EVERSOURCE

Supplement Authorization Form

Project Title: TDRP [redacted]	**Project Number: CD01636**
Date Prepared: 07/27/2025	**Company:** Eversource CT
Organization: Distribution Engineering	**Project Category:** TRMSN DISTR RELIABILTY PERFRM
Initiating Organization: Distribution	**Project Type:** Specific
Project DDE: [redacted]	**Capital Investment part of 5-year plan?** Yes
Project Manager: [redacted]	**Emergency Related Request?** No
Project Sponsor: [redacted]	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution ☐ N/A (General Plant)
Current Authorized Amount: $402.6K	**Approved In-Service Date:** 12/31/2023
Supplement Request: $127.3K	**Estimated In-Service Date:** 12/31/2025
Total Capital Request: $529.9K	**Authorization Type: Supplement Request**
	Reason: Scope Change

1. Project Background

Transmission-Distribution Reliability Performance projects address reliability issues associated with the top Worst 100 Circuits in Connecticut. In doing so, Eversource-CT maintains compliance with Docket 86-12-03. Eversource-CT is required to report the status of actions taken to improve performance for each circuit topping the "Worst 100" list. Updates are required each year for the four years following a circuit's appearance on the list.

The full funding authorized amount is $402,598, but due to a minor change in scope related to equipment obsolescence, an additional $127,264 is needed to complete this project. Therefore, the supplemental request increases the total cost of the project to $529.9K.

2. Supplement Justification Overview

The project's cost increase over the full funding amount is driven by a minor change in scope caused by the replacement of an obsolete oil recloser, whose controller -lower unit- could not be programmed in the loop scheme.

3. Supplement Justification Detail

Test department was unable to program a 3-phase oil recloser to satisfy a loop-scheme requirement and coordination with other protection devices and concluded that the lower unit or "controller" was damaged. The supplemental funds are being requested to replace this recloser which could not be programmed into the loop scheme.

4. Supplement Cost Summary (Project Total)

Line-item Category	To Date Spend Year(s)	Prior Authorized Year(s)	Variance (Supplemental Request) Year(s)	New Total Request (Add Prior Authorized and Variance) Year(s)
Internal Labor and Construction Equipment	$86.6k	$110.9k	$0.2k	$111.1k
Outside Services	$41.2k	$38.9k	$10.0k	$48.9k
Materials	$61.6k	$68.5k	$15.7k	$84.2k
Removals	$21.9k	$0.0	$32.3k	$32.3k
Risk and Contingency	$0.0	$0.0	$37.0k	$37.0k
Other	$5.7k	$6.3k	$0.1k	$6.4k
SUBTOTAL DIRECTS W/ RISKS	**$217.0k**	**$224.6k**	**$95.3k**	**$319.9k**
Indirect / Overhead (including benefits)	$167.4k	$171.8k	$31.8k	$203.6k
AFUDC	$6.4k	$6.2k	$.02k	$6.4k
Subtotal – Indirect Costs	**$173.8k**	**$178.0k**	**$32.0k**	**$210.0k**
TOTAL CAPITAL REQUEST	**$390.8k**	**$402.6k**	**$127.3k**	**$529.9k**
Reimbursables/Customer Contribution	$0.0	$0.0	$0.0	$0.0
PROJECT TOTAL (LESS REIMBURSABLES)	**$390.8k**	**$402.6k**	**$127.6k**	**$529.9k**

New Total Request by Year (if applicable)

Note: If multi-year project, include actuals for current and years past, and then show forecasted spend for upcoming years.

Line item Category	2023 Actual	2024 Actual	2025 Actual	2025+ Forecast	Total
Internal Labor and Construction Equipment	$75.7k	$10.7k	$0.2k	$24.7k	$111.1k
Outside Services	$36.1k	$5.1k	$0.1k	$7.7k	$48.9k
Materials	$53.9k	$7.6k	$0.1k	$22.7k	$84.2k
Removals	$19.2k	$2.7k	$0.0	$10.4k	$32.3k
Risk and Contingency	$0.0	$0.0	$0.0	$37.0k	$37.0k
Other	$5.0k	$0.7k	$0.0	$0.7k	$6.4k
SUBTOTAL DIRECTS W/ RISKS	**$189.8k**	**$26.8k**	**$0.4k**	**$103.2k**	**$319.9k**
Indirect / Overhead (including benefits)	$171.0k	-$4.4k	$0.8k	$37.1k	$203.6k
AFUDC	$6.1k	$0.2k	$0.2k	$0.2k	$6.4k
Subtotal – Indirect Costs	**$177.1k**	**-$4.3k**	**$1.0k**	**$37.3k**	**$210.0k**
TOTAL CAPITAL REQUEST	**$366.9k**	**$22.5**	**$1.4k**	**$140.5k**	**$529.9k**
Reimbursables/Customer Contribution	$0.0	$0.0	$0.0	$0.0	$0.0
PROJECT TOTAL (LESS REIMBURSABLES)	**$366.9k**	**$22.5k**	**$1.4k**	**$140.5k**	**$529.9k**

5. Lessons Learned

Operations Project Authorization Form

Project Title: [redacted] 2020 TDRP	**Project Number: CD01636**
Date Prepared: 09/01/2023	**Company:** Eversource CT
Organization: Electric System Operations	**Project Category:** TRMSN DISTR RELIABILTY PERFRM
Project Initiator: [redacted]	**Project Type:** Specific
Initiating Organization: Distribution	**Capital Investment part of original Op Plan:** Yes
Project Manager: [redacted]	**Emergency Related Request?** No
Project Sponsor: [redacted]	**Facility Type** (check all that apply)**:** ☐ PTF ☐ non-PTF ☒ Distribution ☐ N/A (General Plant)
Required in service date: 12/30/2023	
Total Capital Request: $402.6K	**Authorization Type:** Full Funding

6. Executive Summary

Transmission-Distribution Reliability Performance (TDRP) projects address reliability issues associated with the top Worst 100 circuits in Connecticut. In doing so, Eversource-CT maintains compliance with Docket 86-12-03. Eversource-CT is required to report the status of actions taken to improve performance for each circuit topping the "Worst 100" list. Updates are required each year for the four years following a circuit's appearance on the list.

The [redacted].

The initial engineering estimate for Project CD01636 was approved on May 4, 2021, for $414K. Project CD01636 is expected to be completed within budget mostly by internal resources.

7. Project Cost Summary

Note: Dollar values are in thousands.

Financial Evaluation

Capital Costs	2022	2023	Total
Internal Labor and Construction Equipment	107.8	3.1	110.9
Outside Services	37.8	1.1	38.9
Materials	66.6	1.9	68.5
Removals	0.0	0.0	0.0
Risk and Contingency	0.0	0.0	0.0
Other	6.1	0.2	6.3
Subtotal	**218.2**	**6.4**	**224.6**

Indirect Capital Costs	2022	2023	Total
Indirects/Overheads (including benefits)	166.9	4.9	171.8
Capitalized interest or AFUDC, if any	6.0	0.2	6.2

Subtotal	**172.9**	**5.0**	**178.0**

Total Capital Costs (Gross)	**391.2**	**11.4**	**402.6**

Less Total Customer Contribution	**0.0**	**0.0**	**0.0**
Project Costs (Net of Reimbursement)	**391.2**	**11.4**	**402.6**

3.Technical Justification

a. Background

The [redacted], [redacted]

Storms and Trees are the largest contributing cause to outages. In the last thirteen years storms contributed to forty-one (41%) percent of the outages; years 2014 and 2015 are the exception when storms played no role at all.

[redacted] worst performing devices were studied, shown in Table 1. The number of splices, location of splices and trees, and four (4) year tree outage history determined the sections to be reconductored or where "spot reconductoring" is to be performed.

[redacted]

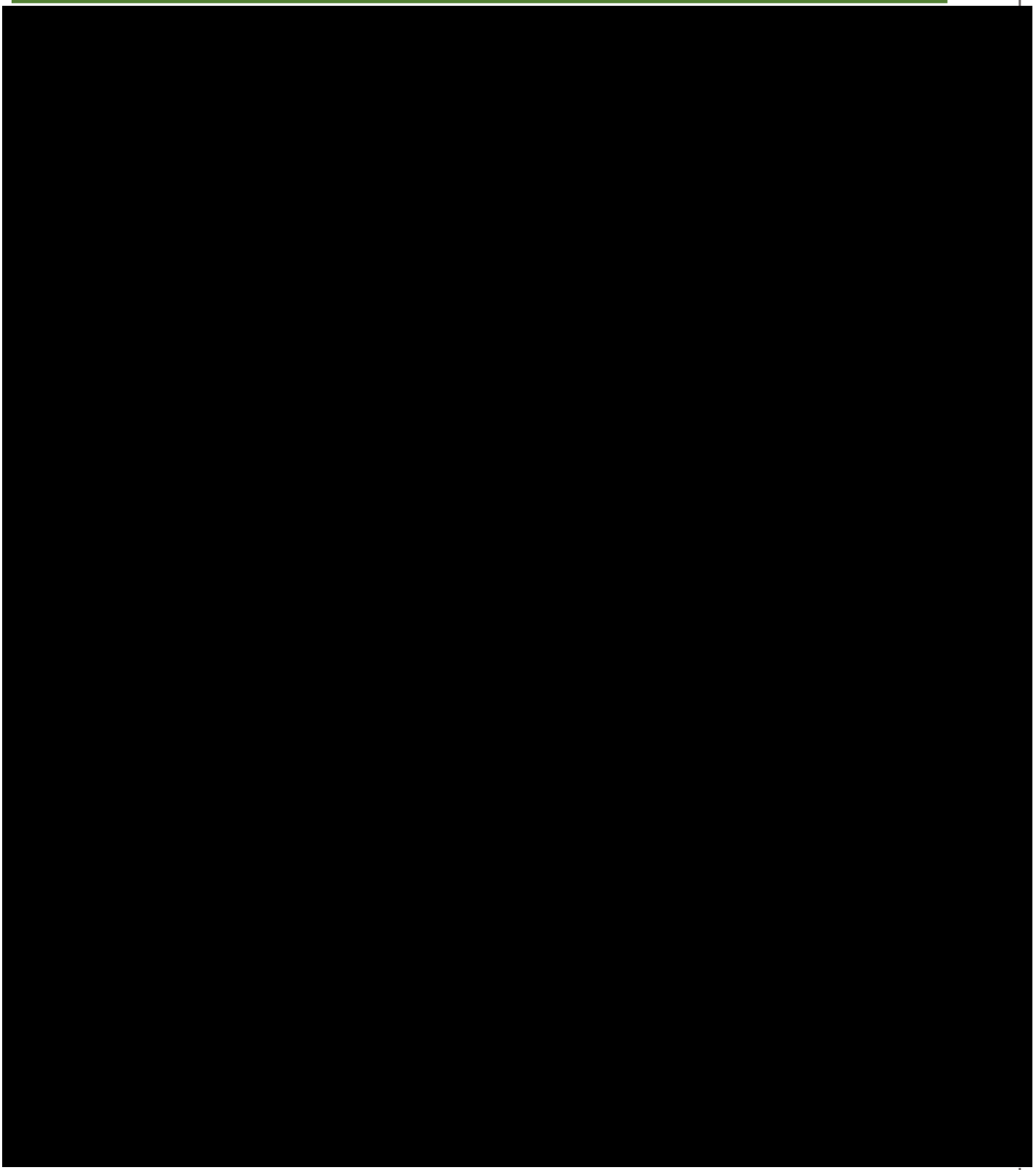
Table 1 – 20Y2's Worst Performing Devices

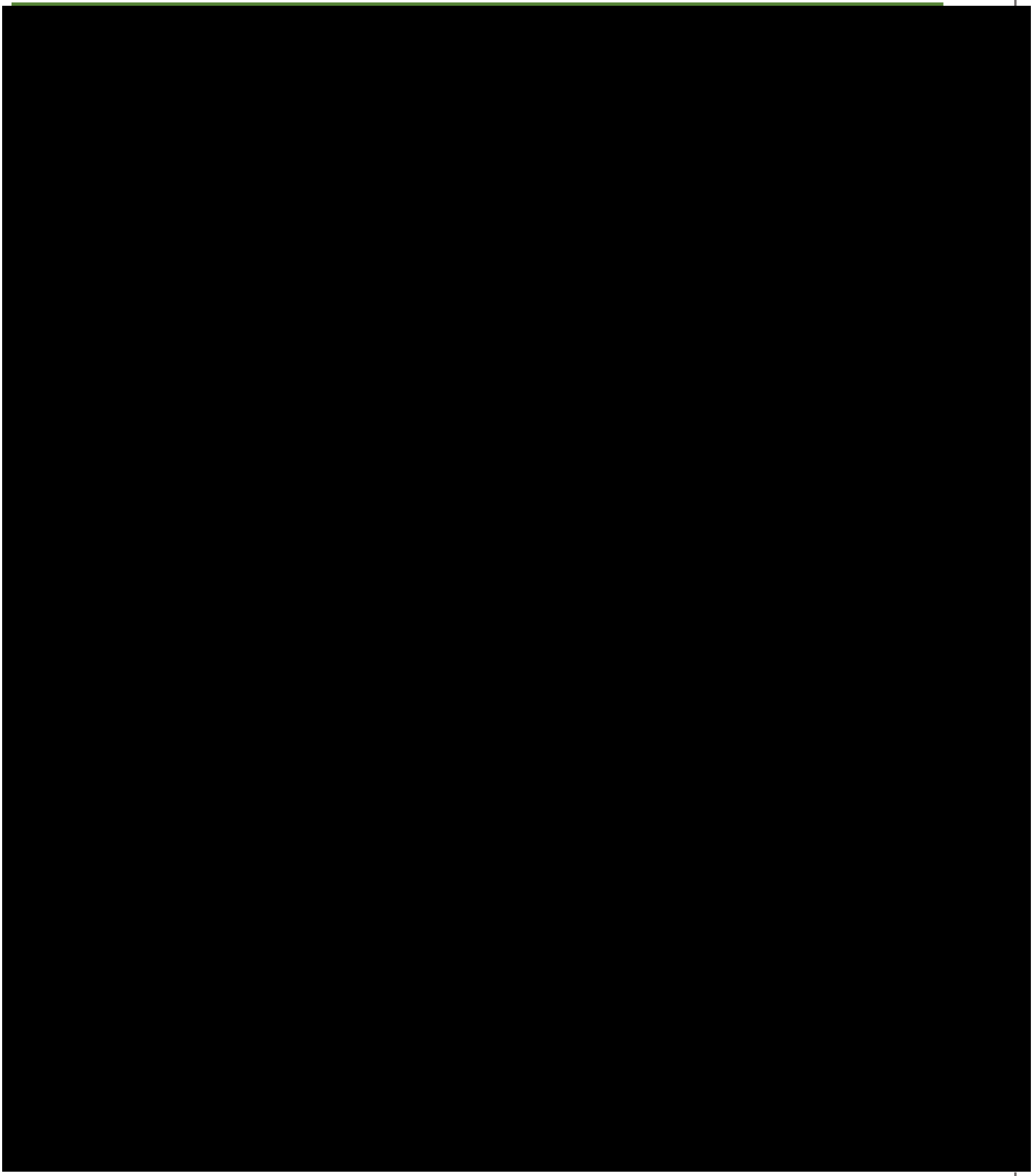
Device Name	Count of Device	Sum of Customer Affected Count	Sum of Customer Minutes	% CMI	% Customers	Comments
[redacted]	2	[redacted]	929,583	19.79%	6.64%	[redacted]
	6		694,484	14.79%	12.69%	
	10		644,905	13.73%	34.46%	
	3		417,914	8.90%	1.74%	
	2		257,209	5.48%	2.38%	
	10		228,146	4.86%	2.53%	
	4		226,506	4.82%	3.24%	
	5		175,263	3.73%	1.83%	
	2		119,370	2.54%	1.03%	
	2		110,646	2.36%	1.20%	
	2		109,533	2.33%	3.37%	
	1		98,968	2.11%	1.54%	
Sum	**49**		**4,012,527**	**85%**	**73%**	

Table 2 - [redacted] and [redacted] Outage History

Start Date	Device	Device Town	Cause Type	Cust Count	Customer Minutes	Duration	Reportable Description

[redacted]





[redacted]

Table 3 – Cost & Reliability Cost Effectiveness Summary Table

Segment/Alternative	Estimated Cost	% CMI	Affected Customers (4 Years)			CMI Interrupted (4 Years)			%CIS	$CMS			$CIS		
			Non-Storm	Storm	Both	Non-Storm	Storm	Both		Non-Storm	Storm	Both	Non-Storm	Storm	Both
[redacted]	$109,655	39%	[redacted]			2,538	3,890,114	3,892,652	39%	$376.97	$0.38	$0.38	$27,075.31	$1,319.55	$1,258.23
	$122,563	39%				134,815	521,028	655,843	39%	$12.12	$3.14	$2.49	$730.52	$1,200.83	$454.95
	$2,549,640	39%				134,815	521,028	655,843	39%	$252.16	$65.25	$51.83	$15,190.78	$25,089.71	$9,464.14
	$252,353	45%				78,114	715,338	793,452	59%	$28.72	$3.14	$2.83	$3,156.41	$3,134.82	$1,572.29
	$515,495	45%				78,114	715,338	793,452	59%	$58.66	$6.41	$5.77	$6,443.69	$6,403.66	$3,211.81
	$38,602	49%				183,777	334,618	518,395	49%	$2.19	$1.15	$0.74	$246.97	$214.57	$114.82
	$210,063	45%				15,022	629,398	644,420	59%	$124.39	$2.97	$2.90	$11,354.76	$5,583.67	$3,742.77
	$193,577	45%				39,706	240,273	279,979	59%	$43.34	$7.16	$6.15	$6,703.97	$15,642.59	$4,692.78
	$204,903	45%				2,772	172,491	175,263	59%	$657.98	$19.56	$10.39	$49,673.45	$12,418.36	$9,934.69
	$232,055	45%				18,423	200,575	220,998	59%	$111.96	$9.89	$9.09	$8,925.19	$37,128.80	$7,195.50

*Preferred Option is proposal 2, 5 and 7 and proposal 1 will be completed by a substation project.

Business Process and / or Technical Improvements

The expectation is to lessen the vulnerability of the system to outages, mostly caused by trees, while strengthening the infrastructure to become more resilient.

b. Project Need

The proposed improvements include reconductoring small, bare wire with covered wire, installing sectionalizing switches and upgraded some poles per resiliency standards.

Project Objectives

- Reconfigure the Protection Scheme to handle the full circuit load to the substation breaker. Substation work to be handled by a separate substation work order or project.
- Reconductor small, bare wire with covered wire to improve performance in heavily treed areas.

c. Project Scope

(Preferred option $402.6K): This option was selected because it addresses all reliability concerns at a lower cost. The following proposals are listed in the order of performance as referenced by Table 3 and are included in the preferred option:

Preferred Option

Proposal #5: [redacted]

Description: [redacted]

Map diagram page 3.

Distribution Project Cost: $252K

Outage Summary: (6) Tree, (1) Miscellaneous, (0) Employee, (0) Equipment (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material: (4,932) single phase 1/0 TW

- [redacted]., [redacted], P. 287: Reconductor to pole 519
- [redacted]., [redacted], P. 803: Replace X-Arm with a ridge pin and vise top insulator for bare wire
- [redacted]., [redacted] P. 799: Replace X-Arm with a ridge pin and vise top insulator for bare wire

Project Scope (Cont'd)

Proposal #2: [redacted]

Description: [redacted]. Map diagram page 2.

Distribution Project Cost: $123K

Outage Summary: (10) Tree, (0) Miscellaneous, (1) Equipment, (1) Vehicle (1/1/2016 – 1/1/2020)

Impacted Customers: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material: (3) 900 Amp In-Line Switches, (1) recloser

- [redacted], P. 204: [redacted]
- [redacted], P. 348 – Install a Smart Switch

Proposal #7: [redacted] Substation

Description: A benefit to both the [redacted] and [redacted]. [redacted]. Design map page #9.

Distribution Project Cost: $39K

Outage Summary: (1) Tree, (2) Miscellaneous, (0) Employee (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): 0

- [redacted]: Reconfigure as a Smart Switch
- [redacted]: Reconfigure as a Smart Switch

Major Material: Reclosers, (4.932) 1/0 TW

4. Alternatives Considered

Alternatives were considered (please describe below)

The following were reviewed and determined to be either not cost effective or did not address the root cause as to reason why [redacted] made the TDRP list. The impacted taps have been assessed and trimming requested as needed. We will continue to monitor the performance and if needed, we will pursue gaining approval for additional reconductoring.

Proposal #1: [redacted]

Description: Fuse transformer at pole 200, at the [redacted]. Map diagram page 1.

Distribution Project Cost: $110K

Outage Summary: (1) Tree, (1) Miscellaneous, (1) Employee (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): 0

Major Material: (3) **900 Amp In-Line Switches**, (1) **Cutout**, (757) **556 TW**

- [redacted], **20Y2-70S, P. 199:** Install (3) 900 Amp Switches on load side of recloser
- [redacted], **P. 199 – P.204:** Reconductor 2/0 Copper with 556 TW

Proposal #6: [redacted]

Description: [redacted]

Distribution Project Cost: $515K

Outage Summary: (6) Tree, (1) Miscellaneous, (0) Employee, (0) Equipment (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material: (10,182) **1/0 TW**

- [redacted], **Columbia, P. 287:** Recon. 10,182 ft.–1/0 TW, from Pole 287 ([redacted] - P.1053 ([redacted])

Proposal #3: [redacted]

Description: [redacted]. Map diagram page 2.

Distribution Project Cost: $2,550K

Outage Summary: (10) Tree, (0) Miscellaneous, (1) Equipment, (1) Vehicle (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material: (3) **900 Amp In-Line Switches**, (20,184) **556 TW**

- [redacted]**., Columbia,** [redacted]**, P. 204:** [redacted]

Alternatives Considered with Cost Estimates (Cont'd)

Proposal #8: [redacted]

Description: [redacted]. Map Diagram Page 4.

Distribution Project Cost: $210K

Outage Summary: (4) Tree, (2) Miscellaneous, (1) Animal (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material: (4,123) **1/0 TW**

- [redacted], **P. 2428:** Reconductor to pole 2033, 4,123 ft. - 1/0 TW
- [redacted], **P. 907 & 907-S:** Bond Guys
- [redacted] **P. 2033-S:** Bond Guys

Proposal #9: [redacted]

Description: [redacted] Design Map Page #5.

Distribution Project Cost: $194K

Outage Summary: (3) Tree, (0) Miscellaneous, (0) Animal (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): 0

Major Material: (4,381) **1/0 TW**, (10) **Cutouts/Fuses**, (4) **Ridge Pins**

- [redacted], **P. 326:** Reconductor to pole 375, 4,381 ft. - 1/0 TW
- [redacted], **P. 356:** Replace x-arm with ridge pin and vise top insulator
- [redacted], **P. 362:** Replace x-arm with ridge pin and vise top insulator
- [redacted] **P. 368:** Replace x-arm with ridge pin and vise top insulator
- [redacted] **P. 375:** Install 1Ø double dead-end transition to bare wire
- [redacted], **P. 377:** Replace x-arm with ridge pin and vise top insulator for bare wire

Alternatives Considered with Cost Estimates (Cont'd)

Proposal #12: [redacted]

Description: [redacted] Design map page #6.

Distribution Project Cost: $232K

Outage Summary: (2) Tree, (3) Vehicle Accidents, (1) Equipment, (1) Lightning (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material: (5,310) **1/0 TW**

- [redacted], **P. 435:** Reconductor to pole 3920, 5,310 ft. - 1/0 TW

Proposal #10: [redacted]

Description: Only one splice found here. Propose to spot reconductor 3,992 ft. of bare wire, based upon the tree outage locations, replacing a storm damaged transformer and pole. Design map page #7.

Distribution Project Cost: $205K

Outage Summary: (4) Tree, (1) Miscellaneous, (0) Equipment, (0) Lightning (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material: (3,992) **1/0 TW**

- [redacted], **P. 2119:** Reconductor to pole 128, 3,992 ft. - 1/0 TW
- [redacted], **P. 4080:** Replace pole and transformer

Proposal #7: [redacted]

Description: A benefit to both the [redacted]. The full load of the [redacted] will be picked up automatically by the [redacted] when the [redacted] is lost and the [redacted] load will be handled within the contingency load guidelines. The Load Sheet, see Reference section, [redacted]. Design map page #9.

Distribution Project Cost: $39K

Outage Summary: (1) Tree, (2) Miscellaneous, (0) Employee (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material:

- [redacted]: Reconfigure as a Smart Switch
- [redacted] Reconfigure as a Smart Switch

5. Project Schedule

Milestone/Phase Name	Estimated Completion Date
Preliminary Approval	4/2021
Detailed Design	5/2021
Construction Approval	8/2021
Settings Requested	9/2021
Construction Start Date	2/2022
Construction End Date	3/2023

6. Regulatory Decisions

No

7. Codes and Standards

8. Risk and Contingencies

Risk Event	Risk Horizon	Likelihood of Occurrence	Risk Mitigation

Actual cost higher than estimated due to scope changes.	2022-2023	Low	Included contingency costs in the funding request. Perform detailed Field Analysis and walk down in project development to avoid potential issues.
Customer Permission / Siting Council / Municipal approvals	2022-2023	Low	Design to minimize customer impact. Project Preplanning and customer/community outreach.
Internal construction resources not available to perform the work.	2022-2023	Medium	Plan internal resources to perform the work. Use competitive bidding to ensure lowest outside labor cost.
Internal engineering resources not available to perform the work.	2022-2023	Low	Plan internal resources to perform the work. Use competitive bidding to ensure lowest outside labor cost.
Materials Shortage or long lead times	2022-2023	Medium	Pre-order long lead time material; minimize the use of non-standard and non-stocked material.
Storm delays	2022-2023	Medium	If storm activity delays work, we may be forced to use external resources.
System abnormal configuration	2022-2023	Low	Schedule work to minimize system abnormal time. Install temporary bypasses/equipment if system will be abnormal for extended periods.
Technological risks involving integration of new technology	2022-2023	Low	Before use of new technology ensure support of standards and manufacturer. Schedule project to accommodate for extra time or ensure new technology is not on the critical path.
Wetlands / Environmentally sensitive area	2022-2023	Low	Use of mats and specialty equipment, only work during certain times of the year.

9. References

References
DSEM10.20 – Recloser Guide
DSEM 10.22 – Recloser Three Phase Selection
DSEM 03.301 – Reliability Cost Effectiveness
DSEM 02.423 – Multiple Interruptions
DSEM 02.501 – System Resiliency Guideline

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

Attachment	Included in Submittal?
A. Project Need Statement	*YES*
B. [redacted] TDRP_One Line	*YES*
C. [redacted] Full circuit Map	*YES*
D. [redacted] Detailed Map	*YES*
E. Storm Isais[redacted] Restoration Timeline	*YES*
F. Load Summary	*YES*

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

Need Statement

CD01636_project_needs_statement_rev1.7

Load Sheet

[redacted]% [redacted]TDRP_Loa

One-Line Map

[redacted]TDRP_rev0.4.pdf

Detail Map

[redacted]_Detail Maps_rev0.7.pdf

Circuit Analysis

[redacted]_TDRP_[redacted]_rev1.1.xlsx

Full Circuit Map

[redacted]_Full Ckt Map.pdf

Storm Isias Restoration Timeline

[redacted] Restoration Timeline.p

- *Attachment A*

Connecticut Light & Power
A Northeast Utilities Company

Specific Project Proposal - Project #: CD01636 [redacted] 2020 TDRP

Work Classification		Ownership / Management	
Category:	Line	AWC:	East Hampton
Type:	TDRP	Statewide:	No
Type Desc:	TRMSN DISTR RELIABILTY PERFRM	Owner:	[redacted]
Work Type:		Manager:	[redacted]

Project Information

Status:	Draft	Associated Projects:	
SPS #:		Assignment ID:	
AIS Score:		Patrol Find ID:	

Budget Summary - Preferred Option [redacted] TDRP_2020_Preferred Proposal

2022

ID	Title	Status	Rev #	Contingency	Expenditure Amount	Net Estimate
2	[redacted] DRP 2020_Pfrd [redacted]	Draft	0	24%	$122,563	$122,563
5	[redacted] DRP 2020_Pfrd_Fuse 287-Hu	Draft	0	24%	$252,353	$252,353
7	[redacted] DRP 2020 [redacted] Feed to	Draft	0	24%	$38,602	$38,602
				2022 Total:	$413,518	$413,518
				Total Project:	$413,518	$413,518

- Attachment B

[redacted]

- Attachment C



- Attachment D



Operations Project Authorization Form

Date Prepared: May 4, 2021	**Project Title:** [redacted] 2020 TDRP
Company/ies: Eversource CT	**Project ID Number:** CD01636
Organization: Distribution Electric	**Class(es) of Plant:** Distribution
Project Initiator: [redacted]	**Project Category:** Line
Project Manager: [redacted]	**Project Type:** TDRP
Project Sponsor: [redacted]	**Project Purpose:** Improve Reliability
Estimated in service date: December 31, 2022	**If Transmission Project: PTF?** N/A
Eng. /Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan?**
Authorization Type: Initial Funding	**O&M Expenses Part of the Original Operating Plan?**
Total Request: $413,518	

Financial Requirements

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

Transmission-Distribution Reliability Performance (TDRP) projects address reliability issues associated with the top Worst 100 circuits in Connecticut. In doing so, Eversource-CT maintains compliance with Docket 86-12-03. Eversource-CT is required to report the status of actions taken to improve performance for each circuit topping the "Worst 100" list. Updates are required each year for the four years following a circuit's appearance on the list.

The [redacted]

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized	2022	20__	20__+	Totals
Capital Additions - Direct	$0	$231	$0	$0	$231
Less Customer Contribution	$0	$0	$0	$0	$0
Removals net of Salvage ____%	$0	$21	$0	$0	$21
Total - Direct Spending	$0	$253	$0	$0	$253
Capital Additions - Indirect	$0	$146	$0	$0	$146
Subtotal Request	$0	$399	$0	$0	$399
AFUDC	$0	$3	$0	$0	$3
Total Capital Request	$0	$402	$0	$0	$402
O&M	$0	$11	$0	$0	$11
Total Request	$0	$414	$0	$0	$414

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	2022	Year 2	Year 3+	Total
Straight Time Labor	$30	$0	$0	$30

Overtime Labor	$3	$0	$0	$3
Outside Services	$130	$0	$0	$130
Materials	$86	$0	$0	$86
Other, including contingency amounts (describe)	$3	$0	$0	$3
Total Direct Costs	**$253**	**$0**	**$0**	**$253**

Indirect Capital Costs	**2022**	**Year 2**	**Year 3+**	**Total**
Indirects/Overheads (including benefits)	$146	$0	$0	$146
Capitalized interest or AFUDC, if any	$3	$0	$0	$3
Total Indirect Costs	**$149**	**$0**	**$0**	**$149**
Total Capital Costs	**$402**	**$0**	**$0**	**$402**
Less Total Customer Contribution	**$0**	**$0**	**$0**	**$0**
Total Capital Project Costs	**$402**	**$0**	**$0**	**$402**
Total O&M Project Costs	**$12**	**$0**	**$0**	**$12**
Total Project Cost	**$414**	**$ -**	**$ -**	**$414**

Technical Justification

[redacted] was analyzed as result of the TDRP ranking. The devices experiencing interruptions over a four-year period were assessed and fixes targeting the root cause have been identified.

Project Need Statement

The proposed improvements include reconductoring small, bare wire with covered wire, installing sectionalizing switches and upgraded some poles per resiliency standards.

Project Objectives

- Reconfigure the Protection Scheme to handle the full circuit load to the substation breaker. Substation work to be handled by a separate substation work order or project.
- Reconductor small, bare wire with covered wire to improve performance in heavily treed areas.

Project Scope

The proposed solution has a high-level estimated cost of $414K. The following proposals are listed in the order of performance as referenced by Table 3 and are included in the preferred option:

Preferred Option

Proposal #5: [redacted]

Description: A single phase side-tap, bare wire, Fuse 287 feeds 217 customers down [redacted]... This segment proposes to reconductor with single phase 1/0 TW 4,932 ft. of bare #631composite and #4 copper 1/0 TW. Map diagram page 3.

Distribution Project Cost: $252K

Outage Summary: (6) Tree, (1) Miscellaneous, (0) Employee, (0) Equipment (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material: (4,932) single phase **1/0 TW**

- [redacted] **P. 287:** Reconductor to pole 519
- [redacted], **P. 803:** Replace X-Arm with a ridge pin and vise top insulator for bare wire
- [redacted] **P. 799:** Replace X-Arm with a ridge pin and vise top insulator for bare wire

Project Scope (Cont'd)

Proposal #2: [redacted]

Description: On the [redacted]. Install a Smart Switch at pole 348. Map diagram page 2.

Distribution Project Cost: $123K

Outage Summary: (10) Tree, (0) Miscellaneous, (1) Equipment, (1) Vehicle (1/1/2016 – 1/1/2020)

Impacted Customers: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer [redacted]

Major Material: (3) **900 Amp In-Line Switches**, (1) recloser

- [redacted] **P. 204:** [redacted]
- [redacted] **P. 348 –** Install a Smart Switch

Proposal #7: [redacted]

Description: A benefit to both the [redacted] and [redacted]. [redacted] Design map page #9.

Distribution Project Cost: $39K

Outage Summary: (1) Tree, (2) Miscellaneous, (0) Employee (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): [redacted]

- [redacted]: Reconfigure as a Smart Switch
- [redacted]: Reconfigure as a Smart Switch

Major Material: Reclosers, (4.932) 1/0 TW

Background / Justification

The [redacted]

Storms and Trees are the largest contributing cause to outages. In the last thirteen years storms contributed to forty-one (41%) percent of the outages; years 2014 and 2015 are the exception when storms played no role at all.

[redacted] worst performing devices were studied, shown in Table 1. The number of splices, location of splices and trees, and four (4) year tree outage history determined the sections to be reconductored or where "spot reconductoring" is to be performed.

Shown in Table 2 are [redacted]

[redacted]

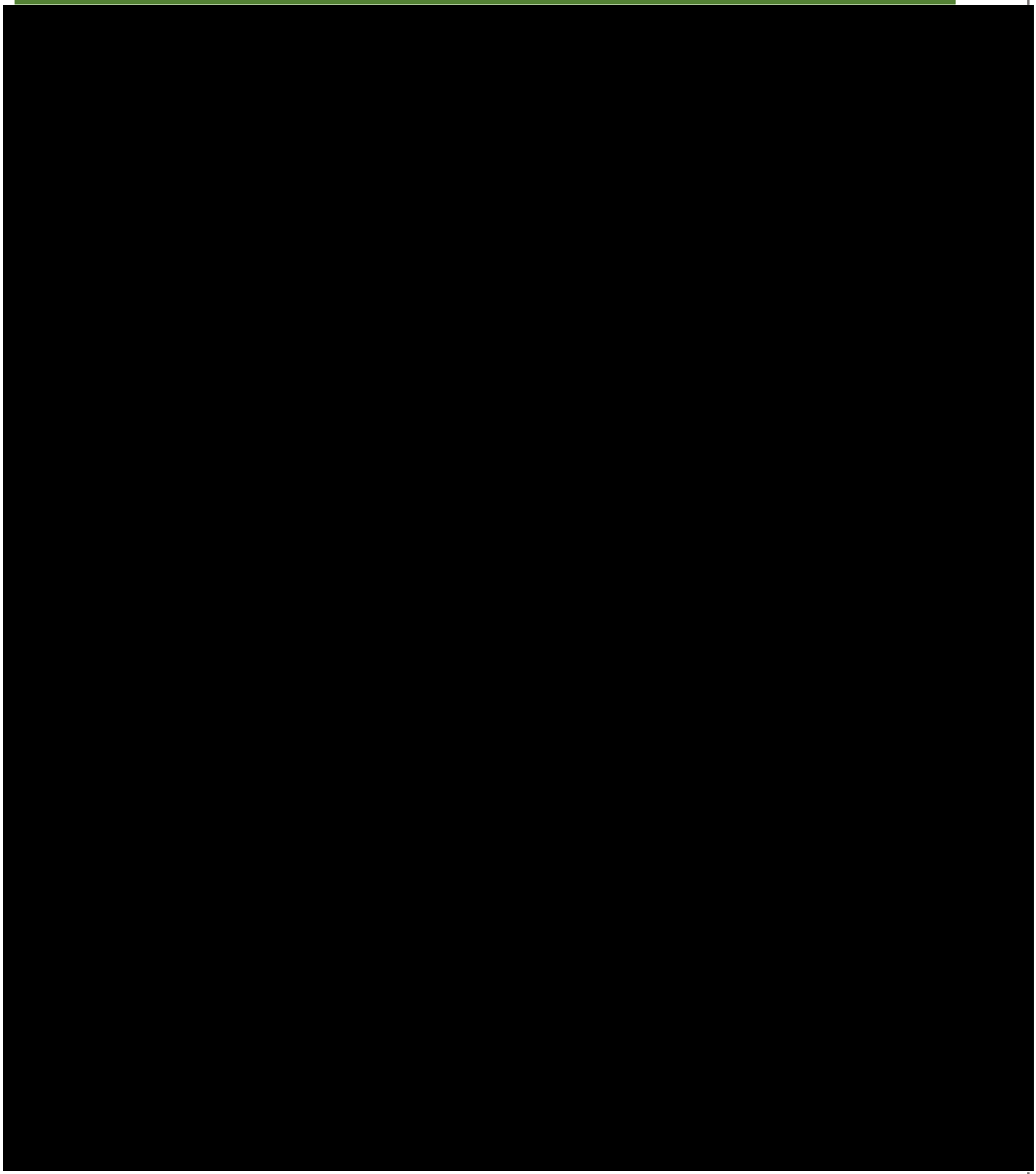
Table 1 – 20Y2's Worst Performing Devices

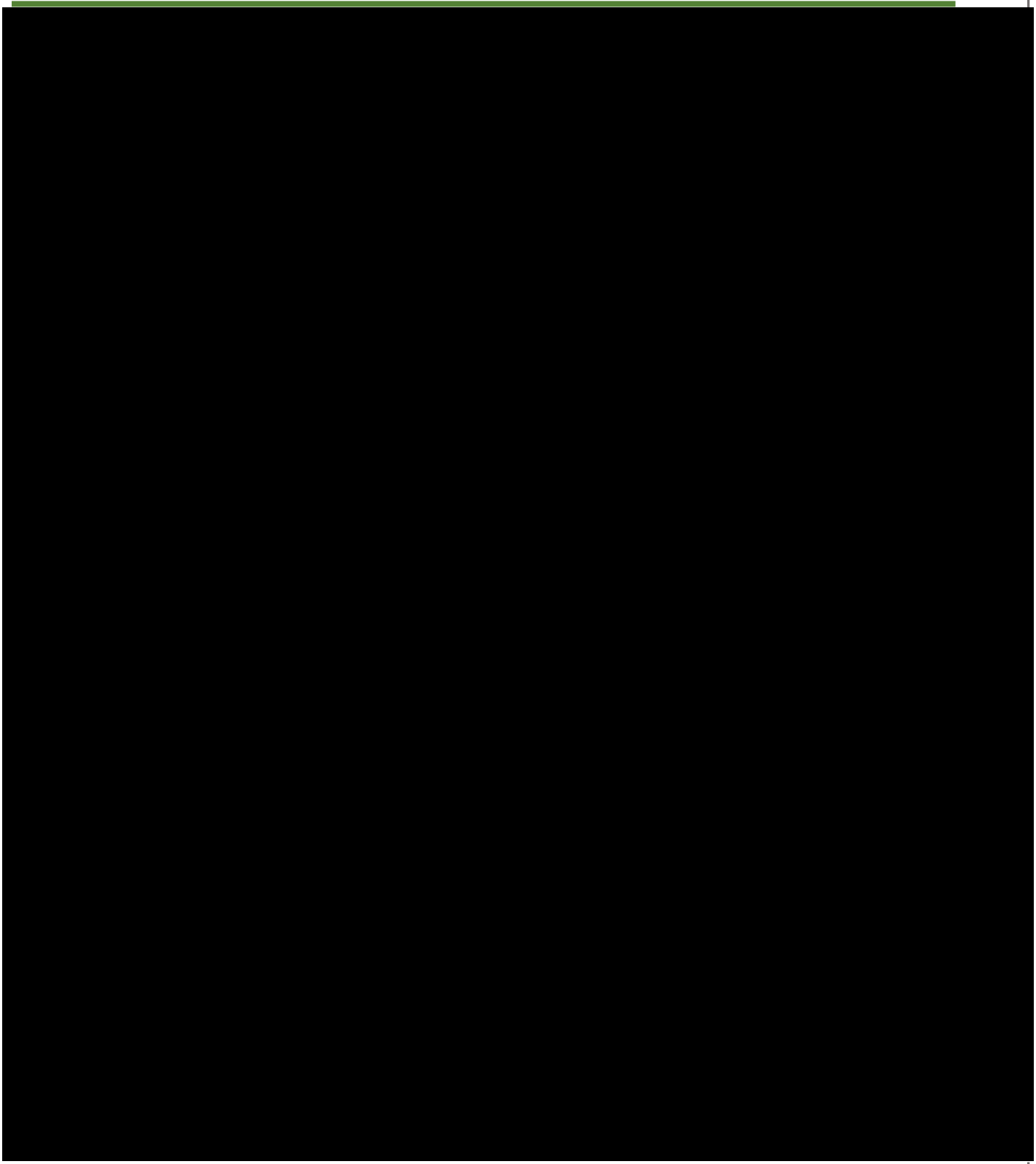
Device Name	Count of Device	Sum of Customer Affected Count	Sum of Customer Minutes	% CMI	% Customers	Comments
[redacted]	2	[redacted]	929,583	19.79%	6.64%	[redacted]
	6		694,484	14.79%	12.69%	
	10		644,905	13.73%	34.46%	
	3		417,914	8.90%	1.74%	
	2		257,209	5.48%	2.38%	
	10		228,146	4.86%	2.53%	
	4		226,506	4.82%	3.24%	

[redacted]	5	[redacted]	175,263	3.73%	1.83%	[redacted]
	2		119,370	2.54%	1.03%	
	2		110,646	2.36%	1.20%	
	2		109,533	2.33%	3.37%	
	1		98,968	2.11%	1.54%	
Sum	**49**		**4,012,527**	**85%**	**73%**	

Table 2 - [redacted] Outage History

Start Date	Device	Device Town	Cause	Cust	Customer	Duration	Reportable Description
[redacted]							





[redacted]

Table 3 – Cost & Reliability Cost Effectiveness Summary Table

Segment/Alternative	Estimated Cost	% CMI	Affected Customers (4 Years)			CM_Interupted (4 Years)			%CIS	$CMS			$CIS		
			Non-Storm	Storm	Both	Non-Storm	Storm	Both		Non-Storm	Storm	Both	Non-Storm	Storm	Both
Design Proposal #1 [redacted]_2020 TDRP [redacted]	$109,655	30%	[redacted]			2,538	3,890,114	3,892,652	30%	$576.07	$0.38	$0.38	$27,075.31	$1,319.55	$1,258.23
Design Proposal #2 [redacted]_2020 TDRP Pfrd[redacted]	$122,563	30%				134,815	521,028	655,843	30%	$12.12	$3.14	$2.49	$730.52	$1,206.03	$454.95
Design Proposal #3 [redacted]_2020 TDRP Alt_[redacted]	$2,549,640	30%				134,815	521,028	655,843	30%	$252.16	$65.25	$51.83	$15,196.78	$25,088.71	$9,464.14
Design Proposal #5 [redacted]_2020 TDRP Pfrd_Fuse OH[redacted]	$252,353	45%				78,114	715,338	793,452	50%	$28.72	$3.14	$2.83	$3,154.41	$3,134.82	$1,572.29
Design Proposal #6 [redacted]_2020 TDRP Alt_Fuse OH[redacted]	$515,495	45%				78,114	715,338	793,452	50%	$58 66	$6.41	$5.77	$6,443.69	$6,403.66	$3,211.81
Design Proposal #7 [redacted]_2020 TDRP [redacted] Feed to[redacted] Substation	$38,602	40%				183,777	334,618	518,395	40%	$2.10	$1.15	$0.74	$246.97	$214.57	$114.82
Design Proposal #8 [redacted]_2020 TDRP 20Y2-1600F[redacted]	$210,063	45%				15,022	629,398	644,420	50%	$124.30	$2.97	$2.90	$11,354.76	$5,583.07	$3,742.77
Design Proposal #9 [redacted]_2020 TDRP	$193,577	45%				39,706	240,273	279,979	50%	$43 34	$7.16	$6.15	$6,703.97	$15,642.59	$4,692.78

20Y2-1602F[redacted]														
Design Proposal #10 [redacted]_2020 TDRP OH Fuse 2119[redacted]	$204,903	45%	[redacted]			2,772	172,491	175,263	50%	$657.06	$10.56	$10.39	$49,673.45	$12,418.36	$9,934.69
Design Proposal #12 [redacted]_2020 TDRP OH Fuse 435[redacted]	$232,055	45%				18,423	208,575	226,998	50%	$111.96	$9.89	$9.09	$8,925.19	$37,128.80	$7,195.50

*Preferred Option is proposal 2, 5 and 7 and proposal 1 will be completed by a substation project.

Business Process and / or Technical Improvements

The expectation is to lessen the vulnerability of the system to outages, mostly caused by trees, while strengthening the infrastructure to become more resilient.

Alternatives Considered with Cost Estimates

The following were reviewed and determined to be either not cost effective or did not address the root cause as to reason why [redacted] made the TDRP list. The impacted taps have been assessed and trimming requested as needed. We will continue to monitor the performance and if needed, we will pursue gaining approval for additional reconductoring.

Proposal #1: [redacted]

Description: [redacted]. Reconductor 757 ft of the three phase 2/0 copper with 556 TW. Map diagram page 1.

Distribution Project Cost: $110K

Outage Summary: (1) Tree, (1) Miscellaneous, (1) Employee (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer [redacted]

Impacted Critical Customer(s): [redacted]

Major Material: (3) **900 Amp In-Line Switches**, (1) **Cutout**, (757) **556 TW**

- [redacted], **P. 199:** Install (3) 900 Amp Switches on load side of recloser
- [redacted], **P. 199 – P.204:** Reconductor 2/0 Copper with 556 TW

Proposal #6: [redacted]

Description: [redacted] Map diagram page 3.

Distribution Project Cost: $515K

Outage Summary: (6) Tree, (1) Miscellaneous, (0) Employee, (0) Equipment (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material: (10,182) **1/0 TW**

- [redacted]**., Columbia, P. 287:** Recon. 10,182 ft.–1/0 TW, from Pole 287 ([redacted] - P.1053 ([redacted].)

Proposal #3: [redacted]

Description: [redacted] Map diagram page 2.

Distribution Project Cost: $2,550K

Outage Summary: (10) Tree, (0) Miscellaneous, (1) Equipment, (1) Vehicle (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material: (3) **900 Amp In-Line Switches**, (20,184) **556 TW**

- [redacted]**, P. 204:** [redacted] Reconductor 20,184 ft. with 556 TW to [redacted]

Alternatives Considered with Cost Estimates (Cont'd)

Proposal #8: [redacted]

Description: [redacted] Map Diagram Page 4.

Distribution Project Cost: $210K

Outage Summary: (4) Tree, (2) Miscellaneous, (1) Animal (1/1/2016 – 1/1/2020)

Impacted Customer: 74

Customer Zone: 74

Impacted Critical Customer(s): 0

Major Material: (4,123) **1/0 TW**

- [redacted], **P. 2428:** Reconductor to pole 2033, 4,123 ft. - 1/0 TW
- [redacted] **P. 907 & 907-S:** Bond Guys
- [redacted], **P. 2033-S:** Bond Guys

Proposal #9: [redacted]

Description: There are fourteen (14) splices within nine (9) spans out of a total of 27 spans or 33% of the spans. This proposal will perform spot reconductoring, 4,381 ft. between poles 326 to 375, which covers replacing the majority of the splices and treed areas. The proposal also covers replacing crossarms with ridge pins. Design Map Page #5.

Distribution Project Cost: $194K

Outage Summary: (3) Tree, (0) Miscellaneous, (0) Animal (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material: (4,381) **1/0 TW**, (10) **Cutouts/Fuses**, (4) **Ridge Pins**

- [redacted], **P. 326:** Reconductor to pole 375, 4,381 ft. - 1/0 TW
- [redacted], **P. 356:** Replace x-arm with ridge pin and vise top insulator
- [redacted], **P. 362:** Replace x-arm with ridge pin and vise top insulator
- [redacted], **P. 368:** Replace x-arm with ridge pin and vise top insulator
- [redacted], **P. 375:** Install 1Ø double dead-end transition to bare wire
- [redacted], **P. 377:** Replace x-arm with ridge pin and vise top insulator for bare wire

Alternatives Considered with Cost Estimates (Cont'd)

Proposal #12: [redacted]

Description: There are 22 splices within 8 spans out of the total 25 spans on [redacted]., Lebanon or 32% of the spans contain splices. Reconductoring is proposed based upon past tree outages and splice locations, 5,310 ft. of 1/0 TW will displace the bare (#631 composite and #4 copper) wire. Design map page #6.

Distribution Project Cost: $232K

Outage Summary: (2) Tree, (3) Vehicle Accidents, (1) Equipment, (1) Lightning (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material: (5,310) **1/0 TW**

- [redacted], **P. 435:** Reconductor to pole 3920, 5,310 ft. - 1/0 TW

Proposal #10: [redacted]

Description: Only one splice found here. Propose to spot reconductor 3,992 ft. of bare wire, based upon the tree outage locations, replacing a storm damaged transformer and pole. Design map page #7.

Distribution Project Cost: $205K

Outage Summary: (4) Tree, (1) Miscellaneous, (0) Equipment, (0) Lightning (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material: (3,992) **1/0 TW**

- [redacted], **P. 2119:** Reconductor to pole 128, 3,992 ft. - 1/0 TW
- [redacted], **P. 4080:** Replace pole and transformer

Proposal #7: [redacted]

Description: A benefit to both the [redacted] and [redacted]. [redacted] Design map page #9.

Distribution Project Cost: $39K

Outage Summary: (1) Tree, (2) Miscellaneous, (0) Employee (1/1/2016 – 1/1/2020)

Impacted Customer: [redacted]

Customer Zone: [redacted]

Impacted Critical Customer(s): [redacted]

Major Material:

- [redacted] Reconfigure as a Smart Switch
- [redacted] Reconfigure as a Smart Switch

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Preliminary Approval	4/2021
Detailed Design	5/2021
Construction Approval	8/2021
Settings Requested	9/2021
Construction Start Date	2/2022
Construction End Date	3/2022

Risks and Risk Mitigation Plans

Risk Event	Risk Horizon	Likelihood of Occurrence	Risk Mitigation
Actual cost higher than estimated due to scope changes.	2022	Low	Included contingency costs in the funding request. Perform detailed Field Analysis and walk down in project development to avoid potential issues.
Customer Permission / Siting Council / Municipal approvals	2022	Low	Design to minimize customer impact. Project Preplanning and customer/community outreach.
Internal construction resources not available to perform the work.	2022	Medium	Plan internal resources to perform the work. Use competitive bidding to ensure lowest outside labor cost.
Internal engineering resources not available to perform the work.	2022	Low	Plan internal resources to perform the work. Use competitive bidding to ensure lowest outside labor cost.
Materials Shortage or long lead times	2022	Low	Pre-order long lead time material; minimize the use of non-standard and non-stocked material.
Storm delays	2022	Medium	If storm activity delays work, we may be forced to use external resources.
System abnormal configuration	2022	Low	Schedule work to minimize system abnormal time. Install temporary bypasses/equipment if system will be abnormal for extended periods.

Technological risks involving integration of new technology	2022	Low	Before use of new technology ensure support of standards and manufacturer. Schedule project to accommodate for extra time or ensure new technology is not on the critical path.
Wetlands / Environmentally sensitive area	2022	Low	Use of mats and specialty equipment, only work during certain times of the year.

References

DSEM10.20 – Recloser Guide

DSEM 10.22 – Recloser Three Phase Selection

DSEM 03.301 – Reliability Cost Effectiveness

DSEM 02.411 – Circuit Performance Ranking

DSEM 02.423 – Multiple Interruptions

DSEM 02.501 – System Resiliency Guideline

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

Need Statement

CD01636_project_needs_statement_rev1.7

Load Sheet

[redacted]% [redacted]TDRP_Loa

One-Line Map



[redacted]_2020 TDRP_rev0.4.pdf

Detail Map



[redacted]_Detail Maps_rev0.7.pdf

Circuit Analysis



[redacted]_TDRP_2020_rev1.1.xlsx

Full Circuit Map



[redacted] TDRP 2020_Full Ckt Map.pdf

Storm Isias Restoration Timeline



[redacted] Restoration Timeline.p