EVERSOURCE

Supplement Authorization Form

Project Title: [redacted] Network Monitoring System	**Project Number: CD00834**
Date Prepared: 05/05/2026	**Company:** Eversource CT
Organization: Distribution Engineering	**Project Category:** Network Reliability
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: $ 163.23k	**Approved In-Service Date:** 12/31/2018
Supplement Request: $ 228.67k	**Estimated In-Service Date:** 12/31/2025
Total Capital Request: $ 391.91k	**Authorization Type:** Supplement Request
	Reason: Cost Overage

1. Project Background

Project CD00834 was the initial installation of the Digital Grid network remote monitoring system. This project focuses on providing Eversource with a convenient and necessary method to control and monitor many different parameters of the underground secondary distribution system. This includes data collection of the network protector including but not limited to current, voltage, network protector status and relay status.

This project will provide the ability to immediately locate faulted network protectors as well as those operating on backfeed, while enhancing safety through thermal monitoring that offers early warnings of overloaded equipment in confined workspaces. It will supply valuable load data to support diversity load analysis and enable more efficient utilization of transformers by identifying where they are needed and where they are not. In addition, the project will help avoid unnecessary network shutdowns during multiple feeder contingencies and create potential switching efficiencies by minimizing superfluous switching required for planned work.

2. Supplement Justification Overview

The requested amount of $ 228.67k is 40% above the authorized direct cost of $391.9k. This project incurred no scope change from full funding to supplemental. Additional outside contractor labor, material costs and removals drove up the overall cost of the project.

3. Supplement Justification Detail

Additional $228.67k is mainly due to increased labor costs, outside services, materials and removals needed for this project.

4. Supplement Cost Summary (Project Total)

Capital Costs	To Date Spend	Prior Authorized	Supplemental Request	Total Request
Internal Labor and Construction Equipment	9.2	0.0	8.8	8.8
Outside Services	56.1	21.8	32.3	54.0
Materials	230.1	101.4	120.2	221.5
Removals	0.0	0.0	11.7	11.7
Risk and Contingency	7.7	0.0	7.7	7.7
Other	19.0	0.0	18.3	18.3
Subtotal	**322.1**	**123.1**	**199.0**	**322.1**

Indirect Capital Costs	To Date Spend	Prior Authorized	Supplemental Request	Total Request
Indirects/Overheads (including benefits)	65.9	39.4	26.5	65.9
Capitalized interest or AFUDC, if any	3.9	0.7	3.2	3.9
Subtotal	**69.8**	**40.1**	**29.7**	**69.8**
Total Capital Costs (Gross)	**391.9**	**163.2**	**228.7**	**391.9**
Less Total Customer Contribution	**0.0**	**0.0**	**0.0**	**0.0**

Project Costs (Net of Reimbursement)	**391.9**	**163.2**	**228.7**	**391.9**

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.

Capital Costs	2017	2018	2019	2022	2024	2025	TOTAL
Internal Labor & Equipment	0.9	3.6	0.2	3.8	0.4	0.0	8.8
Outside Services	5.4	21.8	1.1	23.3	2.6	0.0	54.0
Materials	22.0	89.2	4.4	95.5	10.6	-0.2	221.5
Removals	1.1	4.6	0.2	4.9	0.5	0.3	11.7
Risk and Contingency	0.0	0.0	0.0	0.0	0.0	7.7	7.7
Other	1.8	7.4	0.4	7.9	0.9	0.0	18.3
SUBTOTAL Direct Cost	**31.2**	**126.5**	**6.3**	**135.4**	**15.0**	**7.7**	**322.1**
Indirects / Overheads	5.1	1.8	0.3	54.2	4.5	0.0	65.9
AFUDC	0.0	0.0	0.0	2.2	1.0	0.6	3.9
SUBTOTAL Indirect Cost	**5.1**	**1.8**	**0.3**	**56.5**	**5.5**	**0.6**	**69.8**
TOTAL Capital Request	**36.3**	**128.3**	**6.6**	**191.9**	**20.6**	**8.3**	**391.9**
Less Total Customer Contribution	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
TOTAL Project Cost	**36.3**	**128.3**	**6.6**	**191.9**	**20.6**	**8.3**	**391.9**

5. Lessons Learned

Previous approved PAF;

Operations Project Authorization Form

Date Prepared: 7/10/2018	**Project Title: [redacted]–Network Monitoring System**
Company/ies: CT	**Project ID Number: CD00834**
Organization: Distribution Design	**Class(es) of Plant: Distribution**
Project Initiator: [redacted]	**Project Category: Network Automation**
Project Manager: [redacted]	**Project Type: Specific**
Project Sponsor: [redacted]	**Project Purpose: Install Digital Grid Relays**
Estimated in service date: 12/31/218	**If Transmission Project: PTF? N/A**
Eng. /Constr. Resources Budgeted? No	**Capital Investment Part of Original Operating Plan? No**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan? No**
Total Request: $163,237	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

Digital Grid is a hardware and software solution which provides communications to network vaults over Power Line Carrier (PLC). Digital Grid plays a significant role in maintaining reliability of the secondary network and directly contributes to safety by eliminating the need for access to vaults by personnel to investigate many abnormal conditions.

This project is the initial installation of the Digital Grid network remote monitoring system. This project focuses on providing Eversource with a convenient and necessary method to control and monitor many different parameters of the underground secondary distribution system. This includes data collection of the network protector that includes but it is not limited to: current, voltage, network protector status and relay status. This data can be used for load flow modeling and the ability of the SOC to monitor network status and issues. The greatest savings will come from enabling EVERSOURCE to defer network protector major maintenance from a 2-year cycle to a 4-year cycle to create an O&M savings.

There are 23 Digital Grid network protectors that require the installation of 1 relay at each location. These installations will try to be worked in conjunction with CD00945 to save on electrician labor and traffic control costs.

This project was presented at TRC on 11/22/16 with an ENG estimate of $281,653 and was approved at $28,000 for Engineering.

Following detailed design, **the total project request is $163,237**.

The revised cost estimate is based on contractor working on two vaults a day at 12 hours a day; also included is Clean Harbor's time to clean out the vaults; traffic control for 12 hours a day. Both costs will be shared between CD00834 and CD00945.

Project Costs Summary

	Prior Authorized*	Additional Request	2018	2019+	Total**
Capital Additions Direct	$0	$0	$123,123	$0	$123,123
Less Customer Contribution	$0	$0	$0	$0	$0
Removals Net of Salvage	$0	$0	$0	$0	$0
Total - Direct Spending	$0	$0	$123,123	$0	$123,123
Capital Additions - Indirect	$0	$0	$39,419	$0	$39,419
AFUDC	$0	$0	$695	$0	$695
Total Capital Request	$27,574	$135,663	$163,237	$0	$163,237
O&M	$591	-$591	$0	$0	$0
Total Request	**$28,165**	**$135,072**	**$163,237**	**$0**	**$163,237**

* Current Amount authorized in Powerplan

** Total amount needed for authorization in PowerPlan based on ACT

Financial Evaluation

Direct Capital Costs	2018	2019	2020	Total
Straight Time Labor	$ -	$ -	$ -	$ -
Overtime Labor	$ -	$ -	$ -	
Outside Services	$ 21,758	$ -	$ -	$ 21,758
Materials	$ 101,365	$ -	$ -	$ 101,365
Other, including contingency amounts	$ -	$ -	$ -	$ -
Total	$ 123,123	$ -	$ -	$ 123,123

Indirect Capital Costs	2018	2019	2020	Total
Indirects/Overheads (including benefits)	$ 39,419	$ -	$ -	$ 39,419
Capitalized interest or AFUDC, if any	$ 695	$ -	$ -	$ 695
Total	$ 40,114	$ -	$ -	$ 40,114

Total Capital Costs	$ 163,237	$ -	$ -	$ 163,237
Less Total Customer Contribution	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ 163,237	$ -	$ -	$ 163,237
Total O&M Project Costs	$ -	$ -	$ -	$ -
Total Project Cost	$ 163,237	$ -	$ -	$ 163,237

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

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

What functional area(s) will these future costs be funded in?_____
A representative from the respective functional area is required to be included as a project approver.

If this is other than a Reliability Project, please complete the section below;

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

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

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

What functional area(s) will these benefits be reflected in?_____
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? If yes, please provide details:

Are there other environmental cleanup costs associated with this project? If yes, please provide details:

Technical Justification:

Project Need Statement

Eversource CT has begun monitoring our network transformers and protectors in some of our major networks. A network monitoring system will provide the Company with a convenient method to measure and record many different aspects of the underground secondary distribution grid. This system will provide Engineering the data necessary to build and validate an accurate load flow model with real time network protector data which can be used for capacity planning and maintenance operations. The network communication system data for Eversource CT networks will be made available via a web based portal. Eversource CT personnel will be able to access, view and retrieve network data via this custom web site.

[redacted]

Project Objectives

- This project will give us the ability to immediately locate faulted network protectors and those alive on backfeed.
- Safety – Thermal monitoring provides warning of overloaded equipment in confined space work areas.
- It will provide load data for diversity load analysis.
- It will provide data for the efficient utilization of transformers – where they are needed and not needed.
- It will avoid unnecessary network shutdown during multiple feeder contingencies.
- There are potential switching efficiencies and the ability to minimize superfluous switching for planned work.

Project Scope

The replacement of 23 network protector relays with new Digital Grid relays.

Background / Justification

Digital Grid Inc. (DGI) is a turnkey designer and provider of reliable power line carrier communication systems for underground network distribution systems. Digital Grid supplies equipment and expertise to the two largest underground network systems in the northeast, namely ConEd of New York and legacy NSTAR in Boston. This monitoring system would provide Eversource CT with a convenient and necessary method to control and measure many different aspects of the secondary distribution system. This includes data collection of the network protector's current, voltage and power factor. Other options include monitoring the presence of water in the protector, protector pressure, as well as transformer temperature, oil level and oil pressure all in real time. This data is invaluable for load flow modeling, long term planning and responding to contingency events. Additional savings will be gained through network switching using the Digital Grid network protector relays when that technology becomes available.

Business Process and / or Technical Improvements:

This monitoring system would provide Eversource with a system to measure and record different aspects of the underground secondary distribution system. This data is invaluable for long term planning and contingency operation of the network. It also gives us the ability of detecting low voltage events before customer perception. A remote monitoring system will provide Engineering the data necessary to build and validate an accurate load flow model with real time network protector data which can be used for capacity planning and maintenance operations. It will also supply invaluable information to System Operators responding to network contingency events.

Alternatives Considered with Cost Estimates

There are other network communication systems using different technologies other than power line carrier. Two manufactures offer a communications platform providing not only monitoring but supervisory control of the network protectors as well. They use the microprocessor in the network protector relays to interface with a communications relay that communicates to our network using fiber optics, radio, cellular or phone lines. Up to 32 network protectors can be connected to one communications relay cabinet using shielded 2/c #18 cables.
Some of the disadvantages include:

- Spare underground conduits would be used for network communication and fiber optic cables.
- In-house telecom maintenance and troubleshooting expertise would be required for this new equipment.
- A new 2/C #18 cable must be run in inner duct to a new junction box and wired to every network protector that is to be monitored.
- There are no fiber optic cables in these underground structures and fiber optic cable would have to be brought into the area using contract crews.
- The network receiver cabinet would be exposed in an outdoor environment when an indoor location is preferable.
- The fiber optic service would be leased from a telecom provider.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Relay Replacement Start	Sept 2018
ISD	12/31/2018

Regulatory Approvals

N/A

Risks and Risk Mitigation Plans

[redacted]

Financial risks include extra spend due to traffic control and electrician labor. This estimate assumes that this project (CD00834) will be worked in conjunction with CD00945. By working these two projects together the cost of traffic control and the cost of opening each vault can be divided between the two projects. Should either project be worked separately we will see an increase of $400 per location for traffic control and $195 per location for electrician labor. CD00945 will include similar risks.

References

Digital Grid Project Scope Cost EST 2-0414.

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

Attachment #1; UConn Medical Center, Farmington, CT



CD00834[redacted]
[redacted](relays) ACT.xlsx