Proposals	9	10/01/20 08	10/14/20 16
K1041		Vendors Prepare and Submit Proposals	10	10/13/20 08	10/26/20 16
K1043		Evaluate Proposals and Select Preferred Vendor	1	11/02/20 08	12/07/20 16
K1047		Negoiate Terms and Award Contract	1	12/07/20 08	12/07/20 16
TMP1330		Contractor Selection (Bid) - Engineering - Issue DR	1	12/09/20 08	12/09/20 16
K1049		Approve PO for Mystic Design Vendor	4	12/10/20 08	12/23/20 16
TMP1300		Contractor Selection (Bid) - Engineering - Notice to Proceed	1	12/28/20 08 A	12/28/20 16 A
P&C Engineering					
P&C Engineering Detailed Design					
OP1010		P&C Validation of PAF's Initial Assessment Go/No-Go	2	05/25/21 08	05/26/21 16
OP1020		P&C Updates OP-24 Appendix B	4	05/27/21 08	06/02/21 16
OP1030	OP-24	P&C Submits OP-24 Appendix B to ISO-NE	1	06/03/21 08	06/03/21 16
PC1100	V-DTL	Power Grid Engineer Develop P&C Detail Design, including Relay Settings	30	04/26/21 08	06/07/21 16
PC1110	ES-DTL	ES Engineering Review P&C Detail Design including Relay Settings	10	06/08/21 08	06/21/21 16
CSD1030	CASCADE	PE Initiate CASCADE Forms (Appendix A) for Construction Package	5	07/28/21 08	08/03/21 16
P&C Engineering IFC Design					
P&C Design Package					
PC1320	V-100%	Power Grid Engineer Develop P&C Final Design (100%	7	07/19/21 08	07/27/21 16
PC1330	ES-100%	ES Engineering Review P&C Final Design (100%) | tie to T-04 relay settings	5	07/28/21 08	08/03/21 16
Relay Settings					
K1100		ES Prepare and Complete Relay Settings Design	20	08/04/21 08	08/31/21 16
K1105	ES-RSET	ES Review Relay Settings Design	5	09/01/21 08	09/08/21 16
K1110		ES Doc Control Issue Final P/C Settings to Field	1	09/09/21 08	09/09/21 12
P&C DFR Design					
A-DFR1060		N/R (per CB 23-4-21) DFR Pts Identified	0		04/23/21 00
A-DFR1010		N/R (per CB 23-4-21) P&C Prepare Configuration for DFRs	5	04/23/21 00 A	04/23/21 00 A
A-DFR1020		N/R (per CB 23-4-21) Peer Review and Comment DFR Configuration	5	04/23/21 00 A	04/23/21 00 A
A-DFR1030		N/R (per CB 23-4-21) P&C Issue Configuration For DF	3	04/23/21 00	04/23/21 00
A-DFR1000		N/R (per CB 23-4-21) Verify DFR Calibration is Required	1	04/23/21 00 A	04/23/21 00 A



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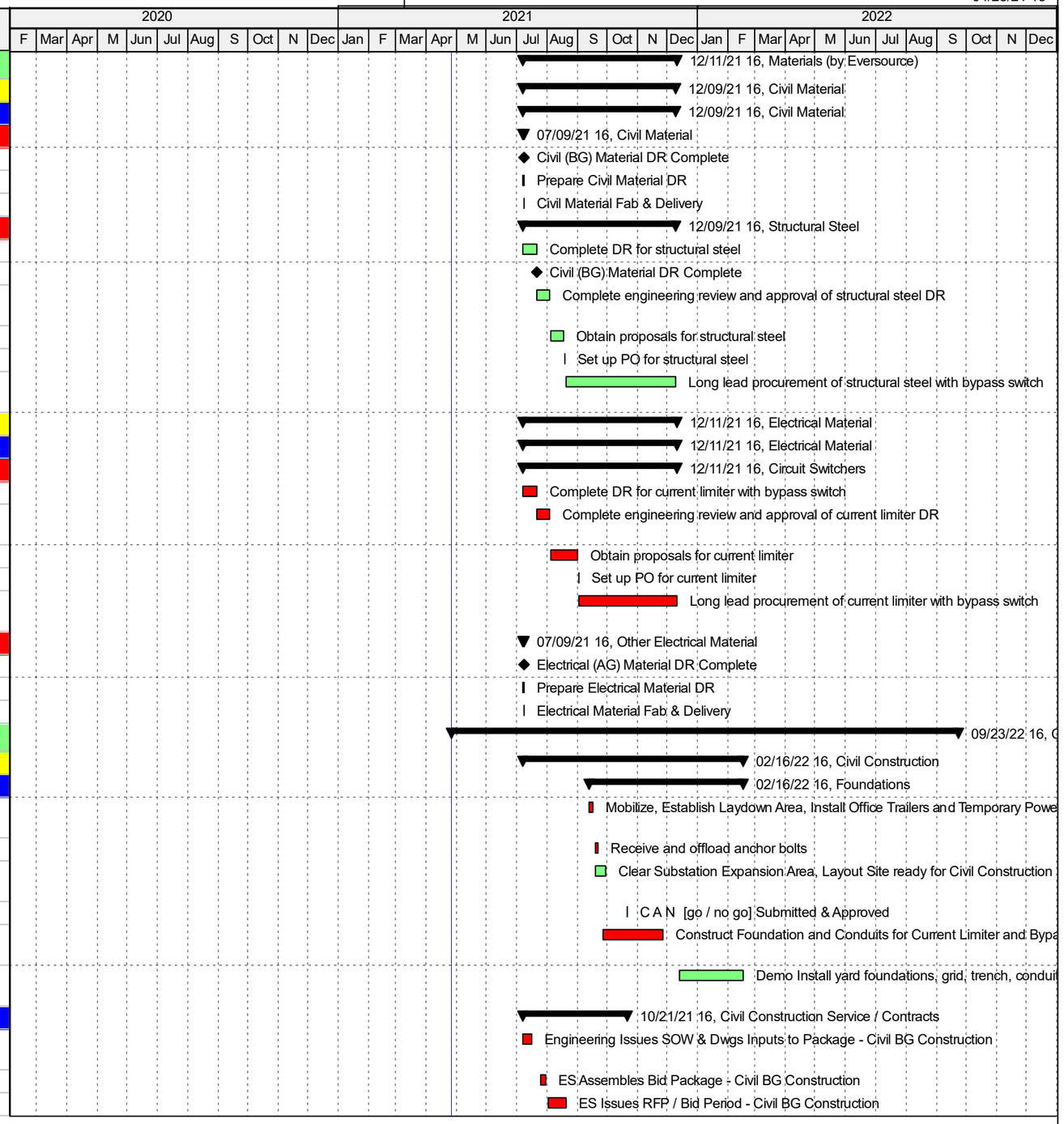
Activity ID	Activity Flag	Activity Name	Original Duration	Start	Finish
Materials (by Eversource)					
Civil Material					
Civil Material					
Civil Material					
CMAT1025	DR-BGM.	Civil (BG) Material DR Complete	0		07/08/21 16
CMAT1030	DR-RM	Prepare Civil Material DR	1	07/08/21 08	07/08/21 16
CMAT1035		Civil Material Fab & Delivery	1	07/09/21 08	07/09/21 16
Structural Steel					
K1252	DR-MM	Complete DR for structural steel	10	07/08/21 08	07/21/21 16
CMAT1045	DR-BGM.	Civil (BG) Material DR Complete	0		07/21/21 16
K1254		Complete engineering review and approval of structural steel DR	10	07/22/21 08	08/04/21 16
K1256		Obtain proposals for structural steel	10	08/05/21 08	08/18/21 16
K1258		Set up PO for structural steel	1	08/19/21 08	08/19/21 16
K1260		Long lead procurement of structural steel with bypass switch	80	08/20/21 08	12/09/21 16
Electrical Material					
Electrical Material					
Circuit Switchers					
K1200		Complete DR for current limiter with bypass switch	10	07/08/21 08	07/21/21 16
K1205		Complete engineering review and approval of current limiter DR	10	07/22/21 08	08/04/21 16
K1210		Obtain proposals for current limiter	20	08/05/21 08	09/01/21 16
K1215		Set up PO for current limiter	1	09/02/21 08	09/02/21 16
K1220		Long lead procurement of current limiter with bypass switch	100	09/03/21 08	12/11/21 16
Other Electrical Material					
EMAT1260	DR-AGM.	Electrical (AG) Material DR Complete	0		07/08/21 16
EMAT1240	DR-RM	Prepare Electrical Material DR	1	07/08/21 08	07/08/21 16
EMAT1250		Electrical Material Fab & Delivery	1	07/09/21 08	07/09/21 16
Construction					
Civil Construction					
Foundations					
K1180		Mobilize, Establish Laydown Area, Install Office Trailers and Temporary Power	5	09/13/21 08*	09/17/21 16
K1270		Receive and offload anchor bolts	2	09/20/21 08*	09/21/21 16
K1265		Clear Substation Expansion Area, Layout Site ready for Civil Construction	9	09/20/21 08	09/30/21 16
PR1000		C A N [go / no go] Submitted & Approved	1	10/22/21 08	10/22/21 16
K1185		Construct Foundation and Conduits for Current Limiter and Bypass Switch	62	09/27/21 08*	11/27/21 16
ACN1010		Demo Install yard foundations, grid, trench, conduits, fence & gate. Receive steel	44	12/14/21 08	02/16/22 16
Civil Construction Service / Contracts					
ACN2000		Engineering Issues SOW & Dwgs Inputs to Package - Civil BG Construction	7	07/08/21 08	07/16/21 16
ACN2010		ES Assembles Bid Package - Civil BG Construction	5	07/26/21 08	07/30/21 16
ACN2020		ES Issues RFP / Bid Period - Civil BG Construction	15	08/02/21 08	08/20/21 16



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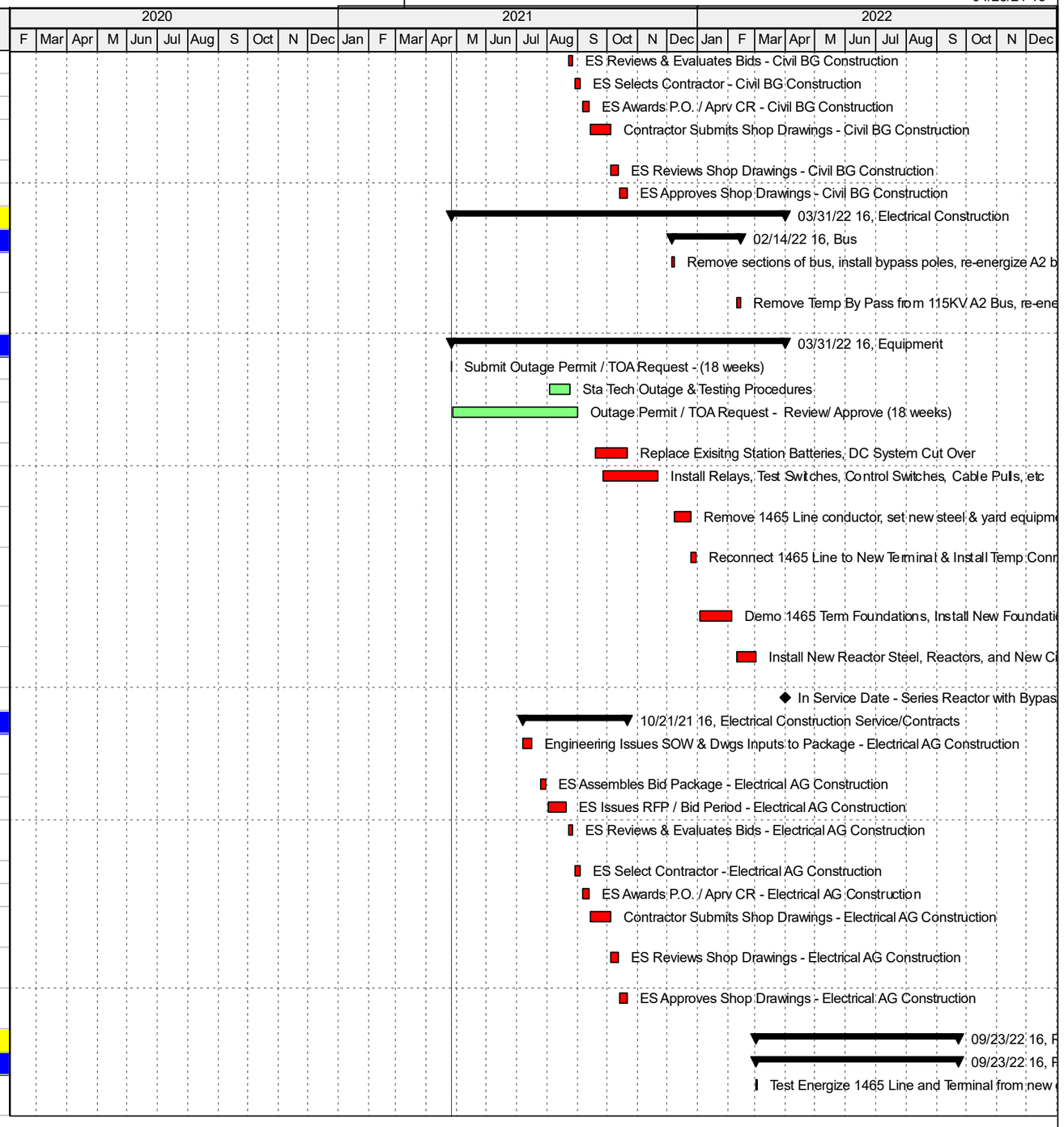
Activity ID	Activity Flag	Activity Name	Original Duration	Start	Finish
ACN2030		ES Reviews & Evaluates Bids - Civil BG Construction	5	08/23/21 08	08/27/21 16
ACN2040		ES Selects Contractor - Civil BG Construction	5	08/30/21 08	09/03/21 16
ACN2050		ES Awards P.O. / Aprv CR - Civil BG Construction	5	09/07/21 08	09/13/21 16
ACN2060		Contractor Submits Shop Drawings - Civil BG Construction	15	09/14/21 08	10/04/21 16
ACN2070		ES Reviews Shop Drawings - Civil BG Construction	6	10/05/21 08	10/13/21 16
ACN2080		ES Approves Shop Drawings - Civil BG Construction	6	10/14/21 08	10/21/21 16
Electrical Construction					
Bus					
K1310	OUT	Remove sections of bus, install bypass poles, re-energize A2 bus	3	12/06/21 08*	12/08/21 16
K1315	OUT	Remove Temp By Pass from 115KV A2 Bus, re-energize	3	02/10/22 08*	02/14/22 16
Equipment					
OPERM1000		Submit Outage Permit / TOA Request - (18 weeks)	1	04/26/21 08*	04/26/21 16
SST1000		Sta Tech Outage & Testing Procedures	15	08/04/21 08	08/24/21 16
OPERM1010		Outage Permit / TOA Request - Review/ Approve (18 weeks)	90	04/27/21 08	09/01/21 16
K1195		Replace Exisitng Station Batteries, DC System Cut Ov	24	09/20/21 08*	10/22/21 16
K1305	OUT	Install Relays, Test Switches, Control Switches, Cable Pulls, etc	39	09/27/21 08*	11/22/21 16
K1197	OUT	Remove 1465 Line conductor, set new steel & yard equipment. Install AG grounding	17	12/09/21 08*	12/25/21 16
K1275	OUT	Reconnect 1465 Line to New Terminal & Install Temp Connection from New Terminal to Existing 115KV A2 Buss	5	12/26/21 08*	12/30/21 16
K1285	OUT	Demo 1465 Term Foundations, Install New Foundations, Conduits, GGrid, Stone Surface for	33	01/03/22 08*	02/04/22 16
K1295	OUT	Install New Reactor Steel, Reactors, and New Circuit Switcher	20	02/10/22 08*	03/01/22 16
ISD	ISD	In Service Date - Series Reactor with Bypass Switch	0		03/31/22 16*
Electrical Construction Service/Contracts					
BCN2000		Engineering Issues SOW & Dwgs Inputs to Package - Electrical AG Construction	7	07/08/21 08	07/16/21 16
BCN2010		ES Assembles Bid Package - Electrical AG Constructio	5	07/26/21 08	07/30/21 16
BCN2020		ES Issues RFP / Bid Period - Electrical AG Constructior	15	08/02/21 08	08/20/21 16
BCN2030		ES Reviews & Evaluates Bids - Electrical AG Construction	5	08/23/21 08	08/27/21 16
BCN2040		ES Select Contractor - Electrical AG Construction	5	08/30/21 08	09/03/21 16
BCN2050		ES Awards P.O. / Aprv CR - Electrical AG Construction	5	09/07/21 08	09/13/21 16
BCN2060		Contractor Submits Shop Drawings - Electrical AG Construction	15	09/14/21 08	10/04/21 16
BCN2070		ES Reviews Shop Drawings - Electrical AG Construction	6	10/05/21 08	10/13/21 16
BCN2080		ES Approves Shop Drawings - Electrical AG Construction	6	10/14/21 08	10/21/21 16
P&C Construction					
P&C Wiring / Terminating					
K1280	OUT	Test Energize 1465 Line and Terminal from new equipment Shunock 32P	2	03/02/22 08*	03/03/22 16



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Activity ID	Activity Flag	Activity Name	Original Duration	Start	Finish
K1325	OUT	Connect New Reactors and Circuit to 115KV A2 Bus, Test Energize	2	03/06/22 08*	03/07/22 16
NX9700		Scheduler - Send Email for 48Hrs Notification before DOE.	1	09/23/22 08	09/23/22 16
NX9701		Scheduler - Send Email for 48Hrs Notification before DOE.	1	09/23/22 08	09/23/22 16
Testing / Commissioning					
Electrical Test and Commission					
TEST - SERVICES STAFFING DECISION					
A3380		STAFFING DECISION: EVERSOURCE OR OUTSOURCE BID/COC	1	02/11/21 08 A	02/11/21 16 A
TEST SERVICES - CONTRACTOR OF CHOICE					
A3470		TEST SERVICES - COC - Eversource Provides Spec / RFQ to COC	5	07/08/21 08	07/14/21 16
A3480		TEST SERVICES - COC - COC Evaluates Spec and Provides Quote	10	07/15/21 08	07/28/21 16
A3490		TEST SERVICES - COC - Eversource Reviews Quote from COC	10	07/29/21 08	08/11/21 16
A3500		TEST SERVICES - COC - Eversource Awards Contract - PO Issued	10	08/12/21 08	08/25/21 16
TEST SERVICES - BID PROCESS					
A3510		TEST SERVICES - BID - Eversource provide Spec / RI	15	03/29/21 08	04/19/21 16
A3520		TEST SERVICES - BID - Contractors Evaluate RFP and Provide Proposal	15	04/26/21 08	05/14/21 16
A3530		TEST SERVICES - BID - Eversource reviews contractor proposals	15	05/17/21 08	06/07/21 16
A3540		TEST SERVICES - BID - Eversource awards contract - PO Issued	20	06/08/21 08	07/06/21 16
LCE PLANNING					
LCE200		Assign Lead Commissioning Engineer	1	03/23/21 08	03/23/21 16
LCE100		PM to Request Lead Commissioning Engineer GO/NO-GO {Steve Bushey assigned}	1	03/29/21 08 A	03/29/21 16 A
LCE400	V-CONCF	Develop Test and Commissioning Plan	20	08/30/21 08	09/27/21 16
LCE500	ES-COMPL	LCE Review and Approve Vendor's Test and Commissioning Plan	3	09/28/21 08	09/30/21 16
TEST ACTIVITIES					
LCE310		Mobilize LCE Prior to Construction	2	08/28/21 08	08/29/21 16
LCE320		Mobilize Testing Vendor Prior to Construction	2	08/28/21 08	08/29/21 16
LCE610		LCE Oversee Execution of Test and Commissioning Plan	32	09/28/21 08	11/12/21 16
LCE620		Execute Test and Commissioning Plan	30	10/01/21 08	11/15/21 16
LCE700		LCE Ensure Test Group Prepare Electrical Field Mark Ups	1	11/16/21 08	11/16/21 16
Project Close Out					
Civil Close Out					
CV1000	V-FLDAS	Prepare Civil Field Mark Ups	21	04/01/22 08	04/29/22 16
CV1100	ES-ASB	Eversource Engineering Prepares & Sends Civil Field Mark Up Packge to Vendor	5	05/02/22 08	05/06/22 16



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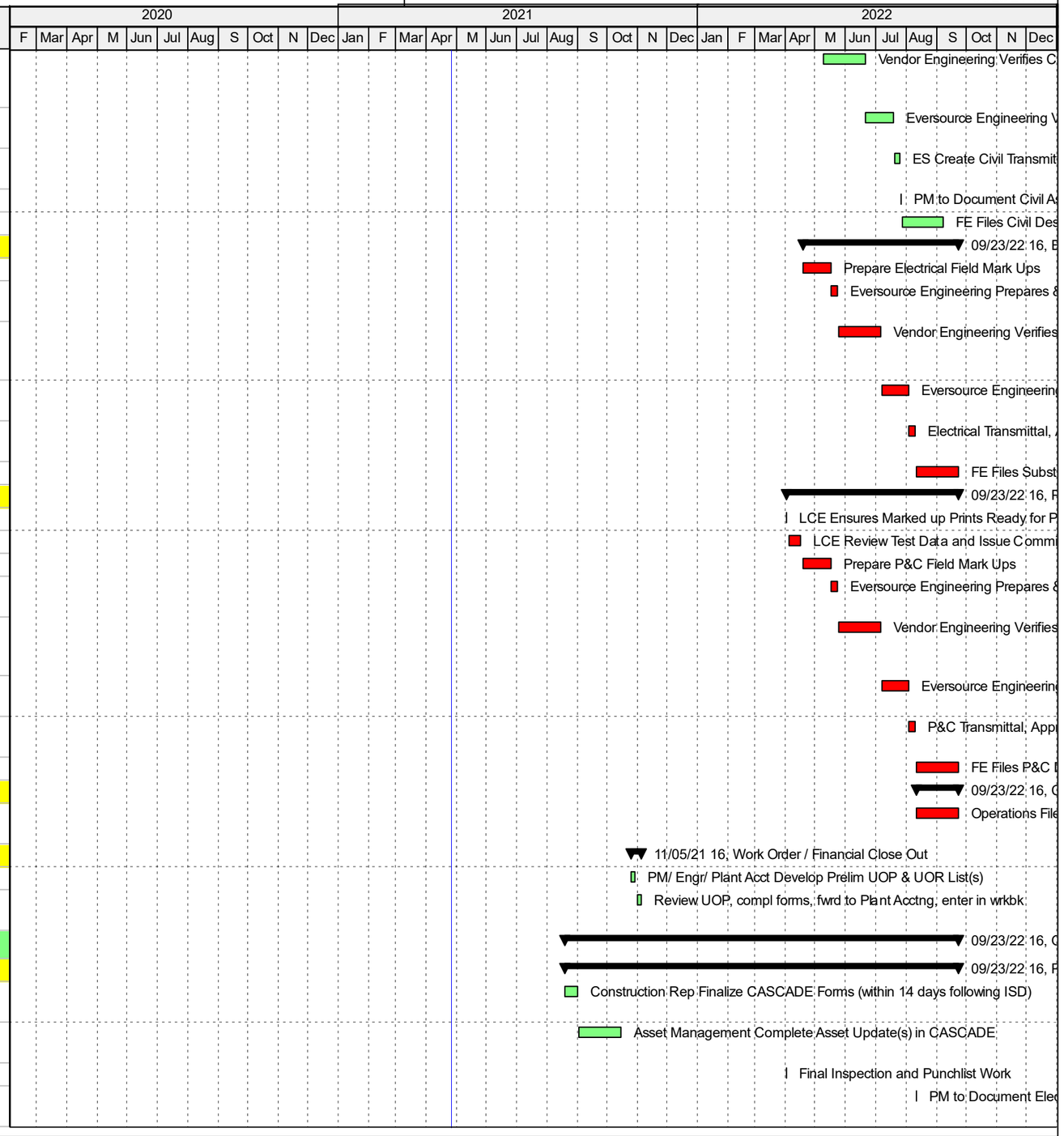
Activity ID	Activity Flag	Activity Name	Original Duration	Start	Finish
CV1200	V-ASB	Vendor Engineering Verifies Civil Mark Ups and Updates As-Built Drawing Package. Submits Final Package to ES	30	05/09/22 08	06/20/22 16
CV1300	ES-ASB	Eversource Engineering Verifies Quality of Submitted Civil Drawings	20	06/21/22 08	07/19/22 16
CV1400	ES-ASB	ES Create Civil Transmittal, Approve Final As-Built Package, and EDC Files and Issue Drawings to Field	5	07/20/22 08	07/26/22 16
PM1000	PM	PM to Document Civil As-Built Drawings Complete	1	07/27/22 08	07/27/22 16
CV1500	ES-FLSA	FE Files Civil Design Drawings at Station	30	07/28/22 08	09/08/22 16
Electrical Close Out					
EV1000	V-FLDAS	Prepare Electrical Field Mark Ups	21	04/18/22 08	05/16/22 16
EV1100	ES-ASB	Eversource Engineering Prepares & Sends Electrical Field Mark Up Packge to Vendor	5	05/17/22 08	05/23/22 16
EV1200	V-ASB	Vendor Engineering Verifies Electrical Mark Ups and Updates As-Built Drawing Package. Submits Final Package to ES	30	05/24/22 08	07/06/22 16
EV1300	ES-ASB	Eversource Engineering Verifies Quality of Submitted Electrical Drawings	20	07/07/22 08	08/03/22 16
EV1400	ES-ASB	Electrical Transmittal, Approve Final As-Built Package, and EDC Files and Issue Drawings to Field	5	08/04/22 08	08/10/22 16
EV1500	ES-FLSA	FE Files Substation Design Drawings at Station	30	08/12/22 08	09/23/22 16
P&C Close Out					
LCE800		LCE Ensures Marked up Prints Ready for Pick-up	1	04/01/22 08	04/01/22 16
LCE900		LCE Review Test Data and Issue Commissioning Rep	10	04/04/22 08	04/15/22 16
PC1000	V-FLDAS	Prepare P&C Field Mark Ups	21	04/18/22 08	05/16/22 16
PC1510	ES-ASB	Eversource Engineering Prepares & Sends Electrical Field Mark Up Packge to Vendor	5	05/17/22 08	05/23/22 16
PC1200	V-ASB	Vendor Engineering Verifies P&C Mark Ups and Updates As-Built Drawing Package. Submits Final Package to ES	30	05/24/22 08	07/06/22 16
PC1300	ES-ASB	Eversource Engineering Verifies Quality of Submitted P&C Drawings	20	07/07/22 08	08/03/22 16
PC1310	ES-ASB	P&C Transmittal, Approve Final As-Built Package, and EDC Files and Issue Drawings to Field	5	08/04/22 08	08/10/22 16
PC1500	ES-FLSA	FE Files P&C Design Drawings at Station	30	08/12/22 08	09/23/22 16
Communications Close Out					
COMM1500	ES-FLSASE	Operations Files Communication Design Drawings at Station	30	08/12/22 08	09/23/22 16
Work Order / Financial Close Out					
FINCO1000		PM/ Engr/ Plant Acct Develop Prelim UOP & UOR List	5	10/25/21 08	10/29/21 16
FINCO1010		Review UOP, compl forms, fwrd to Plant Acctng, enter in wrkbk	5	11/01/21 08	11/05/21 16
Overheads/Indirects					
Project Management					
CSD1050		Construction Rep Finalize CASCADE Forms (within 14 days following ISD)	10	08/19/21 08	09/01/21 16
CSD1060		Asset Management Complete Asset Update(s) in CASCADE	30	09/02/21 08	10/15/21 16
COMPL1010		Final Inspection and Punchlist Work	0	04/01/22 08*	04/01/22 08
PM1100	PM	PM to Document Electrical As-Built Drawings Complete (Electrical, P&C, Communications)	1	08/11/22 08	08/11/22 16



Remaining Level of Effort | Actual Work | Critical Remaining Work
Actual Level of Effort | Remaining Work | Milestone

TASK filter: All Activities

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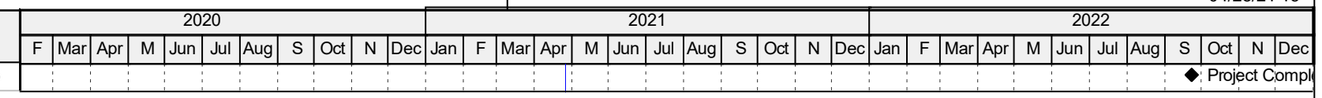
Activity ID	Activity Flag	Activity Name	Original Duration	Start	Finish
COMPL1020		Project Complete	0		09/23/22 16



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Mystic 13K Reactor – Outage Sequence Plan Rev 6

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Mystic 13K Reactor – Outage Sequence Plan Rev 6

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Mystic 13K Reactor – Outage Sequence Plan Rev 6

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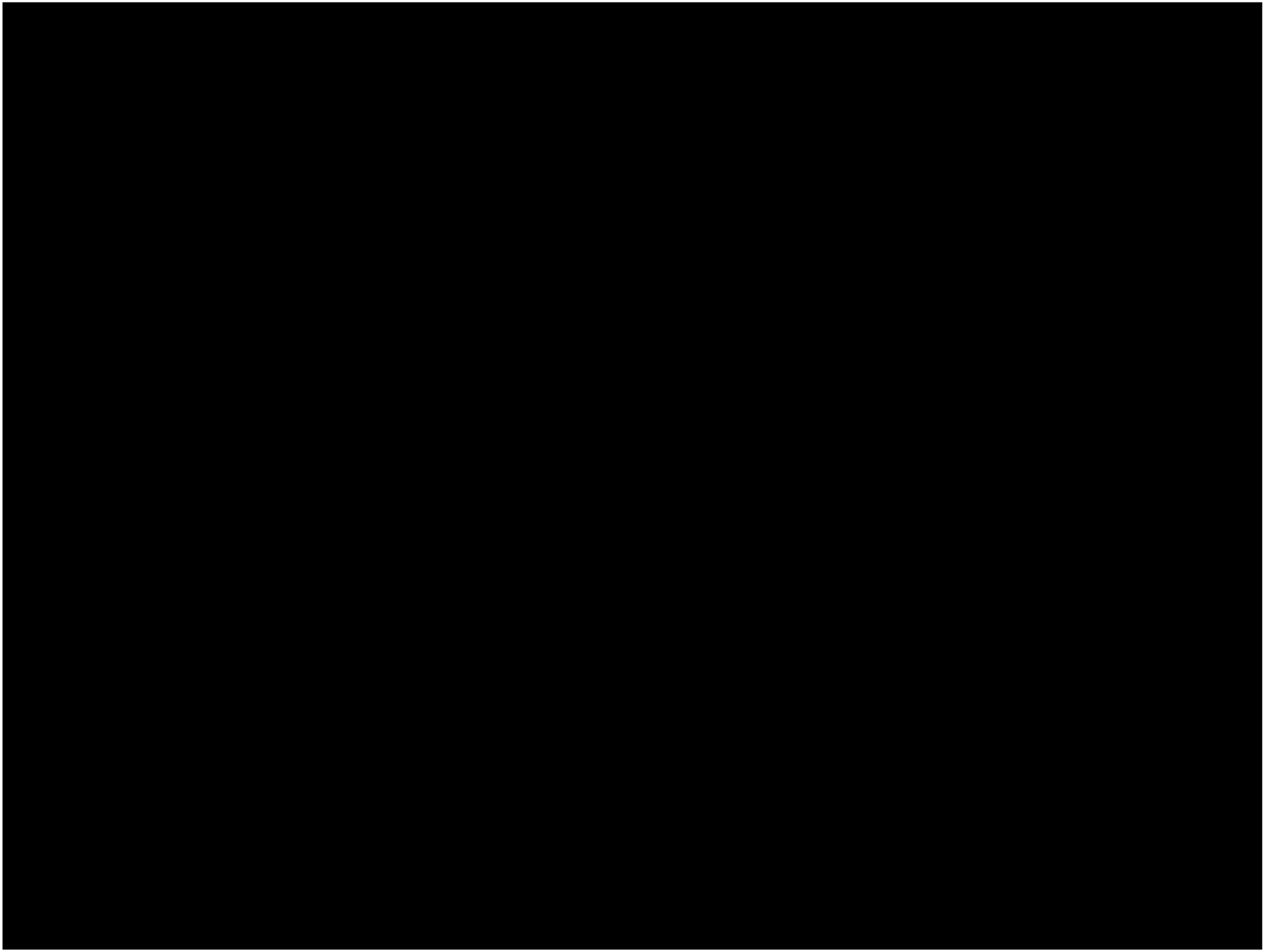

Mystic 13K Reactor – Outage Sequence Plan Rev 6

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Mystic 13K Reactor – Outage Sequence Plan Rev 6

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Mystic 13K Reactor – Outage Sequence Plan Rev 6

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Mystic 13K Reactor – Outage Sequence Plan Rev 6

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Mystic 13K Reactor – Outage Sequence Plan Rev 6

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Mystic 13K Reactor – Outage Sequence Plan Rev 6

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Mystic 13K Reactor – Outage Sequence Plan Rev 6

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