EVERSOURCE

Supplement Authorization Form

Project Title: Replace Tri-Colored Network Secondary	**Project Number:** CD01067
Date Prepared: 05/01/2024	**Company:** Eversource CT
Organization: Distribution Engineering	**Project Category:** NTWRK 500KCMIL CBL RPL PRG
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: $6,484K	**Approved In-Service Date:** 12/31/2022
Supplement Request: $4,176K	**Estimated In-Service Date:** 12/31/2024
Total Capital Request: $10,660K	**Authorization Type:** Supplement Request
	Reason: In-Service Date Change

1. Project Background

Project CD01067 was created to address failure-prone tri-colored secondary cable. In 2017, several underground network secondary systems located in the Central Region were identified as containing 4/0 Cu tri-colored secondary conductor. This 60+ year old cable has insulation that is tri-colored (red/green/black). [redacted]

2. Supplement Justification Overview

- Supplemental Funding is requested for $10,660K which is 164% of the full funding authorized amount of $6,483.7K.
- The Full Funding estimate called for 91,400 ft of cable replacement, at $6,483.7K totals $72.52 per ft.
- The actual secondary cable replacement amount is 143,828 ft, an increase of 63.5%.
- This extra 55,828 ft of secondary cable at $72.52 per ft equals $4,049K, or 97% of the supplement request.

The 56K ft of extra secondary conductor replacement is due to an under-estimated amount of multi-colored secondary conductor in need of replacement. The project estimated that 400 locations at 220 ft

of conductor replacement per location were needed. The actual amount is 523 locations with 144K ft of secondary conductor in need of replacement.

3. Supplement Justification Detail

This program was extended from 5 years to 7 years due to a change in the inspection cycle. The identification of tri-colored secondary conductor relied on field notes obtained during underground manhole inspections. In 2020, the underground manhole inspection program was changed from a street based to a GIS grid-based system. As a result of this route change, the project required two additional years (2023 and 2024) to obtain the required field notes to identify where additional tri-colored secondary was located.

Additionally, underground manhole inspections did not always account for the totality of multi-colored secondary cables contained within. [redacted] During inspection, a manhole was likely identified as containing multi-colored secondary cable, but not the number of groupings. As a result, the total cable replacement per location can vary greatly.

Year	Locations	Length of Cable
2018	126	27,783
2019	81	31,291
2020	102	17,636
2021	11	23,409
2022	103	6,303
2023	72	37,406
Total	495	143,828

The original high-level estimate for tri-colored secondary cable replacement was 91,400 ft. The actual replacement amount is 143,828 ft. for an additional 55,828 ft, or a 63.5% increase.

4. Supplement Cost Summary (Project Total)

Capital Costs	To Date Spend	Prior Authorized	Supplement Request	**Total** (Add Prior and Supplement Request)
Internal Labor & Equipment	700.2	1,524.6	-824.5	700.2
Outside Services	2,864.4	1,123.3	1,741.1	2,864.4
Materials	1,791.8	1,782.5	9.3	1,791.8
Removals	1,140.0	359.2	780.8	1,140.0
Risk and Contingency	0.0	0.0	209.0	209.0
Other	2.8	0.0	2.8	2.8
SUBTOTAL Direct Cost	**6,499.2**	**4,789.7**	**1,918.5**	**6,708.2**
Indirects / Overheads	3,844.8	1,628.7	2,216.2	3,844.8
AFUDC	106.6	31.6	74.9	106.6
SUBTOTAL Indirect Cost	**3,951.4**	**1,660.3**	**2,291.1**	**3,951.4**
TOTAL Capital Request	**10,450.6**	**6,450.0**	**4,209.7**	**10,659.6**
Less Total Customer Contribution	0.0	0.0	0.0	0.0
TOTAL Project Cost	**10,450.6**	**6,450.0**	**4,209.7**	**10,659.6**

New Total Request by Year (if applicable)

Capital Costs	2018	2019	2020	2021	2022	2023	2024	TOTAL
Internal Labor & Equipment	57.0	160.3	142.5	86.4	122.9	101.2	29.8	700.2
Outside Services	169.9	589.9	317.3	374.8	160.2	898.8	353.6	2,864.4
Materials	172.2	372.4	343.4	264.2	144.5	504.9	-9.9	1,791.8
Removals	88.8	250.0	179.1	161.4	95.1	334.9	30.7	1,140.0
Risk and Contingency	0.0	0.0	0.0	0.0	0.0	0.0	209.0	209.0
Other	0.0	0.9	1.5	0.2	0.0	0.1	0.0	2.8
SUBTOTAL Direct Cost	**488.0**	**1,373.5**	**983.8**	**887.0**	**522.8**	**1,840.0**	**613.2**	**6,708.2**
Indirects / Overheads	291.3	699.1	642.1	578.7	288.0	955.8	389.7	3,844.8
AFUDC	3.8	18.3	16.5	28.7	14.0	25.3	0.0	106.6
SUBTOTAL Indirect Cost	**295.2**	**717.4**	**658.6**	**607.4**	**302.0**	**981.1**	**389.7**	**3,951.4**
TOTAL Capital Request	**783.1**	**2,090.9**	**1,642.4**	**1,494.4**	**824.8**	**2,821.1**	**1,002.9**	**10,659.6**
Less Total Customer Contribution								
TOTAL Project Cost	**783.1**	**2,090.9**	**1,642.4**	**1,494.4**	**824.8**	**2,821.1**	**1,002.9**	**10,659.6**

5. Lessons Learned

Multi-year projects are subject to varying labor and material costs year-over-year. Additional contingency funding could be included for high level cost estimates regarding unknown quantities due to facilities located below grade.

6. Attachments

Attachment A: CD01067 – 2020 Full Funding PAF

Operations Project Authorization Form

Date Prepared: 2/26/2020	**Project Title: Replace Tri-Colored Network Secondary**
Company/ies: Eversource CT	**Project ID Number: CD01067**
Organization: Distribution Electric	**Class(es) of Plant: Distribution**
Project Initiator: [redacted]	**Project Category: Line**
Project Manager: [redacted]	**Project Type: NTWRK 500KCMIL CBL RPL PRG**
Project Sponsor: [redacted]	**Project Purpose: Replace antiquated netwk sec cable.**
Estimated in service date: 12/31/2022	**If Transmission Project: NA**
Eng. / Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding – 2020 Work	**O&M Expenses Part of the Original Operating Plan? Yes**
Total Request: $1,316,655 – 2020 Work	

Financial Requirements:

Project Authorization
ERM: _____

FP&A: _____

Executive Summary

A number of underground network secondary systems located in the Central Region have been identified as containing 4/0 Cu tri-colored secondary. This 60+ year old cable (installed in the 1940's and 1950's) has insulation that is tri-colored (red/green/black). [redacted]

[redacted]

Project CD01067 is a five year project, 2018 to 2022, that will proactively replace the antiquated 4/0 Cu tri-colored network secondary cable located in the Central Region. In 2018, CD01067 proposes to replace 17,600 feet of 4/0 Cu tri-colored network secondary cable at 80 manhole/service box locations in Hartford, East Hartford, Manchester and Middletown. Estimated cost of this work is $1,250K or approximately $15.6K per location. [The estimated project cost is based on similar work orders that were previously written to replace sections of underground tri-colored network secondary cable that had failed.] Years 2019 to 2022 are expected to be comparable to the proposed 2018 work at $1,250K per year. Total cost for this five year project is estimated at $6,250K.

The detail design has been completed for the 2018 work associated with Project CD01067. We are requesting Full Funding authorization of $1,484K for the 2018 work; an increase of $234K or 119% of the Initial Funding authorization of $1,250K. The increase in cost is due to the fact that 21,000 feet of 4/0 Cu tri-colored secondary cable will be replaced in 2018 at 100 manhole/service box locations (compared to 17,600 feet and 80 locations that were originally estimated). Average cost per location = $14.84K.

The detail design has been completed for the 2019 work associated with Project CD01067 (Segment 2). We are requesting Full Funding authorization of $1,093K for the 2019 work; a decrease of $157K or 87.4% of the Initial Funding authorization of $1,250K. The decrease in cost is due to the fact that 15,814 feet of 4/0 Cu tri-colored secondary cable will be replaced in 2019 at 78 manhole/service box locations (compared to 17,600 feet and 80 locations that were originally estimated). Average cost per location = $14.01K.

The detail design has been completed for the 2020 work associated with Project CD01067 (Segment 3). We are requesting Full Funding authorization of $1,317K for the 2020 work; an increase of $67K or 105.3% of the Preliminary Funding authorized amount of $1,250K. 105.3% is within the +/- 10% range for Full Funding authorization automatic approval per JA-AM-2001-A, Capital Project Approval Process. 2020 work includes replacement of 16,761 feet of 4/0 Cu tri-colored secondary cable at 92 manhole/service box locations. Average cost per location = $14.31K.

Project Costs Summary

	Prior Authorized*	2018-2019	2020	2021+	Total**
Capital Additions Direct	$ -	$ 1,559,531	$ 766,004	$ 1,776,000	$ 4,101,535
Less Customer Contribution	$ -	$ -	$ -	$ -	$ -
Removals Net of Salvage	$ -	$ 224,595	$ 85,980	$ 120,000	$ 430,575
Total - Direct Spending	$ -	$ 1,784,126	$ 851,984	$ 1,896,000	$ 4,532,110
Capital Additions - Indirect	$ -	$ 707,838	$ 418,170	$ 594,000	$ 1,720,008
AFUDC	$ -	$ 17,903	$ 11,811	$ 10,000	$ 39,714
Total Capital Request	$ 6,449,950	$ 2,509,867	$ 1,281,965	$ 2,500,000	$ 6,291,832
O&M	$ 33,789	$ 66,660	$ 34,690	$ -	$ 101,350
Total Request	**$ 6,483,739**	**$ 2,576,527**	**$ 1,316,655**	**$ 2,500,000**	**$ 6,393,182**

* Amount authorized in PowerPlan

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

Financial Evaluation

Direct Capital Costs	2018-2019	2020	2021+	Total
Straight Time Labor	64,433	$ 61,918	$ 809,604	$ 935,955
Overtime Labor		$ -	$ -	
Outside Services	972,991	$ 375,745	$ 317,802	$ 1,666,538
Materials	746,703	$ 414,321	$ 768,600	$ 1,929,624
Other, including contingency amounts	-	$ -	$ -	$ -
Total	$ 1,784,127	$ 851,984	1,896,006	$ 4,532,117

Indirect Capital Costs	2018-2019	2020	2021	Total
Indirects/Overheads (including benefits)	707,838	$ 418,170	$ 593,994	$ 1,720,002
Capitalized interest or AFUDC, if any	17,902	$ 11,811	$ 10,000	$ 39,713
Total	$ 725,740	$ 429,981	$ 603,994	$ 1,759,715

Total Capital Costs	$ 2,509,867	$ 1,281,965	$ 2,500,000	$ 6,291,832
Less Total Customer Contribution	$ -	$ -	$ -	$ -
Total Capital Project Costs	$ 2,509,867	$ 1,281,965	$ 2,500,000	$ 6,291,832
Total O&M Project Costs	**66,660**	$ 34,690	$ -	$ 101,349
Total Project Cost	**$ 2,576,527**	**$ 1,316,655**	**$ 2,500,000**	**$ 6,393,182**

* to be completed if supplemental authorization is required

Technical Justification:

Project Need Statement

A number of underground network secondary systems located in the Central Region have been identified as containing 4/0 Cu tri-colored secondary. This 60+ year old cable (installed in the 1940's and 1950's) has insulation that is tri-colored (red/green/black). [redacted]

Project CD01067 is a five year project, 2018 to 2022, that will proactively replace the antiquated 4/0 Cu tri-colored network secondary cable located in the Central Region. In 2018, CD01067 proposes to replace 17,600 feet of 4/0 Cu tri-colored network secondary cable at 80 manhole/service box locations in Hartford, East Hartford, Manchester and Middletown. Estimated cost of this work is $1,250K or approximately $15.6K per location. Years 2019 to 2022 are expected to be similar to the proposed 2018 work at $1,250K per year. Total cost for this five year project is estimated at $6,250K.

Project Objectives

Proactively replace the vintage 1940 / 1950, antiquated, 4/0 Cu tri-colored underground network secondary cable located in the Central Region.

Project Scope

Replace 17,600 feet of 4/0 Cu tri-colored network secondary cable at 80 manhole/service box locations in Hartford, East Hartford, Manchester and Middletown.

Background / Justification

A number of underground network secondary systems located in the Central Region have been identified as containing 4/0 Cu tri-colored secondary. This 60+ year old cable (installed in the 1940's and 1950's) has insulation that is tri-colored (red/green/black). [redacted]

Based on comments received from Hartford District UG Operations, 6 - 12 tri-colored network secondary cable failures occur on an annual basis. For each failure that occurs, several sections of secondary is replaced under a DQ annual work order. In 2017, as part of the UG inspection

process, we began tracking/noting the manholes and service boxes that contain tri-colored network secondary cable. It will take approximately four more years to fully complete the underground inspections and identify all manhole and service box locations in the Central Region that contain tri-colored network secondary cable.



Business Process and / or Technical Improvements:

- All new construction will be per the latest Eversource standards for underground network secondary systems.

Alternatives Considered with Cost Estimates

1. Do nothing. Do not do Project CD01067. Tri-colored network secondary failures will continue to occur with the potential to cause manhole fires and damage primary cables and circuits.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Initial Funding Authorization	2/8/2018
Detail Design	4/30/2018 – 12/31/2021
Full Funding Authorization	5/31/2018 – 3/31/2022
Construction Begin	6/1/2018
Construction End	12/31/2022

Regulatory Approvals
None required.

Risks and Risk Mitigation Plans

Risk Event	Risk Horizon	Likelihood of Occurrence	Risk Mitigation
Actual cost higher than estimated due to scope changes.	2018 - 2022	Low	Estimated project cost is based on past work orders for similar type work.
Internal construction resources not available to perform the work.	2018 - 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.	2018 - 2022	Low	Plan internal resources to perform the work. Use competitive bidding to ensure lowest outside labor cost.
Materials Shortage or long lead times	2018 - 2022	Low	Pre-order long lead time material; minimize the use of non-standard and non-stocked material.
Storm delays	2018 - 2022	Low	If storm activity delays work, we may be forced to use external resources.
System abnormal configuration	2018 - 2022	Low	Schedule work to minimize system abnormal time. Install temporary bypasses/equipment if system will be abnormal for extended periods.

Operations Project Authorization Form

Date Prepared: 5/31/2019	**Project Title: Replace Tri-Colored Network Secondary**
Company/ies: CT	**Project ID Number: CD01067**
Organization: Distribution Engineering	**Class(es) of Plant: Distribution**
Project Initiator: [redacted]	**Project Category: NTWRK 500KCMIL CBL RPL PRG**
Project Manager: [redacted]	**Project Type: Specific**
Project Sponsor: [redacted]	**Project Purpose: Replace antiquated netwk sec cable.**
Estimated in service date: 12/31/2022	**If Transmission Project: NA**
Eng. / Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding / Partial ACT – 2019 Work	**O&M Expenses Part of the Original Operating Plan? Yes**
Total Request: $1,093K – 2019 Work	

Financial Requirements:

Project Authorization
ERM: _____

FP&A: _____

Executive Summary

A number of underground network secondary systems located in the Central Region have been identified as containing 4/0 Cu tri-colored secondary. This 60+ year old cable (installed in the 1940's and 1950's) has insulation that is tri-colored (red/green/black). [redacted]

Project CD01067 is a five year project, 2018 to 2022, that will proactively replace the antiquated 4/0 Cu tri-colored network secondary cable located in the Central Region. In 2018, CD01067 proposes to replace 17,600 feet of 4/0 Cu tri-colored network secondary cable at 80 manhole/service box locations in Hartford, East Hartford, Manchester and Middletown. Estimated cost of this work is $1,250K or approximately $15.6K per location. [The estimated project cost is based on similar work orders that were previously written to replace sections of underground tri-colored network secondary cable that had failed.] Years 2019 to 2022 are expected to be comparable to the proposed 2018 work at $1,250K per year. Total cost for this five year project is estimated at $6,250K.

The detail design has been completed for the 2018 work associated with Project CD01067. We are requesting Full Funding authorization of $1,484K for the 2018 work; an increase of $234K or 119%

of the Initial Funding authorization of $1,250K. The increase in cost is due to the fact that 21,000 feet of 4/0 Cu tri-colored secondary cable will be replaced in 2018 at 100 manhole/service box locations (compared to 17,600 feet and 80 locations that were originally estimated). Average cost per location = $14.84K.

The detail design has been completed for the 2019 work associated with Project CD01067 (Segment 2). We are requesting Full Funding authorization of $1,093K for the 2019 work; a decrease of $157K or 87.4% of the Initial Funding authorization of $1,250K. The decrease in cost is due to the fact that 15,814 feet of 4/0 Cu tri-colored secondary cable will be replaced in 2019 at 78 manhole/service box locations (compared to 17,600 feet and 80 locations that were originally estimated). Average cost per location = $14.01K.

Project Costs Summary

	Prior Authorized*	Additional Request	2018**	2019***	2020-2022	Totals
Capital Additions - Direct	$0	$0	$878,830	$680,701	$2,664,000	$4,223,531
Less Customer Contribution	$0	$0	$0	$0	$0	$0
Removals net of Salvage	$0	$0	$119,248	$105,347	$180,000	$404,595
Total - Direct Spending	$0	$0	$998,078	$786,048	$2,844,000	$4,628,126
Capital Additions - Indirect	$0	$0	$440,269	$267,569	$891,000	$1,598,838
AFUDC	$0	$0	$11,603	$6,300	$15,000	$32,903
Total Capital Request	$6,449,950	$0	$1,449,950	$1,059,917	$3,750,000	$6,259,867
O&M	$33,789	$0	$33,789	$32,781	$0	$66,570
Total Request	**$6,483,739**	**$0**	**$1,483,739**	**$1,092,698**	**$3,750,000**	**$6,326,437**

*Amount currently approved in PowerPlan (Total Project Cost).
**Full Funding amount for 2018 work.
***Full Funding amount for 2019 work.

Financial Evaluation

Direct Capital Costs	2018	2019	2020 - 2022	Total
Straight Time Labor	29,069	35,364	1,214,400	1,278,832
Overtime Labor				
Outside Services	579,206	393,785	476,700	1,449,691
Materials	389,804	356,899	1,152,900	1,899,603
Other, including contingency amounts (describe)				
Total	998,078	786,048	2,844,000	4,628,126

Indirect Capital Costs	2018	2019	2020 - 2022	Total
Indirects/Overheads (including benefits)	440,269	267,569	891,000	1,598,838

Capitalized interest or AFUDC, if any	11,603	6,300	15,000	32,903
Total	451,872	273,869	906,000	1,631,741
Total Capital Costs	1,449,950	1,059,917	3,750,000	6,259,867
Less Total Customer Contribution				
Total Capital Project Costs	1,449,950	1,059,917	3,750,000	6,259,867
Total O&M Project Costs	33,789	32,781		66,570
Total Project Cost	**1,483,739**	**1,092,698**	**3,750,000**	**6,326,437**

Technical Justification:

Project Need Statement

A number of underground network secondary systems located in the Central Region have been identified as containing 4/0 Cu tri-colored secondary. This 60+ year old cable (installed in the 1940's and 1950's) has insulation that is tri-colored (red/green/black). [redacted]

Project CD01067 is a five year project, 2018 to 2022, that will proactively replace the antiquated 4/0 Cu tri-colored network secondary cable located in the Central Region. In 2018, CD01067 proposes to replace 17,600 feet of 4/0 Cu tri-colored network secondary cable at 80 manhole/service box locations in Hartford, East Hartford, Manchester and Middletown. Estimated cost of this work is $1,250K or approximately $15.6K per location. Years 2019 to 2022 are expected to be similar to the proposed 2018 work at $1,250K per year. Total cost for this five year project is estimated at $6,250K.

Project Objectives

Proactively replace the vintage 1940 / 1950, antiquated, 4/0 Cu tri-colored underground network secondary cable located in the Central Region.

Project Scope

Replace 17,600 feet of 4/0 Cu tri-colored network secondary cable at 80 manhole/service box locations in Hartford, East Hartford, Manchester and Middletown.

Background / Justification

A number of underground network secondary systems located in the Central Region have been identified as containing 4/0 Cu tri-colored secondary. This 60+ year old cable (installed in the 1940's and 1950's) has insulation that is tri-colored (red/green/black). Over time, the insulation on tri-colored network secondary cable becomes brittle and is prone to cracking. Once cracking occurs in the insulation, the secondary cable is susceptible to failure from water ingress and winter road salt. These failures can lead to small manhole and service box fires which in worst case scenarios can cause damage to primary circuit cables located in the same manhole or service box.

[redacted] under a DQ annual work order. In 2017, as part of the UG inspection process, we began tracking/noting the manholes and service boxes that contain tri-colored network secondary cable. It will take approximately four more years to fully complete the underground inspections and identify all manhole and service box locations in the Central Region that contain tri-colored network secondary cable.

[redacted]

Business Process and / or Technical Improvements:

- All new construction will be per the latest Eversource standards for underground network secondary systems.

Alternatives Considered with Cost Estimates

2. Do nothing. Do not do Project CD01067. Tri-colored network secondary failures will continue to occur with the potential to cause manhole fires and damage primary cables and circuits.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Initial Funding Authorization	2/8/2018
Detail Design	4/30/2018 – 12/31/2021
Full Funding Authorization	5/31/2018 – 3/31/2022
Construction Begin	6/1/2018
Construction End	12/31/2022

Regulatory Approvals
None required.

Risks and Risk Mitigation Plans

Risk Event	Risk Horizon	Likelihood of Occurrence	Risk Mitigation
Actual cost higher than estimated due to scope changes.	2018 - 2022	Low	Estimated project cost is based on past work orders for similar type work.
Internal construction resources not available to perform the work.	2018 - 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.	2018 - 2022	Low	Plan internal resources to perform the work. Use competitive bidding to ensure lowest outside labor cost.
Materials Shortage or long lead times	2018 - 2022	Low	Pre-order long lead time material; minimize the use of non-standard and non-stocked material.
Storm delays	2018 - 2022	Low	If storm activity delays work, we may be forced to use external resources.

System abnormal configuration	2018 - 2022	Low	Schedule work to minimize system abnormal time. Install temporary bypasses/equipment if system will be abnormal for extended periods.

Attachment C: CD01067 – 2018 Full Funding PAF

Operations Project Authorization Form

Date Prepared: 7/19/2018	**Project Title: Replace Tri-Colored Network Secondary**
Company/ies: CT	**Project ID Number: CD01067**
Organization: Distribution Engineering	**Class(es) of Plant: Distribution**
Project Initiator: [redacted]	**Project Category: NTWRK 500KCMIL CBL RPL PRG**
Project Manager: [redacted]	**Project Type: Specific**
Project Sponsor: [redacted]	**Project Purpose: Replace antiquated netwk sec cable.**
Estimated in service date: 12/31/2022	**If Transmission Project: NA**
Eng. / Constr. Resources Budgeted? Yes	**Capital Investment Part of Original Operating Plan? No**
Authorization Type: Full Funding – 2018 Work; Initial Funding – 2019 to 2022.	**O&M Expenses Part of the Original Operating Plan? No**
Total Request: $1,484K – 2018; $5,000K – 2019 to 2022.	

Financial Requirements:

Project Authorization
ERM: _____

FP&A: _____

Executive Summary

A number of underground network secondary systems located in the Central Region have been identified as containing 4/0 Cu tri-colored secondary. This 60+ year old cable (installed in the 1940's and 1950's) has insulation that is tri-colored (red/green/black). [redacted]

Project CD01067 is a five year project, 2018 to 2022, that will proactively replace the antiquated 4/0 Cu tri-colored network secondary cable located in the Central Region. In 2018, CD01067 proposes

to replace 17,600 feet of 4/0 Cu tri-colored network secondary cable at 80 manhole/service box locations in Hartford, East Hartford, Manchester and Middletown. Estimated cost of this work is $1,250K or approximately $15.6K per location. [The estimated project cost is based on similar work orders that were previously written to replace sections of underground tri-colored network secondary cable that had failed.] Years 2019 to 2022 are expected to be comparable to the proposed 2018 work at $1,250K per year. Total cost for this five year project is estimated at $6,250K.

The detail design has been completed for the 2018 work associated with Project CD01067. We are requesting Full Funding authorization of $1,484K for the 2018 work; an increase of $234K or 19% of the Initial Funding authorization of $1,250K. The increase in cost is due to the fact that 21,000 feet of 4/0 Cu tri-colored secondary cable will be replaced in 2018 at 100 manhole/service box locations (compared to 17,600 feet and 80 locations that were originally estimated). Average cost per location = $14.84K.

At this time we are also requesting Initial Funding authorization for the remaining years of the project, 2019 – 2022, at $1,250K per year.

Project Costs Summary

	Prior Authorized*	Additional Request	2018**	2019	2020-2022	Totals***
Capital Additions - Direct	$0	$0	$878,830	$888,000	$2,664,000	$4,430,830
Less Customer Contribution	$0	$0	$0	$0	$0	$0
Removals net of Salvage	$0	$0	$119,248	$60,000	$180,000	$359,248
Total - Direct Spending	$0	$0	$998,078	$948,000	$2,844,000	$4,790,078
Capital Additions - Indirect	$0	$0	$440,269	$297,000	$891,000	$1,628,269
AFUDC	$0	$0	$11,603	$5,000	$15,000	$31,603
Total Capital Request	$1,250,000	$199,950	$1,449,950	$1,250,000	$3,750,000	$6,449,950
O&M	$0	$33,789	$33,789	$0	$0	$33,789
Total Request	**$1,250,000**	**$233,739**	**$1,483,739**	**$1,250,000**	**$3,750,000**	**$6,483,739**

*Amount authorized in PowerPlan for 2018 work.
**Total amount needed for authorization in PowerPlan for 2018 work based on ACT.
***Total amount needed for authorization in PowerPlan for life of project (2018 – 2022).

Financial Evaluation

Direct Capital Costs	2018	2019	2020 - 2022	Total
Straight Time Labor	29,069	404,800	1,214,400	1,648,269
Overtime Labor				
Outside Services	579,206	158,800	476,400	1,214,406
Materials	389,804	384,300	1,152,900	1,927,004
Other, including contingency amounts (describe)				
Total	998,078	947,900	2,843,700	4,789,678

Indirect Capital Costs	2018	2019	2020 - 2022	Total
Indirects/Overheads (including benefits)	440,269	297,100	891,300	1,628,669
Capitalized interest or AFUDC, if any	11,603	5,000	15,000	31,603
Total	451,872	302,100	906,300	1,660,272
Total Capital Costs	1,449,950	1,250,000	3,750,000	6,449,950
Less Total Customer Contribution				
Total Capital Project Costs	1,449,950	1,250,000	3,750,000	6,449,950
Total O&M Project Costs	33,789			33,789
Total Project Cost	**1,483,739**	**1,250,000**	**3,750,000**	**6,483,739**

Technical Justification:

Project Need Statement

A number of underground network secondary systems located in the Central Region have been identified as containing 4/0 Cu tri-colored secondary. This 60+ year old cable (installed in the 1940's and 1950's) has insulation that is tri-colored (red/green/black). [redacted]

Project CD01067 is a five year project, 2018 to 2022, that will proactively replace the antiquated 4/0 Cu tri-colored network secondary cable located in the Central Region. In 2018, CD01067 proposes to replace 17,600 feet of 4/0 Cu tri-colored network secondary cable at 80 manhole/service box locations in Hartford, East Hartford, Manchester and Middletown. Estimated cost of this work is $1,250K or approximately $15.6K per location. Years 2019 to 2022 are expected to be similar to the proposed 2018 work at $1,250K per year. Total cost for this five year project is estimated at $6,250K.

Project Objectives

Proactively replace the vintage 1940 / 1950, antiquated, 4/0 Cu tri-colored underground network secondary cable located in the Central Region.

Project Scope

Replace 17,600 feet of 4/0 Cu tri-colored network secondary cable at 80 manhole/service box locations in Hartford, East Hartford, Manchester and Middletown.

Background / Justification

A number of underground network secondary systems located in the Central Region have been identified as containing 4/0 Cu tri-colored secondary. This 60+ year old cable (installed in the 1940's and 1950's) has insulation that is tri-colored (red/green/black). [redacted]

Based on comments received from Hartford District UG Operations, 6 - 12 tri-colored network secondary cable failures occur on an annual basis. For each failure that occurs, several sections of secondary is replaced under a DQ annual work order. In 2017, as part of the UG inspection process, we began tracking/noting the manholes and service boxes that contain tri-colored network secondary cable. It will take approximately four more years to fully complete the underground inspections and identify all manhole and service box locations in the Central Region that contain tri-colored network secondary cable.

[redacted]

Business Process and / or Technical Improvements:

- All new construction will be per the latest Eversource standards for underground network secondary systems.

Alternatives Considered with Cost Estimates

3. Do nothing. Do not do Project CD01067. Tri-colored network secondary failures will continue to occur with the potential to cause manhole fires and damage primary cables and circuits.

Project Schedule

Milestone/Phase Name	Estimated Completion Date
Initial Funding Authorization	2/8/2018
Detail Design	4/30/2018
Full Funding Authorization	5/31/2018
Construction Begin	6/1/2018
Construction End	12/31/2018

Regulatory Approvals
None required.

Risks and Risk Mitigation Plans

Risk Event	Risk Horizon	Likelihood of Occurrence	Risk Mitigation
Actual cost higher than estimated due to scope changes.	2018	Low	Estimated project cost is based on past work orders for similar type work.
Internal construction resources not available to perform the work.	2018	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.	2018	Low	Plan internal resources to perform the work. Use competitive bidding to ensure lowest outside labor cost.
Materials Shortage or long lead times	2018	Low	Pre-order long lead time material; minimize the use of non-standard and non-stocked material.
Storm delays	2018	Low	If storm activity delays work, we may be forced to use external resources.

System abnormal configuration	2018	Low	Schedule work to minimize system abnormal time. Install temporary bypasses/equipment if system will be abnormal for extended periods.