Exhibit UI-CIP-6

1. Project/Program Binders

Table of Contents

1. PRJ-005226 - 300 State St New Cust Serv
2. PRJ-004288 - 848 Chapel St Vault NH - CAP
3. PRJ-005576 - Steelpointe Harbor (West Block Ph1)
4. 800288.01 - UI - Ind/Comm CAP
5. PRJ-004106 - UI - New Haven Coliseum 1A
6. PRJ-004328 - UI - New Haven Coliseum 1B & 1C - CAP
7. PRJ-002092 - UI - Res Line CAP
8. PRJ-002196 - UI - Serv Conn
9. PRJ-005565 - Govt Hwy - Lafayette Circle Reconfiguration
10. PRJ-005570 - Govt Hwy - Rt1 Road Widening
11. PRJ-005568 - Govt Hwy - TIME-1 Metro-North - Longbrook Ave, Startford
12. PRJ-005567 - Govt Hwy - TIME-1/ TIME-3 Metro-North Corridor Improvement
13. PRJ-003435 - New Congress Bridge Ph 1B & 6
14. PRJ-002108 - UI - Gov't HW CAP
15. PRJ-004483 - UI - Gov't HW Minor Cap
16. 800326.01 - UI - CAPEX Meters
17. PRJ-002738 - Private Area Lighting LED Hamden PAL
18. PRJ-002125 - UI - Street Lght CAP
19. PRJ-005434 - Customer Experience Enhancements
20. PRJ-004212 - Energy Manager Enhancements
21. PRJ-005009 - New IVR and Voice Solution

22. PRJ-005579 - UI - Green Button Connect
23. PRJ-002750 - UI - Net Metering Changes
24. PRJ-004171 - UI CX Digital Journey
25. PRJ-001518 - UI Energy Manager
26. PRJ-004495 - UI EV Regulatory Rate Requirements
27. PRJ-002110 - UI - Make Ready CAP
28. 801819.01 - Water Heater lease
29. PRJ-001236 - UI Comprehensive Area Studies
30. PRJ-002101 - UI - Elec Better CAP
31. PRJ-002114 - UI - Subst Better CAP
32. 802149.01 - Core SDB Grove St
33. PRJ-003281 - Congress Flood Mitigation
34. 802048.01 - Resiliency DN Coastal Sub (Pequonnock)
35. PRJ-001277 - UI Resiliency Program
36. PRJ-003973 - Ansonia - CAP
37. PRJ-004732 - Sackett Busway Replacement
38. 800842.01 - Whitney Sub Decommissioning LVSS UH-U0000005
39. PRJ-005563 - Chapel St - between State and Temple (NH)
40. PRJ-002131 - UI - Splice Chamber Rebuilds CAP
41. PRJ-002121 - UI - Transformer CAP
42. PRJ-002129 - UI - Line Inspect (DLI) CAP
43. PRJ-004276 - 808 Chapel Street Network Vault
44. PRJ-005556 - Network Vault Roof Replacement
45. PRJ-005548 - Radial Vault Replacement Program
46. PRJ-005555 - UI Network Communications Program
47. 801055.01 - Ground Level Inspection
48. PRJ-005550 - Mark III - Sikorsky
49. PRJ-002742 - Switchgear Replacement Program
50. PRJ-005553 - UI Network - Primary Switch Install
51. 801701.01 - Spare G&W Reclosers and Controls (UI-U0054)
52. PRJ-002103 - UI - Gen Equipment - OPS-SO
53. PRJ-002105 - UI - Gen Equipment - OPS-TD
54. PRJ-003548 - Derby Jct to Ansonia
55. PRJ-002099 - UI - Dist Line CAP
56. PRJ-005836 - UI Rate Design - Time of Use Rate Structure Phase 1
57. PRJ-003947 - Rider LIDR
58. PRJ-003872 - Security ASD-UI
59. PRJ-004225 - UI - Regulatory Driven Efforts
60. PRJ-003280 - FIRE PROTECTION
61. 800521.01 - UI Fleet Vehicle Replacement Plan
62. PRJ-002731 - UI BMS System

63. PRJ-002887 - UI Church St Upgrades
64. PRJ-004626 - UI Upgrade Parking Lot Drainage
65. PRJ-001783 - AGR - IOC-Microsoft Deployment LC-UI
66. PRJ-001810 - AGR - IOC-NET-END USER LC-UI
67. PRJ-001803 - AGR - IOC-WINTEL LC-UI
68. PRJ-002837 - AGR-2022-NET-CS-02-Digital Journey EDB Transformation-UI
69. PRJ-005665 - Azure SW Cloud Subscription – UI
70. PRJ-001956 - Client project requests & integration Projects - UI
71. PRJ-003613 - Telecomm Infrastructure
72. PRJ-004473 - UI Smart Metering
73. PRJ-004311 - New Scheduler UI

PRJ-005226

300 State St New Cust Serv

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

300 State St New Cust Serv

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005226	Electric Distribution	Lyons, Robin	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	New Connections	IP3 Financial Execute	Program/As Spent	Program/As Spent

Project description:

Beacon Communities - an Affordable Housing developer, is planning to build a 76-apartment unit at the corner of Chapel and State St in New Haven, CT. Customer requesting service to this new building.

Project Scope:

: A new network Vault at 300 State will be installed equipped with 2 – 500KVA 125/216V Network Transformers, 2 – 1875A Network Protectors, 2 – Primary Switches, and Collector Bus all to power a 3000A service. New Conduit will be installed from existing UI Splice Chamber SC.6 to the new network Vault. Four sets of 5/C 500 Network Secondaries will be pulled to the SC.6 with two sets branching out to the existing network grid. Additionally the vault will be powered by Mill River Circuits 811 and 813.

The existing L257 network vault will have its equipment removed for the customer to install new conduit from the renovated building to UI's vault. Once work is completed UI will install 1 – 750KVA 125/216 Network Transformer, 1 – 2825A Network Protector, 1 – Primary Switch, and a Collector Bus to power the new 1600A Service. The retrofitted Vault will be powered by Mill River Circuit 812.

Project Benefits:

UI will have a new customer in our territory and we are obligated to serve them. The new Network Vault at 300 State St, will also contribute to the existing Underground Network Grid. Lastly, the existing Vault L257 that will feed the renovated Building will have its aging equipment replaced with new UI standard equipment which will also contribute to the existing Network.

Project Risks and Mitigation Plan:

The risks for this project is the availibility of material. Network Equipment are very long lead and may delay construction. To avoid this issue, purchase of the materials must be made ahead of time to take into account the long lead items and take make use of existing stock.

Another risk for the project is civil construction. Considering all the new civil construction taking place on State St, our Civil work can potentially impact the schedule of the State's Civil work. To mitigate this risk, the Company is planning to conduct civil construction before the State St Phase II Reconstruction.

Another risk is with regards to our existing conduit on State St. The existing conduit is Tile Duct and maybe affected by the Civil Construction. During construction, the tile duct may shift and not be able to accomodate cable pulls, which then forces the Company to perofrm last minute civil work or a redesign. To mitigate this risk, the company is planning to build a new PVC duct bank to take up the place of the old tile duct as PVC is sturdier and reliable.

The last risk involving this project is that the customer could pull out of constructing their building at any time. In other words, the Company could perform all the work necessary to feed the customer but they could all of a sudden change their minds and not move forward with their plans. The best plan to mitigate this risk is for the customer to sign a construction agreement and commit to their plans.

Risk of No Action:

The risk of not completing this job is loss of a potential customer/revenue for the company. Furthermore, the customer has an incentive to build new housing for the Yale to recieve a grant from the State.
Furthermore the hardware in L.257 are deteriorating and need to be replaced. If no action is taken to retrofit this existing network vault, access to the Vault will become increasingly difficult. Lastly the tile duct on State St is at risk of being unusable. With the City's State St civil reconstruction plan on the way, their work could severly shift our conduit underneath State St. If the tile duct is not usable, we have no way of pulling out existing cable or pulling in new cable. Which then prompts an expensive emergency civil construction or abandonment of the cable in place.

Project Alternatives:

Option 1: This option calls to build new Splice chamber across street from the new Network Vault location. A new duct bank would also be installed from the new Splice Chamber to the existing splice chambers SC.13 and SC.5. The new splice chamber will then run new laterals to the new Splice Chamber to the Network Vault. From there Mill River Circuits 813 and 811 will feed the new Network Vault. Network Secondary will also feed into and tie into the network grid. Furthermore the existing L.257 Network Vault will be retrofitted to feed the Customers renovated building but only be fed from Mill River Circuit 812.
Option 2: This option calls to only build a new duct bank from SC.13 to SC.9. Then from SC.9 there would be laterals to the new Network Vault. From there Mill River Circuits 813 and 811 will feed the new Network Vault. Furthermore the existing L.257 Network Vault will be retrofitted to feed the Customers renovated building but only will be fed from Mill River Circuit 812.

Basis for Project Estimates

The basis for these estimates are ground up estimates of the design for this project with unit costs derived from historical past projects updated with quoted costs for materials and services as the design and bid process progress.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 110**	$ 0	$ 110	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 1,233**	$ 452	$ 781	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 562**	$ 62	$ 500	$ -	$ -	$ -
# Internal, Overheads	**$ 491**	$ 204	$ 287	$ -	$ -	$ -
# Materials	**$ 1,265**	$ 560	$ 705	$ -	$ -	$ -
# Overheads - External	**$ 651**	$ 186	$ 465	$ -	$ -	$ -
Total	**$ 4,312**	**$ 1,464**	**$ 2,847**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 4,261	$ 1,414	$ 2,847	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

300 State St., New Havent New Network Vault



9/27/24

Distribution Engineering

Index

1. Project Description (Summary) 3

2. Initial Conditions 3

2.1. Pictures 4

3. Need Statement 10

4. Alternatives 11

4.1. Do not Retrofit Existing L.257 Vault and do not Install new Vault 11

4.2. Install New Two – Unit Radial Vault to feed Customer at 300 State St & Retrofit Existing L.257 Vault 11

4.3. Preferred Option: Install New Two-Unit Network Vault to feed Customer at 300 State St but Install new Chamber Across the Street & Retrofit Existing L.257 Vault 12

5. Project Milestones 17

6. Project Assumptions 18

7. Engineering Recommendations 18

1. Project Description (Summary)

Beacon Communities is an Affordable Housing developer headquartered in Boston Massachusetts. Beacon Communities is planning on constructing a new 76 unit apartment at 300 State St, New Haven. The existing building at the corner of State and Chapel St will combine with the new building at 300 State St and be serviced with a new 3000A Service. These new apartments are intended for Yale Students. Additionally, buildings 760 Chapel to 754 Chapel will be renovated into a single 1600A Service. Both buildings are expected to be fully constructed by the 4th Quarter 2025. Lastly the ground level for both buildings will be reserved for Commercial Businesses.

2. Initial Conditions

Chapel St, New Haven is an incredibly congested. The underground infrastructure on Chapel St is taken up by Sewer, Telecommunications, Gas, Water, and Electric. There currently exists no Network Vault on State St. At the corner of State St and Chapel St exists Network Vault L.257. The Network Vault currently only feeds a 1600A Service at 750 Chapel St. The Network Vault is also equipped with Two (2) – 500 KVA 125/216V Network Transformers and Two (2) – 1875A Network Protectors. The vault is also fed from Mill River Circuits 812 and 813. Additionally, there are four sets of 5/C 500 KCMIL CU Network Secondaries that feed back out to the Network Grid. Lastly the existing buildings on Chapel Street from 760 Chapel St to 754 Chapel St are all fed from street secondaries. 760 and 756 Chapel St are both 800A Services fed with two (2) sets of 500 KCMIL Network Secondaries. While as 754 Chapel St is fed from a single #2 Secondary Cable.
Chapel St also has chambers that are incredibly congested. In nearly all the chambers on the street, each chamber is packed with Primary Cables, Network Secondaries and Network Communications. Furthermore, the chambers are incredibly small and currently do not meet NESC Guidelines.

The 300 State St currently is an empty Parking Lot. State St has a couple chambers from the Court St Intersection all the way down to the Water St Intersection. The only network circuits that exist in this section is Mill River CKT – 812 and Mill River CKT – 813. Mill River CKT – 813 is sourced from Chapel St across the Bridge and feeds down State St. Additionally, on State St from SC.20 down to SC.6 only exists 3.5” Tile Duct. From SC.20 at the intersection of Court St down to SC.6 exists only four available ducts. Additionally, SC.6 is sized at 5’ x 10’ and is undersized. Existing conditions would not meet NESC Guidelines to feed a new network Vault.

2.1. Pictures



Figure 1: SC.6 North Side



Figure 2: SC.6 South Side



Figure 3: SC.13 Looking South



Figure 4: SC.13 Looking North



Figure 5: SC.15 Looking South



Figure 6: SC.15 Looking North



Figure 7: SC.20 Looking South



Figure 8: SC.20 Looking North



Figure 8: L.257 Access Hatch

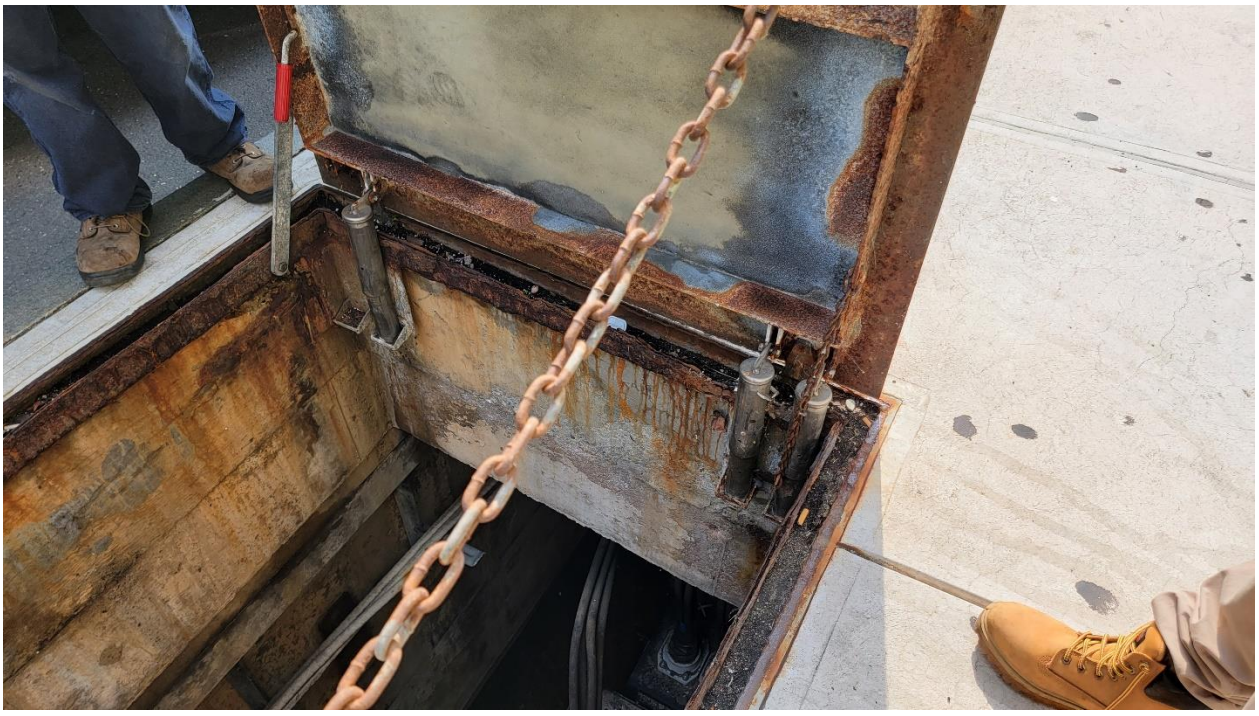


Figure 9: L.257 Access Hatch Rust



Figure 10: L.257 Looking West Endwall



Figure 11: 300 State St, New Haven a Parking Lot

3. Need Statement

There are low voltage secondary networks in specific areas of the City of New Haven. The low voltage secondary network was designed and constructed to provide for N-1 operation; loss of one primary circuit. With the correct number of network vault which are strategically located, the secondary cable grid system provides the needed supply so that the connected load is not impacted. In addition, the system is designed so that when there is a fault on the secondary system, the connected vaults all contribute to the fault current. The concept is to generate enough fault current to clear the fault before significant damage can occur to the low voltage secondary system.

The building planned to be built by Beacon Communities at 300 State St, will house a 76 Unit apartment building. The ground floor will be used for commercial purposes while the rest of the building will be for apartments. The customer is requesting a secondary service of 3000 Amps @ 120/208V. The entire building is expected to be energized by 3rd/4th Quarter of 2025.

Additionally, the buildings from 760 – 754 Chapel St will be renovated into a single building. Instead of multiple services, it will be fed from one 1600 Amp service @ 120/208V. Similar to 300 State St, this renovated building will have the ground floor be used for commercial purposes, while as the rest of the building will be used for apartments. The building is expected to be energized by 4th Quarter of 2025

As per the UI's General Terms and Conditions, the customer must provide UI a location to install the required network Vault equipment such as, the transformers, protectors, communication equipment and primary switches to meet the customer's request of 3000 Amps. The customer prefers to be fed from the network system due to its reliability and flexibility. Additionally, the customer is within the designated Underground Network Area and as per UI's Operating Procedure OPD-10N, the new building will require a network transformer vault to meet their demand.

The proposed location of the network vault will be situated at the sidewalk in front of the parking lot near the alley between the lot and the garage. Approx. 30', there is an existing splice chamber across the street SC.6 that will feed the vault. Furthermore SC.6 is a small Chamber measured at 5' W x 10' L x 7' H. According to NESC requirements, the chamber requires enlargement in order for crews to get the proper working clearances for Splicing Cable. Lastly, UI would have to pull a second feeder down State St to feed this network vault. This would take up the remaining conduits available and require a new set of 4 – 4" Conduit to make up for the used-up conduits.

The existing L.257 Network Vault will remain in place but will need to be retrofitted. The Access hatches are severely rusted and difficult to open. Additionally, the ladders are no longer standard, and there is plenty of water accumulation due to the location of the sump in the vault. The Sump will need to be relocated to near the ladder for easy access to pump water out. The existing service to building at the Corner of State and Chapel St will be transferred over to the new 300 State St Vault. The customer will be running new conduit from the renovated building to the existing L.257 Vault. UI will need to remove all equipment in the vault for the customer to perform their work safely.

Finally, the installation of the new double unit Network Vault at 300 State St will contribute the existing secondary network system so the area maintains the N-1 Operation.

4. Alternatives

4.1. Do not Retrofit Existing L.257 Vault and do not Install new Vault.

This Option is to not do anything here. UI cannot deny a new customer Power if they are requesting it. There are existing issues with the Existing L.257 Vault and can compromise the operation of the network vault as designed. UI will not be able to enter this vault and perform switching to de-energize the existing network feeders. Since this Alternative was not pursued, an estimate was never created.

4.1.1. Advantages:

1. Avoids expensive Capital Spending of Electrical and Civil Construction

4.1.2. Disadvantages

1. No electrical contribution to the existing network secondary grid
2. No new Customer revenue
3. L.257 will not be retrofitted and will remain small and not be NESC Compliant

4.1.3. Risks

1. L.257's doors are in poor condition with access through one door. Making the L.257 vault difficult to operate and work on.
2. Tile duct on State St may be affected by the New Haven State St construction.

4.2. Install New Two – Unit Radial Vault to feed Customer at 300 State St & Retrofit Existing L.257 Vault

This Option is to install a Non-Network Vault at 300 State St with two Submersible Transformers. It would still be in front of the existing Parking Lot and be fed from SC.6. The exiting L.257 Vault will also still need to be retrofitted for the customer to run new conduit to the renovated building on Chapel St. There is also no need to pull new primary cable on State st as there exists 4 Feeders that can be spliced into to feed the new Radial Vault. This option was not pursued as the new Building is in the New Haven Network Area. Additionally, the customer specifically asked to be in the Network so no Estimate was conceived.

4.2.1. Advantages:

1. New Commercial Custom Revenue
2. Radial Vault with a Vista Switch is Cheaper compared to a Network Vault
3. Upgrade Infrastructure in L.257

4.2.2. Disadvantages

1. No electrical contribution to the existing network secondary grid

4.2.3. Risks

1. Radial Submersible Vault maybe in Customer Basement, Building, Property. Access may be difficult.
2. Customer could pull out of building at the site any time .

4.3. Install New Two-Unit Network Vault to feed Customer at 300 State St, Build new Splice Chamber Across the Street & Retrofit Existing L.257 Vault

This Option is to install a two-unit Network Vault at 300 State St with two Network Transformers. This vault would be located in front of the existing Parking Lot and be fed from a new splice chamber on State St. The new Chamber would have new Conduits installed to existing SC.13 and existing SC.6. The existing L.257 Vault will also still need to be retrofitted for the customer to run new conduit to the renovated building on Chapel St. New Underground Primary Cable would have to be pulled on State St to the new Chamber.

4.3.1. Advantages:

1. New Commercial Customer Revenue
2. New Location to Contribute to existing network Grid.
3. UI can easily maintain the Vault as unit is in the State St Right of Way.
4. Upgrades Infrastructure in L.257
5. New Standard and Larger Chamber to replace smaller and aging Splice Chamber 6

4.3.2. Disadvantages

1. Most Expensive Civil and Electrical Costs

4.3.3. Risks

1. Customer could pull out of building at the site any time.
2. Civil Construction can impact timeline of New Haven State St construction project.
3. New Splice Chamber Location may impact future Construction on State St. May require relocation in the future.

4.3.4. Cost Proposal Alternative

	2024 CAP	2025 CAP	Total
External Services	$1,100,000	$500,000*	$950,000
Material	$600,000	$700,000	$1,300,000
UIL Resources	$70,000	$500,000	$570,000
CIAC	0	$(100,000)	$(100,000)
AFUDC	$17,500	$100,000	$117,500
External Overheads	$250,000	$350,000	$600,000
Internal Overheads	$220,000	$350,000	$570,000
Total	$2,257,500	$2,400,000	$4,657,500

4.4. Preferred Option: Install New Two-Unit Network Vault to feed Customer at 300 State St, Keep using Splice Chamber 6, & Retrofit Existing L.257 Vault

This Option is to install a two-unit Network Vault at 300 State St with two Network Transformers. This vault would be in front of the existing Parking Lot and be fed from an existing splice chamber on State St, SC.6. The existing chamber would have new Conduit build from up to SC.13 to accommodate for Network Communications as well as Network Secondaries. The existing L.257 Vault will also still need to be retrofitted for the customer to run new conduit to the renovated building on Chapel St.

4.4.1. Advantages:

1. New Commercial Customer Revenue
2. New Location to contribute to existing network Grid.
3. UI can easily maintain the Vault as unit is in State St Right of Way.
4. Upgrades infrastructure in L.257
5. Makes use of existing Underground Infrastructure

4.4.2. Disadvantages

1. Very Expensive Civil and Electrical Costs

4.4.3. Risks

1. Customer could pull out of building at the site any time.
2. Civil Construction can impact timeline of New Haven State St construction project.

4.4.4. Cost Proposal Alternative

	2024 CAP	2025 CAP	Total
External Services	$450,000	$500,000*	$950,000
Material	$600,000	$700,000	$1,300,000
UIL Resources	$70,000	$500,000	$570,000
CIAC	0	$(100,000)	$(100,000)
AFUDC	$17,500	$100,000	$117,500
External Overheads	$250,000	$353,000	$603,000
Internal Overheads	$220,000	$352,000	$572,000
Total	$1,607,000	$2,505,000	$4,112,000

4.4.5. Work Breakdown

1. Civil Phase I
    a) Install Duct Bank Approx. 300' from SC.13 at the Intersection of Chapel St and State St to SC.6 on State St
    b) Stub out Conduits from SC.6 to Proposed location of new Network Vault
2. Civil Phase II
    a) Customer to install new Standard two-unit Network Vault L.2124 in Sidewalk on State St with assistance from UI
    b) Install Duct Bank Approx. 90' from SC.13 on State St to L.2124 Network Vault
    c) Customer to penetrate their Secondary Conduits to L.2124 Network Vault
3. Electrical Make Ready L.2124 Network Vault
    a) Install 2 – Vault Ladders
    b) Install Vault Lighting
    c) Install Neutral Bus
    d) Install Collector Bus
4. Electrical Make Ready Mill River CKT-811
    a) Prep & Test 1 – 500 KVA 125/216V Network Transformer and Install in L.2124
    b) Prep & Test 1 – 1875A 125/216V Network Protector and Install in L.2124
    c) Prep & Test 1 – Primary Switch and Install in L.2124
    d) Install Approx. 200' of 3 – 500 CU FS UG Primary Cable from SC.15 to SC.20 on State St
    e) Install Approx. 250 of 3 – 500 CU FS UG Primary Cable from SC.15 to SC.13 on State St
    f) Install Straight 500 Splice in SC.15
    g) Install Approx. 300' of 3 – 500 CU FS UG Primary Cable from SC.13 to SC.6 on State St
    h) Install Straight 500 Splice in SC.13
    i) Install Approx. 90' of 3 – 4/0 CU FS UG Primary Cable from SC.6 to L.2124
    j) Install Straight 500-4/0 Splice in SC.6

k) Install 2 Sets of 600A Elbows for Primary Switch in L.2124
l) Install Approx. 40' of 3 – 4/0 CU FS UG Primary Cable from Primary Switch to Network Transformer
m) Install 1 Set of 600A Straight Terminations for Network Transformer
n) Install 4 Sets of Network Secondaries from Network Protector to Collector Bus
o) Install Network Communications

5. Electrical Make Ready Mill River CKT-813
   a) Prep & Test 1 – 500 KVA 125/216V Network Transformer and Install in L.2124
   b) Prep & Test 1 – 1875A 125/216V Network Protector and Install in L.2124
   c) Prep & Test 1 – Primary Switch and Install in L.2124
   d) Install Approx. 90' of 3 – 4/0 CU FS UG Primary Cable from SC.6 to L.2124
   e) Install 2 Sets of 600A Elbows for Primary Switch in L.2124
   f) Install Approx. 40' of 3 – 4/0 CU FS UG Primary Cable from Primary Switch to Network Transformer
   g) Install 1 Set of 600A Straight Terminations for Network Transformer
   h) Install 4 Sets of Network Secondaries from Network Protector
   i) Install Network Communications
6. Electrical Make Ready Secondary
   a) Connect Customer Secondary Cables to Collector Bus in L.2124
   b) Install 4 Sets of 5/C 500 NWK Secondaries Approx. 90' each from L.2124 to SC.6
   c) Install 3 10 Position Hy-Crabs in SC.6
   d) Connect Street Network Secondaries to Collector Bus in L.2124
   e) Install 2 Sets of 5/C 500 NWK Secondaries Approx. 300' each from SC.6 to SC.13
7. Electrical Cutover Mill River CKT-811
   a) Check Alternate feed for all 480V networks and Open CKT-811 Protectors
   b) SW & GND Mill River Bus 1 Pos 13 to De-eng CKT-811
   c) Open all High Side Switches at each Network Transformer fed from CKT-811
   d) Check all Grid Network Protectors and Open
   e) Breakdown Splices in SC.20 at the intersection of Court St and State St
   f) Install 500 – 500 – 500 Wye Splice in SC.20
   g) Phase and Test Cable
   h) Close Primary Switch in L.2124
   i) Close High Side Switch in L.2124
   j) Put Network Protector in the Automatic Position in L.2124
   k) Close in High Side Switches at all Network Transformers fed from CKT-811
   l) Close Bus 1 Pos 13 to Re-eng CKT-811
   m) Put all Network Protectors back into the Automatic Position
8. Electrical Cutover Mill River CKT-813
   a) Check Alternate feed for all 480V networks and Open CKT-813 Protectors
   b) SW & GND Mill River Bus 4 Pos 44 to De-eng CKT-813
   c) Open all High Side Switches at each Network Transformer fed from CKT-813
   d) Check all Grid Network Protectors and Open
   e) Breakdown Splices in SC.6 on State St
   f) Install 500 – 500 – 4/0 Wye Splice in SC.6
   g) Phase and Test Cable
   h) Close Primary Switch in L.2124
   i) Close High Side Switch in L.2124

j) Put Network Protector in the Automatic Position in L.2124
k) Close in High Side Switches at all Network Transformers from CKT-813
l) Close Bus 4 Pos 44 to Re-eng CKT-813
m) Put all Network Protectors back into the Automatic Position.

9. De-Eng Mill River CKT-813 for L.257
   a) Check Alternate feed for all 480V networks and Open CKT-813 Protectors
   b) SW & GND Mill River Bus 4 Pos 44 to De-eng CKT-813
   c) Open all High Side Switches at each Network Transformer fed from CKT-813
   d) Remove high side connections to CKT-813 Network Transformer in L.257
   e) Breakdown Wye Splices in SC.139
   f) Install Straight 500 – 4/0 Splice in SC.139
   g) Phase and Test Cable
   h) Close in High Side Switches at all Network Transformers from CKT-813
   i) Close Bus 4 Pos 44 to Re-eng CKT-813
   j) Put all Network Protectors back into the Automatic Position.
10. De-Eng Mill River CKT-812 for L.257
   a) Check Alternate feed for all 480V networks and Open CKT-812 Protectors
   b) SW & GND Mill River Bus 3 Pos 34 to De-eng CKT-812
   c) Open all High Side Switches at each Network Transformer fed from CKT-812
   d) Remove high side connections to CKT-812 Network Transformer in L.257
   e) Breakdown Wye Splices in SC.138
   f) Install Straight 500 Splice in SC.138
   g) Phase and Test Cable
   h) Close in High Side Switches at all Network Transformers from CKT-812
   i) Close Bus 3 Pos 34 to Re-eng CKT-812
   j) Put all Network Protectors back into the Automatic Position.
11. Retrofit & Electrical Make Ready L.257 for Customer
   a) Remove all Connections in L.257 Network Vault
   b) Remove Network Transformers and Network Protectors
   c) Remove Neutral Bus
   d) Remove Collector Bus
   e) Remove Lighting
   f) Remove Ladder
   g) Customer to penetrate Conduits from new Building into Network Vault
   h) Install new Vault Hatches
   i) Install 2 New Network Vault Ladders
   j) Install New Neutral Bus
   k) Install New Network Lighting
   l) Install New Collector Bus
   m) Prep & Test and Install 1 – 750 KVA 125/216V Network Transformer in L.257 Network Vault
   n) Prep & Test and Install 1 – 2825A 125/216V Network Protector in L.257 Network Vault
   o) Prep & Test and Install 1 – Primary Switch in L.257 Network Vault
   p) Pull Approx. 60’ of 3 – 4/0 CU FS UG Primary Cable from SC.138 to L.257
   q) Install 2 Sets of 600A Elbows for Primary Switch in L.257

r) Install Approx. 40' of 3 – 4/0 CU FS UG Primary Cable from Primary Switch to Network Transformer
s) Install 1 Set of 600A Straight Terminations for Network Transformer
t) Install 6 Sets of Network Secondaries from Network Protector
u) Install Network Communications
v) Pull 6 Sets of 5/C 500 NWK Secondaries Approx. 60' Each from L.257 to SC.138
w) Install 3 – 14 Position Crabs in SC.138
x) Connect Customer Secondaries to Collector Bus in L.257
y) Connect Network Street Secondaries to Collector Bus in L.257

12. Electrical Cutover Mill River CKT – 812
    a) Check Alternate feed for all 480V networks and Open CKT-812 Protectors
    b) SW & GND Mill River Bus 3 Pos 34 to De-eng CKT-812
    c) Open all High Side Switches at each Network Transformer fed from CKT-812
    d) Remove high side connections to CKT-812 Network Transformer in L.257
    e) Breakdown Splices in SC.138
    f) Install 500 – 500 – 4/0 Wye Splice in SC.138
    g) Phase and Test Cable
    h) Close Primary Switch in L.257
    i) Close High Side Switch in L.257
    j) Put Network Protector in the Automatic Position in L.257
    k) Close in High Side Switches at all Network Transformers from CKT-812
    l) Close Bus 3 Pos 34 to Re-eng CKT-812
    m) Put all Network Protectors back into the Automatic Position.
13. Electrical Network Secondary Cutover
    a) Connect six sets of network Secondary from L.257 to the Crabs in SC.138

5. Project Milestones

Upon project approval from UI and confirmation from the Customer, below is a high-level schedule of the project. Specific dates are dependent on customer coordination.

1. Engineering Design Completed – Early Q3 2024
2. Phase I Civil Construction Completed – Mid Q4 2024
3. Phase II Civil Construction Completed – Mid Q1 2025
4. Electrical Make Ready Completed – Early Q2 2025
5. Electrical Cutovers Completed/Energized Vault – Mid Q3 2025
6. Removed Equipment from L.257 Vault – Late Q3 2025
7. Retrofit L.257 Vault Completed – Early Q4 2025
8. Energize L.257 Vault – Late Q4 2025

6. Project Assumptions

The following is a list of standard assumptions which were used to create the estimates for the proposed work.

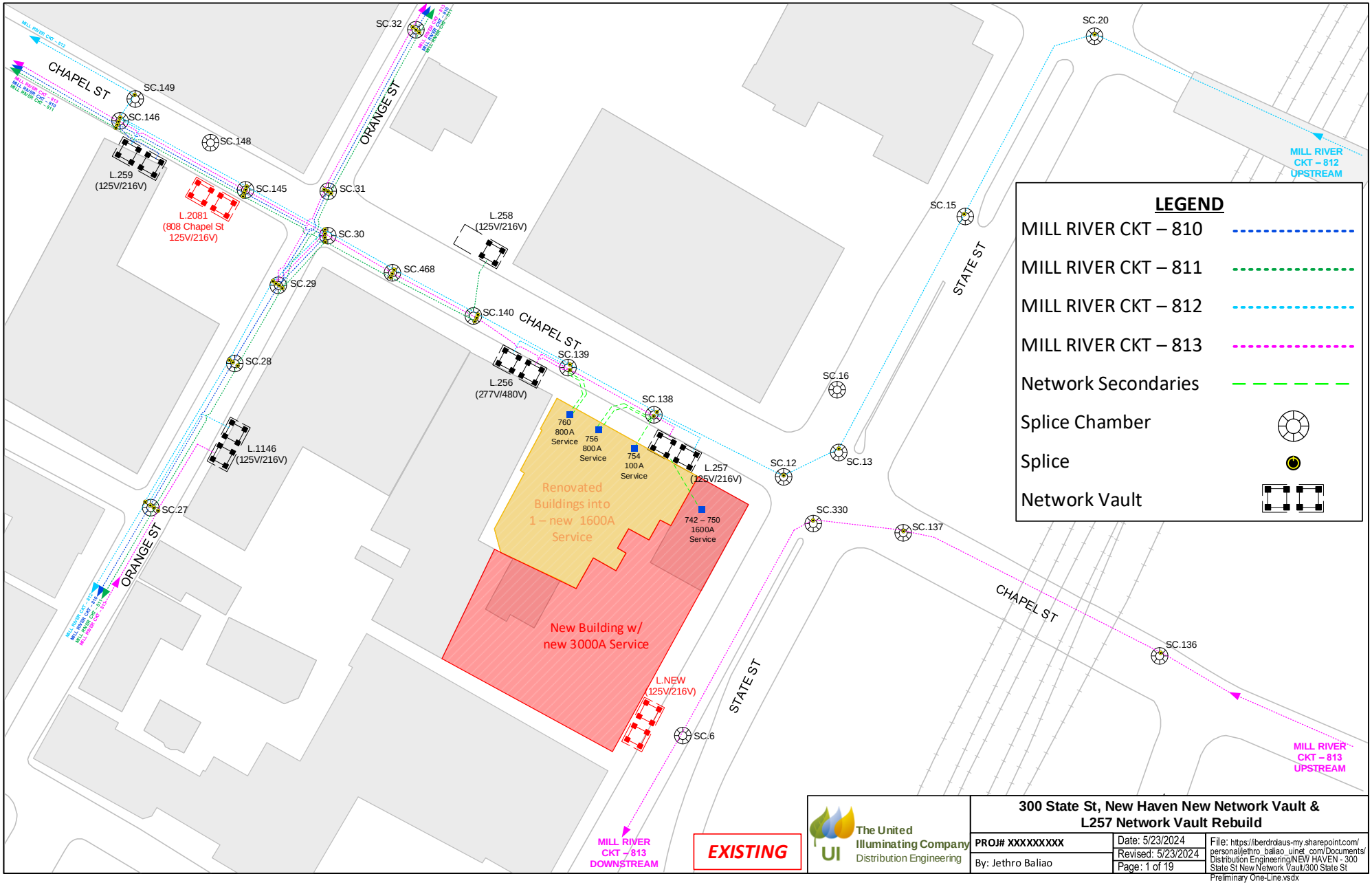
1. UI will be able to apply and get the permit on time to start this project.
2. Based on Test Pit Results, no ledge would be fine.
3. Customer will grant easements for any UI owned equipment on the customer's property.
4. UI to perform test pits to confirm or verify the location of other Utilities in the area after receiving and review the based maps.
5. All UI construction work will be done during the normal business week and hours.
6. UI will not have to relocate any other utility structure to accommodate the proposed UI Construction plan based on the results of the test pit.
7. UI will be able to maintain conduit trench typical depth; no more than 3.5 feet.
8. All materials ordered will be available in time for use by Construction.
9. All budgetary estimates are based on a work product in compliance with existing UI and/or Industry accepted and specifications.
10. Labor rates used in creating the Estimates are based upon historical averages.
11. All dollars shown are in 2023 dollars and subject to change due to escalation in material, labor, and equipment rates at the time of actual construction.
12. The schedule of all work is dependent upon arranging a mutually agreeable outage with the impacted customer(s).

7. Engineering Recommendations

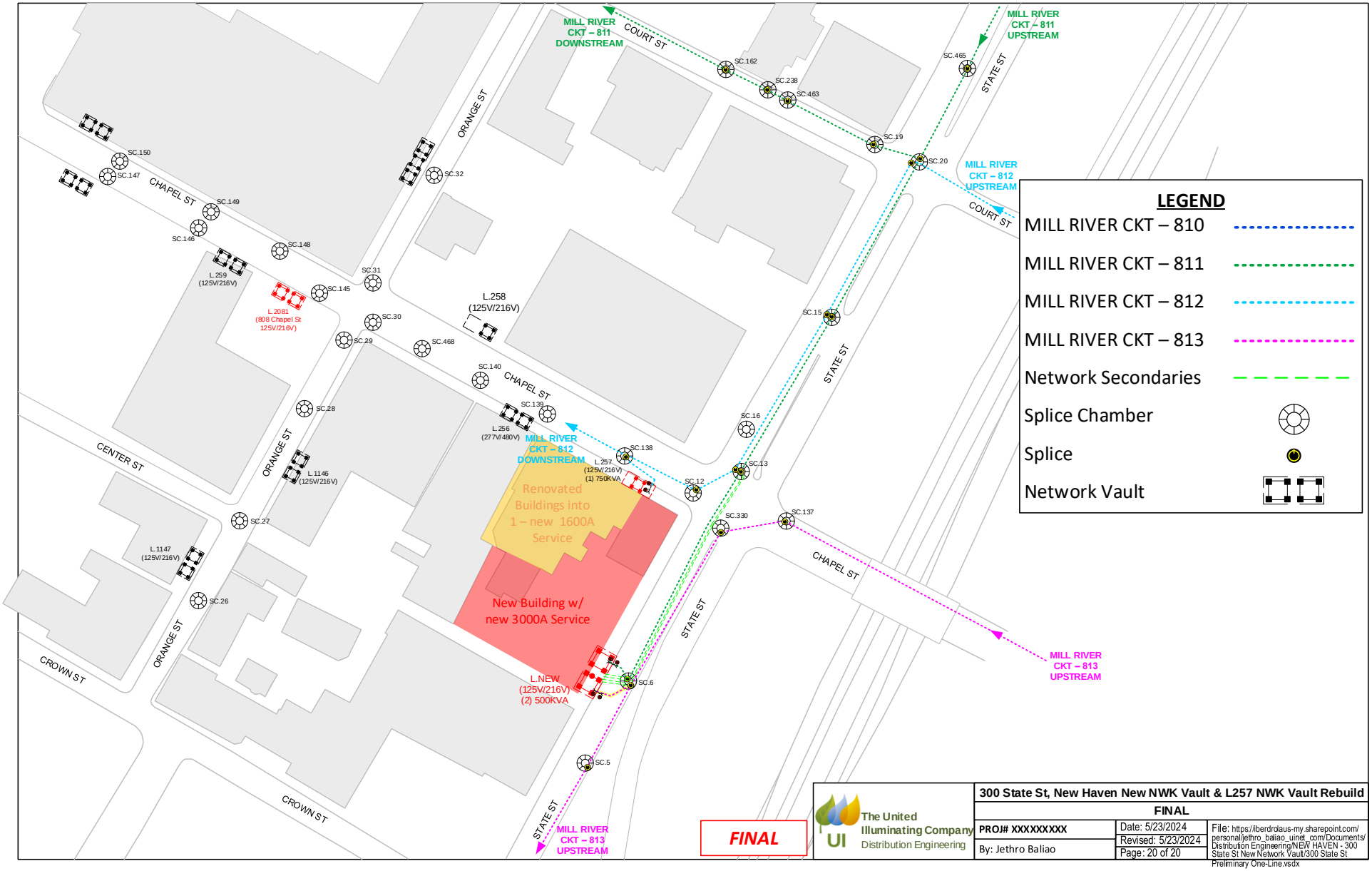
Engineering recommends the Option 3 for the following reasons:

- There is enough space available on the right of way for a new two – unit network vault.
- No easement is required to build a new network vault.
- A new Vault to contribute to the existing network grid.
- Easy access to the Network Vault on Right of Way
- Upgrade infrastructure in L.257 and store two protectors and transformers for future jobs or emergency replacements
- Upgrades existing State St underground infrastructure
- UI can continue to provide power to the customer while building a new network vault.

EXISTING


CHAPEL ST
ORANGE ST
STATE ST
SC.32
SC.149
SC.146
SC.148
SC.145
SC.31
SC.30
SC.29
SC.28
SC.27
SC.468
SC.140
SC.139
SC.138
SC.20
SC.15
SC.16
SC.12
SC.13
SC.330
SC.137
SC.136
SC.6
L.259
(125V/216V)
L.2081
(808 Chapel St
125V/216V)
L.258
(125V/216V)
L.256
(277V/480V)
L.1146
(125V/216V)
L.257
(125V/216V)
L.NEW
(125V/216V)
760
800A
Service
756
800A
Service
754
100A
Service
742 – 750
1600A
Service
Renovated
Buildings into
1 – new 1600A
Service
New Building w/
new 3000A Service
MILL RIVER
CKT – 812
UPSTREAM
MILL RIVER
CKT – 813
UPSTREAM
MILL RIVER
CKT – 813
DOWNSTREAM
LEGEND
MILL RIVER CKT – 810
MILL RIVER CKT – 811
MILL RIVER CKT – 812
MILL RIVER CKT – 813
Network Secondaries
Splice Chamber
Splice
Network Vault
EXISTING
The United
Illuminating Company
Distribution Engineering
300 State St, New Haven New Network Vault &
L257 Network Vault Rebuild
PROJ# XXXXXXXXX
By: Jethro Baliao
Date: 5/23/2024
Revised: 5/23/2024
Page: 1 of 19
File: https://iberdrolaus-my.sharepoint.com/personal/jethro_baliao_uinet_com/Documents/Distribution Engineering/NEW HAVEN - 300 State St New Network Vault/300 State St Preliminary One-Line.vsdx

AFTER


MILL RIVER CKT – 811 DOWNSTREAM
COURT ST
MILL RIVER CKT – 811 UPSTREAM
STATE ST
MILL RIVER CKT – 812 UPSTREAM
ORANGE ST
CHAPEL ST
CENTER ST
CROWN ST
MILL RIVER CKT – 812 DOWNSTREAM
MILL RIVER CKT – 813 UPSTREAM
L.258 (125V/216V)
L.259 (125V/216V)
L.2081 (808 Chapel St 125V/216V)
L.1146 (125V/216V)
L.1147 (125V/216V)
L.256 (277V/480V)
L.257 (125V/216V) (1) 750KVA
L.NEW (125V/216V) (2) 500KVA
Renovated Buildings into 1 – new 1600A Service
New Building w/ new 3000A Service
LEGEND
MILL RIVER CKT – 810
MILL RIVER CKT – 811
MILL RIVER CKT – 812
MILL RIVER CKT – 813
Network Secondaries
Splice Chamber
Splice
Network Vault
FINAL
The United Illuminating Company
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300 State St, New Haven New NWK Vault & L257 NWK Vault Rebuild
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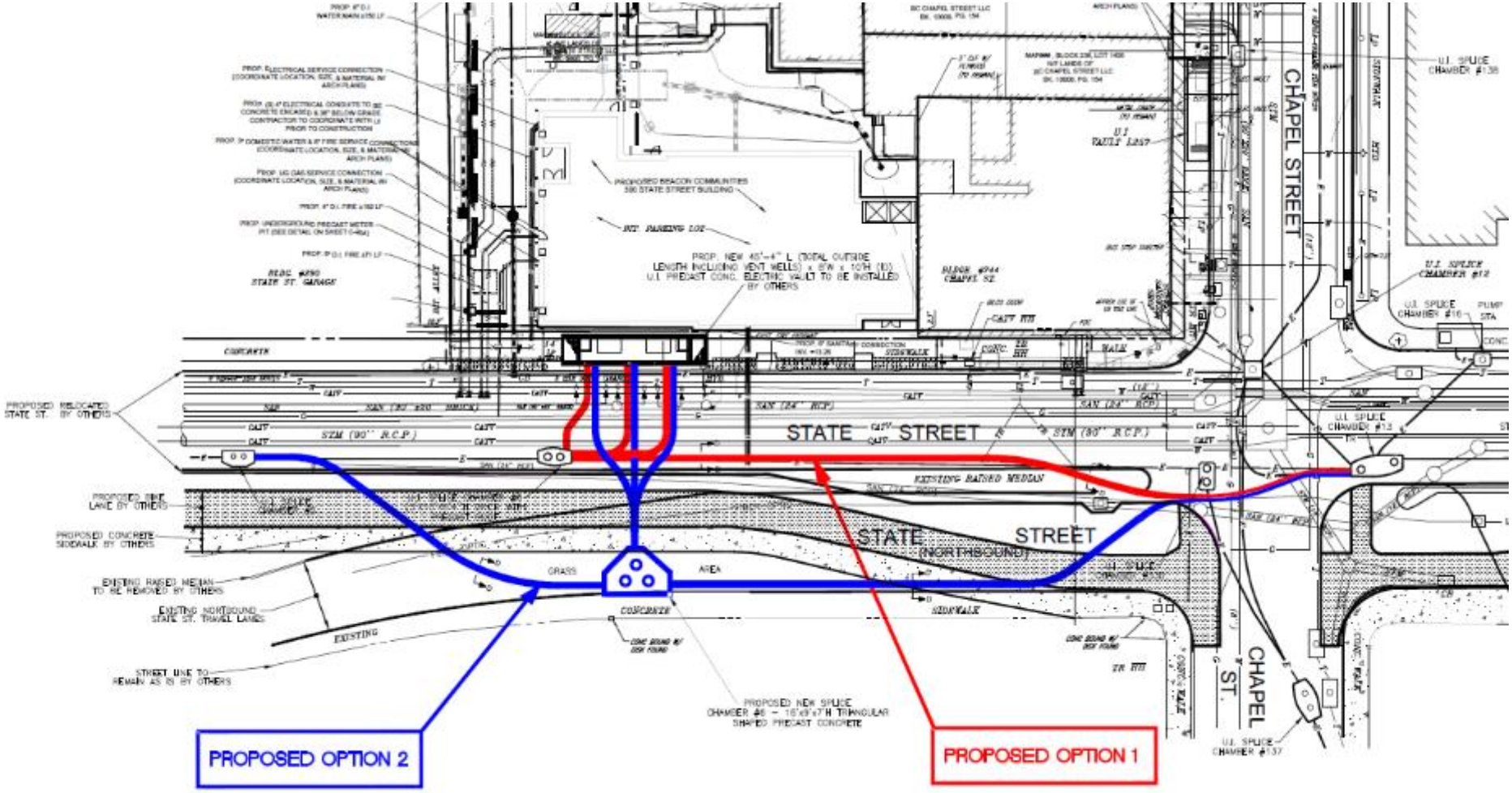
Civil Options



PRJ-004288

848 Chapel St Vault NH – CAP

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

848 Chapel St Vault NH - CAP

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-004288	Electric Distribution	Lyons, Robin	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	New Connections	IP4 Change	Ongoing	Dec 2024

Project description:

CA Ventures (the owner of several apartment buildings in New Haven) approached UI with plans to build a new seven story mixed retail / residential building on an empty lot at 848 Chapel St, New Haven, Ct.
This project is moving FAST. The new building is expected to be completed at the end of the 4th quarter of 2024.
The customer is requesting two services of 3000A @ 120/208V and another at 1600A at 120/208V.

Project Scope:

- Install new Triangular Splice Chamber SC.2050 at the Corner of Church St and Chapel St
- Install Duct Bank Approx. 265' from SC.1768 on Church St to SC.2050
- Install Duct Bank Approx. 205' from SC.2050 to SC.150 on Chapel St.
- Install Vista Vault L.2092 on Chapel St
- Install Duct Bank Approx. 90' from SC.150 to L.2092 Vista Vault
- Customer to Build Duct Bank from L.2092 Vista Vault to L.2093 Basement Vault
- Install approx. 2200' of 3 - 500 CU FS UG Primary Cable for Feeders 1850 and 1851
- Install Approx. 150' of 3 - #2 CU EPR UG Primary Cable from L.2092 to L.2093.
- Install 9 Straight Splices
- Install 2 Wye Splices
- Install new Model 422 Vista Switch in L.2092 Vista Vault
- Install 1 - 500KVA 120/208V and 1 - 300 KVA 120/208V in L.2093 Customer Basement Vault
- Install 2 Sets of 600A Terminations in L.2092 Vista Vault
- Install 4 Sets of 200A Terminations (2 in Vista Vault and 2 in Basement Vault)
- Cutover both circuits to energize Primary Cable, Vista and Transfomers

Project Benefits:

This is a new customer project.
UI has an obligation to serve the customer, including design, procurement, and management of the civil and electrical work

- A customer connected to a vista switch provides them with a reliable service
- Extends the non-network feeder into the area which gives options for the area for future customers
- UI will not need to relocate any underground utilities
- UI will have access to the new vaults L.2092 and L.2093 24/7
- The Vista Vault serves as a new Circuit Tie Point for Mill River Circuits
- New Standard sized corner splice chamber in the right of way provides future expansion ofr distribution services

Project Risks and Mitigation Plan:

There are several risks that come with this project. One of the risks is that the procurement process may delay installation of a new splice chamber. To mitigate this risk, the Company is commited to going through the procurement as early as possible. Another risk is that there may be some existing utilities or obstructions under that would prevent the installation of the new vista vault, splice chamber and conduit on the right of way. To avoid this risk, the Company will perform Test Pits to see what utiilties are underground. Another risk is that the customer may pull out of building at the site at anytime during construction. To prevent this, UI is committed to formulating a customer agreement and verifying the customer moves forward with their plans before UI starts construction.

Risk of No Action:

As per the UI's General Terms and Conditions, the customer must provide UI a location to install the required vault equipment such as, the transformers and switches to meet the customer request of 3000 Amps and 1600 Amps. The customer prefers to be fed from the network system for its reliability and flexibility but their services exceeds the guidelines laid out in UI OPD-10N. Not moving forward with the project is a huge public relations risk from denying customer power with Yale, the City and even the State.

Project Alternatives:
Option 1: This Option is to not do anything. UI cannot deny a new customer power if they are requesting it. UI will not run new primary cable to the building and the area will continue to operate as normal.

Basis for Project Estimates
This basis for the project estimates are based on historical averages and current material prices from manufacturers

- Engineering /Management time
- Materials Cost from the vendor (Splice chambers, Ductbank, Precast Vista Vault)
- Materials Cost stockroom items (Vista, Primary Cable, Terminations, and Splices)
- Labor cost to install splice chamber, Vista Vault and conduits.
- Labor cost to install Transformers, Vista Switch
- Labor cost to install UG Primary Cable and Splices
- Labor cost to cutover each circuit.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 53**	$ 53	$ -	$ -	$ -	$ -
# CIAC	**$ -41**	$ -41	$ -	$ -	$ -	$ -
# External Services	**$ 592**	$ 592	$ -	$ -	$ -	$ -
# Internal - Non-AC	**$ 0**	$ 0	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 368**	$ 368	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 322**	$ 322	$ -	$ -	$ -	$ -
# Materials	**$ 353**	$ 353	$ -	$ -	$ -	$ -
# Overheads - External	**$ 443**	$ 443	$ -	$ -	$ -	$ -
Total	**$ 2,090**	**$ 2,090**	**$ -**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 849	$ 849	$ -	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

848 Chapel St, New Haven

New Basement Vault L.2082



10/9/24

Distribution Engineering

Index

1. Introduction 3
2. Existing Conditions 3
2.1. Pictures 4
3. Need Statement 6
4. Alternatives 7
4.1. Do nothing and not energize customer 7
4.1.1. Advantages: 7
4.1.2. Disadvantages 7
4.1.3. Risks 7
4.2. Preferred Option: Install New Splice Chamber at the Intersection of Chapel and Church, Build new Vista Vault to Feed Customer Vault 7
4.2.1. Advantages: 7
4.2.2. Disadvantages 8
4.2.3. Risks 8
4.2.4. Cost Alternative II 8
4.2.5. Work Breakdown 8
5. Project Assumptions 10
6. Used and Useful 11

1. Introduction

CA Ventures is the owner of several apartment buildings at several locations in New Haven. CA Ventures is planning on constructing a new 6 story building on 848 Chapel St, New Haven that is expected to be completed in the 4th quarter of 2023. This will be a new residential facility with commercial business at the ground level.

On Chapel St, there are several Buildings in the area supplied by the low voltage 120/208V secondary network. The new building on 848 Chapel St is requesting two services with one at 3000 Amps at 120/208V and another at 1600A at 120/208V. As per OPD-10N, this new facility exceeds our guidelines for connectivity to the UG Network, so this building is to be served by 2 radial 15kV feeders into a Primary Switchgear and then into two submersible transformers. UI has been in talks with the customer to construct a new vista vault to house a model 422 Vista Switch and basement vault with 2 120/208V submersible transformers.

2. Existing Conditions

Chapel St, New Haven is one of the Busiest streets in New Haven. It has several Businesses and is home to a lot of traffic with access to the Train Station down the road. 848 Chapel St is a large empty plot of land sandwiched between two buildings. This is a prime location due to its easy access to the Train Station, Church St Park, and the Yale Campus. Additionally, Chapel St also has all major utilities traveling through it. In the right of way, there is Telco, Electric, Water, Sewer, and Gas. There are also several chambers in the area that are incredibly small and are not up to UI Standard. Due to the existing utilities in the area, there is little to no available space for expansion of chambers or new ducts.

The existing splice chambers nearby in area have all Mill River Network Feeders, 810, 811, 812, and 813. There also exists several sets of Network Secondary on the street that the proposed Vault can be tied to. However, there are no nearby non-network feeders in the area. The closest non-network feeder in the area is at the intersection of Church St & Crown St. The closest feeders are Mill River 1850 and 1851. On Church St, there are available ducts up from SC.48 at the intersection of George St and Church St up to SC.1768 on Church St. However, there is no available ducts or connection from SC.1768 to a Chamber on Chapel St. Additionally, there is SC.150 across the street that can also feed the vault. On the other hand, there are other Non-network feeders a couple chambers north of SC.1768 on Church St, but upon field inspections, these chambers were incredibly small with little to no space to pull new primary cable.

Based on field inspections between UI and the customer, it has been determined that is sufficient space in the sidewalk in front of 848 Chapel St to fit a Vista switch. The proposed location of the vista vault will be situated near a couple vaults in the area. Furthermore, there is plenty of space for a new Triangular Splice Chamber at the North – West Corner of Chapel St and Church St. Next door, there is the Network Vault Location 1429 at 852 Chapel St that houses a two-unit network vault. Across the street is a Two – Unit Spot Network Vault Location 1051 at 851 Chapel St. To the east down Chapel St, is another Two – Unit Network Vault Location 259 in front of the old Foot Locker Building.

2.1. Pictures



Figures 1 & 2: Pictures of Splice Chamber 60 at the Intersection of Chapel and Church St.



Figure 3: SC.151 West Wall



Figure 4: SC.151 East Wall



Figure 5: SC.150 East Wall



Figure 6: SC.150 West Wall

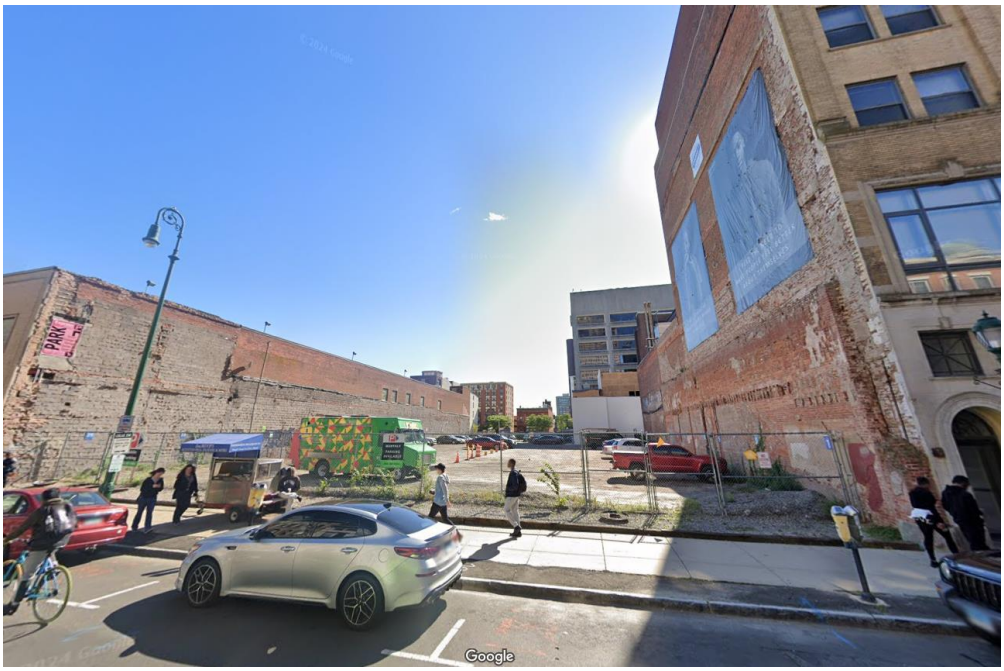


Figure 7: 848 Chapel St Site

3. Need Statement

There are low voltage secondary networks in specific areas of the City of New Haven. The low voltage secondary network was design and constructed to provide for N – 1 operation: loss of one primary supply circuit. However, due to exceeding the guidelines of UI OPD-10N the customer is to be fed from two non-network feeders. The system will be designed where there will be a primary select switch gear where in the case of a fault, the customer will remain online.

The building planned to be built by CA Ventures at 848 Chapel St will be a 6-story building. The top 5 floors will be used for residential purposes while the bottom floor will be used allocated to commercial facilities. The customer is requesting a secondary service of 3000 Amps at 120/208V and 1600 Amps at 120/208V. The entire building is expected to be energized by 3rd quarter of 2024.

As per the UI's General Terms and Conditions, the customer must provide UI a location to install the required vault equipment such as, the transformers and switches to meet the customer request of 3000 Amps and 1600 Amps. The customer prefers to be fed from the network system for its reliability and flexibility but their services exceeds the guidelines laid out in UI OPD-10N.

4. Alternatives

4.1. Do nothing and not energize customer

This Option is to not do anything here. UI cannot deny a new customer Power if they are requesting it. UI will not run new primary cable to the building and the area will continue to operate as normal.

4.1.1. Advantages:

1. Avoids expensive Capital Spending of Electrical and Civil Construction

4.1.2. Disadvantages

1. No new Customer revenue
2. Will not take advantage of existing real estate on Chapel St and Church St to install new underground infrastructure for growing area.

4.1.3. Risks

1. Public Relations risk from denying customer power with Yale, the city and even the State.

4.2. Preferred Option: Install New Splice Chamber at the Intersection of Chapel and Church, Build new Vista Vault to Feed Customer Vault

This option calls to build a new splice chamber in the right of way at the corner of Chapel and Church St. UI will connect the existing splice chamber SC.1768 to the new corner Splice Chamber with a new 4 – 4" PVC Duct Bank Approx. 270'. From the new Splice Chamber to existing Chamber SC.150 on Chapel St, UI would installed a new 4 – 4" PVC Duct bank. After that from SC.150, UI would install a new 4 – 4" G.S Laterals to the Vista Vault. The Vista vault would house a Model 422 Switch that would take in Mill River Feeders CKT-1850 and CKT-1851 to Ways 1 & 2 of the vista respectively. These feeders would come up from Church St and make their way up to Chapel St. The customer would then build a new basement vault that would house two submersible transformers, one at 500KVA and the other at 300KVA both operating at 120/208V.

4.2.1. Advantages:

1. New Commercial Custom Revenue
2. Provides customer with a reliable service from a Vista Switch
3. Extends non-network feeder into area which gives options for the area for future customers.
4. The Vista Vault serves as a new Circuit Tie point for Mill River Circuits
5. New standard corner splice chamber in right of way provides future expansion for distribution services.

4.2.2. Disadvantages

1. Expensive Civil construction costs with the new splice chamber and ductline.
2. UI will be pulling a non-network feeder in a network area.
3. Splice Chamber SC.150 is already crowded and adding additional cable increases congestion.

4.2.3. Risks

1. The procurement process may delay installation of the new splice chamber.
2. There may be some existing utilities or obstructions under that would prevent the installation of the new vista vault, splice chamber and conduit on the right of way.
3. Customer could pull out of building at the site anytime during construction.
4. Customer may not build their vault to UI specifications which can delay construction.
5. Material availability and lead times may delay construction.
6. Other projects in schedule may need to be pushed off or delayed to meet this customer's demands.
7. Construction may impact UI's ability to switch at Network Vaults during outages or emergency situations.

4.2.4. Cost Alternative II

	TOTAL CAP
External Services	$476,590
Material	$426,650
UIL Resources	$234,000
External Overheads	$410,923
Internal Overheads	$315,692
Total	$1,902,444

4.2.5. Work Breakdown

1) Civil Phase I
   a) Install new Splice Chamber SC.2050 at the corner of Church St and Chapel St
   b) Install Duct Bank Approx. 265' from SC.1768 on Church St to SC.2050
   c) Install Duct Bank Approx. 205' from SC.2050 to SC.150 on Chapel St.
   d) Install Vista Vault L.2092 on Chapel St
2) Civil Phase II
   a) Install Duct Bank Approx. 90' from SC.150 to L.2092 Vista Vault
   b) Customer to Build Duct Bank from L.2092 Vista Vault to L.2093 Basement Vault
3) Electrical Make Ready Mill River CKT-1850
   a) Install Ground Grid, Racks and Hooks in new Splice Chamber SC.2050 at the Corner of Church St and Chapel St
   b) Prep & Test and Install Model 422 Vista Switch in L.2092

c) Prep & Test and Install 1 – 500 KVA 120/208V and 1 – 300 KVA 120/208V in L.2093 Basement Vault
d) Install Approx. 200' of 3 – 500 CU FS UG Primary Cable from SC.53 to SC.1769
e) Install Approx. 130' of 3 – 500 CU FS UG Primary Cable from SC.1769 to SC.1768
f) Install Straight 500 Splice in SC.1769
g) Install Approx. 265' of 3 – 500 CU FS UG Primary Cable from SC.1768 to SC.2050
h) Install Straight 500 Splice in SC.1768
i) Install Approx. 205' of 3 – 500 CU FS UG Primary Cable from SC.2050 to SC.150
j) Install Straight 500 Splice in SC.2050
k) Install Approx. 90' of 3 – 500 CU FS UG Primary Cable from SC.150 to L.2092 Vista Vault
l) Install 600A Terminations at L2092 Vista Switch Way 1
m) Install 2 Sets of 3 - #2 CU UG Primary Cable from L.2092 to L.2093 Approx. 100' each.
n) Install 4 Sets of 200A Terminations, (Way 3 & 4 of Vista and at the two Submersible Transformers)

4) Electrical Make Ready Mill River CKT-1851
a) Install Approx. 355' of 3 – 500 CU FS UG Primary Cable from SC.48 at the Intersection of Church St and George St
b) Install Approx. 60' of 3 – 500 CU FS UG Primary Cable from SC.454 to SC.53 on Church St
c) Install Straight 500 Splice in SC.454
d) Install Approx. 200' of 3 – 500 CU FS UG Primary Cable from SC.53 to SC.1769 on Church St
e) Install Straight 500 Splice in SC.53
f) Install Approx. 130' of 3 – 500 CU FS UG Primary Cable from SC.1769 to SC.1768 on Church St
g) Install Straight 500 Splice in SC.1769
h) Install Approx. 270' of 3 – 500 CU FS UG Primary Cable from SC.1768 to SC.2050
i) Install Straight 500 Splice in SC.1768
j) Install Approx. 205' of 3 – 500 CU FS UG Primary Cable from SC.2050 to SC.150
k) Install Straight 500 Splice in SC.2050
l) Install Approx. 90 of 3 – 500 CU FS UG Primary Cable from SC.150 to L.2092
m) Install Straight 500 Splice in SC.150
n) Install 600A Terminations in L2092 Vista Switch Way 2

5) Electrical Cutover Mill River CKT-1850
a) SW & GND at all Vista Switch Locations fed Primarily from Mill River CKT-1850
b) Close in alternate feeds at all Vista Switches
c) SW & GND Bus 2 Pos 21 at Mill River Substation to De-eng CKT-1850
d) Breakdown Splices in SC.53 at the intersection of Crown St and Church St
e) Install 500-500-500 WYE Splice in SC.1850
f) Phase and Test Cable
g) Close Way 1 at L.2092 Vista Switch
h) Close Bus 2 Pos 21 at Mill River Substation to Re-eng CKT-1850
i) Close all Vista Switches to bring back primary feeders and Open Secondary Feeds

6) Electrical Cutover Mill River CKT-1851
a) SW & GND at all Vista Switch Locations Fed Primarily from Mill River CKT-1851
b) Close in Alternate feeds at all Vista Switches

c) SW & GND Bus 4 Pos 43 at Mill River Substation to De-eng CKT-1851
d) Breakdown Splices in SC.48 at the intersection of George St and Church St
e) Install 500- 500 – 500 Wye Splice in SC.48
f) Phase and Test Cable
g) Keep Way 2 at L.2092 Vista Switch Open
h) Close Bus 4 Pos 43 at Mill River Substation to Re-eng CKT-1851
i) Close all Vista Switches to bring back primary feeders and Open Secondary Feeds

5. Project Assumptions

The following is a list of standard assumptions which were used to create the estimates for the proposed work.

1. UI will be able to apply and get the permit on time to start this project.
2. UI to perform test pits to confirm or verify the location of other Utilities in the area after receiving and review the based maps.
3. All UI construction work will be done during the normal business week and hours.
4. UI will not have to relocate any other utility structure to accommodate the proposed UI Construction plan based on the results of the test pit.
5. All materials ordered will be available in time for use by Construction.
6. All budgetary estimates are based on a work product in compliance with existing UI and/or Industry accepted and specifications.
7. Labor rates used in creating the Estimates are based upon historical averages.
8. All dollars shown are in 2020 dollars and subject to change due to escalation in material, labor, and equipment rates at the time of actual construction.
9. Customer will be able to install conduits from their vault to the vista vault
10. UI will be able to install Wye Splices for Mill River Feeders 1850 and 1851 in existing chambers.
11. All civil and electrical work will be completed in accordance with the customer's schedule which is the 3rd quarter of 2024.
12. Any UI Underground Facilities not in the scope of work will not require a replacement or expansion.

6. Used and Useful



Figure 8: Submersibles in Customer Vault

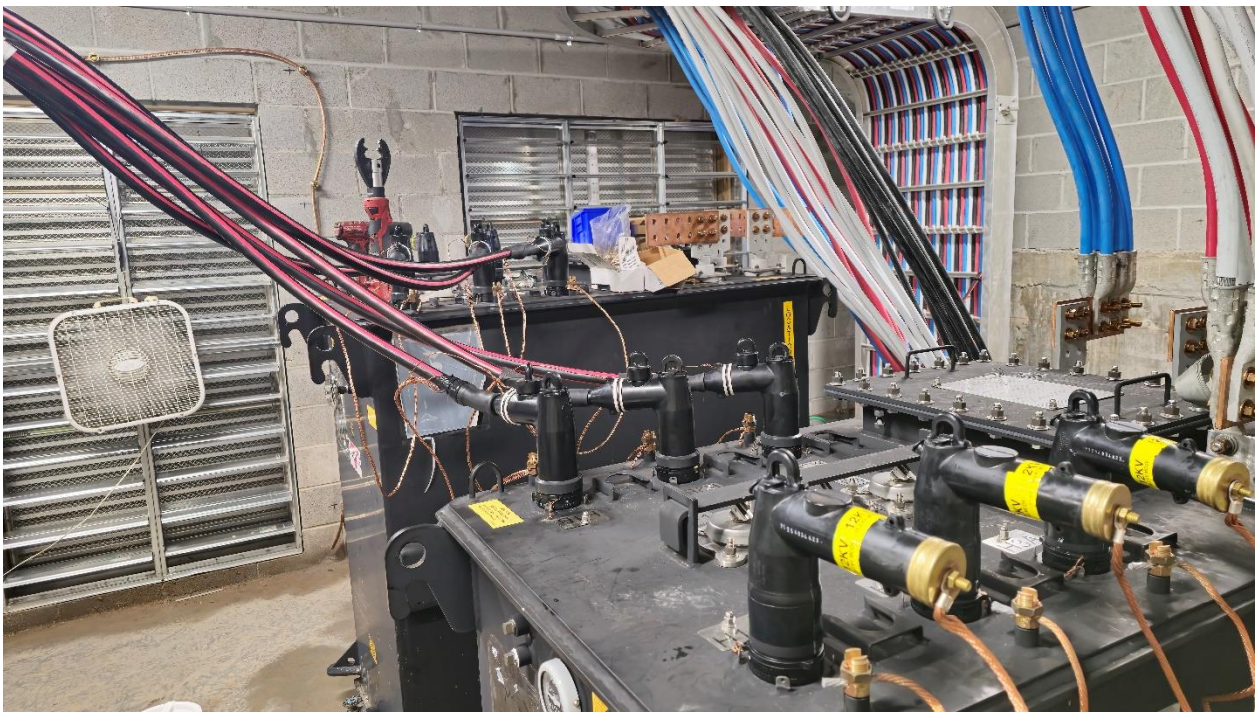
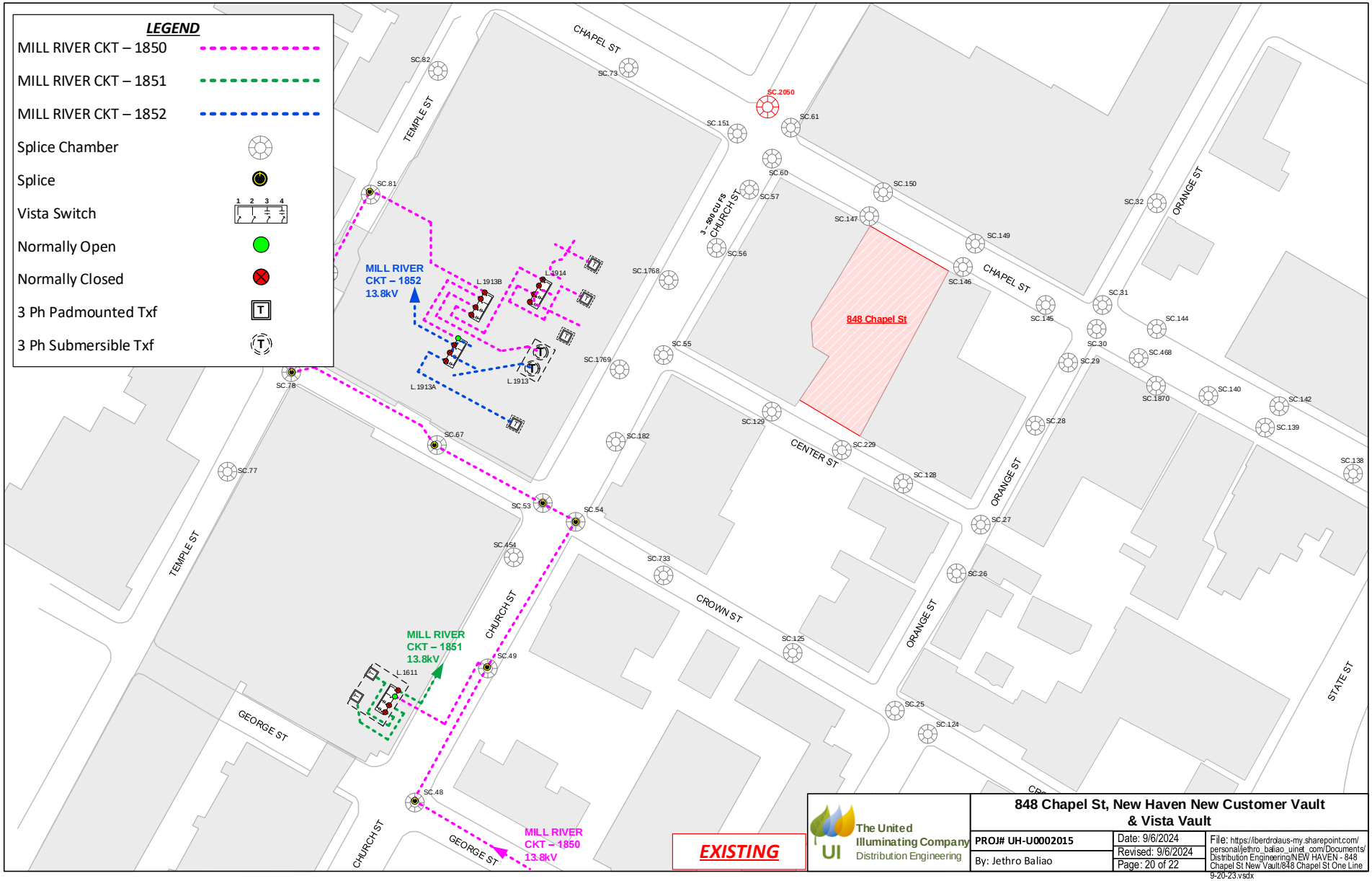
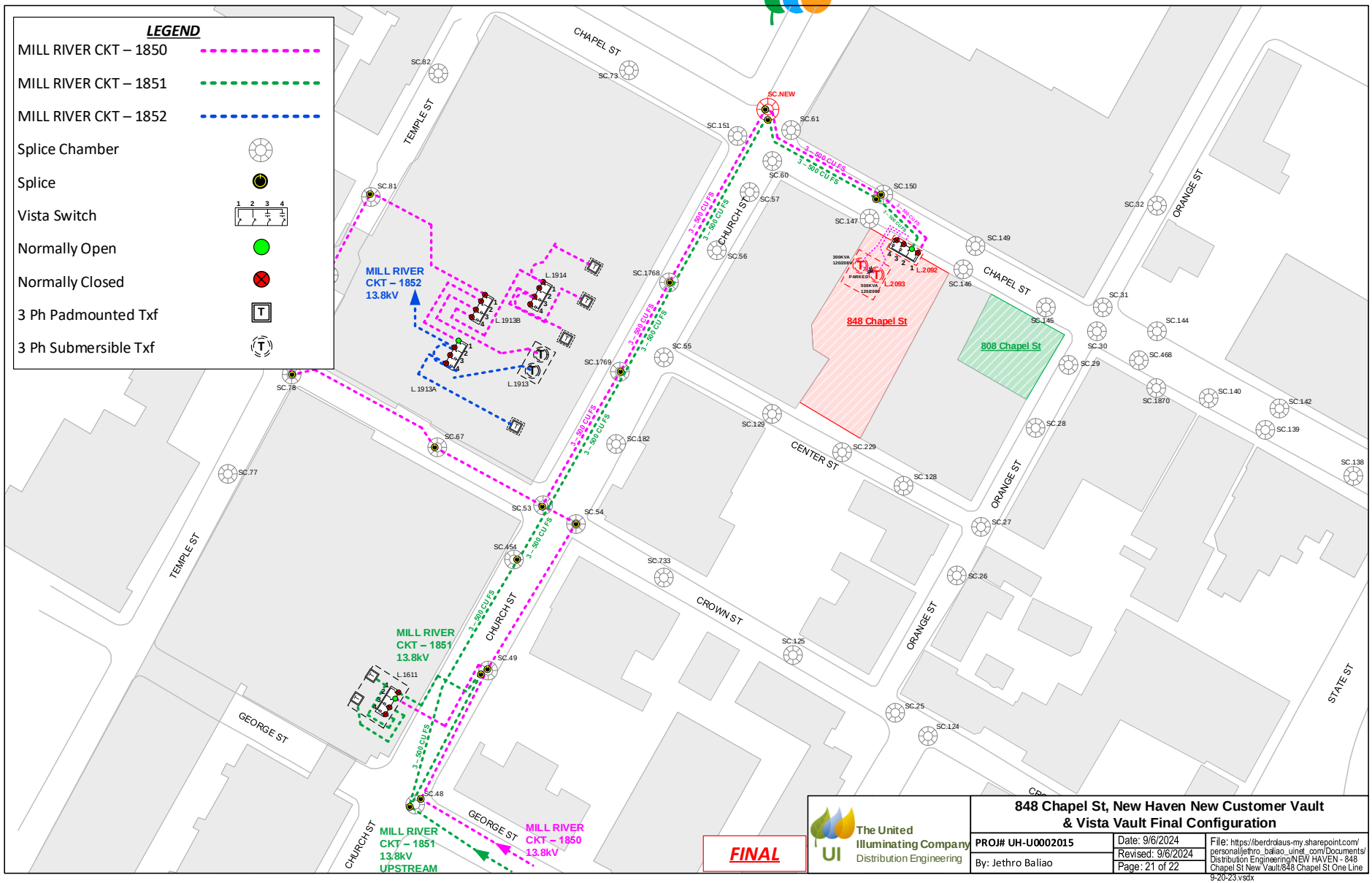


Figure 10: Venting and Primary Cables from Vista Vault connecting onto submersible transformers.

EXISTING


LEGEND
MILL RIVER CKT – 1850
MILL RIVER CKT – 1851
MILL RIVER CKT – 1852
Splice Chamber
Splice
Vista Switch
Normally Open
Normally Closed
3 Ph Padmounted Txf
3 Ph Submersible Txf
MILL RIVER CKT – 1852 13.8kV
MILL RIVER CKT – 1851 13.8kV
MILL RIVER CKT – 1850 13.8kV
848 Chapel St
CHAPEL ST
TEMPLE ST
CHURCH ST
CENTER ST
CROWN ST
GEORGE ST
ORANGE ST
STATE ST
3 - 500 CU FS
EXISTING
The United Illuminating Company
Distribution Engineering
848 Chapel St, New Haven New Customer Vault & Vista Vault
PROJ# UH-U0002015
By: Jethro Baliao
Date: 9/6/2024
Revised: 9/6/2024
Page: 20 of 22
File: https://iberdrolaus-my.sharepoint.com/personal/jethro_baliao_uinet_com/Documents/Distribution Engineering/NEW HAVEN - 848 Chapel St New Vault/848 Chapel St One Line 9-20-23.vsdx

AFTER


LEGEND
MILL RIVER CKT – 1850
MILL RIVER CKT – 1851
MILL RIVER CKT – 1852
Splice Chamber
Splice
Vista Switch
Normally Open
Normally Closed
3 Ph Padmounted Txf
3 Ph Submersible Txf
CHAPEL ST
TEMPLE ST
CHURCH ST
ORANGE ST
CENTER ST
CROWN ST
GEORGE ST
STATE ST
MILL RIVER CKT – 1852 13.8kV
MILL RIVER CKT – 1851 13.8kV
MILL RIVER CKT – 1850 13.8kV
MILL RIVER CKT – 1851 13.8kV UPSTREAM
848 Chapel St
808 Chapel St
3 - 500 CU FS
FINAL
The United Illuminating Company
Distribution Engineering
848 Chapel St, New Haven New Customer Vault & Vista Vault Final Configuration
PROJ# UH-U0002015
By: Jethro Baliao
Date: 9/6/2024
Revised: 9/6/2024
Page: 21 of 22
File: https://iberdrolaus-my.sharepoint.com/personal/jethro_baliao_uinet_com/Documents/Distribution Engineering/NEW HAVEN - 848 Chapel St New Vault/848 Chapel St One Line 9-20-23.vsdx

PRJ-005576

Steelpointe Harbor (West Block Ph1)

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Steelpointe Harbor (West Block Ph1)

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005576	Electric Distribution	Eves, Charles	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	New Connections	IP1 Originate	Program/As Spent	Program/As Spent

Project description:

The Steelpointe Harbor developer is developing property south of Stratford Avenue in Bridgeport and requested an underground electric distribution system to provide power to various mix-use buildings known as West Block Phase 1 and 2 located along East Main Street South, Waterview Avenue South, and Harbor Place in Bridgeport, CT.

UI distribution engineering together with the developers engineering team worked together to design the underground conduit and electrical distribution system to meet the service requirements of the project.

The Steelpointe Development – West Block Phase 1 project was administered per UI's operating procedure (OP-D32) where the developer installs the underground conduit system, after which UI would install the primary and secondary underground cable system.

Once complete, this project will connect 1,500-unit high-end apartments, restaurant and retail to UI's electric distribution system.

Project Scope:

Developer and its contrcators to extend the conduit system (Splice Chambers, Vista switch vaults, Below Grade Junctions vaults, concrete transformer pads, conduit duct-bank/laterals, and associated ground grid) from S.C. #1827 (East Main Street South c/o Waterview Avenue South) to existing Vista switchvault Loc. #1651 (Stratford Avenue c/o Harbor Place).

UI would install Vista switches, padmounted transformers, primary cables, and associated terminations to provide power as required for Phase 1 of the development.

Project Benefits:

Once complete, this project will connect 1,500 unit high-end apartments, restaurant, and retail to UI's electric distribution system. The successful completion of this project also aligns with the City of Bridgeport's revitalization efforts to provide housing, attract businesses, and grow jobs.

Project Risks and Mitigation Plan:

Risk - Delay or non-execution of developer/customer electric service requests could result in not meeting the developer/customer's in-service date and/or occupancy date.

Mitigation - Provide UI engineering services to the developer/customer in the planning, design, and execution of the electric service project deliverables. Communicate and coordinate all such deliverables with UI personnel and the developer/customer and its contractors.

Risk of No Action:

No action would cause the Company to not meet its obligation to provide the customer's request for electric service which would lead to customer disatisfaction. This is not a viable option.

Project Alternatives:
Option1 was selected to deliver an underground electric distribution system to the Steelpointe Harbor (West Block - Phase1) Development as it met all the design criteria for UI and the developer.

Option2 would require the installation of an overhead pole-line with various pole-mounted switches and risers to padmounted transformers in an underground development. This option was not considered as it did not meet the customer's requirements.

Basis for Project Estimates
The project cost estimate are based on UI's current material and labor cost with overheads to install the electric system in accordance with the design of the development.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 58**	$ -	$ 58	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 511**	$ -	$ 511	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 48**	$ -	$ 48	$ -	$ -	$ -
# Internal, Overheads	**$ 104**	$ -	$ 104	$ -	$ -	$ -
# Materials	**$ 240**	$ -	$ 240	$ -	$ -	$ -
# Overheads - External	**$ 122**	$ -	$ 122	$ -	$ -	$ -
Total	**$ 1,083**	**$ -**	**$ 1,083**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 1,083	$ -	$ 1,083	$ -	$ -	$ -

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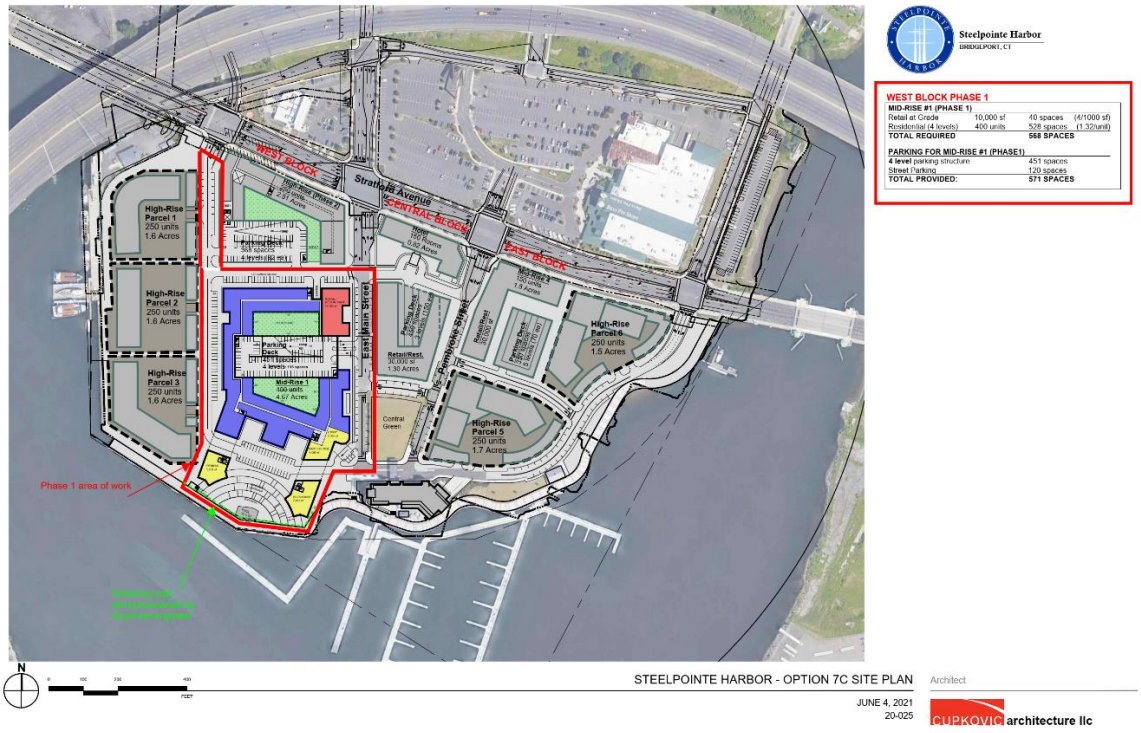
Steelpointe Harbor – West Block Phase 1 & 2 Project



Engineering Project Report

10 East Main Street, Bridgeport

Prepared by:

Distribution Engineering

Date of Report: 9/20/2024

Revised date:

Index

1. Project Description (Summary) 3
2. Existing Conditions 3
3. Need Statement 3
4. Engineering 4
4.1. Phase I 4
Table I – Proposed Estimated 6
4.2. Optional Construction 6
Table II – Optional Construction Estimated 7
4.3. Alternatives 8
5. Project Assumptions 8
6. Maps or Electrical Design 10

1. Project Description (Summary)

The Steelpointe Harbor developer is developing property south of Stratford Avenue in Bridgeport and requested an underground electric distribution system to provide power to various mix-use buildings known as West Block Phase 1 & 2 located along East Main Street South, Waterview Avenue South, and Harbor Place in Bridgeport, CT.

UI distribution engineering together with the developers engineering team worked together to design the underground conduit and electrical distribution system to meet the service requirements of the project. The team worked through challenges such as locating UI's electrical equipment and overcoming design challenges with industry standard metering equipment.

The Steelpointe Development – West Block Phase 1 project was administered per UI's operating procedure (OP-D32) where the developer installs the underground conduit system, after which UI would install the primary and secondary underground cable system.

Once complete, this project will connect 1,500-unit high-end apartments, restaurant & retail to UI's electric distribution system. The successful completion of this project also aligns with the City of Bridgeport's revitalization efforts to provide housing, attract businesses, and grow jobs.

2. Existing Conditions

The electric supply to the Steelpointe Harbor Development located at 10 East Main Street, Bridgeport consists of; various Vista vaults with 15kV S&C Vista switchgear, splice chambers, padmounted transformers, below grade service boxes, two primary underground circuits (New Congress Substation Circuit #'s 2539 & 576) and associated secondary cables.

3. Need Statement

Developers for the Steelpointe Harbor project is developing the property south of Stratford Avenue along East Main Street South, Waterview Avenue South, and Harbor Place in Bridgeport. The property is broken up as follows, West Block Phase 1 & 2, Central Block and East Block.

West Block - Phase 1 is currently under construction which includes Retail, Restaurant, High-end residential apartments, Clubhouse, Fitness Center, Bar & Lounge, etc.

UI is obligated to connect this customer to its electric distribution system in accordance with UI's Terms & Conditions, Construction Standards, the National Electrical Safety Code (NESC), UI Guidebook of Requirements for Electric Service, policies, and procedure.

4. Engineering

4.1. Phase I

Developer and its contractors to extend the conduit system (Splice Chambers (S.C.), Vista switch vaults, Below Grade Junction vaults, Concrete Transformer Pads, Conduit Duct-bank/laterals, and associated ground grid) from S.C. #1827 (E. Main St. c/o Waterview Ave. South) to existing Vista switch Vault Loc. #1651 (Stratford Avenue c/o Harbor Place). UI would install Vista switches, padmounted transformers and primary cables and associated terminations to provide power as required for Phase I of the development.

Civil

1. Install (4) 7'x8' precast transformer foundations & assoc. ground grid
2. Install conduit laterals from Vista switch vault Loc. #1663 to each transformer foundation
3. Install (4) 5'x12'x7' Splice Chamber #C001, C002, C003, & C004 on Waterview Avenue South and Harbor Place
4. Install new 12'x8'x6'-2" Sidewalk Vista vault Location #V001 off Waterview Avenue South
5. Install (4) 4'x6' Sidewalk Mini Vault (Below Grade Junction) Loc. #J001, J002, J003, J004 & J005
6. Install doors, hatches, ladders & platform, splice chamber frames & covers all per UI's requirements
7. Install eight (8) 4" conduit duct-bank from S.C. #1827 to new S.C. #C001, C002, C003, C004 & 1623 (Stratford Ave.)

8. Install four (4) 4" conduit laterals from S.C. #C001 to Vista switch Loc. #V001, from S.C.#C003 to Below Grade Junction Loc. #J005 and from S.C. #C004 to Vista vault Loc. #1651
9. Install two (2) 4" conduit laterals from Vista switch Loc. #1663 to each transformer location & between the transformers, from Vista switch Loc. #V001 to Above Grade Junction Loc. #J001 & J002, from Above Grade Junction Loc. #J001 to each transformer, from Above Grade Junction Loc. #J002 to Transformer Loc. #T009 & T008, from S.C.#C002 to transformer Loc. #T010 & T011, and from S.C. #C003 to Below Grade Junction Loc. #J004 & J003

Electrical

1. Prepare Vista switch vaults and install all necessary hardware (including primary cable supports) per UI specifications
2. Installed a new 15kV S&C Vista Switchgear Model 422, Loc. #'s 1663, V001 & 1651 in vaults
3. Prepare and install 4 - 500kVA, 208Y/120V padmounted transformer
4. Install padmounted transformers at Loc. #T001, T002, T003, & T004
5. Installed two sets of 3/c #500 Cu EPR primary conductor from S.C. #1635 to Vista switch Loc. #1663 and make up terminations
6. Install 3/c #2 Al EPR primary conductor from Vista switch Loc. #1663 to each padmounted transformer and make up terminations
7. Prep and install 5 – 500kVA, 208Y/120v padmounted transformer
8. Install padmounted transformers at Loc. #'s T005, T006, T007, T008, & T009
9. Install two sets of 3/c #500 Cu EPR primary conductor from S.C. #1827 to new Vista switch vault Loc. #V001 and make up terminations
10. Install 3/c #2 Al EPR primary conductor from Vista switch Loc. #V001 to Below Grade Junction Loc. #J001 & J002
11. Install 3/c #2 Al EPR primary conductor from Below Grade Junction Loc. #J001 & J002 to each padmounted transformer and make up terminations
12. Prep and install 2 – 500kVA, 208Y/120v padmounted transformer
13. Install padmounted transformers at Loc. #'s T010 & T011
14. Cut back 3/c #500 Cu EPR primary conductors in Vista switch vault Loc. #1651 and make up terminations between S.C. #1623 & Vista switch Loc. #1665
15. Install 3/c #2 Al EPR primary conductor from Vista switch Loc. #1651 to Below Grade Junction Loc. #J005

16. Install 3/c #2 Al EPR primary conductor from Below Grade Junction Loc. #J005 to S.C. #C002 and to each padmounted transformer and make up terminations

Table I – Proposed Estimated

Category	CAP	COR
Material	$554,300	
Civil Contractors	$0	
Internal Labor	$181,700	$700
OT Labor	$0	
Overheads	$159,527	$406
Allocations	$44,800	
TOTAL	**$940,327**	**$1,106**

Total = $941,433 CAP & COR

The following are the budgetary estimates for the capital, expense, and removal work as outline with the assumptions listed in the appendix. These values have a tolerance of +10% and -10%. These estimates do not include any contingency values, or reimbursements.

4.2. Optional Construction

There are two Vista switches Loc. #'s 1661 & 1653 located along East Main Street s/o I-95 bridge and Waterview Avenue n/o Stratford Avenue respectively that are underutilize. The vista switches currently provide

power to three (3) single-phase padmounted transformers Loc. #'s 1681, 1684 & 1688. Due to long lead time and current costs of S&C Vista switches, utilizing these two vista switches would save on project cost and potential delays resulting from switch availability.

Civil

No civil work is required as a result of the above option to disconnect, remove & relocate Vista switches at Loc. #'s 1661 & 1653.

Electrical

1. De-energize New Congress Circuits 2539 & 576 one at a time tio isolate the Vista switches.
2. Disconnect, remove and return Vista switches to the T&S shop to be prepared
3. Installed two (2) prepared Vista switch at Vista switch vault Loc. #V001 & 1651. Only one new Vista switch would be required at Vista vault Loc. #1663

Table II – Optional Construction Estimated

Category	CAP	COR
Material	$450,100	
Civil Contractors	$0	
Internal Labor	$184,400	$2,800
OT Labor	$0	
Overheads	$150,902	$1,622
Allocations	$39,300	
TOTAL	**$824,702**	**$4,422**

Total = $829,124 CAP & COR

The following are the budgetary estimates for the capital, expense, and removal work as outline with the assumptions listed in the appendix. These values have a tolerance of +10% and -10%. These estimates do not include any contingency values, or reimbursements.

4.3. Alternatives

Installing an overhead pole-line with various pole-mounted switches and risers to padmounted transformers is an option, however, the area is an underground distribution system. This option was not considered as it did not meet the requirements of the project.

5. Project Assumptions

The following is the list of standard assumptions which were used to create the estimates for the proposed work.

1. UI will be able to construct the new facilities system as planned.
2. UI will extend the existing supply facilities in compliance with current standards and construction practices.
3. All budgetary estimates are based on a work product in compliance with existing UI and/or industry accepted standards and specifications.
4. All construction techniques used to install, remove, or replace UI facilities will comply with any and all applicable Federal, State and Local regulations as well as UI Construction Standards.
5. Existing UI underground civil facilities not included in the scope of work will not require replacement or expansion.
6. All UI construction work will be done during the normal business week and hours unless requires customer building outages, of which may fall on off-hours.
7. The conduit trench will be a typical depth; no more than 3.5 feet.
8. Subsurface obstacles which would prevent the installation of the chambers, conduit banks, and laterals will not be encountered.
9. All materials will be ordered and available in time for use by Construction.

10. The UI construction work is weather dependent. For safety reasons, UI will not schedule crews to work on the electrical facilities during inclement weather. There is the possibility of schedule delays due to weather. No value for the costs associated with weather delays is offered.
11. Labor rates used in creating the estimates are based upon historical averages.
12. All dollars shown are in 2023 dollars and subject to change due to escalation in material, labor, and equipment rates at time of actual construction.
13. The base estimates exclude contingency, overheads, and allocations values.
14. The base estimates are subject to the accuracy bandwidth as indicated within the estimate.
15. All necessary local permits will be obtained per the schedule.

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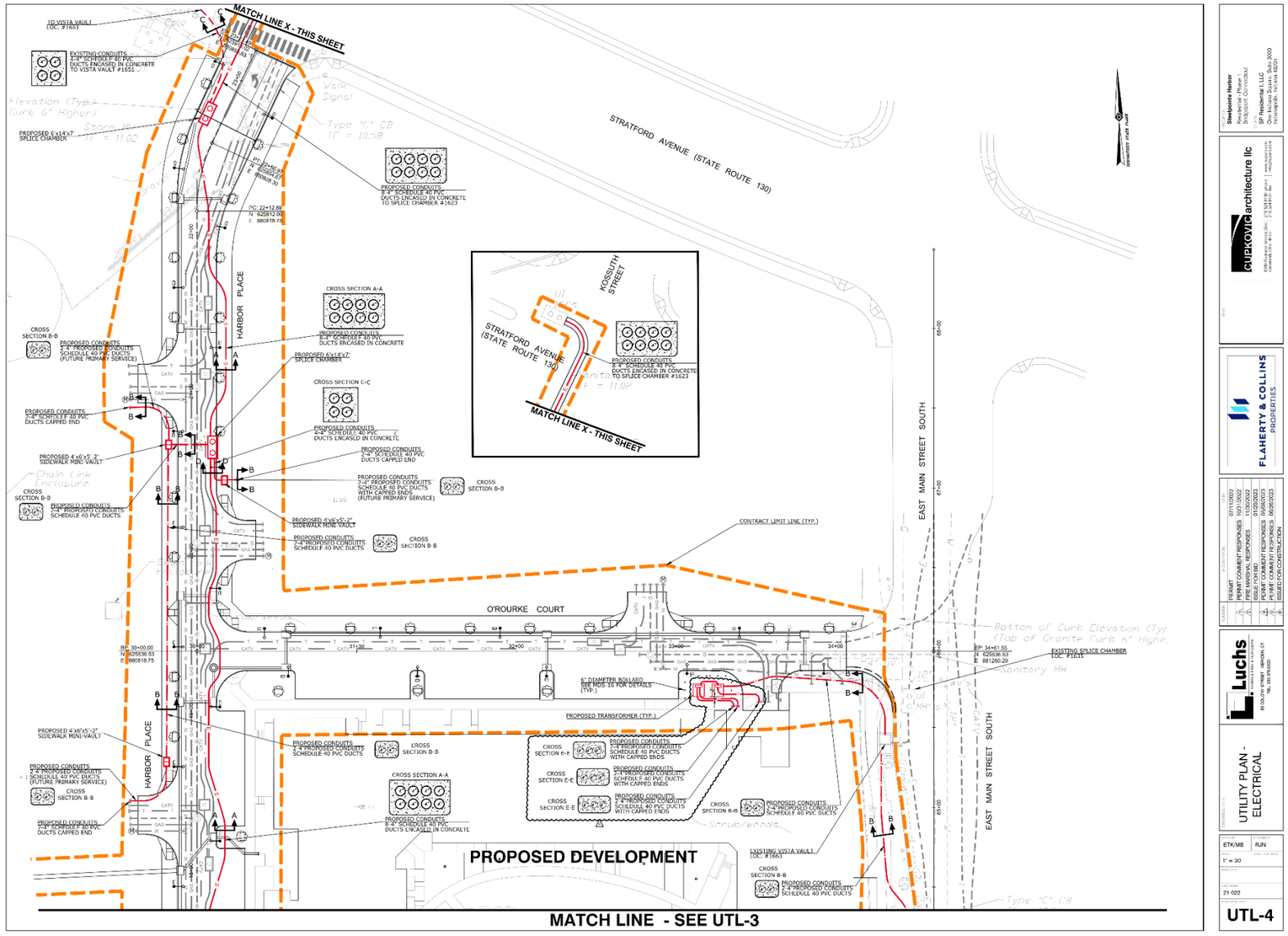
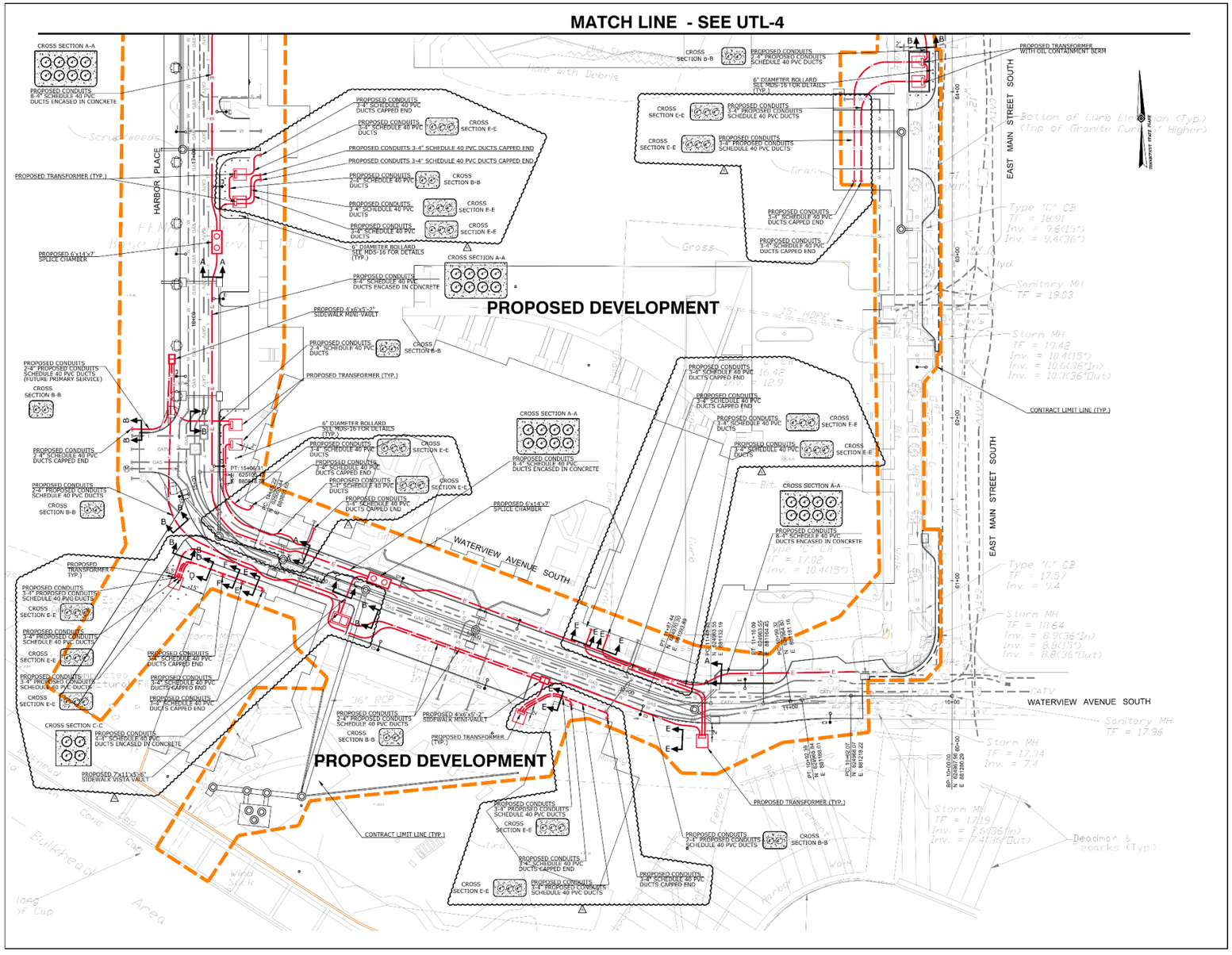
6. Maps or Electrical Design





Steelpointe Harbor
Bridgeport Phase 1
Bridgeport, Connecticut

SPP Residential I, LLC
One Indiana Square, Suite 3000
Indianapolis, Indiana 46204

CUPKOVIC architecture llc

FLAHERTY & COLLINS PROPERTIES

ISSUE	DESCRIPTION	DATE
1	PERMIT	07/11/2022
2	PERMIT COMMENT RESPONSES	10/10/2022
3	PRE-MARSHAL RESPONSES	11/30/2022
4	ISSUE FOR BID	01/20/2023
5	PERMIT COMMENT RESPONSES	04/06/2023
6	PERMIT COMMENT RESPONSES	05/05/2023
7	ISSUED FOR CONSTRUCTION	06/02/2023

Luchs
CONSULTING ENGINEERS, LLC
89 KIMBERLY AVENUE, EAST HAVEN, CT
TEL: 203-239-2320

UTILITY PLAN - ELECTRICAL

ETK/MB	RJN
1" = 20'	
21-022	

UTL-3

800288.01

UI - Ind/Comm CAP

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Ind/Comm CAP

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	800288.01	Electric Distribution	Mitchell, John	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	New Connections	IP4 Change	Program - Ongoing	Program - Ongoing

Project description:

UI is obligated to connect all customers within its franchise area to the electric distribution system in accordance with specific Terms & Conditions, Construction Standards, the National Electrical Safety Code (NESC), UI's Guidebook of Requirements for Electric Service, policies, and procedures, etc. This is an annual blanket program covering hundreds of individual commercial or industrial customer related service requests for a given year.

Project Scope:

Construction work for services to commercial & industrial customers supplied by either overhead or underground powerlines for new, increase, replacement, removal, or demolition electric services. Each individual customer request is a unique project which has its own design scope of work, schedule, and cost. The scope of the job can include distribution primary system upgrades to serve the new customer by installing, new poles, transformers, primary wires, and other system equipment. The average cost from the last three years for this program has been used to determine the high-level cost estimate.

Project Benefits:

The program allows UI to respond to all commercial & industrial customer requests for engineering consultations, adding new, revamp/replacement, temporary, or demolition services in a timely manner.

Project Risks and Mitigation Plan:

Delay or non-execution of customer electric service requests could result in not meeting the customer's in-service date and/or occupancy date. The commercial & industrial program allows UI to respond to each individual requests in a timely manner.

Risk of No Action:

No action could result in not meeting obligation to serve or customer dissatisfaction. This is not a viable option. UI is obligated to serve all customers within its service territory.

Project Alternatives:

Each project has alternatives that are considered during the design review stage to meet the customer's service related request. Overhead / underground options, location of facilities, backup, capacity are all considerations that go into each project design.

Basis for Project Estimates

The Company considers past years actuals together with larger known customer project cost estimates makes up the overall program budget for the future years.

The impact of COVID and inflation have altered the Company's recent results so the analysis for this program

The COVID years show a marked decline in industrial commercial development activity between 2020 and 2023. However in 2024 the Company has seen a rebound in industrial commercial development. The Company's current forecast reflects the planned project costs for known projects and provides a level of funding in the blanket project for smaller projects. Overall the Company's forecast for 2024 through 2027 ($7.6M) is far below the inflation adjusted average for 2016 thru 2019 ($13.0M). Inflation was modeled using both the GDP deflator and the HW index. The Handy Whitman index was used for this analysis because it represents the impact of inflation on distribution construction.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 143**	$ 143	$ -	$ -	$ -	$ -
# CIAC	**$ -4,316**	$ -1,445	$ -708	$ -708	$ -720	$ -734
# External Services	**$ 15,365**	$ 221	$ 2,514	$ 5,071	$ 3,714	$ 3,844
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 2,075**	$ 2,075	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 2,591**	$ 1,258	$ 221	$ 446	$ 327	$ 338
# Materials	**$ 2,279**	$ 2,279	$ -	$ -	$ -	$ -
# Overheads - External	**$ 3,596**	$ 1,692	$ 316	$ 638	$ 467	$ 483
Total	**$ 21,733**	**$ 6,223**	**$ 2,344**	**$ 5,447**	**$ 3,788**	**$ 3,931**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 21,118	$ 5,608	$ 2,344	$ 5,447	$ 3,788	$ 3,931

Note: 2024 Plant Additions includes the entire calendar year

UI
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UI Industrial/Commercial Overhead & Underground Program



Business Report

All Towns

Prepared by:

Distribution Engineering

Date of Report: 9/27/2024

Revised date:

Index

1.	Program Description (Summary)	3
2.	Scope	3
3.	Benefit	4
4.	Program Objectives	4
4.1.	Program Deliverables	4
4.2.	Program Budget	5
4.3.	Alternatives	7
5.	Program Assumptions	7
6.	Program Conclusion	7

1. Program Description (Summary)

This is an on-going yearly blanket program that covers all permanent, temporary, or removal construction work for services to commercial & industrial customers supplied by either overhead or underground powerlines for a given year. The blanket program is constrained by its annual approved budget.

Each year, UI receives hundreds of requests from commercial or industrial customers looking to install a new electric service, or increase, disconnect & remove their existing electric service. Depending on the project scope, some, or all the cost of a project might be reimbursable.

The Ind/Com WBS (UI-U0007) is the program budget for these requests.

While each request is unique, most fall into these five broad categories:

- Consultations with commercial/industrial customers or their contractors to answer questions and to be a resource to help guide their service requests.
- Connect new commercial/industrial customers to UI's electric distribution system.
- Expand the capacity of existing commercial/industrial services due to load growth or building additions.
- Provide temporary construction power.
- Removal of services and equipment at customer locations before the building or structure can be demolished.

UI would like to be recognized as a utility-industry leader, focused on the customer, and engaged in developing and deploying engineering solutions that achieve the delivery of electricity safely, reliably, and reasonably cost. This blanket program allows UI to meet the customer's expectations in a timely manner.

2. Scope

Each individual customer request is a unique project which has its own design scope of work, schedule, and cost. Examples of typical projects include:

- A new commercial/industrial park development
- A new electric vehicle (EV) charging station
- A network service supplied by the underground secondary network system

- A building expansion, addition, or a manufacture investing in new equipment
- A college/university adding new dorms or classrooms
- A developer demolishing an old, deteriorated building to make way for a new building or development
- Some distributed energy resource (DER) projects connecting to UI's electric system

Requests for service can be as simple as upgrading to the next available transformer size up to supplying electric service to a commercial/industrial park with multiple parcels of land. Projects with total cost of $250,000 or more are considered major projects and require their own project definition/WBS.

3. Benefit

This is an annual blanket program covering hundreds of individual customer-related service requests. The program allows UI to respond to all commercial & Industrial customer requests for engineering consultations, adding new, revamped, temporary, or demolition services in a timely manner.

4. Program Objectives

UI is obligated to connect all customers within its franchise area to the electric distribution system in accordance with specific Terms & Conditions, Construction Standards, the National Electrical Safety Code (NESC), UI's Guidebook of Requirements for Electric Service, policies, and procedures, etc. as approved by the Connecticut Public Utilities Regulatory Authority (PURA).

All electric power distribution facilities shall be designed using prudent engineering judgement, in accordance with good industry practice, and shall conform to all applicable UI and industry standards, and regulatory requirements. All costs will be incurred between January 1 and December 31 of each year.

4.1. Program Deliverables

Resolve all customer requests in a timely, cost-effective, and safe manner.

4.2. Program Budget

The Company considers past years actuals together with larger known customer project cost estimates makes up the overall program budget for the future years.

The impact of COVID and inflation have altered the Company's recent results so the analysis for this program

The table below depicts the Industrial commercial banket and specific project costs between 2016 and 2027. The COVID years show a marked decline in industrial commercial development activity between 2020 and 2023. However in 2024 the Company has seen a rebound in industrial commercial development. The Company's current forecast reflects the planned project costs for known projects and provides a level of funding in the blanket project for smaller projects. Overall the Company's forecast for 2024 through 2027 ($7.6M) is far below the inflation adjusted average for 2016 thru 2019 ($13.0M). Inflation was modeled using both the GDP deflator and the HW index. The handy Whitman index was used for this analysis because it represents the impact of inflation on distribution construction.

Table 1

Customer - New Connections	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
2015 Commercial OH & UG Services	874	44	3	8	3	-	-	-				
2016 Comm'l OH/UG Services	4,658	1,129	526	351	289	-	-	-				
2017 Comm'l OH/UG Services	(12)	3,393	1,877	1,387	1,383	-	-	-				
2018 Comm'l OH/UG Services	-	-	2,028	667	15	-	-	-				
2019 Comm'l OH/UG Services	-	-	-	1,818	2,013	-	-	-				
2020 Comm'l OH/UG Services	-	-	-	7	139	-	-	-				
39 Church St New Haven Network Vault	1,554	780	-	-	-	-	-	-				
Allco PV Park Ln	-	-	-	-	-	-	-	395				
Amazon New Service Connection - DO NOT USE	-	22	1,217	(43)	0	-	-	-				
BIC Plant #5 Service Realocation	556	(29)	(16)	-	-	-	-	-				
Bpt Landing Steel Point Dev.	(99)	-	-	(37)	-	-	-	-				
Bridgeport Hospital	(147)	33	-	4	8	-	-	-				
Broadway-Yale Transfer Trip Modifications	(0)	-	-	-	-	-	-	-				
CA 2284 49 Coon Hollow Rd Derby	-	-	-	-	-	-	-	101				
Canal St Reconstruction Ph 2 Shelton	-	20	0	0	-	2	1	-				
College Square	(0)	-	-	-	-	-	-	-				
Crown Court II - New Cust Service	-	-	-	-	246	9	9	1				
Cust Splice Chamber-274 Crown St NH	8	5	-	-	-	-	-	-				
for H. Krevit Load Addition Phase 2	-	1	-	-	-	-	-	-				
General Activities Related to Dist. Generation	196	126	(72)	(65)	13	(0)	(0)	(0)				
Greenchlor Load Addition Phase 2	12	(12)	-	-	-	-	-	-				
H Krevit Load Addition Capacity Portion	(11)	0	-	-	-	-	-	-				
H. Krevit Load Addition	0	(125)	-	-	1	-	-	-				
Jayson - Newfield Customer Service	1	-	312	1,245	3	88	4	0				
McLevy Square Development	18	8	(5)	(0)	-	-	-	-				
Metro North Load Addition	29	53	238	5	(61)	-	-	-				
Network Vault 301 George St New Haven	89	715	240	37	-	-	-	-				
New Congress SS Getaway Engineering NuPower	-	-	-	-	-	35	(49)	(11)				
New Radial Service 323 George St	5	42	685	94	140	-	-	-				
New Service @ 101 College St NH	-	-	-	-	-	-	272	243				
Omni Hotel	23	445	1,066	8	(0)	-	-	-				
Renewable Generation / Bpt Green Energy Park	(28)	-	-	-	-	-	-	-				
Sacred Heart University UG	1	-	-	-	-	-	-	-				
Service to Fountain Lake Commerce Park	1,115	1	-	-	-	-	-	-				
Skiff Street Bridge over Mill River	645	164	252	5	0	-	-	-				
UI - Ind/Comm CAP	174	0	1	5	(9)	3,332	2,222	4,571	6,223	2,344	5,447	3,788
VA Hospital West Haven New Generation	(490)	365	8	3	-	-	-	-	-	-	-	-
Verogy Solar Mill Rd No Haven	-	-	-	-	-	-	-	(69)	-	-	-	-
West Haven Train Station	6	-	-	-	-	-	-	-	-	-	-	-
Whitney and Audobon NH Streetscape	2	-	-	0	1	-	-	-	-	-	-	-
Yale CPP Vista Installation	2	0	-	-	-	-	-	-	-	-	-	-
Yale University - Whitney Ave Beautification	-	(52)	-	(0)	0	-	-	-	-	-	-	-
Applegreen RT15 EV Charging - Orange									-	382	898	911
UI - New Haven Coliseum 1B & 1C - CAP									350	767	387	-
300 State St New Cust Serv									1,464	2,847	-	-
USPS EV Charging Station									-	301	-	-
Bullard Haven Tech H.S.									-	326	-	-
Steelpointe Harbor (West Block Ph1)									-	1,083	-	-
Jayson - Newfield Customer Service									-	-	-	-
Canal St Reconstruction Ph 2 Shelton									-	-	-	-
Crown Court II - New Cust Service									0	-	-	-
New Service @ 101 College St NH									-	-	-	-
SIMS Metal Management									(450)	-	-	-
UI - New Haven Coliseum 1A									1,157	-	-	-
848 Chapel St Vault NH - CAP									2,090	-	-	-
Bella Vista Complex - PSRP									1	-	-	-
Total	9,179	7,130	8,361	5,499	4,183	3,466	2,459	5,231	10,835	8,050	6,732	4,699
GDP Inflation factor	1.26	1.24	1.21	1.19	1.18	1.13	1.05	1.02				
HW Inflation factor	1.81	1.76	1.69	1.63	1.55	1.49	1.35	1.07				
GDP Escalated $$	11,565	8,841	10,117	6,544	4,936	3,916	2,582	5,336				
HW Escalated $$	16,613	12,549	14,130	8,963	6,484	5,164	3,320	5,598	10,835	8,050	6,732	4,699

4.3. Alternatives

At the program level - UI is obligated to provide electric service to all its customers in its franchised area.

The Company works with the Customer to evaluate alternatives on each project subject to the Company's terms and conditions.

5. Program Assumptions

This budget is a high-level estimate based on previous year's actuals (four-year average).

The following factors can impact the overall budget and cause volatility from month to month or year to year:

- **Volume of customer requests** - An estimated 300 to 400 requests per year. (ex. 384 in 2022, 394 in 2023)
- **Location of requests** - the mix between customers supplied by the network (or in dense urban areas) vs customers in more rural locations with fewer construction constraints
- **Size of requests** - the mix between large load additions and small additions. (Increasing a pole top transformer is much less expensive than a 3-phase pad-mounted transformer service for a 10-story building)
- **Amount of reimbursements** - some requests will require the customer to reimburse UI for some or all the cost. The amount and number of reimbursements in any given year are based on the specifics of each request
- **Overall economic activity** – when the economy is strong, we tend to receive more requests and conversely when the economy is weak, we tend to receive fewer requests (ex. COVID and resulting supply-chain issues)

Due to the high variability of this program, the team reviews the budget monthly and reforecasts accordingly throughout the year.

6. Program Conclusion

Each individual project under this program will complete the plan construction work and close out all aspects of the work to make it used and useful.

PRJ-004106

UI - New Haven Coliseum 1A

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - New Haven Coliseum 1A

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-004106	Electric Distribution	Lyons, Robin	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	New Connections	IP4 Change	Ongoing	Dec 2024

Project description:

This has been a vacant lot for the past 15 years in Downtown New Haven. At one point this site had the Veterans Memorial Coliseum and finally is being developed into the "Square 10" complex.

Building 1A – 7 story building with 200 apartments and 16,000 sq ft of retail space (service to be energized by end of 2023).

Project Scope:

Civil Work:
Install (4) 4" laterals from SC# 242 on South Orange St to the curb for a customer supplied vista switch vault for building 1A.

Electrical work:
Procure and install 422 standard vista switch (D8057120)

Procure and install three 3 phase transformers
(2) D9709050 = 3P Submersible 13.8v / 120/208Y - 750 KVA
(1) D9710530 = 3P Submersible 13.8v / 120/208Y - 500 KVA

Procure and install ~1,400' of 3-1/c 500mcm cu UG cable from SC#109-> 242 -> SC1704 -> SC42, and from SC242 to the vista vault.

Project Benefits:

This ~5 acre site is bordered by George St, South Orange St, State St, and North Frontage Road and is currently begin used as a parking lot.

The Square 10 complex is planned to consist of four 'all electric' buildings (each with EV chargers) with mixed retail, residential, and business areas.

Building 1A – 7 story building with 200 apartments and 16,000 sq ft of retail space (service to be energized by end of 2023)

Building 1B – 600,000 sq ft building with 120 apartments and parking garage (service to be energized by end of 2024)

Building 1C – 277,000 sq ft "life sciences" medical / lab office building with a ground floor restaurant (service to be energized by end of 2024)

Phase 2 – remaining 1.5 acre plot will possibly be a high-rise mixed use bldg.

Project Risks and Mitigation Plan:
The risks to this project were (1) availability of equipment; (2) late design changes by the customer just prior to start of construction, and (3) completion of UI's civil work to allow the customer service to be built and energized in time. The UI submersible 15kV switch and three transformers were identified and ordered in time to meet the customer's needs. UI was able to pivot quickly and accomodate the design changes brought on by the customer without delaying the project. UI was able to prepare civil documents in advance allowing for timely coordination with our civil conctractor just before the yearly winter construction moratorium was scheduled to start in the downtown area as required by the City of NH.

Risk of No Action:
UI has an obligation to serve our customers, so risk of no action would result in substantial financial losses to the customer, as well as for the city since the building includes residential units and retail spaces. Since this project is in the heart of downtown New Haven with high visibility, there would have been significant political backlash had UI not acted in a timely manor to prepare and execute its plan to provide power to the new customers.

Project Alternatives:
Option #1 was to provide service from four sidewalk vaults located along So.Orange St (one for a submersible 15kV switch, and one for each of the three submersible transformers). The plan was initially requested and agreed to by the customer so that no utilities would be seen within their property, but the customer would later reject the design when they received the costs from their contractor to build the equipment vaults.
Option #2 was to install UI's equipment in building vaults, but this was abandoned early on in the design stage as the customer did not have a lower building level, and it would have increased their costs significantly to construct a lower level within the building footprint to house UI's equipment.

Basis for Project Estimates
The basis for the estimates are from historical past projects as well as quoted costs for materials.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 20**	$ 20	$ -	$ -	$ -	$ -
# CIAC	**$ -11**	$ -11	$ -	$ -	$ -	$ -
# External Services	**$ 265**	$ 265	$ -	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 176**	$ 176	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 208**	$ 208	$ -	$ -	$ -	$ -
# Materials	**$ 230**	$ 230	$ -	$ -	$ -	$ -
# Overheads - External	**$ 269**	$ 269	$ -	$ -	$ -	$ -
Total	**$ 1,157**	**$ 1,157**	**$ -**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 546	$ 546	$ -	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

UI
An Avangrid company

Customer Project:
Square 10 Development (Phase 1A) aka:
New Haven Coliseum
20 George Street, New Haven, CT



UI Project #UH-U0002008

Distribution Engineering
Date of Report: 11/30/2023

Index

1. Project Description (Summary) 3
2. Existing Conditions 3
3. Need Statement 6
4. Engineering 8
   4.1. Option 1 8
      Table I Proposed Estimates 8
   4.2. Option 2 12
      Table II Proposed Estimates 12
   4.3. Option 3 12
      Table III Proposed Estimates 13
5. Project Milestones 14
6. Project Assumptions 15
7. Engineering Recommendations 15
8. Maps or Electrical Design 16

1. Project Description (Summary)

The vacant lot in downtown New Haven that was once the site of the Veterans Memorial Coliseum is being developed into the "**Square 10**" complex.

This ~5 acre site is bordered by George St, South Orange St, State St, and North Frontage Road and is currently begin used as a parking lot.

The Square 10 complex has been sold and split into four separate properties with different developers. The current plan consists of four buildings (each with EV chargers) with mixed retail, residential, and business areas as follows:

- **Building 1A** – 7 story building with 200 apartments and 16,000 sq ft of retail space (The electric service is expected to be energized in Q2 of 2024)
- Building 1B – 600,000 sq ft building with 120 apartments and parking garage (service to be energized by end of 2025)
- Building 1C – 277,000 sq ft "life sciences" medical / lab office building with a ground floor restaurant (service to be energized by end of 2024)
- Phase 2 – The remaining 1.5 acre plot will possibly be a high-rise mixed use bldg.

This report is specifically for the 1A portion of the project, as it has a standalone electric service from the other phases of the development.

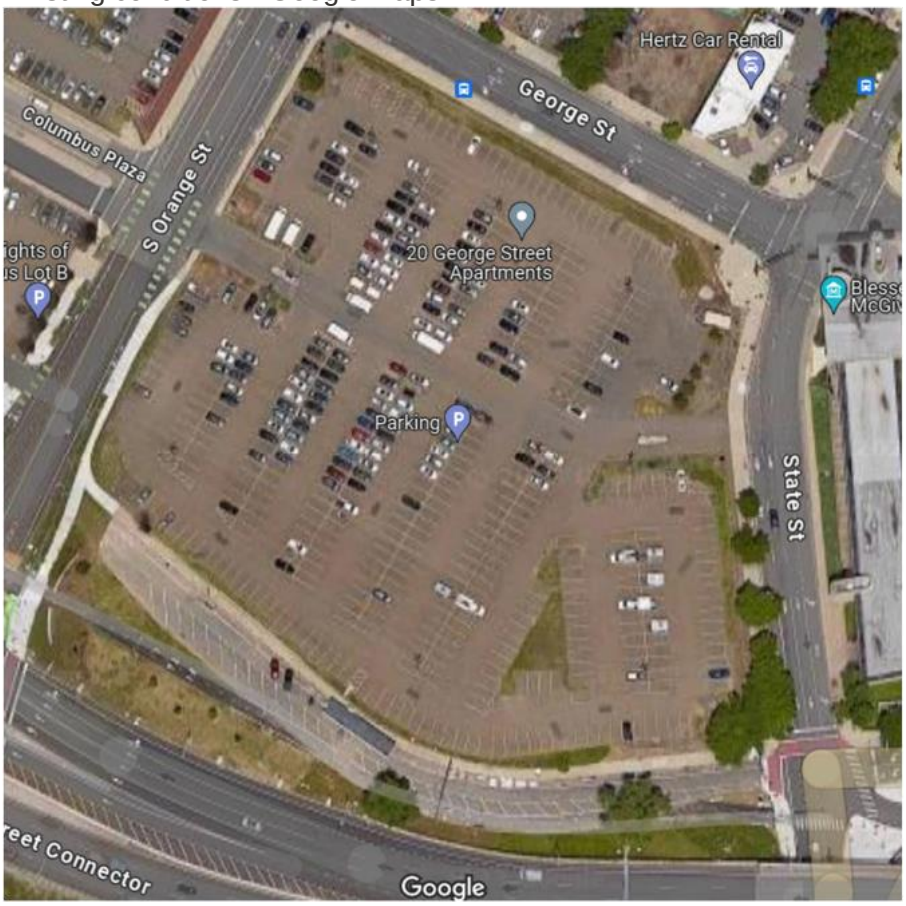
The developer/customer requested 4 electric services from UI to feed the 1A building, each at 208Y/120volts.

- 3000A service for 136-125A residential meters;
- 3000A service for 64-125A residential meters and a 1200A house meter;
- 1200A service for (4) retail tenants; and
- 600A service for a fire pump.

2. Existing Conditions

The property being developed is bound by George St, South Orange St, North Frontage Rd, and State Street. The 1A portion has road frontage only to George Street and South Orange Street. The property is in an area of New Haven that is served from the UI underground distribution system, and is just outside of the network boundary area.

Existing conditions - Google Maps.

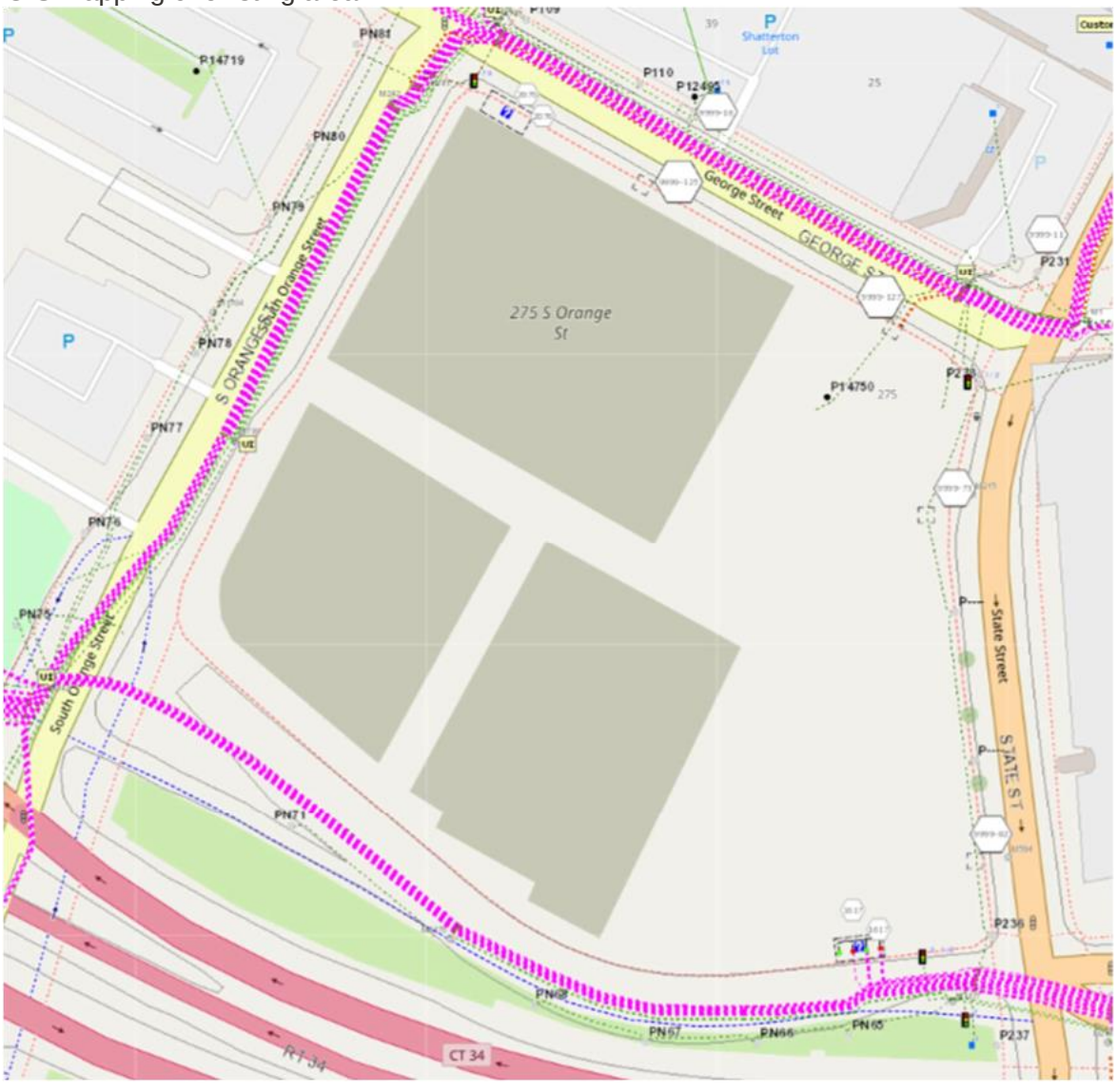


Phase 1A property located at the north-west portion of the development.



Internal Use

GIS mapping of existing area.



Internal Use

3. Need Statement

The developer requested the following services for the Phase 1A building:

- 3000A service for 136-125A residential meters;
- 3000A service for 64-125A residential meters and a 1200A house meter;
- 1200A service for (4) retail tenants; and
- 600A service for a fire pump.

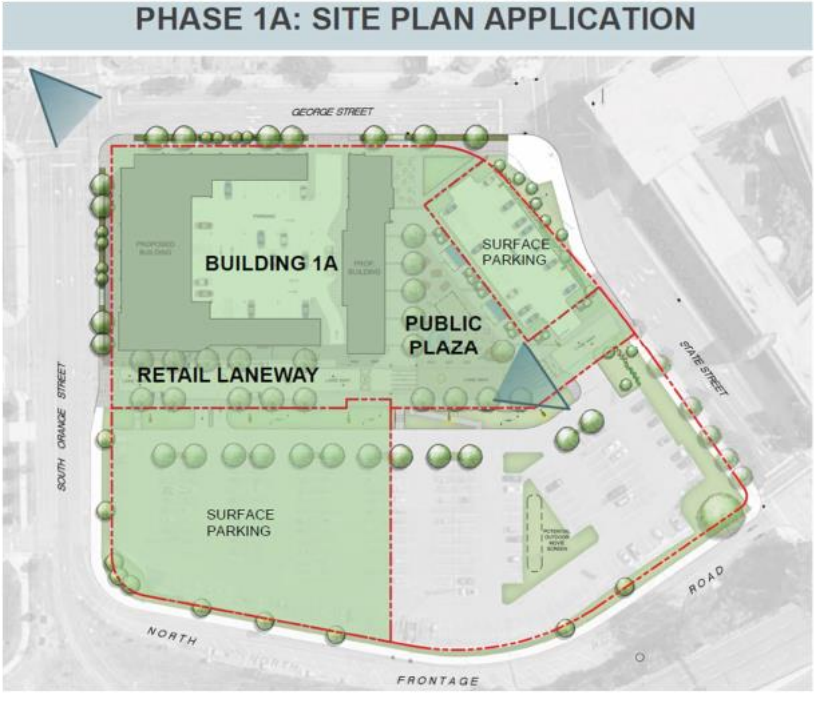
The quantity and sizes of the services for Phase 1A requires a design with three 3-phase transformers at 208Y/120volts and a high voltage (15kV) switch fed from the underground distribution system. A poleline is not an option as all electric facilities in this area of New Haven are underground. The proposed service date is Q3 of 2024.

Architect rendering of the completed development.

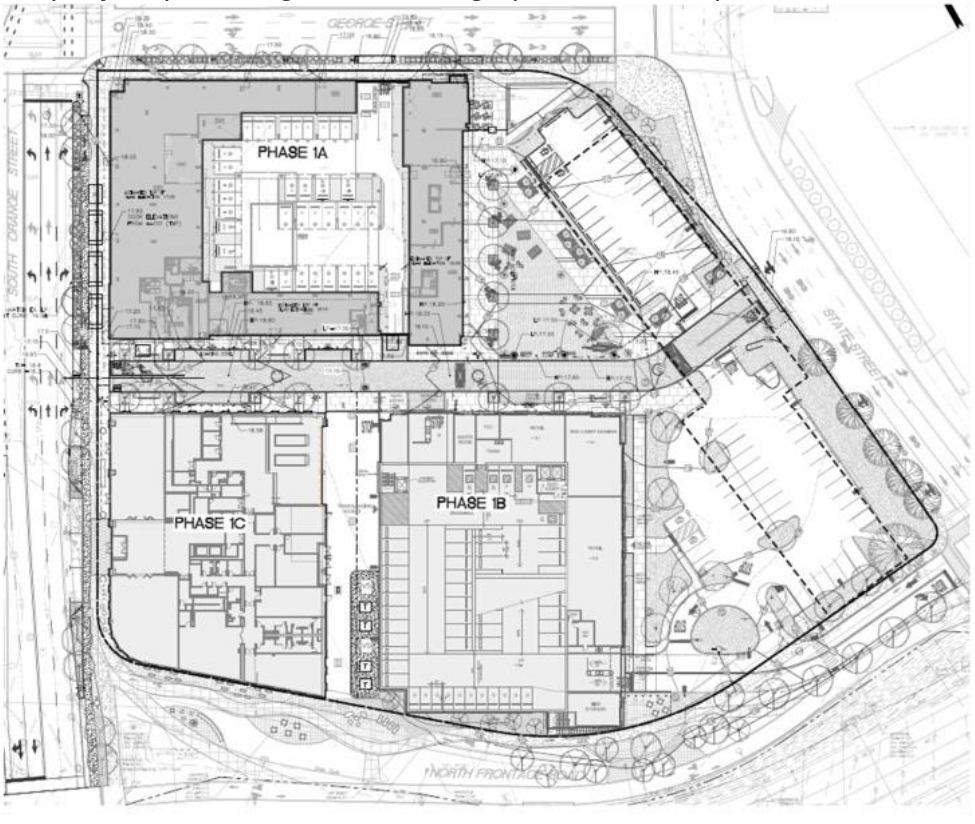


Internal Use

Property map showing Phase 1A development.



Property map showing future buildings (Phase 1B & 1C).



Internal Use

4. Engineering

4.1. Option 1

Option 1 was the original design to feed Phase 1A. It consisted of one new vista switch sidewalk vault, and three sidewalk transformer vaults at the west side of the property along So. Orange St. The customer requested all UI facilities to be installed below grade, so they are not visible to the public or take up space on the property.

In this option, the customer would be responsible for all civil work from the curb to the property, as well as the procurement and installation of the four precast concrete vaults.

UI would provide and install the following:

- Install (4) 4" laterals from SC242 to the curb.
- (2) 15kV feeder cables from SC242 to the Vista vault (CKT1850 & CKT1851).
- All 3#2 15kV cable from the vista vault to each transformer vault.
- Make up all primary and secondary connections in the vaults.
- Replace the 15kV P&L CKT1850 & CKT1851 cables on S.Orange from George St to North Frontage Rd.
- (2) 750kVA 3ph 208Y/120v submersible transformers.
- (1) 500kVA 3ph 208Y/120v submersible transformer.
- All 15kV terminations and splices for the above work.
- All 15kV switching to de-energize/re-energize CKT1850/CKT1851.

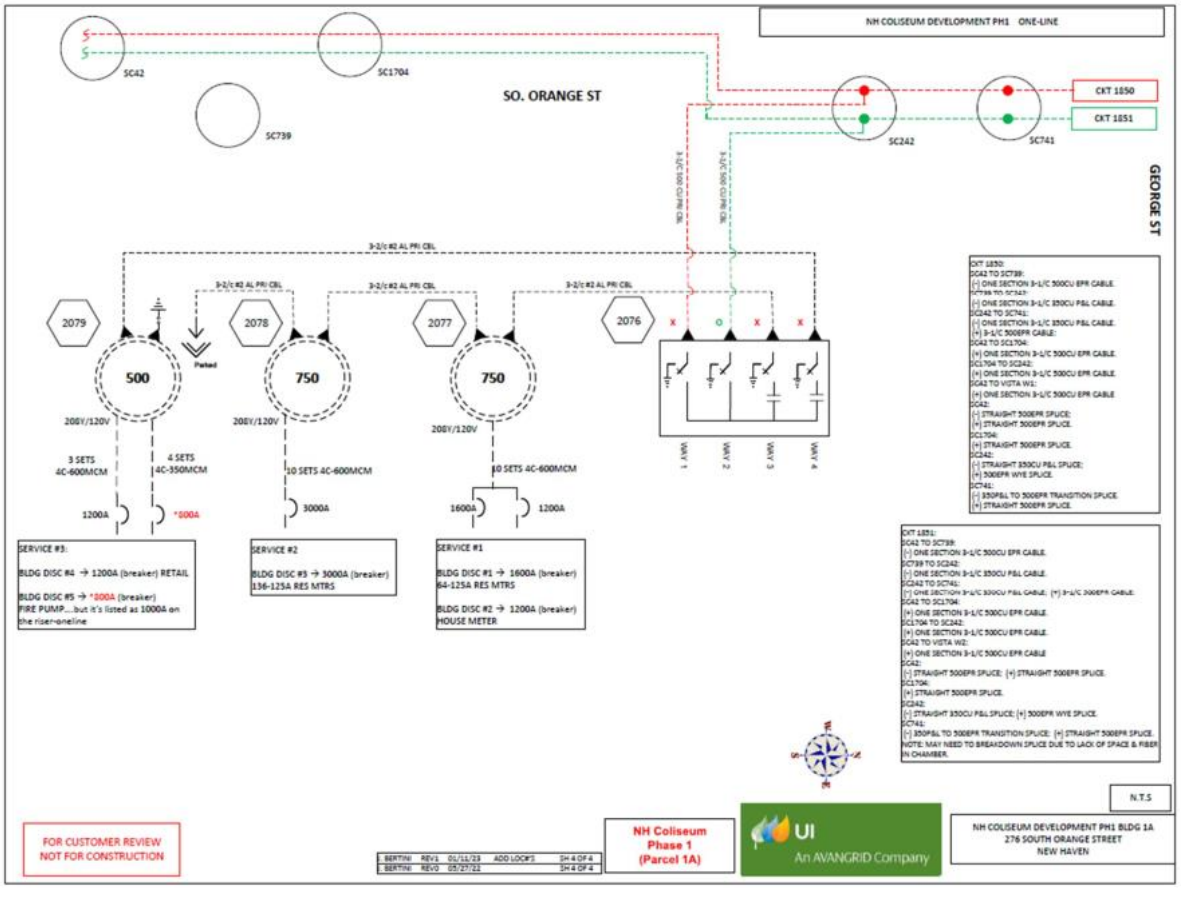
This option & design was originally accepted by the customer in 2022, but was later rejected in February 2023 by the customer when they received pricing for the procurement and installation of the precast concrete vaults.

Table I Proposed Estimates

	2023	2024	Total
UI Labor	$100,000	$53,000	$153,000
Material	$200,000	$47,900	$247,900
Contractors	$250,000	$44,700	$294,700
OH/AFUDC	$140,000	$45,000	$185,000
COR	$20,000	$4,600	$24,600
Contingency	$213,000	$58,500	$271,500
Total	$923,000	$253,700	$1,176700

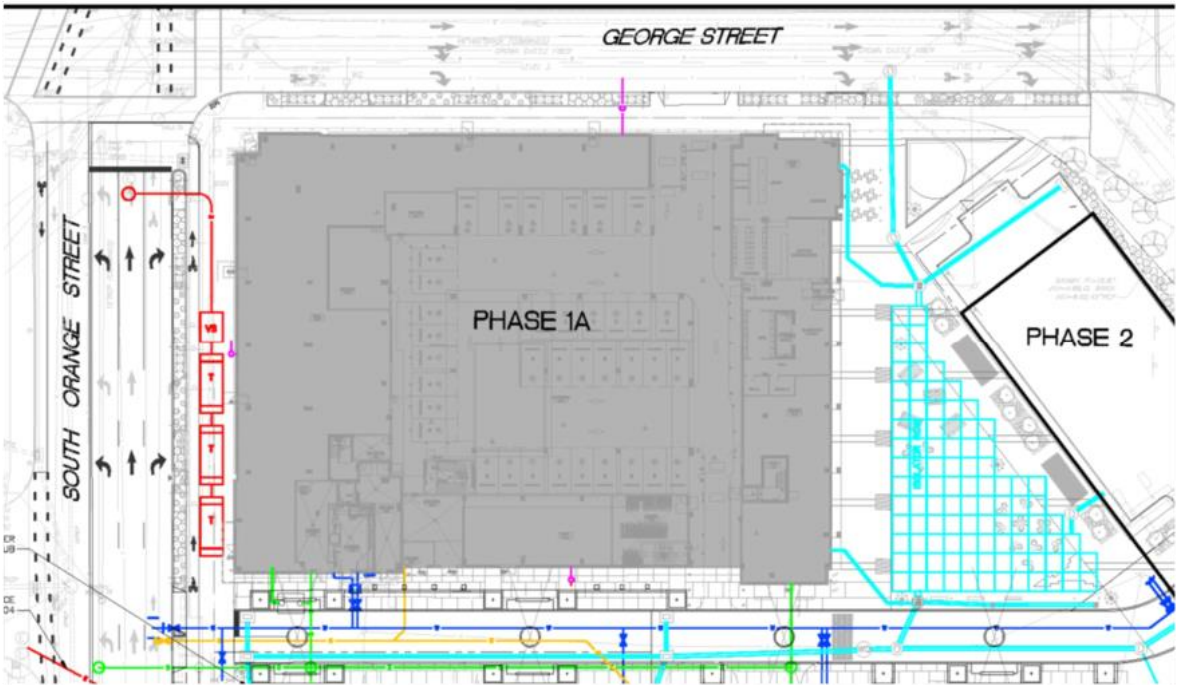
Note: this is a preliminary estimate with a +50%/-25% tolerance.

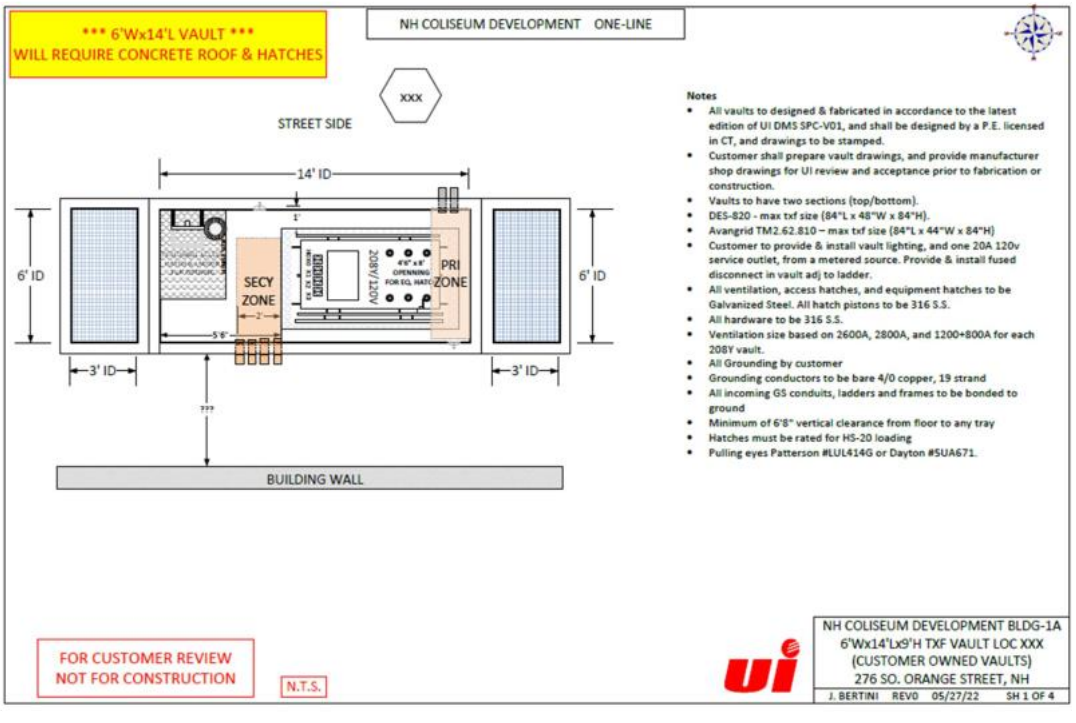
Option #1 design for (4) vaults located in S.Orange St sidewalk.



Internal Use

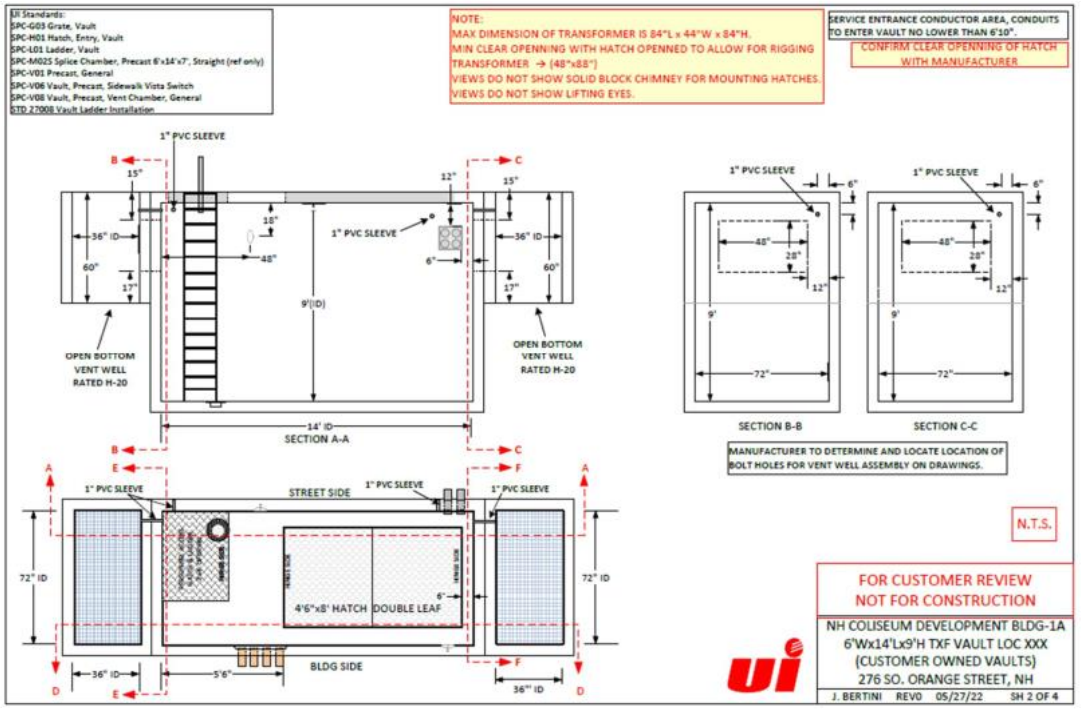
Option #1 design cont. (Electric facilities on customer site map are marked in red).

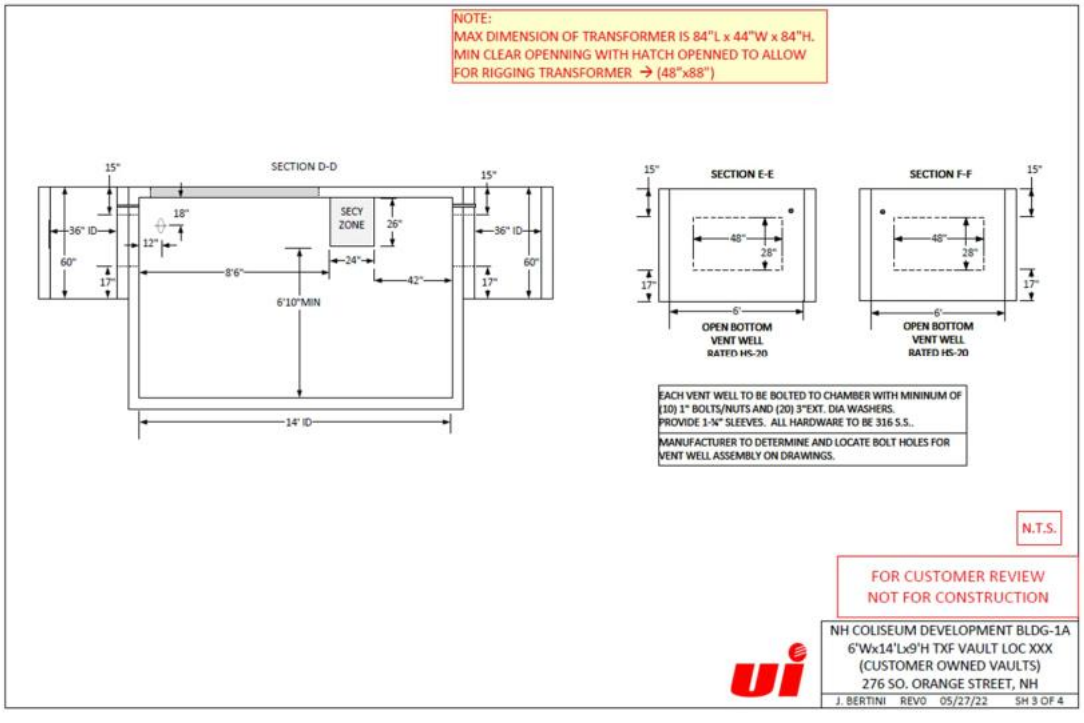




Internal Use

Option #1 design cont.





Internal Use

4.2. Option 2

After Option 1 was rejected by the customer, the developer requested UI to create a design with padmounted transformers (rather than submersible transformers) to save on cost. They also wanted to minimize the length of conduit between the vista vault and transformers. UI investigated using SC106 on George St and installing the vista and padmounted transformers directly across the street from SC106. Field inspections determined it was not possible to install (4) 4" laterals from SC106 to the customer's property due to the multiple underground utility conflicts that ran parallel to George St between SC106 and the customer's property, namely (42"RCP, 48"x60" brick sanitary line, gas, water, and multiple communication conduits). There are no available facilities in State Street that would allow UI to support the 15kV tap needed to support this design, and the same foreign utilities mentioned above are in State St prohibiting construction in this area.

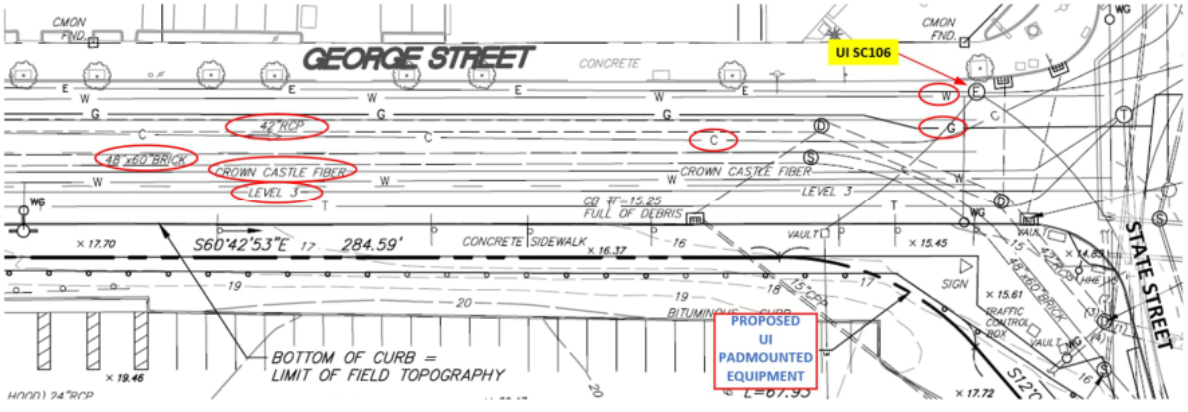


Table II Proposed Estimates

No cost estimates generated for Option 2 – as the design was not feasible.

4.3. Option 3

Option 3 was developed to allow the use of padmounted transformers on the east side of the property, while using two 15kV feeders from the only readily available location (SC242) located at South Orange Street. The design consists of one new vista switch sidewalk vault (Loc2076) located along George Street near the South Orange St intersection, two below grade 15kV junction boxes, and three padmounted transformers on the east side of the property near George Street and the intersection of State St.

In this option, the customer would be responsible for all civil work from the curb to the vault Loc2076, as well as the procurement and installation of the precast concrete vista vault Loc1976.

Internal Use

The customer would procure, install, own, and maintain all 15kV conduit systems from Loc2076 to the junction boxes, to the three transformers. As well as the two junction boxes, three transformer foundations, associated ground grid, protective bollards, and decorative barrier masonry wall between the transformers and George Street sidewalk.

UI would provide. Install, own, and operate the following:

- Install (4) 4" laterals from SC242 to the curb.
- (2) 15kV feeder cables from SC242 to the Vista vault (CKT1850 & CKT1851).
- All 3#2 15kV cable from the vista vault to the below grade junction boxes, and each of the three padmounted transformers.
- Make up all primary and secondary connections in the vault, junction boxes, and at the transformers.
- Replace the 15kV P&L CKT1850 & CKT1851 cables on S.Orange from George St to North Frontage Rd.
- (2) 750kVA 3ph 208Y/120v padmounted transformers.
- (1) 500kVA 3ph 208Y/120v padmounted transformer.
- All 15kV terminations and splices for the above work.
- All 15kV switching to de-energize/re-energize CKT1850/CKT1851.

UI will take over ownership of the vista sidewalk vault Loc2076 and the 15kV conduits between the South Orange St curb and Loc2076 (for the incoming 15kV feeders).

This would be the only cost effective design to deliver power to Square 10 Phase 1A.

Table III Proposed Estimates

	2023	2024	Total
UI Labor	$110,000	$60,000	$170,000
Material	$265,000	$50,000	$315,000
Contractors	$90,000	$45,000	$135,000
OH/AFUDC	$235,000	$81,000	$316,000
COR	$5,000	$6,000	$11,000
Contingency	$210,000	$71,000	$281,000
Total	$916,000	$313,000	$1,229,000

Note: this estimate has a +25%/-25% tolerance.

Internal Use

Actuals to	10/31/2023					
Cost Type	Charge Code	Resource	Cost Total		Actual Cost	
			Amount	Currency Code	Amount	Currency Code
Capital	Electric Distribution	# AFUDC	50,000.00	USD	1970	USD
Capital	Electric Distribution	# External Services	436,000.00	USD	6295	USD
Capital	Electric Distribution	# Materials	339,081.51	USD	1487	USD
Capital	Electric Distribution	# Internal, Overhea	130,000.00	USD	8270	USD
Capital	Electric Distribution	# Cost of Removal	11,000.00	USD		
Capital	Electric Distribution	# CIAC	-5,292.00	USD	-5292	USD
Capital	Electric Distribution	# Overheads - Exte	98,049.16	USD	24661	USD
Capital	Electric Distribution	# Internal, Labor	170,000.00	USD	50152	USD
Cost			**1,228,838.67**	**USD**		
Actual Cost					**87544**	**USD**

5. Project Milestones

1. Engineering design completed, and accepted by the customer in 2023.
2. UI laterals installed from SC242 to the curb in 2023.
3. Customer installed laterals from the curb to Loc2076 in 2023.
4. Customer installed sidewalk vista vault in 2023.
5. Customer to install vista vault riser and GS hatches in 2024.
6. Customer to complete all civil work between Loc2076 and the transformers.
7. UI to accept installation by customer January 2024.
8. UI to fit out Loc2076 and install 15kV vista switch January 2024.
9. UI to install three padmounted transformers January 2024.
10. UI to install 15kV cables January-February 2024.
11. UI to make all 15kV terminations February 2024.
12. UI feeder outages CKT1850/CKT1851 to energize vista switch February 2024.
13. UI to energize one transformer for temp service February 2024.
14. Customer to install all service entrance equipment April 2024.
15. UI to energize services May 2024.

Internal Use

16. Project close out completed June 2024.

6. Project Assumptions

1. UI will be able to construct the new facilities as designed.
2. UI will be granted easement to its facilities on private property (sq10 1A).
3. UI will be granted equipment access from George St.
4. The customer applies for service, and the local AHJ releases the services for energizing.
5. The customer installs all metering & remote meter reading equipment as planned.
6. The customer signs the Responsibility Letter, The construction Agreement, and pays in advance for any portion of work that is billable.
7. All UI construction work will be done during the normal business week and hours.
8. All permitting is obtained.

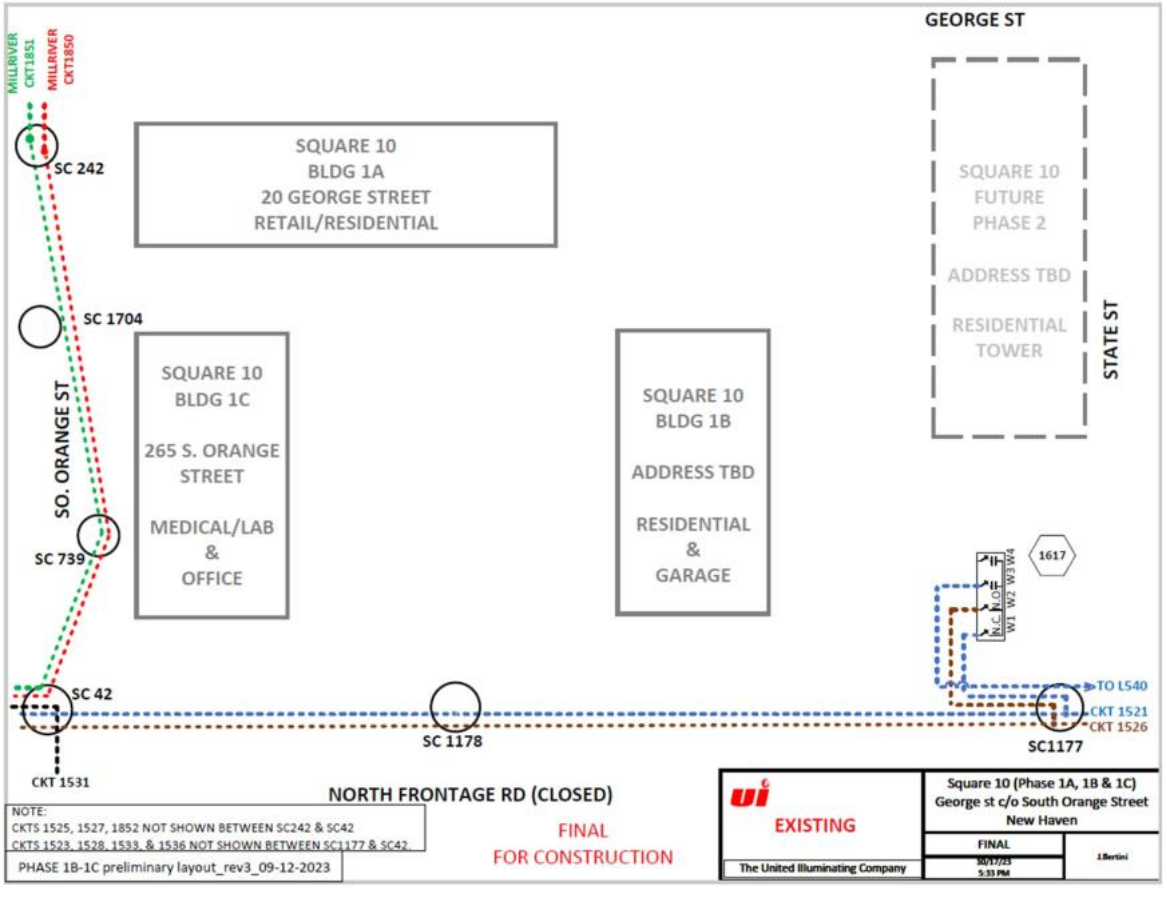
7. Engineering Recommendations

Due to the limited space on the property, and the limited available splice chamber locations that could be used in this area, UI recommends Option 3 to deliver power to the Square 10 1A property.

Internal Use

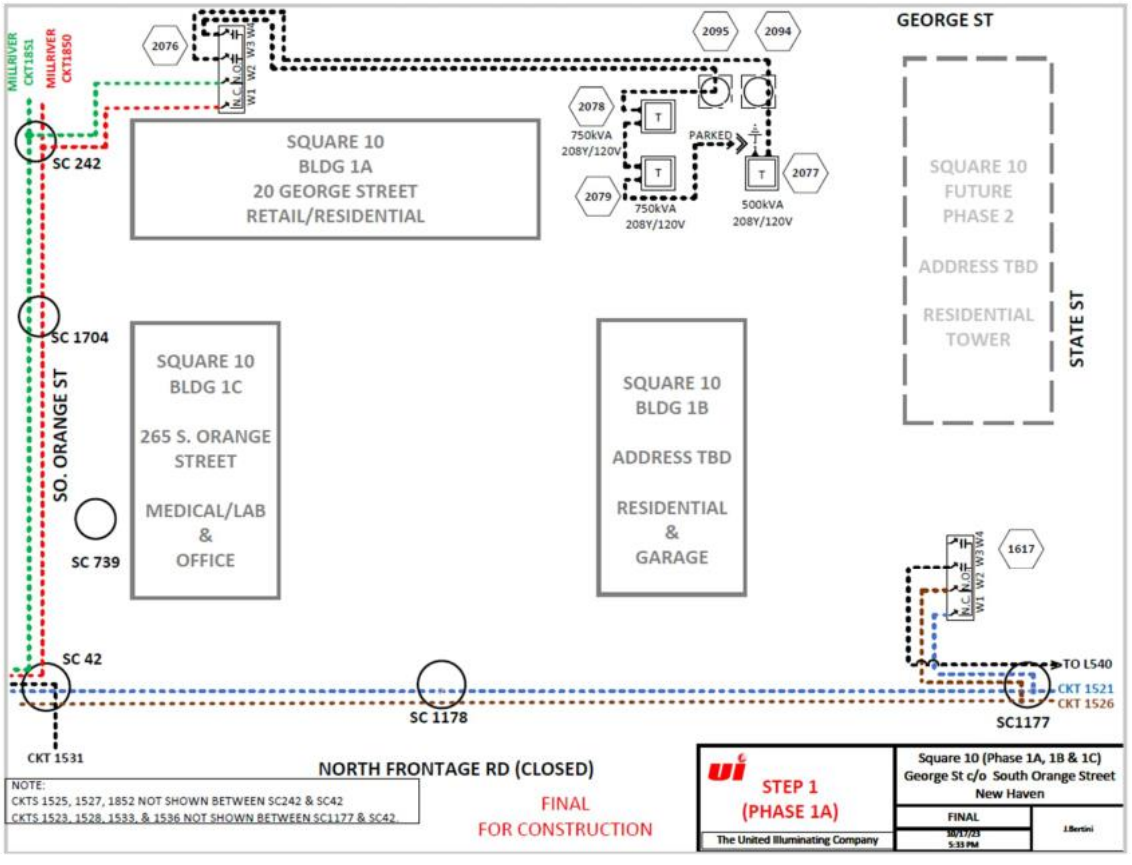
8. Maps or Electrical Design

Phase 1A - Existing Oneline

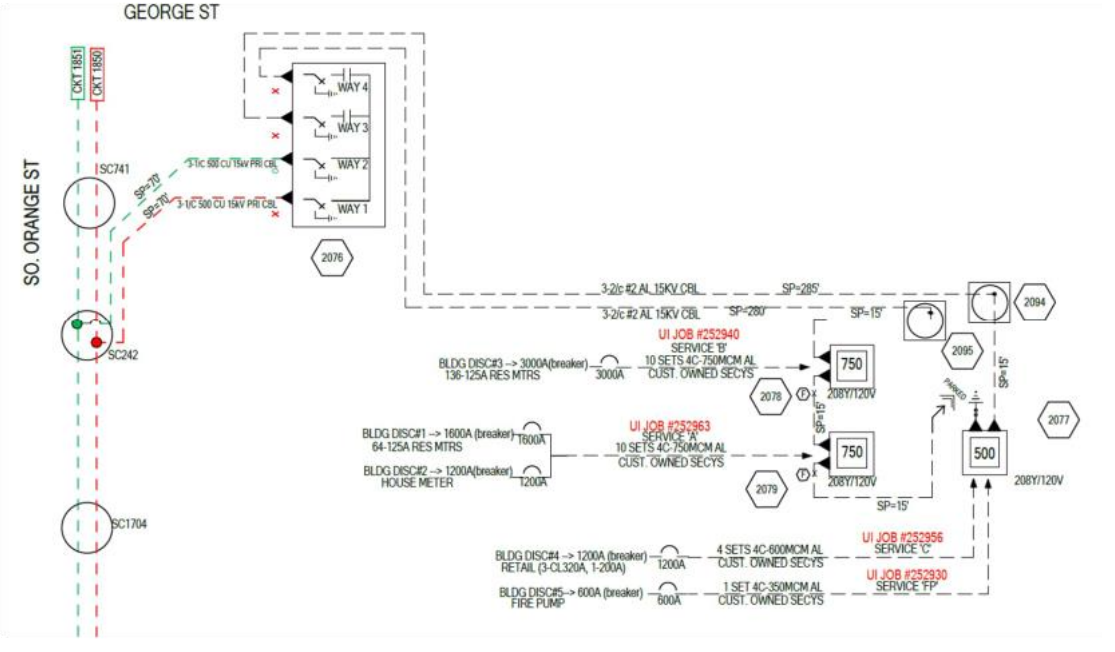


Internal Use

Phase 1A - Proposed Oneline (Option 3)

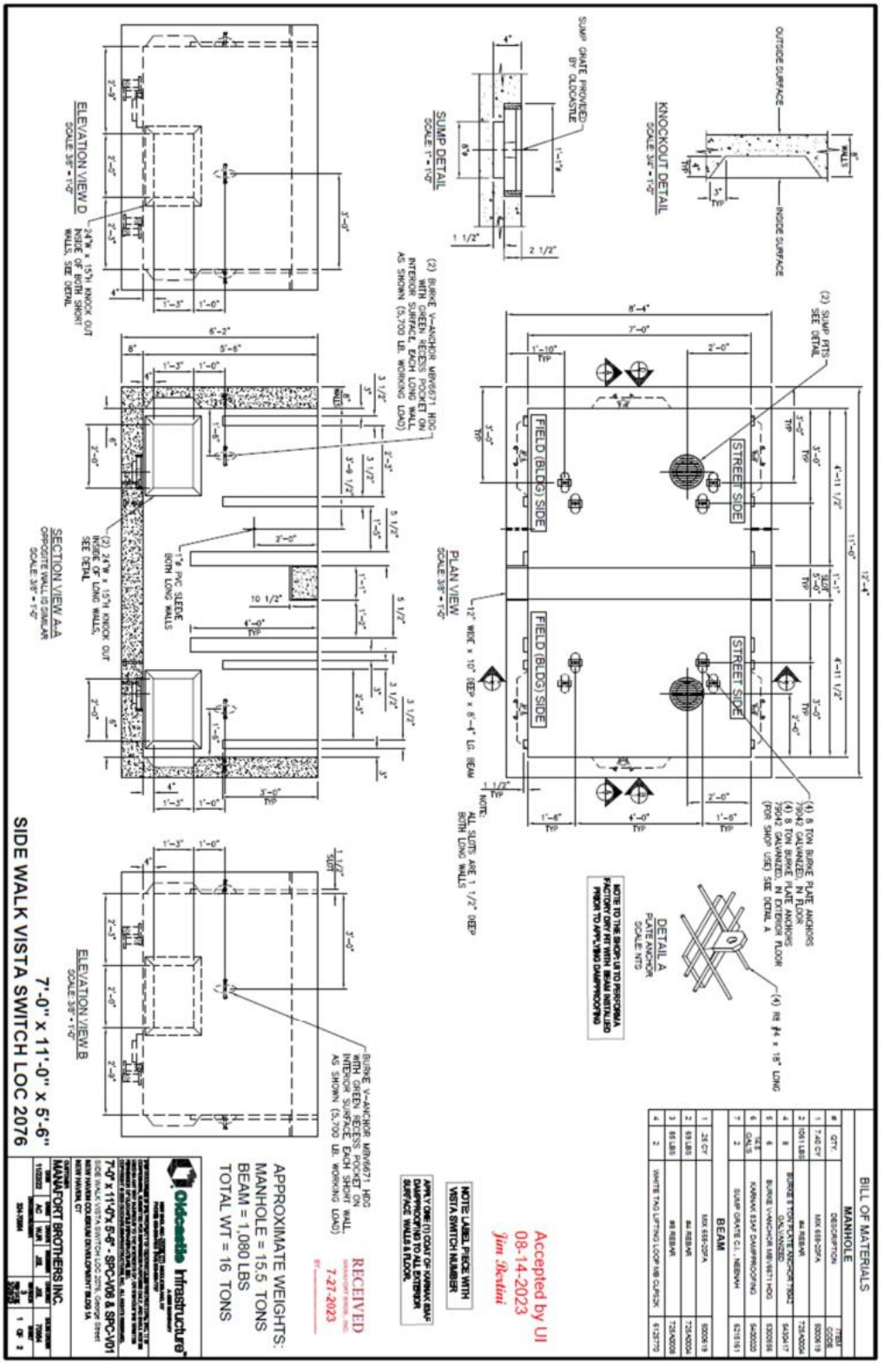


Phase 1A - Proposed OneLine (including services) (Option 3)



Internal Use

Vista Vault L2076 Detail (Option 3)



Internal Use

May 2023 – Phase 1A construction.



October 2023 – Phase 1A construction.



Internal Use

October 2023 (Customer excavation for UI Vista switch sidewalk vault L2076).



Internal Use

October 2023 (L2076 vista vault installation – west wall).



October 2023 (lateral installation curb to L2076 vault west wall).





Internal Use

Internal Use

PRJ-004328

UI - New Haven Coliseum 1B & 1C – CAP

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - New Haven Coliseum 1B & 1C - CAP

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-004328	Electric Distribution	Lyons, Robin	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	New Connections	IP3 Financial Execute	Program/As Spent	Program/As Spent

Project description:

Square 10 Development - Building 1B & 1C
275 South Orange St New Haven, CT
(aka New Haven Coliseum Development)

Building 1B will be a 158k sqft building with 150 apartments and a parking garage.
Buidling 1C will be a 277k sqft "life sciences" medical / lab office building with a ground floor restaurant.
The current plan proposed by the develper is to start 1C then start 1B when 1C is almost complete.

Project Scope:

Civil Scope: (to serve 1B & 1C)
Install ~150' (4) 4" laterals from SC#1178 on No.Frontage Rd to the curb for a customer supplied vista switch vault for building 1C.
Customer to install all civil work on private property, including conduit between the vistas, precast foundations, and txf foundations.
Electrical Scope:
Procure and install (1) S&C 422 Vista Switches (D8057120), base spacer, and enclosure.
Use the existing Vista L1617-Way 4 to feed the two transformers for building 1B.
Procure and install (2) 1500kVA 480Y/277v transformers for 1C and (2) 750kVA 208Y/120v transformers for 1B.
Procure and install ~800' of 3-1/c 500mcm cu 15kV FS UG cable from SC#109->242-SC1704-SC42, and from SC242 to the vistas.

Procure and install ~300' 3-2/c #2AL 15kV URD cable.

Project Benefits:

The vacant lot in downtown New Haven that was once the site of the Veterans Memorial Coliseum is finally being developed into the "Square 10" complex.
Building 1B – 158,000 sq ft building with 150 apartments and parking garage
Building 1C – 277,000 sq ft "life sciences" medical / lab office building with a ground floor restaurants

The developer has delayed the start of 1C due to the high interest rates and lack of tenant lease commitments. UI is waiting on the developer to restart the 1B and 1C construction.

Project Risks and Mitigation Plan:

The risk for the project is avaiability of materials, and the customer's schedule. UI has completed its design and ordered long lead items. The intent is to be ready when construction resumes.

Risk of No Action:

UI is obligated to serve its customers, so the risk of not doing so is not a viable option. Building 1C is expected to serve the downtown New Haven area with research tenants such as Yale and other high profile companies. Building 1B will have residential units and parking, and UI would need to provide power to it in a timely manner with an agreed upon design.

Project Alternatives:
Due to the location of the property and the limited access to adjacent streets, the only viable option was to serve the customers from the section of North Frontage Rd between South Orange St and State St.

Basis for Project Estimates
The basis for the estimates are from historical past projects as well as quoted costs for materials.
•The 1C building, which will be built first, will require appr. 150' of 4" laterals from SC1178 to the curb.
•One S&C Vista 422 15kV switch, appr. 800' of 3-1/c 500cu epr 15kV cable, 15kV splices, 15kV terminations, and 4 sets of 200A 15kV elbows.
•UI will also provide and install 2-1500kVA padmounted transformers and make up all customer 600V connections at UI transformers.
•The 1B building will be constructed when 1C is complete, and will utilize an existing S&C vault style Vista 422 15kV switch.
•UI will stub out of the vault with 4-4" conduits, and install approximately 300' of 3#2 urd 15kV cable to two UI provided and installed padmounted transformers at 120/208volts.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 52**	$ -	$ 35	$ 17	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 671**	$ 275	$ 262	$ 134	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 183**	$ -	$ 122	$ 61	$ -	$ -
# Internal, Overheads	**$ 142**	$ 33	$ 73	$ 37	$ -	$ -
# Materials	**$ 233**	$ -	$ 155	$ 78	$ -	$ -
# Overheads - External	**$ 223**	$ 42	$ 120	$ 61	$ -	$ -
Total	**$ 1,504**	**$ 350**	**$ 767**	**$ 387**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 1,154	$ -	$ 767	$ 387	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

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Customer Project:
Square 10 Development (Phase 1B/1C)
aka: New Haven Coliseum
265/275 South Orange Street, New Haven, CT



UI Project #UH-U0002010

Distribution Engineering
Date of Report: 09/11/2024

Index

1. Project Description (Summary) 3
2. Existing Conditions 4
3. Need Statement 6
4. Engineering 7
   4.1. Option 1 7
      Table I Proposed Estimates 9
   4.2. Option 2 10
      Table II Proposed Estimates 11
   4.3. Option 3 11
      Table III Proposed Estimates 11
5. Project Milestones 12
6. Project Assumptions 13
7. Engineering Recommendations 13
8. Maps or Electrical Design 14

1. Project Description (Summary)

The vacant lot in downtown New Haven that was once the site of the Veterans Memorial Coliseum is being developed into the "**Square 10**" complex.

This ~5 acre site is bordered by George St, South Orange St, State St, and North Frontage Road and is currently under construction for Building 1A.

The Square 10 complex has been sold and split into four separate properties with different developers. The current plan consists of four buildings (each with EV chargers) with mixed retail, residential, and business areas as follows:

- Building 1A – 7 story building with 200 apartments and 16,000 sq ft of retail space (The electric service was energized in Q2 of 2024) (20 George St).
- **Building 1B** – 600,000 sq ft building with 120 apartments and parking garage (service to be energized in 2026) (275 S. Orange St).
- **Building 1C** – 277,000 sq ft "life sciences" medical / lab office building with a ground floor restaurant (service to be energized in 2025) (265 S. Orange St).
- Phase 2 – The remaining 1.5-acre plot will possibly be a high-rise mixed use bldg.

This report is specifically for the 1B/1C portion of the project, as it has stand-alone electric services fed from North Frontage Rd and is separate from the other phases.

Building 1B: The developer (Spinnaker) requested 2 electric services from UI to feed the 1B building, each at 208Y/120volts. Developer waiting for 1C to be completed prior to starting construction.

- (2) 3000A services with 120 self-contained meters

Building 1C: The developer (Consigli) requested 3 electric services from UI to feed the 1C building, each at 480Y/277volts. Developer waiting for signed leases before starting construction.

- (2) 2500A services with CT rated revenue meters
- (1) 400A service with CT rated revenue meter for the fire pump
- (1) 1600A "Future" with CT rated revenue meter for mechanical services.

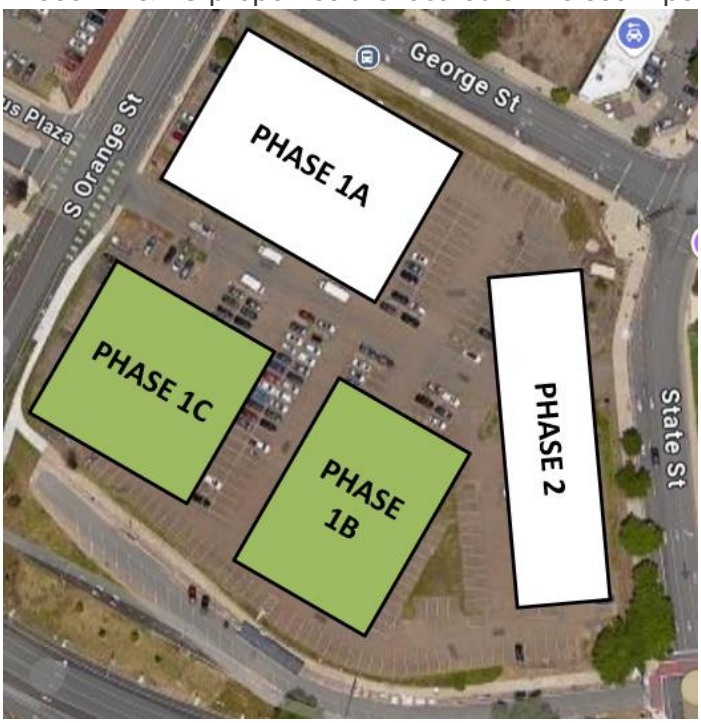
2. Existing Conditions

The property being developed is bound by George St, South Orange St, North Frontage Rd, and State Street. The 1B portion has road frontage to North Frontage Rd, and 1C to South Orange St and North Frontage Rd. The property is in an area of New Haven that is served from the UI underground distribution system, and just outside of the network boundary area.

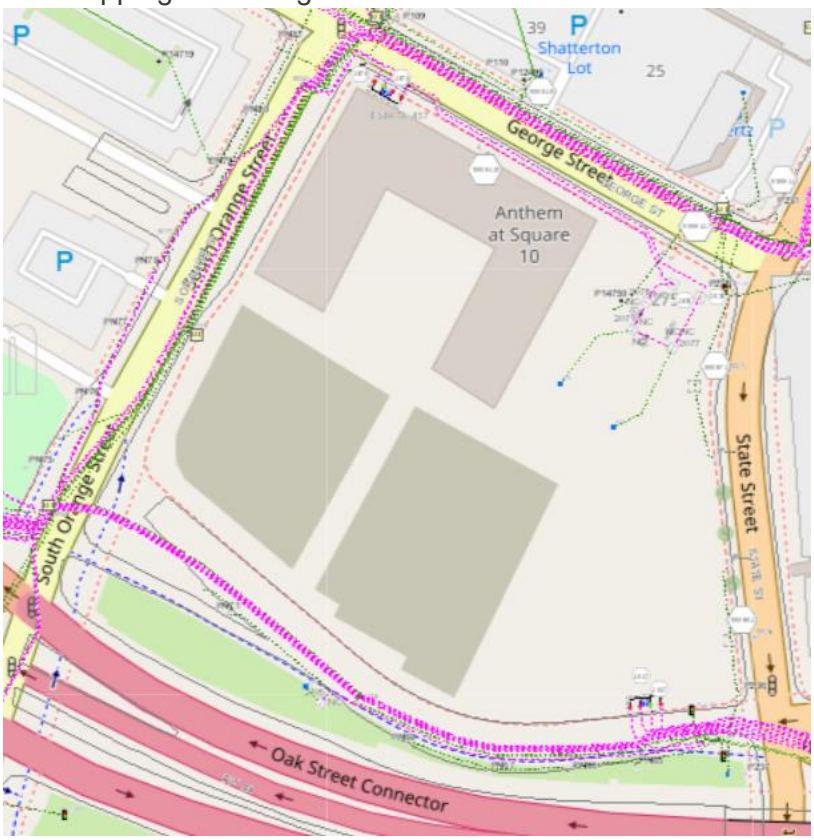
Existing conditions (Phase 1A services energized) - Google Maps.



Phase 1B & 1C properties are located at the south portion of the development.



GIS mapping of existing area.



3. Need Statement

The developers requested the following services for the Phase 1B/1C buildings:

- 1B: (2) 3000A 208Y/120v services with 120 self-contained meters.
- 1C: (2) 2500A 480Y/277v services with two CT rated meters.
- 1C: (1) 400A 480Y/277v service with CT rated meter for the fire pump.

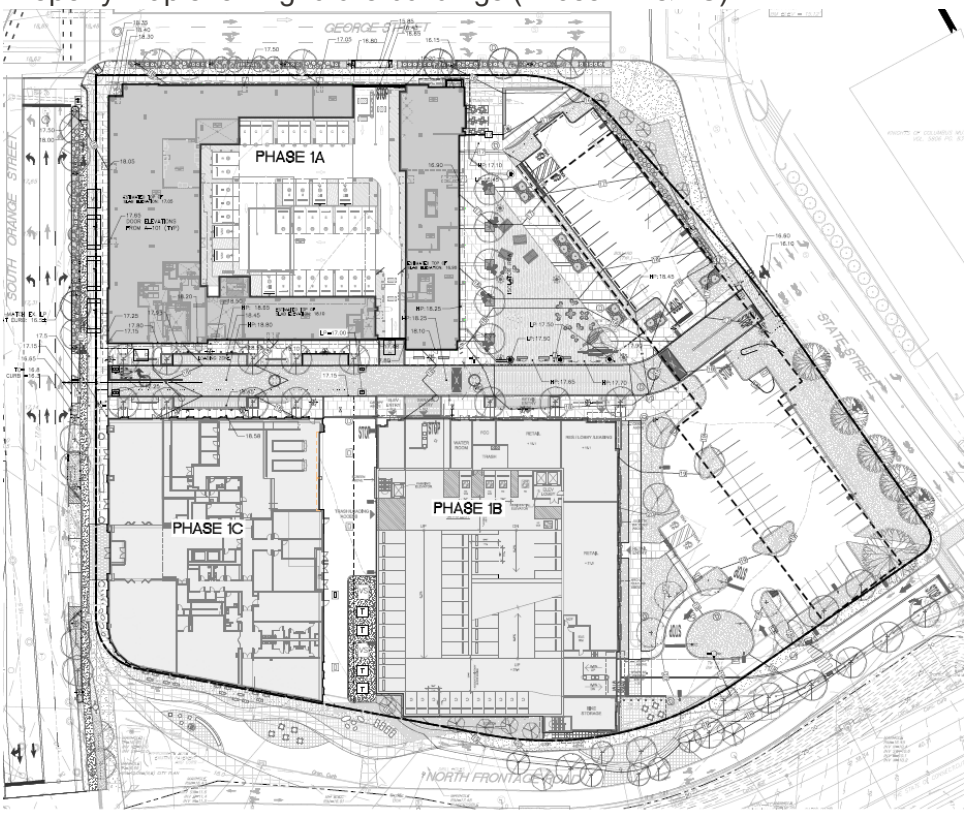
The quantity and sizes of the services for Phase 1B require a design with two 3-phase transformers at 208Y/120volts and existing high voltage (15kV) switch L1617 fed from the underground distribution system. A pole line is not an option as all electric facilities in this area of New Haven are underground. The proposed service date is 2026. The customer has not finalized designs and is waiting for 1C building to be completed before they start construction. The information above is the latest UI has at hand for planning purposes.

The quantity and sizes of the services for Phase 1C require a design with two 3-phase transformers at 480Y/277volts and a new high voltage (15kV) switch L2107 fed from the underground distribution system. A pole line is not an option as all electric facilities in this area of New Haven are underground. The proposed service date is 2025. The customer has finalized design but is waiting for signed leases prior to starting construction. The information above is the latest UI has at hand for planning and financial purposes.

Architect rendering of the completed development.



Property map showing future buildings (Phase 1B & 1C).



4. Engineering

4.1. Option 1

Option 1 design would have located both 1B & 1C electric facilities together to serve both buildings 1B and 1C. UI would install two underground 15kV feeders to their property from S. Orange St from SC1704. The customer would install one private splice chamber and ductline on private property for UI use. They would also install one precast concrete vault and one precast concrete foundation for the two new padmounted 15kV S&C Vista switches, as well as four precast concrete foundations for the four UI transformers. They would leave space for a future padmounted transformer if they required additional load in the future.

In this option, the customer would be responsible for all civil work from the curb thru private property, as well as the procurement and installation of the precast concrete structures and ductline.

UI would provide and install the following:

- Install (4) 4" laterals from SC1704 to the curb.
- (2) 15kV feeder cables from SC1704 to the Vista switch (CKT1521 & CKT1531).
- All 3#2 15kV cable from the vista switches to four padmounted transformers.
- Make up all primary and secondary connections at the UI transformers.
- (1) 15kV S&C Vista Model 422 padmounted switch for 1B.
- (1) 15kV S&C Vista Model 422 padmounted switch for 1C.
- (2) 750kVA 3ph 208Y/120v padmounted transformers for 1B.
- (2) 1500kVA 3ph 480Y/277v padmounted transformers for 1C.
- (1) "FUTURE" 500kVA 3ph 480Y/277v padmounted transformer-if needed.
- All 15kV terminations and splices for the above work.
- All 15kV switching to de-energize/re-energize the UI feeders to the site.

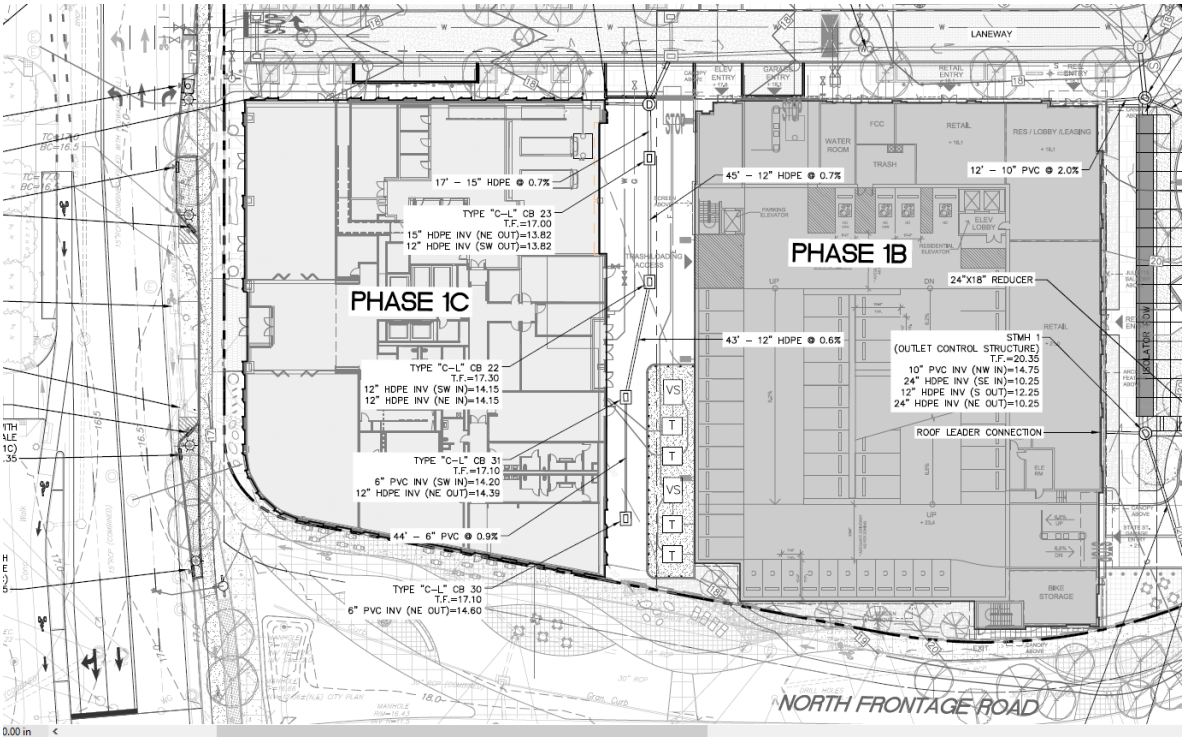
This option & design was tentatively accepted by the customer in 2022, but later rejected as UI & the customer could not agree on the exact ductline & SC locations. UI preferred its facilities to be in the driveway for truck access - with easement. The customer preferred the UI facilities to be in the sidewalk close to the buildings - with easement. That would have required UI to block tenant entrances while working on the system – either for future planned work or emergencies, which UI deemed unacceptable.

Several iterations of this design were developed but eventually abandoned prior to preparing UI cost estimates. The customer determined the amount of excavation and conduit installation was not the most cost-effective design for their 1B project. They rotated the 1B building design by 90 degrees which allowed them to install two transformers at the east side of the building and utilize an existing UI vista switch L1617. This became the Option 2 that was selected to be constructed.

Table I Proposed Estimates

None prepared as this option was determined not acceptable by the 1B developer, but with the additional vista switch and cabling, the total cost to UI would have exceeded the Option #2 cost by $200k to $300k. The designs are similar except for the additional 15kV padmounted switch and associated cables to support the 2nd switch.

Option #1 design cont. (Electric facilities on customer site map).



4.2. Option 2

After it was determined that UI and the 1B developer could not agree on equipment location for Option 1, the developer requested UI to create a design with padmounted transformers for 1B to the east side of the building but leaving the transformers for 1C in the alley as in option 1. This was able to be achieved after the developer rotated the design of the building by 90 degrees and adjusted the parking garage entrance to allow sufficient space to the east of 1B building for two padmounted transformers. This also reduced the length of excavation and conduit between the vista switch and transformers, saving the developer additional money. UI investigated this option and determined we would be able to feed both 1B and 1C buildings from North Frontage Rd. By doing so, it eliminated the need for a ductline under the sidewalk along their private property drive. It also eliminated the need to install a 2nd 15kV padmounted Vista switch.

UI would provide and install the following items:

Civil Scope: (to serve 1B & 1C)

- Install ~150' (4) 4" laterals from SC#1178 on No.Frontage Rd to the curb for a customer supplied vista switch vault for building 1C.
- Install ~5' stubout (2) 4" laterals from L1617 on No. Frontage Rd for bldg. 1B.

Electrical Scope (to serve 1B & 1C):

- Procure and install (1) S&C 422 Vista Switch (D8057120), base spacer, and enclosure for (1C).
- Procure & install (4) three phase txfs:
- 3Phase 13.8kV x 208Y/120V – 750kVA (bldg 1B)
- 3Phase 13.8kV x 480Y/277V - 1500 kVA (bldg 1C)
- Procure and install ~800' of 3-1/c 500mcm cu 15kV FS UG cable from SC#42→SC1178→L2106 vista.
- Procure and install ~260' 3-2/c #2AL 15kV URD cable.
- Procure and install all 15kV terminations and splices.
- Make up all primary and secondary connections at the UI transformers.
- All 15kV switching to de-energize/re-energize the UI feeders to the site.

Table II Proposed Estimates

Option 2. (Phase 1B & 1C) from PPM

Cost Type	Charge Code	Resource			
			2025	2026	Total
Capital	Electric Distribution	# AFUDC	34,933.60	17,466.80	52,400.40
Capital	Electric Distribution	# External Services	262,029.08	133,702.00	395,731.08
Capital	Electric Distribution	# Materials	155,000.00	77,500.00	232,500.00
Capital	Electric Distribution	# Internal, Overheads	72,611.73	36,542.38	109,154.11
Capital	Electric Distribution	# Overheads - External	120,337.50	60,506.42	180,843.92
Capital	Electric Distribution	# Internal, Labor	122,312.75	61,156.00	183,468.75
Capital	Electric Distribution	# COR - Ext Svc	8,000.00	8,000.00	16,000.00
Capital	Electric Distribution	# COR - Ext OH	3,490.34	3,490.34	6,980.68
CAP			**767,224.66**	**386,873.60**	**1,154,098.26**
COR			**11,490.34**	**11,490.34**	**22,980.68**
Total			**778,715.00**	**398,363.94**	**1,177,078.94**

Note: this is estimate has a +25%/-25% tolerance.

4.3. Option 3

There is no Option 3 prepared for this project, as there are no other available areas to feed the property from. Although State Street abuts the east side of the property, using State St to serve Phases 1B and 1C would have created conflict for UI underground facilities that are needed to serve Phase 2 of the project. UI is reserving space in State St for Phase 2.

Table III Proposed Estimates (n/a)

5. Project Milestones

1. Engineering design completed and accepted by the customer in 2023.
2. UI laterals installed from SC1178 to the curb in 2023-Q4.
3. UI to energized one padmounted transformer for temp service February 2024.
4. Customer to install laterals from the curb to Loc2106 in 2025.
5. Customer to install vista vault in 2025.
6. Customer to complete all civil work in 2025.
7. UI to accept installation by customer 2025-Q2.
8. UI to install 15kV vista switch 2025-Q3.
9. UI to install two padmounted transformers 2025-Q3.
10. UI to install 15kV cables 2025-Q4.
11. UI to make all 15kV terminations 2025-Q4.
12. UI feeder outages CKT1521/CKT1531 to energize vista switch 2025.
13. Customer to install all service entrance equipment 2025.
14. UI to energize 1C services 2026-Q1.
15. Customer to install conduits and foundations for 1B 2026-Q1.
16. UI to install two transformers for 1C 2026-Q2.
17. UI to energize 1C services 2026-Q3.
18. Project close out 2026-Q4.

6. Project Assumptions

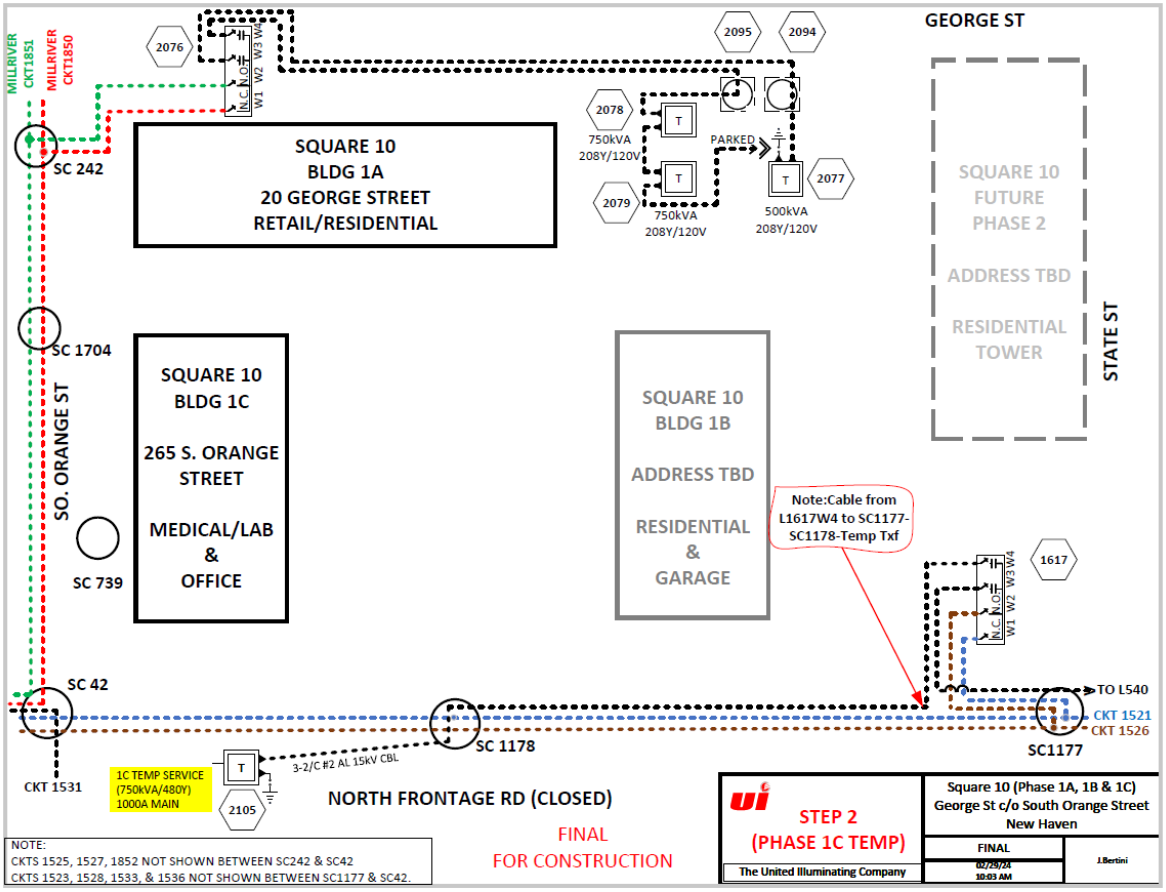
1. The 1B & 1C developers obtain signed leases and funding to start construction.
2. The developers do not change design, and start dates are not delayed beyond 2025.
3. UI will be able to construct the new facilities as designed.
4. UI will be granted easement to its facilities on private property (Sq10 1B/1C).
5. UI will be granted equipment access from North Frontage Rd.
6. The City of NH provides an acceptable design for UI truck access at North Frontage Rd between State St and S. Orange St. The City is transitioning this section to a park with utility truck access.
7. The customer applies for service, and the local AHJ releases the services for energizing.
8. The customer installs all metering & remote meter reading equipment as planned.
9. The customer signs the Responsibility Letter, The Construction Agreement, and pays in advance for any portion of work that is billable.
10. All UI construction work will be done during the normal business week and hours.
11. All permitting is obtained.

7. Engineering Recommendations

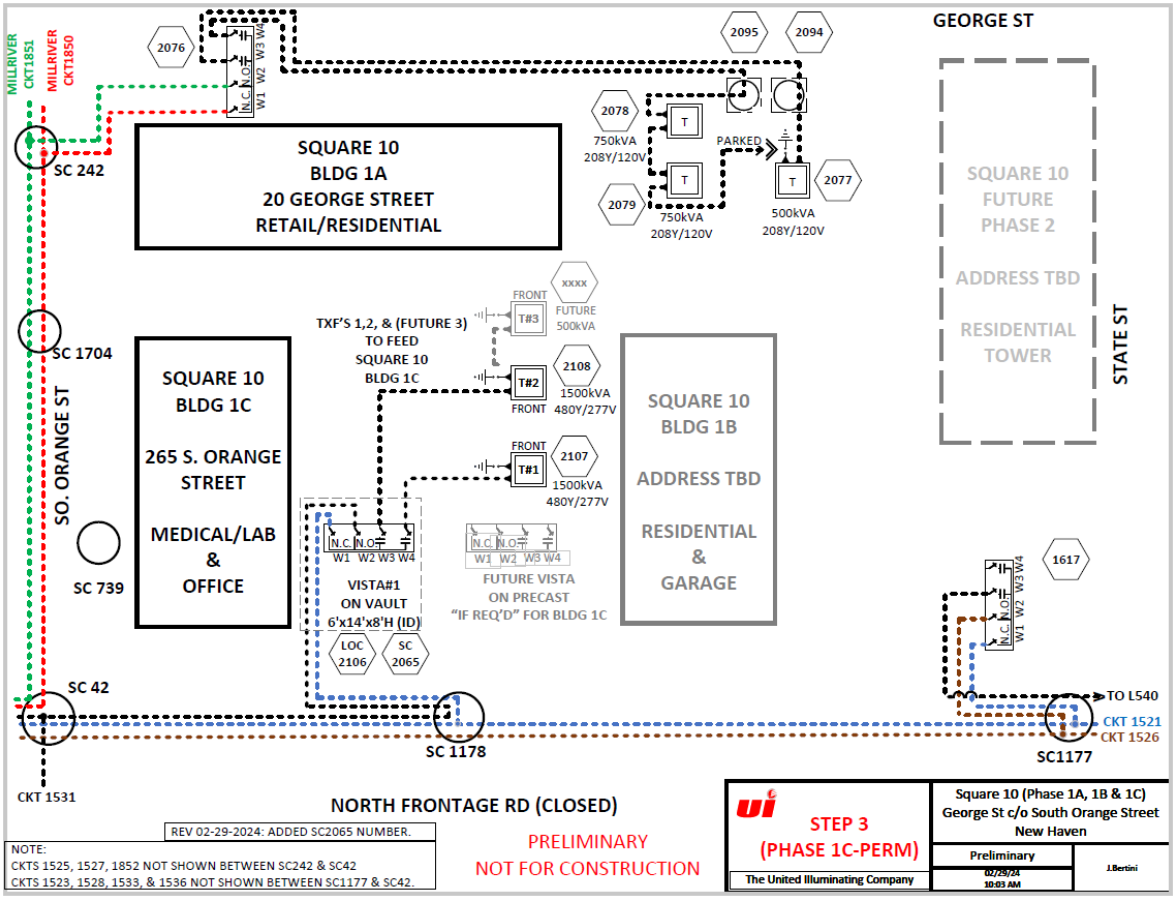
Due to the limited options to bring electric service to the property to feed both 1B and 1C buildings, UI recommends Option 2 to deliver power to the Square 10 (1B & 1C).

8. Maps or Electrical Design

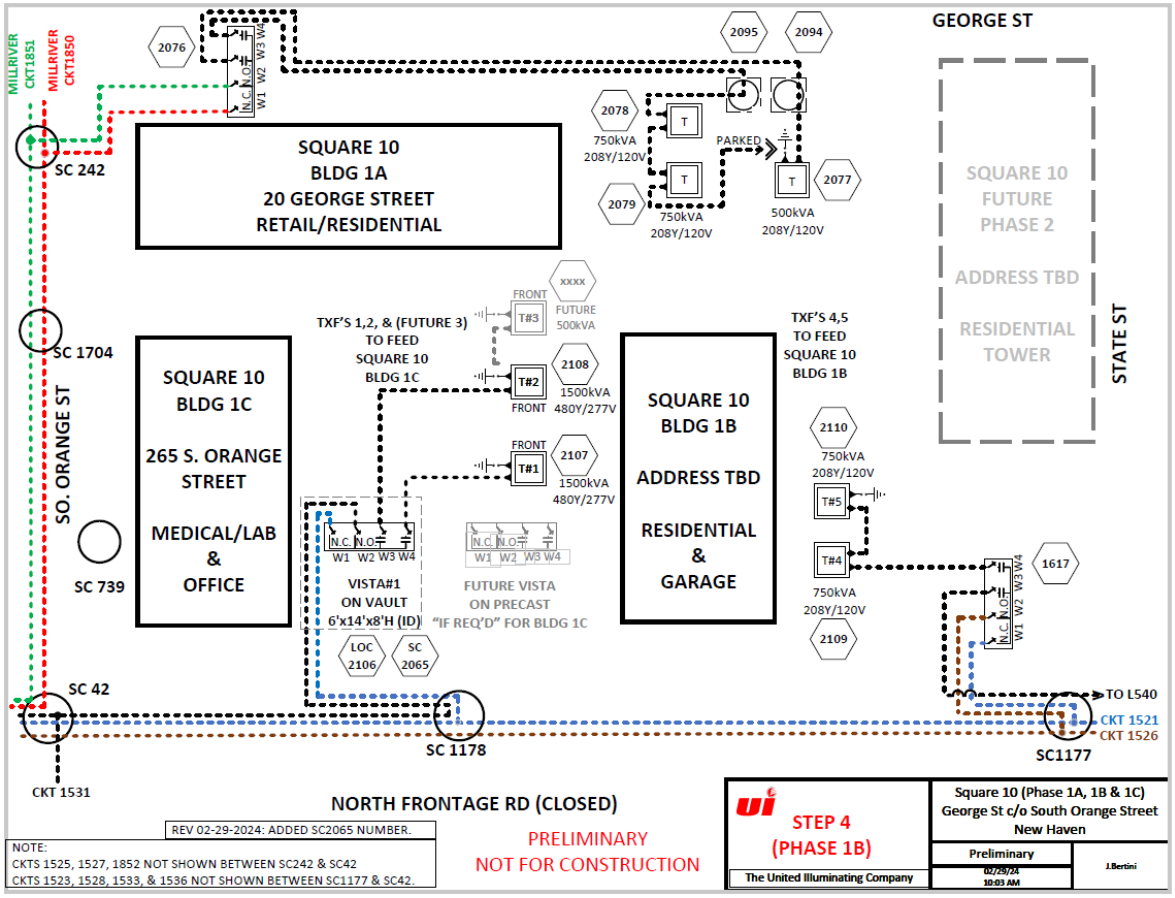
Phase 1B/1C - Existing Oneline



Phase 1C - Proposed Oneline (Option 2)



Phase 1B - Proposed OneLine (Option 2)



PRJ-002092

UI - Res Line CAP

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Res Line CAP

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002092	Electric Distribution	Mitchell, John	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	New Connections	IP4 Change	Program - Ongoing	Program - Ongoing

Project description:
This is an annual blanket program to connect and maintain residential customers within its franchise area to the electric distribution system in accordance with specific Terms & Conditions, Construction Standards, the National Electrical Safety Code (NESC), UI's Guidebook of Requirements for Electric Service, policies, and procedures, etc. as approved by the Connecticut Public Utilities Regulatory Authority (PURA).

Project Scope:
This is an on-going program for residential overhead and underground new services, underground residential cable repairs, rebuilds, secondary line extension, initial installation of equipment for every subdivision on-going program for commercial and residential overhead and underground new services, underground residential cable repairs, rebuilds, secondary line extension, initial installation of equipment for every subdivision (single phase or multiple phases). The scope, designs, estimates and construction is based on customer request that come in throughout the year. This includes new residential service for 3-phase primary overhead or underground, single premise which would be for a multi-unit apartment building with separate metering, requiring a 3-phase transformer. This would include distribution primary system upgrades to serve this new customer. The scope of the construction may include installing new poles, transformers and primary/secondary/service wires. Additionally, the scope would include interconnecting with a neighboring Utility. It could be both billable or non-billable.
2024 scope: this program is reactive in nature and the budget is consistent with 2023 spending of $2.6M.

Project Benefits:
Project is required for new customers connections. This includes service work for temporary and permanent construction (new, increases, replacements, removals, and demolitions).
The work is required to satisfy customer needs to purchase new or additional power for their consumption.
UI has an obligation to serve all customers within our franchise area and our policies and procedures are under the regulation of the PURA.

Project Risks and Mitigation Plan:
Sourcing of materials (Txfs. Wire and associated materials) has been limited by supply chain. Each customer application is evaluated and consideration given for possible alternatives to connect the customers.

Risk of No Action:
The Company is required to connect customers requesting service. Delayed or non-execution of customer applications could result in fines, penalties, and reputation damages.

Project Alternatives:
Each customer application is designed using company standards and adherence to NESC. Alternative are considered and offered to the customer through the design phase where possible.

Basis for Project Estimates
The Program estimate is based on 3 years average actual costs and adjusted based upon recent economic activity. In 2020, 2021 and 2022 this work was reduced due to Covid. In 2023 the work in this program rebounded to roughtly $2.2 M. The Company expects this trend to continue into rateyear as supply chain restrictions loosen.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 52**	$ 52	$ -	$ -	$ -	$ -
# CIAC	**$ -313**	$ -313	$ -	$ -	$ -	$ -
# External Services	**$ 7,717**	$ 159	$ 1,857	$ 1,900	$ 1,900	$ 1,900
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 521**	$ 521	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 1,093**	$ 428	$ 163	$ 167	$ 167	$ 167
# Materials	**$ 802**	$ 802	$ -	$ -	$ -	$ -
# Overheads - External	**$ 1,473**	$ 523	$ 233	$ 239	$ 239	$ 239
Total	**$ 11,345**	**$ 2,173**	**$ 2,254**	**$ 2,306**	**$ 2,306**	**$ 2,306**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 11,316	$ 2,144	$ 2,254	$ 2,306	$ 2,306	$ 2,306

Note: 2024 Plant Additions includes the entire calendar year

UI
An Avangrid company

UI- Res Line CAP

All Towns

WBS: UI-U0009

Index

1. Program Description 3
2. Scope 3
3. Benefits 3
4. Actual Costs 3
5. Budget Forecast 4

1. Program Description

This is an annual blanket program to connect and maintain residential customers within its franchise area to the electric distribution system in accordance with specific Terms & Conditions, Construction Standards, the National Electrical Safety Code (NESC), UI's Guidebook of Requirements for Electric Service, policies, and procedures, etc. as approved by the Connecticut Public Utilities Regulatory Authority (PURA).

2. Scope

This is an on-going program for commercial and residential overhead and underground new services, underground residential cable repairs, rebuilds, secondary line extension, initial installation of equipment for every subdivision (single phase or multiple phases). The scope, designs, estimates and construction is based on customer request that come in throughout the year. This includes new residential service for 3-phase primary overhead or underground, single premise which would be for a multi-unit apartment building with separate metering, requiring a 3-phase transformer. This would include distribution primary system upgrades to serve this new customer. The scope of the construction may include installing new poles, transformers and primary/secondary/service wires. Additionally, the scope would include interconnecting with a neighboring Utility. It could be both billable or non-billable.

3. Benefits

Project is required for new customers connections. This includes service work for temporary and permanent construction (new, increases, replacements, removals, and demolitions).

The work is required to satisfy customer needs to purchase new or additional power for their consumption.

UI has an obligation to serve all customers within our franchise area and our policies and procedures are under the regulation of the PURA.

4. Actual Costs

Program Actual Costs

	2021 Actual	2022 Actual	2023 Actual
UI - Res Line CAP	1,280,012	1,047,481	2,469,583

5. Budget Forecast

The Program estimate is based on 3 years average actual costs and adjusted based upon recent economic activity. In 2020, 21 and 22 this work was reduced due to Covid. In 2023 the work in this program rebounded to roughtly 2.2 M. The Comapony expects this trend to continue into rateyear as supply chain restrictions loosen.

Work Type	2025	2026	2027	2028
SVC (OH/UG/Temp)	$608,605	$622,649	$622,649	$622,649
Make Ready Construction	$1,510,242	$1,545,094	$1,545,094	$1,545,094
DER	$33,811	$34,591	$34,591	$34,591
ENERG Service	$45,081	$46,122	$46,122	$46,122
Residential Service Conn	$33,811	$34,591	$34,591	$34,591
Total	$2,254,093	$2,306,111	$2,306,111	$2,306,111

PRJ-002196

UI - Serv Conn

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Serv Conn

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002196	Electric Distribution	Mitchell, John	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	New Connections	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:
Standard Residential OH Service

Project Scope:
This is an on-going program for non-discretionary work to connect new single phase commercial and residential service orders. The scope includes the installation of overhead and underground service cables, overhead and padmounted transformers, updating secondary wires, service connection for CATV, includes hooking up to padmount transformer/handhole, includes secondary riser to supply a house. All temporary residential and commercial service connections

Project Benefits:
Project is required to perform the work associated with single phase commercial and residential service orders. This work is required to satisfy customer needs for power consumption, including for temporary services. UI has an obligation to serve all customers within our franchise territory and our policies and procedures are under the regulation of PURA.

Project Risks and Mitigation Plan:
Sourcing of materials (Txfs. Wire and associated materials) has been limited by supply chain. Each customer application is evaluated and consideration given for possible alternatives to connect the customers.

Risk of No Action:
The Company is required to connect customers requesting service. Delayed or non-execution of customer applications could result in fines, penalties and reputation damages.

Project Alternatives:
Each customer application is designed using company standards and adherence to NESC. Alternatives are considered and offered to the customer through the design phase where possible.

Basis for Project Estimates
The program estimate is based on 3 years average actual costs.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 192**	$ 23	$ 41	$ 42	$ 43	$ 43
# CIAC	**$ -353**	$ -85	$ -65	$ -66	$ -68	$ -69
# External Services	**$ 413**	$ -9	$ 40	$ 160	$ 110	$ 112
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 754**	$ 212	$ 131	$ 134	$ 137	$ 139
# Internal, Overheads	**$ 341**	$ 71	$ 77	$ 62	$ 65	$ 66
# Materials	**$ 796**	$ 48	$ 260	$ 140	$ 171	$ 176
# Overheads - External	**$ 578**	$ 130	$ 111	$ 112	$ 111	$ 114
Total	**$ 2,720**	**$ 390**	**$ 596**	**$ 583**	**$ 568**	**$ 582**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 2,614	$ 284	$ 596	$ 583	$ 568	$ 582

Note: 2024 Plant Additions includes the entire calendar year

UI
An Avangrid company

UI- Serv Conn

All Towns

WBS: UI-U0012

Index

1. Program Description 3
2. Scope 3
3. Benefits 3
4. Actual Costs 3
5. Budget Forecast 3

1. Program Description

Standard Residential OH Service

2. Scope

This is an on-going program for non-discretionary work to connect new single phase commercial and residential service orders. The scope includes the installation of overhead and underground service cables, overhead and padmounted transformers, updating secondary wires, service connection for CATV, includes hooking up to padmount transformer/handhole, includes secondary riser to supply a house. All temporary residential and commercial service connections.

3. Benefits

Project is required to perform the work associated with single phase commercial and residential service orders. This work is required to satisfy customer needs for power consumption, including for temporary services. UI has an obligation to serve all customers within our franchise territory and our policies and procedures are under the regulation of PURA.

4. Actual Costs

	2021 Actual	2022 Actual	2023 Actual
UI - Serv Conn	624,851	678,349	674,101

The budget amount ($544,000) for 2025 is based on 3 years of historical actuals and aligns with the 2024 budget for $453,000.

5. Budget Forecast

Work Type	2025	2026	2027	2028
Residential OH/UG	$405,581	$396,554	$396,554	$396,554
Temporary Service	$23,857	$23,326	$23,326	$23,326
Increase Service	$167,004	$163,287	$163,287	$163,287
Total	$596,444	$583,169	$568,035	$582,100

PRJ-005565

Govt Hwy - Lafayette Circle Reconfiguration

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Govt Hwy - Lafayette Circle Reconfiguration

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005565	Electric Distribution	Eves, Charles	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	State & Municipal	IP1 Originate	Program/As Spent	Program/As Spent

Project description:

The City of Bridgeport (City) is proceeding with plans to make roadway improvements along Lafayette Circle, Fairfield Avenue, Courtland Street, and Cannon Street. The City is looking to remove the traffic circle and create a more traditional grid like street layout. Based on the design provided by the City, UI is anticipated that there would be direct conflicts between the planned roadway and the existing UI underground facilities along Fairfield Avenue. UI would be required to adjust or relocate the underground infrastructure to accommodate the City's roadway construction plans. These adjustments/relocations may result in additional modifications to UI facilities adjacent to the project boundary.
In conjunction with the roadway improvements, the City Water Pollution Control Authority – City of Bridgeport (WPCA – BPT) is planning for additions/upgrades to the combined storm/sanitary system. The intent is to separate the combined storm and sanitary sewer system in this area into two separate systems. Since these are gravity systems, it is very likely that there would be direct conflicts between the proposed systems and the existing UI underground facilities.
The City's intention is to complete the roadway design phase by spring of 2025 and then start construction of the roadway in 2027 and completing the project in late 2028. This will be a forced relocation by the City. The extent of the impact to the UI facilities cannot be fully determined until the final plans of the City are developed. At a minimum, it is expected that UI will have to remove/relocate/replace four to seven splice chambers, 510 linear feet of 3.5" tile conduit bank resulting in the redirection of cables for the network. These chambers are along Fairfield Avenue between the two LaFayette circle intersections.
Area is Lafayette Cir., Fairfield Ave., and Park Ave.

Project Scope:

Civil
Create a new civil path - can be constructed in the existing civil path after cable removals - street lights in area out for duration (two to three years)
- Install a new splice chamber, 6x14x7, west of the intersection of Lafayette Circle and Fairfield (near SC143).
- Rebuild SC141 with overcast splice chamber, 6x14x7, west of the intersection of Lafayette Circle and Fairfield.
- Install 230 feet of 8-4" conduit system from Rebuilt SC141 to new chamber (near SC143)
- Install 280 feet of 8-4" conduit system from new chamber (near SC143) to SC519 (assumes SC519 structurally sound)
- Remove existing chambers SC393, SC142, SC 319, SC143, SC320, SC144, SC321, SC263 after electrical cutovers.

Electrical
- Remove network secondary cables between SC141 and SC321 - 7 pulls
- Remove network secondary cables between SC956 and SC119 – two pulls
- Install 2 - 550 feet of 5/C-500 600V network secondary cable sets in new civil path between rebuilt SC141 and SC519, two pulls each.

Project Benefits:

The State and Municipal relocation and rehabilitation projects are based in improving public safety. Reconstructing the conduit system in this project area will be done to the latest version of the NESC resulting in more reliable, resiliant service to our customers. It also provides options for electrification in close proxcimity to the CT 8, CT 25 and I-95 corridors.

Project Risks and Mitigation Plan:
The City has plans on completing a final design by spring 2025. The project could be delayed, cancelled or expanded by the city of Bridgeport. An APEC study (Area of Potential Environmental Concern) will be conducted for the project area. If contaminated soil is discovered during the study, test pitting or construction we will accept that risk and dispose of the spoils according to the Avangrid Excess Soil Management Plan.

Risk of No Action:
We are obligated by state law to relocate facilities for municipal and state projects.

Project Alternatives:
This is a forced relocation project. The city is at 60% design and expects to be at 100% design in spring of 2025. The shortest, most cost effective route along Fairfield Ave is the preferred option. Once we receive final design from the city we may have to adjust the path slightly but the route is fixed.

Basis for Project Estimates
The Basis of these estimates are based on historical projects and current material prices from the manufacturers detailed below:
• Engineering /Management time
• Materials Cost from the vendor (Ductbank, Splice chambers)
• Materials Cost stockroom items (Primary Secondary Cable, Splices,)
• Labor cost from the vendor to install splice chamber and duct bank.
• Labor cost to install Primary and Secondary Cables.
• Labor cost to cutover each circuit.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 117**	$ -	$ 2	$ 23	$ 46	$ 46
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 1,188**	$ -	$ 50	$ 380	$ 375	$ 383
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 708**	$ -	$ 34	$ 70	$ 300	$ 304
# Internal, Overheads	**$ 249**	$ -	$ 9	$ 42	$ 98	$ 100
# Materials	**$ 253**	$ -	$ -	$ -	$ 125	$ 128
# Overheads - External	**$ 570**	$ -	$ 25	$ 86	$ 228	$ 231
Total	**$ 3,084**	**$ -**	**$ 119**	**$ 601**	**$ 1,172**	**$ 1,192**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 3,084	$ -	$ 119	$ 601	$ 1,172	$ 1,192

UI
An Avangrid company

Lafayette Circle Reconstruction in Bridgeport

PRJ-005565

UH-U0002214

Index

1. Project Description and Scope (Summary) 3
2. Existing Conditions 4
3. Need Statement 6
4. Engineering 6
5. Project Milestones 7
6. Project Assumptions 8
7. Engineering Recommendation 8
8. Maps or Drawings 8

1. Project Description and Scope (Summary)

The City of Bridgeport (City) is proceeding with plans to make roadway improvements along Lafayette Circle, Fairfield Avenue, Courtland Street, and Cannon Street. The City is at 60% design stage. The intent of the design is to remove the traffic circle and create a more traditional grid like street layout. The City has reached out to United Illuminating (UI) and other utilities with facilities in the project boundary to solicit input in the design. It is anticipated that there would be direct conflicts between the planned roadway and the existing UI underground facilities along Fairfield Avenue. UI would be required to adjust or relocate the underground infrastructure to accommodate the City's roadway construction plans. These adjustments/relocations may result in additional modifications to UI facilities adjacent to the project boundary. Further details are required.

In conjunction with the roadway improvements, the City Water Pollution Control Authority – City of Bridgeport (WPCA – BPT) is planning for additions/upgrades to the combined storm/sanitary system. The intent is to separate the combined storm and sanitary sewer system in this area into two separate systems. Since these are gravity systems, it is very likely that there would be direct conflicts between the proposed systems and the existing UI underground facilities. The extent of the sewer/sanitary line conflicts is unknown since the design has not been submitted to UI.

The City's intention is to complete the roadway design phase by spring of 2025 and then start construction of the roadway in 2027 and completing the project in late 2028. This will be a forced relocation by the City. The extent of the impact to the UI facilities cannot be fully determined until the final plans of the City are developed. At a minimum, it is expected that UI will have to remove/relocate/replace four to seven splice chambers, 510 linear feet of 3.5" tile conduit bank resulting in the redirection of cables for the network. These chambers are along Fairfield Avenue between the two LaFayette circle intersections.

From the initial investigation of UI facility records and the City's plan, there appears to be direct conflicts along Fairfield Avenue. To avoid schedule conflicts during the construction phases, UI would start the remove/relocate of facilities in 2026 and continue through 2028, coordinating with the City's construction plan. The conceptual mitigation plan by UI is:

Civil

Create a new civil path - can be constructed in the existing civil path after cable removals - street lights in area out for duration (two to three years)

- Install a new splice chamber, 6x14x7, west of the intersection of Lafayette Circle and Fairfield (near SC143).
- Rebuild SC141 with overcast splice chamber, 6x14x7, west of the intersection of Lafayette Circle and Fairfield.
- Install 230 feet of 8-4" conduit system from Rebuilt SC141 to new chamber (near SC143)
- Install 280 feet of 8-4" conduit system from new chamber (near SC143) to SC519 (assumes SC519 structurally sound)

- Remove existing chambers SC393, SC142, SC 319, SC143, SC320, SC144, SC321, SC263 after electrical cutovers.

Electrical

- Remove network secondary cables between SC141 and SC321 - 7 pulls
- Remove network secondary cables between SC956 and SC119 – two pulls
- Install 2 - 550 feet of 5/C-500 600V network secondary cable sets in new civil path between rebuilt SC141 and SC519, two pulls each.

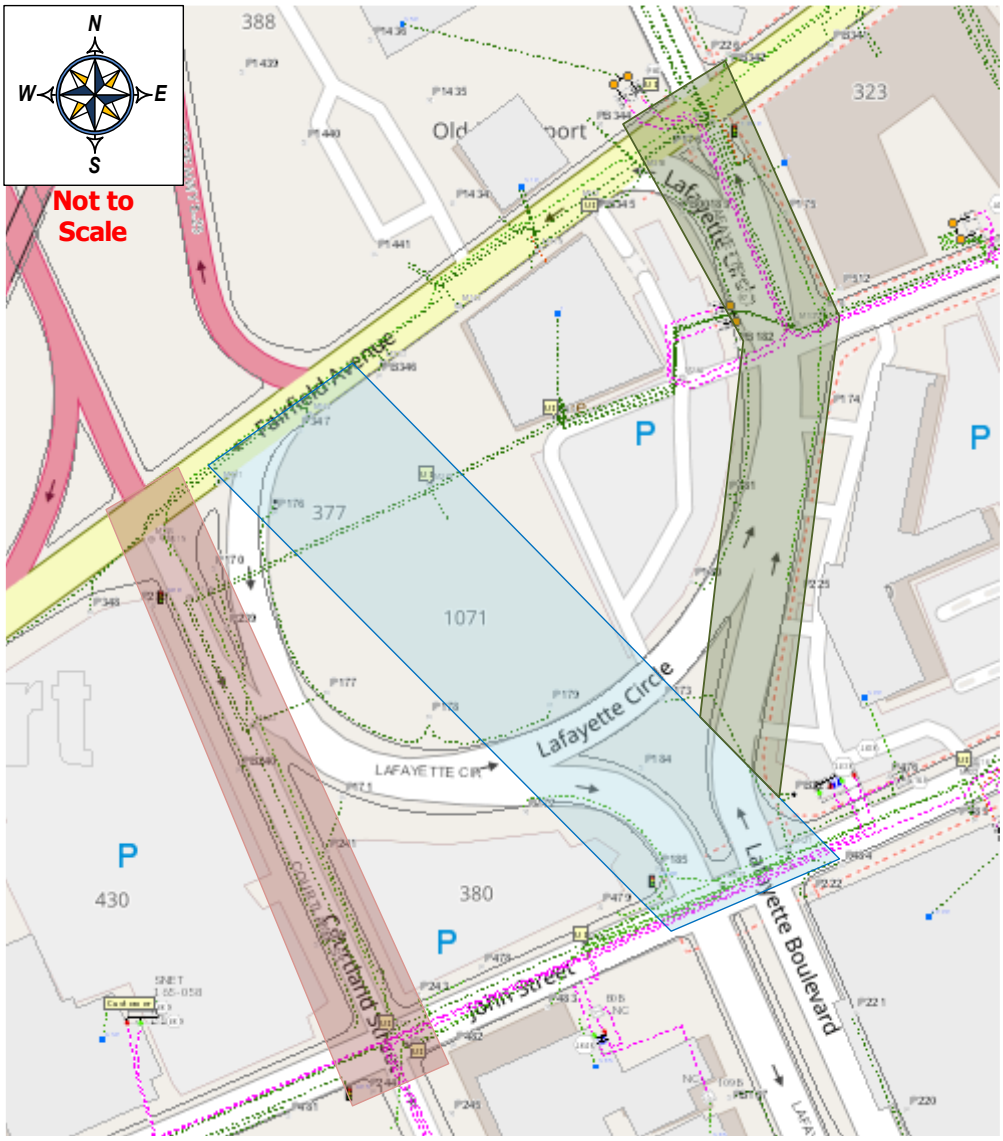
Below is the estimated costs associated with this proposed UI work.

	2025	2026	2027	2028	Total
A.F.U.D.C.	$2,190	$22,750	$45,500	$46,410	$116,850
External Services	$50,000	$380,000	$375,000	$382,500	$1,187,500
Internal Labor	$33,700	$70,000	$300,000	$304,000	$707,700
Overheads, Internal	$8,630	$42,230	$98,225	$99,940	$249,025
Overheads, External	$24,745	$86,150	$227,920	$231,380	$570,195
Materials			$125,000	$127,500	$252,500
Total	**$119,265**	**$601,130**	**$1,171,645**	**$1,191,730**	**$3,083,770**

2. Existing Conditions

UI currently has underground civil paths within the project boundaries. These paths consist of multiple splice chambers, most installed around 1920, which are brick walls with brick and rail roofs. The chambers have primary and secondary cables that are part of the Bridgeport low voltage secondary network (network). The chambers are interconnected with a 3.5" diameter tile conduit bank also installed in the 1920's. Additionally, there are network vaults and radial vaults within, and adjacent, to the project boundary.

Figure 1 Overlay on UI GIS Map of Proposed Roadway Paths



This is a listing of the civil structures that may be in conflict with the City's plan.

Along Fairfield Avenue

SC141, SC393, SC142, SC319, SC143, SC320, SC144, SC321, SC145, SC519; approximately 510 feet of conduit system

Vault 864; network vault, two transformers

Along LaFayette – UI system passes through the circle.

SC263, SC956, SC264, SC1072; approximately 500 feet of conduit system

Vault 870; network vault, two transformers

Along Cannon Street

SC265, SC266; approximately 165 feet of conduit system

Vault 1484; network vault, two transformers

Along Courtland

SC119, SC440, SC117, SC516; approximately 430 feet of conduit system

Along John Street

SC120, SC517, SC121, SC122; approximately 460 feet of conduit system

Vault 1630; radial switch vault

3. Need Statement

The City is at the 60% design stage for this project in 2024. UI is being requested to assign resources to work with the City to develop the final plans during the Yer 2025. The UI resources would perform a thorough investigation of the potential conflicts. Once these are confirmed with the City, UI would work to formulate a mitigation plan. The mitigation plan could require the replacement and/or relocation of the existing UI underground facilities prior to the start of roadway/sewer construction. UI would have to move out of the City's way since they own the roadway right-of-way.

4. Engineering

At this early stage, there appears to be direct conflicts at chambers SC321, SC144, SC320 and possibly SC141 along with the connecting conduit system. UI proposes to remove the conflict by building a new system along Fairfield Avenue.

Civil

Create a new civil path - can be constructed in the existing civil path after cable removals - street lights in area out for duration (two to three years)

- Install a new splice chamber, 6x14x7, west of the intersection of Lafayette Circle and Fairfield (near SC143).
- Rebuild SC141 with overcast splice chamber, 6x14x7, west of the intersection of Lafayette Circle and Fairfield.
- Install 230 feet of 8-4" conduit system from Rebuilt SC141 to new chamber (near SC143)
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Electrical

- Remove network secondary cables between SC141 and SC321 - 7 pulls
- Remove network secondary cables between SC956 and SC119 – two pulls
- Install 2 - 550 feet of 5/C-500 600V network secondary cable sets in new civil path between rebuilt SC141 and SC519, two pulls each.

Figure 2 Proposed new UI civil path



5. Project Milestones

The project schedule is very dependent upon the City. A conceptual schedule has been developed based upon conversations with the City. No firm design or schedule has been provided. UI cannot finalize a design on this project until the City of Bridgeport has

provided UI with 90% design so we can confirm the potential conflicts and establish a mitigation plan. Assuming that the City has a Spring 2025 target for a completed design, UI would need to be in design on this project by late summer 2025 for a 2026 construction start to accommodate the City's current schedule.

1. Engineering Distribution Design Completed for Civil – August 2025
2. Civil Work starts – March 2026
3. Civil Work completed – August 2028
4. Electrical work starts – August 2028
5. Electrical work completed – October 2028
6. Project closeout completed – Dec 2028

6. Project Assumptions

A. The roadway and sewer/sanitary line construction plans are completed by the City by June 2025.
B. The City of Bridgeport will approve and stamp all traffic plans submitted for this project in a timely manner and issue all required permits.
C. This project will be approved internally within UI for all years of construction.
D. All materials (chambers, conduit, cable, etc.) will be readily available as needed.

7. Engineering Recommendation

Civil designs can take several months to complete. UI needs to meet the City's schedule. To do this, UI Engineering recommends UI proceed with the design phase beginning in 2025. UI would be executing chamber inspections within the area of impact and start the evaluation of the existing infrastructure. Engineering resources would be allocated to assist and review the City's design. A complete mitigation plan would be developed once the City has completed the roadway and sewer/sanitary separation design.

8. Maps or Drawings

The two images below are copies of the high-level Preliminary design sent to UI by the City of Bridgeport. The project extent is Fairfield Avenue between Park Avenue and Lafayette Square intersections.

Figure 3. City Plan - Fairfield Ave, Park Ave to Courtland Street

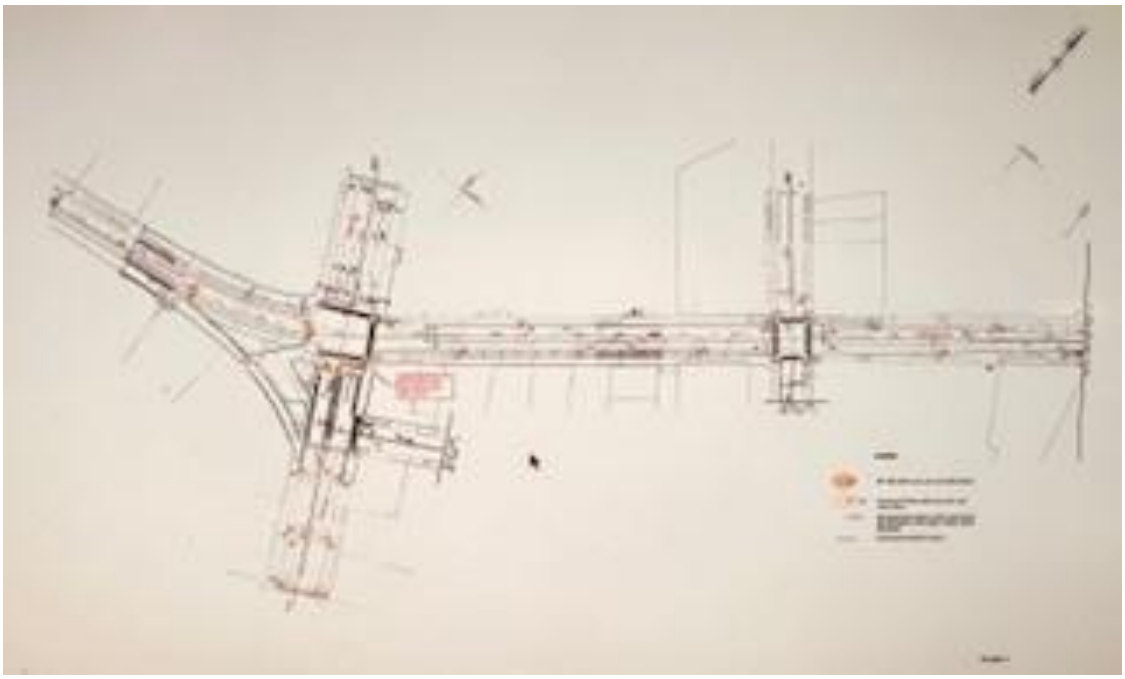


Figure 4 City Plan - Fairfield Ave, Courtland to Lafayette Square

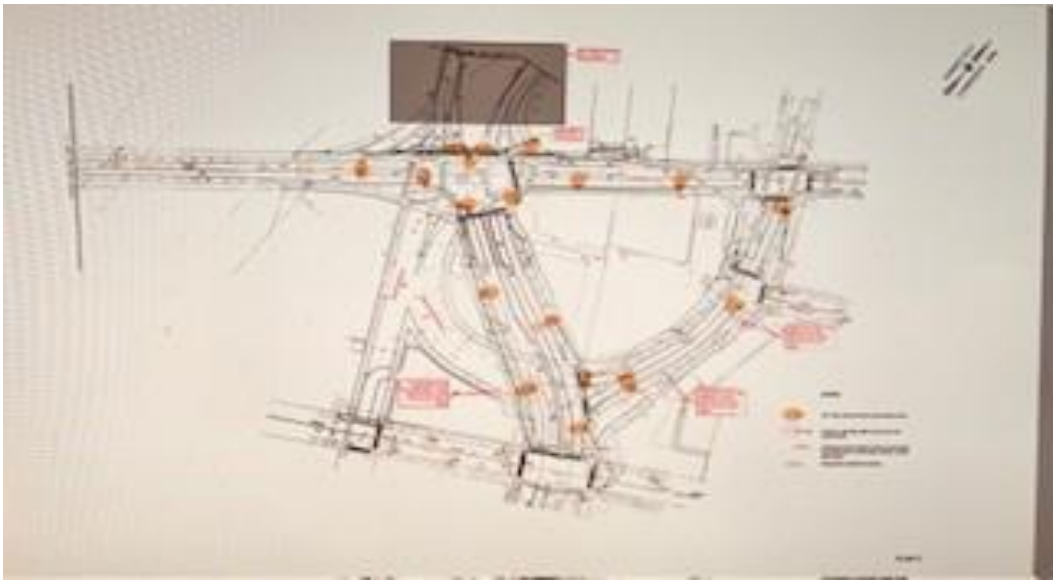


Figure 5 Google Street View Looking north across the LaFayette Circle



PRJ-005570

Govt Hwy - Rt1 Road Widening

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Govt Hwy - Rt1 Road Widening

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005570	Electric Distribution	Eves, Charles	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	State & Municipal	IP1 Originate	Program/As Spent	Program/As Spent

Project description:

The State of Connecticut Department of Transportation (CTDOT) has undertaken a road improvement project, #106-108 in the Town of Orange CT, along Boston Post Road (Rt 1), between Milford/Orange Town Line (near Peck La) and Lambert Road. The CTDOT has requested UI to relocate their facilities to accommodate this road widening & reconfiguring project.

UI does not have Transmission facilities in this area, only Distribution. Other than 11 underground customer riser locations, only UI overhead facilities are in this stretch of approximately 6,500FT (about 1-1/4 mile) on Rt 1.

The alternatives are documented in this report.

Project Scope:

CTDOT has undertaken the Rt1 (Boston Post Road) road widening project (#106-108) between the Milford/Orange town line and Lambert Road in the Town of Orange CT. UI was instructed to move all infrastructure away from the existing to the new planned widened road curb line. This includes 41 distribution poles, 21,500 ft of wires & cable, and equipment, including 21 underground riser connections.

Project Benefits:

- The State expansion of RT1 from Milford/Orange Town Line to Lambert Rd Orange project will improve public safety and commuting with new sidewalks and additional lane crossing locations. UI is obligated and mandated to perform The work in a timely manner.
- Lastly, this solution can be fully constructed in The least amount of time and expense.

Project Risks and Mitigation Plan:

1. Meet State of Conn DOT Rt1 road widening & sidewalk install project #106-108 schedule from Milford/Orange town line to Lambert Rd in Orange.
   Mitigated through communication & proper planning with execution.

2. Coordinate with Frontier Communications for pole replacement installs and OH shifts.
   Mitigated through communication & proper planning with execution.

3. Easements and taking lines required for poles, wires and anchors.
   Mitigation - The State of Conn DOT will gather all easements required.

Risk of No Action:

- Project will be out of compliance with State of Connecticut \ CTDOT request per Connecticut State statutes 13a-126 and 13a-98f.
- The overhead system has many utility poles in conflict with the new roadwidening and new sidewalk installation. Leaving poles and risers "as is" could cause property damage or personal injury.

Project Alternatives:
Alternative I:
Replace complete pole line, equipment on opposite side of road. This will increase pole replacement by 25% (from 73 to 97 of buth Frontier & UI poles) and increase the number of riser replacements.

Alternative II:
Do Nothing. This is not an alternative since UI will be out of compliance with State of Connecticut \ CTDOT request per Connecticut State statutes 13a-126 and 13a-98f.

Basis for Project Estimates

The cost estimate for this project is based off a ground up estimate and includes the following:
- Engineering/Management Time
- Materials Cost from the Vendor (Poles, Cross Arms, Transformers, Duct Bank, Cable and Terminations)
- Labor Cost to install all Overhead Equipment
- Labor Cost to cutover circuits and cable to new Pole Line
- Labor Cost to remove OH equipment from Old Pole Line

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 33**	$ -	$ 33	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 160**	$ -	$ 160	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 140**	$ -	$ 140	$ -	$ -	$ -
# Internal, Overheads	**$ 77**	$ -	$ 77	$ -	$ -	$ -
# Materials	**$ 205**	$ -	$ 205	$ -	$ -	$ -
# Overheads - External	**$ 124**	$ -	$ 124	$ -	$ -	$ -
Total	**$ 738**	**$ -**	**$ 738**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 738	$ -	$ 738	$ -	$ -	$ -

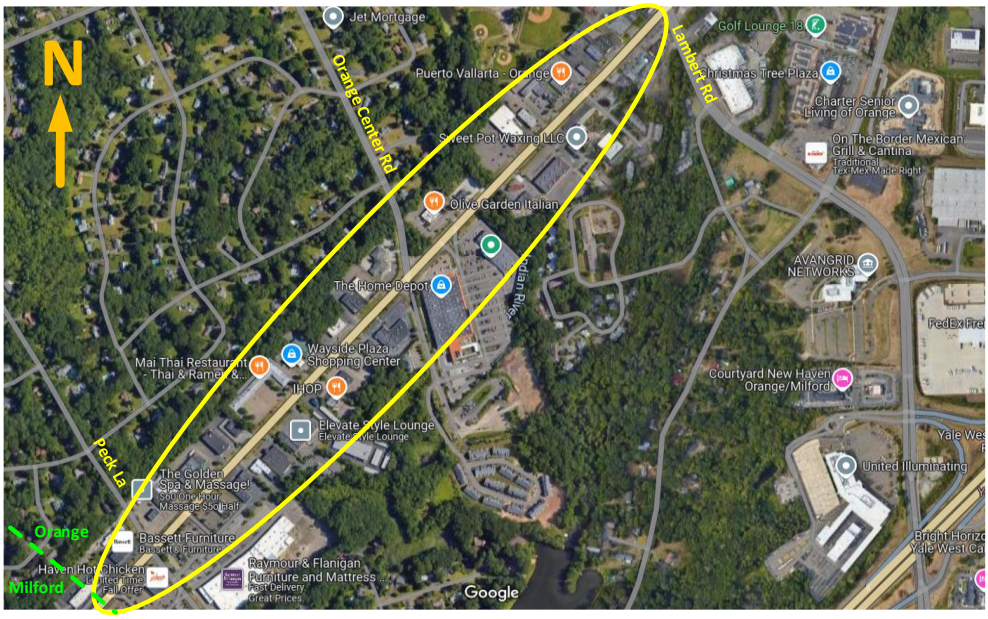
UI
An Avangrid company

Rt1 Road Widening

Milford/Orange Town Line to Lambert Rd

UI Project # Proj -005570

Orange, CT



Prepared by: The UI Distribution Engineering Dept.

Date of Report: 9/6/2024

The United Illuminating Company

100 Marsh Hill Road

Orange CT

Index

1. Project Description (Summary) 3
2. Initial Conditions 4
2.1. Pictures 4
3. Need Statement 7
4. Alternatives 7
4.1. Alternative I 7
4.1.1. Cost Alternative I 7
4.2. Alternative II 7
4.2.1. Cost Alternative II 8
4.3. Proposal Alternative 8
4.3.1. Cost Proposal Alternative 8
5. Project Assumptions 9
6. Maps or Electrical Design 10

1. Project Description (Summary)

The State of Connecticut Department of Transportation (CTDOT) has undertaken a road improvement project, #106-108 in the Town of Orange CT, along Boston Post Road (Rt 1), between Milford/Orange Town Line (near Peck La) and Lambert Road. The CTDOT has requested UI to relocate their facilities to accommodate this road widening & reconfiguring project.

UI does not have Transmission facilities in this area, only Distribution. Other than 11 underground customer riser locations, only UI overhead facilities are in this stretch of approximately 6,500FT (about 1-1/4 mile) on Rt 1.

Engineering has reviewed this request and proposed these alternatives documented in this report.

2. Initial Conditions

CTDOT provided UI with pre-liminary drawings of road widening limits. UI is currently working with CTDOT and their Engineering firm to meet design criteria and their schedule.

2.1.Pictures

Figure 1: Rt1 shown heading South-West from Lambert Road Intersection (at end of project limits) prior to the shifting of poles before road widening construction began.



Figure 2: Rt1 shown heading South-West at intersection of Orange Center Rd. prior to the shifting of poles before road widening construction began.



Figure 3: Rt1 shown heading South-West at intersection of Peck Ln. prior to the shifting of poles before road widening construction began.



Figure 4: Rt1 shown heading North-East (at end of project limits) prior to the shifting of poles before road widening construction began.



Figure 5: Closeup view of Riser pole P21 to be moved before road widening construction began. A total of 11 primary circuit risers were found needing to be re-located.



3. Need Statement

CTDOT has undertaken the Rt1 (Boston Post Road) road widening project (#106-108) between the Milford/Orange town line and Lambert Road in the Town of Orange CT. UI was instructed to move all infrastructure away from the existing to the new planned widened road curb line. This includes 41 distribution poles, 21,500 ft of wires & cable, and equipment, including 21 underground riser connections.

4. Engineering Alternatives

United Illuminating Distribution Engineering (UI) investigated a few alternatives to move the facilities for the planned roadway changes on Rt1 in Orange CT between Lambert Rd and Racebrook Rd. UI engineering evaluated the area & determined the number of poles, wire, and all equipment to be moved. The investigation found two (2) alternatives to accomplish the work needed in this area with a third to do nothing.

4.1. Alternative I

UI engineering looked replace the pole line and equipment with a new overhead line on opposite side of road. This will increase pole replacement by 25% (from 73 to 97 of both Frontier & UI poles) and increase the number of riser replacements. This alternative will require more material and labor costs.

4.1.1. Cost for Alternative I

UI engineering determined this alternative takes much longer to build and more material, it is estimated this will cost at least 25% more than the proposed alternative where CTDOT would view this as non-reimbursable to UI. Based on prior experience, this would be the costliest alternative therefore was not estimated.

4.2. Alternative II

UI engineering determined doing nothing was not an alternative as the CTDOT required UI to move the facilities to provide better traffic flow, reduce crashes and improve business access. This will be out of compliance with State of Connecticut \ CTDOT request per Connecticut State statutes 13a-126 and 13a-98f.

4.2.1. Cost for Alternative II

UI engineering determined this CTDOT request is not negotiable, so it was not estimated.

4.3. Proposal Alternative

UI engineering determined to replace 27 distribution poles, 21,500 ft of open wires, 900 ft of cable and equipment, including 21 underground connections. Basically, this is a full like for like replacement.

See below for a better description:

Civil

This includes the design, procurement, installation and removal of 21 riser locations with 4" galvanized steel conduit.

Electrical

UI would design, procure, and install electrical wires, poles and associated equipment for one 13.8kV distribution circuit. UI would connect circuit #1440 to a new path on Rt1 behind the existing path on both sides of the road.

4.3.1. Cost for Alternative III

Resource	2025
AFUDC	$32,825
COR – Ext OH	$17,452
COR – Ext Svc	$40,000
COR – Int Labor	$20,000
COR – Int OH	$17,915
External Services	$160,000
Internal Labor	$140,000
Internal Overheads	$76,883
Materials	$205,000
Overheads – External	$123,779
Total	**$833,853**

5. Project Assumptions

The following is the list of assumptions used to create the estimates for the proposed work.

1. All budgetary estimates are based on a work product in compliance with existing UI and/or industry accepted standards and specifications.
2. UI will be able to obtain any and all of the base maps of above ground and underground utilities in the area.
3. All UI construction work will be done during the normal business week and hours.
4. No ledge removal has been assumed nor included within the budgetary cost estimates.
5. No final road restoration required within the project limits of underground construction on Rt1.
6. All materials will be ordered and available in time for use by Construction.
7. The UI construction work is weather dependent. For safety reasons, UI will not schedule crews to work on the electrical facilities during inclement weather. There is the possibility of schedule delays due to weather. No value for the costs associated with weather delays is offered.
8. All dollars shown are conceptual level dollars and subject to change due to escalation in material, labor, and equipment rates at time of actual construction.
9. The base estimates exclude contingency, overheads, and allocations values.
10. The base estimates are subject to the accuracy bandwidth as indicated within the estimate.

6. Maps & Electrical Design

In summary, this State of CTDOT RT1 road widening project #106-108 is still in preliminary design level. Below are the preliminary diagrams of the distribution system changes by UI:

Figure 6. Distribution Circuit #1440 RT1 at intersection of Orange Center Rd between Match Marks #4 and #7):

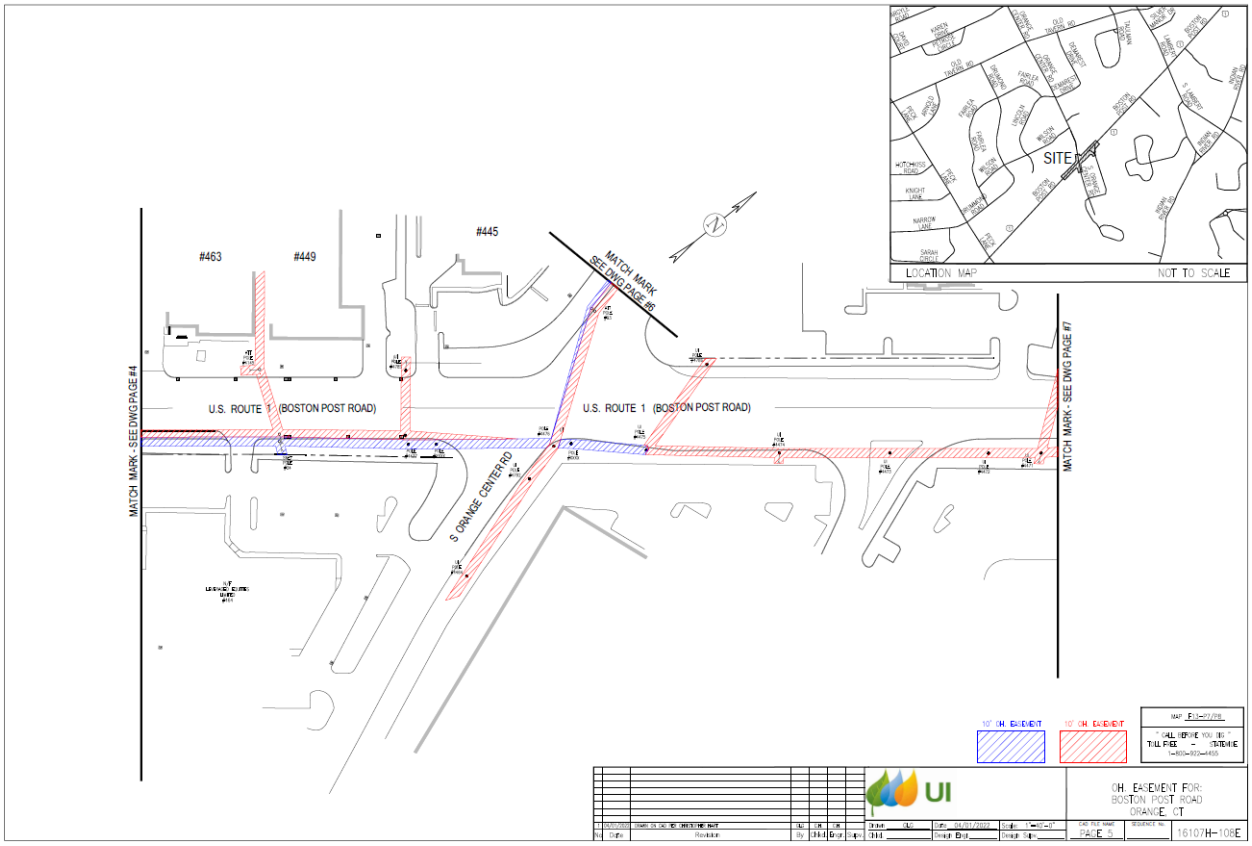


Figure 7 Distribution Circuit #1440 - Orange Center Rd at Match Mark #5:

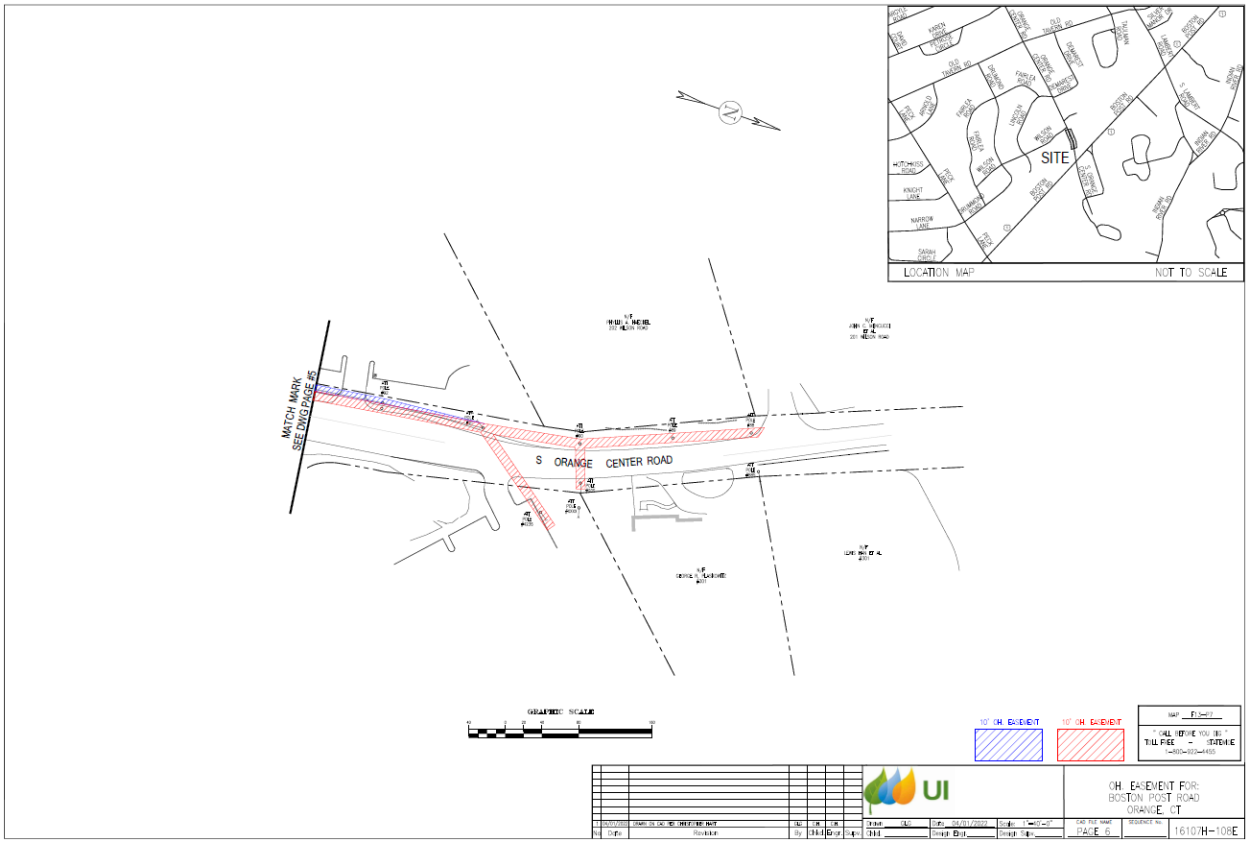


Figure 8. Distribution Circuit #1440 RT1 between Match Mark #6 & #8 :

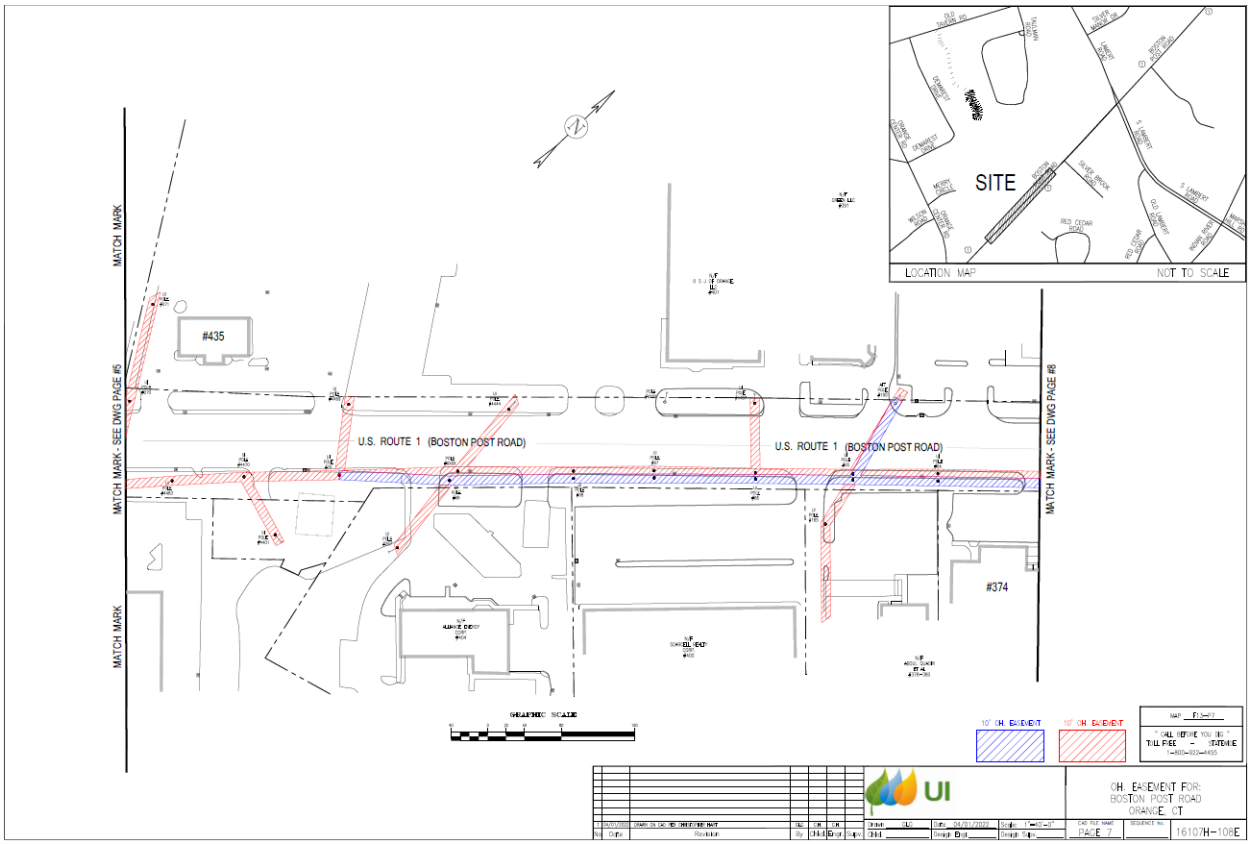
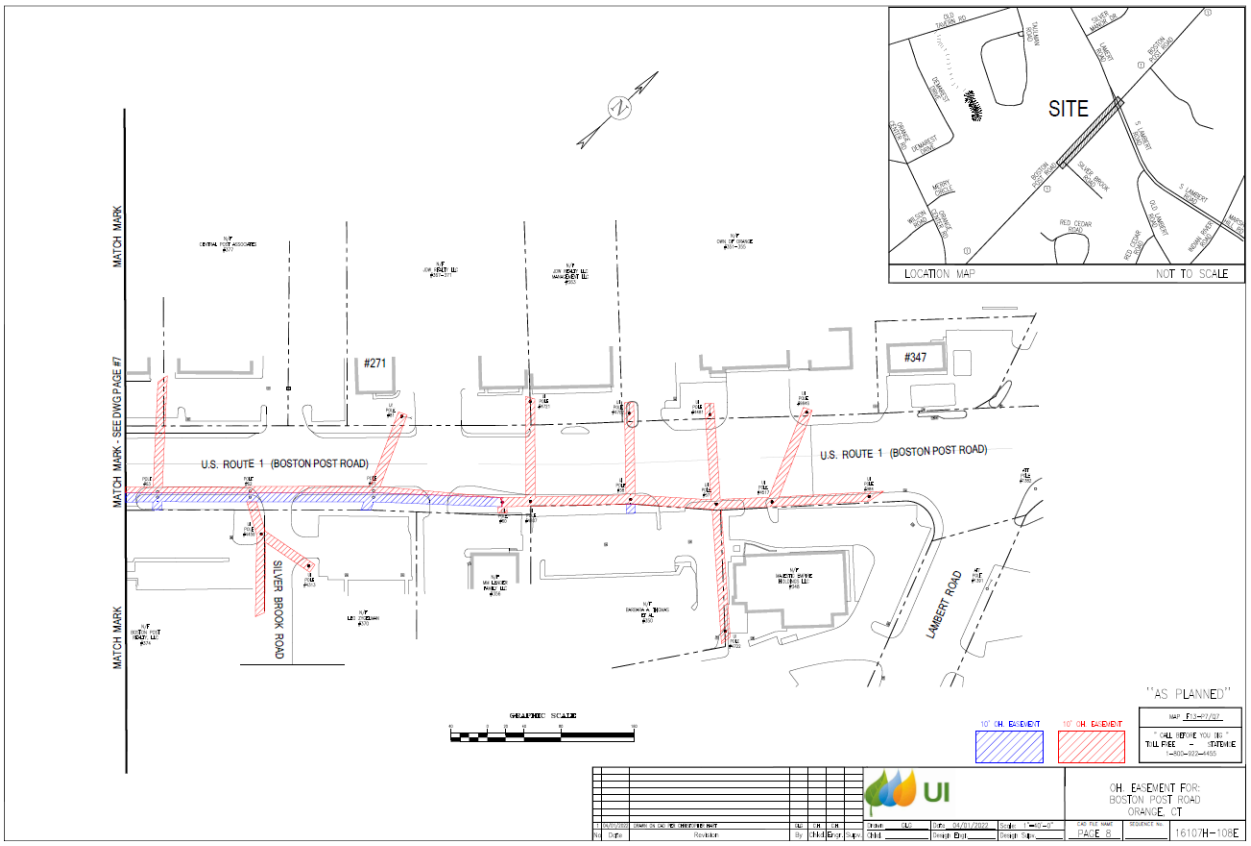


Figure 9. Distribution Circuit #1440 – RT1 at intersection of Lambert Rd (End of Project Limit):



PRJ-005568

Govt Hwy - TIME-1 Metro-North - Longbrook Ave, Startford

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Govt Hwy - TIME-1 Metro-North - Longbrook Ave, Startford

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005568	Electric Distribution	Eves, Charles	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	State & Municipal	IP1 Originate	Program/As Spent	Program/As Spent

Project description:

The Connecticut Department of Transportation (CTDOT), and the National Infrastructure Project Assistance Grants Program (Mega).
It is undertaking the Track Improvement Mobility Enhancement-1 (TIME-1) project in Bridgeport and Stratford, CT.
The TIME-1 project is part of a comprehensive rail investment program to reduce travel times and increasing track speed.
The project includes significant infrastructure upgrades to improve bridges, mainline tracks, and signal system modifications.
One critical aspect of the project Metro-North rail line involves the replacing of the Longbrook Avenue Bridge in Stratford.
The existing single-span bridge, supported by two end wall structures, will be replaced with a new road constructed between Longbrook Avenue and Barnum Avenue Cutoff.
This will require re-grading the area to build up the elevation between the two roadways.
The replacement of the bridge will affect the United Illuminating (UI) underground and overhead infrastructures across the Longbrook Avenue bridge.
In consequence, a new underground conduit path needs to be installed, and each electric circuit needs to be cut over one at a time, ensuring power continuity before the full removal of the existing bridge.

Project Scope:

The scope of work includes the following:
•Install 2 triangular Splice chambers 5'X 9'X16'X7'.
•Install 2 Rectangular Splice chamber 6'X14'X7'.
•Install 12-5" Duct bank 515 linear feet.
•Install 8-5" Duct bank 670 linear feet.
•Install 12-5" Duct bank with hangers under the new bridge.
•Install galvanized steels conduits for all the riser poles.
•Install 16 new poles to relocate the overhead lines.
•Install approximately 6000ft of 500 EPR CU underground primary circuits and splices.
•Install 3-397 Al primary cables et cable terminators.
•Deenergize the circuits one at a time to perform the cutover.
•Remove old cable and demo old conduits and chambers.

Project Benefits:

The State is rebuilding this bridge; therefore, UI must move its overhead and underground distribution lines to make room for the new bridge. UI will benefit from having some new infrastructures that can last over another 40 years or plus. UI will also benefit by having new standard size of splice chambers.

Project Risks and Mitigation Plan:

1. Meet State of Connecticut TME-1 Longbrook Ave bridge replacement project.
   Mitigated through communication & proper planning with execution.

2. Contaminated soil.
   Mitigation - All underground facilities will be sampled for contaminates prior to excavation.

3. Ledge removal.
   Mitigation - Even with test pits, it is difficult to predetermine ledge in working area. Ledge removal will need to occur if needed and funded though contingency in the project budget at a pre-negotiated flat rate with the civil contractor.

Risk of No Action:
UI is obligate to perform this work for the State and Metro North.

Project Alternatives:
Alternative I
This concept would require the design, procurement, and installation of 2 new risers and 1 section of 8way 5" PVC encased conduits under the new roadway, ~260 linear feet between SC1982 and SC815

Alternative II
This proposal would require the design, procurement, and installation of 4 standard chambers and 5 sections or 1,850 linear feet (~400 feet each section) of 12way 5" PVC encased conduits; along Main Street, and Route 1, ending just to the west of the Rt 1bridge in SC1983.
.
Additionally, a new 4" riser from SC1978 to Pole on Longbrook Ave. This would be considered participating for the State.

Basis for Project Estimates
The cost estimate for this project is based off a ground up estimate and include the following:
• Engineering /Management time
• Materials Cost from the vendor (Splice chambers, ductbank, and conduits laterals)
• Materials Cost stockroom items (Poles, Primary cable, Terminators, ABS)
• Labor cost to install splice chambers and conduits.
• Labor cost to install Poles and associated materials.
• Labor cost to install Primary cables (underground and Overhead).
• Labor cost to cutover each circuit.
• Labor cost to remove old infrastructures.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 131**	$ -	$ 131	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 1,700**	$ -	$ 1,700	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 298**	$ -	$ 298	$ -	$ -	$ -
# Internal, Overheads	**$ 237**	$ -	$ 237	$ -	$ -	$ -
# Materials	**$ 225**	$ -	$ 225	$ -	$ -	$ -
# Overheads - External	**$ 406**	$ -	$ 406	$ -	$ -	$ -
Total	**$ 2,997**	**$ -**	**$ 2,997**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 2,997	$ -	$ 2,997	$ -	$ -	$ -

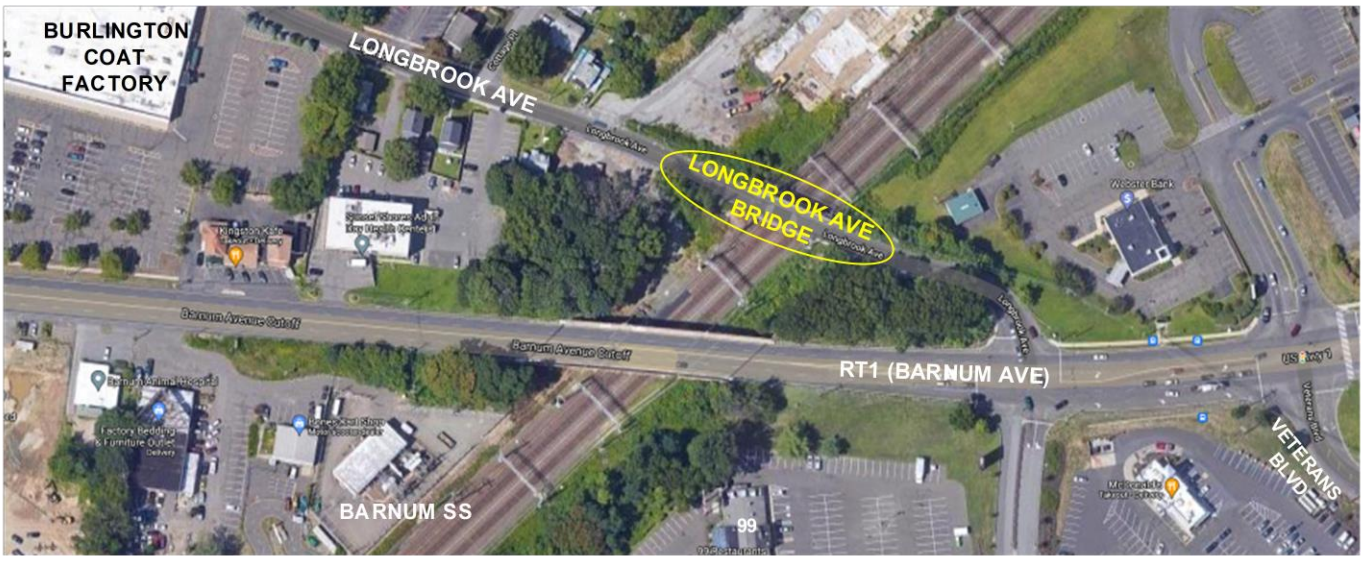
UI
An Avangrid company

Longbrook Ave Bridge Replacement

Stratford CT

CTDOT Time-1 Project # 301-536

UI Project # UH-U0002106



Prepared by: The UI Distribution Engineering Dept.

Date of Report: 8/30/2024

The United Illuminating Company

100 Marsh Hill Road

Orange CT

Index

1. Project Description (Summary) 3
2. Existing Conditions 3
2.1. Pictures 6
3. Need Statement 12
4. Engineering Alternatives 13
4.1. Alternative I 13
4.1.a Table I – Estimated Costs for Alternative I 14
4.2 Alternative II 14
4.2.a Table II – Estimated Costs 15
4.3 Alternative III Proposed 16
4.3.a Table III – Estimated Costs Proposed 18
5. Project Milestones 18
6. Project Assumptions 21
7. Maps or Electrical Design 22

1. Project Description (Summary)

The Connecticut Department of Transportation (CTDOT) under the U.S. Department of Transportation's FY 2022 National Infrastructure Project Assistance Grants Program (Mega) for Track Improvement Mobility Enhancement-1 (Time-1) Project is taking on a comprehensive rail investment program in Bridgeport and Stratford CT. The TIME-1 project will support a vital component of CTDOT's Track Speed Improvement Program to enhance service in the rail corridor. The project will reduce travel time, increase track speed, make infrastructure improvements to bridges and track mainlines, and deploy catenary and signal modifications. In addition, TIME-1 will replace five aging rail bridges, increase bridge vertical clearances for better emergency response and road freight mobility, increase track centers for curve modifications, and improve drainage in flood prone areas.

One of the six bridges impacting UI within the TIME-1 project includes the removal of the Longbrook Ave Bridge in Stratford that crosses over the Metro North rail line. The existing single span bridge is supported by two end wall structures. Two very different alternatives were explored by CTDOT engineering. The first alternative included the complete replacement of the Longbrook Ave Bridge in Stratford that crosses over the Metro North rail line with a new single span bridge with two new end wall support structures at a new elevated height and re-grading the road to meet the new elevated bridge. The second alternative replaced the bridge with a new road constructed between Longbrook Ave and Barnum Ave Cutoff requiring to build up elevation between both roadways by re-grading the earth.

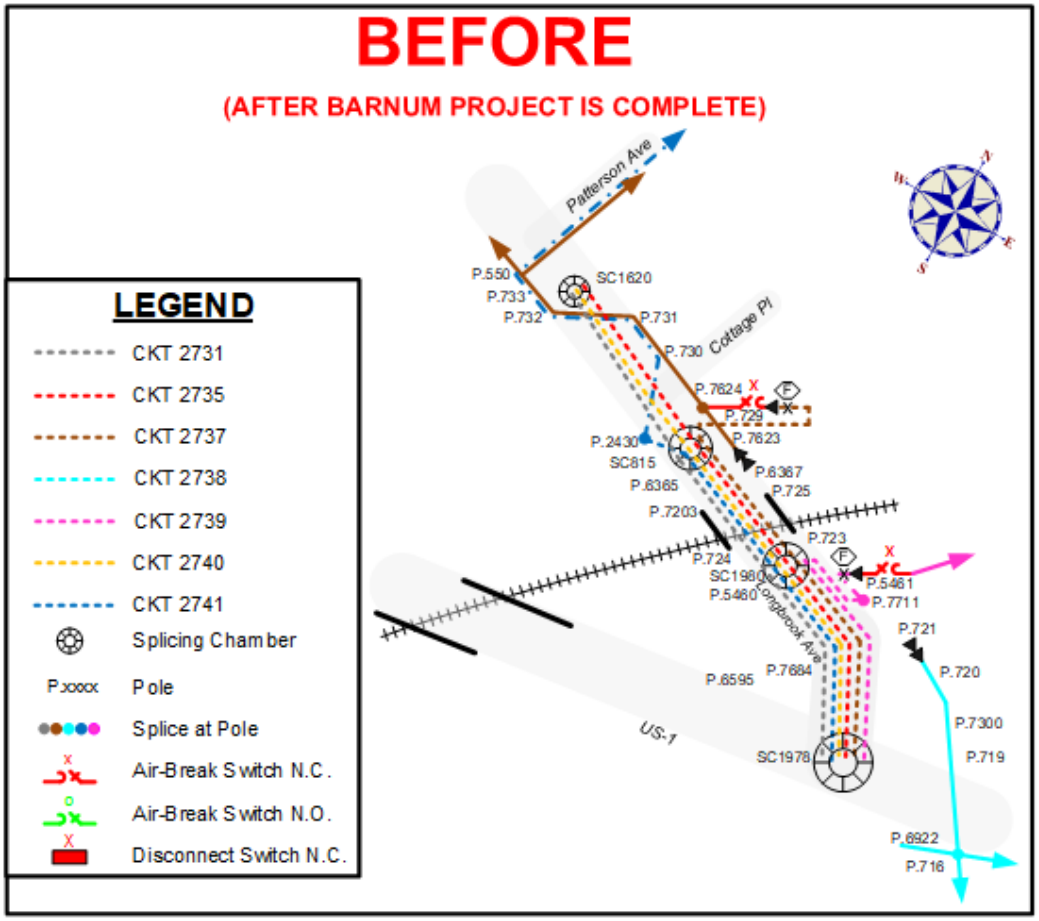
United Illuminating (UI) has some infrastructures across Longbrook Ave bridge. The replacement of the bridge requires UI to install a new underground conduit path to relocate the existing circuits affected by the bridge replacement. Each circuit would need to be cutover one at a time before the existing bridge can fully be removed. A scheduled construction sequence would need to be worked out between CTDOT and all utilities.

2. Existing Conditions

There are five distinct and separate underground and no overhead circuits that cross the bridge paths with multiple subsurface chambers connected by multi-conduit encased systems. These (5) five primary UG circuit feeders head west under the Longbrook Ave Bridge are all 750 KcMil EPR cables. The distribution circuits in these conduit systems supply customers in the Towns of Stratford and Trumbull.

Internal Use
180 Marsh Hill Road, Orange, Connecticut 06477

Figure 1. Existing circuit paths crossing over the Longbrook Ave bridge. NTS



During the Rt1 Bridge project, UI had changed the original design and installed a triangular shaped splice chamber at the west side of the bridge. This chamber was installed to proactively prepare for the future Longbrook Bridge replacement. CTDOT has issued a 95% level completed design. All circuits in the project limits are underground which either rise up on poles to the overhead or remain underground in the splice chamber and ductline conduit system. Past the bridge crossing, the overhead system contains both aerial circuit feeders and an open wire design with multiple secondary transformers supplying customer services. The overhead system requires some wire and pole shifting to allow for either alternative to make room for CTDOT construction.

13.8kV Circuit Ratings as of 3/8/2024:

Circuit Path	Circuit #	Amps Max (Normal/Peak)	Limiting factor
Longbrook Ave (Before Bridge)	2739	438 / 599	500 EPR Cable – 3 Duck bank
Under Longbrook Ave Bridge	2731	487 / 599	397 AL Open Wire
	2735	520 / 599	750 EPR Cable – 3 Duck bank
	2737	487 / 599	397 AL Open Wire
	2740	520 / 599	750 EPR Cable – 3 Duck bank
	2741	487 / 599	397 AL Open Wire

Inspections:

Splice Chamber (SC) inspections were conducted & all found to be in good condition, including the ductline. This project is not about the failing infrastructure but the ability to maintain the facilities after the new bridge is built. Below is the inspection data collected & summarized for each SC:

Splice Chamber	Inspection Date	Inspection Condition(s) Found	Engineering Recommendation(s)
SC1980	1/9/2024	Precast concrete walls & roof – New (Built in 2023) Rectangular in shape 14ft x 6ft x 6ft-6in height West wall has (8) eight PVC 5” conduits surrounded by a concrete encasement which crosses over the MNRR bridge and ends at SC1980	Good condition, Chimney height is 48”
SC815	1/9/2024	Precast concrete walls & roof – OK (built in 2012) Triangular in shape 18ft x 9ft x 6ft-6in height East wall has (8) eight PVC 5” conduits surrounded by a concrete encasement which crosses over the MNRR bridge and ends at SC1980	Good condition, Chimney height is 36”

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2.1. Pictures

Figure 2. Google View looking down at the Longbrook Ave RR bridge crossing project area.

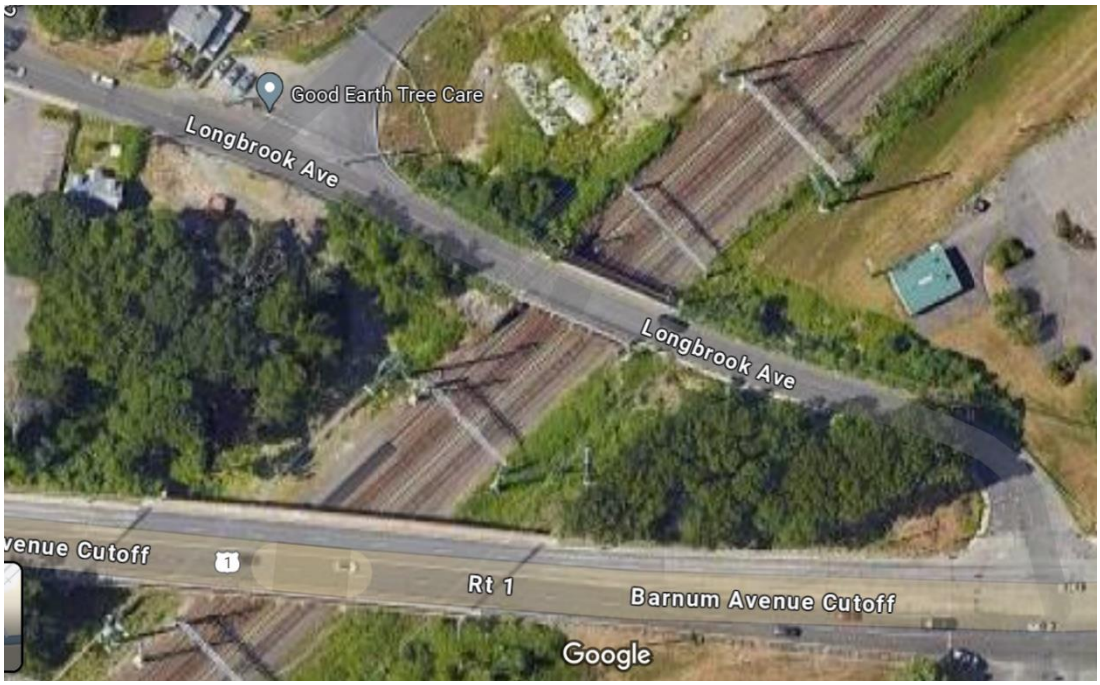

Figure 3. View of Longbrook Ave Bridge looking North. This will be replaced with a 5ft higher new bridge.



Figure 4. View looking North-West (project limit) towards the Longbrook Ave bridge with recently installed SC1978 at bottom.

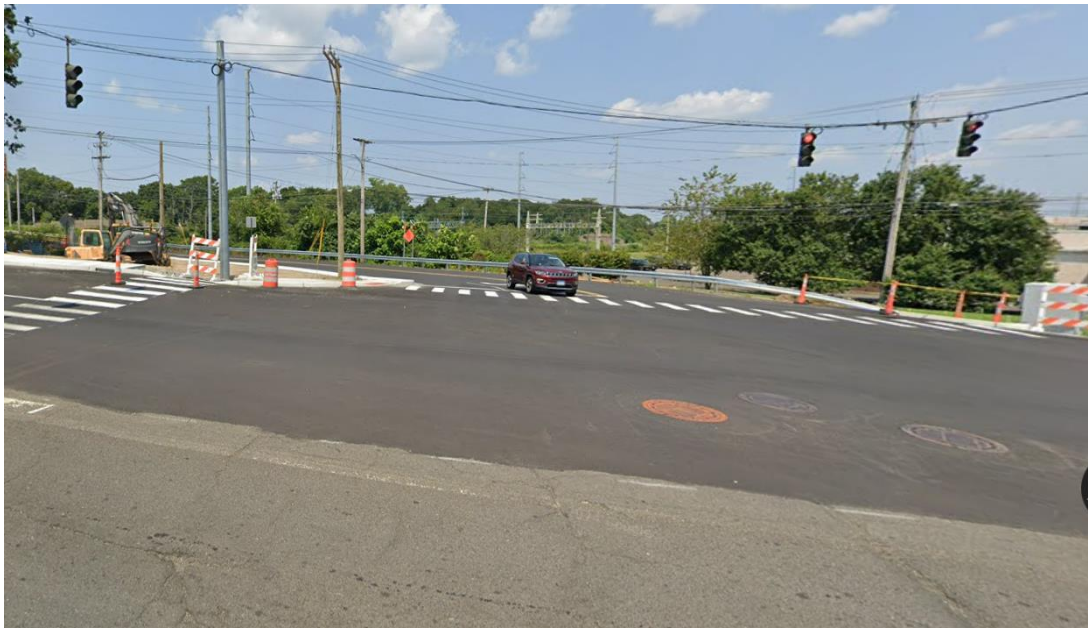

Figure 5. View looking West towards the Longbrook Ave bridge with project limit OH to be shifted North.



Figure 6. View looking North-West towards the Longbrook Ave bridge with recently installed SCI980 at bottom.



Figure 7. View looking North-East from the Longbrook Ave bridge.



Figure 8. View looking North-West at the North side of the Longbrook Ave bridge.



Figure 9. View looking East at the South side of the Longbrook Ave bridge.



Figure 10. View looking East at the traffic beacon with Longbrook Ave bridge in foreground.



Figure 11. View looking East at the traffic beacon with Environmental Drive to the left and Longbrook Ave bridge in foreground.



Figure 12. View looking North-West at the traffic beacon with Environmental Drive to the right.



Figure 13. View looking West down Longbrook Ave with UI property on the left & SC815 at the bottom.



3. Need Statement

As part of the TIME-1 CTDOT program and described in the Summary section, this project is the complete replacement of the CTDOT Bridge crossing the Metro North rail line on Longbrook Ave in Stratford CT. The design is to have one span with two new end wall support structures at a new elevated height of approximately 5 feet taller than the existing bridge requiring a new ductline crossing between adjacent splice chambers. The project also includes the re-grading and northward re-aligning of Longbrook Ave by 15 feet from Rt1 to approximately 400ft to the west of the bridge and tapering back to each end point to straighten the road alignment. These changes will impact the existing UI underground and overhead facilities:

- Splice Chamber SC1980 chimney access increases by 60" from 48" to approximately 108" (9ft) which is too far for a person using a UI standard pitched ladder to safely enter and exit safely.
- Splice Chamber SC815 chimney access increases by 48" from 36" to approximately 84" (7ft) which is too far for a person using a UI standard pitched ladder to safely enter and exit safely.
- The proposed depth of cover from CDOT above the UI cables on the conduit system limits the feeder circuit current to the existing ratings with no future circuit addition or expansion of customer load in the area. It also decreases the ability of the cables to supply power during normal and emergency operation of back-up.
- The re-alignment of Longbrook Ave to the north requires the area overhead poles, risers, and facilities to re-locate for the new road path.

The objective of the UI engineering review is to facilitate the overall design of the bridge, roadway and overhead, lesson the possible damage during (and after) construction resulting in long period power outages, ensure safety during the construction of the bridge and roadway, ensure future capacity needs and eliminate future access issues. Two risks were identified about the contaminated soil in the area and the additional cover needed over the protective mat on North side of Longbrook Ave for setting new poles. UI informed CTDOT for their design team to mitigate these risks in their design.

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4. Engineering Alternatives

CTDOT plans to replace the Longbrook Ave crossing the bridge over Metro North rails in Stratford CT in sections to allow the utilities to cutover from the old to the new bridge. This bridge design will construct half of the new bridge on the north side of Longbrook Ave. first then allow utilities to cut over before constructing the south side. CTDOT also plans to slightly widen and shift the bridge with roadway approximately 15 feet to the north to meet back at both ends of the project limits.

UI engineering reviewed the area and developed three feasible alternatives to redirect the 13.8kV supply cables before the bridge project began. These alternatives were presented to the State CTDOT as described below. After review discussions with the CTDOT and the design firm for the CTDOT, both CTDOT and UI agreed upon the Proposed Alternative.

4.1. Alternative I

In early design stages, CTDOT engineering created an alternative to construct a new roadway between Barnum Ave Cutoff and Longbrook Ave in parallel to the railroad lines as a solution to remove and not replace the Longbrook Ave bridge. This new roadway would take all the traffic flow currently travelling over the present Longbrook Ave Bridge.

UI engineering would design and construct an underground system that provides one new underground path from Route 1 to Longbrook Ave using a new roadway built by CTDOT. UI would be able to construct a new underground ductline between SC1982 on Barnum Ave Cutoff to SC815 on Longbrook Ave. Though this idea was discussed as a feasible alternative, CTDOT ran into resistance from the Town of Stratford

Civil

This concept would require the design, procurement, and installation of 2 new risers and 1 section of 8way 5” PVC encased conduits under the new roadway, ~260 linear feet between SC1982 and SC815

Electrical

Underground Electrical Work – UI would design, procure, and install electrical cables and associated equipment for five 13.8kV distribution circuits in the new path in new roadway and in Barnum Ave Cutoff. Three circuits would rise to the overhead, one from SC1980, one from SC815 and one from SC1620. Circuit riser locations at SC1980 & SC815 can remain installed and not altered. In total, this would require, per circuit, the installation of approximately 5,100 linear feet of 13.8kV UG 750KcMil cable; 15 pulls, 21

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splices, pulling through two riser laterals and six cutovers. It begins with five underground circuits from SC1978 heading west to SC1982 through S1981 by crossing over the new Barnum Ave Cutoff (Rt1) bridge. Next these same five circuits will head north from SC1982 to SC815 where one will be connected to existing riser pole. Three of the remaining underground circuits will be spliced in SC815 and the last underground circuit will continue west out of SC815 to east side of SC1620, where one will rise to an existing pole with new cable. The 13.8kV primary underground circuit cable splicing includes all new splice chambers and riser locations to all existing cables.

Overhead Electrical Work – UI would design, procure, and install electrical riser for one 13.8kV distribution circuit cable to splice into an existing aerial cable at existing pole #733 from SC1620.

Remove the Longbrook Ave 13.8kV supply cables that pass under the bridge between SC1978 at the intersection of Barnum Ave and SC1620 near the intersection of Patterson Ave and abandon the underground system. There are five (5) circuits, each of which would require advance construction, an outage, cut splices, make up splices and cable removal pulls. The civil structures, once empty of the UI cables, would be removed by the bridge contractor during the new bridge's construction.

4.1.a Table I – Estimated Costs for Alternative I

Since CTDOT discarded this alternative at the conceptual project level, no cost estimate was created.

4.2 Alternative II

Design and construct a new underground system west along Barnum Avenue to Main Street then north on Main Street to the intersection of Longbrook Ave; a total distance of approximately 2,270 linear feet of new civil path. This proposed construction would replace the path which passes under the bridge. The paths would have to be built individually and sequentially after the Rt1 Bridge is complete; estimated duration of 4 years from start of design to completion of all UI work. Foreign utility relocation would be required to ensure lane assignment for both paths.

Path 1 – Civil Work – This proposal would require the design, procurement, and installation of 4 standard chambers and 5 sections or 1,810 linear feet (~350 feet each section) of 12-way 5" PVC encased conduits; along Main Street, and Route 1, ending just to the west of the Rt1 bridge in SC1983. This new underground path would connect to the existing path at the intersection of Main Street and Barnum Ave SS Driveway.

Path 1 – Electrical Work – UI would design, procure, and install electrical cables and associated equipment for five 13.8kV 750KcMil UG cable distribution circuits in the UG new path. UI would rise three of the circuits to the overhead at or near the intersection of Main and Longbrook. This would require the installation of two new riser poles, new 4" lateral, approximately 14,400 linear feet of 13.8kV UG cable; 39 pulls, 45 splices, pulling through new laterals and five circuit cutovers.
Path 2 – Civil Work – This proposal would require the design, procurement, and installation of a new 4" riser from SC1978 to Pole on Longbrook Ave.
Path 2 – Electrical Work – UI would design, procure, and install electrical cables and associated equipment for one 13.8kV distribution circuit in the new path. UI would connect the circuit just to the east of the Longbrook Ave bridge. This would require, the installation of a new riser pole, new 4" lateral, three new poles, 200 linear feet of 13.8kV UG riser cable; 1 pull, 2 splices, and a circuit cutover. OH requires two new spans of aerial cable, totaling approximately 200 linear feet.

Remove the 13.8kV supply cables that pass under the Longbrook Ave bridge between Rt1 (Barnum Ave) and Main St and abandon the system between SC1620 and SC1978. There are six (6) circuits, requiring a total of 37 cable removal pulls and two riser removal pulls. The two civil structures and conduits, once empty of the UI cables, would be removed by UI. The conduits under the Longbrook Ave bridge would be by the state contractor during the construction of the new bridge.
The Table below indicates the planned level estimated labor and material costs for underground (civil) and electrical (OH and UG) construction, overheads, allocations, and the recommended contingency for known risks, including environmentally suspect soil. The values presented have a proposed tolerance of +50%/-25%.

4.2.a Table II – Estimated Costs

Alternative II	CAP	COR
Labor	$551,400	$79,800
External Services	$2,875,700	$60,000
Materials	$813,700	$0
Overheads	$2,380,430	$64,520
AFUDC	$93,440	
Total	**$6,918,990**	

4.3 Alternative III Proposed

Investigation by United Illuminating (UI) Distribution Engineering into the planned roadway changes and upgrades by the State determined that there would be conflicts with the UI existing underground and overhead facilities. Some conflicts were resolved by the State adjusting the planned work. However, after the adjustments, there were still conflicts between the State proposed work and the existing UI facilities within the area.

The nature of the conflicts, along with the proposed work to be performed by the State resulted in a UI proposal to design, and construct an underground system under Longbrook Ave between Barnum Avenue heading west to the second splice chamber just past the construction limits of the road elevation increase. This includes the underground crossing over Metro North rails in the new bridge, installing two new splice chambers to the new road grade and a new conduit system to be install underneath for a total distance of approximately 1,000 linear feet of new civil path. This underground ductline system is a direct replacement of the existing system to meet the new elevated Longbrook Ave roadway & bridge heights required to maintain system ratings and allow for UI personal access. Also, the bridge widening, and road shifting requires a new poles line with three risers & the removal of the overhead wires crossing the bridge. One circuit riser needs to relocate from SC815 to SC1620 because the new SC815 needs to be relocated further. This requires six circuit cutovers before the removal and abandoning the existing UI underground and overhead facilities which UI currently occupies. To achieve proper depths, UI Engineering determined the north side of the Longbrook Ave roadway elevation needs to be completed before the overhead and underground system can be built. Simply, this alternative is a direct “like for like” system replacement.

This proposal would allow UI the ability to redirect all energized cables from the existing bridge to the partially constructed new bridge and area before completing the new bridge. This would remove safety issues during bridge construction, increase the design flexibility for the bridge and eliminate outages during the bridge construction.

Civil

This would require the design, procurement, and installation of three riser locations, two standard splice chambers; one standard straight 6x14x7 and one standard triangular chamber, 9.5x16x7 chambers along with four sections of 8way 5" PVC encased conduit system under Longbrook Ave; roughly ~1,000 linear feet, estimated as shown below:

- East side of bridge: (198 feet from SC1978 to new SC1980 + 132 feet from new SC1980 to the bridge conduit east stub out)
- West side of bridge: (203 feet from the bridge conduit west stub out to new SC815 + 475 feet from new SC815 to SC1620)

This does not include the estimated 75 feet of 5" fiberglass conduit crossing under the new bridge to be installed by the CTDOT contractor.

Electrical

Underground Electrical Work – UI would design, procure, and install electrical cables and associated equipment for six 13.8kV distribution circuits in the new path on Longbrook Ave. UI would rise three of the circuits to the overhead, one from SC1980, one from SC815 and one from SC1620. In total, this would require, per circuit, the installation of approximately 5,900 linear feet of 13.8kV UG cable; 18 pulls, 21 splices, pulling through three riser laterals and three cutovers. It begins with six underground circuits from SC1978 heading west to SC1980, where one will rise to a new pole. The remaining 5 underground circuits will continue west out of SC1980 and head over the bridge to SC815, where one will rise to a new pole. The last section of four underground circuits will continue west out of SC815 to east side of SC1620, where one will rise to an existing pole. The 13.8kV primary underground circuit cable splicing includes all new splice chambers and riser locations to all existing cables.

Overhead Electrical Work – UI would design, procure, and install electrical wires and associated equipment for three 13.8kV distribution circuit cables to make room for the re-alignment of the road and bridge moving north approximately 15 feet. On the west side of the bridge, one circuit will splice into an existing aerial cable at new pole #732 and one circuit to new pole #729. To the east of the bridge, one circuit will be relocated to a new pole #7711. The open wire circuit heading northeast will be shifted requiring pole #5461 with an Air Brake Switch (ABS) and pole #7111 to be replaced.

Remove the Longbrook Ave 13.8kV supply cables that pass under the bridge between SC1978 at the intersection of Barnum Ave and SC1620 near the intersection of Patterson Ave and abandon the underground system. There are six (6) circuits, each of which would require advance construction, an outage, cut splices, make up splices and cable removal pulls. The civil structures, once empty of the UI cables, would be removed by the bridge contractor during the new bridge's construction.

The Table below indicates the proposed level estimated costs for both underground (UG) and overhead (OH) construction, labor and material plus the overheads and allocations has a tolerance of +50%/-25%. The cost estimate includes the installation of two new splice chambers, 16 new poles, 12-5" Sch 40 PVC, 8-5" Sch 40PVC, 1295 ft of duct bank, 12-5" duct bank with hangers under the bridge, three, laterals for the primary riser poles, primary cables, and the demolition of two old splice chambers Engineering recommends a 20% Contingency to be added by Project Manager. Written SAP work orders and more detailed engineering is required to reduce the tolerance window. This table does not reflect or include any mitigation of possible risks.

4.3.a Table III – Estimated Costs Proposed

	CAP	COR
Labor	$297,500	$30,000
External Services	$1,700,000	$150,000
Materials	$225,000	$0
Overheads	$642,890	$92,320
AFUDC	$131,460	
Total	**$3,269,170**	

5. Project Milestones

	Proposed	Plan	Detail	Support
Project Management	30	40	40	40
Civil Engineer	150	150	150	50
Electrical Engineer	100	70	80	50
Operations Engineer	0	0	15	15
Field Technician & Supervisor	15	25	70	15
Civil Construction Supervisor	0	30	40	330
UG PD Supervisor	5	5	10	60
OH PD Supervisor	0	5	5	50
T&S Group Supervisor	0	0	5	25
GIS & Graphics Designers	0	0	6	24
Environmental/Safety Engineering	0	0	4	6
Total	300	325	425	665

*= (Using ConnDOT Engineering Contractor latest schedule using 95% complete drawing set)

	Estimated Duration & Date	**Actual Date**
Engineering Charter Approval (IP1)	3 Weeks (9/19/24)	
Civil Engineer (Detail)	12 Weeks	
Electrical Engineer (Plan)	12 Weeks	
Planned Level Complete (Total)	**12 Weeks (12/13/24)**	
Approval from ConnDOT for project to proceed	By 12/13/24	
Charter Approval (IP2)	1 Week (12/19/24)	
Civil Construction Procurement	39 Weeks	
Shift Street lights and Make Ready for Communications to shift OH to South Longbrook Ave South side	8 Weeks	
Material Procurement (Splice Chamber, etc.)	8 Weeks	
Civil & Elec OH Make Ready WO's	4 Weeks	
Remove poles P723 & P725	2 Weeks	
Designed Level Complete (Total after Charter Approval -incl'g overlaps)	**39 Weeks (9/18/25)**	
CTDOT Fill Longbrook Ave North side for poles & UI civil	By 6/12/26	
Make Ready for Civil (Install new poles)	4 Weeks	
IFC (Issue For Construction) Drawings Completed & PO awarded	3 Weeks	
CTDOT Build new bridge with conduits	By 8/3/26	
Civil Construction – Obtain permits & mobilize to site	18 Weeks (by 8/3/26) *	
Civil Construction – Install SC1980 & SC815	4 Weeks	
Civil Construction – Install ductline & risers on Longbrook Ave	13 Weeks	
Complete OH work (To begin after Civil Complete)	8 Weeks	
Civil Records updated	3 Weeks	
Electrical Engineer (Detail) – Level of Effort (Release 2 weeks after Civil Records Updated)	2 Weeks	
Electrical Make Ready (start 2 weeks after Eng Detail begins)	2 Weeks	
Electrical – Install, Cutover & Remove 6 Circuits	23 Weeks	

Internal Use

Communications Companies to complete OH removals and move to bridge UG – Work with UI within the circuit cutovers	*Est. 4 Weeks (By 1/7/28)*	
Electrical - UI shift street lights & remove south side of bridge pole line from P.6365 to P.5460 (incl P.7203 and P.724)	1 Week	
Civil Construction – Demo Old SC's 1980 & 815 plus abandon associated ductline (Remove)	2 Weeks	
ConnDOT installs new Beacon and service ready for UI	*(By 9/3/27)*	
UI connects beacon meter service – parallel work with above	1 week	
Longbrook Ave - UI Complete for ConnDOT to continue with south side of bridge (Total)	**58 Weeks (9/10/27)**	
CTDOT Fill Longbrook Ave South side (Stage 2B) for poles & UI civil	18 Weeks (By 1/14/28)	
Install new pole P7684 & guy, shift OH	2 Weeks (by 1/28/28)	
Communications Companies to shift from old pole P7684 to new pole P7684	*Est. 4 Weeks (By 2/28/28)*	
Remove old pole P7684 & guy	1 Week	
Civil Construction – Final Pave outside state scope (UI scope only)	3 Weeks (By 4/7/28)	
Project Manager – Closeout	12 Weeks	
Project Total for UI (Est. from 12/31/2025 - incl'g overlaps)	**200 Weeks 6/30/2028**	

Internal Use

6. Project Assumptions

The following is the list of assumptions used to create the estimates for the proposed work.

1. UI will be able to construct the new facilities system as planned.
2. Some of the soil may be contaminated based on the proximity of other nearby land. All underground facilities will be sampled for contaminates prior to excavation.
3. All budgetary estimates are based on a work product in compliance with existing UI and/or industry accepted standards and specifications.
4. All construction techniques used to install, remove, or replace UI facilities will comply with any and all applicable Federal, State and Local regulations as well as UI Construction Standards.
5. UI will not require easements for any UI owned equipment on the customer's property.
6. All UI construction work will be done during the normal business week and hours.
7. No ledge removal has been assumed nor included within the budgetary cost estimates. There is a risk that ledge will be in the area of excavation and will have to be removed. The method of removal of ledge has not been determined nor agreed upon.
8. Standard trench restoration with one travel lane will be done. There will be no milling or curb to curb paving required.
9. All materials will be ordered and available in time for use by Construction.
10. The UI construction work is weather dependent. For safety reasons, UI will not schedule crews to work on the electrical facilities during inclement weather. There is the possibility of schedule delays due to weather. No value for the costs associated with weather delays is offered.
11. Labor rates used in creating the estimates are based upon historical averages.
12. All dollars shown are in 2024 dollars and subject to change due to escalation in material, labor, and equipment rates at time of actual construction.

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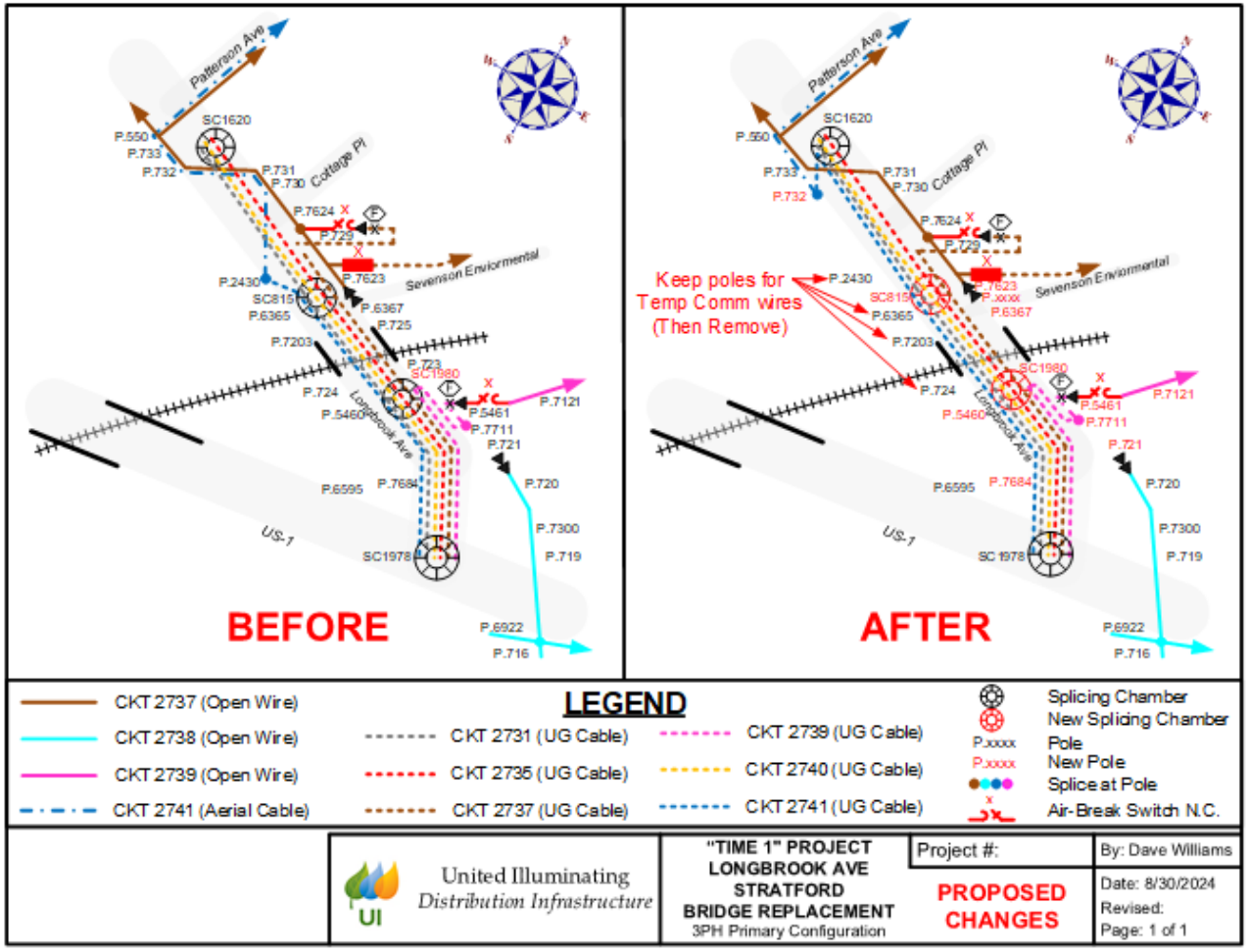
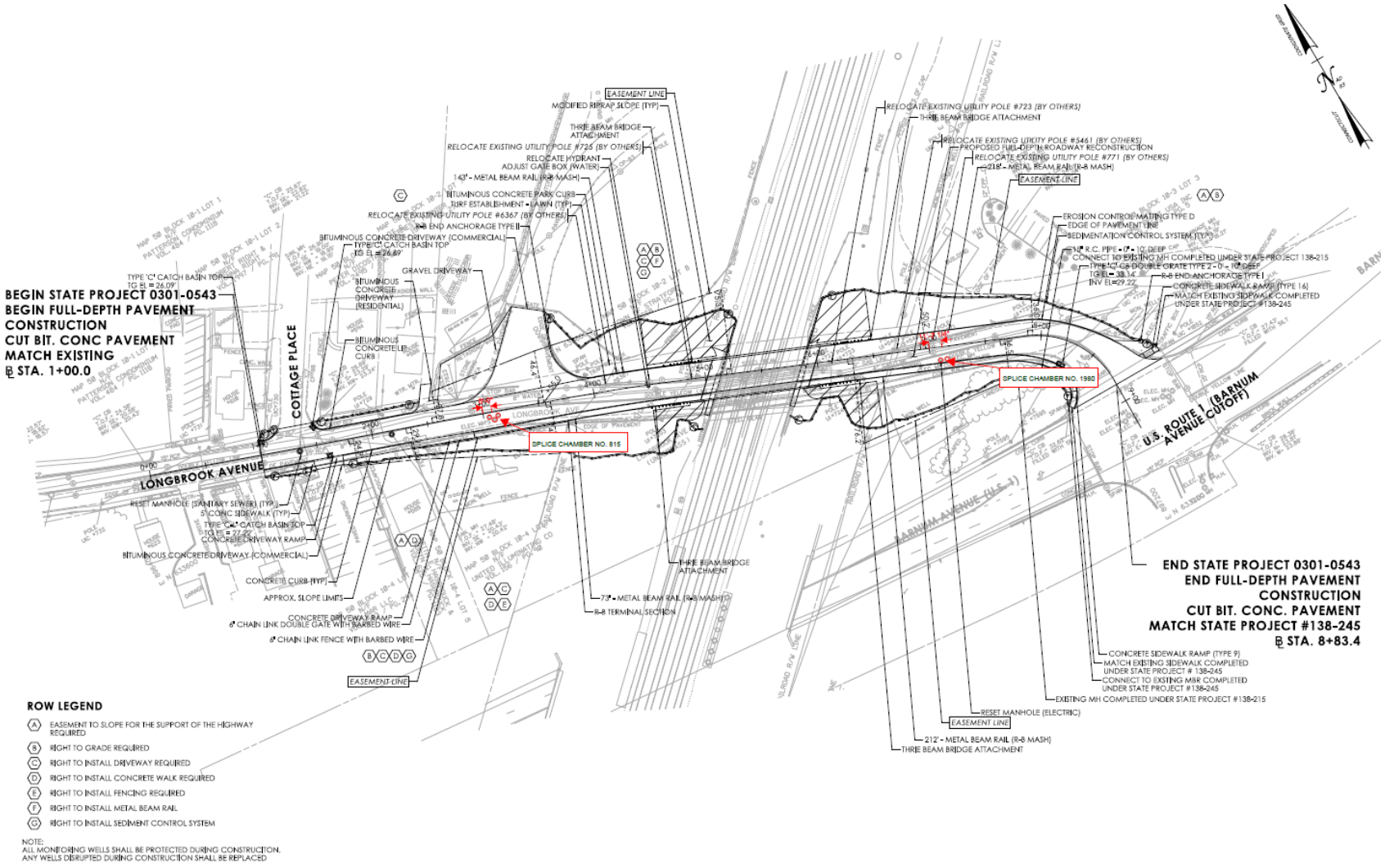
7. Maps or Electrical Design

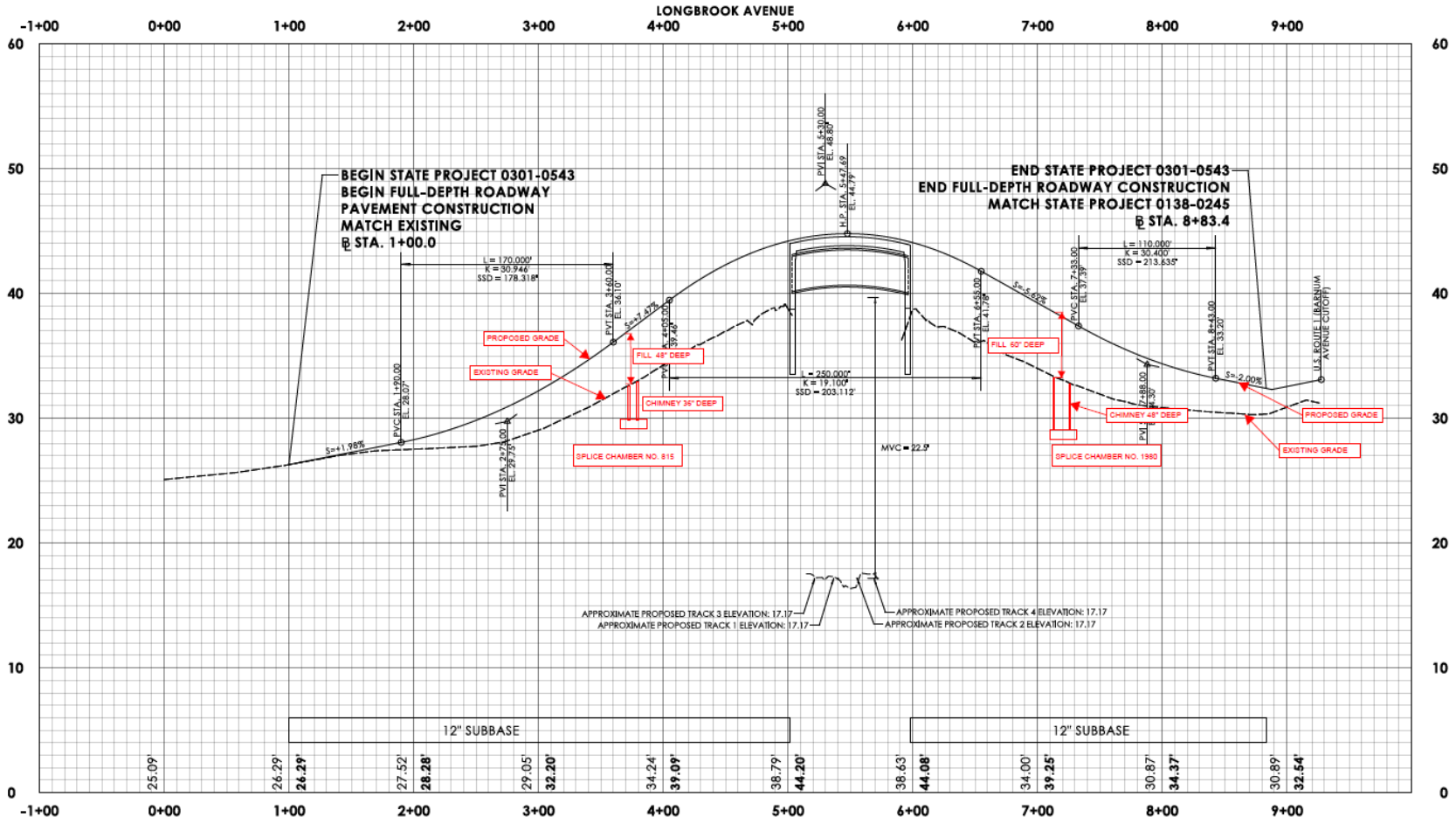
BEFORE AND AFTER ELECTRICAL DESIGN:



PLAN VIEW OF TOTAL BRIDGE PROJECT AT 95% COMPLETE DESIGN LEVEL BY CTDOT:



PROFILE VIEW OF TOTAL BRIDGE PROJECT AT 95% COMPLETE DESIGN LEVEL BY CTDOT WITH UI NOTES IN RED:



PRJ-005567

Govt Hwy - TIME-1/ TIME-3 Metro-North Corridor Improvement

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Govt Hwy - TIME-1/ TIME-3 Metro-North Corridor Improvement

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005567	Electric Distribution	Eves, Charles	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	State & Municipal	IP1 Originate	Program/As Spent	Program/As Spent

Project description:

The Connecticut Department of Transportation (CTDOT), and the National Infrastructure Project Assistance Grants Program (Mega).
It is undertaking the Track Improvement Mobility Enhancement-1 (TIME-1) project in Bridgeport and Stratford, CT.
The TIME-1 project is part of a comprehensive rail investment program to reduce travel times and increasing track speed.
The project includes significant infrastructure upgrades to improve bridges, mainline tracks, and signal system modifications.
The replacement of these bridges will affect the United Illuminating (UI) underground and overhead infrastructures.
Therefore, UI needs to relocate the infrastructures to accommodate the need of the State projects for five Metro North railroad bridges. This includes three bridges in CTDOT TIME-1, Contract B: East Main St, Main St & West Broad St in Stratford and two bridges in CTDOT TIME-1, Contract C: Bruce Ave in Stratford & Bishop Ave in Bridgeport.

Project Scope:

The scope of work includes the following:
East Main St, Stratford:
Relocate OH Cir's 2739 & 2741 for approx. 900ft
Relocate 14 poles, guying & equipment
Construct infrastructure to supply power for new electric drain pump.

Main St, Stratford:
Relocate OH Cir's 2640 & 2634 for approx. 800ft
Relocate 9 poles, guying & equipment
West Broad St, Stratford:
Relocate OH Cir's 2740 & 2741 for approx. 600ft
Relocate 10 poles & equipment

Bruce Ave, Stratford:
Relocate UG, 5" - 8 Duct Bank ductbank & Cir 2641 for approx. 400ft
Install 2- 6'X14'X7' Rectangular Splice Chamber
Relocate OH Cir 2643 approach to both sides of bridge approx. 700ft
Relocate 10 poles, guying & equipment
Construct infrastructure to supply power for new electric drain pump.

Bishop Ave, Bridgeport:
Relocate UG, 5''-8 ductbank & Cir's 2644, 2643 & 552 for approx. 350ft
Install 3 - 6'X14'X7' Rectangular Splice Chamber
Relocate OH Cir 2643 approach to both sides of bridge approx. 700ft
Relocate 12 poles, guying & equipment
Construct infrastructure to supply power for new electric drain pump.

Project Benefits:

UI is obligated and mandated to relocate our facilities and infrastructure to support the State's project. New infrastructures will be installed that can last over another 40 years or plus.

Project Risks and Mitigation Plan:

1. Meet State of Connecticut TIME-1 & TIME-3 Metro-North RR bridge replacement project.
   Mitigated through communication & proper planning with execution.

2. Contaminated soil.
   Mitigation - All underground facilities will be sampled for contaminates prior to excavation.

3. Ledge removal.
   Mitigation - Even with test pits, it is difficult to predetermine ledge in working area. Ledge removal will need to occur if needed and funded though contingency in the project budget at a pre-negotiated flat rate with the civil contractor.

Risk of No Action:

UI has an obligation to relocate our facilities when in conflict with a State or municipal project. No action is not a viable alternative.

Project Alternatives:

This project requires the relocation of existing UI facilties to avoid conflicts with the states bridge construction. The company will be relocating the existing facilties to adhere to safety safety and construction standards at the minimum possible cost.

Basis for Project Estimates

Based on the State's 30% design information, the cost estimate for this project includes the following:

- Engineering /Management time
- Materials Cost from the vendor (Splice chambers, ductbank)
- Materials Cost stockroom items (Poles, Primary cable, Terminators, Risers)
- Labor cost to install splice chambers and conduits.
- Labor cost to install Poles and associated materials.
- Labor cost to install Primary cables (underground and Overhead).
- Labor cost to cutover each circuit.
- Labor cost to remove old infrastructures.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 132**	$ -	$ -	$ 44	$ 44	$ 44
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 1,200**	$ -	$ -	$ 400	$ 400	$ 400
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 465**	$ -	$ -	$ 155	$ 155	$ 155
# Internal, Overheads	**$ 243**	$ -	$ -	$ 81	$ 81	$ 81
# Materials	**$ 360**	$ -	$ -	$ 120	$ 120	$ 120
# Overheads - External	**$ 453**	$ -	$ -	$ 151	$ 151	$ 151
Total	**$ 2,853**	**$ -**	**$ -**	**$ 951**	**$ 951**	**$ 951**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 2,853	$ -	$ -	$ 951	$ 951	$ 951

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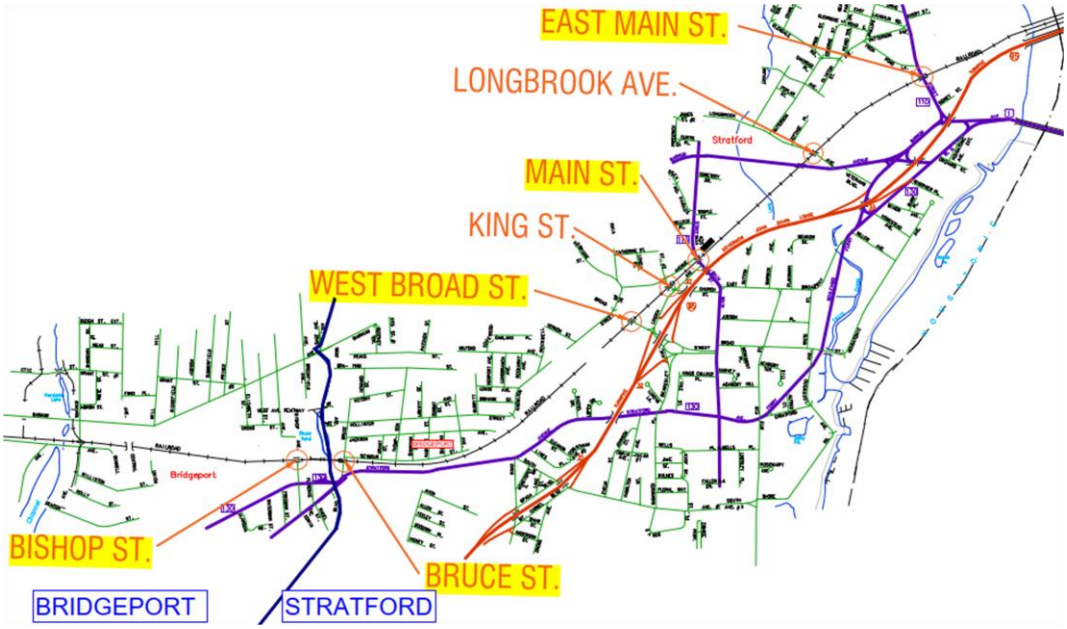
CTDOT – Time-1
MNRR Bridge Replacement
Stratford & Bridgeport CT
CTDOT Time-1 Project # 301-536

UI Project # PRJ-005567



Prepared by: The UI Distribution Engineering Dept.

Date of Report: 10/1/2024

The United Illuminating Company

180 Marsh Hill Road

Orange CT

Index

1. Project Description (Summary) 3
2. Existing Conditions 4
3. Need Statement 15
4. Engineering alternatives 15
4.1 Alternative I. Do nothing. 16
4.2 Alternative II. Preferred Solution 16
4.2.a Table 1 – Estimated Cost Proposed 17
4.2.b Table II – Estimated Costs Proposed by Location 18
5. Project Milestones 18
6. Project Assumptions 19
7. Maps or Electrical Design 20

1. Project Description (Summary)

The Connecticut Department of Transportation (CTDOT) is advancing the Mobility Enhancement-1 known as Time-1 project under the National Infrastructure Project Assistance Grants Program (Mega). This initiative focusses on improving rail infrastructure in Bridgeport and Stratford CT, as part of the broader Track Speed Improvement Program. Time-1 aims to reduce travel time, increase track speeds, and upgrade critical infrastructure, including the replacement of five aging rail bridges. The project also addresses bridge vertical clearance, enhances road freight mobility, and improves drainage in flood-prone areas.

United Illuminating (UI) plays a crucial role in this project in relocating its electric facilities at six key bridge locations impacted by rail bridge replacements. UI will ensure uninterrupted electric service throughout the construction process, while coordinating with CDOT to implement necessary infrastructure modifications. These efforts will improve both rail and road mobility, the success of TIME-1 hinges on effective collaboration between CTDOT, UI, and other stakeholders to meet infrastructure and safety goals.

Longbrook Ave Stratford is one of the six bridges affected and this bridge has been identified to be a separate UI project as it will be completed first under CTDOT TIME-1, Contract A.
The remaining TIME-1 locations with UI conflict includes the replacement of five Metro North railroad bridges that cross over vehicular roadways.
These include three bridges in CTDOT TIME-1, Contract B: East Main St, Main St & West Broad St in Stratford.
Bruce Ave in Stratford & Bishop Ave in Bridgeport will be part of CTDOT TIME-1, Contract C.
East Main St (Rt 110) and Main St (Rt 113) are the only two state road allowing for 50% state re-imbursement to UI. The three other bridge locations are municipal roads with have no state re-imbursement to UI.

2. Existing Conditions

East Main St. (RT 110) Stratford:
The existing single-span steel bridge at East Main St. is supported by two end wall structures. There are no underground or overhead electric facilities directly crossing the bridge. However, overhead Circuit 2741 runs along the north side of the bridge, while a three-phase open wire Circuit 2739 is located on the south side. Both circuits provide electric service to customers in Stratford. On the north side, Circuit 2741 includes a 13.8/4.16kV three-phase step-down transformer bank at pole P.7498, which supplies power to a 4.16kV/120-240V pad-mounted transformer.

Figure 1. Depiction of the existing OH circuit paths near the East Main St. bridge. NTS

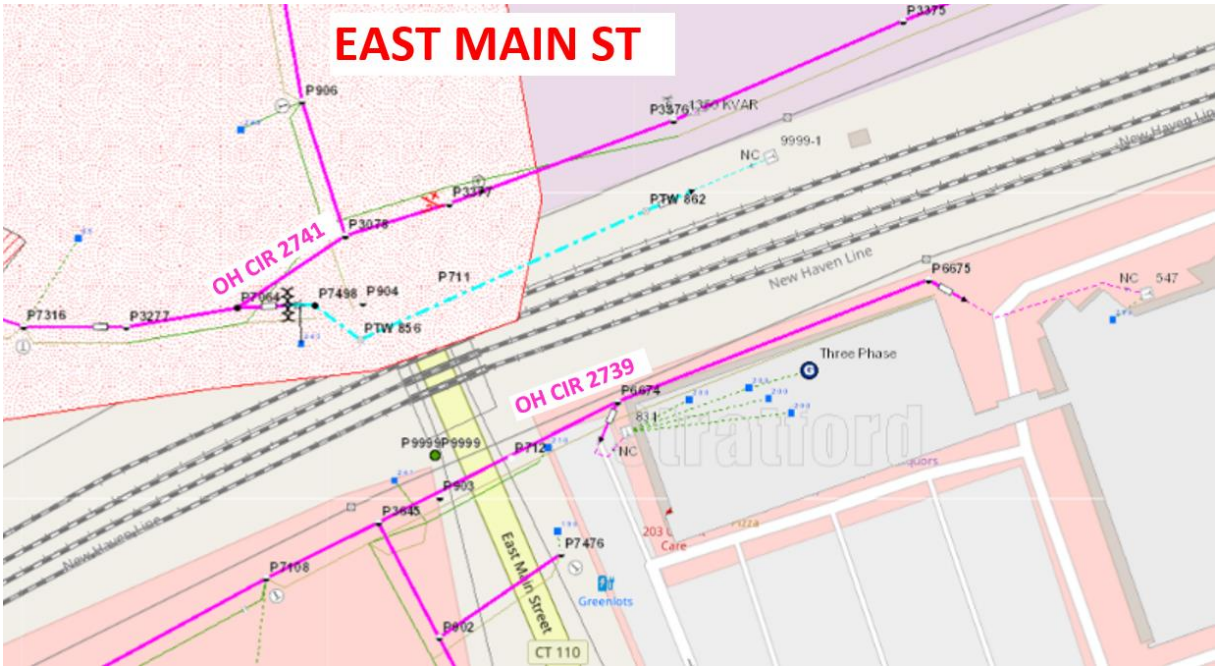


Figure 2. Picture of East Main St. bridge facing North.



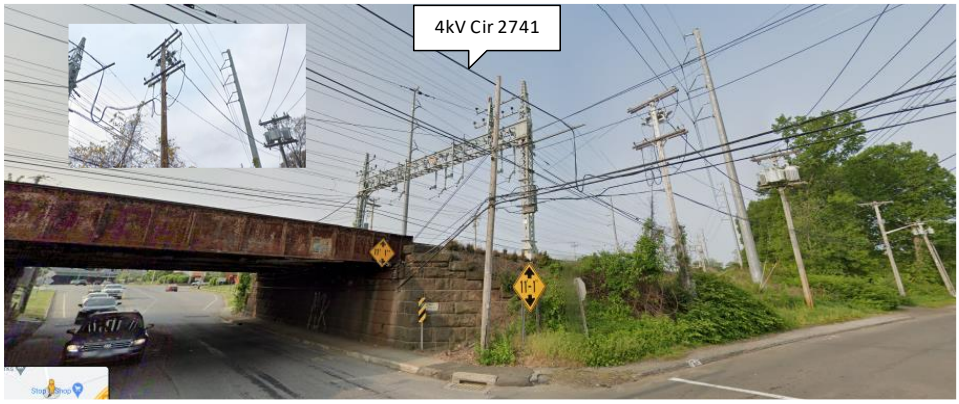
Figure 3 Picture of East Main St. bridge facing South.



Figure 4 Picture of East Main St. bridge facing East down Frog Pond Lane.



Figure 5 Picture of East Main St. bridge facing South (corner of Frog Pond Ln.) with Cir 2741 13.8/4.16kV stepdown transformer bank at P.7498 and OH wire shown.



Main St. (RT 113) Stratford:

The existing single-span steel bridge at Main St. in Stratford is supported by two columns and two end wall structures. There are no underground or overhead electric facilities crossing the bridge itself. However, on the north side, three-phase open wire Circuit 2634 provides electric service to customers in Stratford, including the Stratford Train Station. Additionally, a guy wire from pole P.515 is anchored to the east side of the bridge's end wall. On the south side, single-phase Circuit 2640 powers the area's street lights, the National Helicopter Museum, the railroad parking office, and parking lot lighting, ensuring essential services remain operational in the vicinity.

Figure 6. Depiction of the existing OH circuit paths near the Main St. bridge. NTS

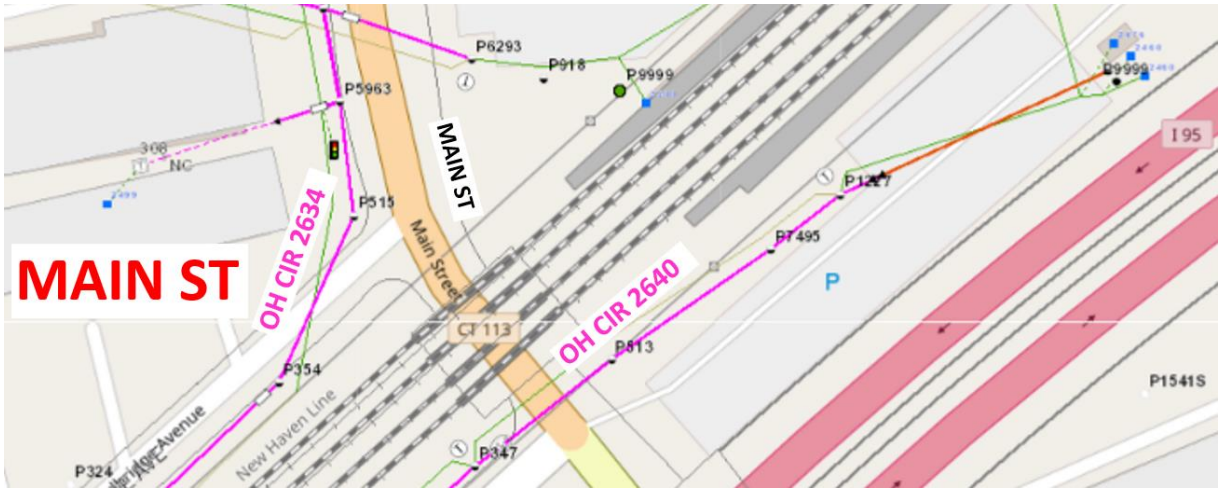


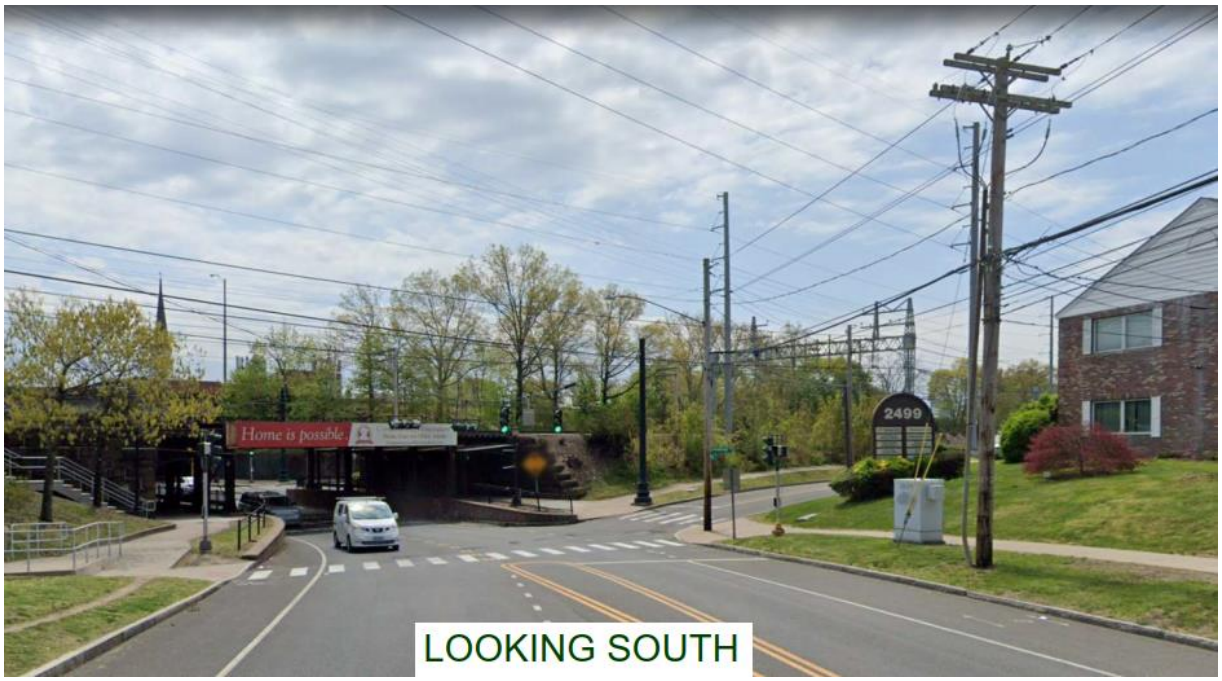
Figure 7 Picture of Main St. bridge looking down with Circuits outlined (North is facing down) .



Figure 8 Picture of Main St. bridge facing North.



Figure 9 Picture of Main St. bridge facing South.



West Broad St. Stratford:

The existing single-span steel bridge at West Broad St. is supported by two end wall structures, with no underground or overhead electric facilities crossing beneath or above it. On the north side of the bridge, three-phase open wire Cir 2741 provides power to local customers, while Cir 2739, also a three-phase open wire system, serves the south side. Both circuits are essential for delivering service to residents and businesses in the town of Stratford.

Figure 10. Depiction of the existing OH circuit paths near the West Broad St. bridge. NTS

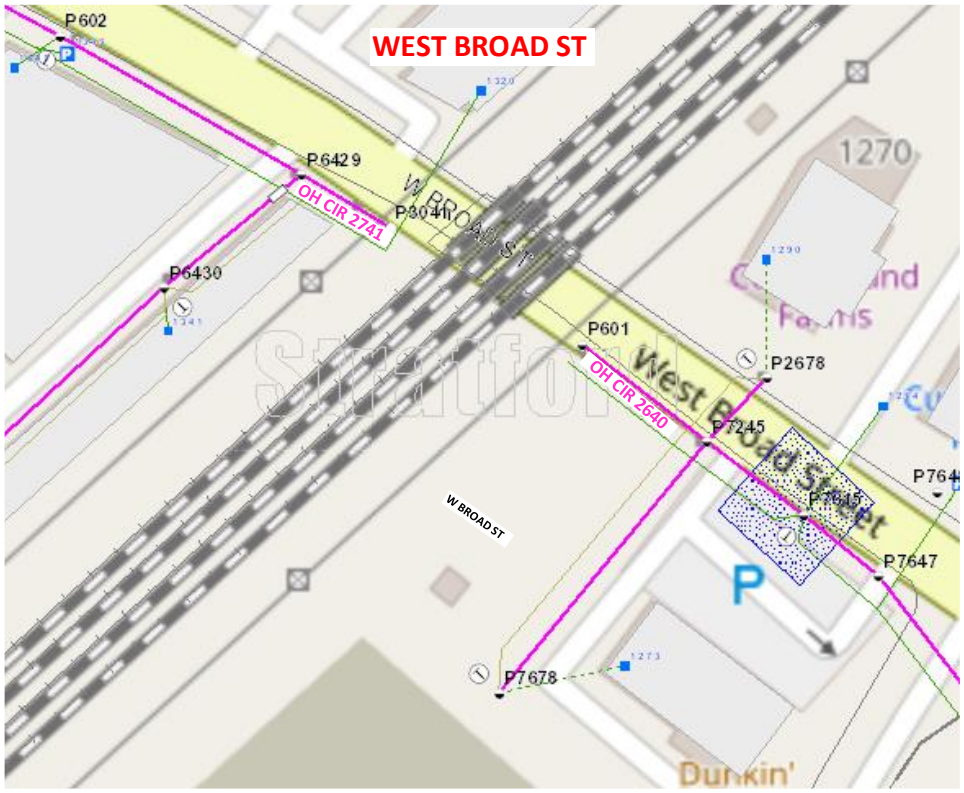


Figure 11 Picture of West Broad St. bridge looking down with Circuits outlined (North is facing up) .

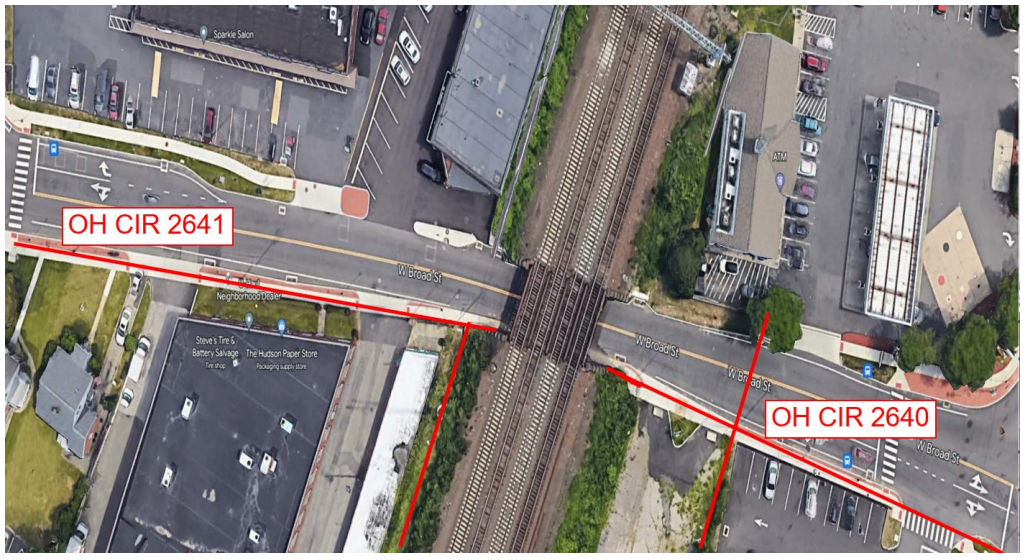


Figure 12 Picture of West Broad St. bridge facing West.



Figure 13 Picture of West Broad St. bridge facing East.



Bruce Ave in Stratford:

The single-span bridge at Bruce Ave. is supported by two end wall structures, with no overhead electric facilities crossing over or under the bridge. However, on the north side, three-phase open wire Cir 2643 serves customers in both Stratford and Bridgeport. Additionally, a four-conduit underground ductline runs beneath the bridge, connecting splice chamber SC723 on the south side to SC724 on the north. Within this ductline, the three-phase 500 Kcmil underground Cir 2741 serves to customers in the Town of Stratford.

Figure 14. Depiction of the existing OH and UG circuit paths near the Bruce Ave. bridge. NTS

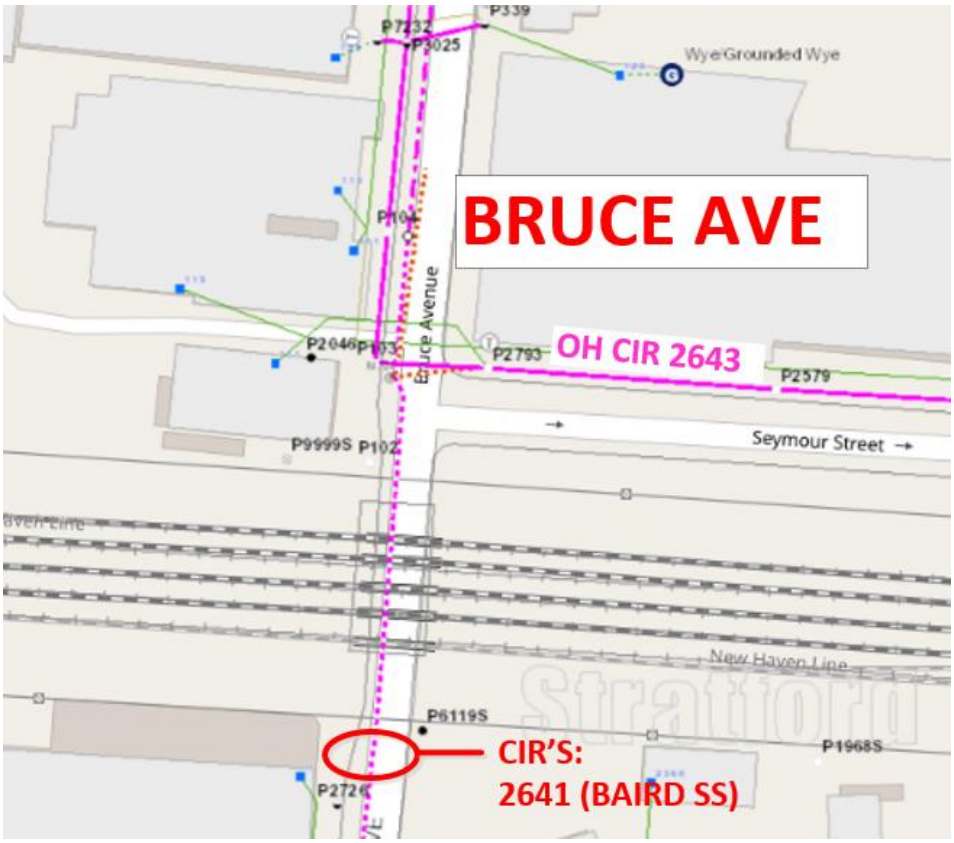


Figure 15 Picture of Bruce Ave. bridge looking down with Circuits outlined (North is facing down) .

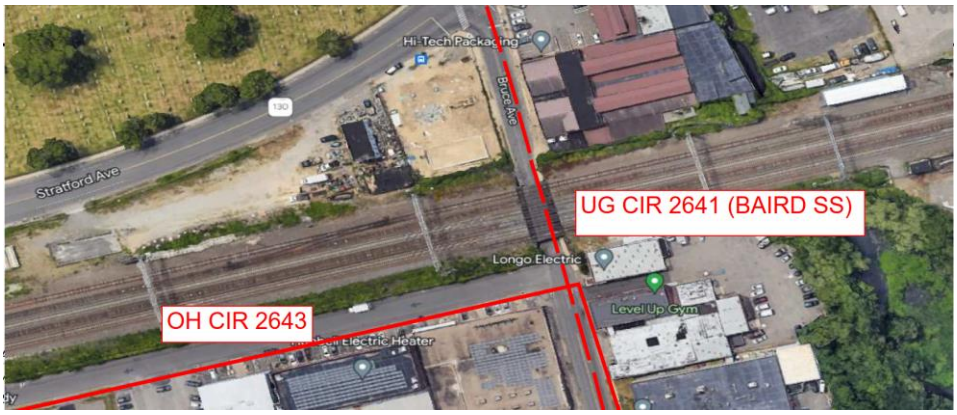


Figure 16 Picture of Bruce Ave. bridge facing North.

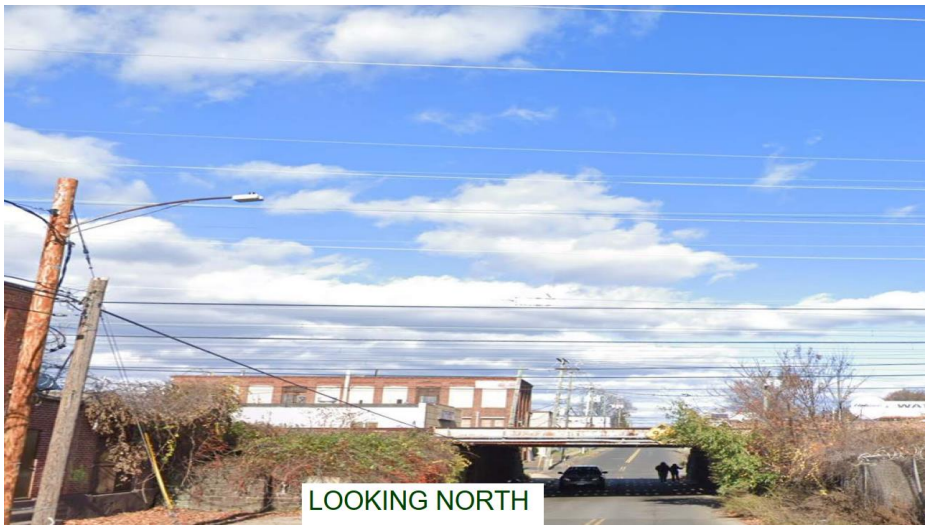


Figure 17 Picture of Bruce Ave. bridge facing South.



Bishop Ave in Bridgeport:

The existing single-span bridge at Bishop Ave. in Bridgeport is supported by two columns and two end wall structures. On the north side, three-phase open wire Cir 2643 provides power to customers in both Stratford and Bridgeport. Beneath the bridge, an underground system includes a six-conduit and a separate two-conduit ductline, connecting splice chamber SC1787 on the south side to SC898 on the north. Within the six-conduit ductline, three-phase 500 KcMil Circuits 2643 and 552 supply customers in Stratford and Bridgeport. Additionally, the two-conduit ductline houses three-phase 500 KcMil Circuit 2644, delivering power to customers in the City of Bridgeport.

Figure 18. Depiction of the existing OH and UG circuit paths near the Bishop Ave. bridge. NTS

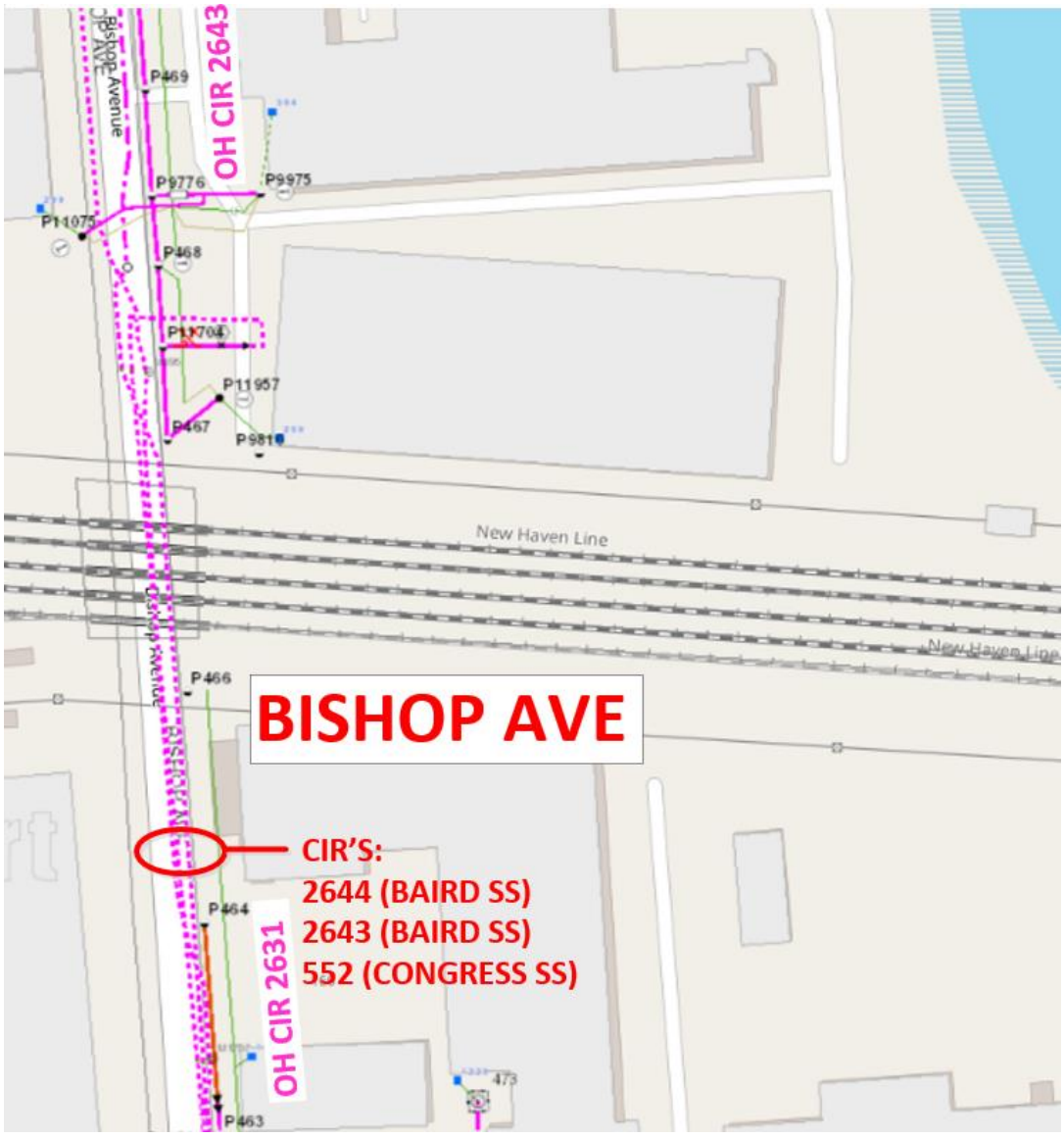


Figure 19. Picture of Bishop Ave. bridge looking down with Circuits outlined (North is facing up) .

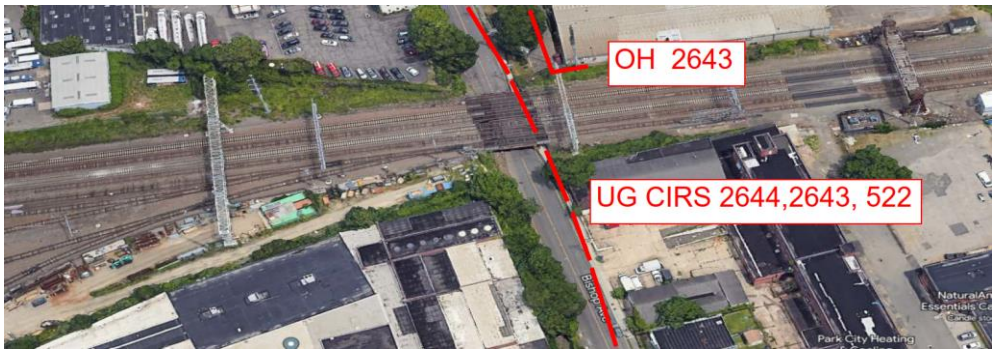


Figure 20 Picture of Bruce Ave. bridge facing North.

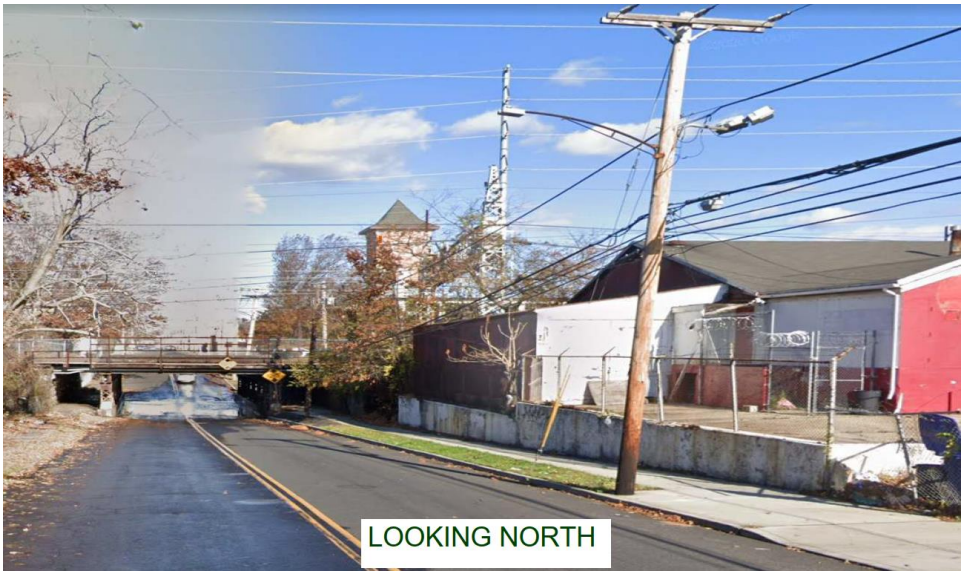


Figure 21 Picture of Bruce Ave. bridge facing South.



3. Need Statement

As part of the TIME-1 CDOT program, detailed in the Summary section, this project involves the complete replacement of several bridge crossings along the Metro-North rail line in Stratford, CT, as well as the Bishop Ave. bridge in Bridgeport, CT. The new designs call for updated columns and end wall support structures at increased heights and widths to accommodate modern transportation needs. The bridges will be up to 10 feet wider, and the road beneath will be lowered by up to 4 feet to allow for improved vehicle clearance and traffic flow. Overhead electric lines (OH) will need to be relocated near the approaches of each bridge due to the road widening. Only two bridge locations have underground (UG) ductlines that will be moved to accommodate the new support columns and road adjustments. Additionally, three bridge sites will require new electrical services to power CDOT's drainage pump systems.

4. Engineering alternatives

TIME-1 CTDOT design is to replace the bridges with new columns & new end wall support structures at new elevated height and widths of the existing bridge. Some of these bridge locations require new service for new electric drainage pumps. These reasons require UI to relocate OH & UG infrastructure as necessary at each of the five bridge locations. Below are the risks associated to this project.

- These areas have been identified with having contaminated soil in proximity of each of the bridge locations.
- At locations with overhead systems, the new lowered roadway will undermine the existing poles and will need to be relocated to accommodate the widened roadway and bridge.
- At locations with existing conduit systems would be exposed in the roadway during the excavation, installation, and compaction of the new bridge and footing. There is a high risk of damage to the UI system during construction of the footing and the subsequent backfill. The conduit systems would pass in the roadway, crossing under the new Metro-North RR bridge, connecting to the existing splice chambers with a new depth of cover of 3 feet below the new lowered roadway surface.
- The existing energized UI facilities present a serious construction risk to the State to perform their work. A suitable means to protect, maintain and support the UI facilities to prevent damage during each bridge construction location could not be determined. Discussions with CTDOT about the construction risk, the inaccessibility after construction and the negative impact on the capacity of the UI facilities determined that a new ductline is required to replace the existing.

4.1 Alternative I. Do nothing.

Alternative 1 is not an option because UI is obligate to move the infrastructures to accommodate the State.

4.2 Alternative II. Preferred Solution

Investigation by United Illuminating (UI) Distribution Engineering into the planned roadway changes and upgrades by the State determined that there are conflicts with the UI existing underground and overhead facilities. Some of the conflicts are being discussed by the State adjusting in the planned work. Many of these adjustments will still have conflicts between the State proposed work and the existing UI facilities within the area, the goal is to minimize them as much as possible. This alternative is the shortest path for a "like for like" replacement as required by ConnDOT bridge replacements.

Civil Work

- **East Main St, Stratford:**
  - Minimal riser work required.
  - Construct UG infrastructure to supply power for new electric drain pump.
- **Main St, Stratford:**
  - No civil work required.
- **West Broad St, Stratford:**
  - No civil work required.
- **Bruce Ave, Stratford:**
  - Install new UG ductbank between SC723 & SC724
  - Modify SC724 for new road elevation lowering.
  - Construct UG infrastructure to supply power for new electric drain pump.
- **Bishop Ave, Bridgeport:**
  - Install new UG ductbank between SC1787 & SC898
  - Modify SC898 for new road elevation lowering.
  - Construct UG infrastructure to supply power for new electric drain pump.
  - Install 1 - 6'X14'X7' Rectangular Splice Chamber.

Electrical Work

Underground and Overhead Electrical Work – UI would design, procure, and install electrical cables and associated 13.8kV & 4.16kV equipment as indicated below.

- **East Main St, Stratford:**
  - Relocate OH Cir's 2739 & 2741 for approx. 900ft.
  - Relocate 18 poles, guying & equipment.
  - Construct infrastructure to supply power for new electric drain pump.

- **Main St, Stratford:**
  - Relocate OH Cir's 2640 & 2634 for approx. 800ft.
  - Relocate 2 poles, guying & equipment.

- **West Broad St, Stratford:**
  - Relocate OH Cir's 2740 & 2741 for approx. 600ft.
  - Relocate 10 poles & equipment.
  - Install #8 wire for the streetlight.
  -
- **Bruce Ave, Stratford:**
  - Relocate OH Cir 2643 approach to both sides of bridge approx. 700ft.
  - Relocate 10 poles, guying & equipment.
  - Construct infrastructure to supply power for new electric drain pump.

- **Bishop Ave, Bridgeport:**
  - Relocate OH Cir 2643 approach to both sides of bridge approx. 700ft.
  - Relocate 12 poles, guying & equipment.
  - Construct infrastructure to supply power for new electric drain pump.

The Table below indicates conceptual level estimated costs for both underground (UG) and overhead (OH) construction, labor and material plus the overheads and allocations has a tolerance of +200%/-50% with a 20% Contingency to be added. This table does not reflect or include any mitigation of possible risks.

Each location construction date is based on the latest CTDOT forecast.

4.2.a Table 1 – Estimated Cost Proposed

Proposed Alternative	2026		2027		2028	
	CAP	COR	CAP	COR	CAP	COR
Labor	$155,000	$25,000	$155,000	$25,000	$155,000	$25,000
External Services	$400,000	$100,000	$400,000	$100,000	$400,000	$100,000
Materials	$120,000	$0	$120,000	$0	$120,000	$0
Overheads	$232,110	$66,020	$232,110	$66,020	$232,110	$66,020
AFUDC	$43,880		$43,880		$43,880	
Total	**$1,142,010**		**$1,142,010**		**$1,142,010**	

4.2.b Table II – Estimated Costs Proposed by Location

Conceptual Alternative	TIME-1 Contract	2026	2027	2028	Total
East Main St., Stratford *	B	$ 150,000	$ 34,000		$ 184,000
Main St., Stratford *	B	$ 122,000			$ 122,000
West Broad St., Stratford	B	$ 58,000	$ 100,000		$ 158,000
Bruce Ave., Stratford	C	$ 200,000	$ 300,000	$ 800,000	$ 1,300,000
Bishop Ave., Bridgeport	C	$ 612,000	$ 708,000	$ 342,000	$ 1,662,000
Total	**$ 3,426,000**				

5. Project Milestones

Below is a preliminary schedule based on the latest CTDOT forecast. CTDOT Engineering needs to provide more information to UI for a more accurate schedule.

Description	Estimated Duration & Date
Engineering Project Authorization (IP1)	2025
Civil Engineer (Detail)	2026
Electrical Engineer (Plan)	2026
Engineering Planned Level Charter Approval (IP2)	2026
Planned Level Complete (Total)	**2026**
Main St., Stratford Complete	2026
East Broad St., Stratford Complete	2027
West Broad St., Stratford Complete	2027
Bruce Ave., Stratford Complete	2028
Bishop Ave., Bridgeport Complete	2028
Construction Complete	**2028**
Project Closeout by UI Project Manager	**End of 2028**

6. Project Assumptions

The following is the list of assumptions used to create the estimates for the proposed work.

1. UI will be able to construct the new facilities system as planned.
2. Some of the soil may be contaminated based on the proximity of other nearby land. All underground facilities will be sampled for contaminates prior to excavation.
3. All budgetary estimates are based on a work product in compliance with existing UI and/or industry accepted standards and specifications.
4. All construction techniques used to install, remove, or replace UI facilities will comply with any and all applicable Federal, State and Local regulations as well as UI Construction Standards.
5. UI will not require easements for any UI owned equipment on the customer's property.
6. All UI construction work will be done during the normal business week and hours.
7. No ledge removal has been assumed nor included within the budgetary cost estimates. There is a risk that ledge will be in the area of excavation and will have to be removed. The method of removal of ledge has not been determined nor agreed upon.
8. Standard trench restoration with one travel lane will be done. There will be no milling or curb to curb paving required.
9. All materials will be ordered and available in time for use by Construction.
10. The UI construction work is weather dependent. For safety reasons, UI will not schedule crews to work on the electrical facilities during inclement weather. There is the possibility of schedule delays due to weather. No value for the costs associated with weather delays is offered.
11. Labor rates used in creating the estimates are based upon historical averages.
12. All dollars shown are in 2024 dollars and subject to change due to escalation in material, labor, and equipment rates at time of actual construction.

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7. Maps or Electrical Design

Figure 22 - CTDOT Drawing at 30% Design with UI comments for East Main St.,Stratford.

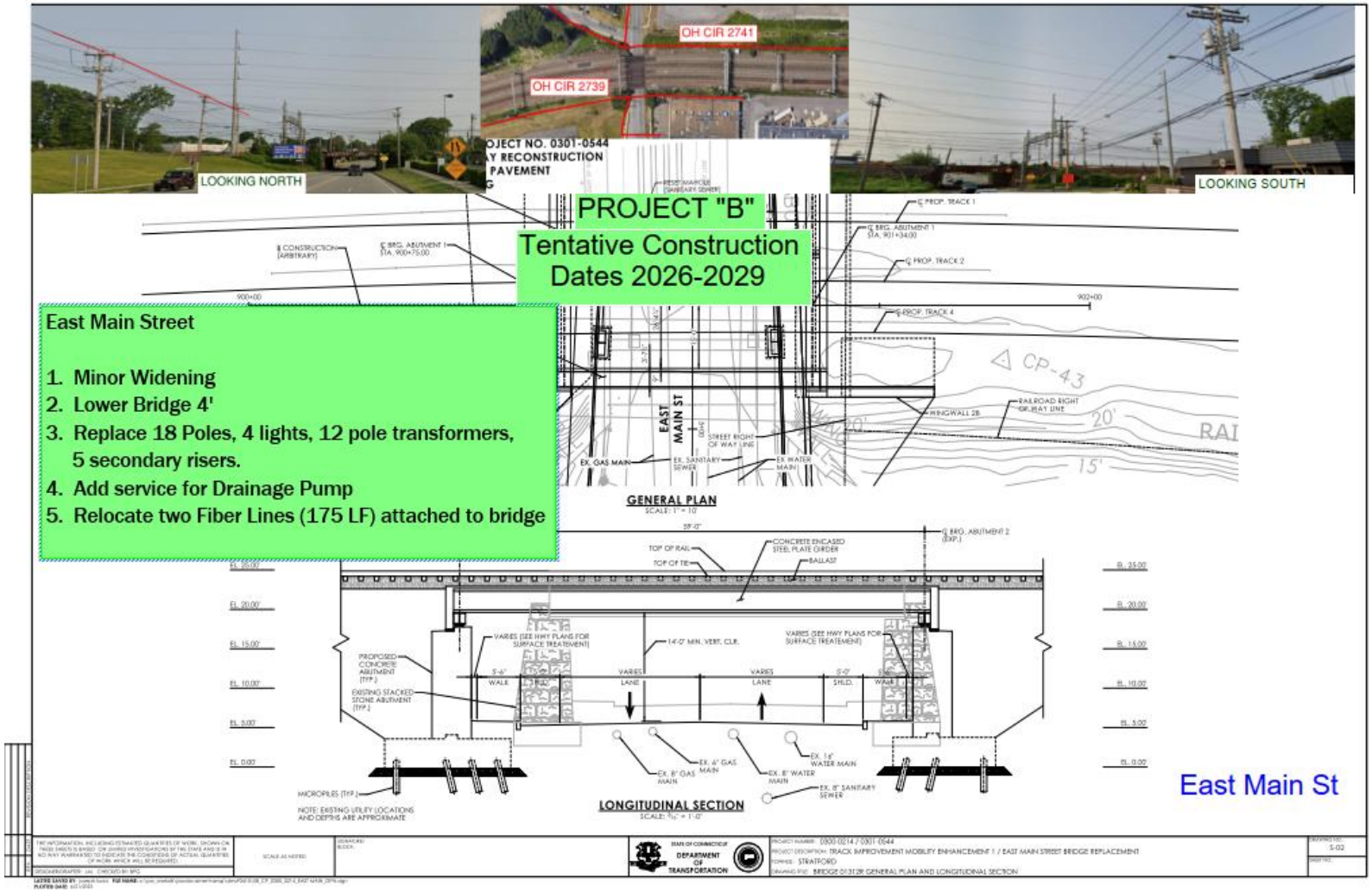


Figure 23 - CTDOT Drawing at 30% Design with UI comments for Main St., Stratford.

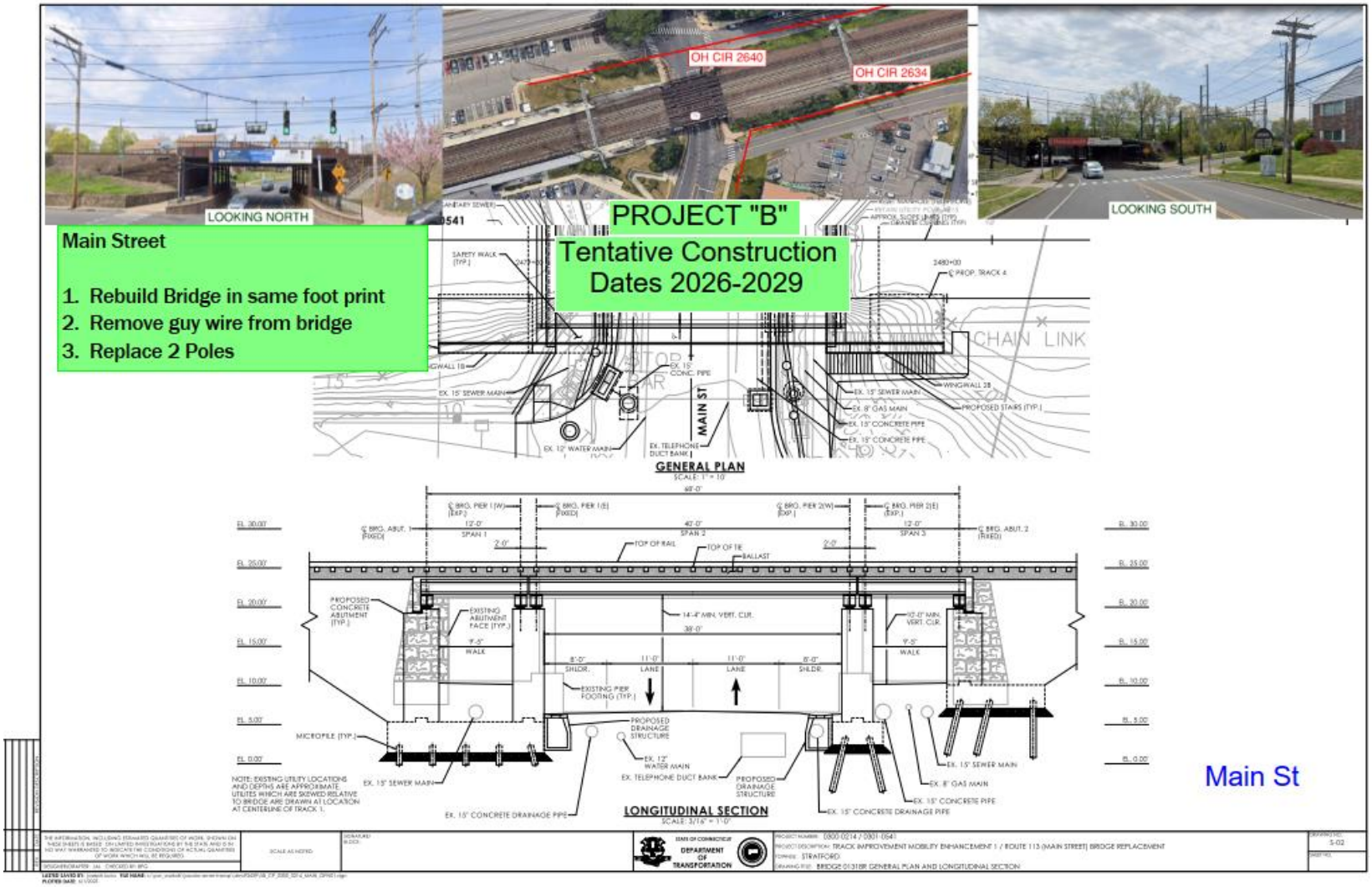


Figure 24 - CTDOT Drawing at 30% Design with UI comments for West Broad St., Stratford.

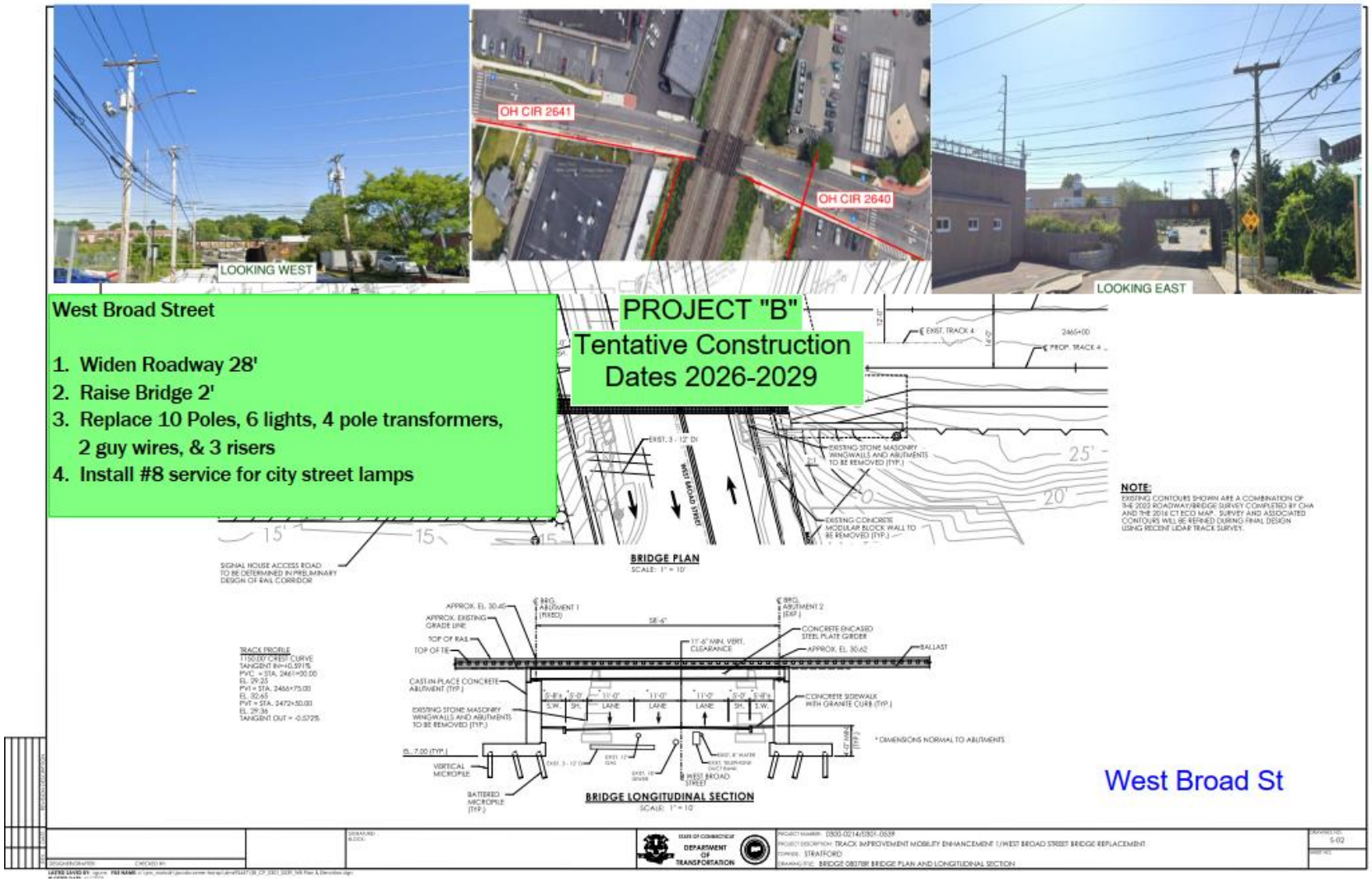


Figure 25 - CTDOT Drawing at 30% Design with UI comments for Bruce Ave., Stratford.

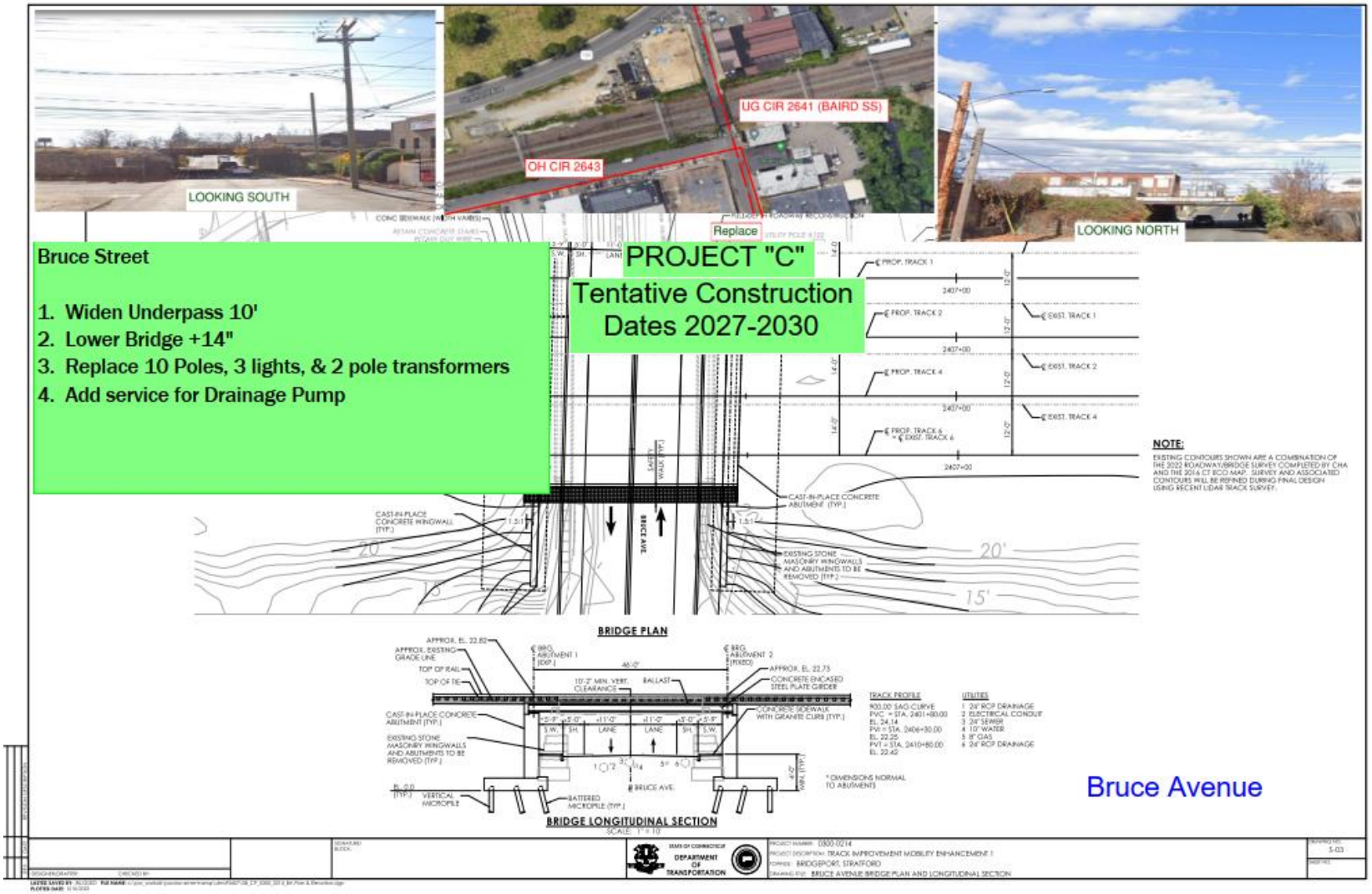
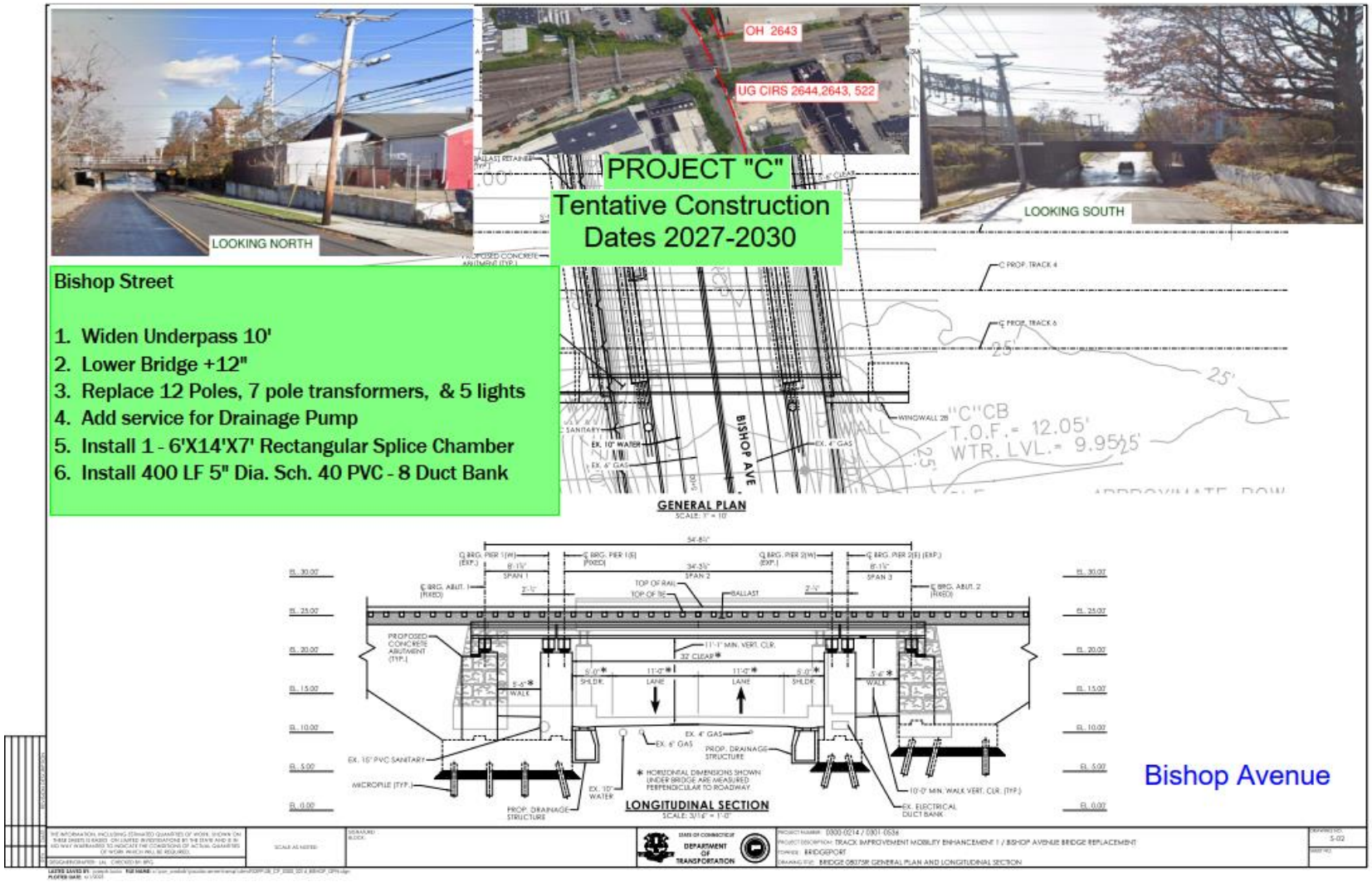


Figure 26 - CTDOT Drawing at 30% Design with UI comments for Bishop Ave., Bridgeport.



PRJ-003435

New Congress Bridge Ph 1B & 6

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

New Congress Bridge Ph 1B & 6

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-003435	Electric Distribution	Lyons, Robin	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	State & Municipal	IP3 Seed Money	Program/As Spent	Program/As Spent

Project description:

Original northern getaway follows the substation driveway to Congress St and then connects to Housatonic Ave.
A separate 2 x 8 duct getaway installed in the early 2000's also goes north but then dives under the river.
The southern getaway exits the station and follows an easement in the Bridgeport Superior Court property to connect to Housatonic St.

Project Scope:

Proposed Scope Phase 1b: Bridge Approach
* West Side: Two parallel paths each consisting of one triangular 9 x 16' SC, and one 6 x 14' SC, along with 800 feet of 5" dia ductline in 4 x 3 configuration.
* East Side: Two parallel paths each consisting of one 6 x 14' SC, along with 200 feet of 5" dia ductline in 4 x 3 configuration.

This would connect the Congress St Bridge work (phase 1a) to the Housatonic Ave work (phase 5) in the west and east side civil (phase 6)

Proposed Scope Phase 6: Picking up the east side of the bridge
* One path of 400 feet of 5" dia ductline in a 4 x 3 configuration connecting the SC in the eastern side of the Congress St bridge (phase 1a) to existing SC # 514 on Williams St.
* The other path of 600 feet of 5" dia ductline in a 4 x 3 configuration connecting the SC in the eastern side of the Congress St bridge (phase 1a) to existing SC # 129 on Crescent Ave.

Project Benefits:

The City of Bridgeport has requested that we complete our proposed underground work on both sides of the bridge on Congress St while they are demolishing the old bridge (Sept 2023 - April 2024) before they being construction. They have multiple concerns regarding sequencing the work:
Given the narrow, restricted work area, the city is concerned that having our crews work on the approach, while city crews simultaneously work on the bridge construction, would lead to construction inefficiencies, schedule delays, and ultimately higher costs for both projects.

Congress St is the main entrance to a State Courthouse as well as a Juvenile Detention facility, and a secondary entrance to Bridgeport's Fire Dept Headquarters. The city and all nearby stakeholders would strongly prefer to limit the amount of interruption as much as possible. Doing work in parallel would cut down on the time they are impacted.

The City will pave the entire length of Congress St from Housatonic Ave on the west all the way across the bridge to the east side of the river upon completion of the bridge. They do not want us to dig up their new pavement to install our infrastructure after they are complete.

Project Risks and Mitigation Plan:

The city of Bridgeport has asked that we perform our construction activities during their demolition phase of the existing bridge. This will minimize construction congestion in an already tight area. The start date for the demo work has been pushed out several times due to the city's desire to break the project into 2 phases. We will accept this risk and adjust our schedule as needed. Another risk is any unknown underground obstructions that would force us to change the design. Again we would accept the risk and work around it with possible scope or budget creep. Environmental issues are always a concern in this area of the city based on past historical uses of adjacent parcels. We would accept the environmental risk.

Risk of No Action:
It would be better to coordinate with the city during the old bridge demolition because then we would not have to pay for permanent asphalt restoration, not to mention the additional public burden of future road closures and detours, the unsightly pavement markouts, noise and dust that would be required when we returned in lets say 5 years. If a large load or generator were proposed near the Congress Substation we may not be able to connect them to the system because the largest cable allowed in 4" conduit is 500 MCM.

Project Alternatives:
The location of the new conduit system structure can be adjusted slightly, but the general characteristics of conduit system such as the size of the new splice chambers, the minimum depth cover of clean fill over structures, the number of and the diameter of the conduit is fixed per our construction standards to allow for many years of reliable performance.

Basis for Project Estimates
Project estimates are based on a specific design and unit costs from the actual costs of historical civil projects of the same size, type, scope and character.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 1**	$ 1	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 2,573**	$ 2	$ 2,571	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 4**	$ 4	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 228**	$ 2	$ 226	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ 326**	$ 3	$ 323	$ -	$ -	$ -
Total	**$ 3,132**	**$ 11**	**$ 3,121**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 3,121	$ -	$ 3,121	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

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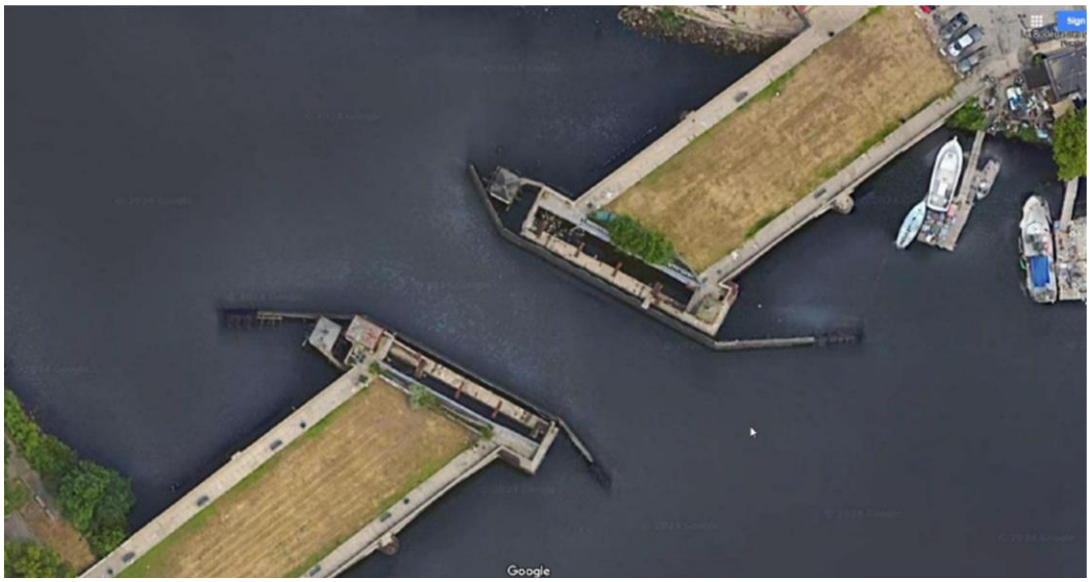
PRJ-003435
New Congress Bridge Phase 1B & 6
UH-U0000572
33 Congress Street, Bridgeport CT



9/27/24

Distribution Engineering

Index

1. Project Description (Summary) 3
2. Existing Conditions 4
3. Need Statement 4
4. **Engineering Overview** 6
Table I Proposed Estimate in USD's 6
4.1. **Option II: Limited Adjustments** 7
5. Project Milestones 7
6. Project Assumptions 8
7. Engineering Recommendations 8
8. Maps or Electrical Design 9
Appendix **11-20**

1. Project Description (Summary)

The Congress Street Substation, located at 33 Congress Street in Bridgeport, CT, plays a critical role in delivering reliable energy in UI's territory. Originally constructed in the 1960s, the substation's aging infrastructure, including 4-inch fiber conduits, has become vulnerable due to its proximity to the Pequonnock River. Over time, tidal groundwater exposure has caused the conduits to deteriorate, impacting their ability to serve customers efficiently.

In response, UI is undertaking a comprehensive modernization of the substation to improve reliability, and better serve our customers. To protect against future flood risks, a flood wall and pump system have been installed around the substation perimeter. Simultaneously, UI is replacing the old fiber conduits with more durable, twin 12-5" PVC concrete-encased duct banks, extending 10 feet beyond the flood wall.

This infrastructure overhaul is divided into six distinct project phases, making it more manageable for engineering design and construction, while also optimizing costs. By aligning these efforts with the City of Bridgeport's planned demolition and replacement of the Congress Street Bridge, UI is maximizing the efficiency of taxpayer contributions. The new bridge, which will replace the original 1909 structure, will accommodate the updated utility needs of the substation, ensuring that critical infrastructure is maintained without disruption.

These projects are not just about upgrading outdated systems, but about future-proofing our infrastructure to safety, performance, and environmental standards. Ultimately, this effort is focused on delivering improved service to our customers, enhancing system resilience, and making prudent use of public resources through strategic collaboration with the City of Bridgeport.

Project Phases Overview
(Refer to Appendix A, Drawing 1 for details)

Phase 1A: Install a conduit hanger system and conduit to the underside of the new Congress Street Bridge.
Phase 1B: Complete approach work by installing conduit systems on the west side from Housatonic Avenue to the bridge, and on the east side from Knowlton Street to the bridge.
Phase 2: Originally a separate conduit system installation phase, Phase 2 has been incorporated into Phase 4 for improved constructability.
Phase 3: Install a conduit system from the northern substation access gate to Congress Street.
Phase 4A: Install a conduit system from Switchgear Rooms 1 and 2 to Housatonic Avenue, and install a new conduit system from SC1023, passing the flood wall at the main entrance, and extending north to the cul-de-sac.
Phase 5: Install a conduit system along Water Street, connecting the north and south conduit systems.
Phase 6: Perform approach work from Knowlton Street on the east side of the bridge.

Note: The phases are not executed sequentially but follow a naming convention for organizational purposes.

2. Existing Conditions

The Congress Street Bridge has been closed to vehicle traffic since 1997. Utility infrastructure includes cable houses, which are similar to splice chambers, located on the exterior of the bridge. These cable houses allowed cables to be pulled across the river from the west to the east side. However, when the bridge was closed, UI removed as many cables as safely possible. The remaining cables, which are stuck between the cable houses, will be removed as part of the City's bridge demolition project. Due to the bridge's structural instability, access to the cable houses is no longer safe. *(See Appendix A, Drawing 2 and photos for additional context).*

3. Need Statement

UI requires a reliable method to serve electrical load on the east side of the Pequonnock River from the Congress Substation. Planned developments at Steel Point (1,000,000 sq ft of undeveloped land), the former Carpenter Technologies site on Seaview Avenue (753,000 sq ft of undeveloped land), and a proposed soccer stadium on Kossuth Street (675,000 sq ft of available land) will necessitate increased electrical capacity. Additionally, properties around the Bass Pro Shop area are primed for redevelopment, and the electrification of medium and heavy-duty fleet vehicles along the I-95 corridor will significantly increase load demands.

The City has requested that UI align construction activities in the approach areas (Phases 1B and 6) with the City's bridge demolition schedule. This alignment benefits UI for several key reasons:

- **Cost savings**: The City will cover the cost of final pavement restoration, reducing UI's financial burden.
- **Minimized police protection**: Performing work during the bridge demolition while roads remain closed will lower the need for extensive police traffic control, which would otherwise be required.
- **Infrastructure compliance**: The new conduit system will ensure a viable path from the Congress Substation to the east side of the Pequonnock River and north along Housatonic Avenue, all built to meet current National Electrical Safety Code (NESC) standards.
- **Upgraded conduit system**: Replacing the fiber conduit with PVC encased in concrete ensures a durable, usable path for future cable installations.

- **Connection points**: Phases 1B and 6 will establish crucial connection points for Phase 1A, completing the cable pathway across the river.
- **Minimized disruption**: Coordinating UI's work with the bridge demolition will result in fewer disruptions to local businesses and stakeholders.

This coordinated approach ensures efficient use of taxpayer contributions while maximizing the benefits of both the bridge demolition and UI's infrastructure upgrades.

4. Engineering Overview

4.1 Option I: Civil & Electrical Scope

The proposed conduit system has only one viable path for construction: along Congress Street, extending west to Housatonic Avenue and east to Knowlton Street. This ensures optimal use of the public right-of-way for both safety and accessibility.

Scope of Work:

- **Civil Engineering:**
  - Install four rectangular splice chambers (6' x 14' x 7')
  - Install two triangular splice chambers (9' x 16' x 7')
  - Install 2,000 linear feet of 12-5' PVC conduit, encased in concrete, and terminate near the bridge abutments
  - Demolish empty chambers in the approach work areas
- **Electrical Engineering:**
  - Prepare six chambers with racks, hooks, ground grids, and supplemental neutral systems to ensure they are cable-ready

Table I Proposed Estimate in USD's

Charge Code	Resource	2024	2025	2026
Electric Distribution	# AFUDC		142,662	
Electric Distribution	# External Services		2,314,000	
Electric Distribution	# Materials		76,800	
Electric Distribution	# Internal, Overheads		226,349	
Electric Distribution	# Overheads, External		321,816	
Electric Distribution	# Internal, Labor		103,200	
Electric Distribution	# COR - Ext Svc		0	
Electric Distribution	# COR- Ext OH		0	
Electric Distribution	# COR-Int OH		0	
Electric Distribution	# COR- Int Labor		0	
CAP		0	3,184,827	0
COR		0	0	0
Total		0	3,184,827	0

4.1. Option II: Limited Adjustments

While there is no alternative route for this project, minor adjustments to the proposed path may be made if required. The project will involve a parallel rebuild of the existing system, with a cutover to the new infrastructure when necessary.

5. Project Milestones

The timeline for this project hinges on the City of Bridgeport's progress with their bridge project, which includes both demolition and construction phases. Currently, the City is awaiting additional federal funding to bridge the gap in previously received bids.

Once the demolition phase is awarded, UI will have clearer timing for the overall project. UI anticipates approximately 90 workdays of construction.

Key milestones are as follows:

- **Q1 2025:** City of Bridgeport receives bids and awards the bridge project
- **Q2 2025:** UI issues a civil construction package for bidding
- **Q3 2025:** City begins bridge demolition
- **Q4 2025:** UI awards the civil construction bid
- **Q2 2026:** City completes demolition phase
- **Q2 2026:** UI completes conduit system construction
- **Q2 2028:** Congress Street reopens to traffic

6. Project Assumptions

The following assumptions have been made in planning and executing the project:

- Temporary pavement restoration will be sufficient, with full restoration being handled by the City of Bridgeport.
- Environmental remediation costs will not exceed $200,000.
- Congress Street will remain closed to traffic during construction, minimizing traffic control requirements.
- No civil work will be required on the old Congress Substation property.
- All work by UI crews will be performed during normal business hours.

7. Engineering Recommendations

The engineering team recommends moving forward with the proposed plan to build out the necessary infrastructure along Congress Street, crossing the Pequonnock River from Housatonic Avenue to Knowlton Street. This will ensure the safe and reliable delivery of electrical service to both existing customers and future developments in this rapidly growing area of Bridgeport. The project aligns with the city's vision of revitalizing the area and supports anticipated development projects that will drive increased demand for electrical services.

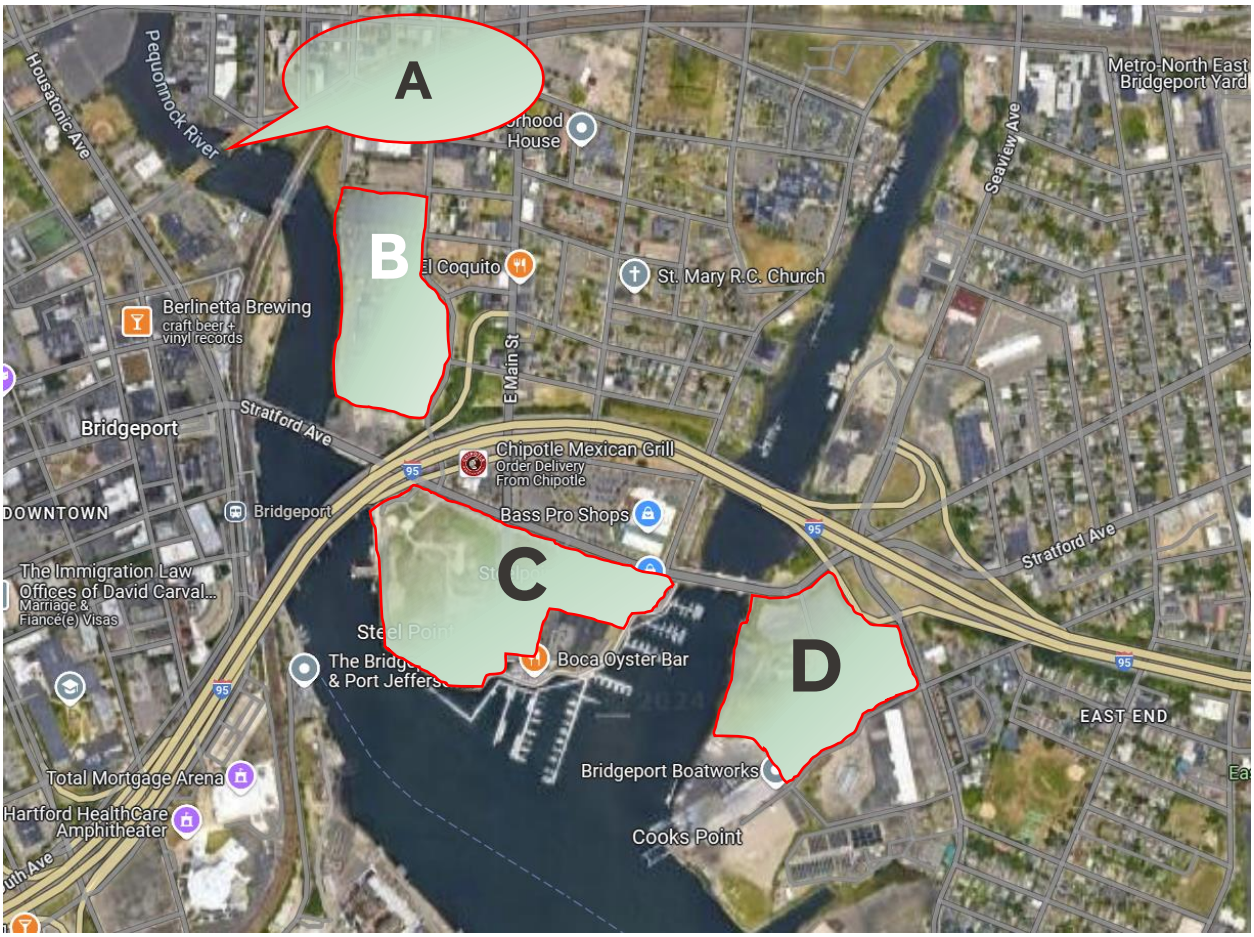
New Congress Bridge and Development Areas

A: New Congress Bridge

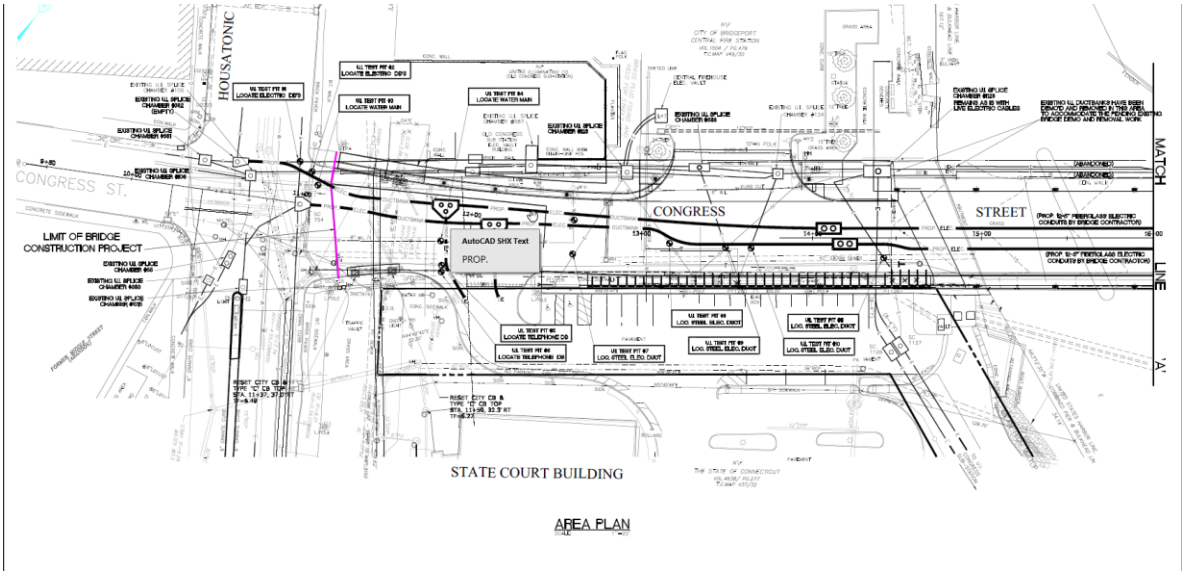
B: Proposed soccer stadium area development approximately 674,600 ft^2

C: Steelpointe development area approximately 1,042,340 ft^2

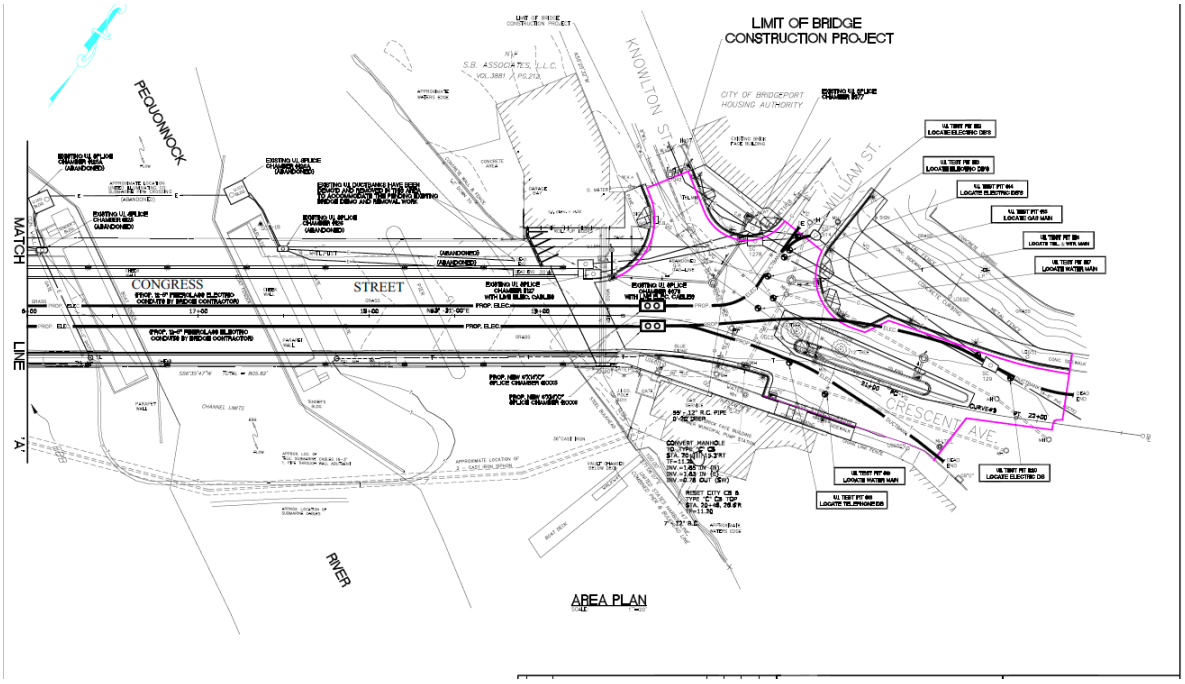
D: Steelpointe development area approximately 752,530 ft^2


A
B
C
D
Housatonic Ave
Pequonnock River
Metro-North East
Bridgeport Yard
Seaview Ave
St. Mary R.C. Church
Berlinetta Brewing
craft beer + vinyl records
E Main St
Bridgeport
Stratford Ave
Chipotle Mexican Grill
Order Delivery From Chipotle
DOWNTOWN
Bridgeport
Bass Pro Shops
The Immigration Law Offices of David Carval...
Marriage & Fiancé(e) Visas
Steel Point
Boca Oyster Bar
EAST END
Total Mortgage Arena
Bridgeport Boatworks
Hartford HealthCare Amphitheater
Cooks Point

8. Maps or Electrical Design

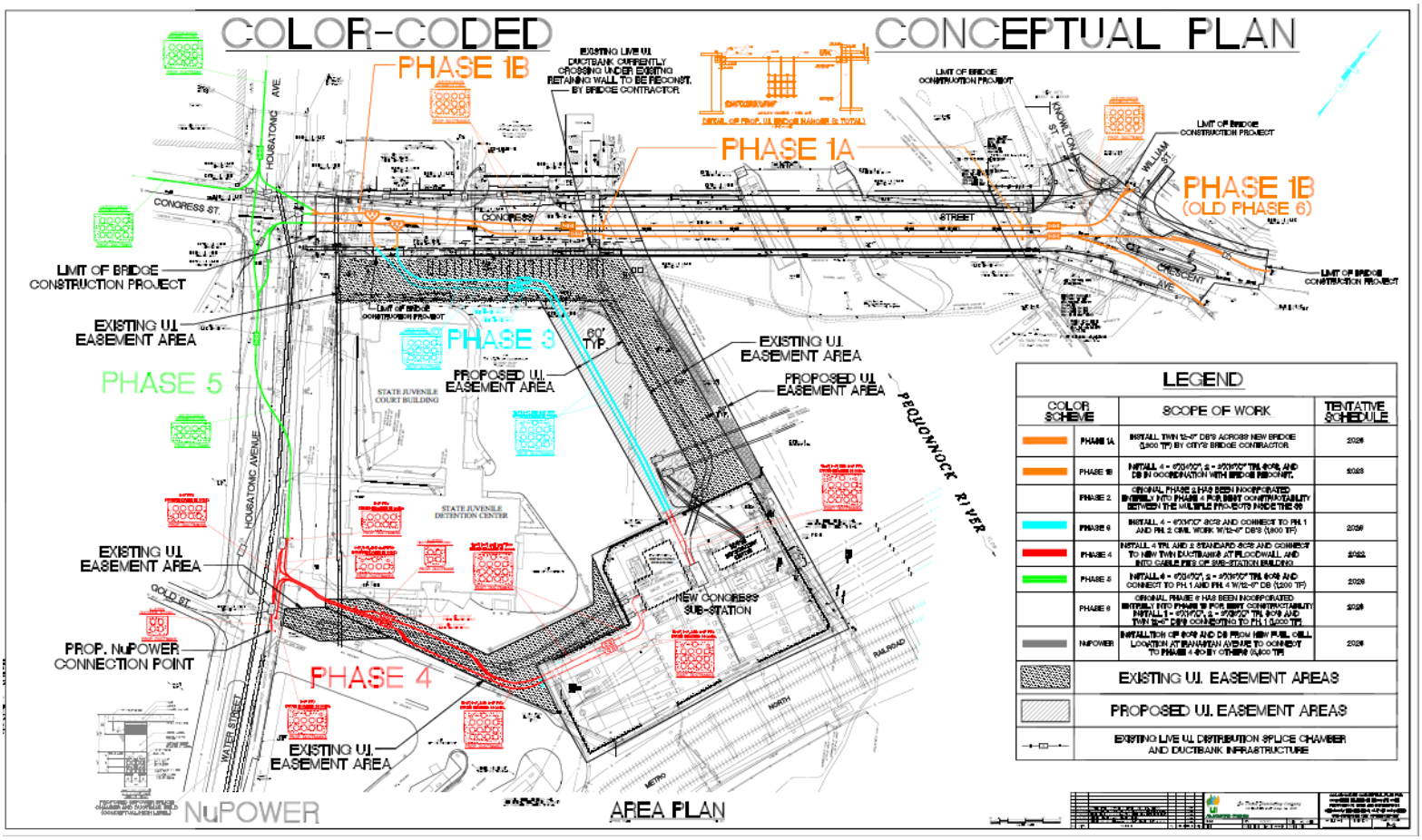


Phase 1B



Phase 6

Appendix A



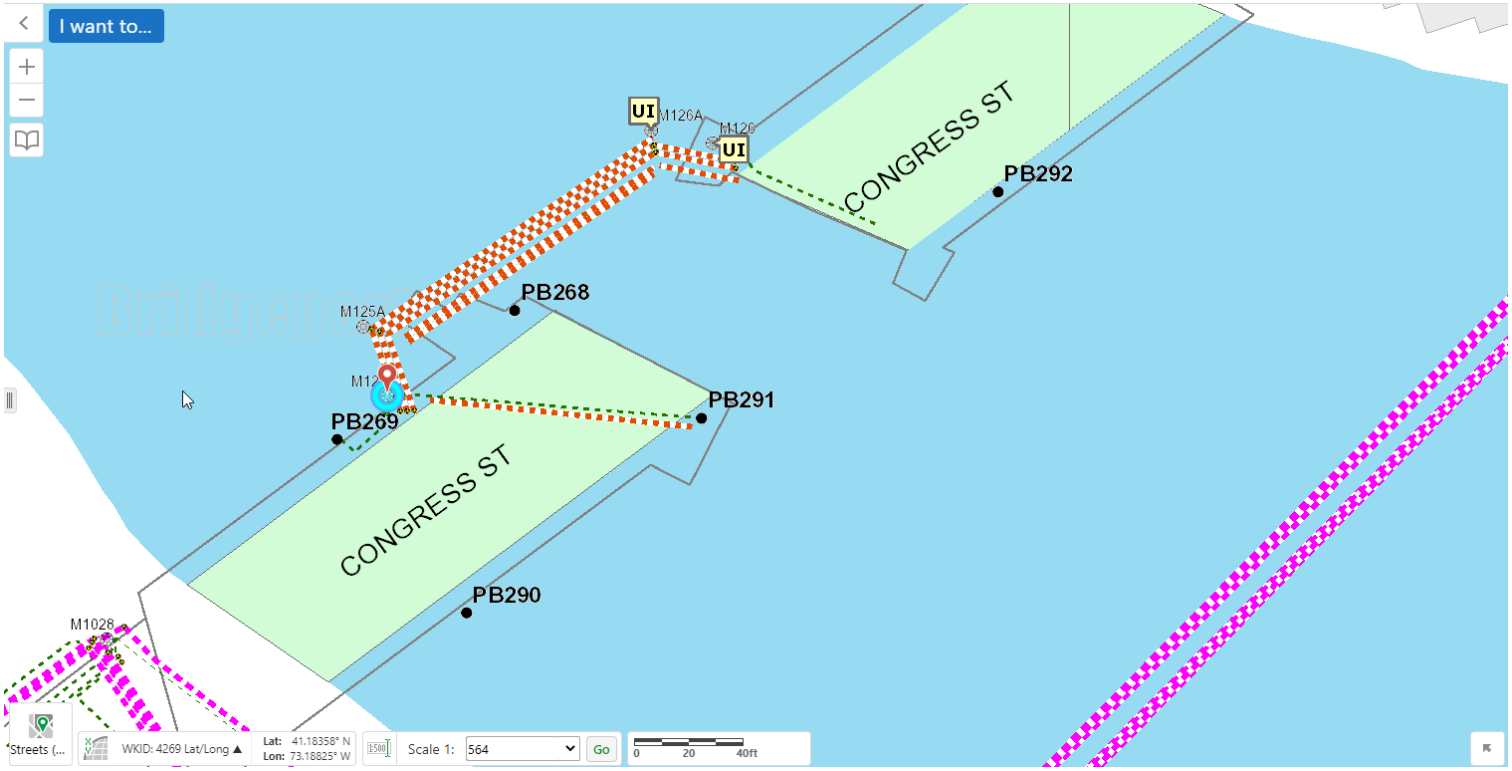
Drawing 1 Congress area projects.



Congress Street Bridge as seen from Bpt Fire Headquarters property.

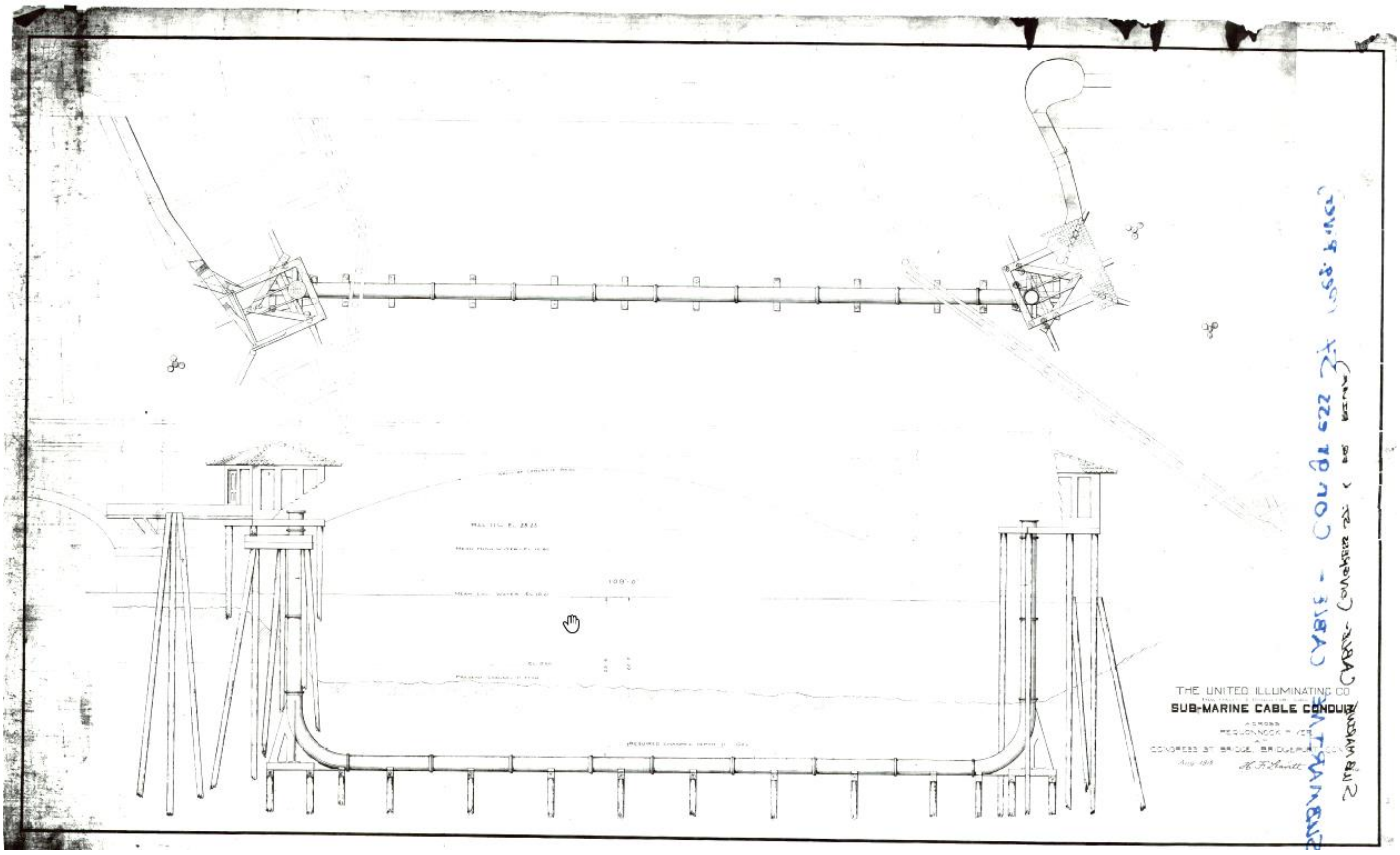
Note cable house 126A and its condition in red circle.

D



Drawing 2

The submarine cable path under the Pequonnock River adjacent to the Congress Street Bridge. Cable house 125A and 126A to be demolished during bridge demolition.



THE UNITED ILLUMINATING CO.

NEW HAVEN & BRIDGEPORT, CONN

SUB-MARINE CABLE CONDUIT

ACROSS

PEQUONNOCK RIVER

AT

CONGRESS ST. BRIDGE, BRIDGEPORT CONN

Aug 1915

H. F. Leavitt



Entrance to cable house 125A. Note rusted out railings and ladder hardware.



Typical cable conduit riser inside of a cable house.



SC129 Note structural cracks and roof condition.





SC587



SC216



Example of hanger and conduit system in a bridge bay. Similar to what is designed for the Congress Street Bridge over the Pequonnock River. This installation only has 4 conduits.

PRJ-002108

UI - Gov't HW CAP

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Gov't HW CAP

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002108	Electric Distribution	Lyons, Robin	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	State & Municipal	IP4 Change	Program - Ongoing	Program - Ongoing

Project description:
This program encompasses the relocation of electric overhead and underground facilities that are in conflict with mandated highway/road/bridge rehabilitation projects initiated by the State of Connecticut and the municipalities within the UI service territory.

Project Scope:
Each State or Municipal initiated project is evaluated based on plans provided to the utilities. UI determines any conflicts between UI facilities and the the State/Municipality proposed areas of work. The resulting relocation/replacement/removal work for UI is then estimated on a project by project basis. If estimates are known at the time of the annual budget planning process, those costs will be used as the basis for the planned funding, but typically, the cost of this program is based on the historical average UI expends per year, or a combination of both historical and estimated known projects.

The work resulting from these State and Municipal improvement projects ranges from single pole relocations to large-scale removal/re-establishment of UI conduit systems.

Project Benefits:
The most common risks associated with this work are related to the coordination of utility work in relation to the State/municipality's schedule. Often there are multiple utlities requiring work, and delays are often encountered. To mitigate the schedule risks, utility work schedules are provided to the State/Municipalities by all utilities prior to the start of any work. The utility work schedules outline the utility's work schedule and assumptions that the schedule was based upon, including how/when delays may occur and any contingency time that would be required.

Project Risks and Mitigation Plan:
The most common risks associated with this work are related to the coordination of utility work in relation to the State/municipality's schedule. Often there are multiple utlities requiring work, and delays are often encountered. To mitigate the schedule risks, utility work schedules are provided to the State/Municipalities by all utilities prior to the start of any work. The utility work schedules outline the utility's work schedule and assumptions that the schedule was based upon, including how/when delays may occur and any contingency time that would be required.

Risk of No Action:
The objective of State/Municipal highway/bridge improvement projects is to maintain/improve public safety. Utilities are obligated/mandated to relocate their facilities that are in direct conflict with the State/Municipal project limits. This work is necessary to insure the public safety and no action is not permissible.

Project Alternatives:
The nature of State/Municpal highway and bridge relocation/rehabilitation projects is such that there are geographical project limits that define the scope of the work required. In most cases, the work that is required by the utilities is a like-for-like relocation of any facilities that are in direct conflict within the geographical area.
Situations do arise where work must be performed by the utilities adjacent to or outside of the immediate geographical area in order for the utility to maintain the operational integrity of its system. This work is still considered mandatory and required.

Basis for Project Estimates

The expenditures and volume of work in this program are driven by State/Municipal needs and schedules. If project estimates are known at the time of the annual budget planning process, those costs will be used as the basis for the planned funding, but typically, the cost of this program is based on the historical average UI expends per year, or a combination of both historical and estimated known projects.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 415**	$ 57	$ 33	$ 119	$ 101	$ 106
# CIAC	**$ -17**	$ -17	$ -	$ -	$ -	$ -
# External Services	**$ 4,800**	$ 420	$ 480	$ 1,300	$ 1,300	$ 1,300
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 765**	$ 155	$ 60	$ 225	$ 150	$ 175
# Internal, Overheads	**$ 968**	$ 189	$ 68	$ 253	$ 222	$ 236
# Materials	**$ 1,867**	$ 433	$ 84	$ 500	$ 400	$ 450
# Overheads - External	**$ 1,279**	$ 205	$ 104	$ 352	$ 298	$ 319
Total	**$ 10,077**	**$ 1,443**	**$ 829**	**$ 2,749**	**$ 2,471**	**$ 2,585**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 9,587	$ 953	$ 829	$ 2,749	$ 2,471	$ 2,585

Note: 2024 Plant Additions includes the entire calendar year

UI
An Avangrid company

UI- Gov't HW CAP

All Towns

WBS: UI-U0025

Index

1. Program Description 3
2. Need Statement 3
3. Work Type 3
4. Engineering 3
5. Forecasted CAPEX 4

1. Program Description

This program encompasses the relocation of electric overhead and underground facilities that are in conflict with mandated highway/road/bridge rehabilitation projects initiated by the State of Connecticut and the municipalities within the UI service territory.

2. Need Statement

Each State or Municipal initiated project is evaluated based on plans provided to the utilities. UI determines any conflicts between UI facilities and the the State/Municipality proposed areas of work. The resulting relocation/replacement/removal work for UI is then estimated on a project by project basis. If estimates are known at the time of the annual budget planning process, those costs will be used as the basis for the planned funding, but typically, the cost of this program is based on the historical average UI expenditures per year, or a combination of both historical and estimated known projects.

The State and Municipal highway/bridge relocation and rehabilitation projects are based on improving public safety. All utilities are obligated and mandated to perform their work timely. This budget provides funding for a level of activity that is based on past experience. The Company will react to meet the needs of the State and Municipalities.

3. Work Type

The work resulting from these State and Municipal improvement projects ranges from single pole relocations to large-scale removal/re-establishment of UI conduit systems.

4. Engineering

The engineering tasks associated with these projects include the following:

- Review of State/Municipal plans. This includes reviews of the plans at various completion stages; i.e. mark-ups and comments from all utilities are shared at

each stages and as revisions are available, review and feeback cycles continue until final drawings are issued by the State/Municipality.

- Attendance at utility coordination meetings
- Construction estimate packages and utility work schedules are developed from the UI electric distribution design.
- Formal submission of the construction estimate package and schedule to the State/Municipality.
- Work order creation and release to construction upon notice to proceed from the State/Municipality.
- Monitoring of the work as it progresses through construction and if change in scope occurs, design is performed, estimated and submitted to the State/Municipality.

5. Forecasted CAPEX

The following are forecasted capital expenditures for the Government Highway program:

2024	2025	2026
$2,040,957	$829,339	$2,749,097

The forecasted capital expenditures in this program are associated with smaller scale projects (less than $500,000) or unplanned work that cannot be estimated. Forecasted amounts are initially based on average historical requirements for this program. Large-scale projects, where planned/known estimates are forecasted, are managed under separate individual projects.

2024:

The forecasted expenditures reflect the historical average as a basis, adjusted for anticipated State and municipal activity .

2025:

The forecasted expenditures reflect the historical average. The State has undertaken a major effort to upgrade the Metro North Railway Bridges referred to as the “TIME-1 and TIME-3” projects. The historical average has been reduced by preliminary forecasted amounts required for TIME-1 and TIME-3 in 2025.

2026:

The forecasted expenditures reflect the historical average (with standard escalation), adjusted for anticipated State and municipal activity .

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PRJ-004483

UI - Gov't HW Minor Cap

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Gov't HW Minor Cap

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-004483	Electric Distribution	Lyons, Robin	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	State & Municipal	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:
This program encompasses UI's minor capital work associayed with the State's installation/maintenance/upgrades of traffic signals, traffic control devices, streetlights, and intersections.

Project Scope:
The work performed under this program fall under the following categories:

Traffic Signals: UI is installs and maintains electrical service to traffic signals at State intersections. UI work typically involves the installation/replacement of pole(s) and associated electrical wiring.

Street Lighting: UI is installs and maintains electrical service to street lighting at State intersections. The continuous and dependable operation of this lighting is critical to ensure adequate illumination and public safety. UI work typically includes the installation of light poles, fixtures, and wiring.

Traffic Control Devices/Cabinets: UI installs and maintains electrical service to traffic control devices at State intersections. UI work typically involves the installation/replacement of pole(s) and associated electrical wiring.

Intersection Improvements: When State intersections undergo design upgrades and improvements, UI may be required to relocate poles, cables, wires, and underground structure. Re-design of State intersections may involve more complex and costly work.

Project Benefits:
The State continually maintains and upgrades traffic control for public safety. Utility work in support of the State's efforts needs to be performed timely. This program is necessary for the Company to properly react, meet the needs of the State, ensuring public safety.

Project Risks and Mitigation Plan:
The most common risks associated with this work are related to the coordination of utility work in relation to the State schedule. To mitigate the schedule risks,UI provides the State with a work schedule and attends all on-site field meetings prior to the start of any work. The work schedule outlines the UI's major milestones and assumptions that the schedule was based upon, including how/when delays may occur and any contingency time that would be required.

Risk of No Action:
The objective of State traffic control improvement projects is to maintain/improve public safety. UtiUI is obligated/mandated to perform the necessary work in conjunction with the State's plans. This work is necessary to insure public safety and no action is not permissible.

Project Alternatives:
The nature of State traffic control installation and upgrade imptovements is such that the work is confined to a small specific intersections or geographical limits. In most cases, the work that is required follows UI standards for provisioning electrical service or like-for-like relocation of any facilities that are in direct conflict within the geographical area.
Situations do arise where work must be performed by the UI adjacent to or outside of the immediate geographical area in order to maintain the operational integrity of electrical feed. This work is still considered mandatory and required.

Basis for Project Estimates

The expenditures and volume of the work in this program are driven by the State's needs and schedules. The forecasted expenditures for this annual program are based on typical unit costs and volume received, by work type.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 90**	$ -	$ 22	$ 22	$ 23	$ 23
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 1,156**	$ 125	$ 244	$ 258	$ 262	$ 266
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 292**	$ 94	$ 48	$ 49	$ 50	$ 51
# Internal, Overheads	**$ 245**	$ 53	$ 46	$ 48	$ 49	$ 50
# Materials	**$ 446**	$ 100	$ 84	$ 86	$ 87	$ 89
# Overheads - External	**$ 357**	$ 73	$ 68	$ 71	$ 72	$ 73
Total	**$ 2,586**	**$ 446**	**$ 512**	**$ 533**	**$ 543**	**$ 552**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 2,140	$ 0	$ 512	$ 533	$ 543	$ 552

UI
An Avangrid company

UI- Gov't HW Minor CAP

All Towns

WBS: UI-U5299

Index

1. Program Description 3
2. Need Statement 3
3. Work Type 3
4. Engineering 4
5. Forecasted CAPEX 4

1. Program Description

This program encompasses UI's minor capital work associated with the State's installation/maintenance/upgrades of traffic signals, traffic control devices, streetlights, and intersections.

2. Need Statement

The State continually maintains and upgrades traffic control for public safety. Utility work in support of the State's efforts needs to be performed timely. This program is necessary for the Company to properly react, meet the needs of the State, ensuring public safety.

3. Work Type

The work performed under this program fall under the following categories:

Traffic Signals: UI is installs and maintains electrical service to traffic signals at State intersections. UI work typically involves the installation/replacement of pole(s) and associated electrical wiring.

Street Lighting: UI is installs and maintains electrical service to street lighting at State intersections. The continuous and dependable operation of this lighting is critical to ensure adequate illumination and public safety. UI work typically includes the installation of light poles, fixtures, and wiring.

Traffic Control Devices/Cabinets: UI installs and maintains electrical service to traffic control devices at State intersections. UI work typically involves the installation/replacement of pole(s) and associated electrical wiring.

Intersection Improvements: When State intersections undergo design upgrades and improvements, UI may be required to relocate poles, cables, wires, and underground structure. Re-design of State intersections may involve more complex and costly work.

4. Engineering

The engineering tasks associated with this program may include the following:

- Review of State plans. This includes reviews of the plans at various completion stages; i.e. mark-ups and comments from all utilities are shared at each stages and as revisions are available, review and feeback cycles continue until final drawings are issued by the State.
- Attendance at utility coordination meetings.
- Construction estimates and utility work schedules are developed from the UI electric distribution design.
- Submission of the construction estimate and schedule to the State.
- Work order creation and release to construction upon notice to proceed from the State.
- Monitoring of the work as it progresses through construction and if change in scope occurs, design is performed, estimated and submitted to the State.

5. Forecasted CAPEX

The following are forecasted capital expenditures for the Government Highway Minor program:

2024	2025	2026
$485,072	$511,898	$533,302

The forecasted capital expenditures for this program are based on the work type and volume that UI typically receives each year:

Work Type	"Typical" Cost Range*	Forecasting Unit Cost	Volume	Total Cost
Traffic Signals	$5,000 – $25,000	$15,000	5	$75,000
Street Lighting	$5,000 – $15,000	$10,000	5	$50,000
Traffic Devices	$5,000 – $25,000	$15,000	5	$75,000
Intersections - Simple	$10,000 - $50,000	$30,000	5	$150,000
Intersections - Complex	$50,000 - $100,000	$75,000	2	$150,000
			Program Total	$500,000

** Note: the scope of the work performed under this program can vary depending on the location and traffic patterns.*

800326.01

UI - CAPEX Meters

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - CAPEX Meters

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	800326.01	Electric Distribution	Rebolleda, Alfonso	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Metering	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:

This project provides the material and labor for meter installations for new customers, new solar connections, defective equipment, AMR to AMI conversion and substitution of load control adapter at the end of their useful lives.

Project Scope:

The forecast is based on historical data and deployment strategy:
•New Customers: This is a reactive program that has been consistently deploying 3,500 units yearly during the analyzed period. We expect similar figures in 2024, 2025 and 2026.
•Defective equipment. Reactive program anticipating 8,000 failures per year based on forecast.
•AMR/AMI program: Currently slowed down due to investment prioritization out of the last Rate Case resolution.Due to good practice and efficiency, we will continue replacements where substitution are efficient within 2024 (8750 replacements), 2025 (12,000 replacements) and ramp up in 2026 to 20,000 replacements. L& G has confirmed to stop support to this meters by the end of 2026 being this the main reason to have to finish this project by then.
•Solar we have seen about 3000 requests and we expect similar for 2025 but due to the increasing popularity we are considering 3500 requests in 2026.
•Load Control Adaptor: We have identified 7,500 locations where the device will be present, however there is an undetermined number where there is no active Water Heater program. The intent is to initiate a replacement program with 2,500 replacements per year starting in 2026.

Project Benefits:

This is a customer facing activity which provides service to customers where we need accurate functioning meters installed. L&G will stop supporting AMR meters by the end of 2026 pushing the completion of the AMI replacements by then.

Project Risks and Mitigation Plan:

If funds were not to be provided for the AMI deployment activity, starting in 2027 estimates will increase as the network deteriorates and field reads will be needed, increasing operational cost.

For the rest of the activities, lack of funding will prevent the company to provide service or substitute defective metering equipment.

Risk of No Action:

Installing meters is in the critical path of service to customers. As AMR meters read end of life if we don't have the resources to replace them, customers will receive estimated bills.

Project Alternatives:
The Company has a second vendor to provide alternative meters to provide an alternative source for the acquisition of meters.

Basis for Project Estimates
A ground up estimate of material and labor costs and expected volumes broken down by work type.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 20**	$ 20	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 118**	$ 118	$ -	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 16,927**	$ 2,445	$ 3,537	$ 5,281	$ 2,489	$ 3,175
# Materials	**$ 22,664**	$ 3,947	$ 4,571	$ 6,826	$ 3,217	$ 4,104
# Overheads - External	**$ 625**	$ 301	$ 79	$ 118	$ 56	$ 71
Total	**$ 40,354**	**$ 6,830**	**$ 8,188**	**$ 12,225**	**$ 5,762**	**$ 7,350**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 40,600	$ 7,076	$ 8,188	$ 12,225	$ 5,762	$ 7,350

Note: 2024 Plant Additions includes the entire calendar year

UI
An Avangrid company

UI- CAPEX meters

All Towns

WBS: UI-U1223

Index

1. Program Description 3
2. Need Statement 3
3. Work Type 3
4. Forecasted CAPEX 4
5. Project Milestones 5
6. Project Assumptions 5

1. Program Description

This is an on-going program which includes all needs for meter and meter related accessories installation/replacement.

2. Need Statement

Most of the work done under this program is corrective/reactive in nature. The source of this work comes from customer requests, and equipment failures. The budget is based on historical average actual costs. There is a planned piece of the program related to the substitution of AMR (One Way) with AMI(Two way) meters. This part of the budget is based on installations forecast.

3. Work Type

- New Customers: Continuous demand for new connection points for electricity usage.
- New solar connections: Due to observed growth in requests for connections for solar generations, this category deserves independent tracking and forecasting due to the need to supply 2 meters at each location.
- AMR/AMI program. New metering equipment with higher capabilities represents an advantage for the system. Currently, over 90% of our system meters are state-of-the-art technology. This program aims to complete deployment for the remaining 10%.
- Defective equipment. Since 2020, we have experienced a significant number of failures due to component deterioration in a meter population installed between 2010 and 2016. This forecast includes any failing meter, however there is a separate focus on these meters.
- Load Control Adaptor: When the company replaced traditional electromechanical metering with solid-state AMR meters, an alternative to the previous meter with an integrated load control timer was needed. The determined solution was to install a Load Control Adaptor (LCA). These devices have reached their lifespan, prompting us to initiate a program to replace them.

4. Forecasted CAPEX

The forecasted capital expendiatures are as follows:

2024	2025	2026
$6,970,326	$8,117,471	$12,238,592

The following is the forecasted breakdown by work type of the plant additions during the time period of 2024 through 2026:

	2024		2025		2026	
Work Type	**Units**	**Cost**	**Units**	**Cost**	**Units**	**Cost**
New Customer	3500	$ 958,910	3500	$ 982,979	3500	$ 1,006,570
Supercap	8000	$ 2,478,564	8000	$ 2,540,776	8000	$ 2,601,755
AMR/AMI	8750	$ 2,710,929	12000	$ 3,811,164	20000	$ 6,504,386
Solar	3000	$ 821,923	3000	$ 842,553	3500	$ 1,006,570
Load Control Adaptor (LCA)	0	$ -	0	$ -	2500	$ 1,119,311
Total	23250	$ 6,970,326	26500	$ 8,177,471	37500	$ 12,238,592

Assumptions

- New Customers: This is a reactive program that has been consistently deploying 3,500 units yearly during the analyzed period. We expect similar figures in 2024, 2025 and 2026.
- Defective equipment. Reactive program anticipating 8,000 failures per year based on forecast.
- AMR/AMI program: Currently slowed down due to investment prioritization out of the last Rate Case resolution. Due to good practice and efficiency, we will continue replacements where substitution are efficient within 2024 (8750 replacements), 2025 (12,000 replacements) and ramp up in 2026 to 20,000 replacements. L& G has confirmed to stop support to this meters by the end of 2026 being this the main reason to have to finish this project by then.
- Solar we have seen about 3000 requests and we expect similar for 2025 but due to the increasing popularity we are considering 3500 requests in 2026.
- Load Control Adaptor: We have identified 7,500 locations where the device will be present, however there is an undetermined number where there is no active

Water Heater program. The intent is to initiate a replacement program with 2,500 replacements per year starting in 2026.

5. Project Milestones

Finishing AMI program by the end of 2026 as we have received notice from L&G after that date AMR meters could not be supported.

6. Project Assumptions

AMI deployment plan pending on regulatory decisions on Rate case and negotiation with L&G for a service extension on AMR meter after December 2026.

PRJ-002738

Private Area Lighting LED Hamden PAL

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Private Area Lighting LED Hamden PAL

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002738	Electric Distribution	Mitchell, John	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Customer Lighting	IP3 Financial Execute	Jan 2026	Oct 2026

Project description:

This program replaces approximately 1,007 private area lighting (PAL) locations in the town of Hamden and another 118 locations that still remained in various other towns throughout the UI service territory. The current HPS or MH fixtures and photocells will be replaced with LED fixtures and photocells. The timing of this replacement is dependent on securing a signed agreement with the town of Hamden. UI's program to convert PALs to LED technology will conclude upon the completion of Hamden, as all other towns have been converted.

Project Scope:

The typical work performed under this program is as follows:
•Replace existing HPS and MH fixtures and photocells installed on customer premises (private areas) with LED fixtures and photocells.
•Replace existing connection wires ("pigtails") with newer, longer lasting material.
•Replace existing light shields with new LED designed shields.
•Perform functional test for new fixtures and report failures.
•Record unique LED head serial number for tracking and billing. (This is performed utilizing a mobile tablet which scans and records the replacement data).
•Properly dispose of old fixtures and photocells.

Project Benefits:

The conversion of HPS and MH fixtures and photocells to LED technology has three major benefits; (1) reduction in energy usage, (2) lower costs to the town/customers resulting from the energy savings, and (3) lower maintenance costs for UI.

Project Risks and Mitigation Plan:

The timing and schedule of this work are dependent on the execution of an agreement with the town of Hamden. UI continues to work with Hamden to finalize an agreement.

Risk of No Action:

The current HPS and MH fixtures and photocells are operational. If no conversion occurs, spare parts and replacement parts will become difficult to procure and more costly, as the industry is moving toward LED. Energy usage will remain higher as will the rates.

Project Alternatives:

No Action - maintenance of HPS and MH fixtures and photocells will continue until replacement/repair materials are scarce and cost prohibitive.

Partial Conversion to LED - A partial change-out of the HPS and MH private area lighting can be prioritized with Hamden, however, records keeping and various billing rates will apply. This requires the stocking of inventory to manage both technologies for repair calls. Maintenance would still remain more costly.

Full Conversion to LED - A complete conversion is the most efficient method of conversion to manage. The entire conversion would be completed in approximately 2-3 months. Billing rates will be reduced for all PALs. LED stock is readily available for any repair calls that may occur.

Basis for Project Estimates

The estimated capital expenditures for this project are based on three major items.
1. Materials - based on the inventory of PALs and the type/size fixtures, unit costs were obtained for each of the 1,125 locations.
2. Contractor Labor - the conversion work would be performed by contractor resources. The historical cost per location was escalated out to 2026 and then multiplied by the number of locations (1,125).
3. Traffic Control - this assumes that one contractor crew will perform all the work and therefore, only one traffic control resource with the crew at each location. The historical average traffic control rate was escalated out to 2026 and then multiplied by the total number of hours that a traffic control resource would be required.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 68**	$ -	$ -	$ 68	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 770**	$ -	$ -	$ 770	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 67**	$ -	$ -	$ 67	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ 97**	$ -	$ -	$ 97	$ -	$ -
Total	**$ 1,002**	**$ -**	**$ -**	**$ 1,002**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 1,002	$ -	$ -	$ 1,002	$ -	$ -

UI
An Avangrid company

Hamden LED Streetlighting

WBS: UH-U0000540

Index

1. Program Description 3
2. Need Statement 3
3. Work Type 3
4. Engineering 4
5. Forecasted CAPEX 4

1. Program Description

This program replaces approximately 1,007 private area lighting (PAL) locations in the town of Hamden and another 118 locations that still remained in various other towns throughout the UI service territory. The current HPS or MH fixtures and photocells will be replaced with LED fixtures and photocells. The timing of this replacement is dependent on securing a signed agreement with the town of Hamden. UI's program to convert PALs to LED technology will conclude upon the completion of Hamden, as all other towns have been converted.

2. Need Statement

The conversion of HPS and MH fixtures and photocells to LED technology has three major benefits; (1) reduction in energy usage, (2) lower costs to the town/customers resulting from the energy savings, and (3) lower maintenance costs for UI.

3. Work Type

The typical work performed under this program is as follows:

- Replace existing HPS and MH fixtures and photocells installed on customer premises (private areas) with LED fixtures and photocells.
- Replace existing connection wires ("pigtails") with newer, longer lasting material.
- Replace existing light shields with new LED designed shields.
- Perform functional test for new fixtures and report failures.
- Record unique LED head serial number for tracking and billing. (This is performed utilizing a mobile tablet which scans and records the replacement data).
- Properly dispose of old fixtures and photocells.

4. Engineering

Refer to Section 3, Work Type above for an explanation of the engineering phase.

5. Forecasted CAPEX

The following are forecasted capital expenditures for this program:

2024	2025	2026
-	-	$1,001,545

The forecasted capital expenditures are predominately driven by material costs, external contractor resources, and the traffic control/police protection required while performing this work.

Total Cost Summary:

Source	Estimated Cost
Materials	$391,433
Contractor	$229,500
Traffic Control	$88,500
Subtotal	$709,433
Other – Overheads and Contingency	$292,112
Total	$1,001,545

Material - $391,433

Fixture Short Description	MID	Long Description	QTY	Unit Cost	Total Cost			
Acorn 45WLED5863	30053069	3000K 100W Eq. Acorn	152	391.96	59577.68			
Cobra 121WLED15104	30049960	3000K 400W Eq. Cobrahead	11	199.82	2198.05			
Cobra 19WLED2300	30049949	4000K 50W Eq. Cobrahead	19	104.67	1988.77			
Cobra 24WLED2945	30049956	3000K 70W Eq. Cobrahead	23	104.67	2407.46			
Cobra 39WLED4739	30049957	3000K 100W Eq. Cobrahead	15	104.67	1570.08			
Cobra 56WLED6962	30049958	3000K 150W Eq. Cobrahead	36	117.68	4236.60			
Cobra 81WLED9879	30049959	3000K 250W Eq. Cobrahead	32	145.75	4664.11			
Colonial 45WLED4510	30053029	3000K 100W Eq. Colonial	206	280.25	57731.85			
Flood 128WLED16268	30053027	3000K 400W Eq. Floodlight	352	337.09	118655.64			
Flood 252WLED32001	30053026	3000K 1000W Eq. Floodlight	74	641.27	47453.97			
Flood 85WLED10122	30053028	3000K 250W Eq. Floodlight	42	320.21	13448.70			
MonFlood 59WLED9632	30991433	3000K 250W Eq. Mongoose	4	798.29	3193.16			
MonFlood105WLED15763	30991434	3000K 400W Eq. Mongoose	8	798.29	6386.32			
Shoebox 57WLED6982	30053070	3000K 250W Eq. Shoebox	58	280.25	16254.60			
Shoebox131W LED16832	30053025	3000K 400W Eq. Shoebox	93	336.53	31297.02			
Shield - Acorn	30991287		31	22.51	697.82	Assumed that 20% of the installed LED Fixtures would require shields.		
Shield - Colonial	30991289		42	27.52	1155.78			
Shield - Floodlight	30991290		94	31.38	2949.64			
Shield - Cobra Head/Shoebox	30991292		58	22.77	1320.60			
Photocells	30047095	CONTROL SL PHOTO LED 120V	1125	12.66	14244.72			
				Total Cost	**391432.59**			

External – Contractor Resources - $229,500

Contractor Labor Rate Per Location = $204 X 1,125 Locations = $229,500

Traffic Control/Police Protection - $88,500

Assumes 1 Contractor Crew and

Crew Productivity = 15 locations per day

1,125 locations/15 locations per day = 75 days

10 hour days x 75 days = 750 hours

Average Hourly Rate for Traffic Control = $118 per hour X 750 hours = $88,500

PRJ-002125

UI - Street Light CAP

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Street Light CAP

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002125	Electric Distribution	Mitchell, John	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Customer Lighting	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:

This is an on-going program to install/replace/relocate/remove existing municipal street lighting and customer private area lighting. The scope includes lights that are fed from overhead and underground, secondary and service wire work, poles and light heads and civil work for bases and conduit and miscellaneous hardware. Majority of the budget is used to repair existing infrastructure and is corrective/reactive in nature.

Project Scope:

This is an on-going program to install/replace/relocate/remove existing customer private area lighting. The scope includes lights that are fed from overhead and underground, secondary and service wire work, poles and light heads and civil work for bases and conduit and miscellaneous hardware. The sources of the work come from customer requests to install new lighting, repair damaged lighting and from routine inspections. 2024 Scope will include any new requests or notifications of damaged lights that come in throughout the year. The budget amount was determined based on historical information, the average of the actuals for 2020-2023 is $1.1M.

Project Benefits:

Ensuring equipment is installed to meet customer commitment and ensuring it's maintained to provide the service the customer is paying for- customer satisfaction. State Statutes require utilities to repair 'Light Out' calls within 3 business days. UI receives notifications for Light-Out and schedules the next day through mobility.

Project Risks and Mitigation Plan:

Sourcing of materials is a risk (Poles, Wire and associated materials) has been limited by supply chain and lead times have significantly increased for certain items.
Operations Engineering works with each customer/municipality conduct assessment of in service plant, reviews needs with the customer and develop alternatives where possible to select the most feasible repair/replace designs.
Temporary repairs made by the workforce are sent to engineering for follow-up to ensure permanent repairs are made to current construction standards and adherence to industry codes.

Risk of No Action:

This program is customer facing. UI has a service obligation to execute this work. Delayed or non-execution of street light installations could result in fines, penalties, and reputation damages.

Project Alternatives:
The Company responds to customer needs, replacement is like for like.

Basis for Project Estimates
The budget for this program is based on 3 years average actual costs. Due to lack of capital funding the Company will defer work in '25 until '26, when funding has been potentially restored.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 376**	$ 136	$ -	$ 78	$ 80	$ 82
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 2,318**	$ 331	$ 751	$ 404	$ 412	$ 420
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 1,118**	$ 481	$ -	$ 208	$ 212	$ 216
# Internal, Overheads	**$ 798**	$ 284	$ 66	$ 162	$ 142	$ 144
# Materials	**$ 1,537**	$ 362	$ -	$ 453	$ 358	$ 363
# Overheads - External	**$ 1,165**	$ 411	$ 94	$ 224	$ 215	$ 219
Total	**$ 7,312**	**$ 2,006**	**$ 911**	**$ 1,530**	**$ 1,420**	**$ 1,445**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 6,435	$ 1,129	$ 911	$ 1,530	$ 1,420	$ 1,445

Note: 2024 Plant Additions includes the entire calendar year

UI
An Avangrid company

UI- Street Light CAP

All Towns

WBS: UI-U0015

9/27/24

Electric Operations

Index

1. Program Description 3
2. Need Statement 3
3. Work Types 3
4. Engineering 3
5. Actual Costs 4
6. Budget Forecast 6
7. Project Assumptions 6
8. Maps or Electrical Design 7

1. Program Description

This is an on-going program to install/replace/relocate/remove existing municipal street lighting and customer private area lighting. The scope includes lights that are fed from overhead and underground, secondary and service wire work, poles and light heads and civil work for bases and conduit and miscellaneous hardware. Majority of the budget is used to repair existing infrastructure and is corrective/reactive in nature.

2. Need Statement

The source of this work comes from customer requests to install new lighting, repair damaged lighting, replace secondary, municipal projects and from customers for light out.

3. Work Types

Types of work include:

- Install new customer private area lighting.
- Repair broken pole and bases due to Motor Vehicle Accident (MVA), municipal projects, customer work and others.
- Replace damages pole and bases.
- Relocate existing pole and bases upon request and project scopes.

4. Engineering

Examples of repair/replace/relocate:

- At Sargent Dr in New Haven, CT, UI had to replace 7 bases and run 800 feet of 2'' RGS conduits to repairs a string of lights that were damaged due to bad conduits and pole hits.

  WO#: 801000609380

Group/Dscrptn	Est. costs	Plan costs	Act. costs	Currency
Costs	1,166.76	3,917.35	213,893.28	USD
CONTRACTORS	0.00	0.00	112,070.94	USD
EXTERNAL SERVICE OVERHEAD	256.29	635.69	54,023.37	USD
FLEET OVERHEAD	58.58	66.57	177.90	USD
INTERNAL LABOR	765.60	870.00	2,518.54	USD
LABOR OVERHEADS	86.29	344.03	41,554.79	USD
MATERIAL OVERHEADS	0.00	1.26	0.00	USD
MATERIALS	0.00	1,999.80	2,138.81	USD
SALES REVENUES	0.00	0.00	1,408.93	USD

- City of New Haven were replacing the streetlights foundations at various locations and needed UI to de-energize the bases and removed wires. But due to multidude of issues, UI had to hire civil contractors to trench and install conduits from the manhole to the streetlights foundations.

  WO#: 801000592082

Group/Dscrptn	Est. costs	Plan costs	Act. costs	Currency
Costs	373.67	647.72	38,553.58	USD
EXTERNAL SERVICE OVERHEAD	73.70	127.75	11,078.63	USD
FLEET OVERHEAD	16.38	28.41	922.75	USD
INTERNAL LABOR	254.88	441.79	13,031.88	USD
LABOR OVERHEADS	28.71	49.77	7,612.01	USD
MATERIALS	0.00	0.00	5,865.07	USD
SALES REVENUES	0.00	0.00	43.24	USD

5. Actual Costs

The budget for 2025 is based on the historical actual costs:

	2021 Actual	2022 Actual	2023 Actual
UI - Street Lght CAP	1,486,021	1,072,652	1,472,576

The Table below shows the order numbers for repairs, average repair cost of $375 per repair order.

Year	Number of Repairs	Annual Average Total
2024*	736	$276,000.00
2023	1779	$667,125.00
2022	1225	$459,375.00
2021	1267	$475,125.00

*As of 7/8/2024

The Table below shoes the number of orders and costs for the Install/Removal/Exchange orders.

Year	Number of orders	Material and Labor	Average actual cost
2024*	62	$107,000.00	$144,450.000
2023	147	$306,000.00	$413,100.00
2022	128	$169,000.00	$228,150.00
2021	91	$172,000.00	$232,200.00

*As of 7/8/2024

6. Budget Forecast

Work Type	2025	2026	2027	2028
STLT OH/UG Repair/Replace	$410,170	$688,284	$638,777	$638,777
Install/Removal/Exchange	$437,514	$734,184	$681,362	$681,362
Pole/Base Replace	$63,804	$107,068	$99,365	$99,365
Total	$911,489	$1,529,552	$1,419,506	$1,445,191

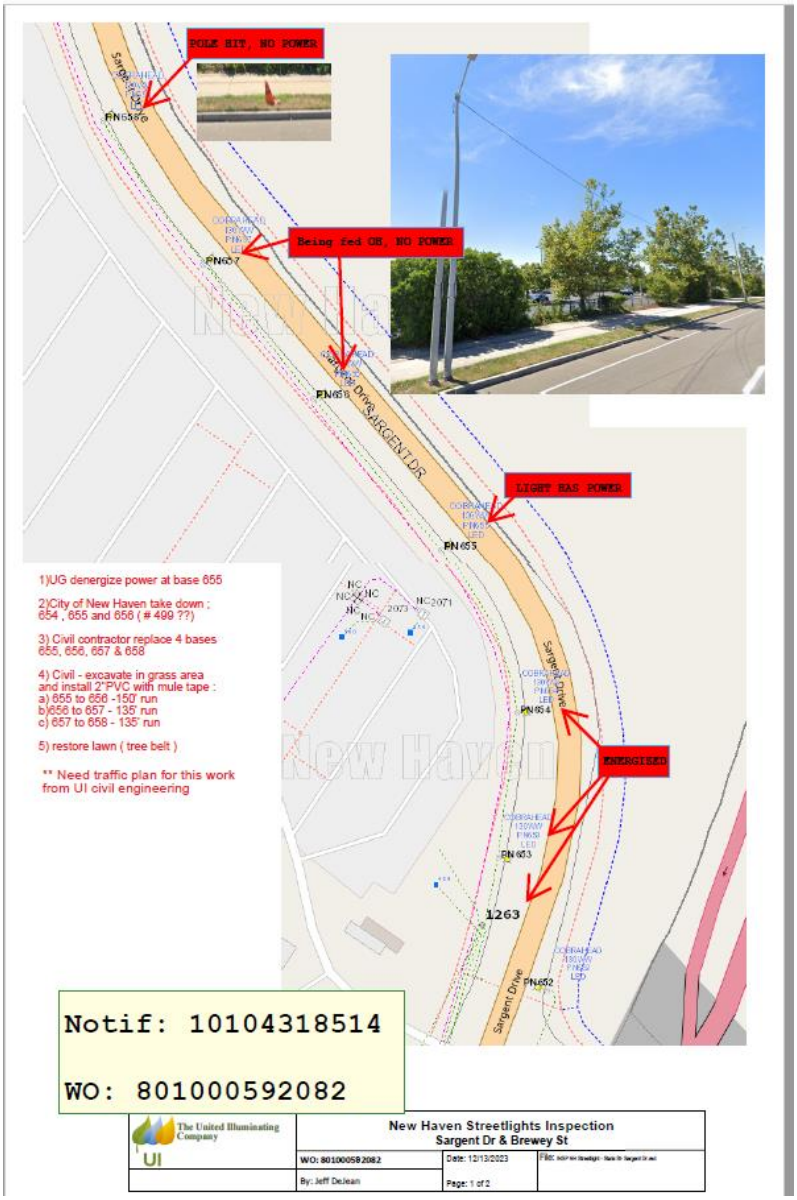
7. Project Assumptions

The following is the list of standard assumptions which were used to create the estimates for this project:

1. UI will continue the on-going program of installing/replacing/relocating/removing existing customer private area lighting.
2. All budgetary estimates are based on a work product in compliance with existing UI and/or industry accepted standards and specifications.
3. All construction techniques used to install, remove, or replace UI facilities will comply with any and all applicable Federal, State and Local regulations as well as UI Construction Standards.
4. Adequate working clearances would be maintained during and after placement of the UI facilities.
5. UI will be able to obtain any and all of the base maps of above ground and underground utilities in the area
6. All UI construction work will be done during the normal business week and hours.
7. Standard trench restoration with one travel lane of milling and paving will be done.
8. All materials will be ordered and available in time for use by Construction.
9. Labor rates used in creating the estimates are based upon historical averages.
10. External Civil Contractors will be used for Underground consrtuctions.
11. Internal crews will be used for all overhead streetlight projects

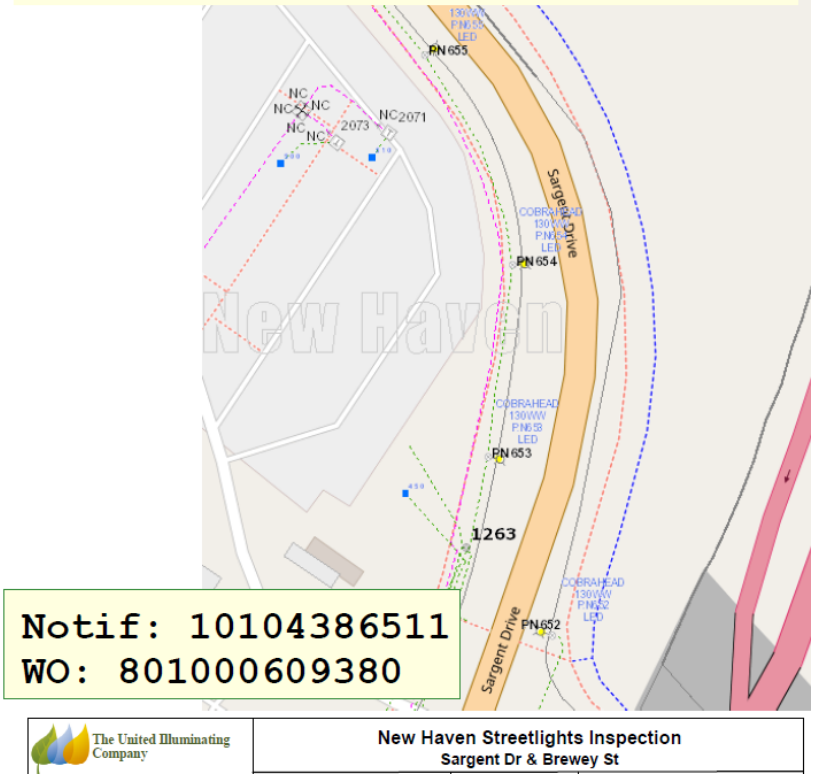
8. Maps or Electrical Design

Examples of Streetlights project at Sargent Dr, New Haven:



Scope of Work:

1)UI de-energized power at SC1263 on 03/26/2024
2)City of New Haven take down P.654 and P.653
3) Civil contractor replace 2 bases at P.654 and P.653
4) Civil - excavate in grass area and install 2" RGS with mule tape:
   a) SC 1263 to 653 -100' run
   b) 653 to 654 - 150' run
   c) 654 to 655 - 150' run
5) Restore lawn (tree belt)



Notif: 10104386511
WO: 801000609380

The United Illuminating Company

New Haven Streetlights Inspection
Sargent Dr & Brewey St

PRJ-005434

Customer Experience Enhancements

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Definition Document

Customer Experience Enhancements

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005434	Common	Paterson, Craig	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Customer Service	Customer Service Technology	IP1 Originate	Program - Ongoing	Program - Ongoing

Project description:

The high level objectives of this program are to provide our customers with an improved customer experience and to increase contact satisfaction. We will also increase digital engagement which typically has a higher CSAT (Customer Satisfaction) than traditional contact methods; this will also have an impact on cost to serve by reducing the need for customers to use more expensive contact methods.
These improvements will include several digital and operational improvements as well as focusing on operational efficiencies including automation of non-value add tasks. There will also be several ongoing new initiatives to support our employees and customers.

Project Scope:

The program's scope for 2025-2026 will reimagine how customers interact with the company's most critical touchpoints. 2023 JD Power and Associates residential satisfaction studies and the Voice of the Customer (VOC) program have highlighted the need to further develop key customer experiences. Through the development of a matrix, key experiences for redesign have been identified and prioritized based on the following criteria: customer satisfaction, cost reduction, strategic value, and complexity.

Those experiences will include:
- New connections phase 2
- Redesign the Outage Experience Phase 1
- Outage experience phase 2
- Redesign the billing end to end experience
- Redesign the Move-In/Move-Out experience Phase 2
- Redesign the App experience
- Redesign the High Bill/High Usage Journey (HBHU)
- Redesign Customer Contact experience and strategy (call reduction)
- Redesign the end-to-end Payments experience (vendor replacement)
- Redesign the end-to-end EBILL experience (vendor replacement)
- Journey Stability monitoring and improvements (Operations teams)
- Webchat/chatbot implementation, API (Application Programming Interface) enhanced
- Redesign the end-to-end debt collection experience

The Customer Experience Enhancements Program is rooted in an iterative process called Design Thinking. Design Thinking is used by some of the world's largest brands, including Bank of America, TMobile, Airbnb, and Apple. Through this process, each OpCo will go through five phases per experience to understand the end user and identify solutions that will result in new end-to-end experience maps and customer-tested prototypes for IT production and implementation.

Project Benefits:

Increase Contact satisfaction - Customers engaged in digital platforms have a higher customer satisfaction rate.
Our ability to drive customers to our digital platforms will help reduce call volumes, allowing representatives to focus on more complex calls.

Project Risks and Mitigation Plan:
Projects were committed to in previous rate cases, so delays could result in fines, penalties and reputation damage. Mitigation plans are to ensure collaborative portfolio management

Risk of No Action:
Companies must continually enhance their customer journies, and reduce their cost to serve, to meet with evolving customer expectations. With technological advancements and the proliferation of digital platforms, customers are used to seamless, personalized experiences across all touchpoints, and if UI does not provide that customer satisfaction will fall.

Project Alternatives:
Altenatives to enhacements would be the status quo of each of these journies, leading to outcomes in the "risk of no action" area

Basis for Project Estimates
Costs are based on estimated number of contracted and internal labor hours multiplied by assumed hourly rates. The hours are based on vendor estimates and on past efforts of similar scope and complexity where applicable.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 400**	$ -	$ -	$ 109	$ 143	$ 147
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 4,720**	$ -	$ -	$ 1,429	$ 1,571	$ 1,721
# Internal - Non-AC	**$ 422**	$ -	$ -	$ 147	$ 151	$ 124
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 5,542**	**$ -**	**$ -**	**$ 1,685**	**$ 1,865**	**$ 1,992**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 5,542	$ -	$ -	$ 1,685	$ 1,865	$ 1,992

Note: 2024 Plant Additions includes the entire calendar year

Project Definition

PDD Name - Following new Naming Convention*	Project Number - CS PMO Only	PDD Submitter*
PDD-AGR-NET-2024-CS-06-Digital Journey EBD transformation continued-AGR	PDD-AGR-2024-NET-CS-06-Digital Journey EBD transformation continued-AGR_All	Ken Turner

Business Area*	Business Portfolio Leader (CS Sr Team)	Business Process Director	Business Process Liaison (CS Functional Area Mgr)	CS PM	Number of Users*
NET APPS Networks Customer Service	Craig Paterson	Vitor Cruz	Ken Turner	TBD	0

CS Project Management Office (PMO)	CS Center of Excellence (COE) Lead	IT Area*	IT/OT*	PDD Initiative Type
Dave Harrington	Sarath Garikapati	TPO	IT	Program (multi year)

Negative Revenue Adjustment (NRA) and/or Non-Compliance Penalties/Fees Risk	Project Type*	Classification of Investment*	Special recovery of costs (if applicable)
N/A	Apps – Business Funded Project	Strategic	N/A

Requested Start Date*	Requested Delivery Date(s)*	Mandated by Statute or Regulatory Order (PURA/NERC/CIP)*	Identify the specific Statute or Order	Customers Affected by Project
2025-01-01	2026-12-31	No	N/A	Common (el & gas)

Business Objectives/Goal of the Project*

The high level objectives of these initiatives is to provide our customers with an improved customer experience and increase contact satisfaction. We will also increase digital engagement which typically has a higher CSAT than traditional contact methods, this will also have an impact on cost to serve by reducing the need for customers to use more expensive contact methods.

Description*

The Customer Journey Redesign Project will reimagine how customers interact with the company's most critical touchpoints. 2023 JD Power and Associates residential satisfaction studies and the Voice of the Customer (VOC) program have highlighted the need to further develop key customer journeys. Through the development of a matrix, key journeys for redesign have been identified and prioritized based on the following criteria: customer satisfaction, cost reduction, strategic value, and complexity.

Those journeys will include:
•New connections phase 2 (NY, UI, CMP)
•Redesign the Outage Experience Phase 1 (NY and UI)
•Outage experience phase 2 (CMP, NY, UI)
•Redesign the billing end to end journey
•Redesign the Move-In/Move-Out journey Phase 2
•Redesign the App experience
•Redesign Customer Contact journey and strategy (call reduction)

Justification*

The high level objectives of these initiatives is to provide our customers with an improved customer experience and increase contact satisfaction. We will also increase digital engagement which typically has a higher CSAT than traditional contact methods, this will also have an impact on cost to serve by reducing the need for customers to use more expensive contact methods.

Estimated Annual Benefits ($'s) & Benefit Description*
(Information related to benefits must be collected for all projects, despite the project purpose/justification)

Increase Contact satisfaction
Reduction of calls saves cost as their is a cost associated with reps times

Impact if this project does not get implemented

Our ability to drive customers to our digital platforms will help reduce call volumes, allowing reps to focus on more complex calls. Customers engaged in digital platforms have a higher customers satisfaction

Dependencies with other Ideas and projects*

SAP HANA

Comments: Include Issues, Risks, Constraints, Technical Solution thoughts, Problems and/or other considerations

$300K of this program is a regualtory ask for UI (Order 34 UI rate case)

PRJ-004212

Energy Manager Enhancements

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Definition Document

Energy Manager Enhancements

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-004212	Common	Paterson, Craig	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Customer Service	Customer Service Technology	IP1 Originate	Jan 2026	July 2026

Project description:

Implement the High Bill email alerts product from Uplight. Implement new mobile device functionality for our customers to manage their usage via mobile devices and have enhanced insights at their finger tips, allowing them to make informed decisions regarding the energy consumption in their property.

Project Scope:

UI
Full Residential and Non Residential Portals Go Live

All
High-bill usage alerts
Energy manager on mobile app

Project Benefits:

Required to help us improve our customer experience and satisfaction as well as digital adoption across all our customer touch points.
Reduce high bill complaints, increase customer satisfaction and enhance our proactive notifications for our customers to help them make informed decisions about their energy usage.
Improve gap in JD Power CSAT (Customer Satisfaction) scores for Easy to Business With - simple tools for managing my usage and utility costs.
Improve gap in JD Power CSAT scores for Reliability - application is evergreen, doesn't go out of support.
Improve gap in JD Power CSAT scores for Value - available 24x7.
Decrease contact center call volumes for high bill complaints- complaint reduction.
Increase in app downloads.
Increase in app logins.
This will naturally increase overall enrollment in many programs due to being able to link a customer's energy usage more effectively to CLM programs and efficiency advice on their mobile devices.

Risks if not approved:
Customers who receive high bills will continue to raise complaints and have zero context given as to why their energy usage or bill amount has increased. Customers will fail to be educated into how to efficiently manage the energy in their home proactively.
Customers will only be able to have an energy usage experience on their responsive My Account portal and not via their mobile app.
Customers may rank us lower in JD Power metrics for not having key digital functionality as this drastically affects the UX for our mobile app customers.
Platform becomes outdated, customers are not provided with the latest in technology to support functionality for easier and most relevant solutions, system becomes unreliable with frequent outages. Decreased customer satisfaction and NPS scores increased call volumes and increased customer complaints.

Project Risks and Mitigation Plan:

Dependency risk on completion of the Energy Manager project. Mitigations to this are baked into the energy manager overall project.

Dependencies on key business SME's to support the project to meet required quality and in turn key project timelines and milestones.

Working with Key business stakeholders to determine the right quantity and quality of resources to deliver the project as quickly as possible.

Risk of No Action:

Customers who receive high bills will continue to raise complaints and have zero context given as to why their energy usage or bill amount has increased. Customers will fail to be educated into how to efficiently manage the energy in their home proactively.
Customers will only be able to have an energy usage experience on their responsive My Account portal and not via their mobile app.
Customers may rank us lower in JD Power metrics for not having key digital functionality as this drastically affects the UX for our mobile app customers.
Platform becomes outdated, customers are not provided with the latest in technology to support functionality for easier and most relevant solutions, system becomes unreliable with frequent outages. Decreased customer satisfaction and NPS scores increased call volumes and increased customer complaints.

Project Alternatives:

N/A this project is already committed to.

Basis for Project Estimates

Costs are based on estimated number of contracted and internal labor hours multiplied by assumed hourly rates. The hours are based on vendor estimates and on past efforts of similar scope and complexity where applicable.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	$ -	$ -	$ -	$ -	$ -	$ -
# CIAC	$ -	$ -	$ -	$ -	$ -	$ -
# External Services	$ 796	$ -	$ -	$ 576	$ 221	$ -
# Internal - Non-AC	$ -	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	$ 33	$ -	$ -	$ 33	$ -	$ -
# Internal, Overheads	$ -	$ -	$ -	$ -	$ -	$ -
# Materials	$ -	$ -	$ -	$ -	$ -	$ -
# Overheads - External	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ 830**	**$ -**	**$ -**	**$ 609**	**$ 221**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 609	$ -	$ -	$ 609	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

Project Definition

PDD Name - Following new Naming Convention*	Project Number - CS PMO Only	PDD Submitter*
PDD-AGR-NET-25-06-CS-Energy manager enhacements-AGR		Kenneth Turner

Business Area*	Business Portfolio Leader (CS Sr Team)	Business Process Director	Business Process Liaison (CS Functional Area Mgr)	CS PM	Number of Users*
NET APPS Networks Customer Service	Craig Paterson	Vitor Cruz	Kenneth Turner	TBD	50

CS Project Management Office (PMO)	CS Center of Excellence (COE) Lead	IT Area*	IT/OT*	PDD Initiative Type
Dave Harrington	Kenneth Turner	NET-APPS	IT	Program (multi year)

Negative Revenue Adjustment (NRA) and/or Non-Compliance Penalties/Fees Risk	Project Type*	Classification of Investment*	Special recovery of costs (if applicable)
Multiple references to EM Across opcos but no specific timelines in place against this initative	Apps – Business Funded Project	Strategic	N/A

Requested Start Date*	Requested Delivery Date(s)*	Mandated by Statute or Regulatory Order (PURA/NERC/CIP)*	Identify the specific Statute or Order	Customers Affected by Project
2025-01-02	2026-12-31	Yes	NY AMI Dockets, RE02 in UI	Common (el & gas)

Business Objectives/Goal of the Project*

Provide customers with access to increased functionality within the energy manager portal to provide customers with a clearer view of their energy usage. Allowing customers to make informed decisions about the consumption in their property. In turn, increasing customer satisfaction and reducing high billing and usage contacts.

Description*

Go Live of the following features for NY
Weekly Alerts w/ Bill Summary (AMI) + Reporting
Bill Forecast Chart
Rate Advisor Chart
AMI Cost Display
Green Button Data Download with AMI via GridX iCost API

CMP
Full Residential Portal + Features Go Live
Final Implementation of the following features in addition
Alerts - Weekly Updates w/ Bill Summary (AMI) + Alert Reporting
Bill Forecast Chart, Rate Advisor Chart, AMI Cost Display
Green Button Download w/AMI via GridX iCost API

Justification*

Currently, customers have limited options outside of their bill, to self serve with regards to their energy usage and billing, and in addition to that, high billing and usage contacts are some of the hight interactions that Avangrid Opco's receive. Therefore this product is being put into place to achieve a standardized platform across all opco's with better user experience, and richer features to what is currently offered to customers, increasing CSAT, and reducing contact volume in the process through high levels of self service from customers.

Estimated Annual Benefits ($'s) & Benefit Description*
(Information related to benefits must be collected for all projects, despite the project purpose/justification)

Provide customers with access to increased functionality within the energy manager portal to provide customers with a clearer view of their energy usage. Allowing customers to make informed decisions about the consumption in their property. Providing customer with this insight will provide a better understand of their energy bill and reduce the need for customer to call.

Impact if this project does not get implemented

If this product doesn't get implemented, it risks not delivering on regulatory commitments we have made within NY and UIL (RE02) AMI Dockets to deliver this functionality. In addition to this, it risks communications we have made to customers in NY Directly that this functionality is coming in line with there new smart meters.

Dependencies with other Ideas and projects*

MDM development and Automation of customer Data (ESPM)

Comments: Include Issues, Risks, Constraints, Technical Solution thoughts, Problems and/or other considerations

PRJ-005009

New IVR and Voice Solution

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Definition Document

New IVR and Voice Solution

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005009	Common	Bartczak, Mike	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Customer Service	Customer Service Technology	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:

This program covers the costs associated with upgrading and enhancing our CCaaS (Contact Center as a Service) platform which includes our IVR (Interactive Voice Response) system and call flow software. It also includes the budget for our software licenses for the CCaaS which meet the tresholds and qualifications for capitalization.

Project Scope:

Scope for 2025:
Implement new CCaaS (Contact Center as a Service) platform, transitioning from the current Genesys platform to new Talkdesk platform.

The implementation project will implement the solution in different phases, aligned to the substitution of the current Contact Center as a Service (CCaaS) solutions (Proposed CCaaS solution – Talkdesk)
in a roadmap to determine how they can map the existing features:
- Propose a unified design (IE: self-service options and prompts).
- Interactive Voice Response capabilities including Avangrid standardized interactive voice response capabilities DTMF and Direct Dialog Speech.
- Contact routing of multiple channels including voice and email and Outbound dialer.
- Support management, with administrative capabilities such as workforce management, call recording, quality monitoring, reporting, and dashboards.
- Computer Telephony Integration (CTI) with Utah, the current version release of Service Now.
- Computer Telephony integration with SAP (CRM7.0 and ECC 6.0 suite on HANA) and able to support future SAP S/4 HANA and CRM products such as SAP service cloud platform.
- Integrate the following processes: IVR, SAP, CRM, IVA, Mosaicx Virtual Hold.
- Project scope includes rolling out new functionality for Omni Channel, Chat channel, SMS, Virtual Assistant.
- Integration with Business Process Outsourcing (BPO).
- Middleware work (insert based on vendor).
- Provide features in a Roadmap of what is offered as requirements.
-All historical data would be retained from current platform in a readily searchable format.
-Migrate Avangrid phone numbers to the cloud provider that contains engineering, designs and cost related to:
  - Full Port
  - BYOC
  - Hybrid
- Procure required CCaaS licenses (DEV & PRD environments) including Text-to-speech (TTS) and Automatic Speech Recognition (ASR)
- Integrate VHT (Virtual Hold) cloud to new CCaaS platform
- Implement datalake for historical recording playback (Genesys, NICE, API)

Project Benefits:

Current Genesys IVR platform is reaching end of life by Mid 2025. Future IVR platforms are SaaS-based platforms. Unified call flow, better customer experience and cost-effectiveness through improved self-service, right channeling contacts and enhancing agent efficiency. Improved Reliability and stability.

Consequences if we don't do it - Current platform won't be supported beyond 2025. This puts contact centers at risk to take customer calls which directly impacts customer experience, service levels and risk of incurring penalties.

Project Risks and Mitigation Plan:
Delays in the procurement process is the biggest risk. To mitigate we are collaborating closely with Procurement and working diligently to complete procurement requirements and on-board the vendor.

Risk of No Action:
Major risk to the IVR system to serve UI customers as the current Genesys Platform end of life is July 2025.

Project Alternatives:
There are no alternatives as the current IVR/Telephony platform is reaching end of support by Q2 2025.

Basis for Project Estimates
Estimates are based on the expected costs of contracted and internal labor at assumed hourly rates to implement the new platform as well as the cost of software licenses.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 28**	$ 0	$ 28	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 1,466**	$ 246	$ 589	$ 210	$ 210	$ 210
# Internal - Non-AC	**$ 3**	$ 3	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 30**	$ -	$ 30	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 1,526**	**$ 250**	**$ 646**	**$ 210**	**$ 210**	**$ 210**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 1,277	$ -	$ 646	$ 210	$ 210	$ 210

Note: 2024 Plant Additions includes the entire calendar year

Project Definition

PDD Name - Following new Naming Convention*	Project Number - CS PMO Only	PDD Submitter*
PDD-AGR-NET-2024-CS-18-New IVR and Voice solution–AGR	AGR-BTCSS-24-IVR and Voice Solution	Vincent Lam

Business Area*	Business Portfolio Leader (CS Sr Team)	Business Process Director	Business Process Liaison (CS Functional Area Mgr)	CS PM	Number of Users*
NET APPS Networks Customer Service	Michal Bartzczak	Kumar Jaladanki	Vincent Lam	Gary West	940

CS Project Management Office (PMO)	CS Center of Excellence (COE) Lead	IT Area*	IT/OT*	PDD Initiative Type
David Harrington & Roxxie Brochu	NA	NET-APPS	N/A	Program (multi year)

Negative Revenue Adjustment (NRA) and/or Non-Compliance Penalties/Fees Risk	Project Type*	Classification of Investment*	Special recovery of costs (if applicable)
N/A	Apps – Business Funded Project	Strategic	N/A

Requested Start Date*	Requested Delivery Date(s)*	Mandated by Statute or Regulatory Order (PURA/NERC/CIP)*	Identify the specific Statute or Order	Customers Affected by Project
2024-06-10	2025-12-31	No	N/A	Common (el & gas)

Business Objectives/Goal of the Project*

Current Genesys Platform is reaching End of Life by July 2025. Implementing a new Contact Centre As a Service (CCaaS) platform to have a Standardized and common platform across Avangrid OpCos.

Description*

•Review NY/CMP/UIL/HR Self-service strategy and standardize self-service options
•Conduct a Self-Service Discovery to review call flows
•Configure call flows of New York (NYSEG&RGE) and Maine (CMP) and UIL (CNG/SCG/BG/UI) and HR to a new CCaaS (Contact Centre As a Service) platform

••Procure required CCaaS licenses (DEV & PRD environments) including Text-to-speech(TTS) and Automatic Speech Recognition (ASR)
- Integrate Virtual Hold (VHT) cloud to new CCaaS platform
- Implement datalake for historical recording playback (Genesys, NICE, API)

Justification*

•Single Platform guarantees simplified applications integration and ease of support.
•Consolidated Maintenance offering reduced support cost.

Estimated Annual Benefits ($'s) & Benefit Description*
(Information related to benefits must be collected for all projects, despite the project purpose/justification)

$1.091m annual subscription saving vs existing Genesys vendor. Also, future subscription cost can be capitalized vs OPEX currently.

Impact if this project does not get implemented

Major risk to the IVR system to serve AGR customers, as current Genesys Platform EOL in July/2025.

Dependencies with other Ideas and projects*

None

Comments: Include Issues, Risks, Constraints, Technical Solution thoughts, Problems and/or other considerations

Issues:
Major risk to the IVR system to serve AGR customers, as current Genesys Platform EOL in July/2025.
Risks:
Major risk to the IVR system to serve AGR customers, as current Genesys Platform EOL in July/2025.
Constraints:
Timing for curently Genesys Platform EOL
Problems:
Integration Challenges: Integrating with multiple system, e.g. SAP, VHT, etc.
Upgrade Challenges: Need major TPO infrastructure support

Platform by end of 2024, phased roll out into 2025 for each OPCO for in service dates

PRJ-005579

UI - Green Button Connect

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Definition Document

UI - Green Button Connect

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005579	Common	Paterson, Craig	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Customer Service	Customer Service Technology	IP1 Originate	Jan 2026	May 2026

Project description:
Anticipated regulatory requirement to deliver Green Button Connect functionality to the Energy Manager platform at UI pending RE02 PURA final decision. This would be implented by the end of 2026.

Project Scope:
Software enhancement to add Green Button Download feature to the UI Energy Manager platform using data from SAP, Master Data Management and Digital platform.

Project Benefits:
Compliance with regulatory direction. Customers would receive additional feature for viewing their energy usage.

Project Risks and Mitigation Plan:
As not yet funding recovery agreed to by the regulator. Project detailed planning will not start until recovery mechanism is agreed to. However, some common risks with this type of project are:

A. Adequate resourcing of data SME's and business owners avaliable from UI - This would be mitigated by conversations up front with the relevant heads of each business unit to get agreement for resourcing linked to the regulatory directive.

B. Data Quality - On Occasion, it has been observed that some of the SAP Data that is required as foundational data, is not up to the required quality for smooth work towards a plan. There is a number of activities happening across the organization to continuously improve the quality and governance of data outside of the project teams control.

Risk of No Action:
High-bill contact rates will remain high and possible fines if customer satisfaction scores don't improve

Project Alternatives:
Not applicable, this is a regulatory directed project.

Basis for Project Estimates
Costs are based on estimated number of contracted and internal labor hours multiplied by assumed hourly rates. The hours are based on vendor estimates and on past efforts of similar scope and complexity where applicable.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	$ -	$ -	$ -	$ -	$ -	$ -
# CIAC	$ -	$ -	$ -	$ -	$ -	$ -
# External Services	$ 946	$ -	$ -	$ 946	$ -	$ -
# Internal - Non-AC	$ -	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	$ -	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	$ -	$ -	$ -	$ -	$ -	$ -
# Materials	$ -	$ -	$ -	$ -	$ -	$ -
# Overheads - External	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ 946**	**$ -**	**$ -**	**$ 946**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 946	$ -	$ -	$ 946	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

Project Definition

PDD Name - Following new Naming Convention*	Project Number - CS PMO Only	PDD Submitter*
PDD-AGR-NET-25-CS-13-Green Button Connect-UI		Kenneth Turner

Business Area*	Business Portfolio Leader (CS Sr Team)	Business Process Director	Business Process Liaison (CS Functional Area Mgr)	CS PM	Number of Users*
NET APPS Networks Customer Service	Craig Paterson	Vitor Cruz	Kenneth Turner	TBD	0

CS Project Management Office (PMO)	CS Center of Excellence (COE) Lead	IT Area*	IT/OT*	PDD Initiative Type
Dave Harrington	Kenneth Turner	NET-APPS	N/A	Program (multi year)

Negative Revenue Adjustment (NRA) and/or Non-Compliance Penalties/Fees Risk	Project Type*	Classification of Investment*	Special recovery of costs (if applicable)
To be dertermined dependent on RE02 Docket Final response.	Apps – Business Funded Project	Strategic	N/A

Requested Start Date*	Requested Delivery Date(s)*	Mandated by Statute or Regulatory Order (PURA/NERC/CIP)*	Identify the specific Statute or Order	Customers Affected by Project
2026-01-02	2026-12-31	Yes	RE02	Common (el & gas)

Business Objectives/Goal of the Project*

Green Button Connect: A Customer and Third Party facing web page that is focused on providing a quick and easy way for customers to share usage data with third party organizations, and for third parties to be able to request customer data directly via an approval process. This is currently a regulatory mandate from Pura, subject to recieving the appropriate level of funding and resourcing from Pura.

Description*

UI Green button connect - Enables third parties to securely access interval meter data, this initiative is not widely used but will likely be mandated by the regulator

Justification*

Regulatory requirement to deliver green button connect in UI. UI is requesting funding from the regulator to deliver this initative.

Estimated Annual Benefits ($'s) & Benefit Description*
(Information related to benefits must be collected for all projects, despite the project purpose/justification)

Benefits are limited to the business.
Regulatory requirement to deliver green button connect in UI

Impact if this project does not get implemented

Dependent on funding from PURA in RE02 docket if development is mandated or not

Dependencies with other Ideas and projects*

MDM intiavite and Automation of customer Data

Comments: Include Issues, Risks, Constraints, Technical Solution thoughts, Problems and/or other considerations

PRJ-002750

UI - Net Metering Changes

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Definition Document – RRES Changes
    b. Project Definition Document – Non Bypassable Charges
    c. Project Definition Document – RRES and NRES Ph2

UI - Net Metering Changes

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002750	Common	Robie, Erik	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Customer Service	Customer Service Technology	IP4 Change	Ongoing	Dec 2025

Project description:

SAP and other system enhancements to enable appropriate billing and crediting of customers who install solar utilizing UI's Netting and Buy-All Tariff options:
1) Enhance SAP to provide a method to provide an on-bill, volumetric non-bypassable charge to customers who install solar as part of the new renewable energy tariffs.
2) RRES (Residential Renewable Energy Solutions) and NRES (Nonresidential Renewable Energy Solutions) functionality to enable existing solar customers to add on additional solar through the RRES and NRES programs using the Netting configuration and tariff.
RRES SAP and other system enhancements.

Project Scope:

1) NonBypassable Charge project (NBC) includes:
- This volumetric charge mechanism would establish a per kWh charge on the PV system's production as measured by the production meter.
- Create an automated work order processes for any changes related to the meter installation/maintenance of net metering Production meters (aka Generation meters, REC meters) for both tariff options. This provides a means to track the location, maintenance, testing, etc. of these meters in the SAP system and helps assure correct meter reading and accounting.
- Create new rates, schemas and categories for each tariff option.
- Create/adjust custom program table/T code, create new notifications, adjust CRM screen and create BW (Business Warehouse) and other program reports; and adjust bill print logic.
- Create/adjust workflow to automate process of enrollment request.
- Satisfy all internal and external accounting requirements and compliance with all Sarbanes – Oxley regulations.
- Integrate the work required for tariffs with similar programs/projects (LREC/ZREC, RES and NRES) to achieve operational efficiencies.
- Enable required bill print changes.
- Develop BW and other required reports.
2) Additional solar using Netting Tariff:
- The scope entails IT system changes to rates (residential and non-residential), billing and workflow to enable the simultaneous application of both Netting functionality and Buy-All functionality.
- The outcome will be that customers with existing solar on Rate NE would need to be removed from Rate NE and re-enrolled in the RRES (or NRES) Netting tariff for their old PV system, and their new PV system would also be enrolled in the RRES (or NRES) Netting Tariff. Banked netting credits from the old system would be cashed out to the customer. Both systems could be metered together to compensate the customer for netted production on bill. The old system, however, would not be eligible for the direct payment of RECs and/or adders; while the new system would still be eligible for the payment of RECs and/or adders.
3) RRES SAP and other system Enhancements scope currently includes:
- Multi Family Affordable Housing changes in SAP
- MDMS and other system integrations.
- E-Payments system and process development.
PowerClerk enhancements to accommodate Tariff Payment Beneficiary Changes.

Project Benefits:
Regulatory mandated (PURA): risk of not implementing could result in compliance issues and potential fines.
Program costs are recoverable through RAM so depreciation expense would be recovered through NBFMCC once asset is in service.
Customer benefits: enables customer to be accurately credited and/or billed based on program requirements. Enables customer flexibility to choose Netting Tariff if they have an existing solar system.

Project Risks and Mitigation Plan:
Risk of Notice of Violation or potential fine if project deadlines are not met.
Project dependency means delays in one project causes delays in dependent projects
Potential resources constraints (Project Management or Technical) may impact timing of implementation.
Mitigation plan - requested additional FTE support in 2024 RAM Known & Measurable filing to foster project completion.

Risk of No Action:
Risk of Notice of Violation and fine from CT PURA if not completed by regulatory due date.

Project Alternatives:
No viable alternatives identified.

Basis for Project Estimates
Project costs were calculated based on an estimation of contracted and internal labor hours based on past work of similar scope/complexity.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 9**	$ 9	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 1,216**	$ 580	$ 636	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 1,225**	**$ 589**	**$ 636**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 1,413	$ 494	$ 920	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

Project Definition

PDD Name - Following new Naming Convention*	Project Number - CS PMO Only	PDD Submitter*
PDD-AGR-NET-2022-CS-02-Net Metering RRES Changes-UIL	AGR-BTCSS-24 Net Metering RRES change	Marissa Westbrook

Business Area*	Business Portfolio Leader (CS Sr Team)	Business Process Director	Business Process Liaison (CS Functional Area Mgr)	CS PM	Number of Users*
NET APPS Networks Customer Service	Erik Robie	Erik Robie	Marissa Westbrook / Aaron Smith	Desh Deepak (Cognizant) / Aaron Smith	250

CS Project Management Office (PMO)	CS Center of Excellence (COE) Lead	IT Area*	IT/OT*	PDD Initiative Type
David Harrington/Roxxie Brochu	Shelina Mohammed	NET-APPS	N/A	Program (multi year)

Negative Revenue Adjustment (NRA) and/or Non-Compliance Penalties/Fees Risk	Project Type*	Classification of Investment*	Special recovery of costs (if applicable)
No established fines, however potential to receive a penalty from CT PURA if functionality is not live in 2024	Apps – Business Funded Project	Mandatory Compliance	CapEx Defferable reg. asset

Requested Start Date*	Requested Delivery Date(s)*	Mandated by Statute or Regulatory Order (PURA/NERC/CIP)*	Identify the specific Statute or Order	Customers Affected by Project
2023-01-01	2025-06-30	Yes	20-07-01, 21-08-02, 22-08-02, 23-08-02	Electric

Business Objectives/Goal of the Project*

On February 10, 2021, PURA released its Final Interim Decision in Docket NO. 20-07-01 PURA Implementation of Section 3 of P.A. 19-35 Renewable Energy Tariffs and Procurement Plans, which established the details of the new tariffs for the utilities to implement beginning January 1, 2022, with a proposed new non-bypassable charge design to be proposed and implemented for 1/1/23 (also as part of Docket 21-08-02). UI filed proposed charge designs on 1/1/22, along with written comments on 2/7/22. PURA issued its response to written comments in Docket 21-08-02 on 2/24/22 issues a ruling on motion 24 selected a specific proposed charge design to be implmented 1/1/23. Subsequest PURA decision in 21-08-02 in May and June also required the following to be developed: 1) Temporary solutions for use of inverter data 2) least cost plan to permanently use invterer data to be filed in August 2022, 3) least cost plan to implement REC adn adder payments on bill to be filed in October and 4) ability to accept multi family projects into program by 1/1/23 and distribute benefits by 4/1/23

Description*

Some RRES enhancement projects will be completed in 2024, while the projects noted below will begin in 2024 but will carry over into 2025 due to use of common resources.
Carry Over implementation in 2025 (per notes below):
• Post Go Live Support for Multi Family Affordable Housing - estimate $50K
• RRES SAP enhancements - $ TBD
• E-Payments - $ TBD
• New TPB change portal -$78K
SAP enhancements to accommodate Meter Socket adapters (MSAs) - $150
Implementation in 2024:
•PowerClerk Phase 2: systems integrations related to global SAP and payments, SAP look ups for rates & hardship status, integration with MDMS data and/or queries, potential inclusion of Meter Request form and integration with Right Now system.
○ MDMS/ Meter Request process - To be completed in 2024 ($139K)
○ Epayments - 2025 Carry Over - $ TBD;
Multi Family Affordable Housing - estimate TBD

Justification*

CT PURA Requirement, enhancements identified from Working group meetings and requirements identified in regultaory filings.

Estimated Annual Benefits ($'s) & Benefit Description*
(Information related to benefits must be collected for all projects, despite the project purpose/justification)

N/A

Impact if this project does not get implemented

If not implemented there is a risk of regulations getting changed
Out of Compliance with CT PURA requirements
Risk of Potential Fine for noncompliance with regulatory requirements

Dependencies with other Ideas and projects*

May have dependancy on Non Bypassable Charge project

Comments: Include Issues, Risks, Constraints, Technical Solution thoughts, Problems and/or other considerations

Project Definition

PDD Name - Following new Naming Convention*	Project Number - CS PMO Only	PDD Submitter*
PDD-AGR-NET-2022-CS-11-Net Metering Non By Charge-UIL	AGR-BTCSS-24 Net Metering RRES change	Marissa Westbrook

Business Area*	Business Portfolio Leader (CS Sr Team)	Business Process Director	Business Process Liaison (CS Functional Area Mgr)	CS PM	Number of Users*
NET APPS Networks Customer Service	Erik Robie	Kumar Jaladanki	Marissa Westbrook	Desh Deepak (Cognizant)	25

CS Project Management Office (PMO)	CS Center of Excellence (COE) Lead	IT Area*	IT/OT*	PDD Initiative Type
David Harrington/Roxxie Brochu	Shelina Mohammed	NET-APPS	N/A	Program (multi year)

Negative Revenue Adjustment (NRA) and/or Non-Compliance Penalties/Fees Risk	Project Type*	Classification of Investment*	Special recovery of costs (if applicable)
No established fine, however potential to receive a penality if system is not live and functioning in 2024.3/31/	Apps – Business Funded Project	Mandatory Compliance	CapEx Deferrable reg. asset

Requested Start Date*	Requested Delivery Date(s)*	Mandated by Statute or Regulatory Order (PURA/NERC/CIP)*	Identify the specific Statute or Order	Customers Affected by Project
2023-01-01	2025-03-31	Yes	Docket No. 20-07-01, 21-08-02	Electric

Business Objectives/Goal of the Project*

On February 10, 2021, PURA released its Final Interim Decision in Docket NO. 20-07-01 PURA Implementation of Section 3 of P.A. 19-35 Renewable Energy Tariffs and Procurement Plans, which established the details of the new tariffs for the utilities to implement beginning January 1, 2022, with a proposed new non-bypassable charge design to be proposed and implemented for 1/1/23 (also as part of Docket 21-08-02). UI filed proposed charge designs on 1/1/22, along with written comments on 2/7/22. PURA issued its response to written comments in Docket 21-08-02 on 2/24/22 issues a ruling on motion 24 selected a specific proposed charge design to be implemented 1/1/23. On June 30, 2022, PURA granted Motion 8 and changed the implementation due date to January 1, 2024

Description*

Note: 2025 Carryover - for Post Go Live support. IT project completed in 2024, but functionality will not be turned on until 2025. Enhance SAP to provide a method to provide an on-bill, volumetric non-bypassable charge to customers who installer solar as part of the new renewable energy tariffs. This volumetric charge mechanism would establish a per kWh charge on the PV system's production as measured by the production meter. For example, if the Authority determined that an NBC of $0.01 per kWh was required to meet targeted rates of return, then all kWh produced by the production meter would be subjected to the charge. Assuming that the average residential renewable energy system has a nameplate capacity of 5 kW (AC), the average monthly bill over a year would be $4.75 per month. However, the customer's actual charge would be depend on their actual production and could vary widely throughout a year as solar production varies. PURA will require display the charge on customer bills using production meter reads in alignment with current billing cycle. This entails the use of meter reads that were being treated as "non-billable" in the 2022 metering and billing configuration for UI and are used to provide direct REC payments to customers or third parties in the 2022 program. The change to display this new charge on-bill would require significant IT system modifications from the 2022 model. It would entail creating a new set of rate categories, as production meters are typically read on a calendar month, which differs from customer billing cycles. Project will entail:
• Create an automated work order processes for any changes related to the meter installation/maintenance of net metering Production meters (aka Generation meters, REC meters) for both tariff options. This provides a means to track the location, maintenance, testing, etc. of these meters in the SAP system and helps assure correct meter reading and accounting.
• Create new rates, schemas and categories for each tariff option
• Create/adjust custom program table/T code, create new notifications, adjust CRM screen and create BW and other program reports; and adjust bill print logic

Justification*

CT PURA requirement

Estimated Annual Benefits ($'s) & Benefit Description*
(Information related to benefits must be collected for all projects, despite the project purpose/justification)

N/A

Impact if this project does not get implemented

If not implemented there is a risk of regulations getting changed
Out of Compliance with CT PURA requirements
Risk of Potential Fine for non compliance with regulatory order

Dependencies with other Ideas and projects*

Comments: Include Issues, Risks, Constraints, Technical Solution thoughts, Problems and/or other considerations

Project IT is completing in 2024 per CT PURA requirement, however; per PURA final decision in DN 23-08-02, the non-bypassable charge will not be implemented in 2024, and may be implemeted in 2025 instead.

Project Definition

PDD Name - Following new Naming Convention*	Project Number - CS PMO Only	PDD Submitter*
PDD-AGR-NET-2024-CS-09-Add-On Netting Phase 1 RRES Phase 2 NRES-UI		Marissa Westbrook

Business Area*	Business Portfolio Leader (CS Sr Team)	Business Process Director	Business Process Liaison (CS Functional Area Mgr)	CS PM	Number of Users*
NET APPS Networks Customer Service	Erik Robie	Erik Robie (CS) / Christie Prescott (Wholesale Power)	Marissa Westbrook / (TBD Wholesale Power)	Desh Deepak (Cognizant)	300

CS Project Management Office (PMO)	CS Center of Excellence (COE) Lead	IT Area*	IT/OT*	PDD Initiative Type
Dave Harrington / Roxxie Brochu	Shelina Mohammed	NET-APPS	N/A	Project (1 year)

Negative Revenue Adjustment (NRA) and/or Non-Compliance Penalties/Fees Risk	Project Type*	Classification of Investment*	Special recovery of costs (if applicable)
No established fines, however potential to receive a penalty from CT PURA if functionality is not live in 2024	Apps – Business Funded Project	Mandatory Compliance	Capex Defferable Reg. Asset

Requested Start Date*	Requested Delivery Date(s)*	Mandated by Statute or Regulatory Order (PURA/NERC/CIP)*	Identify the specific Statute or Order	Customers Affected by Project
2024-01-01	2025-05-31	Yes	t. 22-08-02 Order 16 and Motion 16 ruling, Dkt 23-08-03 Orde	Electric

Business Objectives/Goal of the Project*

The goal of the project is to modify SAP systems, including rates and workflow, to accommodate a new option that for customers with pre-existing solar to enable them add on additional solar through the Residential and Non-residential Renewable energy Solutions program using the Netting configuration and tariff. (Note, this was originally one of the many enhancements in the PDD-AGR-NET-22-CS-XX-Net Metering RRES Changes-UIL but it was broken out into its own carry-over PDD here, and expanded to include NRES as Phase 2).

Description*

The scope of this project is for both Residential (RRES) and Non-Residential (NRES) projects. The regulatory due date for the RRES implementation is by 10/1/2024. IF NRES can be designed to meet this same due date, the work should be combined. If it cannot, it should be pursued as a phase 2 (NRES does not yet have a regulatory due date). The scope entails IT system changes to rates (residential and non-residential), billing and workflow to enable the simultaneous application of both Netting functionality and Buy-All functionality. The outcome will be that customers with existing solar on Rate NE would need to be removed from Rate NE and re-enrolled in the RRES (or NRES) Netting tariff for their old PV system, and their new PV system would also be enrolled in the RRES (or NRES) Netting Tariff. Banked netting credits from the old system would be cashed out to the customer. Both systems could be metered together to compensate the customer for netted production on bill. The old system, however, would not be eligible for the direct payment of RECs and/or adders; while the new system would still be eligible for the payment of RECs and/or adders.

Justification*

For RRES, this is regulatory requirement from the RRES Year 2 Decision dated November 2, 2022 in Docket 22-08-02, per Order No. 16, which initially asked the utility to file a proposal to implement a solution to achieve these outcomes, in response to written comments filed by Tesla.
6/30/23 - UI filed compliances with Order 16, providing a more cost effective alternative to Tesla request, estimating that system improvements to accommodate participation of existing PV systems within the RRES Netting tariff would cost approximately $99,000 and take about seven months after the start of implementation. UI Compliance, Attachment 1, June 30, 2023, p. 1. UI notes that based on resource utilization and regulatory approval timelines, the earliest estimated project implementation would be mid-2024. UI Compliance, Cover Ltr., June 30, 2023, p. 2
7/19/23 - PURA Ruling 2 on Motion No 16: authorizes UI to begin implementing the solution outlined in Motion No. 16 and its June 30, 2023 Compliance to enroll customers with existing PV systems under the Netting tariff in UI's territory.
For NRES Docket 23-08-03 has the below compliance orders related to this requirement:

Estimated Annual Benefits ($'s) & Benefit Description*
(Information related to benefits must be collected for all projects, despite the project purpose/justification)

Customer satisfaction

Impact if this project does not get implemented

If not implemented there is a risk regulations getting changed
Out of Compliance with CT PURA requirements
Risk of Potential Fine for noncompliance with regulatory requirement

Dependencies with other Ideas and projects*

has dependancy on completion of a pre-requisit non bypassable charge IT project , PDD-AGR-NET-22- CS-11-Net Metering Non By Charge-UIL, which will deliver functionality that must be in place prior to system implementation

Comments: Include Issues, Risks, Constraints, Technical Solution thoughts, Problems and/or other considerations

Potential resource constraints with testing and testers and conflicting/ overlapping projects (overlapping RRES NBC project, RRES enhancement projects use common resources, outsourced IT project management by Cognizant may need to be revisited and managed to ensure project management tools are being effectively utilized to manage project milestones and deadlines In addition, we have identified challenges with the IT vendor (Wipro) in previous related projects that invovle SAP programming. Identified challenges include: Lack of identified Wipro Project Manager to manage and oversee programming adherence to business requirements, resolution of defects and move to production, Multiple errors and defects in programing identified prior to completion of unit/functional testing as well as in UAT testing, and delays in correcting errors/defects.

PRJ-004171

UI CX Digital Journey

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Definition Document

UI CX Digital Journey

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-004171	Common	Paterson, Craig	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Customer Service	Customer Service Technology	IP3 Financial Execute	Ongoing	Dec 2024

Project description:

Driving exceptional customer satisfaction by delivering seamless digital experiences for customers through innovation, operational efficiency and personalized interactions.

Project Scope:

- Expand the launch of Moving Home, Outage and New Connections journeys across remaining Opcos;
- Redesign of new high-volume digital journeys including Energy Usage and control, Customer requests and Collections;
- Increase mobile payments with the launch of Apple Pay and expand launch of Google Pay;
- Offer self-service tools on the Web and App with Webchat/Chatbot and an improved support center/site search;
- New Mobile App with critical functionality to support the increasing mobile customer base of > 1 Million;
- New AMI powered Energy Manager platform to provide personalized energy usage and insight to mitigate customer calls and complaints;
- Drive Google traffic to new Digital tools with enhanced Search Engine Optimization (SEO);
- Launch push notifications in the mobile app to proactively communicate to customers;
- Increased Telephony deflection tactics by introducing direct SMS links to digital tools;
- Introduce a new my account registration tool for CSR's to drive customer sign-ups.

Project Benefits:

- Moving Home - from 9% self-service to 48% self-service
- New Connections - from 24% self-service to 41% self-service
- Outage Management/Alerts - from 79% to 84% enrollment
- Mobile App downloads - from 1.13M to 1.4M
- Online My Account - from 68.2% to 72% enrollment
- E-billing - from 45.2% to 50% enrollment
- Digital Payments - from $2.34B to $2.5B collection

Project Risks and Mitigation Plan:

Projects were committed to in previous rate cases, so delays could result in fines, penalties and reputation damage. Mitigation plans are to ensure collaborative portfolio management

Risk of No Action:
- Increased cost to serve and slower pace of self-service channel adoption;
- Need to hire additional resources/agents to cope with increased call volumes;
- Deterioration of Customer Satisfaction (CSAT) and Net Promoter Score (NPS).

Ultimately, customers will need to continue to call for more complex issues and not be able to self-serve. This will likely increase operational cost as our customer's needs continue to grow

Project Alternatives:
Altenatives to enhacements would be the status quo of each of these journies, leading to outcomes in the "risk of no action" area

Basis for Project Estimates
Costs are based on estimated number of contracted and internal labor hours multiplied by assumed hourly rates. The hours are based on vendor estimates and on past efforts of similar scope and complexity where applicable.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 27**	$ 27	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 740**	$ 740	$ -	$ -	$ -	$ -
# Internal - Non-AC	**$ 19**	$ 19	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 786**	**$ 786**	**$ -**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 905	$ 905	$ -	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

Project Definition

PDD Name - Following Agreed to Naming Convention	Clarity Project Name - IT Only	PDD Submitter
PDD-AGR-2024-NET-CS-06-Digital Journey EBD transformation continued-AGR_All	PDD-AGR-2024-NET-CS-06-Digital Journey EBD transformation continued-AGR_All	Ken Turner

Business Director (BD)	Business Process Liaison (BPLS)	Business Area Coordinator (BAC)	IT Portfolio Lead (ITPL)	IT Application Manager (AM)
Craig Paterson	Ken Turner	David Harrington	Asier Santacolma Cue	Sarath Babu Garikapati

Business Area*	IT Area*	Project Type*	Classification of Investment*	Purpose
NET APPS Networks Customer Service	NET-APPS	Apps – IT Funded Activity Line	Strategic	Strategy

Requested Start Date*	Requested Delivery Date(s)*	Quantity of Users*	Regulatory (PURA/NERC/CIP)		
2024-07-01	2026-06-30	High			

Business Objectives/Goal of the Project*

Description*

The Customer Journey Redesign Project will reimagine how customers interact with the company's most critical touchpoints. 2022 JD Power and Associates residential satisfaction studies and the Voice of the Customer (VOC) program have highlighted the need to further develop key customer journeys. Through the development of a matrix, key journeys for redesign have been identified and prioritized based on the following criteria: customer satisfaction, cost reduction, strategic value, and complexity.

Those journeys will include:
•Redesign the New Connections Journey Phase 1 (UI and CMP)
•New connections phase 2 (NY, UI, CMP)
•Redesign the Outage Experience Phase 1 (NY and UI)
•Outage experience phase 2 (CMP, NY, UI)
•Redesign the billing end to end journey
•Redesign the Move-In/Move-Out journey Phase 2
•Redesign the App experience
•Redesign Customer Contact journey and strategy (call reduction)

Justification*

Estimated Annual Benefits ($'s) & Benefit Description*
(Information related to benefits must be collected for all projects, despite the project purpose/justification)

Impact if this project does not get implemented

Dependencies with other Ideas and projects*

Comments: Include Issues, Risks, Constraints, IT Solution thoughts, Problems and/or other considerations

PRJ-001518

UI Energy Manager

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Definition Document

UI Energy Manager

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-001518	Electric Distribution	Paterson, Craig	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Customer Service	Customer Service Technology	IP4 Change	Jan 2024	Feb 2025

Project description:
To consolidate three Energy Manager/Analyzer platforms across 7 companies onto one platform to optimize the customer usage experience. Consolidating these portals will achieve economies of scale within operational SAAS fees, and support and maintainence for these portal in production vs current planned activity which is spread out across the operating companies.

Project Scope:
We will consolidate the Energy Manager/Energy Analyzer platforms for both residential and commercial customers into a common platform across the CMP, UIL, NYSEG and RG&E operating companies. As part of that process, we will retain the current features and functionality in the existing platforms (like Home Energy Reports, access to Energy Marketplace, Green Button Download and connection to Energy Star Portfolio Manager). We will also upgrade the existing user experience to allow for more intuitive use, APIs and widgets that can display in a mobile app or on various locations in My Account, connection to the CRM portal and ease of use for account managers. Approved project on LTO redoing for split between UIL OPCOS

Project Benefits:
Reduction in call propensity related to billing and usage calls, increase in customer satisfaction through an easier abillity to self serve.

Project Risks and Mitigation Plan:
Dependencies on key business SME's to support the project to meet required quality and in turn key project timelines and milestones.

Working with Key business stakeholders to determine the right quantity and quality of resources to deliver the project as quickly as possible.

Risk of No Action:
This project has been spoken about in multiple dockets within UI, and is already in flight, and vendor specific setup fees paid for. If no action is taken here it would lead to wasted investments.

Project Alternatives:
N/A this project is already committed to.

Basis for Project Estimates
Actual spend from previous opcos and years.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 42**	$ 42	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 47**	$ 28	$ 19	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 2**	$ -	$ 2	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ 2**	$ -	$ 2	$ -	$ -	$ -
Total	**$ 93**	**$ 70**	**$ 23**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 703	$ -	$ 703	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

Project Definition

* Required Fields

PDD Name - Following Agreed to Naming Convention	Clarity Project Name - IT Only
PDD-NET-2018-CS-27-EnergyManager RFP-AGR	AGR-2022-NET-CS-27-EnergyManager RFP

PDD Submitter	Business Area*	Business Owner (L1)	Primary Business Connector (L2)	IT Manager (L1)	Primary IT Connector (L2)
Karen Rose	NET APPS – Customer Service	Beth Nowack Cowan	Tracy Maus	Carl Young	Sarath Garikapati

List other PDDs that could potentially be bundled for CAPEX funding	Project Type*	Classification of Investment*	Purpose
NETAPPS-2020-PDD-SG-###-MDMS Upgrade UIL AMI Solutions RFP (NY AMI RFP #3) AMI CRM RFP (NY AMI RFP #10) AGR-2020-NET-IT (SG)-18 Itron MDM Upgrade to 9.0 CMP	Apps – Activity Line (IT or IT/Business funded)	Efficiency	Efficiency

Other Impacted Business Areas, if known or applicable	
NET APPS – SmartGrids	
NET APPS – Digital	NET APPS – Electric & Gas Operations

Regulatory (PURA/NERC/CIP)	Docket Number*	Regulatory Due Date*	Quantity of Users*	IT Area*	Requested Start Date*	Requested Delivery Date(s)*
Yes			High	NET-APPS	2021-01-01	2022-06-30

Business Objectives/Goal of the Project*

To consolidate three Energy Manager/Analyzer platforms across 7 companies onto one platform to optimize the customer usage experience.

Description*

We will consolidate the Energy Manager/Energy Analyzer platforms for both residential and commercial customers into a common platform across the CMP, UIL, NYSEG and RG&E operating companies. As part of that process, we will retain the current features and functionality in the existing platforms (like Home Energy Reports, access to Energy Marketplace, Green Button Download/Connect and connection to Energy Star Portfolio Manager). We will also upgrade the existing user experience to allow for more intuitive use, APIs and widgets that can display in a mobile app or on various locations in My Account, connection to the CRM portal and ease of use for account managers.

Additional details include:
- Use existing data files for each company as much as possible although if there is opportunity to standardize the data flow we will do that standardize integration of data from exisiting systems into the EM platform with an eye to flexibility with systems upgrades, etc.
- Display usage for electric only customers, gas only customers, or customers with both services.
- Ability to display multiple meters on a single account.
- Ability to display multiple accounts for one customer.
- Graphs/charts that show interval data (15 minute or hourly) views for residential and small business (non-demand) customers.
- Ability to display usage by $ or kWh. Include temperature data. Include current and historical data.
- Ability to compare savings based on actual usage if customer switched to different rates (time of use rates and what if analysis)

Justification*

Company Objectives:
- Increase self-service adoption and products saturation (eBill, AutoPay, Alerts)
- Support customer satisfaction (Awareness of digital services is linked to higher customer satisfaction*).

*JD Power and Associates, 2019 Utility Digital Experience Study
- Achieve global target of 71% self-service by 2021
- Achieve 2020 Saturation targets of 4.9% Usage Alerts (CMP)
- Meet regulatory requirements on sharing usage information to customers

Estimated Annual Benefits ($'s) & Benefit Description*
(Information related to benefits must be collected for all projects, despite the project purpose/justification)

We estimate we would save approx. 41% in hosting fees by combining Energy Manager into a common and more technically up to date residential and business platform. We would also have an opportunity to simplify and consolidate operational processes internally as a result of a common platform. This savings would further reduce the actual operating cost of the program and improve efficiency and business response to the customer.

Impact if this project does not get implemented

We will not achieve company objectives and targets and risk regulatory compliance in multiple states.

Dependencies with other Ideas and projects*

There is a direct dependency with NY AMI, with a regulatory requirement that when AMI meters go live in the NYSEG and RG&E territories Energy Manager will be available and operational for all customers (prior to April 2022)
NETAPPS-2020-PDD-SG-###-MDMS Upgrade-UIL: We require completion of this project to correct the defect in the UIL MDM system data handling process so we can display hourly and 15 minute interval data to customers. This will align the UIL customers experience with the CMP and NYSEG data presentation. We currently collect a tariff at UIL to display hourly or 15 min interval data to customers.
AMI solutions RFP (NY AMI RFP #3): There is a direct dependency to this project as it is building out the NY MDM system which will need to share usage data with the Energy Manager platform in order for the platform to perform. Scheduled

Comments: Include Issues, Risks, Constraints, IT Solution thoughts, Problems and/or other considerations

Risks:
NY AMI is not approved--we have options to provide usage information for non-AMI customers at RG&E and NYSEG if that's the case. Would improve that customer experience as they don't receive usage information on a digital platform currently.
NY AMI timeline. Currently required to have NY platform available for NYSEG and RG&E by April 2022. Will need to manage to that date and be aware if it moves up.
Timeline of MDM and SAP system upgrades during build and integration: we need to be mindful and aware of any IT plans to upgrade existing SAP and MDM systems and ensure that our data feeds are preserved and considered during this project
NETAPPS-2020-PDD-SG-###-MDMS Upgrade-UIL: If this project is not approved, we will not be able to align the usage interval display to all Avangrid customers. If approved, we also need to be aware of the development timeline (completion estimate 4Q2020).
NY AMI CRM system updates: Will need to align with this team to ensure the CRM platform at NYSEG and RG&E is operational with the Energy Manager launch.
CMP MDM Upgrades and Migration to Orange: We need to align the timelines of these projects to ensure the MDM upgrade is complete prior to the CMP Energy Manager upgrades

Considerations:
Energy Analyzer is integrated into the existing UIL My Account platform. With the change to the Uplight platform we will need to consider the removal of the Energy Analyzer messaging in those content zones either with direct replacement of those widgets with new widgets or restructuring the UIL My Account platform. This work will involve internal IT resources.

PRJ-004495

UI EV Regulatory Rate Requirements

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Definition Document

UI EV Regulatory Rate Requirements

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-004495	Common	Robie, Erik	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Customer Service	Customer Service Technology	IP3 Financial Execute	Oct 2024	Sep 2025

Project description:

This PDD was submitted for the purpose of establishing new regulatory EV Rates established by PURA (CT) in the reference dockets 17-12-03RE04, 21-08-06, and 22-08-06. 1) An EV Level 2 Charger Lease Tariff, 2) An EV Rate Rider for public Level 2 and DCFC chargers.

Project Scope:

(1) Establish an on-bill Tariff for UI owned and operated Level 2 Chargers at MUD's and leased to customers on a monthly basis. This new Tariff would be very similar to UI's existing Water Heater Rental Tariff. Rates would be a fixed monthly fee with no other metering interface requirements for volumetric or demand billing. The Tariff would be an additional installation under existing BP's and CA's in SAP. UPDATE: The manual billing portion of this tariff was completed and moved into production on February 1, 2023. The workflow automation for this tariff is on hold and being carried foward to 2025. UI and Eversource have no customers on this tariff and will seek PURA approval to end this program.

(2) Establish an on-bill Tariff for publicly owned and operated Level2 an DCFC EV chargers that provides variable volumetic and demand cost components based on charging station utilization rates. For the purposes of the Tariff, Charger Utilization would be determined by calculating Load Factor for each Charger. Low load factors would have a higher volumetric charge and lower demand charges and vice versa. For example, a load factor of 0% would be billed at 100% volumetric and 0% demand. A load factor of 30% or more would be billed 100% demand and 0% volumetric. UPDATE: The manual billing portion of this tariff was completed and moved into production on April 1, 2024. The workflow automation for this tariff is being carried foward to 2025.

Project Benefits:

PURA mandated. Docket numbers 17-12-03RE04, 21-08-06, 22-08-06.

Project Risks and Mitigation Plan:

The risks associated with EV Regulatory Rate Requirements are minimal. Both rates have been designed and moved into production but are only available through an initial manual rate change. A process is in place with the Manager of Pricing, Manager of EV Programs and Special Billing to review and approve customer requests for rate changes. The SAP automated work flow design and implementation in 2025 will provide for full availability of rate changes and eliminate the need for manual rate changes.

Risk of No Action:
Discontinuation of PURA-mandated project without a foundation will expose UI to disciplinary action and/or penalties that do not have a good basis for appeal. Potential $10k/day/Order (could be interpreted as fine per customer).

Project Alternatives:
There are currently no Project Alternatives. Any future Orders or mandates by PURA related to the EV Program will be the determinate factor in any future Project Alternatives.

Basis for Project Estimates
Project estimates are calculated based on estimated number of contracted and internal labor hours multiplied by assumed hourly rate. The hours are based on historical projects of similar scope and complexity.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ -**	$ -	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 510**	$ 144	$ 366	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 114**	$ 31	$ 83	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 625**	**$ 175**	**$ 449**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 800	$ -	$ 800	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

Project Definition

PDD Name - Following new Naming Convention*	Project Number - CS PMO Only	PDD Submitter*
PDD-AGR-NET-2022-CS-01-EV Regulatory Rate Requirements 2024 Update-UI		Rick Rosa

Business Area*	Business Portfolio Leader (CS Sr Team)	Business Process Director	Business Process Liaison (CS Functional Area Mgr)	CS PM	Number of Users*
NET APPS Networks Customer Service	Erik Robie	Erik Robie	Rick Rosa	Rick Rosa	20

CS Project Management Office (PMO)	CS Center of Excellence (COE) Lead	IT Area*	IT/OT*	PDD Initiative Type
David Harrington and Roxxie Brochu	Shelina Mohammed	NET-APPS	N/A	Program (multi year)

Negative Revenue Adjustment (NRA) and/or Non-Compliance Penalties/Fees Risk	Project Type*	Classification of Investment*	Special recovery of costs (if applicable)
Discontinuation of PURA-mandated program without a foundation will expose UI to disciplinary action and/or penalties that do not have a good basis for appeal. Potential $10k/day/Order (could be interpreted as fine per customer)	Apps – Business Funded Project	Mandatory Compliance	Currently Deferred Regulatory Asset

Requested Start Date*	Requested Delivery Date(s)*	Mandated by Statute or Regulatory Order (PURA/NERC/CIP)*	Identify the specific Statute or Order	Customers Affected by Project
2022-05-18	2025-07-01	Yes	17-12-03RE04, 21-08-06, 22-08-06, 23-08-06	Electric

Business Objectives/Goal of the Project*

This PDD is updated to reflect work completed, work to be carried foward to 2025 and regulatory mandate revisions. The original PDD was submitted for the purpose of establishing 3 new regulatory EV Rates established by PURA (CT) in the reference dockets. 1) An EV Level 2 Charger Lease Tariff, 2) An EV Rate Rider for public Level 2 and DCFC chargers and 3) an Multi-Unit Dwelling (MUD) EV Charging Variable Peak Pricing and On-Bill EV Charging.

Description*

(1) Establish an on-bill Tariff for UI owned and operated Level 2 Chargers at MUD's and leased to customers on a monthly basis. This new Tariff would be very similar to UI's existing Water Heater Rental Tariff. Rates would be a fixed monthly fee with no other metering interface requirements for volumetric or demand billing. The Tariff would be an additional installation under existing BP's and CA's in SAP. UPDATE: The manual billing portion of this tariff was completed and moved into production on February 1, 2023. The workflow automation for this tariff is on hold and being carried foward to 2025. UI and Eversource have no customers on this tariff and will seek PURA approval to end this program.

(2) Establish an on-bill Tariff for publicly owned and operated Level2 an DCFC EV chargers that provides variable volumetic and demand cost components based on charging station utilization rates. For the purposes of the Tariff, Charger Utilization would be determined by calculating Load Factor for each Charger. Low load factors would have a higher volumetric charge and lower demand charges and vice versa. For example, a load factor of 0% would be billed at 100% volumetric and 0% demand. A load factor of 30% or more would be billed 100% demand and 0% volumetric. UPDATE: The manual billing portion of this tariff was completed and moved into production on April 1, 2024. The workflow automation for this tariff is being carried foward to 2025 due to uncertainty regarding the Company's investment in the EV Program pending Motions to PURA to modify program cost recovery. Program budgets are significanlty constrained for 2024.

(3) Establish an on-bill Tariff for Level 2 and/ or DCFC chargers installed at MUD's that provides for day ahead variable peak pricing. In addition, customers residing at MUD's can elect to have their EV charing costs billed to thier UI Account. UPDATE: IN DOCKET NO. 22-08-06, PURA RULED IN FAVOR OF THE COMPANY'S POSITION THAT THIS TARIFF WAS INFEASIBLE. THIS TARIFF IS NO

Justification*

CT PURA Regularory Requirements

Estimated Annual Benefits ($'s) & Benefit Description*
(Information related to benefits must be collected for all projects, despite the project purpose/justification)

There are no benefits to the Company. All benefits from these rates defer to customers and specifically EV Charging Equipment Owners/ Operators.

Impact if this project does not get implemented

Potential Fines: Refer to the Non-Compliance Penalties/ Fines Section
Out of Compliance: Refer to the Non-Compliance Penalties/ Fines Section
Change in Regulations: The Regulatory Authority Could Modify Orders Related to the Project Resulting in Changes in Scope.

Dependencies with other Ideas and projects*

Comments: Include Issues, Risks, Constraints, Technical Solution thoughts, Problems and/or other considerations

Please note: While manual billing of item 2 is complete and in production, no charges have been billed by Cognizant and nothing has been paid. Therefore these costs are still shown in this updated PDD. Internal Testing Hours are reduced base on testing completed on manual billing.

PRJ-002110

UI - Make Ready CAP

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Make Ready CAP

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002110	Electric Distribution	Mitchell, John	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Third Part Pole Attachments/Replacem	IP4 Change	Program - Ongoing	Program - Ongoing

Project description:

This program encompasses the field review, data collection, data analysis, development of engineering solutions, and make ready construction associated with proposed pole attachment locations in the communication space. The third party pole attachment application process has compliance timeframes established by the Connecticut Public Utilities Regulatory Authority (PURA).

Project Scope:

The Company receives attachment applications from wireline and wireless communcations companies. The processing of these applications includes a field survey of the poles, collection of the survey data, analysis of existing conditions of the pole, analysis of conditions with the additional attachment, and development of a design solution that will provide space for the new attachment. These design solutions vary based on the town and current state of a pole prior to attachment. The majority of the resulting solutions are to bring the existing conditions into NESC compliance. The amount of work required, can vary based on the location of a pole and the number of existing attachments on a pole.
Financial requirements for this program are volume sensitive and highly volatile. Attachers do not typically share forecasts years in advance of their build outs.

Project Benefits:

This project is mandated by the CT Regulatory Authority to allow Third party attachers on pole lines in the communication space and supports broadband expansion within the UI service territory.

Project Risks and Mitigation Plan:

The risks associated with this program are as follows:
1) This program and its annual requirements are volume sensitive.Forecasts are volatile and are changed frequently by attachers. This volatility makes resource planning challenging and often hard to retain trained contractor resources.
2) Make-ready engineering and construction can be dependent on entities outside of UI. UI coordinates with these entities, but backlog can develop and delays increase.

UI works will attachers and all other entities to insure that overall broadband expansion plans are not delayed. Work is prioritized and coordinated so that attachers builds are meeting their build timelines.

Risk of No Action:

The third party pole attachment application process has compliance timeframes established by the Connecticut Public Utilities Regulatory Authority (PURA). If UI does not effectively comply with this process and timeframes established by PURA, penalties can be imposed.

Project Alternatives:
There are PURA mandated and approved processes in place with regard third party pole attachment applcations. There are a various alternatives within theapproved and mandated third party pole attachment application process in CT that attachers may select from such as Traditional Application Process, Self-Help Engineering, and One Touch Make Ready (OTMR). Attachers have not selected the Self-Help Engineering or OTMR application processes to date. All applications follow the Traditional application process.

Basis for Project Estimates
CAPEX requirements for this program are volume sensitive and highly volatile. Attachers do not typically share forecasts years in advance of their build outs.
Estimates are developed by evaluating:
1) the forecasted volume at the time of annual budget development
2) the resources required to address the forecasted volume and backlog from prior years
3) the expected availability of internal and external resources and how much engineering and construction can be completed
4) PURA mandated timeframes
5) Review of historical spend per volume of poles

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 585**	$ 74	$ 124	$ 126	$ 129	$ 132
# CIAC	**$ -545**	$ -545	$ -	$ -	$ -	$ -
# External Services	**$ 19,420**	$ 3,837	$ 3,600	$ 3,896	$ 3,994	$ 4,094
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 10,217**	$ 1,215	$ 2,184	$ 2,228	$ 2,272	$ 2,318
# Internal, Overheads	**$ 5,286**	$ 1,420	$ 922	$ 960	$ 981	$ 1,002
# Materials	**$ 7,330**	$ 1,147	$ 1,500	$ 1,530	$ 1,561	$ 1,592
# Overheads - External	**$ 9,647**	$ 1,943	$ 1,846	$ 1,911	$ 1,952	$ 1,994
Total	**$ 51,939**	**$ 9,092**	**$ 10,176**	**$ 10,652**	**$ 10,889**	**$ 11,131**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 50,207	$ 7,360	$ 10,176	$ 10,652	$ 10,889	$ 11,131

Note: 2024 Plant Additions includes the entire calendar year

UI
An Avangrid company

UI- MAKE READY CAP

All Towns

WBS: UI-U0057

Index

1. Program Description 3
2. Need Statement 3
3. Work Type 4
4. Engineering 5
5. Forecasted CAPEX 5

1. Program Description

This program encompasses the field review, data collection, data analysis, development of engineering solutions, and make ready construction associated with proposed pole attachment locations in the communication space. The third party pole attachment application process has compliance timeframes established by the Connecticut Public Utilities Regulatory Authority (PURA).

2. Need Statement

The third party pole attachment application process and the associated work operations that support the process are mandatory. Third Party Attachment companies that have been certified by PURA to offer wireline or wireless services and have also executed Pole Attachment License Agreements with United Illuminating may submit applications to attach to poles. The Connecticut Public Utilities Regulatory Authority (PURA) encourages broadband expansion. The Authority has established compliance timeframes for the engineering and construction phases of the third party pole attachment application process. Failure to allocate adequate resources and complete the application process milestones as mandated may result in penalties.

The processing of these applications includes a field survey of the poles, collection of the survey data, analysis of existing conditions of the pole, analysis of conditions with the additional attachment, and development of a design solution that will provide space for the new attachment. These design solutions vary based on the current state of a pole prior to attachment. The majority of the resulting solutions are to bring the existing conditions into National Electric Safety Code (NESC) compliance. The amount of make-ready construction work required can vary based on the location of a pole and the number of existing attachments on a pole.

Funding requirements for this program are volume sensitive and highly volatile. Attachers do not typically share forecasts years in advance of their build outs. The Company conducts quarterly meetings with all Attacher companies and typically will receive six months to one year of forecast. These forecasts can change quarter to quarter, as Attacher companies business plans change.

3. Work Type

There are two phases of work associated with the third party pole attachment applicationmake-ready process; (1) Survey/Engineering Phase, (2) Make-Ready Construction Phase.

1. Survey/Engineering Phase:
    - Field Survey – Proposed pole attachment locations are surveyed. The survey is performed with an industry standard field survey tool that records all attachments and essentially models the pole as it currently exists in the field. The surveyor will add annotations to further reflect existing conditions.
    - Design Analysis/Solution Development – The existing conditions of the pole are analyzed and loading results and compliance with NESC and UI Standards are evaluated. The new pole attachment is then modeled. Loading results and compliance with NESC and UI Standards are evaluated again. Engineering solutions are developed to allow the Third Party Pole Attacher to attach safely and within NESC guidelines.
    - Concurrence – UI, the Electric Distribution Company (EDC), and Frontier, the Incumbent Local Exchange Carrier (ILEC), must agree upon a comprehensive solution; i.e. one that addresses the power and communications gain. The process by which this mutual agreement is reached is a concurrence meeting. Each entity notifies the other when an application is ready for concurrence and that application will be discussed at a weekly concurrence meeting.
    - Work Order Creation – Once concurrence has been reached, work orders are written to capture the work operations required to create the space for the new attachment.
2. Make Ready Construction: Work orders are released to construction crews to make the pole ready for the new attachment. From the EDC perspective, the typical work operations related to make-ready construction include:
    - Pole Replacements – replace the existing UI custodian poles for additional height or class (circumference/width) due to clearance or loading requirements

- New Pole Placements – new pole locations are required, typically mid-span, to address existing clearance issues and loading conditions
- Guying/Anchors – replace existing guying/anchors that are inadequate and/or place additional guying/anchors to accommodate loading conditions
- Attachment Shifts – movement of power attachments (i.e. mainly secondary wires) to create proper NESC clearances within the power gain and between the power and communications gain.

4. Engineering

Refer to Section 3, Work Type for an explanation of the the engineering phase.

5. Forecasted CAPEX

The following are the forecasted capital expenditures for third party pole attachment application make-ready:

2024	2025	2026
$8,476,897	$10,176,129	$10,651,530

2024

In 2023,the Company received third party pole attachment applications totaling 33,915 poles/attachments. This volume is unprecedented and triple the average annual volume UI had received over the previous five years (2018-2022). Due to low volumes of applications in received in 3Q and 4Q2022, engineering contractor resources being utilized were minimal. To address this large increase in volume, the Company had to retain additional engineering contractor resources. Contractor ramp-up commenced in 2Q2023 and was still in progress into 2024. The amount of work available for make-ready construction was constrained during this time. They historical annual CAPEX expenditures are approximately $9-10M. Given the delay attributed to the ramp-up and training of contractor resources, the forecasted amount of completed make-ready construction work will be less than the historical average.

2025 & 2026

By 4Q2024, the contractor engineering resources will be in place, trained and steadily producing make-ready construction work orders. The Company is forecasting the historical average of approximately $10M. Note: the amounts required in 2025 and 2026 will be determined by the pace at which the engineering solutions are developed. Amounts may fluctuate depending on the engineering contractors' productivity and ability to retain/supplement trained resources.

801819.01

Water Heater Lease

Sections

1. Project Summary

Water Heater Lease

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	801819.01	Electric Distribution	Robie, Erik	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Customer Service	Other Customer Programs	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:

Provide water heater leases to UI customers for a monthly payment. Through this program, UI customers are able to rent water heaters and conversion burners for a monthly fee. Some maintenance is done in house by licensed UI electrictians but UI also subcontracts to a local company for installs, replacements, and removals.

Project Scope:

In 2025 we expect the following activity:
Replacements: 364 replacements at an average cost of $2,600.00, total of $946,400. Estimating a 4% increase in pricing from vendor for 2025.
Removals: 229 removals at an average cost of $391.00, total of $89,539.
Contracted Program Fees: $322,500 This program is pending a response to Order 33 of Docket 22-08-08. This forecast does not account for any decision or changes that would take place based on PURA's ruling.

Project Benefits:

This is a regulated program in Connecticut that provides UI customers with 24/7 support on the maintenance of their UI leased Water Heater. This program is tariffed by CT under CPUCA No. 447 and would would require PURA's approval if we were to make any adjustments to our fulfilment of the program.

Project Risks and Mitigation Plan:

The program continues to operate at a shortfall due to the current rates being insufficient to cover the operating costs making this the largest risk. The company is exploring whether we are allowed to increase rates for the program without a rate proceeding and awaited PURA approval on our submitted phase out plan. The proposed rate increase is $6/month each year for the next three years to bring the program out of the red. While we wait for PURA's decision on the phase out plan, UI is still contractually obligated to repair and replace assets already deployed in the field. The program is currently closed to new customers. UI has not explored whether we have an option to not replace units that are unrepairable.

Risk of No Action:

Failure to operate the program could result in financial penalties, reputational damage and possible safety concerns. Program participants could potentially be left without hot water if a repair or replacement is not completed in a timely manner. This would likely result in customer complaints. As this program is tarriffed under CPUCA No. 447, failure to operate the program could result in PURA imposing financial penalties for not complying with the tariff.

Project Alternatives:

Per Docket 22-08-08 Order 33, UI was ordered to file a comprehensive phase out plan of the water heater rental program by June 1, 2024. UI has complied with this order and is awaiting PURA's ruling. UI proposed selling off its existing fleet to either a qualified third party administrator, directly to customers or a combination of both. UI stated any of its fleet not able to be sold would need to be removed from customer premises.

Basis for Project Estimates

In 2025 we expect the following activity:
Replacements: 364 replacements at an average cost of $2,600.00, total of $946,400. Estimating a 4% increase in pricing from vendor for 2025.
Removals: 229 removals at an average cost of $391.00, total of $89,539.
Contracted Program Fees: $322,500 This program is pending a response to Order 33 of Docket 22-08-08. This forecast does not account for any decision or changes that would take place based on PURA's ruling.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ -**	$ -	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 2,476**	$ 489	$ 468	$ 487	$ 506	$ 527
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 13**	$ 13	$ -	$ -	$ -	$ -
# Materials	**$ 4,212**	$ 812	$ 801	$ 833	$ 866	$ 901
# Overheads - External	**$ 11**	$ 11	$ -	$ -	$ -	$ -
Total	**$ 6,714**	**$ 1,325**	**$ 1,269**	**$ 1,320**	**$ 1,372**	**$ 1,427**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 6,745	$ 1,357	$ 1,269	$ 1,320	$ 1,372	$ 1,427

Note: 2024 Plant Additions includes the entire calendar year

PRJ-001236

UI Comprehensive Area Studies

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Overall Program Report
    b. Program Report - Ash Creek Circuit 2673
    c. Program Report - Ash Creek Substation Project 1
    d. Program Report - Ash Creek Substation Project 2
    e. Program Report - Hawthorne Circuit 2682
    f. Program Report - Hawthorne Circuit 2683
    g. Program Report - Indian Well Substation
    h. Program Report - Mix Ave Substation
    i. Program Report - New Congress Circuit 2535
    j. Program Report - New Congress Circuit 2536
    k. Program Report - North Haven Substation
    l. Program Report - Quinnipiac Circuit 1542
    m. Program Report - Water St Circuit 1526

UI Comprehensive Area Studies

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-001236	Electric Distribution	de Andrade Cruz, Lucas	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Planning & Coordination	Capacity	IP1 Originate	Program/As Spent	Program/As Spent

Project description:

This program consists of capacity projects which were the result of comprehensive area studies. As part of this process, UI conducts an annual capacity review of all substations and circuits to identify and develop solutions to stations and feeders that exceed 90% of their normal ratings or are projected to do so within five years. In the most recent distribution system capacity review, the UI Distribution Planning team identified seven circuits and four substations that surpassed the established criterion (90% of normal rating) and developed 12 discrete projects to address these capacity needs. The outlined project details are general and apply to all 12 projects; however, greater individual project details are available in the program's supporting documentation as part of this binder.

Capacity project list:

- Ash Creek Circuit 2673 (separate project in the capital plan)
- Ash Creek Substation Project 1
- Ash Creek Substation Project 2
- Hawthorne Circuit 2682
- Hawthorne Circuit 2683
- Indian Well Substation
- Mix Ave Substation
- New Congress Circuit 2535
- New Congress Circuit 2536
- North Haven Substation
- Quinnipiac Circuit 1542
- Water St Circuit 1526

Project Scope:

The UI Comprehensive Area Studies budget will fund several capacity projects. The most practical and cost-effective capacity solutions typically involve load redistribution from one circuit or substation to another by utilizing existing circuit ties. A range of solution alternatives were explored to address each identified need. These alternatives were evaluated based on their estimated cost and overall system performance. The following types of system upgrades were considered in this analysis:

Upgrading Conductors: Enhancing the capacity of the circuits.
Establishing New Circuit Ties: Connecting with neighboring circuits.
Transferring Load: Shifting load to neighboring substations.
Developing New Feeders: Utilizing available positions in substations.
Non-Traditional Solutions: Implementing Battery Energy Storage Systems (BESS).

The preferred solutions were selected for their low cost and ability to address all system needs in the area while maintaining the potential for future load growth. All projects and the alternatives analyzed comply with the Avangrid Distribution Planning Criteria.

The outlined project details are general and apply to all 12 projects; however, greater individual project details are available in the program's supporting documentation as part of this binder.

Project Benefits:
Reliability: Enhancing capacity in feeders and substations will help meet reliability requirements by avoiding outages caused by overloads.
Economic Development: The solutions can facilitate the roll-out of beneficial electrification plans such as the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development. This can stimulate economic growth and progress in the region.
Cost Efficiency: the solutions proposed are the least costly when compared with other alternatives.
Accommodation of New Load: The solutions will increase available hosting capacity in feeders and substations, and it will allow for the interconnection of new load, effectively managing the increased demand.
Environmental Impact: Increased capacity can accommodate more distributed energy sources (DER), contributing to a cleaner and more sustainable energy sector.
Safety: By preventing overloading, these projects can enhance the safety of the power grid.

The outlined project details are general and apply to all 12 projects; however, greater individual project details are available in the program's supporting documentation as part of this binder.

Project Risks and Mitigation Plan:
Failing to proactively address capacity issues can significantly hinder economic growth and development by creating bottlenecks that delay new customer connections and slow the implementation of beneficial electrification plans, such as electric vehicle charging infrastructure and the electrification of heating systems. Overloading the system can lead to equipment damage, including insulation breakdown, overheating, and premature wear of feeder cables and switches. This not only reduces system reliability, making the grid more prone to faults and disruptions, but also increases energy losses and inefficiency. Additionally, prolonged overloading poses a serious fire hazard, risking both the feeder and nearby equipment. To mitigate these risks, proper load management and preventive measures are essential. Inaction could lead to compromised safety, reduced equipment lifespan, and increased operational costs.

The outlined project details are general and apply to all 12 projects; however, greater individual project details are available in the program's supporting documentation as part of this binder.

Risk of No Action:
Impact on Economic Growth and Development: Failing to act in advance can lead to capacity bottlenecks, extending the timeline required to accommodate new customer requests. This inaction can negatively impact the economic development of the area, slowing down the roll-out of beneficial electrification plans. These plans include the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development.
Equipment Damage: Overloading can cause damage to substation transformers, feeder cables, switches, and other components. It may lead to insulation breakdown, overheating, and premature wear.
Reduced System Reliability: Overloaded feeders and substations are more prone to faults, which can disrupt power supply and affect reliability.
Increased Energy Loss: Overloaded feeders and substations consume more energy, leading to higher losses and inefficiency.
Fire Hazard: Overheating due to prolonged overloading increases the risk of fire in the feeder or nearby equipment.
In summary, overloading a distribution feeder or substation can compromise safety, reduce equipment lifespan, and increase operational costs. Proper load management and preventive measures are crucial to mitigate these risks. Therefore, taking no action is not a viable option, as it could lead to serious consequences.

The outlined project details are general and apply to all 12 projects; however, greater individual project details are available in the program's supporting documentation as part of this binder.

Project Alternatives:
These alternatives were evaluated based on their estimated cost and overall system performance. The following types of system upgrades were considered in this analysis:
Upgrading Conductors: Enhancing the capacity of the circuits.
Establishing New Circuit Ties: Connecting with neighboring circuits.
Transferring Load: Shifting load to neighboring substations.
Developing New Feeders: Utilizing available positions in substations.
Non-Traditional Solutions: Implementing Battery Energy Storage Systems (BESS).

The outlined project details are general and apply to all 12 projects; however, greater individual project details are available in the program's supporting documentation as part of this binder.

Basis for Project Estimates
Cost estimates were developed using budgetary estimates for capital with a tolerance of -25 to +50 percent.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ -**	$ -	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 1,766**	$ -	$ -	$ 266	$ 1,000	$ 500
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 342**	$ -	$ -	$ 67	$ 153	$ 121
# Materials	**$ 852**	$ -	$ -	$ 200	$ 300	$ 352
# Overheads - External	**$ 334**	$ -	$ -	$ 60	$ 165	$ 109
Total	**$ 3,294**	**$ -**	**$ -**	**$ 593**	**$ 1,618**	**$ 1,082**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 3,294	$ -	$ -	$ 593	$ 1,618	$ 1,082

Note: 2024 Plant Additions includes the entire calendar year

2023-2024 Distribution System Capacity Planning



Index

1.	**EXECUTIVE SUMMARY**	**3**
2.	**INTRODUCTION**	**4**
3.	**METHODOLOGY**	**6**
3.1.	Seasonal Peak Load	6
3.2.	UI System Peak 10-year Forecast	9
3.3.	Power Flow Software	13
3.4.	Non Wires Solutions	15
4.	**2023-2024 RESULTS**	**16**
5.	**ATTACHMENTS**	**19**
5.1.	UI Capacity Program Circuits:	19
5.2.	UI Capacity Program Substations:	19



1. EXECUTIVE SUMMARY

The Distribution System Capacity Planning Study is a process that consists of two different components, the Annual Seasonal Peak Load Review and the Annual System and Substation Load Forecast Analysis.

The Annual Seasonal Peak Load Review is conducted after summer peak load season. It involves a comprehensive analysis of actual peak loads across all UI substations and circuits. The focus is on eliminating false peaks and the impact of switching operations. Once the peak loads for each substation and circuit are determined, the UI planning team conducts alternative solution assessment for those exceeding 90% of their normal rating.

The Annual System and Substation Load Forecast Analysis is updated annually in the first quarter. This process involves the development of a 10-year forecast that aligns with state electrification goals. It leverages statistical models to predict future demand across the UI system and substations. As part of the planning process, the 90/10 extreme weather scenario is utilized to identify substations that require capacity assessment. Any substation projected to exceed 90% of its normal rating in this scenario is flagged for alternative solution assessment.

A range of solution alternatives were considered with the objective of addressing each of the identified needs. These alternatives were evaluated based on their estimated costs and overall impact on system performance.

The results are summarized in Tables 1 and 2 below. The selected solutions offer the most cost-effective alternative and have the ability to address all systems needs in the area while ensuring adequate load-serving capacity margin for future load growth.

Circuit	3-year highest thermal loading	In service year	Cost preferred solution	Year 1	Year 2	Year 3	IP Status	PPM Project ID
HAWTHORNE 2683	103.9%	2028	$5,093,580	$509,358	$3,056,148	$1,528,074	IP2 approved	PRJ-005129
ASH CREEK 2673	98.7%	2026	$24,130	$24,130			IP2 approved	PRJ-005286
NEW CONGRESS 2535	102.8%	2026	$290,501	$290,501	-	-	IP2 approved	PRJ-005134
QUINNIPIAC 1542	99.1%	2028	$148,632	-	$74,316	$74,316	IP2 approved	PRJ-005131
WATER ST 1526	98.2%	2027	$71,040	-	$71,040	-	IP2 approved	PRJ-005130
HAWTHORNE 2682	99.5%	2028	$77,040	-	-	$77,040	IP2 approved	PRJ-005136
NEW CONGRESS 2536	93.2%	2028	$268,642	-	$134,321	$134,321	IP2 approved	PRJ-005135
			$5,973,565	$823,989	$3,335,825	$1,813,751		

Table 1: Results summary of the Annual Summer Peak Review Process



Substation	90/10 Forecast in 2033	In service year	Cost preferred solution	Year 1	Year 2	Year 3	IP Status	PPM Project ID
ASH CREEK (Project 1)	110%	2026	$82,896	$82,896	-	-	IP2 approved	PRJ-005374
ASH CREEK (Project 2)	110%	2028	$2,491,368	$249,137	$1,494,821	$747,410	IP2 approved	PRJ-005375
NORTH HAVEN	102%	2028	$82,896	$6,000		$76,896	IP2 approved	PRJ-005376
INDIAN WELL	94%	2028	$205,910	-	$129,014	$76,896	IP2 approved	PRJ-005378
MIX AVE	95%	2028	$6,000	-	-	$6,000	IP2 approved	PRJ-005377
			$2,869,070	$338,033	$1,623,835	$907,202		

Table 2: Results summary of the Annual System and Substation Load Forecast Analysis

2. INTRODUCTION

The UI Distribution System is composed of lines and equipment operating at medium voltage of 34.5 kV and below.

The service territory of UI encompasses urban, suburban and rural areas, including the cities of Bridgeport and New Haven in Connecticut. The majority of the distribution system load is supplied through conventional overhead radial distribution, which utilizes overhead poles and conductors. In urban and suburban areas, some load is also supplied via conventional underground radial supply.

Additionally, the downtown areas of New Haven and Bridgeport are served by underground secondary network systems. A Secondary Grid System consists of an urban underground electrical system that normally supplies customers at 120/208V. These systems typically consist of four to ten primary cables, transformers, secondary and service cables, and switching equipment. The secondaries of all transformers are interconnected and protected by fuses and network protectors so that a first contingency interruption of any secondary cable does not cause an interruption in another portion of the network. The protection ensures that a first contingency outage in any major part of the network will not cause a customer interruption.

Annually, the planning team assesses the maximum load of each circuit and substation and compares them to their respective ratings. This report presents the optimal solutions for each of the capacity needs at both the substation and circuit level, identified through the capacity review of the distribution system.

All proposed solutions comply with Avangrid Distribution Planning Criteria, which outlines the guidelines for planning the distribution system. This ensures a safe, reliable and cost-effective electricity supply service to Avangrid customers. The criteria recognize that there are thermal and operational limitations to the normal and contingency operation of the system, as well as the need to maintain an appropriate balance between the reliability of the service and the cost of providing that service.

2023-2024 Distribution System Capacity Planning

The Avangrid Distribution Planning Criteria is used both in the annual review process of seasonal peak loads and in substation load forecasting to identify equipment that requires improvements to prevent current or future overloads.

For the circuit capacity study and in accordance with the Avangrid Distribution Planning Criteria, a threshold of 90% is set for the ratio between the actual load and the normal classification of the circuit and substation. This serves as a trigger for an evaluation of capacity needs and is designed to prevent possible overloads by starting important work on the circuit and substation early.

Figure 1 shows an example of a circuit where both the threshold of 90% (depicted by the yellow line) and the normal classification of the circuit (depicted by the red line) are exceeded during the days around the peak load day in 2023.

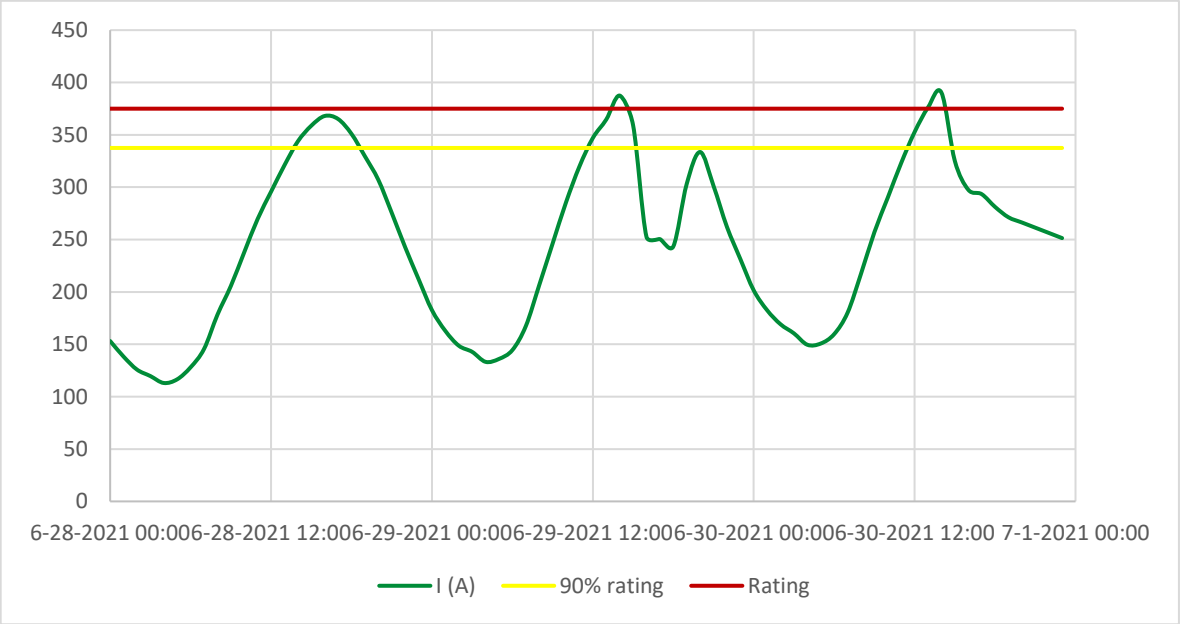


Figure 1: Load on peak days in 2023

Additionally, the Avangrid Distribution Planning Criteria determines that the number of customers per circuit should be limited to 2,000 – 2,500 for 15 kV class distribution feeders.

In the case of a substation with with multiple transformers, the total load on the substation should not exceed the Long Term Emergency (LTE) rating of the smallest (lowest rated) transformer, as per the Avangrid Distribution Planning Criteria.

Additionally, a threshold of 90% is set for the ratio of transformer normal rating to actual loading to flag a capacity needs assessment. This threshold is established to proactively identify potential overloads and commence necessary work ahead of time, a process that typically extends over several years. This proactive approach assists in maintaining the stability and reliability of the power distribution system.



In addition to the aforementioned criteria, all other criteria outilined in AVANGRID Distribution Planning Criteria has been taken into account in all proposed solutions:

- **Load Balancing**: a distribution circuit should be assessed for load balancing when the most heavily loaded phase exceeds the average phase loading by over 15% or if phases are unbalanced by more than 50 Amps in circuits in the 15 kV class.
- **Voltage**: based on ANSI C84.1 Range A, service voltage shall be between +/- 5% of nominal voltage or between 114V and 126V on a 120V base.
- **N-1 Back-Up Supply**: N-1 contingency planning requires that adequate back-up capability is established for the single loss of any major distribution system equipment6. This criterion ensures that an alternative supply is available in the event of a distribution outage or fault condition to improve system restoration time and system reliability. Circuit ties should be available to allow for all the load of the faulted source to be transferred to other area circuits without exceeding their LTE rating.

3. METHODOLOGY

3.1. Seasonal Peak Load

The analysis of current load levels utilizes peak load data from the past three years. This approach allows the distribution planner to observe the upward or downward trend on each circuit and substation, along with any anomalies that might have occurred in the past three years. These anomalies could include, but are not limited to, switching (both permanent and temporary), extreme weather conditions, and new load additions or subtractions.

Although UI currently only has seasonal peaks in summer, it is expected that in the future UI may have winter peaks due, among other causes, to the electrification of heating systems. The system model takes into account the peak load conditions at the feeder or substation. It uses the maximum load information from the last three years to identify possible mitigation techniques for the observed adverse impacts. It is considered the Coincident Peak for circuits and Non-Coincident Peak for substations.

In the circuits analysis, once the loads of the last three years have been obtained, it is compared with the normal rating of the limiting element of each circuit. This comparison allows the calculation of the thermal loading and the prioritization of those circuits that exceed 90% of their normal capacity.

Figure 2 presents a classification of the circuits based on their thermal loading. As per the Avangrid Distribution Planning Criteria, 96% of the circuits are bellow the 90% of their thermal loading capacity.

2023-2024 Distribution System Capacity Planning

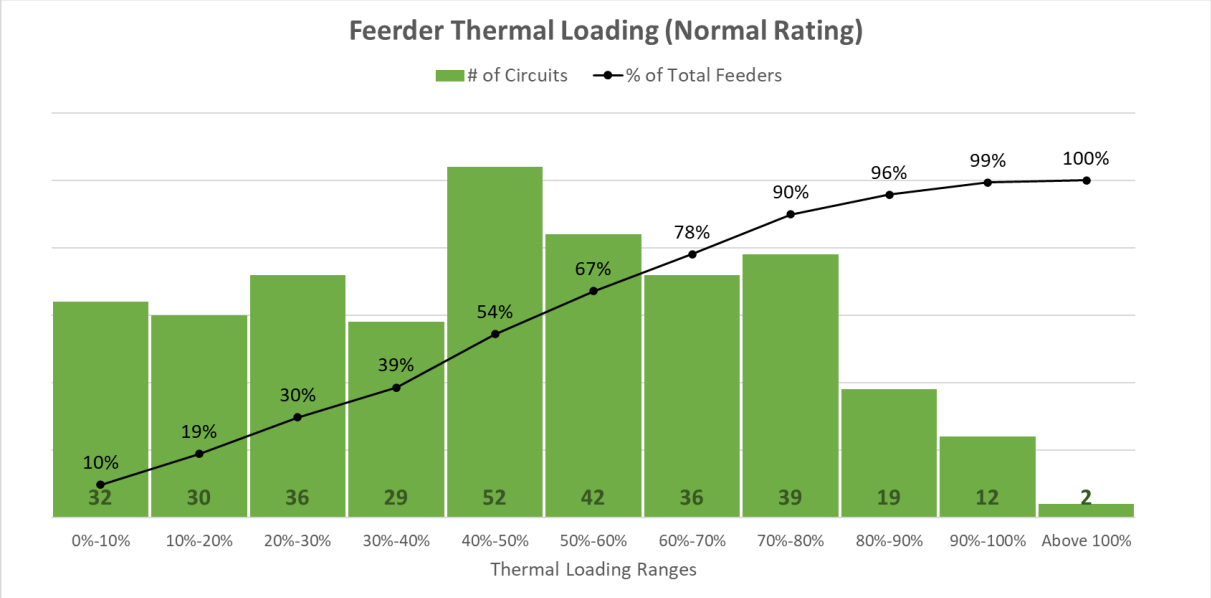


Figure 2: Feeder Thermal Loading.

A proirization is carried out among the circuits that have exceeded 90% of their thermal capacity in the last three years. This process helps identify those circuits where UI focuses its efforts on mitigating overloads and those circuits which maintains active monitoring to see if they need to be included in the study of solutions for improvement in the following years. The results of this prioritization are found in Table 3.

Substation	Circuit	Limiting Element	Normal Rating (A)	2023 Summer Peak Load (A)	2023 Thermal Loading	2022 Summer Peak Load (A)	2022 Thermal Loading	2021 Summer Peak Load (A)	2021 Thermal Loading
NEW CONGRESS	2535	350 PL-6 DUCT	274	282	102.8%	275	100.2%	265	96.6%
ASH CREEK	2673	500 PL-6 DUCT	329	325	98.7%	293	89.0%	312	94.9%
HAWTHORNE	2683	500 EPR-6 DUCT	364	339	93.1%	366	100.5%	378	103.9%
QUINNIPIAC	1542	500 PL-3 DUCT	391	357	91.2%	387	99.1%	370	94.6%
WATER ST	1526	500 PL-6 DUCT	329	299	91.0%	323	98.2%	310	94.3%
NEW CONGRESS	2536	2/0 CU O.W.	338	304	90.0%	309	91.4%	306	90.5%
HAWTHORNE	2682	500 EPR-6 DUCT	364	330	90.6%	349	96.0%	362	99.5%
MILVON	3631	500 PL-6 DUCT	329	295	89.8%	313	95.2%	310	94.1%
HAWTHORNE	2685	500 EPR-6 DUCT	375	330	90.6%	313	85.9%	325	89.4%
ASH CREEK	2670	500 PL-6 DUCT	329	292	88.8%	303	92.1%	277	84.3%
ASH CREEK	2660	500 EPR-6 DUCT	375	322	88.4%	331	91.0%	334	91.8%
JUNE ST	1608	500 EPR-6 DUCT	364	285	78.2%	306	84.2%	329	90.3%
ASH CREEK	2668	500 EPR-6 DUCT	375	263	72.2%	209	57.5%	357	98.1%
ASH CREEK	2664	500 EPR-6 DUCT	375	151	41.5%	342	94.0%	344	94.5%

Table 3: Circuit peak load analysis

2023-2024 Distribution System Capacity Planning

Table 3 identifies seven circuits that must be analyzed to find a solution to mitigate the overloads they have had in recent years. The projects with the solutions are outlined in Appenix A.

In the substation analysis, as can be observed in Figure 3, the peak loads from the last three years have been obtained. These loads are compated with the substation rated capacity as indicated in the Avangrid Distribution Planning Criteria. Since all UI substations have two transformers, the substation rating is the Long Term Emergency (LTE) rating of the smallest (lowest rated) transformer installed at the substation. The results obtained for the substations are indicated in Table 4.

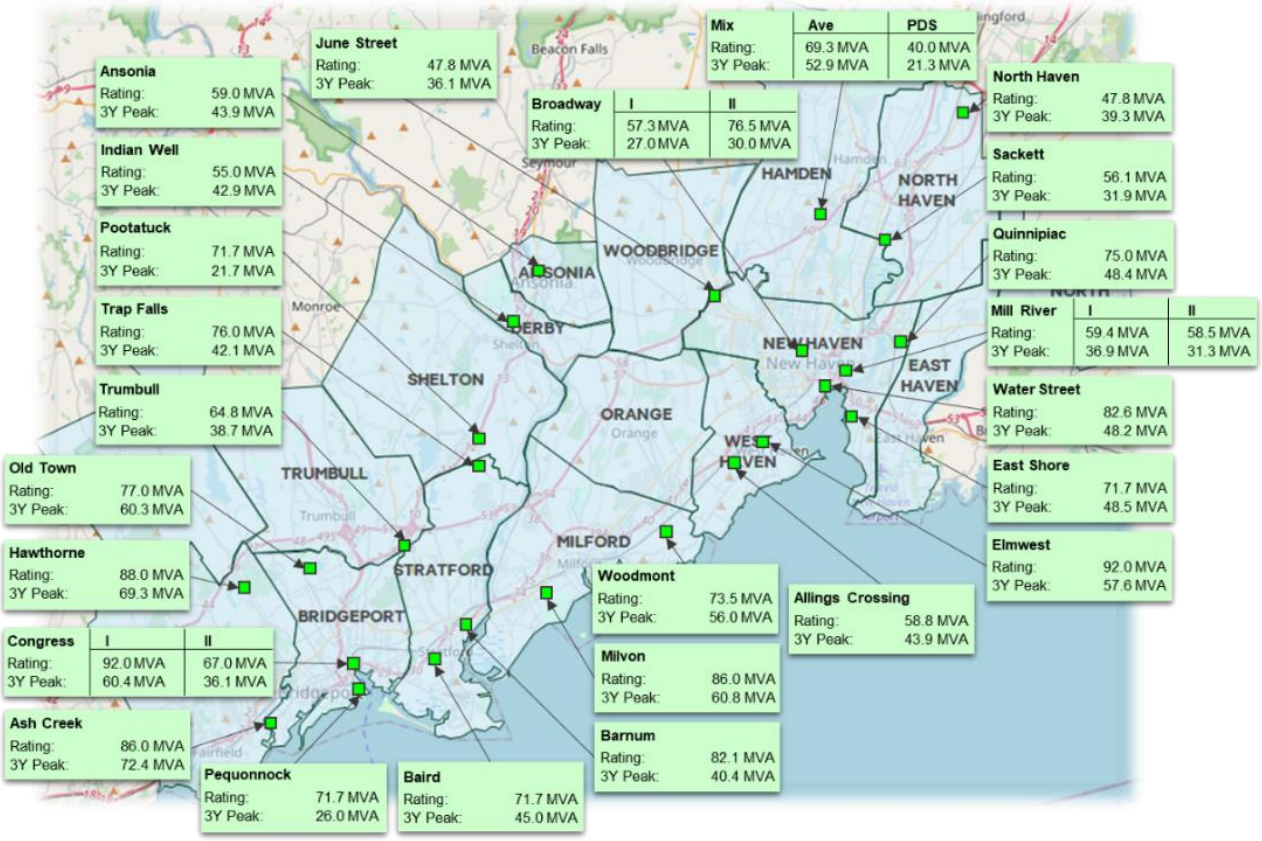


Figure 3: Substation peak load map

Table 4 reveals that no substation exceeds the threshold of 90% of its rated capacity, so none UI substation was flagged for capacity needs assessment.



Substation	Remaining MVA	3Y Highest Loading %
ASH CREEK	14	84%
NORTH HAVEN	9	82%
HAWTHORNE	19	79%
OLD TOWN	17	78%
INDIAN WELL	12	78%
WOODMONT	17	76%
MIX AVE	16	76%
JUNE STREET	12	76%
ALLINGS CROSSING	15	75%
ANSONIA	15	74%
MILVON	25	71%
EAST SHORE	23	68%
NEW CONGRESS I	32	66%
QUINNIPIAC	27	64%
BAIRD	27	63%
ELMWEST	34	63%
MILL RIVER I	23	62%
TRUMBULL	26	60%
WATER STREET	34	58%
SACKETT	24	57%
TRAP FALLS	34	55%
NEW CONGRESS II	31	54%
MILL RIVER II	27	53%
MIX PDS	19	53%
BARNUM	42	49%
BROADWAY I	30	47%
BROADWAY II	46	39%
PEQUONNOCK	51	34%
POOTATUCK	50	30%

Table 4: Peak load analysis in subtations

3.2. UI System Peak 10-year Forecast

The substation forecast analysis involves the development of a 10-year forecast, which aligns with state electrification goals and leverages statistical models to predict future demand across the UI system and substations.

Peak load forecasting aims to accurately forecast and evaluate peak system loads under both normal and extreme weather conditions. The Peak Load Forecast for 2024 was developed using



a Direct Peak Forecast methodology. This methodology utilizes the most recent ten years of weather-adjusted system peaks and econometric forecast models. The weather-adjustment for historic peak loads is based on a model that correlates the twelve-hour average Temperature Humidity Index (a mathematical formula that combines temperature and humidity into a single number) to historical summer weekday peak loads (THI Model). The THI Model adjusts historic peak loads to the loads that would have been observed under normal or average temperature and humidity conditions, as well as under extreme conditions.

The impact to the peak load from Conservation and Load Management ("C&LM") and Distributed Generation ("DG") currently on the UI system are embedded in the historical data used to develop the Base Peak Load Forecast. Similar to the Sales Forecast, the process accounts for projected new incremental C&LM, and DG programs separately and also takes into account new large customer loads separately. UI's final Peak Load Forecast is the sim of the Base Load Forecast and new or removed large customer loads, along with reductions due to new DG and new incremental C&LM.

The forecast for 2024 to 2033 also considers potential impacts of Electric Vehicle (EV) charging on the system peak loads. The EV forecast is aligned with ISO-NE forecasts scaled to fit the UI service territory.

The 50/50 System Peak Forecast Scenario, also referred to as the Normal or average weather scenario, refers to a probability-based weather normalization of the historical system peak load data. A 50/50 weather normalization indicates a 50% probability of exceeding the forecasted value and a 50% probability of falling short of it in any given year. In the 50/50 system peak forecast scenario, the peak demand occurs 50% of the time, indicating a more regular occurrence compared to the 90/10 scenario. Capacity planning based on this scenario focuses on ensuring adequate resources are available to meet the demand under typical conditions. It helps in determining baseline capacity requirements to maintain reliable service under normal operating conditions.

The 90/10 Weather System Peak Forecast Scenario, also referred to Design weather scenario, indicates that the forecasted extreme weather-adjusted system peak has a 10% probability of being exceeded on the system peak day, due to extreme weather conditions (high temperatures). In other words, the forecasted 90/10 peak load is expected to be exceeded once every ten years.

In capacity planning, UI considers this scenario to ensure that we have enough capacity to handle peak demand during these rare occurrences. It helps in determining the maximum capacity requirements to ensure grid stability and reliability during extreme conditions.

The Envelope scenario would be the worst of all the scenarios considered. It indicates the peak of the system adjusted for predicted extreme weather without any connected generation that initially were included in the 90/10 Weather System Peak Forecast Scenario.

Figure 4 bellow represents the actual peak for each year (green dots), the 50/50 Weather System Peak Forecast Scenario (grey line), the 90/10 Weather System Peak Forecast Scenario (orange line), and the Envelope (blue line).

2023-2024 Distribution System Capacity Planning

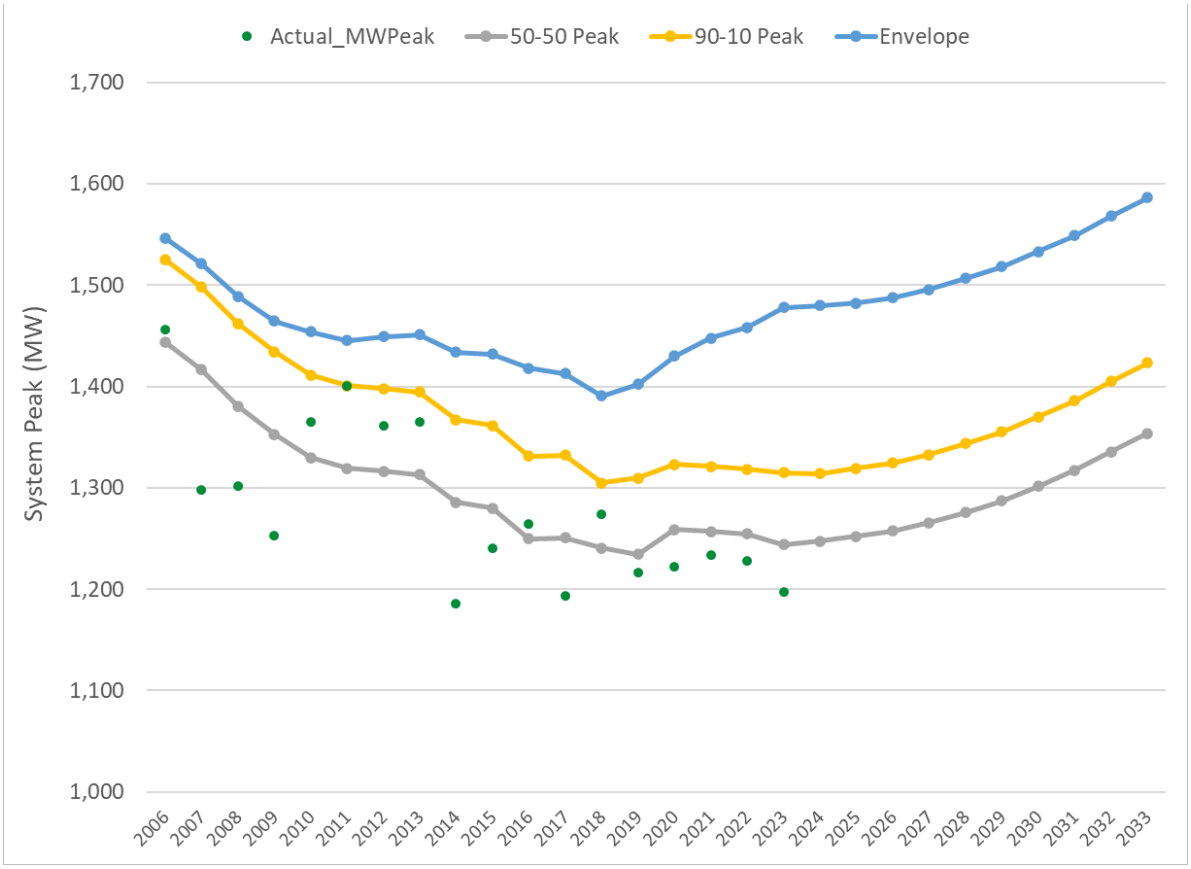


Figure 4: UI system peak 10 years forecast

Utilizing the UI system peak ten years forecast and historical non-coincident peak loads from each substation, the Distribution Planning conducts a comprehensive analysis. This analysis projects a long-term peak load forecast for each substation. It takes into account the incremental loads of economic development and the contributions from large generators. Combined with the 90/10 Weather System Peak Forecast Scenario, this analysis helps determine the anticipated future peak load for each substation.

As part of system planning, the substation 90/10 extreme weather scenario is utilized to identify substations requiring capacity assessment. Any substation projected to exceed 90% of its normal rating in this scenario is flagged for the development of capacity projects. Figure 5 shows the UI substation 10-year forecast 90/10 weather scenario.

2023-2024 Distribution System Capacity Planning

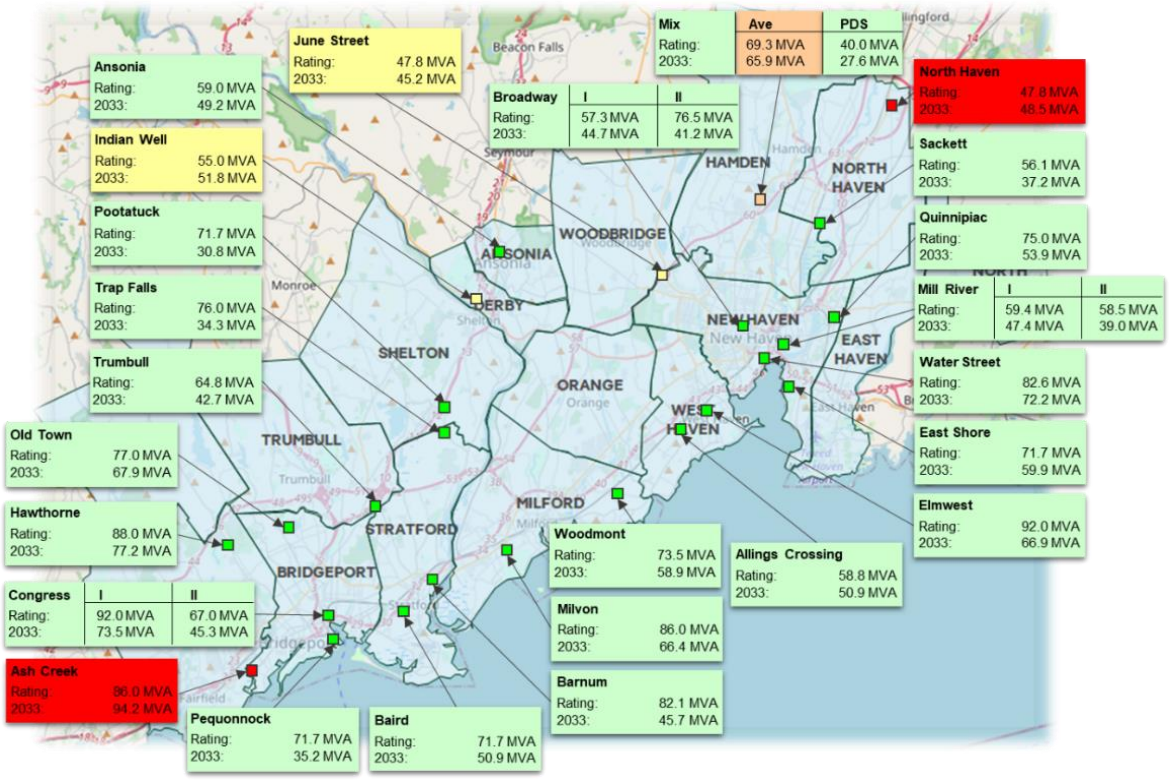


Figure 5: UI substations 90/10 peak load forecast on 2033

Table 5 shows the year-by-year results of the UI substation forecast under the 90/10 weather scenario and divides them into 3 distinct groups. The substations identified in the first group and that are exposed to exceeding 90% of their nominal capacity between 2024 and 2028 are those that are analyzed in this program and projects are developed for the approval on rate cases.

In the second group, the substations stand out that will be exposed to exceeding 90% of their nominal capacity between 2029 and 2033. Projects are also developed for these substations in this program.

Finally, the substations identified in the third group will be exposed to exceeding 90% of their nominal capacity between 2034 and 2040. The identification of these substations is carried out for monitoring purposes and inclusion in the long-term outlook (LTO) capital plan of the company.



		1st group *(needs within 5 years)*					2nd group *(needs within 5 to 10 years)*					3rd group *(needs for LTO)*						
Substation	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
ALLINGS CROSSING	81%	81%	81%	81%	82%	83%	83%	84%	85%	86%	87%	87%	88%	88%	89%	89%	90%	91%
ANSONIA	74%	74%	75%	75%	76%	77%	78%	79%	80%	82%	83%	84%	85%	86%	87%	88%	89%	90%
ASH CREEK	97%	97%	101%	101%	104%	104%	105%	106%	107%	108%	110%	111%	112%	113%	115%	116%	118%	119%
BAIRD	66%	66%	66%	67%	67%	67%	68%	69%	69%	70%	71%	72%	72%	72%	73%	73%	74%	74%
BARNUM	54%	54%	54%	54%	54%	54%	55%	55%	55%	55%	56%	56%	56%	56%	56%	57%	57%	57%
BROADWAY I	57%	62%	64%	65%	66%	68%	69%	71%	73%	76%	78%	81%	83%	86%	89%	92%	95%	98%
BROADWAY II	45%	47%	50%	50%	50%	51%	51%	52%	52%	53%	54%	55%	56%	57%	58%	59%	60%	61%
EAST SHORE	78%	78%	79%	79%	79%	80%	80%	81%	82%	83%	84%	84%	85%	85%	86%	86%	87%	87%
ELMWEST	70%	70%	70%	70%	70%	71%	71%	71%	72%	72%	73%	73%	73%	74%	74%	74%	74%	75%
HAWTHORNE	83%	83%	83%	83%	84%	84%	85%	85%	86%	87%	88%	88%	89%	89%	90%	90%	91%	91%
INDIAN WELL	89%	90%	91%	91%	91%	91%	92%	92%	93%	94%	94%	95%	95%	96%	96%	97%	97%	98%
JUNE STREET	76%	77%	85%	86%	87%	87%	89%	90%	91%	93%	94%	97%	99%	101%	103%	105%	108%	110%
MILL RIVER I	70%	70%	71%	72%	76%	76%	77%	78%	78%	79%	80%	81%	82%	83%	84%	85%	87%	88%
MILL RIVER II	61%	61%	61%	62%	63%	63%	64%	64%	65%	66%	67%	67%	68%	68%	69%	69%	70%	70%
MILVON	75%	75%	75%	75%	76%	76%	76%	76%	77%	77%	77%	77%	78%	78%	78%	78%	78%	79%
MIX AVE	88%	88%	92%	92%	92%	93%	93%	93%	94%	94%	95%	96%	96%	97%	98%	98%	99%	100%
MIX PDS	55%	55%	56%	57%	58%	59%	60%	62%	64%	67%	69%	70%	72%	74%	75%	77%	79%	80%
NEW CONGRESS I	75%	75%	75%	75%	76%	76%	77%	77%	78%	79%	80%	80%	81%	81%	82%	82%	83%	83%
NEW CONGRESS II	59%	59%	59%	59%	60%	61%	62%	63%	65%	66%	68%	69%	70%	71%	72%	73%	74%	75%
NORTH HAVEN	92%	92%	92%	93%	94%	95%	96%	97%	98%	100%	102%	103%	103%	104%	105%	106%	107%	108%
OLD TOWN	83%	83%	83%	84%	85%	85%	86%	86%	87%	88%	88%	89%	89%	90%	90%	91%	91%	92%
PEQUONNOCK	43%	43%	43%	43%	44%	44%	45%	46%	47%	48%	49%	50%	50%	51%	52%	53%	53%	54%
POOTATUCK	32%	32%	32%	33%	34%	35%	36%	38%	39%	41%	43%	44%	46%	47%	49%	50%	52%	53%
QUINNIPIAC	69%	69%	70%	66%	66%	67%	67%	68%	69%	70%	71%	72%	72%	72%	72%	72%	73%	73%
SACKETT	58%	58%	58%	64%	64%	65%	65%	65%	65%	66%	66%	67%	68%	69%	70%	70%	71%	72%
TRAP FALLS	44%	44%	44%	44%	44%	44%	44%	45%	45%	45%	45%	45%	45%	45%	46%	46%	46%	46%
TRUMBULL	63%	63%	63%	63%	64%	64%	64%	65%	65%	65%	66%	66%	66%	67%	67%	67%	68%	68%
WATER STREET	77%	77%	76%	77%	80%	81%	82%	83%	84%	86%	87%	89%	90%	91%	92%	93%	94%	95%
WOODMONT	79%	79%	79%	79%	79%	79%	79%	80%	80%	80%	80%	80%	80%	81%	81%	81%	81%	81%

Table 5: UI substation 10 years forecast 90/10 scenario

Table 5 identifies three substations that are exposed to exceed 90% of their nominal capacity in 2024 and one more that will do so before 2028. These four substations were analyzed and solution alternatives were found to mitigate future expected overloads. The projects with the solutions are outlined in Appenix A.

3.3. Power Flow Software

Avangrid Operating Companies (OpCos) utilize CYME, a distribution power flow software by Eaton, for engineering analysis. The CYME Power System Analysis software, known as CYMDIST, is a Power Engineering analysis tool used to simulate the distribution system and to assess its performance for planning, operational, and contingency purposes.

CYMDIST is employed for conducting various studies including Reliability Assessment, Network Optimization, Coordination of Protection Devices, and the analysis of new Distributed Energy Resources (DER) interconnection impacts on the distribution system, also known as Distributed Generation (DG). The software is also utilized to develop DER hosting capacity analyses and maps for DG, EVs and Battery Energy Storage Systems (BESS). These analyses enable the Engineering and Planning departments to develop safe, economical and reliable system solutions.

The diagram below illustrates the components and data sources necessary to create CYME models and conduct different types of analyses. The CYME Gateway interfaces with Avangrid source systems to gather electrical connectivity from the Geographic Information System (GIS),



customer load data, circuit load data, and equipment settings. It also connects to the CYME Equipment database, which houses equipment characteristic information such as impedance and ratings. The base models, combining electrical connectivity and impedance and ratings information, are created in a single database. Upon validation and verification of these models, engineers can commence various power flow analyses.

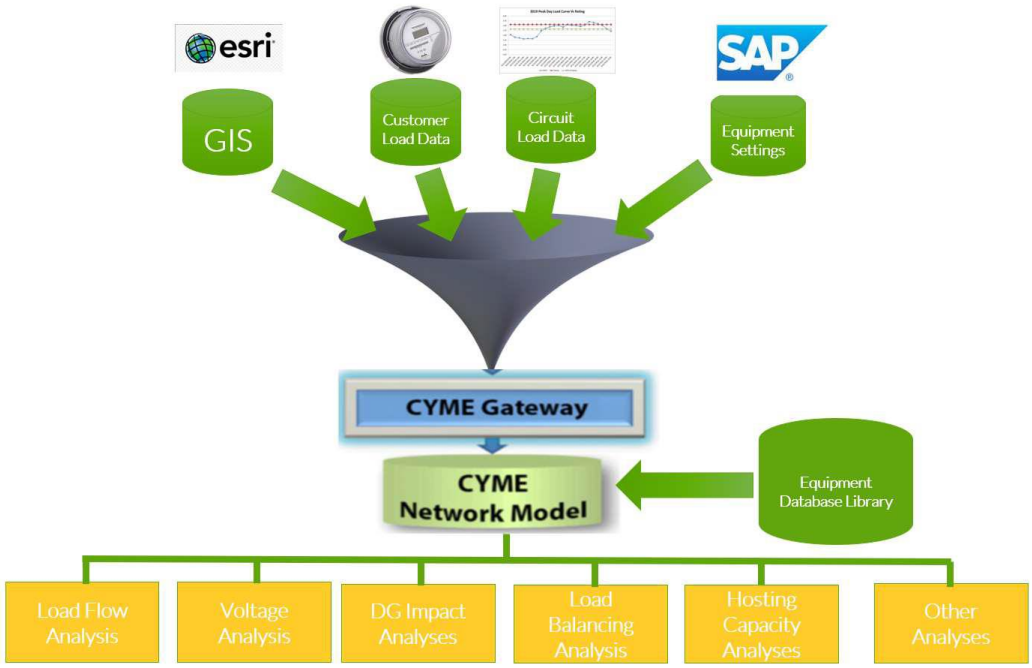


Figure 6: Components to create CYME models

A system model has been developed in the CYMDIST power system simulation software for each solution considered to address each identified need. The following assumptions were made as part of the modeling and analysis:

- The load flow analysis was conducted to determine the project impact on steady-state circuit voltage. To ensure adequate voltage to customers, 114 to 126 volts, the circuit voltage must remain within the range of 117 to 126 volts (120 volt base) during normal operations.

- All voltages shown in the report refers to the Medium Voltage side (13.8 kV), converted to a 120 V nominal basis.

In the developed model, Distribution Planning includes the circuit or substation under study and all circuits tied to it. The first alternative studied is redistributing loads from one circuit to another using existing ties, which is the most practical and cost-effective solution when feasible. Nearby circuits are also included to study the construction of small sections to tie the circuits as a second alternative.

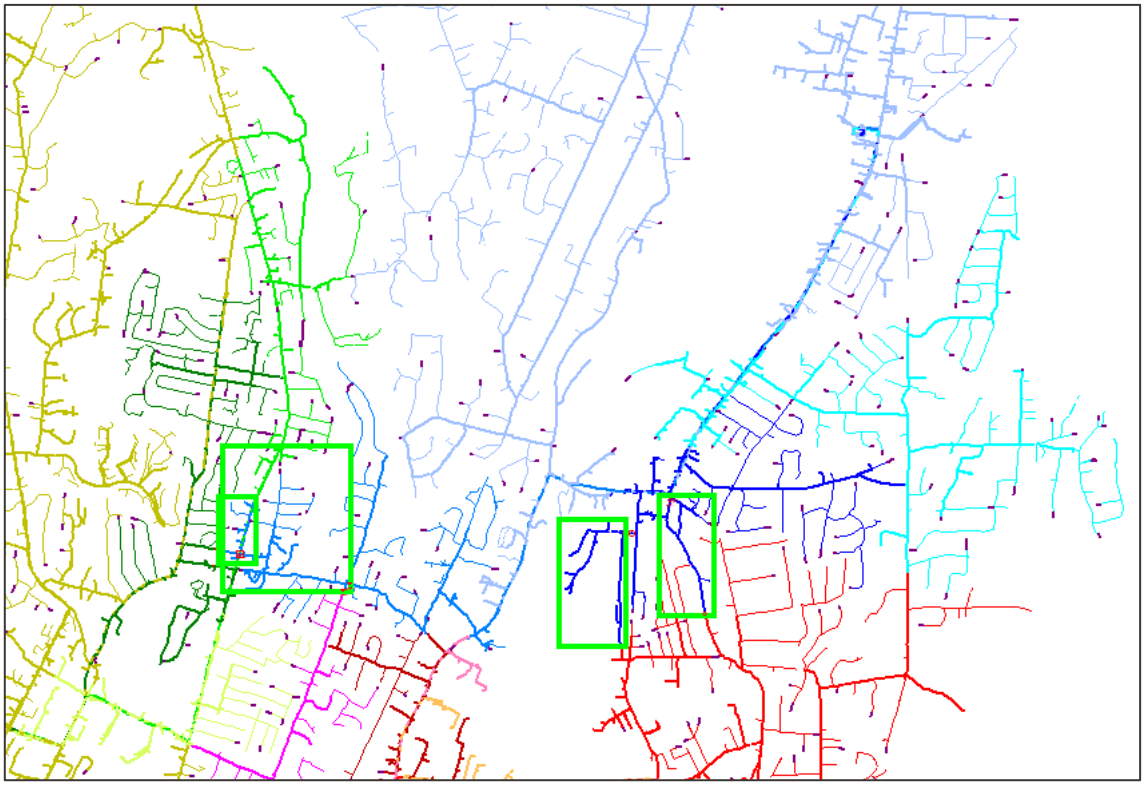


Figure 7: Example of a CYME case

Once the areas susceptible to transfer from one circuit to another have been delimited (green rectangles in Figure 7), it is confirmed that the number of customers, the thermal loading and the voltage in all the circuits involved are within the limits indicated in the Avangrid Distribution Planning Criteria.

3.4. Non Wires Solutions

Non-Wires Solutions (NWS) represent a non-conventional approach that can address system needs, potentially deferring, delaying, or even eliminating the need for traditional investments in the distribution grid infrastructure. These solutions typically include DER such as Distributed Generation (DG), Energy Storage (ES), Energy Efficiency (EE), Demand Response (DR), and advanced grid software and controls.

Avangrid strategically pursues NWS projects that are cost effective for customers, offer reliable alternatives to traditional capital investment projects, and comply with regulatory, legislative directives, and environmental policies.

NWS play an important role in the distribution planning process. New constraints should be evaluated for their suitability for NWS, taking into account factors such as resource location, time-based performance, economic considerations, and design.

The Non-Wires Solutions (NWS) framework in Connecticut is currently under development through Docket Nos. 17-12-03 RE07 PURA Investigation Into Distribution System Planning of the Electric Distribution Companies – Non-Wires Alternatives and 24-08-08 Non-Wires Solutions Process Initiation Phase and goes into effect January 1, 2025. A third-party consultant or Process Monitor to PURA has been hired to help establish the NWS program's framework. The Process Monitor's role include facilitating stakeholder meetings, reviewing the annual data filing, provide overseeing the NWS procurement process, and providing PURA with feedback on the overall NWS program.

UI, in collaboration with Eversource, is currently working with the Process Monitor to establish the NWS program. This includes the annual filing and its requirements, procurement process, cyber security processes, and more. The NWS program is expected to be fully established by the end of 2024.

Projects with a budget exceeding $250,000 are required to evaluate the feasibility of an NWS solution.

4. 2023-2024 RESULTS

Based on the data obtained and the methodology outilined in Section 3, seven circuits and four substations were flagged for capacity solution assessment. The Distribution Planning department conducted studies and developed alternative solutions to mitigate current or expected future overloads.

Circuit	3-year highest thermal loading
HAWTHORNE 2683	100.9%
ASH CREEK 2673	98.7%
NEW CONGRESS 2535	102.8%
QUINNIPIAC 1542	99.1%
WATER ST 1526	98.2%
HAWTHORNE 2682	96.5%
NEW CONGRESS 2536	93.2%

Table 6: Circuits flagged for capacity assessment

Substation	90/10 Forecast in 2033
ASH CREEK	110%
NORTH HAVEN	102%
INDIAN WELL	94%
MIX AVE	95%

Table 7: Substations flagged for capacity assessment

2023-2024 Distribution System Capacity Planning

Once the circuits and substations to be studied have been identified, a CYME case is created for each, and all feasible alternatives to resolve the overloads are studied.

The most practical and cost-effective solution typically involves redistributing the load from one circuit or substation to another, utilizing existing circuit ties.

Furthermore, a range of solution alternatives were explored with the goal of mitigating each of the identified needs. These alternatives were evaluated based on their estimated cost and overall system performance. The following types of system upgrades were considered in this analysis:

- Upgrading conductors to enhance the capacity of the circuits.
- Establishing new circuit ties with neighboring circuits.
- Transferring load to neighboring substations.
- Developing new feeders on available positions in substations.
- Developing non-traditional solutions such as Battery Energy Storage Systems (BESS).

The preferred solutions are selected for its low cost and ability to address all systems needs in the area while maintaining the potential for future load growth. All projects and the alternatives analyzed comply with the Avangrid Distribution Planning Criteria. Detailed project reports of these solutions and the alternatives studied for each circuit and substation are provided in Section 5 - Appendices.

Tables 8 and 9 summarize the approximate costs to complete each of the above alternatives. These are planning level estimates with a tolerance of -50% to +200%. As the project progresses, more detailed engineering and site visits will be conducted to refine the scope of work and costs.

Project	In service year	Cost preferred solution	Year 1	Year 2	Year 3
UI Capacity program - Hawthorne Circuit 2683	2027	$5,093,580	$509,358	$3,056,148	$1,528,074
UI Capacity program - Ash Creek Circuit 2673	2025	$24,130	$24,130		
UI Capacity program - New Congress Circuit 2535	2025	$290,501	$290,501	-	-
UI Capacity program - Quinnipiac Circuit 1542	2027	$148,632	-	$74,316	$74,316
UI Capacity program - Water Circuit 1526	2026	$71,040	-	$71,040	-
UI Capacity program - Hawthorne Circuit 2682	2027	$77,040	-	-	$77,040
UI Capacity program - New Congress Circuit 2536	2027	$268,642	-	$134,321	$134,321
		$5,973,565	$823,989	$3,335,825	$1,813,751

Table 8: Summary of circuit projects and budget schedule

2023-2024 Distribution System Capacity Planning

Substation	In service year	Cost preferred solution	Year 1	Year 2	Year 3
UI Capacity program - Ash Creek SS Project 1	2025	$82,896	$82,896	-	-
UI Capacity program - Ash Creek SS Project 2	2027	$2,491,368	$249,137	$1,494,821	$747,410
UI Capacity program - North Haven SS	2027	$82,896	$6,000		$76,896
UI Capacity program - Indial Well SS	2027	$205,910	-	$129,014	$76,896
UI Capacity program - Mix Ave SS	2027	$6,000	-	-	$6,000
		$2,869,070	$338,033	$1,623,835	$907,202

Table 9: Summary of substation projects and budget schedule

Table 10 presents the updated 10-year forecast, reflecting changes after the completion of all projects developed in this capacity planning cycle.

		1st group *(needs within 5 years)*					2nd group *(needs within 5 to 10 years)*					3rd group *(needs for LTO)*						
Substation	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
ALLINGS CROSSING	81%	81%	81%	81%	82%	83%	83%	84%	85%	86%	87%	87%	88%	88%	89%	89%	90%	91%
ANSONIA	74%	74%	75%	75%	79%	80%	81%	82%	84%	85%	87%	88%	89%	90%	91%	92%	93%	94%
ASH CREEK	97%	97%	94%	94%	89%	89%	90%	91%	92%	93%	95%	96%	96%	97%	98%	99%	100%	101%
BAIRD	66%	66%	66%	67%	67%	67%	68%	69%	69%	70%	71%	72%	72%	72%	73%	73%	74%	74%
BARNUM	54%	54%	54%	54%	54%	54%	55%	55%	55%	55%	56%	56%	56%	56%	56%	57%	57%	57%
BROADWAY I	57%	62%	64%	65%	66%	68%	69%	71%	73%	76%	78%	81%	83%	86%	89%	92%	95%	98%
BROADWAY II	45%	47%	50%	50%	50%	51%	51%	52%	52%	53%	54%	55%	56%	57%	58%	59%	60%	61%
EAST SHORE	78%	78%	79%	79%	79%	80%	80%	81%	82%	83%	84%	84%	85%	85%	86%	86%	87%	87%
ELMWEST	70%	70%	70%	70%	70%	71%	71%	71%	72%	72%	73%	73%	73%	74%	74%	74%	74%	75%
HAWTHORNE	83%	83%	83%	83%	84%	84%	85%	85%	86%	87%	88%	88%	89%	89%	90%	90%	91%	91%
INDIAN WELL	89%	90%	91%	87%	86%	87%	87%	88%	88%	89%	89%	90%	90%	91%	91%	92%	92%	93%
JUNE STREET	76%	77%	85%	86%	87%	87%	89%	90%	91%	93%	94%	97%	99%	101%	103%	105%	108%	110%
MILL RIVER I	70%	70%	71%	72%	76%	76%	77%	78%	78%	79%	80%	81%	82%	83%	84%	85%	87%	88%
MILL RIVER II	61%	61%	61%	62%	63%	63%	64%	64%	65%	66%	67%	67%	68%	68%	69%	69%	70%	70%
MILVON	75%	75%	75%	75%	76%	76%	76%	76%	77%	77%	77%	77%	78%	78%	78%	78%	78%	79%
MIX AVE	88%	88%	92%	92%	90%	90%	90%	91%	91%	92%	93%	93%	94%	94%	95%	96%	96%	97%
MIX PDS	55%	55%	56%	57%	62%	63%	65%	66%	68%	71%	73%	75%	76%	78%	80%	82%	83%	85%
NEW CONGRESS I	75%	75%	75%	75%	76%	76%	77%	77%	78%	79%	80%	80%	81%	81%	82%	82%	83%	83%
NEW CONGRESS II	59%	59%	59%	59%	60%	61%	62%	63%	65%	66%	68%	69%	70%	71%	72%	73%	74%	75%
NORTH HAVEN	92%	92%	90%	90%	82%	83%	84%	85%	87%	88%	90%	91%	92%	93%	93%	94%	95%	96%
OLD TOWN	83%	83%	83%	84%	85%	85%	86%	86%	87%	88%	88%	89%	89%	90%	90%	91%	91%	92%
PEQUONNOCK	43%	43%	51%	51%	62%	62%	63%	64%	65%	66%	78%	79%	80%	81%	82%	84%	85%	86%
POOTATUCK	32%	32%	32%	33%	34%	35%	36%	38%	39%	41%	43%	44%	46%	47%	49%	50%	52%	53%
QUINNIPIAC	69%	69%	70%	66%	66%	67%	67%	68%	69%	70%	71%	72%	72%	72%	72%	72%	73%	73%
SACKETT	58%	58%	61%	67%	74%	74%	75%	75%	75%	76%	76%	77%	78%	79%	80%	81%	82%	83%
TRAP FALLS	44%	44%	44%	44%	44%	44%	44%	45%	45%	45%	45%	45%	45%	45%	46%	46%	46%	46%
TRUMBULL	63%	63%	63%	63%	64%	65%	65%	65%	66%	66%	67%	67%	67%	68%	68%	68%	69%	69%
WATER STREET	77%	77%	76%	77%	80%	81%	82%	83%	84%	86%	87%	89%	90%	91%	92%	93%	94%	95%
WOODMONT	79%	79%	79%	79%	79%	79%	79%	80%	80%	80%	80%	80%	80%	81%	81%	81%	81%	81%

Table 10: UI substation 10 years forecast 90/10 scenario



5. ATTACHMENTS

Files attached to this report include the projects developed with the selected solutions for each of the circuits and substations indicated in this report.

Each file contains a complete report with the project description, system requirements and project justification, proposed scope of work, solution alternatives considered, the justification for the selected solution and benefits to the network, as well as the cost and funding details for the chosen project

These files are grouped into two different groups UI Capacity Program Circuits and UI Capacity Program Substations.

5.1. UI Capacity Program Circuits:

UI Capacity Program - Hawthorne Circuit 2683

UI Capacity Program - Ash Creek Circuit 2673

UI Capacity Program - New Congress Circuit 2535

UI Capacity Program - Quinnipiac Circuit 1542

UI Capacity Program - Water St Circuit 1526

UI Capacity Program - Hawthorne Circuit 2682

UI Capacity Program - New Congress Circuit 2536

5.2. UI Capacity Program Substations:

UI Capacity Program - Ash Creek Substation Project 1

UI Capacity Program - Ash Creek Substation Project 2

UI Capacity Program - North Haven Substation

UI Capacity Program - Indian Well Substation

UI Capacity Program - Mix Ave Substation

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The United Illuminating Company - Electric Capex Projects/Programs

1. Summary

Project Title: UI Capacity Program – Ash Creek Circuit 2673

Work Category: Other Asset Condition (Thermal)

Project Sponsor: Lucas Cruz (D. Planning)

IP Status: Technical (IP2)

PPM Project ID#: PRJ-005286

Total Funding Request: $24,130

Type: Project

Estimated Start Year (IP3 Execution): 2026

Functional grouping: Capacity

Estimated In Service Year (Energized): 2026

Project Description:

Ash Creek circuit 2673, originating from the Ash Creek substation in UI's western area, is a distribution circuit serving approximately 1,452 customers. Over the past three years, this circuit has consistently operated beyond its rated capacity, making it one of the most heavily loaded circuits within the UI territory.

To alleviate this issue, the most feasible and cost-effective solution is to redistribute the load between circuits, utilizing existing circuit ties. The UI distribution planning team has developed a capacity project aimed at reducing the thermal load on Circuit 2673, thereby creating room for future growth. This initiative is crucial, especially considering the beneficial electrification plans, which include the introduction of electric vehicles and the electrification of heating systems, among others.

The proposed solution involves the transfer of approximately 46 A and 25 customers from Circuit 2673 to Circuit 2669, both located in Ash Creek substation. This transfer aims to prevent Circuit 2673 from exceeding 90% of its rated capacity in the foreseeable future.

Upon the implementation of this solution, the load on Circuit 2673 is projected to decrease to 84.8% of its rated capacity, a significant reduction from the 98.7% thermal loading experienced in the summer of 2023. This strategic load redistribution will not only ensure the efficient operation of both circuits but also accommodate the region's growing power demand.

System Needs and Justification:

According to the Avangrid Distribution Planning Criteria, a threshold of 90% is set for the ratio of actual loading to circuit normal rating, serving as trigger for a capacity needs assessment. This threshold is designed to prevent potential overloads by starting major circuit work in advance.

Furthermore, the number of customers per circuit should be limited to 2,000 – 2,500 for 15kV class distribution feeders.

As represented in Table 1, the thermal loading of Ash Creek Circuit 2535 has consistently exceeded 90% of its normal capacity in 2021, 2022 and 2023. During the summer of 2023 the peak load frequently exceeded 90% of the rated capacity, particularly at the beginning of September. On September 7th, 2023, the circuit experienced its highest peak in the last three years, with the load exceeding 95% of the rated capacity, as shown in Figure 1.

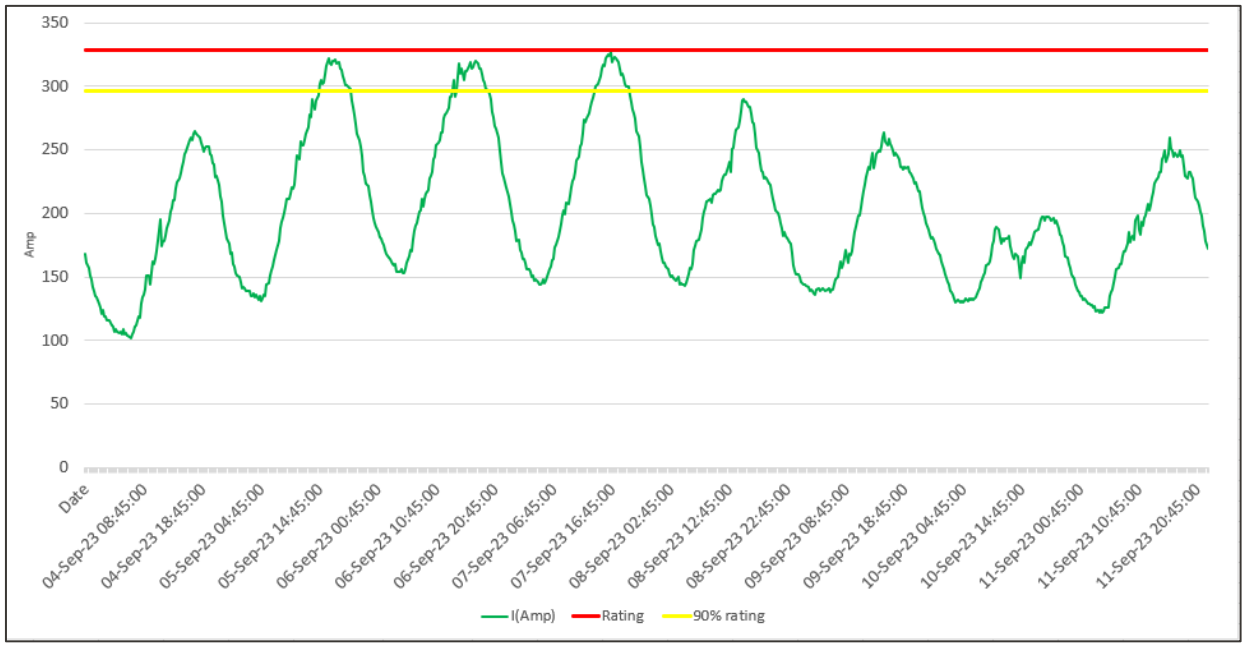

Figure 1: Circuit 2673 peak load in the last 3 years

Table 1: Circuit 2673 peak load in the last 3 years

Circuit	Substation	Normal Rating (A)	2023 Summer peak load (A)	2023 Thermal Loading	2022 Summer peak load (A	2022 Thermal Loading	2021 Summer peak load (A	2021 Thermal Loading	Number of customers
2673	Ash Creek	329	325	98.7%	293	89.0%	321	94.9%	1,452

The most practical and cost-effective solution to this issue involves redistributing load from one circuit to another, capitalizing on existing circuit ties where possible. As a result, this capacity project was developed to mitigate the potential overload on Ash Creek Circuit 2673. This proactive measure ensures the continued reliable service to all customers in the area.

Proposed Scope of Work

The project's scope of work involves transferring load from Ash Creek Circuit 2673 to a selected circuit with available capacity and ties to 2673. Ash Creek Circuit 2669, which meets these conditions, has been selected for this purpose.

The process of transferring 46 A and 25 customers from Circuit 2673 to Circuit 2669 involves the following steps:

1. Remove the 3-phase cutout from Pole 477 and add it to Pole 6870 and close it.
2. Add an air breaker Switch at pole P3520 (this will be a new tie switch between Circuit 2673 and Circuit 2669).

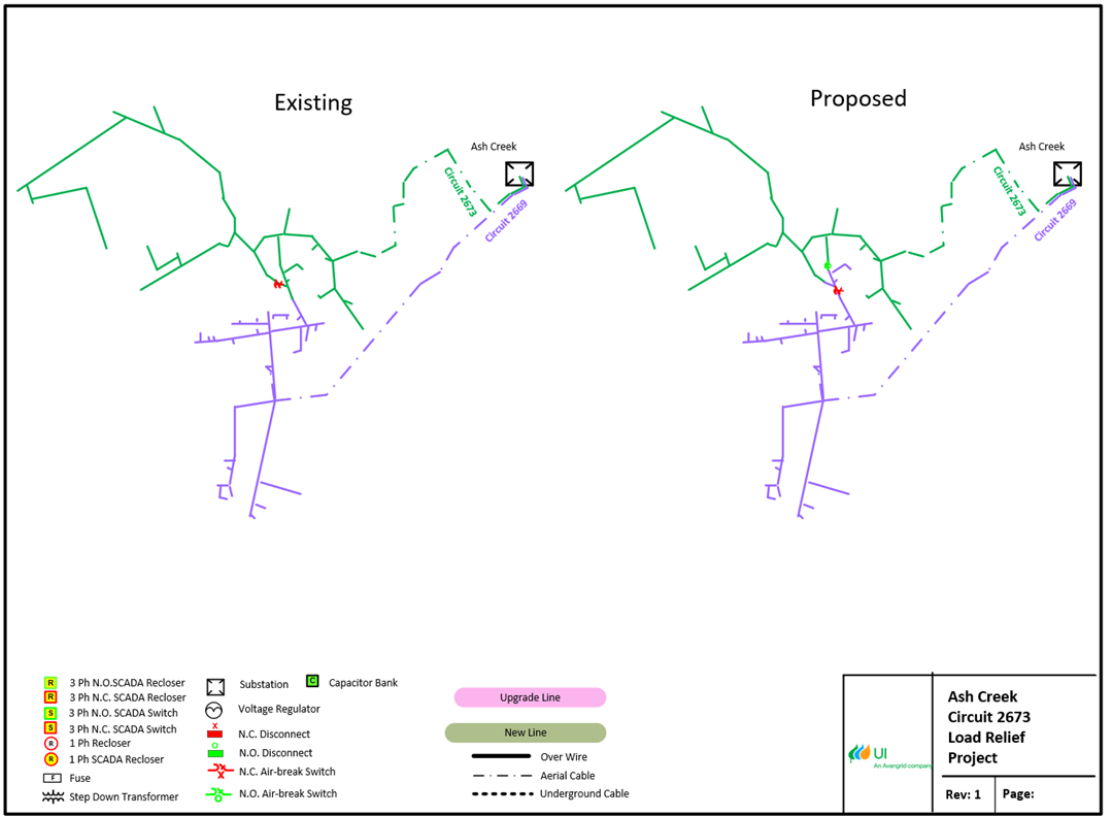

Figure 2: Transfer load from Circuit 2673 to Circuit 2669 through circuit ties

Table 2 shows the initial conditions, and Table 3 the final conditions of the involved circuits. After Circuit 2669 has absorbed the load from Circuit 2673, it remains under its maximum load, and the number of customers stays within the 2,500 limit. This satisfies the load transfer criteria.

Table 2: Involved circuits initial conditions.

Circuit	Substation	Current				
		Normal Rating (A)	LTE Rating (A)	Max peak Load in the last 3 years (A)	Thermal Loading	Number of customers
2673	Ash Creek	329	498	325	98.7%	1,452
2669	Ash Creek	364	599	280	76.8%	1,316

Table 3: Involved circuits final conditions.

Circuit	Substation	After Preferred Solution				
		Normal Rating (A)	LTE Rating (A)	Max peak Load in the last 3 years (A)	Thermal Loading	Number of customers
2673	Ash Creek	329	498	279	84.8%	1,427
2669	Ash Creek	364	599	326	89.6%	1,341

The project's implementation cost is $24,130, as detailed in Table 4. This is considered the cost-effective solution. The outlined scope of work ensures the efficient operation of both substations and accommodates the region's growing power demand.

Table 1: Total cost of the project.

Category	Cost Estimate
Material	
15 kV – Air breaker Switch - 3 phase (1 device)	$ 12,300
Overheads during all phases of the project	$ 6,130
Internal Labor	
Evaluation, Design and Support	$ 5,700
Total Cost	**$ 24,130**

Solution Alternatives Considered:

In addressing the overload issue on Ash Creek Circuit 2673, an alternative solution was studied, evaluated, and compared with the chosen solution. This alternative is:

1. **Upgrading Select Sections of the Underground Cable**: This alternative proposes load balancing and an upgrade to the capacity of the underground cable. Specifically, it involves re-conducting 12 sections of 500 PL underground cable to 500 CU EPR, extending from the ASH Creek Substation to circuit 1058. Implementing this solution would effectively resolve the overload issue, as the circuit's new rating would increase to 375 Amps, reducing the thermal loading at the peak to 85%. The estimated cost for this alternative is projected to be $1,072,456, as detailed in Table 5.

Table 2: Total cost of the alternative.

New feeder	Cost Estimate
Material	
15kV - UG 500 CU EPR 3Ø Primary (12 sections-per section - 400ft)	$ 689,063
Overheads during all phases of the project	$ 193,394
Internal Labor	
Evaluation, Design and Support	$ 30,000
Support during project construction	$ 32,500
Responsible for Design	$ 15,000
Allocations assigned to the project	$ 22,500
Remove 15kV - UG 500 CU PL 3Ø Primary (12 sections-per section - 400ft)	$ 90,000
Total Cost	**$ 1,072,456**

Risk of No Action:

1. **Impact on Economic Growth and Development**: Failing to act in advance can lead to capacity bottlenecks, extending the timeline required to accommodate new customer requests. This inaction can negatively impact the economic development of the area, slowing down the roll-out of beneficial electrification plans. These plans include the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development.
2. **Equipment Damage:** Overloading can cause damage to the feeder cables, switches, and other components. It may lead to insulation breakdown, overheating, and premature wear.
3. **Reduced System Reliability:** Overloaded feeders are more prone to faults, which can disrupt power supply and affect reliability.
4. **Increased Energy Loss:** Overloaded feeders consume more energy, leading to higher losses and inefficiency.
5. **Fire Hazard:** Overheating due to prolonged overloading increases the risk of fire in the feeder or nearby equipment.

In summary, overloading a distribution feeder can compromise safety, reduce equipment lifespan, and increase operational costs. Proper load management and preventive measures are crucial to mitigate these risks. Therefore, taking no action is not a viable option, as it could lead to serious consequences.

Project Benefits:

1. **Reliability**: Enhancing capacity in this feeder will help meet reliability requirements by avoiding outages caused by overloads.
2. **Economic Development**: It can facilitate the roll-out of beneficial electrification plans such as the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development. This can stimulate economic growth and progress in the region.
3. **Cost Efficiency**: the solution proposed in this project is the least costly when compared with other alternatives.
4. **Accommodation of New Load**: It will increase capacity of New Congress Circuit 2673 and will allow for the interconnection of new generation and load, effectively managing the increased demand.
5. **Environmental Impact**: Increased capacity can accommodate more distributed energy sources (DER), contributing to a cleaner and more sustainable energy sector.
6. **Safety**: By preventing overloading, these projects can enhance the safety of the power grid.

Project Relationships (if applicable):

This project does not have any correlation with other projects.

2. Funding Detail

Substation	Circuit	3-year highest thermal loading	In service year	Cost preferred solution	Budget - Year 1	IP status	PPM Project ID
Ash Creek	2673	98.7%	2026	$24,130	$24,130	Technical (IP2)	PRJ-005286

An Avangrid company

The United Illuminating Company - Electric Capex Projects/Programs

1. Summary

Project Title: UI Capacity Program - Ash Creek Substation Project 1

Project Sponsor: Lucas Cruz (D. Planning)

PPM Project ID#: PRJ-005374

Type: Project

Functional grouping: Capacity

Work Category: Other Asset Condition (Thermal)

IP Status: Technical (IP2)

Total Funding Request: $82,896

Estimated Start Year (IP3 Execution): 2026

Estimated In Service Year (Energized): 2026

Project Description & One-Line:

The UI Ash Creek substation is a critical infrastructure that serves 19,134 customers in the eastern part of Fairfield through 15 distribution circuits. Currently, it is the most loaded substation in the UI territory. Projections based on the 90/10 weather scenario, indicate that this substation is exposed to exceed 90% of its rated capacity in 2024 and reach full capacity by 2030.

To address this issue, the most practical and cost-effective solution involves redistributing the load from one substation to another, leveraging existing circuit ties. The UI distribution planning team has developed this capacity project to alleviate the potential overload on the Ash Creek substation and create room for future growth. This is particular important in light of beneficial electrification plans such as electric vehicles, the electrification of heating systems and others.

The solution involves transferring approximately 11.7 MVA out of the Ash Creek substation to avoid the risk of exceeding its capacity in the next 10 years. This load is planned to be transferred to the Pequonnock substation through two project solutions:

1. Project 1: This project involves transferring 5.6 MVA from Ash Creek to Pequonnock through the existing circuit ties. This fast, low-cost solution is proposed to mitigate the overload for the next 5 years and buy some time needed to complete Project 2.
2. Project 2: This project involves extending a new circuit from Pequonnock to Ash Creek area to pick up some load (around 7.2 MVA).

After the implementation of Project 1, Ash Creek is expected to reach 97% of its rating in 2028, instead of 104% before this load transfer. Meanwhile, Pequonnock is still expected to be below its 90% capacity. This strategic load redistribution will ensure the efficient operation of both substation and provide room for the growing power demand in the region.

Table 1: Ash Creek and Pequonnock substations forecasted 90/10 thermal loading.

Year	Forecasted 90/10 thermal loading			
	Ash Creek Substation		Pequonnock Substation	
	Current	AFTER Project 1	Current	AFTER Project 1
2025	101%	94%	40%	51%
2028	104%	97%	41%	53%
2033	110%	103%	66%	69%

*2033 load forecast Including the Westside Wastewater Treatment Plant expected future load

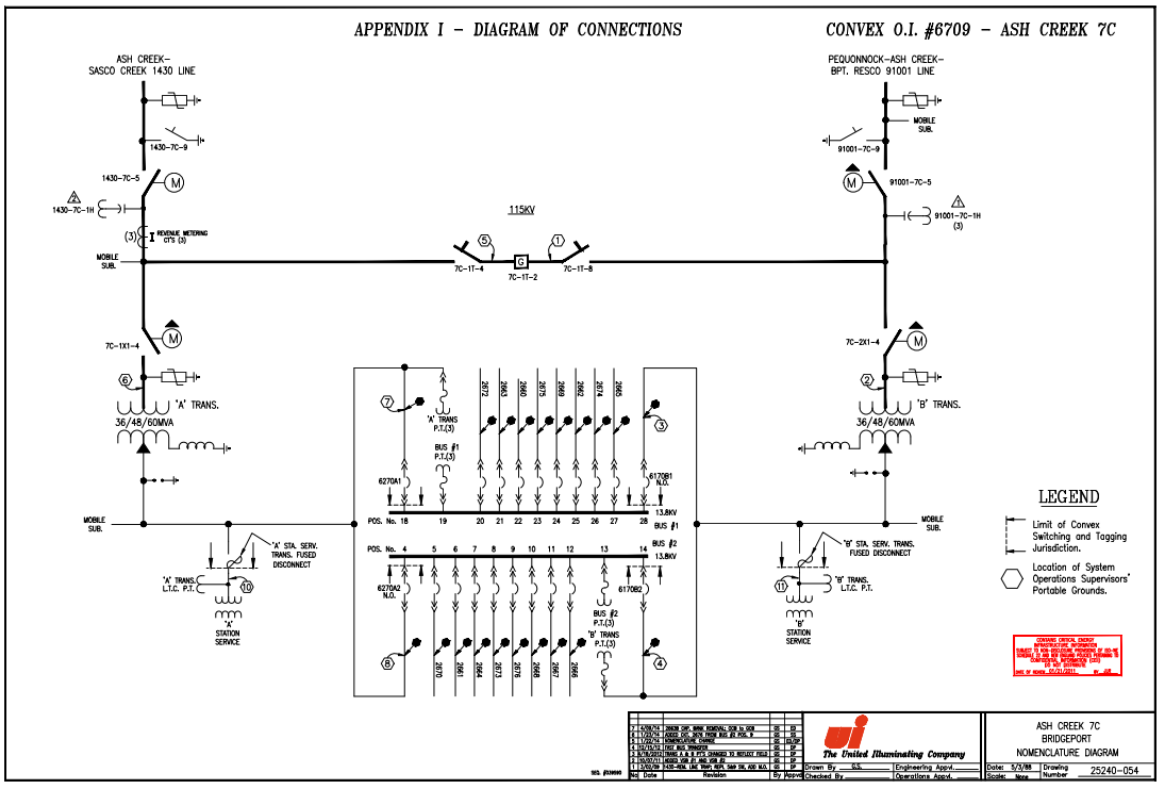

Figure 1: Ash Creek substation one-line diagram.

System Needs and Justification:

According to Avangrid Distribution Planning Criteria, the load on a substation with multiple transformers should not exceed the LTE (long term emergency) rating of the smallest (lowest rated) transformer. Additionally, a threshold of 90% should be used for transformer normal rating to actual loading to flag a capacity needs assessment. This threshold is established to proactively identify potential overloads and commence necessary work ahead of time, a process that typically extends over several years. This proactive approach assists in maintaining the stability and reliability of the power distribution system.

Based on the 90/10 load forecast scenario, UI Ash Creek substation is projected to exceed its rated capacity within the next decade. The Ash Creek substation serves 19,134 customers in the eastern part of Fairfield and is exposed to exceed 90% of its rated capacity in 2024 and reach full capacity by 2030, as indicated in Tables 2 and Table 3.

The most practical and cost-effective solution to this issue involves redistributing the load from one substation to another, leveraging existing circuit ties where possible. Consequently, this capacity project was developed to alleviate the potential overload on the Ash Creek substation. This proactive approach ensures the continued reliable service to all customers in the area.

Table 2: Ash Creek 90/10 peak load forecast

Substation	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Sub Rating MVA	2033 Thermal loading (90/10)
ASH CREEK	83.38	86.56	86.86	89.17	89.76	90.42	91.24	92.13	93.19	94.22	86	110%

Table 3: Ash Creek 90/10 thermal loading

Substation	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
ASH CREEK	97%	101%	101%	104%	104%	105%	106%	107%	108%	110%

Proposed Scope of Work

The scope of work for this project involves redistributing the load from the Ash Creek substation to the Pequonnock substation. Circuit 2502 at the Pequonnock substation, which has a large available capacity and many ties with the Ash Creek substation, has been selected for this purpose. The load from circuits 2667, 2676, and 2663 at Ash Creek will be transferred to circuit 2502, as represented in Figure 5.

The steps to complete this load transfer are as follows:

1. Transfer 128.8 A from circuit 2676 to circuit 2502 by closing the switch on pole 11090 and opening the one on pole 2231. This is represented in Figure 2.

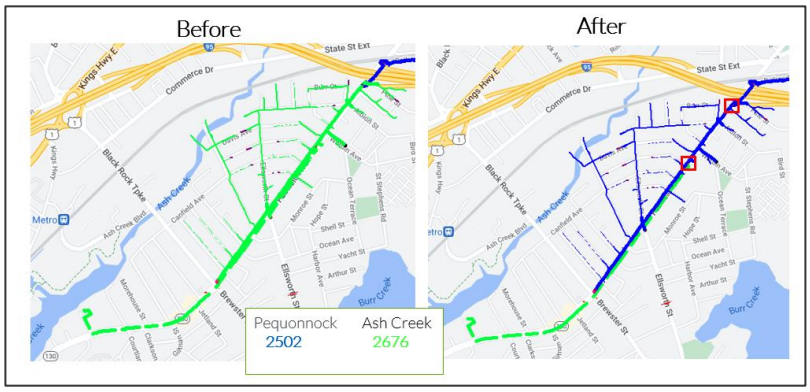

Figure 2: Step 1 - transfer the load through circuit ties.

2. Transfer approximately 60 A from circuit 2663 to circuit 2502 by closing the switch on P5516 and opening the one on P5520. This is represented in Figure 3.

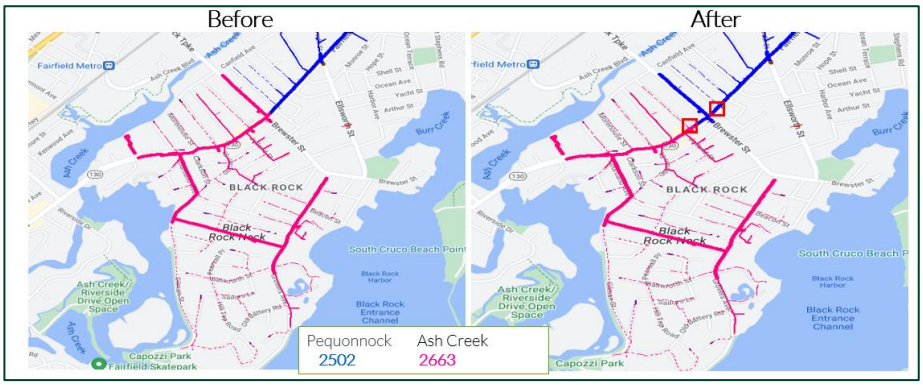

Figure 3: Step 2 - transfer the load through circuit ties.

3. Transfer around 47 A from circuit 2667 to circuit 2502 by close the switch between P2262 and P11464 and add a recloser on P2279 or P2280. This is represented in Figure 4.

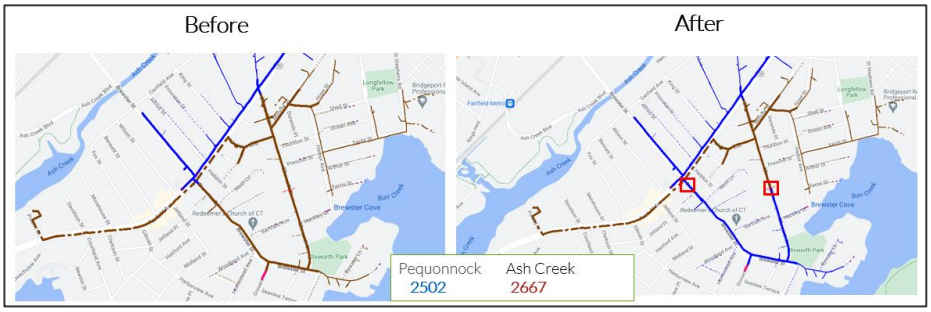

Figure 4: Step 3 - transfer the load through circuit ties.

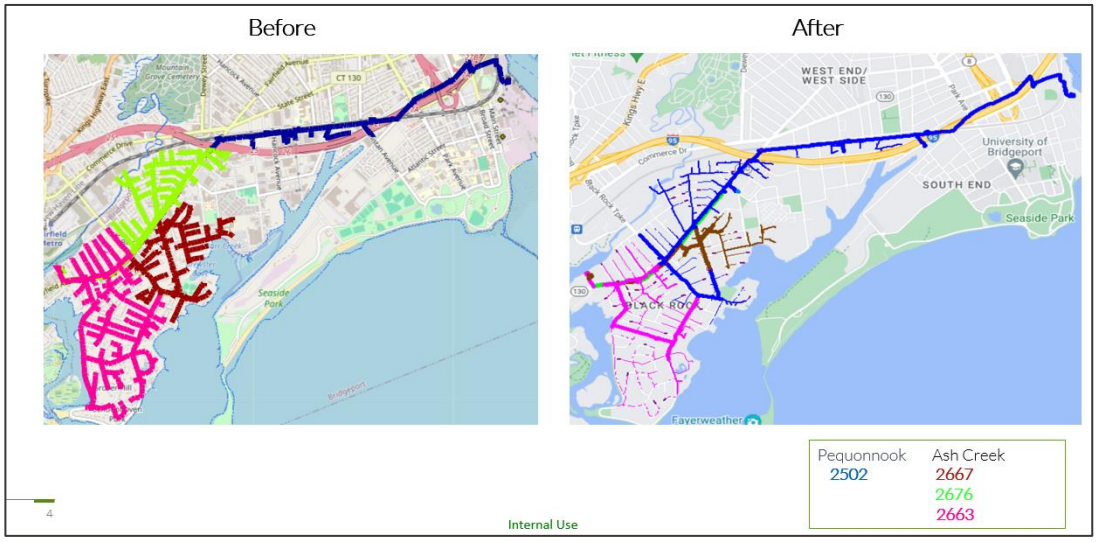

Figure 5: involved circuits before and after the proposed solution.

Table 5 shows the initial conditions and Table 6 final conditions of the involved circuits. After circuit 2502 has picked up the load from the Ash Creek substation, it is still not overloaded, and the number of customers is below 2,500. This achieves the load transfer criteria.

Table 1: Involved circuits initial conditions.

Substation	Circuit	Current				
		Normal Rating (A)	LTE Rating (A)	Peak Load (A)	Thermal Loading	Number of customers
Pequonnock	2502	274	405	51.64	19%	28
Ash Creek	2676	283	331	119.3	42%	1,348
Ash Creek	2667	274	405	130.3	47%	1,591
Ash Creek	2663	364	599	203.53	55%	2,267

Table 6: Involved circuits final conditions.

Substation	Circuit	After Preferred solution				
		Normal Rating (A)	LTE Rating (A)	2028 Projected peak load (A)	Thermal Loading	Number of customers
Pequonnock	2502	274	405	240.56	87%	2,099
Ash Creek	2676	283	331	0	0%	0
Ash Creek	2667	274	405	83.02	30%	1,002
Ash Creek	2663	364	599	142.2	39%	1,507

The total cost of mitigating the overload through the existing ties is $82,896, as represented in Table 7. This is considered the cheapest solution. This scope of work outlines the steps necessary to ensure the efficient operation of both substations and create room to the growing power demand in the region.

Table 7: Total cost of the project.

Material	Cost Estimate
15 kV - SCADA Controlled Recloser - 3 phase (one recloser)	$ 55,800
Overheads during all phases of the project	$ 13,596
Internal Labor	
Evaluation, Design and Support	$ 3,600
Support during project construction	$ -
Responsible for Design	$ 2,400
Switching 15 kV - Pad mounted switches (5 switches)	$ 7,500
Total Cost	**$ 82,896**

Solution Alternatives Considered:

To address the overload issue at the Ash Creek substation, several alternatives have been studied, evaluated, and compared with the chosen solution. These alternatives include:

1. **New feeder from Pequonnock to Ash Creek**: This alternative involves extending a new feeder from the Pequonnock substation to Ash Creek at an estimated cost of around $2,500,000. The new feeder can pick up some load from Ash Creek and mitigate the overload. This alternative is necessary and is applied in Project 2. Although transferring the extra load using only the existing ties is cheaper, it is not sufficient to solve the condition in the long term. Therefore, Project 2 (the new feeder) complements Project 1 (load transfer).

2. **Battery Energy Storage System (BESS)**: one potential solution involves installing a Battery Energy Storage System (BESS) with sufficient capacity to prevent overloads during the substation's peak hours. Specifically, during the peak in 2033, the battery would need to provide 7.1 MVA to avoid overloading, as depicted in Figure 6. The estimated battery size required for this purpose is 16 MWh. However, the cost associated with installing a BESS of this size is approximately $7,212,000, as indicated in Table 8. Despite its effectiveness, this alternative is significantly more expensive than the preferred solution and is no longer under consideration.

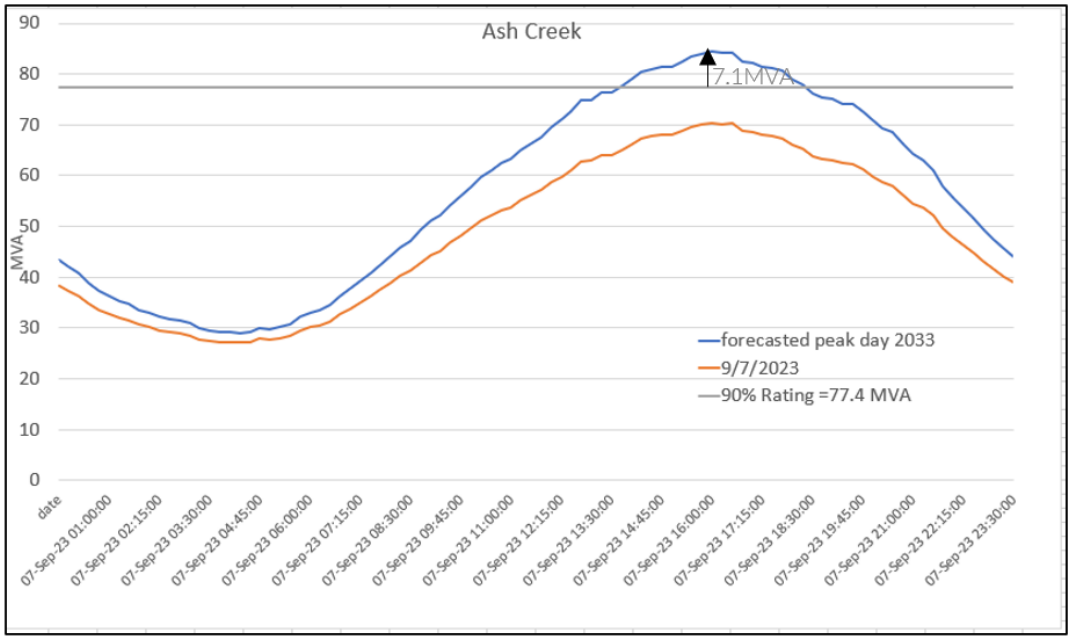

Figure 6: BESS assessment for Ash Creek substation

Table 8: BESS project cost estimate.

BESS Project Cost Estimate	
Engineering and Design	$160,731
Battery System and Electrical	$6,389,421
Civil/Structural	$446,634
Commissioning	$115,214
Land Lease	$100,000
Microgrid Equipment	$-
Total Cost	**$ 7,212,000**

3. **Upgrading the Substation's Transformers:** Another solution could be to upgrade the Ash Creek power transformers to 80 MVA instead of the existing 60 MVA transformers, to avoid future overloads at the substation. If the substation transformers are replaced, then the existing 2000-amp Switchgear should also be replaced with a 4000-amp bus to support the full capacity of the 80MVA transformers. The cost of upgrading the substation transformers and the switchgears is around $36 million, as represented in Table 9 and Table 10. This solution is significantly more expensive than the preferred solution and is therefore no longer considered.

Table 9: Total cost for upgrading the substation switchgear.

Substation switchgear upgrade Cost Estimate	
Construction	$1,715,045
In-Ground	$566,900
Above-Ground	$1,148,145
Procurement	$2,093,529
Procurement Phase 1 (30%)	$628,059
Procurement Phase 2 (70%)	$1,465,470
Pre-Conceptual & Conceptual Eng	$228,514
Digital Engineering	$342,772
PM/PMO/CONST External labor	$1,168,448
Warehouse Cost	$300,00
Tax	$286,676
Contingency	$3,067,492
Overheads	$3,090,218
Escalation	$913,289
Subtotal W/O actuals	**$13,205,984**
Total Cost	**$13,205,984**

Table 10: Total cost for upgrading the power transformers.

Substation switchgear upgrade Cost Estimate	
Construction	$1,817,240
In-Ground	$1,314,000
Above-Ground	$503,240
Transmission line	$0
Procurement	$4,800,000
Procurement Phase 1 (30%)	$1,440,000
Procurement Phase 2 (70%)	$3,360,000
P&C and A&I commissioning	$0
Land Acquisition	$0
Permits	$0
Pre-Conceptual & Conceptual Eng	$398,034
Digital Engineering	$595,552
PM/PMO/CONST External labor	$2,032,364
Warehouse Cost	$360,000
Tax	$498,398
Contingency	$5,250,294
Overheads	$5,913,392
Escalation	$1,573,211
Subtotal W/O actuals	**$23,237,484**
Total Cost	**$23,237,484**

Selected Solution Justification:

The chosen solution for mitigating the risk of overload in Ash Creek involves a strategic load transfer to the neighboring Pequonnock substation. This substation was selected due to its forecasted availability of ample capacity. The plan is to transfer as much load as possible through the existing circuit ties to Pequonnock (Project 1) and then construct a new feeder from the same substation to accommodate the remaining load (Project 2).

This load transfer solution, referred to as Project 1, was chosen primarily for its economic feasibility. It presents the most cost-effective approach to addressing the overload risk in the long term. By leveraging the existing infrastructure and capacity at Pequonnock, we can minimize the need for new construction and equipment, thereby reducing costs.

In conclusion, the selected solution offers a balanced approach to risk mitigation, combining efficient use of existing resources with strategic new construction to ensure capacity to accommodate the short and long-term demand growth at Ash Creek substation.

Risk of No Action:

1. **Impact on Economic Growth and Development**: Failing to act in advance can lead to capacity bottlenecks, extending the timeline required to accommodate new customer requests. This inaction can negatively impact the economic development of the area, slowing down the roll-out of beneficial electrification plans. These plans include the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development.
2. **Reduced Lifespan**: Overloading can significantly reduce the lifespan of a transformer within the substation. It can cause damage to insulation, winding, and other components, leading to premature failure.
3. **Reduced Efficiency**: Overloading also affects the efficiency of the transformer. When a transformer operates beyond its rated capacity, it becomes less efficient.
4. **Safety Hazards**: Overloading can cause the transformer to overheat, posing a fire risk or even an explosion.

In summary, overloading a power substation can compromise safety, reduce equipment lifespan, and increase operational costs. Proper load management and preventive measures are crucial to mitigate these risks. Therefore, taking no action is not a viable option, as it could lead to serious consequences.

Project Benefits:

1. **Reliability**: Enhancing capacity in this substation will help meet reliability requirements by avoiding outages caused by overloads.
2. **Economic Development**: It can facilitate the roll-out of beneficial electrification plans such as the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development. This can stimulate economic growth and progress in the region.
3. **Cost Efficiency**: the solution proposed in Project 1 is the least costly when compared with other alternatives.
4. **Accommodation of New Load**: It will increase capacity in Ash Creek and will allow for the interconnection of new generation and load, effectively managing the increased demand.
5. **Environmental Impact**: Increased capacity can accommodate more distributed energy sources (DER), contributing to a cleaner and more sustainable energy sector.
6. **Safety**: By preventing overloading, these projects can enhance the safety of the power grid.

Project Relationships (if applicable):

After the completion of Project 1, it is projected that Ash Creek will be exposed to reach 97% of its capacity by 2028, and this figure is expected to rise to 104% by 2033. However, Project 1 alone is not a long-term solution to the issue at hand. As such, an additional load transfer project is necessary. Consequently, Project 2 was developed to construct a new feeder from the Pequonnock substation. This new feeder will accommodate the extra load from Ash Creek, effectively complementing the efforts of Project 1. It is crucial that the execution of Project 2 commences after the completion of Project 1.

2. Funding Detail

Substation	90/10 Forecast in 2033	In service year	Cost preferred solution	Budget - Year 1	IP status	PPM Project ID
Ash Creek	110%	2026	$82,896	$82,896	Technical (IP2)	PRJ-005374

An Avangrid company

The United Illuminating Company - Electric Capex Projects/Programs

1. Summary

Project Title: UI Capacity Program - Ash Creek Substation Project 2

Project Sponsor: Lucas Cruz (D. Planning)

PPM Project ID#: PRJ-005375

Type: Project

Functional grouping: Capacity

Work Category: Other Asset Condition (Thermal)

IP Status: Technical (IP2)

Total Funding Request: $2,491,368

Estimated Start Year (IP3 Execution): 2026

Estimated In Service Year (Energized): 2028

Project Description & One-Line:

The UI Ash Creek substation is a critical infrastructure that serves 19,134 customers in the eastern part of Fairfield through 15 distribution circuits. Currently, it is the most loaded substation in the UI territory. Projections based on the 90/10 weather scenario indicate that this substation is exposed to exceed 90% of its rated capacity in 2024 and reach full capacity by 2030.

To address this issue, the most practical and cost-effective solution involves redistributing the load from one substation to another, leveraging existing circuit ties. The UI distribution planning team has developed this capacity project to alleviate the potential overload on the Ash Creek substation and create room for future growth. This is particularly important in light of beneficial electrification plans such as electric vehicles, the electrification of heating systems and others.

The solution involves transferring approximately 11.7 MVA out of the Ash Creek substation to avoid the risk of exceeding its capacity in the next 10 years. This load is planned to be transferred to the Pequonnock substation through two project solutions:

1. Project 1: This project involves transferring 5.6 MVA from Ash Creek to Pequonnock through the existing circuit ties. This fast, low-cost solution is proposed to mitigate the overload for the next 5 years and buy some time needed to complete Project 2.
2. Project 2: This project involves extending a new circuit from Pequonnock to Ash Creek area to pick up some load (around 7.2 MVA).

After the implementation of Project 2, Ash Creek is expected to reach 89% of its rating in 2028, instead of 97% after project 1. Meanwhile, Pequonnock is still expected to be below its 90% capacity. This strategic load redistribution will ensure the efficient operation of both substations and provide room for the growing power demand in the region.

Table 1 :Ash Creek and Pequonnock substations forecasted 90/10 thermal loading.

Year	Forecasted 90/10 thermal loading			
	Ash Creek Substation		Pequonnock Substation	
	AFTER Project 1	AFTER Project 2	AFTER Project 1	AFTER Project 2
2028	97%	89%	53%	63%
2033	103%	95%	69%	79%

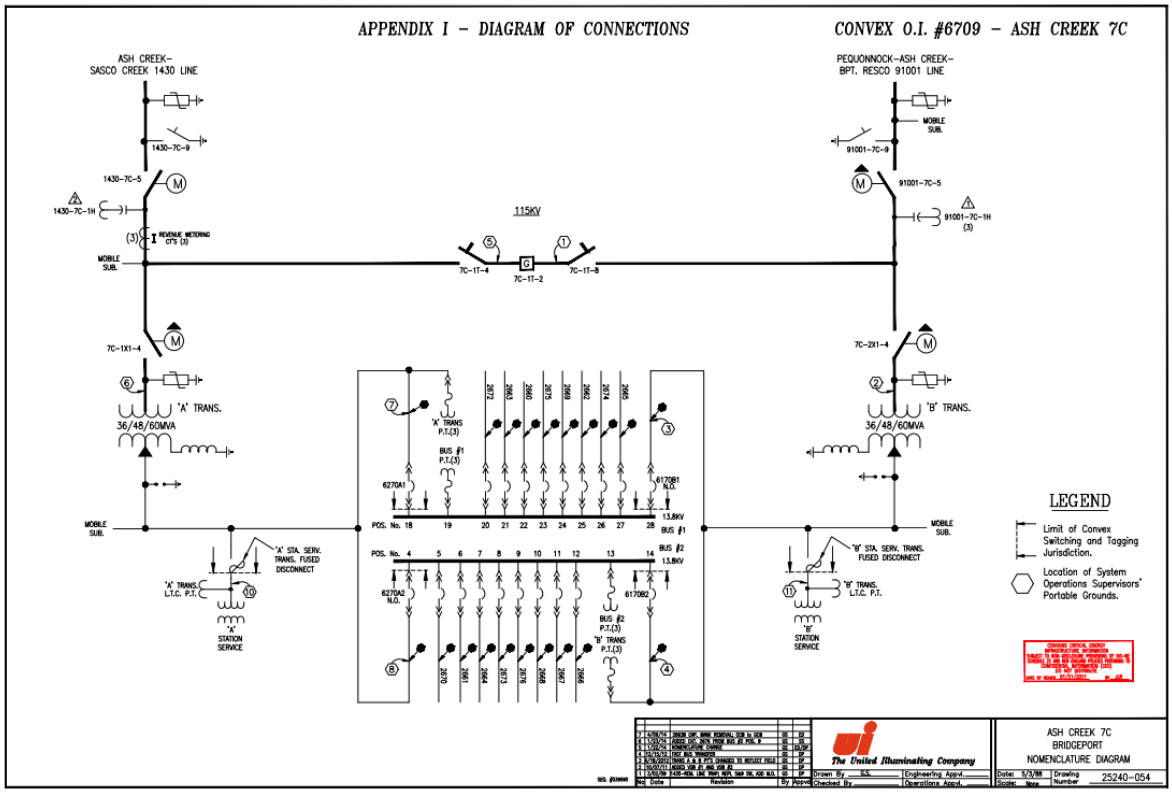

Figure 1: Ash Creek substation one-line diagram.

System Needs and Justification:

According to Avangrid Distribution Planning Criteria, the load on a substation with multiple transformers should not exceed the LTE (long term emergency) rating of the smallest (lowest rated) transformer. Additionally, a threshold of 90% should be used for transformer normal rating to actual loading to flag a capacity needs assessment. This threshold is established to proactively identify potential overloads and commence necessary work ahead of time, a process that typically extends over several years. This proactive approach assists in maintaining the stability and reliability of the power distribution system.

Based on the 90/10 load forecast scenario, UI Ash Creek substation is projected to exceed its rated capacity within the next decade. The Ash Creek substation serves 19,134 customers in the eastern part of Fairfield and is exposed to exceed 90% of its rated capacity in 2024 and reach full capacity by 2030, as indicated in Tables 2 and Table 3.

The most practical and cost-effective solution to this issue involves redistributing the load from one substation to another, leveraging existing circuit ties where possible, and this is done in project 1 moving 5.6 MVA from Ash Creek to Pequonnock , However, additional load relief from Ash Creek is necessary to avoid the risk of overloading, therefore project 2 is proposed , where a new circuit supposed to be installed in Pequonnock substation and extended to Ash creek to pick up 7.2 MVA. Consequently, this capacity project was developed to alleviate the potential overload on the Ash Creek substation. This proactive approach ensures the continued reliable service to all customers in the area.

Table 2: Ash Creek 90/10 peak load forecast

Substation	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Sub Rating MVA	2033 Thermal loading (90/10)
ASH CREEK	83.38	86.56	86.86	89.17	89.76	90.42	91.24	92.13	93.19	94.22	86	110%

Table 3: Ash Creek 90/10 thermal loading

Substation	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
ASH CREEK	97%	101%	101%	104%	104%	105%	106%	107%	108%	110%

Proposed Scope of Work

The scope of work for this project involves utilizing a spare position at the Pequonnock substation to develop a new circuit capable of picking up around 7.2 MVA from Ash Creek substation. This new circuit is specifically planned to pick up the load from Ash Creek circuits 2661 and 2662.

The new circuit's path will commence underground, extending approximately 4400 feet from the Pequonnock substation, located on Broad Street, to a new riser pole (as shown in Figure 2). From this riser pole, the circuit will continue along Railroad Ave, employing a new aerial cable that spans an estimated 7000 feet.

Subsequently, the circuit will descend back underground, rising at a new pole to cross interstate highway I-95. This segment will cover approximately 1000 feet of underground cable. Finally, the aerial cable will extend along Commerce Drive, connecting to P3132 and circuit 2662, covering approximately 3700 feet.

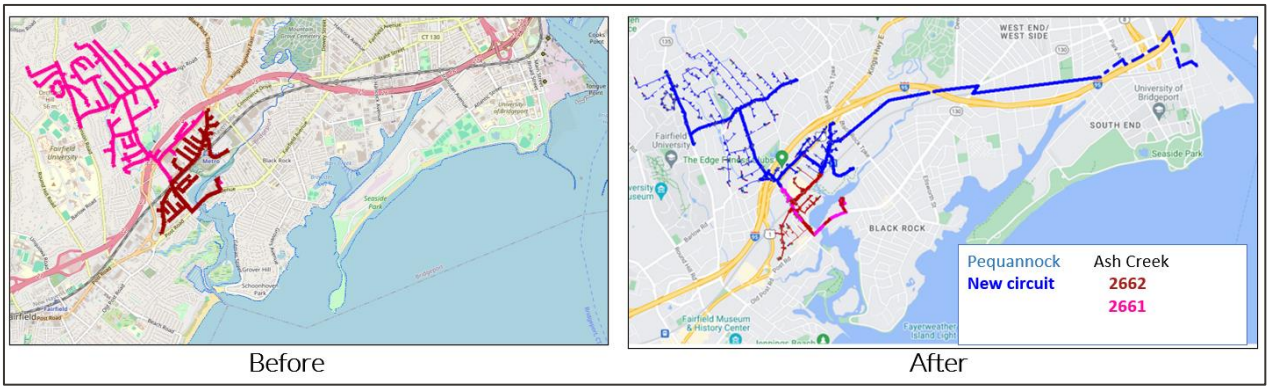

Figure 2: The Path of the new circuit

The steps to complete the load transfer from circuits 2662 and 2661 to the new circuit are as follows:

1. Connect the new feeder and circuit 2662 by linking it to P3132. Add a new SCADA recloser between P1450 and P1098 to transfer approximately 110 Amps and 365 customers from circuit 2662 to the new circuit. This process is represented in Figure 3.

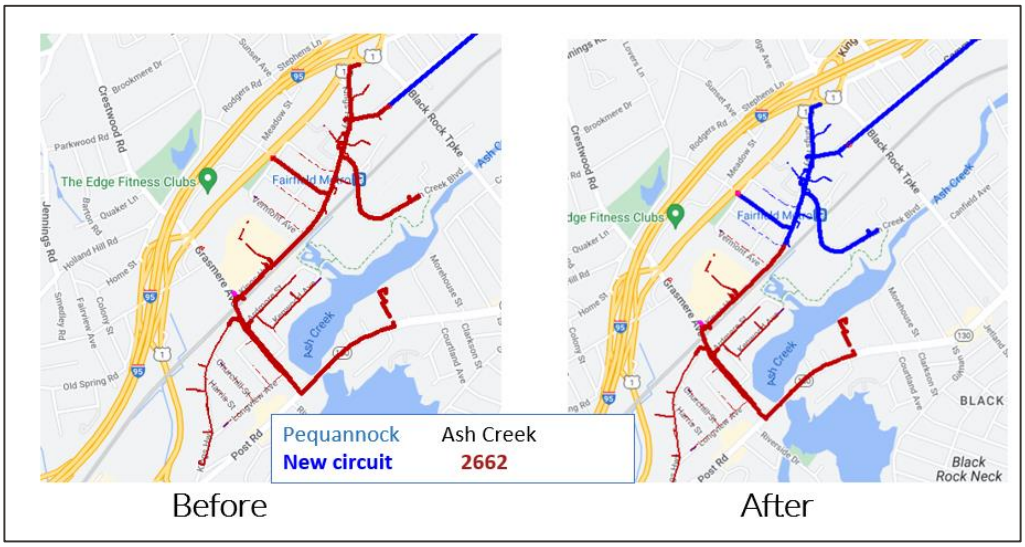

Figure 3: Step 1 - transfer the load to the new circuit.

2. Close the switch on P3180 to connect the new feeder to circuit 2661. Add a new SCADA recloser on P2250 to transfer approximately 188 Amps and 883 customers from circuit 2662 to the new circuit. This process is represented in Figure 4.

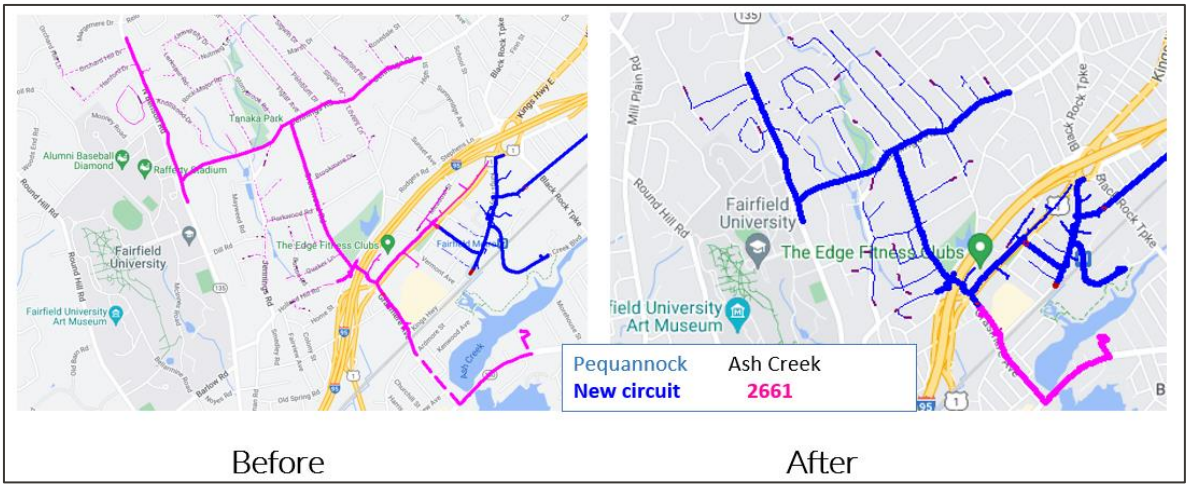

Figure 4: Step 2 - transfer the load to the new circuit.

Table 4 shows the initial conditions and Table 5 final conditions of the involved circuits. After the new circuit has picked up the load from the Ash Creek substation, it remains non-overloaded, and the customer count is maintained below 2500. This achieves the load transfer criteria.

Table 4: Involved circuits initial conditions.

Substation	Circuit	Current				
		Normal Rating (A)	LTE Rating (A)	Peak Load (A)	Thermal Loading	Number of customers
PEQUONNOCK	New circuit	429	599	0.0	0%	0
ASH CREEK	2662	338	388	147.3	44%	823
ASH CREEK	2661	274	405	160.7	59%	902

Table 5: Involved circuits final conditions.

Substation	Circuit	After Preferred solution				
		Normal Rating (A)	LTE Rating (A)	2033 Projected peak load (A)	Thermal Loading	Number of customers
PEQUONNOCK	New circuit	343	394	304.07	88%	1,248
ASH CREEK	2662	338	388	37.6	11%	458
ASH CREEK	2661	274	405	0	0%	0

The total cost of mitigating the overload through the new ties with the new circuit is $2,491,368, as represented in Table 6. This is considered the cheapest solution. This scope of work outlines the steps necessary to ensure the efficient operation of both substations and create room to the growing power demand in the region.

Table 6: Total cost of the project.

Material	Cost Estimate
15kV - New Three Phase poles (62 poles)	$ 362,700
15kV - Three Phase Mainline OH conductor (62 sections)	$ 54,405
15kV - SCADA Controlled Recloser – 3 phases (2 reclosers)	$ 120,900
15kV – Under Ground cable- 750 CU 3Ø Primary (18 sections)	$ 1,228,500
Overheads during all phases of the project	**$ 449,263.10**
Internal Labor	
Evaluation, Design and Support	$ 93,600
Support during project construction	$ 111,800
Responsible for Design	$ 35,100
Allocations assigned to the project	$ 35,100
Total Cost	**$ 2,491,368**

Solution Alternatives Considered:

To address the overload issue at the Ash Creek substation, several alternatives have been studied, evaluated, and compared with the chosen solution. These alternatives include:

1. **Alternative path for the new feeder:** An alternative approach would involve installing overhead lines for the new circuit along State Street instead of Railroad Ave, as shown in Figure 5. This consideration arises due to the narrow space on Railroad Ave. However, this alternative is slightly more expensive than the preferred solution. The estimated total cost for this alternative path is approximately $2,598,066.

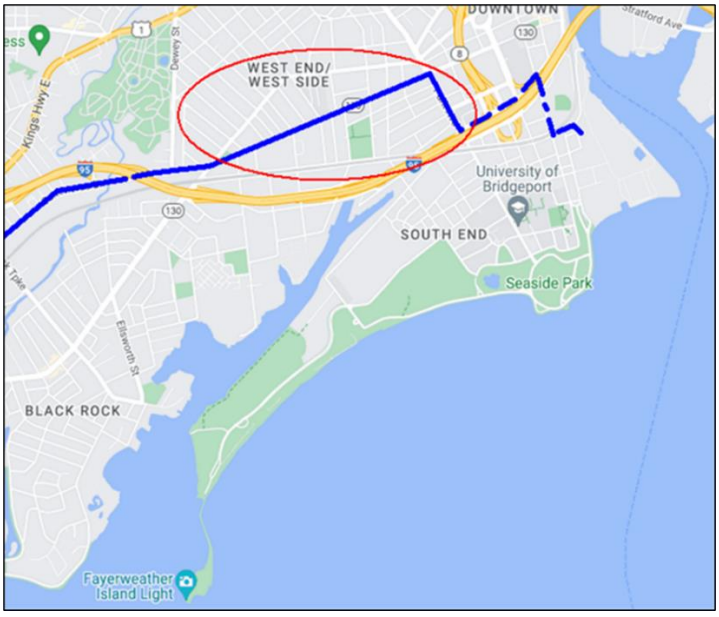

Figure 5: An alternative path for the new circuit

2. **Battery Energy Storage System (BESS)**: one potential solution involves installing a Battery Energy Storage System (BESS) with sufficient capacity to prevent overloads during the substation's peak hours. Specifically, during the peak in 2033, the battery would need to provide 7.1 MVA to avoid overloading, as depicted in Figure 6. The estimated battery size required for this purpose is 16 MWh. However, the cost associated with installing a BESS of this size is approximately $7,212,000, as indicated in Table 8. Despite its effectiveness, this alternative is significantly more expensive than the preferred solution and is no longer under consideration.

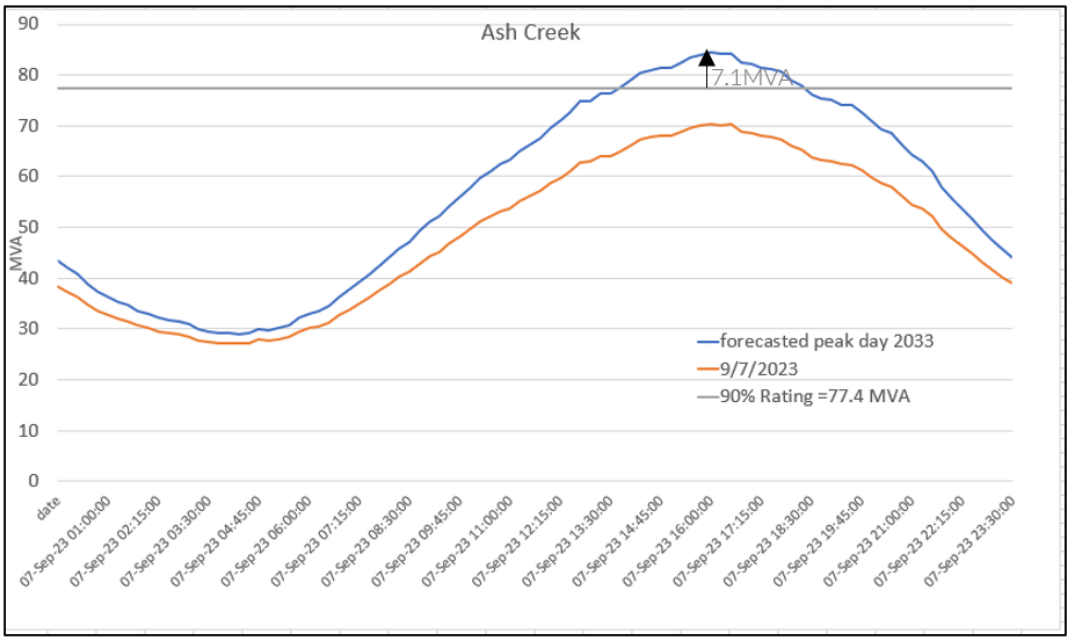

Figure 6: BESS assessment for Ash Creek substation

Table 8: BESS project cost estimate.

BESS Project Cost Estimate	
Engineering and Design	$160,731
Battery System and Electrical	$6,389,421
Civil/Structural	$446,634
Commissioning	$115,214
Land Lease	$100,000
Microgrid Equipment	$-
Total Cost	**$ 7,212,000**

3. **Upgrading the Substation's Transformers:** Another solution could be to upgrade the Ash Creek power transformers to 80 MVA instead of the existing 60 MVA transformers, to avoid future overloads at the substation. If the substation transformers are replaced, then the existing 2000-amp Switchgear should also be replaced with a 4000-amp bus to support the full capacity of the 80MVA transformers. The cost of upgrading the substation transformers and the switchgears is around $36 million, as represented in Table 9 and Table 10. This solution is significantly more expensive than the preferred solution and is therefore no longer considered.

Table 9: Total cost for upgrading the substation switchgear.

Substation switchgear upgrade Cost Estimate	
Construction	$1,715,045
In-Ground	$566,900
Above-Ground	$1,148,145
Transmission line	$0
Procurement	$2,093,529
Procurement Phase 1 (30%)	$628,059
Procurement Phase 2 (70%)	$1,465,470
P&C and A&I commissioning	$0
Land Acquisition	$0
Permits	$0
Pre-Conceptual & Conceptual Eng	$228,514
Digital Engineering	$342,772
PM/PMO/CONST External labor	$1,168,448
Warehouse Cost	$300,00
Tax	$286,676
Contingency	$3,067,492
Overheads	$3,090,218
Escalation	$913,289
Subtotal W/O actuals	**$13,205,984**
Total Cost	**$13,205,984**

Table 10: Total cost for upgrading the power transformers.

Substation switchgear upgrade Cost Estimate	
Construction	$1,817,240
In-Ground	$1,314,000
Above-Ground	$503,240
Transmission line	$0
Procurement	$4,800,000
Procurement Phase 1 (30%)	$1,440,000
Procurement Phase 2 (70%)	$3,360,000
P&C and A&I commissioning	$0
Land Acquisition	$0
Permits	$0
Pre-Conceptual & Conceptual Eng	$398,034
Digital Engineering	$595,552
PM/PMO/CONST External labor	$2,032,364
Warehouse Cost	$360,000
Tax	$498,398
Contingency	$5,250,294
Overheads	$5,913,392
Escalation	$1,573,211
Subtotal W/O actuals	**$23,237,484**
Total Cost	**$23,237,484**

Selected Solution Justification:

The chosen solution for mitigating the risk of overload in Ash Creek involves a strategic load transfer to the neighboring Pequonnock substation. This substation was selected due to its forecasted availability of ample capacity. The plan is to transfer as much load as possible through the existing circuit ties to Pequonnock (Project 1) and then construct a new feeder from the same substation to accommodate the remaining load (Project 2).

The construction of a new feeder, referred to as Project 2, was chosen primarily for its economic feasibility, since the cost of this solution is low compared to other alternatives.

In conclusion, the selected solution offers a balanced approach to risk mitigation, combining efficient use of existing resources with strategic new construction to ensure capacity to accommodate the short and long-term demand growth at Ash Creek substation.

Risk of No Action:

1. **Impact on Economic Growth and Development**: Failing to act in advance can lead to capacity bottlenecks, extending the timeline required to accommodate new customer requests. This inaction can negatively impact the economic development of the area, slowing down the roll-out of beneficial electrification plans. These plans include the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development.
2. **Reduced Lifespan**: Overloading can significantly reduce the lifespan of a transformer within the substation. It can cause damage to insulation, winding, and other components, leading to premature failure.
3. **Reduced Efficiency**: Overloading also affects the efficiency of the transformer. When a transformer operates beyond its rated capacity, it becomes less efficient.
4. **Safety Hazards**: Overloading can cause the transformer to overheat, posing a fire risk or even an explosion.

In summary, overloading a power substation can compromise safety, reduce equipment lifespan, and increase operational costs. Proper load management and preventive measures are crucial to mitigate these risks. Therefore, taking no action is not a viable option, as it could lead to serious consequences.

Project Benefits:

1. **Reliability**: Enhancing capacity in this substation will help meet reliability requirements by avoiding outages caused by overloads.
2. **Economic Development**: It can facilitate the roll-out of beneficial electrification plans such as the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development. This can stimulate economic growth and progress in the region.
3. **Cost Efficiency**: the solution proposed in Project 2 is the least costly when compared with other alternatives.
4. **Accommodation of New Load**: It will increase capacity in Ash Creek and will allow for the interconnection of new generation and load, effectively managing the increased demand.
5. **Environmental Impact**: Increased capacity can accommodate more distributed energy sources (DER), contributing to a cleaner and more sustainable energy sector.
6. **Safety**: By preventing overloading, these projects can enhance the safety of the power grid.

Project Relationships (if applicable):

Ash Creek Substation Project 2 is designed to complement Project 1. After the completion of Project 1, it is anticipated that Ash Creek will approach 97% of its capacity by 2028, with projections indicating a rise to 103% by 2033. The new feeder, as planned in Project 2, will accommodate the additional load from Ash Creek, in this way effectively enhancing the efforts of Project 1. It is crucial that the execution of Project 2 commences after the competition of Project 1.

2. Funding Detail

Substation	90/10 Forecast in 2033	In service year	Cost preferred solution	Budget - Year 1	Budget - Year 2	Budget – Year 3	IP status	PPM Project ID
Ash Creek	110%	2028	$2,491,368	$249,137	$1,494,820	$747,410	Technical (IP2)	PRJ-005375

An Avangrid company

The United Illuminating Company - Electric Capex Projects/Programs

1. Summary

Project Title: UI Capacity Program – Hawthorne Circuit 2682

Project Sponsor: Lucas Cruz (D. Planning)

PPM Project ID#: PRJ-005136

Type: Project

Functional grouping: Capacity

Work Category: Other Asset Condition (Thermal)

IP Status: Technical (IP2)

Total Funding Request: $77,040

Estimated Start Year (IP3 Execution): 2028

Estimated In Service Year (Energized): 2028

Project Description:

Hawthorne Circuit 2682, originating from the Hawthorne substation in UI's western area, is a distribution circuit serving approximately 1,783 customers. Over the past three years, this circuit has consistently operated close to its rated capacity, making it one of the most heavily loaded circuits within the UI territory.

To alleviate this issue, the most feasible and cost-effective solution is to redistribute the load between circuits, utilizing existing circuit ties. The UI distribution planning team has developed a capacity project aimed at reducing the thermal load on Hawthorne Circuit 2682, thereby creating room for future growth. This initiative is crucial, especially considering the beneficial electrification plans, which include the introduction of electric vehicles and the electrification of heating systems, among others.

The proposed solution involves the transfer of approximately 104 A and 573 customers from Circuit 2682 to Circuit 2688, and 12 A and 76 customers from Circuit 2682 to Circuit 2615. Both circuits are in Hawthorne substation. This transfer aims to prevent Circuit 2682 from exceeding 90% of its rated capacity in the foreseeable future.

Upon the implementation of this solution, the load on Circuit 2682 is projected to decrease to 67.3% of its rated capacity, a significant reduction from the 99.5% thermal loading experienced in the summer of 2021. This strategic load redistribution with the new circuit will not only ensure the efficient operation of both circuits but also accommodate the region's growing power demand.

System Needs and Justification:

According to the Avangrid Distribution Planning Criteria, a threshold of 90% is set for the ratio of actual loading to circuit normal rating, serving as trigger for a capacity needs assessment. This threshold is designed to prevent potential overloads by starting major circuit work in advance. Furthermore, the number of customers per circuit should be limited to 2,000 – 2,500 for 15kV class distribution feeders.

As represented in Table 1, the thermal loading of Hawthorne Circuit 2682 has consistently exceeded 90% of its normal capacity in 2021, even nearly reaching its rated capacity in 2022. During the summer of 2022, the peak load frequently exceeded 90% of the rated capacity, particularly in the middle of August. On August 13, 2021, the circuit experienced its highest peak in the last three years, with the load exceeding 99.5% of the rated capacity, as shown in Figure 1.

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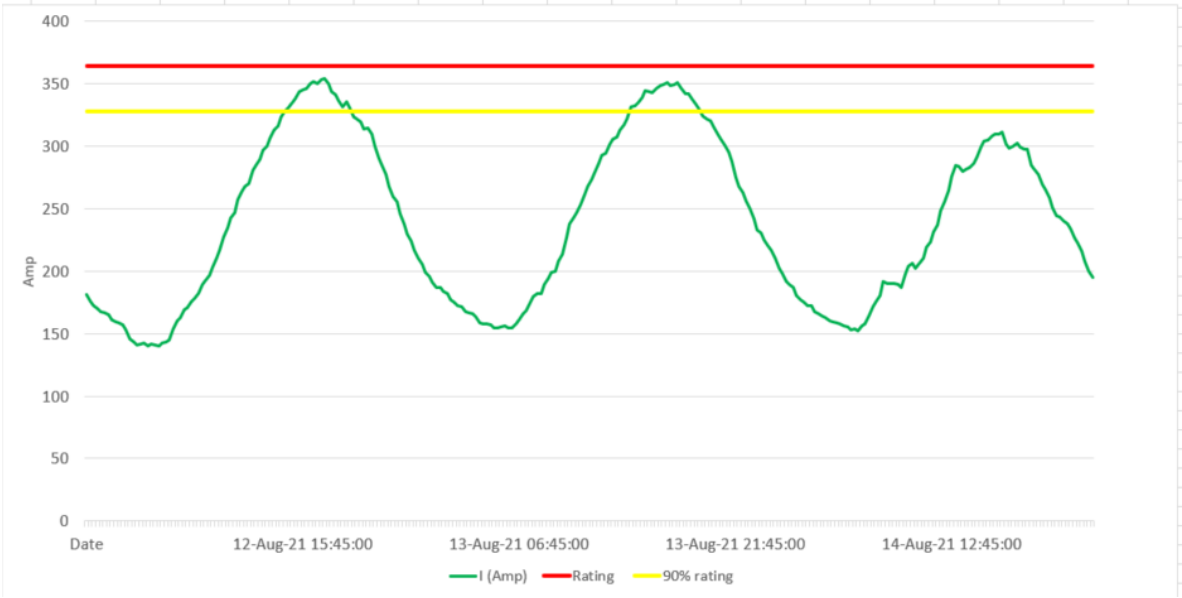

Figure 1: Circuit 2682 peak load in the last 3 years

Table 1: Circuit 2682 peak load in the last 3 years

Circuit	Substation	Normal rating (A)	2023 Summer peak load (A)	2023 Thermal loading	2022 Summer peak load (A	2022 Thermal loading	2021 Summer peak load (A	2021 Thermal loading	Number of customers
2682	Hawthorne	364	330	90.6%	349	96.0%	362	99.5%	1,783

The most practical and cost-effective solution to this issue involves redistributing load from one circuit to another, capitalizing on existing circuit ties where possible. As a result, this capacity project was developed to mitigate the potential overload on Hawthorne Circuit 2682. This proactive measure ensures the continued reliable service to all customers in the area.

Proposed Scope of Work

The project's scope of work involves transferring load from Circuit 2682 to neighboring circuits of both Hawthorne substation and Old Town substation, by applying the following steps:

STEP 1

This step can be implemented by transferring around 31A and 94 customers from Circuit 2688 to the New Circuit from Hawthorne substation indicated as the preferred proposed solution for UI Capacity Program - Hawthorne Circuit 2683. Thus, around 104A and 573 customers can be transferred from Hawthorne Circuit 2682 to Hawthorne Circuit 2688and by applying the followings and as shown in Figure 2:

- Close the existing Air breaker Switch at pole P2081. It will be the new tie between New Circuit& Circuit 2688.
- Open the existing Air breaker Switch at Pole P2070 in Circuit 2688.
- Install a SCADA Recloser at Pole P1722. It will be the new tie between Circuit 2682 & Circuit 2688.
- Close the existing Recloser 57345 at Pole P9999 in Circuit 2688.

STEP 2

This step can be implemented by transferring around 12A and 76 customers from Hawthorne Circuit 2682 to Old Town Circuit 2615 and by applying the followings and as shown in Figure 2:

- Close the existing Air breaker Switch at pole P865.
- Open the existing Air breaker Switch at pole P2070.

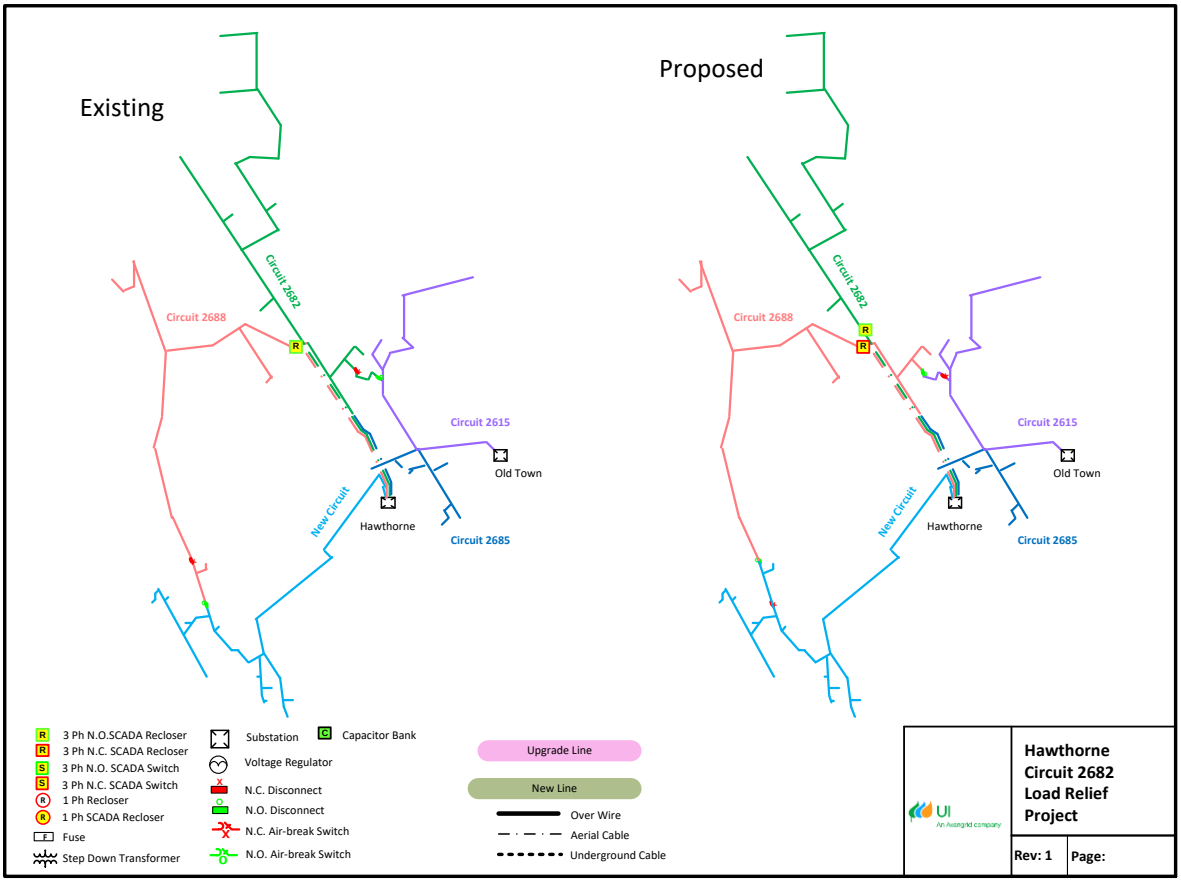

Figure 2: Transfer load from Circuit 2682 to the involved circuits

Table 2 shows the initial condition, and Table 3 the final conditions of the involved circuits. After applying step 1 and step 2. There will be a reduction in both thermal loading and the number of customers served in Circuit 2682.

Table 2: Involved circuits initial conditions.

Circuit	Substation	Current				
		Normal rating (A)	LTE rating (A)	Max peak load in the last 3 years (A)	Thermal loading	Number of customers
2682	Hawthorne	364	599	362	99.5%	1,783
New Circuit	Hawthorne	364	599	0	0	0
2688	Hawthorne	364	599	260	71.5%	1108
2615	Old Town	329	599	282	85.7%	1072

Table 3: Involved circuits final conditions.

Circuit	Substation	After Preferred Solution				
		Normal rating (A)	LTE rating (A)	Max peak Load in the last 3 years (A)	Thermal loading	Number of customers
2682	Hawthorne	364	599	245	67.3%	1,134
New Circuit	Hawthorne	364	599	304	84%	1071
2688	Hawthorne	364	599	333	92%	1681
2615	Old Town	329	599	294	89%	1148

The project's implementation cost is$77,040, as detailed in Table 4. This is considered the cost-effective solution. The outlined scope of work ensures the efficient operation of both substations and accommodates the region's growing power demand.

Table 1: Total cost of the project.

Category	Cost Estimate
Material	
15 kV - SCADA Controlled Recloser - 3 phase (1 reclosers)	$55,800
Overheads during all phases of the project	$12,540
Internal Labor	
Evaluation, Design and Support	$1,200
Support during project construction	
Responsible for Design	
Allocations assigned to the project	
Switching operation at 15 kV - Pad mounted switches (5 devices)	$7,500
Total Cost	**$77,040**

Solution Alternatives Considered:

In addressing the overload issue on Circuit 2682, An alternative solution was studied, evaluated, and compared with the chosen solution. This alternative include:

1. Wait until Old Town complete substation and Getaway upgrade for load transfer from Hawthorne Circuit 2682 to Old Town Circuit super feeder 2615. Extend the aerial cable for 2682 approximately 2 miles and transfer load to 2615. The estimated cost of this solution is $879,041.

Risk of No Action:

1. **Impact on Economic Growth and Development**: Failing to act in advance can lead to capacity bottlenecks, extending the timeline required to accommodate new customer requests. This inaction can negatively impact the economic development of the area, slowing down the roll-out of beneficial electrification plans. These plans include the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development.
2. **Equipment Damage:** Overloading can cause damage to the feeder cables, switches, and other components. It may lead to insulation breakdown, overheating, and premature wear.
3. **Reduced System Reliability:** Overloaded feeders are more prone to faults, which can disrupt power supply and affect reliability.
4. **Increased Energy Loss:** Overloaded feeders consume more energy, leading to higher losses and inefficiency.
5. **Fire Hazard:** Overheating due to prolonged overloading increases the risk of fire in the feeder or nearby equipment.

In summary, overloading a distribution feeder can compromise safety, reduce equipment lifespan, and increase operational costs. Proper load management and preventive measures are crucial to mitigate these risks. Therefore, taking no action is not a viable option, as it could lead to serious consequences.

Project Benefits:

1. **Reliability**: Enhancing capacity in this feeder will help meet reliability requirements by avoiding outages caused by overloads.
2. **Economic Development**: It can facilitate the roll-out of beneficial electrification plans such as the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development. This can stimulate economic growth and progress in the region.
3. **Cost Efficiency**: the solution proposed in this project is the least costly when compared with other alternatives.
4. **Accommodation of New Load**: It will increase capacity of Hawthorne Circuit 2682, and it will allow for the interconnection of new generation and load, effectively managing the increased demand.
5. **Environmental Impact**: Increased capacity can accommodate more distributed energy sources (DER), contributing to a cleaner and more sustainable energy sector.

6. **Safety**: By preventing overloading, these projects can enhance the safety of the power grid.

Project Relationships (if applicable):

It is important to prioritize first the implementation of 'UI Capacity Program - Hawthorne Circuit 2683' project to facilitate the execution of this project. These two projects are closely correlated and should be approached as part of an integrated strategy.

2. Funding Detail

Substation	Circuit	3-year highest thermal loading	In service year	Cost preferred solution	Budget - Year 1	IP status	PPM Project ID
Hawthorne	2682	99.5%	2028	$77,040	$77,040	Technical (IP2)	PRJ-005136

An Avangrid company

The United Illuminating Company - Electric Capex Projects/Programs

1. Summary

Project Title: UI Capacity Program – Hawthorne Circuit 2683

Project Sponsor: Lucas Cruz (D. Planning)

PPM Project ID#: PRJ-005129

Type: Project

Functional grouping: Capacity

Work Category: Other Asset Condition (Thermal)

IP Status: Technical (IP2)

Total Funding Request: $5,093,580

Estimated Start Year (IP3 Execution): 2026

Estimated In Service Year (Energized): 2028

Project Description:

Hawthorne Circuit 2683, originating from the Hawthorne substation in UI's western area, is a distribution circuit serving approximately 1.197 customers. Over the past three years, this circuit has consistently operated beyond its rated capacity, making it one of the most heavily loaded circuits within the UI territory.

To alleviate this issue, the most feasible and cost-effective solution is to utilize a spare position at the Hawthorne substation to develop a new circuit that will run parallel to Circuit 2683. This project aims to reduce the thermal load on Circuit 2683, creating room for future growth. This initiative is crucial, especially considering the beneficial electrification plans, which include the introduction of electric vehicles and the electrification of heating systems, among others.

Neither shifting the load from Circuit 2683 to the neighboring circuits nor replacing all the 500 EPR cables in the duct line with 750 EPR can be implemented as alternative solutions. This is due to the heavy load on the neighboring circuits, the geographical constraints of the area, and the difficulty of construction.

Upon the implementation of this solution, the load on Circuit 2683 is projected to decrease to 48.6% of its rated capacity, a significant reduction from the 103.9% thermal loading experienced in the summer of 2021. This strategic load redistribution with the new circuit will not only ensure the efficient operation of both circuits but also accommodate the region's growing power demand.

System Needs and Justification:

According to the Avangrid Distribution Planning Criteria, a threshold of 90% is set for the ratio of actual loading to circuit normal rating, serving as trigger for a capacity needs assessment. This threshold is designed to prevent potential overloads by starting major circuit work in advance. Furthermore, the number of customers per circuit should be limited to 2,000 – 2,500 for 15kV class distribution feeders.

As represented in Table 1, the thermal loading of Hawthorne Circuit 2683 has consistently exceeded 90% of its normal capacity in 2021, even surpassing its rated capacity in 2022. .During the summer of 2021, the peak load frequently exceeded 90% of the rated capacity, particularly at the end of June. On June 30, 2021, the circuit experienced its highest peak in the last three years, with the load exceeding 100% of the rated capacity, as shown in Figure 1.

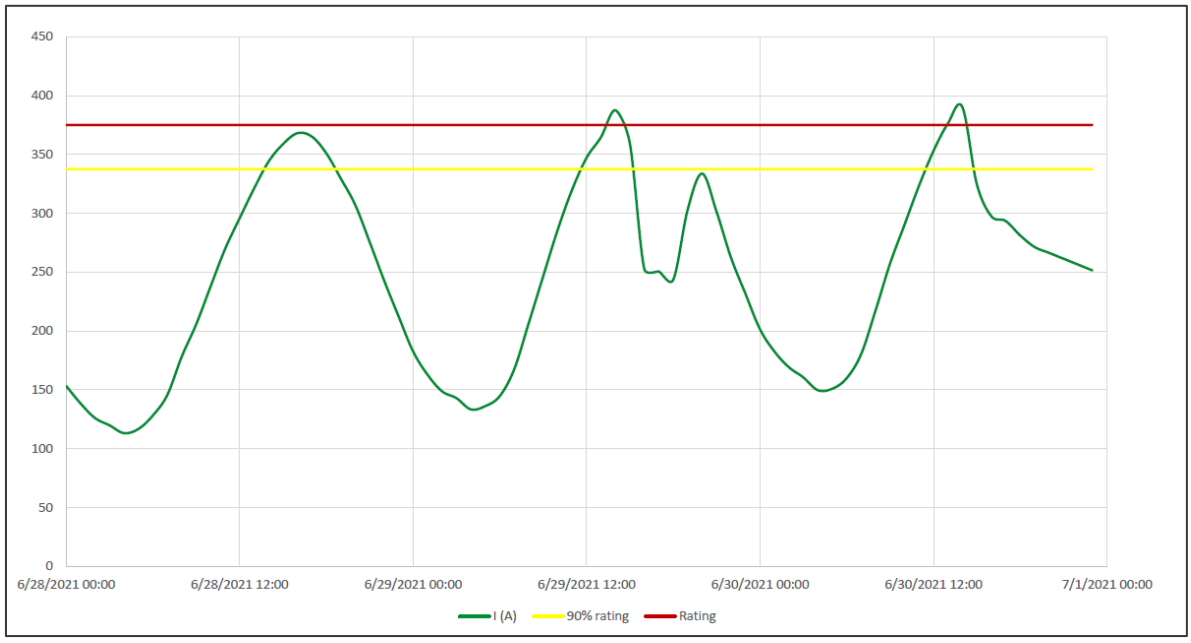

Figure 1: Circuit 2683 peak load in the last 3 years

Table 1: Circuit 2683 peak load in the last 3 years

Circuit	Substation	Normal Rating (A)	2023 Summer peak load (A)	2023 Thermal Loading	2022 Summer peak load (A	2022 Thermal Loading	2021 Summer peak load (A	2021 Thermal Loading	Number of customers
2683	Hawthorne	364	339	93.1%	366	100.5%	378	103.9%	1,197

The most practical and cost-effective solution to this issue involves utilizing a spare position out of Hawthorne Substation to develop a new circuit that will run parallel to Circuit 2683, which can pick some of Circuit 2683 loads. As a result, this capacity project was developed to mitigate the potential overload on Hawthorne Circuit 2683. This proactive measure ensures the continued reliable service to all customers in the area.

Proposed Scope of Work

The project's scope of work involves utilizing a spare position out of Hawthorne Substation to develop a new circuit that will run parallel to Circuit 2683 and tie the new circuit and Circuit 2683 with a recloser.

The circuit will be underground with an approximate length of 3,000 ft of UG cable from the substation to the new riser pole. With this new riser installed, it would be possible to re-establish the Merritt Parkway aerial crossing with a new aerial cable: approx. 700 ft. The circuit will once again be underground through the new chamber, approx. 700 ft of UG cable and will go up to Congress Street at Pole P6580. From there, the aerial cable will extend along Congress Street to Pole P2439; approx. 8,400 ft. It will go down again to underground 3approx. 600 ft of UG cable and will rise at a new pole near the existing Pole P6134 with an overhead cable extension of approx. 450 ft. until Pole P6131. It will again go down to the underground at Pole P6131, approx. 450 feet, to rise back up to overhead at P8025 and extend the overhead cable to a new pole placed between P2386 and P2387; approx. 8,000 ft. A recloser will be installed on the new pole, which will be the future tie between Circuit 2683 and the new circuit.

As shown in Figure 2, Circuit 2683 will take over the Burr Street load along with some of the load of neighboring circuits (Circuits 2684 and 2689) and the new circuit will take over the rest of the existing load on Circuit 2683. Circuit 2683 and the new circuit will provide N-1 to the load demand in the area.

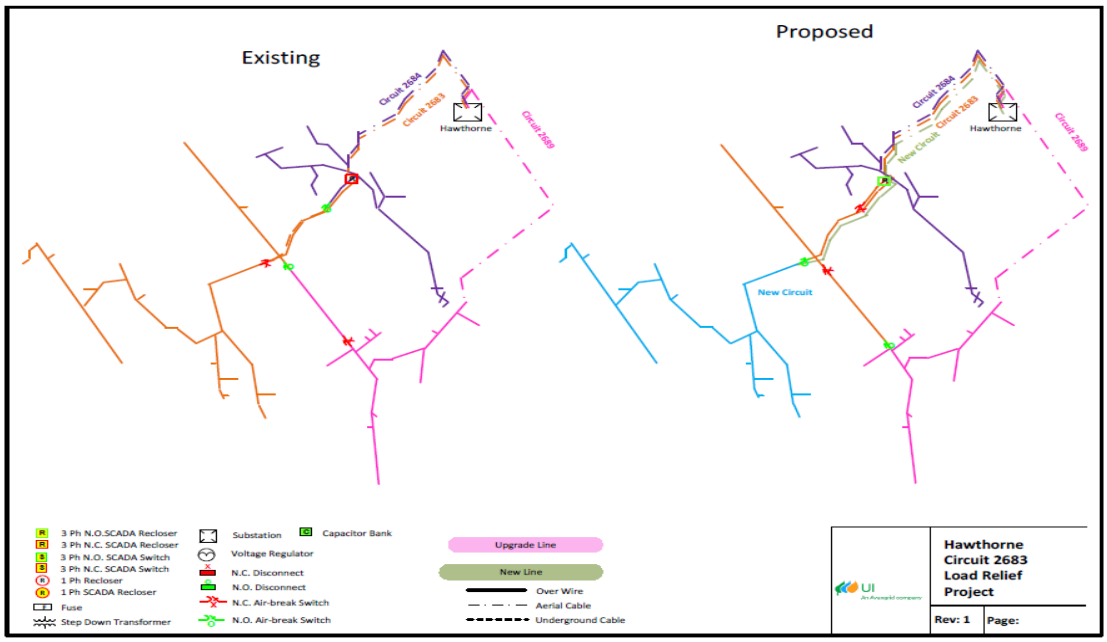

Figure 2: Transfer load from Circuit 2683 to new circuit through the ties

Table 2 shows the initial condition, and Table 3 the final conditions of the involved circuits. After proposed new circuit picks up some load from Circuit 2683, and Circuit 2683 picks up some customers from Circuit 2684 and Circuit 2689, there will be a reduction in both thermal loading and the number of customers served in the involved circuits.

Table 2: Involved circuits initial conditions.

Circuit	Substation	Current				
		Normal Rating (A)	LTE Rating (A)	Max peak load in the last 3 years (A)	Thermal Loading	Number of customers
2683	Hawthorne	364	599	378	103.9%	1,197
New Circuit	Hawthorne	364	599	0	0	0
2684	Hawthorne	364	599	334	92%	1608
2689	Hawthorne	364	599	331	91%	1585

Table 3: Involved circuits final conditions.

Circuit	Substation	After Preferred Solution				
		Normal Rating (A)	LTE Rating (A)	Max peak Load in the last 3 years (A)	Thermal Loading	Number of customers
2683	Hawthorne	364	599	177	48.6%	351
New Circuit	Hawthorne	364	599	273	75%	966
2684	Hawthorne	364	599	276	76%	1434
2689	Hawthorne	364	599	275	76%	1400

The project's implementation cost is $5,093,580, as detailed in Table 4. This is considered the cost-effective solution. The outlined scope of work ensures the efficient operation of both substations and accommodates the region's growing power demand.

Table 1: Total cost of the project.

Category	Cost Estimate
Material	$1,629,946
Overheads during all phases of the project	$713,100
Internal Labor	$611,230
AFUC	$101,872
External Services	$2,037,432
Total Cost	$5,093,580

Solution Alternatives Considered:

In addressing the overload issue on Circuit 2683, five alternative solutions were studied, evaluated, and compared with the chosen solution:

1. **South Path for a new feeder:** An alternative was considered to run a new circuit to the south of Hawthorne Substation. Analysis of the design indicated that there are multiple issues that this solution would present. These issues along with the associated high cost makes this alternative not feasible and is no longer considered.
2. **Shift load to neighboring circuits:** A permanent load transfer using existing or new ties was studied to help mitigate the thermal overload. This permanent load shift is not recommended because of the heavy load on neighboring circuits and geographical constraints of the area. This alternative is not feasible and is no longer considered.
3. **Increase Circuit(s) rating:** One way to increase capacity is to replace all 500 EPR cables in the duct line with 750 EPR. Assuming that task complete, the next limiting factor will be the bridge

on Easton Turnpike over the Merritt which do not allow for circuits to be added due to the type of bridge construction (closed webbing). The existing duct lines are not properly sized to accept 750 ERP cables. This solution can't be constructed and is no longer considered.

4. **New Feeder from Ash Creek Substation:** Ash Creek Substation is loaded above 95% of its nominal rating and does not have an open breaker position to install a new circuit. This solution isn't feasible and is no longer considered.

5. **BESS:** One way to increase capacity is to install a BESS with sufficient capacity to avoid overloading the circuit during peak hours. The necessary size has been studied for the forecasted load in 2033. The estimated size of the battery is 9.38MWh, and the required energy from this battery is 7.5 MWh. As depicted in Figure 3. However, the estimated cost of the BESS is more expensive ($5,327,969) than the preferred solution ($5,093,580) while not providing the same amount of benefits to the area as the preferred solution, the BESS solution does not include redistributing the loads of neighboring circuits which has the benefits of allowing load expansion in the area. Therefore, this solution is no longer considered.

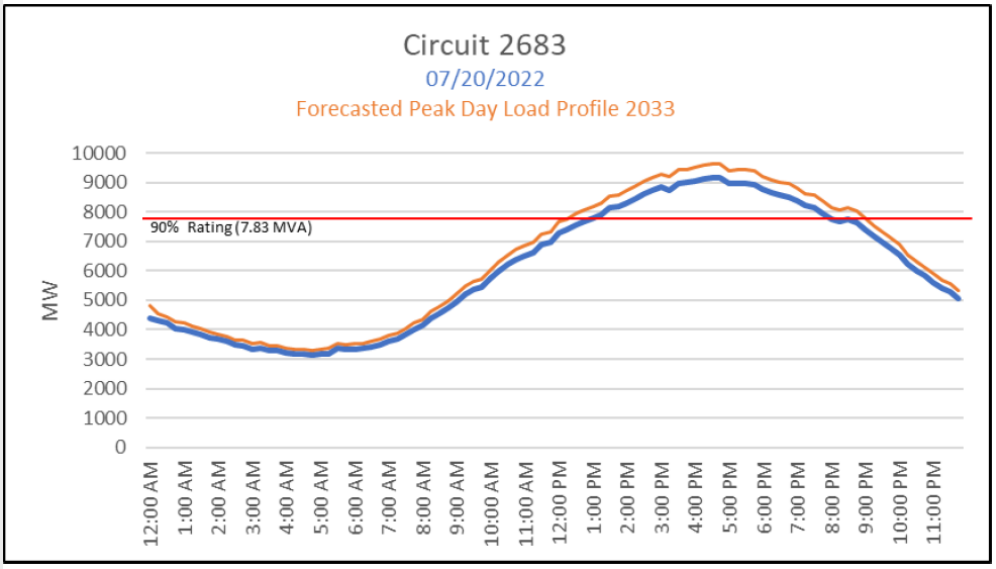

Figure 3: BESS assessment for Circuit 2683

Table 5: BESS project cost estimate.

BESS Project Cost Estimate	
Engineering and Design	$ 94,178
Battery System and Electrical	$ 3,743,801
Civil/Structural	$ 261,699
Commissioning	$ 67,508

Land Lease	$ 100,000
Microgrid Equipment	$ 100,000
Total Cost	**$ 5,327,969**

Risk of No Action:

1. **Impact on Economic Growth and Development**: Failing to act in advance can lead to capacity bottlenecks, extending the timeline required to accommodate new customer requests. This inaction can negatively impact the economic development of the area, slowing down the roll-out of beneficial electrification plans. These plans include the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development.
2. **Equipment Damage:** Overloading can cause damage to the feeder cables, switches, and other components. It may lead to insulation breakdown, overheating, and premature wear.
3. **Reduced System Reliability:** Overloaded feeders are more prone to faults, which can disrupt power supply and affect reliability.
4. **Increased Energy Loss:** Overloaded feeders consume more energy, leading to higher losses and inefficiency.
5. **Fire Hazard:** Overheating due to prolonged overloading increases the risk of fire in the feeder or nearby equipment.

In summary, overloading a distribution feeder can compromise safety, reduce equipment lifespan, and increase operational costs. Proper load management and preventive measures are crucial to mitigate these risks. Therefore, taking no action is not a viable option, as it could lead to serious consequences.

Project Benefits:

1. **Reliability**: Enhancing capacity in this feeder will help meet reliability requirements by avoiding outages caused by overloads.
2. **Economic Development**: It can facilitate the roll-out of beneficial electrification plans such as the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development. This can stimulate economic growth and progress in the region.
3. **Cost Efficiency**: the solution proposed in this project is the least costly when compared with other alternatives.
4. **Accommodation of New Load**: It will increase capacity of Hawthorne Circuit 2683, and it will allow for the interconnection of new generation and load, effectively managing the increased demand.

5. **Environmental Impact**: Increased capacity can accommodate more distributed energy sources (DER), contributing to a cleaner and more sustainable energy sector.
6. **Safety**: By preventing overloading, these projects can enhance the safety of the power grid.

Project Relationships (if applicable):

It is important to prioritize the implementation of this project before the execution of the project 'UI Capacity Program - Hawthorne Circuit 2682'. These two projects are closely correlated and should be approached as part of an integrated strategy.

Upon the completion of this project, the new circuit in Hawthorne substation will accommodate loads from Circuit 2682 as well. Consequently, it is important to prioritize the implementation of this project to make possible the execution of the project 'UI Capacity Program - Hawthorne Circuit 2682'.

2. Funding Detail

Substation	Circuit	3-year highest thermal loading	In service year	Cost preferred solution	Budget - Year 1	Budget - Year 2	Budget - Year 3	IP status	PPM Project ID
Hawthorne	2683	103.9%	2028	$5,093,580	$509,358	$3,056,148	$1,528,074	Technical (IP2)	PRJ-005129

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The United Illuminating Company - Electric Capex Projects/Programs

1. Summary

Project Title: UI Capacity Program – Indian Well Substation Project

Project Sponsor: Lucas Cruz (D. Planning)

PPM Project ID#: PRJ-005378

Type: Project

Functional grouping: Capacity

Work Category: Other Asset Condition (Thermal)

IP Status: Technical (IP2)

Total Funding Request: $205,910

Estimated Start Year (IP3 Execution): 2027

Estimated In Service Year (Energized): 2028

Project Description & One-Line:

The UI Indian Well substation, which serves 13,601 customers in the north central division of UI across 13 distribution circuits, is currently one of the most heavily loaded substations in the UI territory. Projections based on the 90/10 weather scenario suggest that this substation faces the risk of exceeding 90% of its rated capacity in 2025, with a potential increase to 94% by 2033.

To address this issue, the most practical and cost-effective solution involves redistributing the load from one substation to another, leveraging existing circuit ties. The UI distribution planning team has developed this capacity project to alleviate the potential overload on the Indian Well substation and create room for future growth. This is particular important in light of beneficial electrification plans such as electric vehicles, the electrification of heating systems and others.

The solution involves transferring approximately 2.3 MVA out of the Indian Well substation to avoid the risk of exceeding 90% capacity in the next 10 years. This load is planned to be transferred to the Ansonia and Trumbull substations through two steps solutions:

1. Step 1: transfer 2.03 MVA from Indian Well to Ansonia through the existing ties to mitigate the risk of exceeding 90% of its rated capacity.
2. Step 2: transfer 0.62 MVA from Indian Well to Trumbull through the existing ties. Implementing this solution will mitigate the risk of the rated capacity of Indian Well from exceeding 94% of its rating by the year of 2033.

After the implementation of the two steps of this project, Indian Well is expected to reach 87% of its rating in 2028, and 89% of its rating in 2033. Meanwhile, Ansonia and Trumbull substations are still expected to be below its 90% their rated capacity. This strategic load redistribution will ensure the efficient operation of those three substations and provide room for the growing power demand in the region.

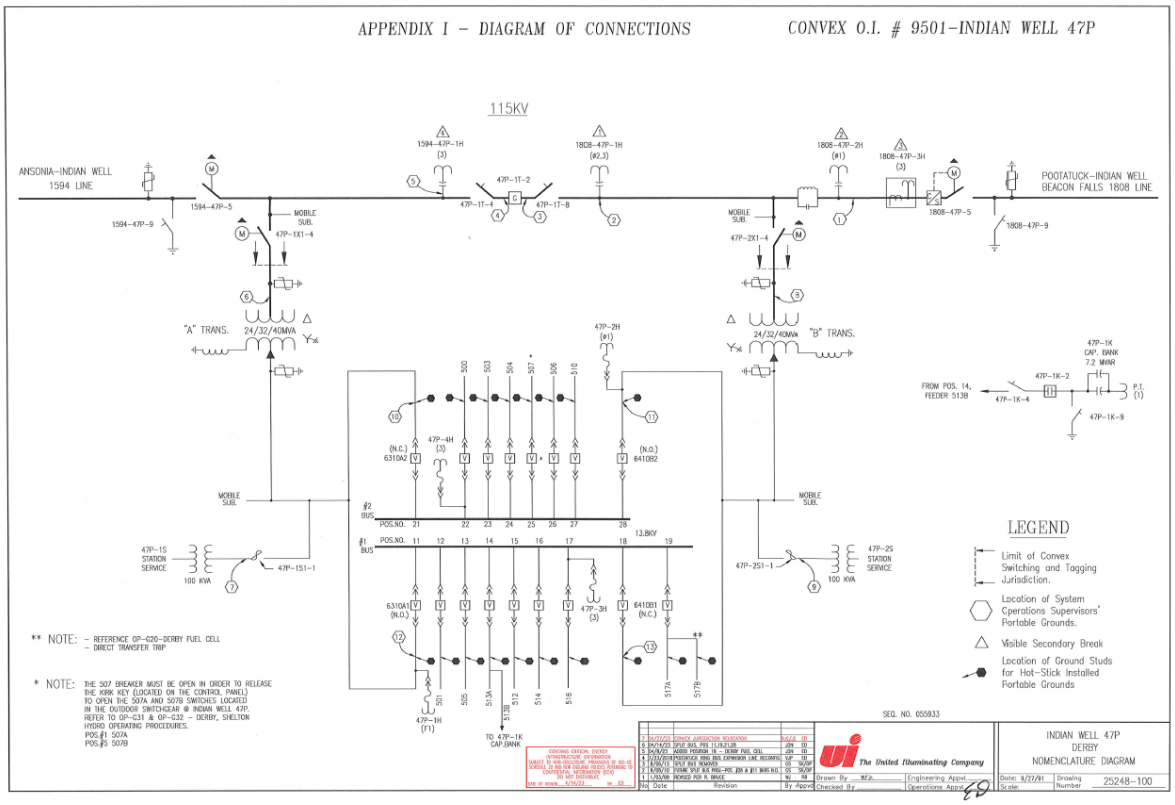

Figure 1: Indian Well substation one-line diagram

System Needs and Justification:

According to Avangrid Distribution Planning Criteria, the load on a substation with multiple transformers should not exceed the LTE (long term emergency) rating of the smallest (lowest rated) transformer. Additionally, a threshold of 90% should be used for transformer normal rating to actual loading to flag a capacity needs assessment. This threshold is established to proactively identify potential overloads and commence necessary work ahead of time, a process that typically extends over several years. This proactive approach assists in maintaining the stability and reliability of the power distribution system.

Based on the 90/10 load forecast scenario, UI Indian Well substation is projected to exceed its rated capacity within the next decade. The Indian Well substation serves 13,601 customers in the north central division and is exposed to the risk of exceeding 90% of its rated capacity in 2024 and exceeding that for the upcoming decade, as indicated in Tables 1 and Table 2.

The most practical and cost-effective solution to this issue involves redistributing the load from on substation to other ones, leveraging existing circuit ties where possible. Consequently, this capacity project was developed to alleviate the potential overload on the Indian Well substation. This proactive approach ensures the continued reliable service to all customers in the area.

Table 1: Indian Well 90/10 peak load forecast

Substation	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Sub Rating MVA	2033 Thermal loading (90/10)
INDIAN WELL	49.77	49.86	49.97	50.12	50.32	50.55	50.82	51.12	51.48	51.83	55.00	**94.23%**

Table 2: Indian Well 90/10 thermal loading

Substation	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
INDIAN WELL	90%	91%	91%	91%	91%	92%	92%	93%	94%	94%

Proposed Scope of Work

The objective of this project is to redistribute the load from the Indian Well substation to the Ansonia and Trumbull substations. By implementing the following steps, we aim to optimize capacity utilization and mitigate risks associated with exceeding rated capacity. The steps to complete this load transfer are as follows:

Step 1: Transfer load from Indian Well to Ansonia through the existing ties

- This step is to transfer around 2.03 MVA (85A) from Indian Well circuit 513 to the Ansonia circuit 3671, as shown in Figure 2:

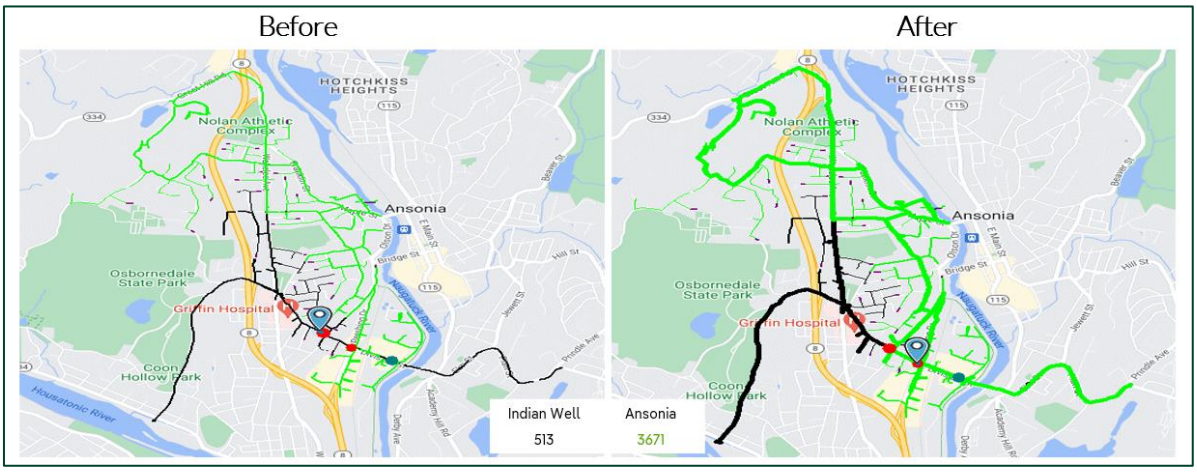

Figure 2: Step 1 - transfer the load through circuit ties.

- To mitigate voltage drop in Ansonia circuit 3671 after transferring load from Indian Well circuit 513, the size of the power factor correction (PFC) capacitor is recommended to be increased from 900 kVAr to 1200 kVAr on P687.

After implementing this solution, the Indian Well substation is projected to operate at 87% of its rated capacity by 2027, an improvement from the previous estimate of 91%. Meanwhile, the Ansonia substation remains below its 90% capacity threshold as illustrated in Table 3:

Table 3: Indian Well and Ansonia substations forecasted 90/10 thermal loading.

Year	Forecasted 90/10 thermal loading			
	Indian Well Substation		Ansonia Substation	
	Current	After Step 1	Current	After Step 1
2027	91%	87%	76%	79%
2033	94%	91%	83%	87%

Table 4 shows the initial conditions and Table 5 final conditions of the involved circuits. After Ansonia circuit 3671 has picked up the load from Indian Well circuit 513, it is still not overloaded, and the number of customers is below 2,500. This achieves the load transfer criteria.

Table 4: Involved circuits initial conditions.

Substation	Circuit	Current				
		Normal Rating (A)	LTE Rating (A)	Peak Load (A)	Thermal Loading	Number of customers
Ansonia	3671	438	599	307	70%	1,821
Indian Well	513	487	599	236	57%	792

Table 5: Involved circuits final conditions.

Substation	Circuit	Final Conditions				
		Normal Rating (A)	LTE Rating (A)	Peak Load (A)	Thermal Loading	Number of customers
Ansonia	3671	438	599	191	39%	139
Indian Well	513	487	599	392	89%	1,960

Step 2: Transfer load from Indian Well to Trumbull through the existing ties

- This additional step is required to ensure this project address any potential violations to the planning criterion by 2033. It involves the transfer of approximately 0.62 MVA (26A) from Indian Well circuit 510 to Trumbull circuit 2801, as shown in Figure 3:



Figure 3: Step 2 - transfer the load through circuit ties.

Following the implementation of the proposed solution, it is forecasted that Indian Well will operate at 89% of its rated capacity by 2033, reflecting a reduction from the pre-transfer estimate of 91%. Concurrently, the capacity of Trumbull will remain under the 90% threshold. As it is illustrated in Table 6:

Table 6: Indian Well and Trumbull substations forecasted 90/10 thermal loading.

Year	Forecasted 90/10 thermal loading			
	Indian Well Substation		Trumbull Substation	
	After Step 1	After Step 2	After Step 1	After Step 2
2027	87%	86%	64%	64%
2033	91%	89%	66%	67%

Table 7 shows the initial conditions and Table 8 final conditions of the involved circuits. After Trumbull circuit 2801 has picked up the load from circuit 510 in Indian Well substation, it is still not overloaded, and the number of customers is below 2,500. This achieves the load transfer criteria.

Table 7: Involved circuits initial conditions.

Substation	Circuit	Current				
		Normal Rating (A)	LTE Rating (A)	Peak Load (A)	Thermal Loading	Number of customers
Trumbull	2801	438	599	368	84%	2,010
Indian Well	510	364	599	292	80%	1,891

Table 8: Involved circuits final conditions

Substation	Circuit	Final Conditions				
		Normal Rating (A)	LTE Rating (A)	Peak Load (A)	Thermal Loading	Number of customers
Trumbull	2801	438	599	394	90%	1,792
Indian Well	510	364	599	266	73%	2,037

The Total cost of the Project

The total cost of mitigating the overload through the existing ties is $205,910, as represented in Table 9 and Table 10. This is considered the cheapest solution. This scope of work outlines the steps necessary to ensure the efficient operation of both substations and create room to the growing power demand in the region.

Table 9: Total cost of step 1.

Step 1	
Material	**Cost Estimate**
15 kV - SCADA Controlled Recloser - 3 phase	
15kV - OH Cap Bank	$92,520
Overheads during all phases of the project	$22,994
Internal Labor	
Evaluation, Design and Support	$7,200
Responsible for Design	$4,800
Switching 15 kV - Pad mounted switches	$1,500
Total Cost Step 1	**$129,014**

Table 10: Total cost of step 2.

Step 2	
Material	**Cost Estimate**
15 kV - SCADA Controlled Recloser - 3 phase	$55,800
Overheads during all phases of the project	$13,596
Internal Labor	
Evaluation, Design and Support	$3,600
Responsible for Design	$2,400
Switching 15 kV - Pad mounted switches	$1,500
Total Cost Step 2	**$76,896**
Project Total Cost	**$205,910**

Solution Alternatives Considered:

To address the overload issue at the Indian Well, several alternatives have been studied, evaluated, and compared with the chosen solution. These alternatives include:

1. New feeder from Ansonia to Indian Well: Proposing an extension of a new feeder from the Ansonia substation to Indian Well, estimated at approximately $1,738,534, aims to alleviate the existing load overload. However, an alternative approach involves optimizing the existing ties and circuit through upgrades, which may be a more cost-effective solution for transferring the load from Indian Well as indicated in step1 solution.
2. New Feeder from Trumbull to Indian Well: Proposing an extension of a new feeder from the Trumbull substation to Indian Well, estimated at approximately $3,336,627, aims to alleviate the existing load overload. However, an alternative approach involves optimizing the existing ties, which may be a more cost-effective solution for transferring the load from Indian Well as indicated in step 2 solution.

Selected Solution Justification:

The chosen solution for mitigating the risk of overload in Indian Well involves a strategic load transfer to the neighboring Ansonia and Trumbull substations. This substation was selected due to its forecasted availability of ample capacity. The plan is to transfer as much load as possible through the existing circuit ties to Ansonia (step 1) and then transfer some of the load to Trumbull substation via exiting ties (step 2).

This load transfer solution, referred in this project, was chosen primarily for its economic feasibility. It presents the most cost-effective approach to addressing the overload risk in the long term. By leveraging the existing infrastructure and capacity. we can minimize the need for new construction and equipment, thereby reducing costs.

In conclusion, the selected solutions offer a balanced approach to risk mitigation, combining efficient use of existing resources with strategic some upgrades to ensure capacity to accommodate the short and long-term demand growth at Indian Well substation.

Risk of No Action:

1. **Impact on Economic Growth and Development**: Failing to act in advance can lead to capacity bottlenecks, extending the timeline required to accommodate new customer requests. This inaction can negatively impact the economic development of the area, slowing down the roll-out of beneficial electrification plans. These plans include the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development.
2. **Reduced Lifespan**: Overloading can significantly reduce the lifespan of a transformer within the substation. It can cause damage to insulation, winding, and other components, leading to premature failure.
3. **Reduced Efficiency**: Overloading also affects the efficiency of the transformer. When a transformer operates beyond its rated capacity, it becomes less efficient.
4. **Safety Hazards**: Overloading can cause the transformer to overheat, posing a fire risk or even an explosion.

In summary, overloading a power substation can compromise safety, reduce equipment lifespan, and increase operational costs. Proper load management and preventive measures are crucial to mitigate these risks. Therefore, taking no action is not a viable option, as it could lead to serious consequences.

Project Benefits:

1. **Reliability**: Enhancing capacity in this substation will help meet reliability requirements by avoiding outages caused by overloads.
2. **Economic Development**: It can facilitate the roll-out of beneficial electrification plans such as the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development. This can stimulate economic growth and progress in the region.
3. **Cost Efficiency**: the solution proposed in this Project is the least costly when compared with other alternatives.
4. **Accommodation of New Load**: It will increase capacity in Indian Well and will allow for the interconnection of new generation and load, effectively managing the increased demand.
5. **Environmental Impact**: Increased capacity can accommodate more distributed energy sources (DER), contributing to a cleaner and more sustainable energy sector.
6. **Safety**: By preventing overloading, these projects can enhance the safety of the power grid.

Project Relationships (if applicable):

This project does not have any correlation with other projects.

2. Funding Detail

Substation	90/10 Forecast in 2033	In service year	Cost preferred solution	Budget - Year 1	Budget - Year 2	IP status	PPM Project ID
Indian Well	94%	2028	$205,910	$129,014	$76,896	IP2 approved	PRJ-005378

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The United Illuminating Company - Electric Capex Projects/Programs

1. Summary

Project Title: UI Capacity Program – Mix Ave Substation Project

Project Sponsor: Lucas Cruz (D. Planning)

PPM Project ID#: PRJ-005377

Type: Project

Functional grouping: Capacity

Work Category: Other Asset Condition (Thermal)

IP Status: Technical (IP2)

Total Funding Request: $6,000

Estimated Start Year (IP3 Execution): 2028

Estimated In Service Year (Energized): 2028

Project Description & One-Line:

The UI Mix Ave substation, which serves 23,842 customers in the east division of UI across 10 distribution circuits, is currently one of the most heavily loaded substations in the UI territory. Projections based on the 90/10 weather scenario suggest that this substation faces the risk of exceeding 90% of its rated capacity in 2025, with a potential increase to 95% by 2033.

To address this issue, the most practical and cost-effective solution involves redistributing the load from one substation to another, leveraging existing circuit ties. The UI distribution planning team has developed this capacity project to alleviate the potential violation on the Mix Ave substation and create room for future growth. This is particular important in light of beneficial electrification plans such as electric vehicles, the electrification of heating systems and others.

The solution involves transferring approximately 1.7 MVA out of the Mix Ave substation to mitigate the risk of exceeding its capacity in the next 10 years. This load is planned to be transferred to the Mix PDS substation by transferring 1.7 MVA from Mix Ave to Mix PDS through the existing ties to mitigate the risk of exceeding 90% of its rated capacity.

After the implementation of this step of this project, Mix Ave is expected to reach 90% of its rating in 2028, and 93% of its rating in 2033. Meanwhile, Mix PDS is still expected to be below its rated capacity until 2033. This strategic load redistribution will ensure the efficient operation of those two substations and provide room for the growing power demand in the region.

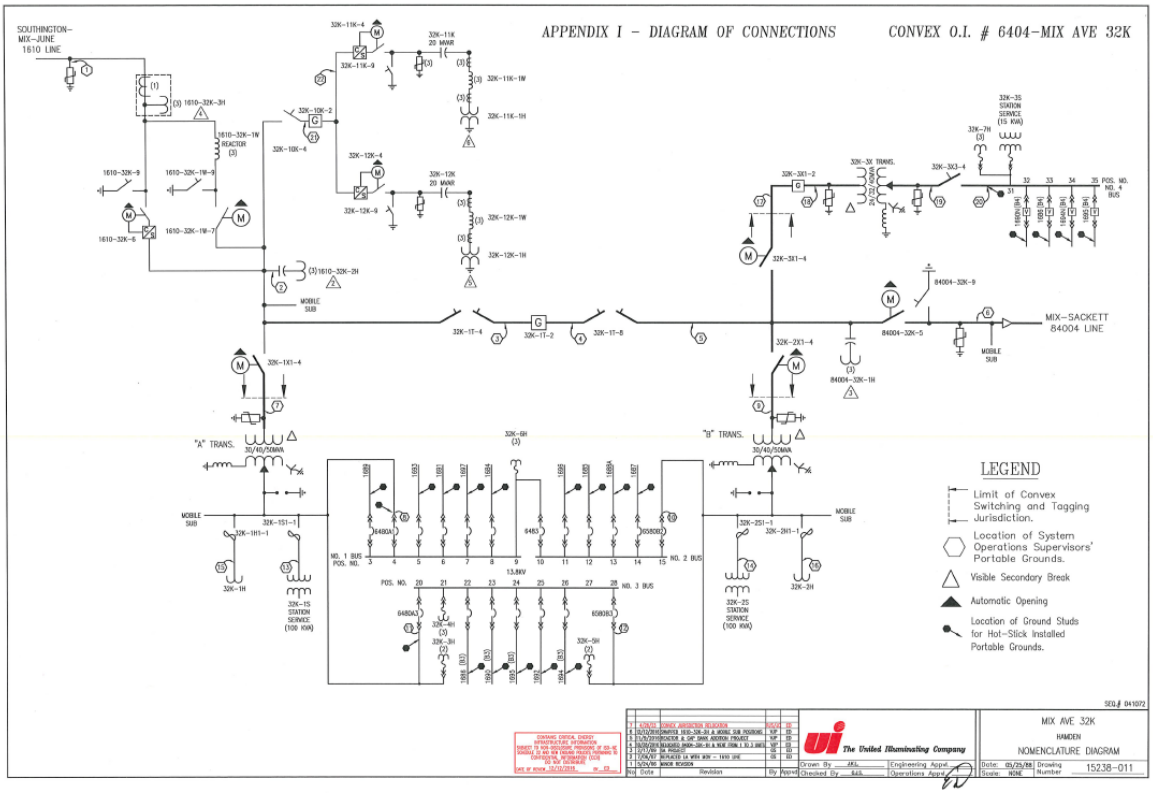

Figure 1: Mix Ave substation one-line diagram

System Needs and Justification:

According to Avangrid Distribution Planning Criteria, the load on a substation with multiple transformers should not exceed the LTE (long term emergency) rating of the smallest (lowest rated) transformer. Additionally, a threshold of 90% should be used for transformer normal rating to actual loading to flag a capacity needs assessment. This threshold is established to proactively identify potential overloads and commence necessary work ahead of time, a process that typically extends over several years. This proactive approach assists in maintaining the stability and reliability of the power distribution system.

Based on the 90/10 load forecast scenario, UI Mix Ave substation is projected to exceed the planning criterion within the next decade. The Mix Ave substation serves 23,842 customers in the east division and is exposed to the risk of exceeding 90% of its rated capacity in 2025 and exceeding that for the upcoming decade, as indicated in Tables 1 and Table 2.

The most practical and cost-effective solution to this issue involves redistributing the load from on substation to other ones, leveraging existing circuit ties where possible. Consequently, this capacity project was developed to alleviate the potential overload on the Mix Ave substation. This proactive approach ensures the continued reliable service to all customers in the area.

Table 1: Mix Ave 90/10 peak load forecast

Substation	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Sub Rating MVA	2033 Thermal loading (90/10)
Mix Ave	61.30	63.62	63.73	63.91	64.14	64.40	64.71	65.06	65.47	65.87	69.30	**95.04%**

Table 2: Mix Ave 90/10 thermal loading

Substation	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Mix Ave	88%	92%	92%	92%	93%	93%	93%	94%	94%	95%

Proposed Scope of Work

The objective of this project is to redistribute the load from the Mix Ave substation to the Mix PDS substation. By implementing the following step, we aim to optimize capacity utilization and mitigate risks associated with exceeding rated capacity in the future. The steps to complete this load transfer are as follows:

This solution is to transfer around 1.7 MVA (71A) from two Mix Ave circuits to two Mix PDS circuits, as shown in Figure 2:

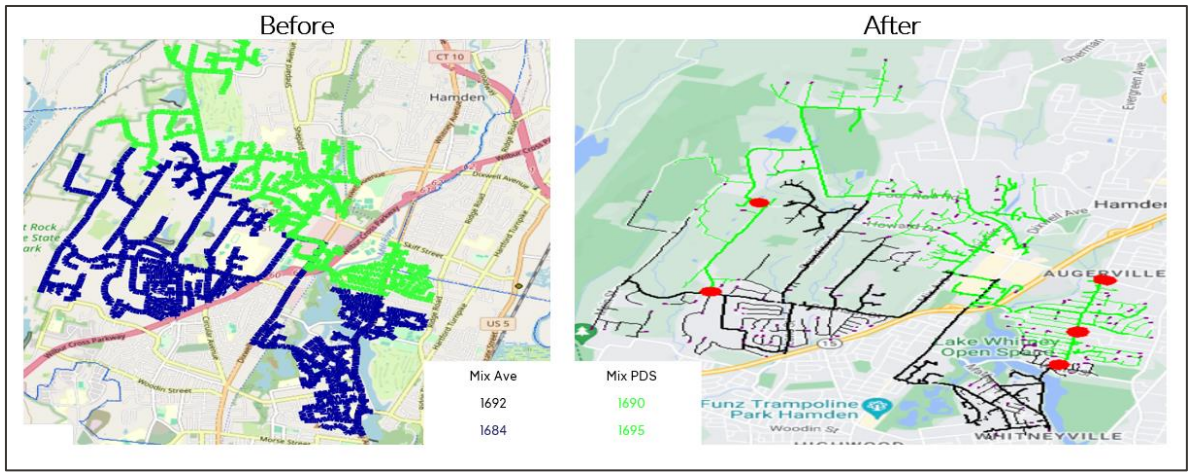

Figure 2: Transfer the load through circuit ties.

Step 1: Transfer 1.36 MVA (57A) from Mix Ave circuit 1684 to Mix PDS circuit 1695.

In the context of the solution, 1.36 MVA (57A) will be transferred by opening the recloser on pole 1585 within the Mix Ave circuit 1684. Additionally, the load will be picked up by closing the recloser on pole 1607 in the Mix PDS circuit 1695. This load transfer step is illustrated in Figure 3:

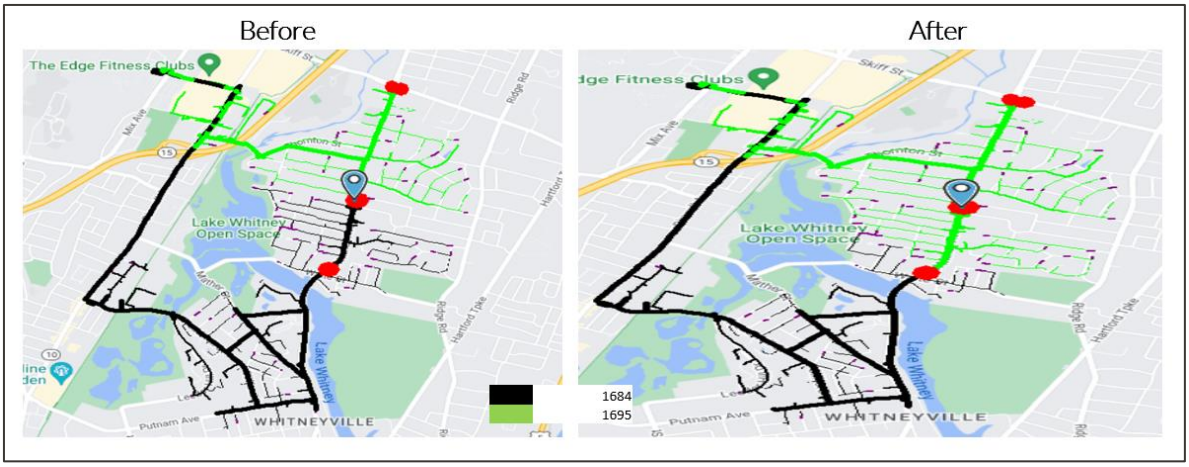

Figure 3: Step 1 - transfer the load through circuit ties.

Step 2: Transfer 0.336 MVA (14A) from Mix Ave circuit 1692 to Mix PDS circuit 1690.

Then, 0.336 MVA (14A) will be transferred by opening the recloser on pole 1197 within the Mix Ave circuit 1692. Additionally, the load will be picked up by closing the recloser on pole 3129 in the Mix PDS circuit 1690. After the implementation of this solution, Mix PDS is expected to not exceed 90% of its rated capacity, ensuring efficient and reliable operation. As shown in Figure 4:

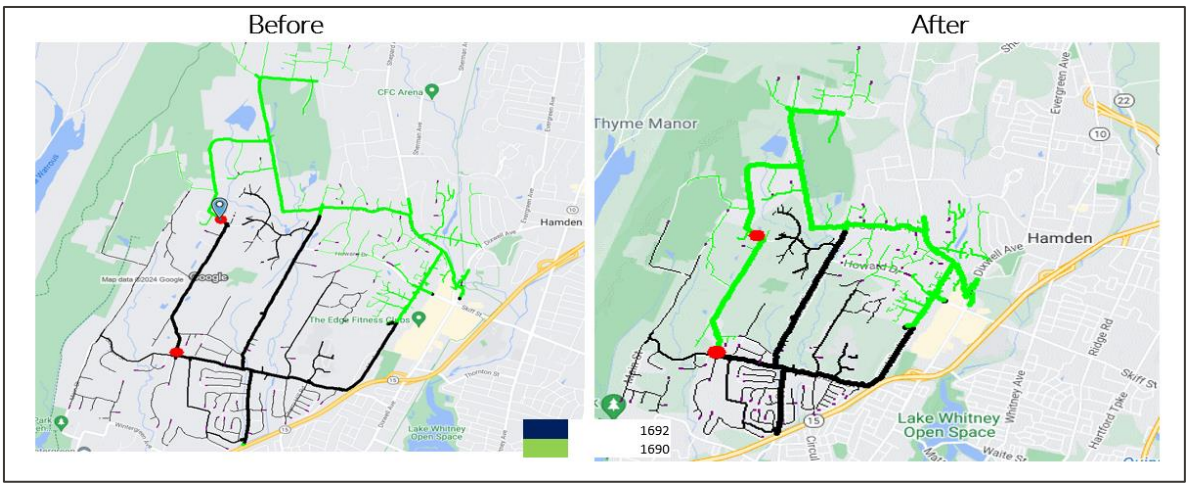

Figure 4: Step 2 - transfer the load through circuit ties.

Table 3 shows the initial conditions and Table 4 final conditions of the involved circuits. After Mix PDS circuits 1690 and 1692 have picked up the load from Mix Ave circuits 1692 and 1684, both substations are expected to meet the planning criteria, and the number of customers is for both circuits below 2,500 customers.

Table 3: Involved circuits initial conditions.

Substation	Circuit	Current				
		Normal Rating (A)	LTE Rating (A)	Peak Load (A)	Thermal Loading	Number of customers
Mix PDS	1690	348	440	243	67%	2,121
Mix PDS	1695	329	498	215	70%	560
Mix Ave	1692	438	599	243	85%	1,297
Mix Ave	1684	329	498	242	89%	2,667

Table 4: Involved circuits final conditions.

Substation	Circuit	Final				
		Normal Rating (A)	LTE Rating (A)	Peak Load (A)	Thermal Loading	Number of customers
Mix PDS	1690	348	440	309	89%	2,224
Mix PDS	1695	329	498	288	88%	1,422
Mix Ave	1692	438	599	278	63%	1,194
Mix Ave	1684	329	498	185	56%	2,107

After this solution Mix Ave is expected to reach 90% percent of its rating in 2027, instead of exposed to the risk of reaching 92% of its rating, while Mix PDS is still bellow it's 90%. As shown in Table 5:

Table 5: Mix Ave and Mix PDS substations forecasted 90/10 thermal loading.

Year	Forecasted 90/10 thermal loading			
	Mix Ave Substation		Mix PDS Substation	
	Current	After Step 1	Current	After Step 1
2027	92%	90%	58%	62%
2033	95%	93%	69%	73%

The Total cost of the Project

The total cost of mitigating the overload through the existing ties is $6,000, as represented in Table 6 and Table 7. This is considered the cheapest solution. This scope of work outlines the steps necessary to ensure the efficient operation of both substations and create room to the growing power demand in the region.

Table 6: Total cost of step 1.1.

Step 1.1	
Material	**Cost Estimate**
15 kV - SCADA Controlled Recloser - 3 phase	
15kV - OH Cap Bank	
Overheads during all phases of the project	
Internal Labor	
Evaluation, Design and Support	
Responsible for Design	
Switching 15 kV - Pad mounted switches	$3,000
Total Cost Step 1.1	**$3,000**

Table 7: Total cost of step 1.2.

Step 1.2	
Material	**Cost Estimate**
15 kV - SCADA Controlled Recloser - 3 phase	
Overheads during all phases of the project	
Internal Labor	
Evaluation, Design and Support	
Responsible for Design	
Switching 15 kV - Pad mounted switches	$3,000
Total Cost Step 1.2	**$3,000**
Project Total Cost	**$6,000**

Solution Alternatives Considered:

To address the overload issue at the Mix Ave, the following alternative has been studied, evaluated, and compared with the chosen solution.

1. **New feeder from Mix PDS to Mix Ave:** Proposing an extension of a new feeder from the Mix PDS substation to Mix Ave, estimated at approximately $566,995, aims to alleviate the existing load overload. However, an alternative approach involves optimizing the existing ties and circuit through upgrades, which may be a more cost-effective solution for transferring the load from Mix Ave as indicated in the Proposed Scope of Work section.

Selected Solution Justification:

The chosen solution for mitigating the risk of overload in Mix Ave involves a strategic load transfer to the neighboring Mix PDS substation. This substation was selected due to its forecasted availability of ample capacity. The plan is to transfer as much load as possible through the existing circuit ties to Mix PDS substation.

This load transfer solution, referred in this project, was chosen primarily for its economic feasibility. It presents the most cost-effective approach to addressing the overload risk in the long term. By leveraging the existing infrastructure and capacity, we can minimize the need for new construction and equipment, thereby reducing costs.

In conclusion, the selected solutions offer a balanced approach to risk mitigation, combining efficient use of existing resources with strategic some upgrades to ensure capacity to accommodate the short and long-term demand growth at Mix Ave substation.

Risk of No Action:

1. **Impact on Economic Growth and Development**: Failing to act in advance can lead to capacity bottlenecks, extending the timeline required to accommodate new customer requests. This inaction can negatively impact the economic development of the area, slowing down the roll-out of beneficial electrification plans. These plans include the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development.
2. **Reduced Lifespan**: Overloading can significantly reduce the lifespan of a transformer within the substation. It can cause damage to insulation, winding, and other components, leading to premature failure.
3. **Reduced Efficiency**: Overloading also affects the efficiency of the transformer. When a transformer operates beyond its rated capacity, it becomes less efficient.
4. **Safety Hazards**: Overloading can cause the transformer to overheat, posing a fire risk or even an explosion.

In summary, overloading a power substation can compromise safety, reduce equipment lifespan, and increase operational costs. Proper load management and preventive measures are crucial to mitigate these risks. Therefore, taking no action is not a viable option, as it could lead to serious consequences.

Project Benefits:

1. **Reliability**: Enhancing capacity in this substation will help meet reliability requirements by avoiding outages caused by overloads.
2. **Economic Development**: It can facilitate the roll-out of beneficial electrification plans such as the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development. This can stimulate economic growth and progress in the region.
3. **Cost Efficiency**: the solution proposed in this Project is the least costly when compared with other alternatives.
4. **Accommodation of New Load**: It will increase capacity in Mix Ave and will allow for the interconnection of new generation and load, effectively managing the increased demand.
5. **Environmental Impact**: Increased capacity can accommodate more distributed energy sources (DER), contributing to a cleaner and more sustainable energy sector.
6. **Safety**: By preventing overloading, these projects can enhance the safety of the power grid.

Project Relationships (if applicable):

This project does not have any correlation with other projects.

2. Funding Detail

Substation	90/10 Forecast in 2033	In service year	Cost preferred solution	Budget - Year 1	IP status	PPM Project ID
Mix Ave	95%	2028	$6,000	$6,000	IP2 approved	PRJ-005377

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The United Illuminating Company - Electric Capex Projects/Programs

1. Summary

Project Title: UI Capacity Program – New Congress Circuit 2535

Work Category: Other Asset Condition (Thermal)

Project Sponsor: Lucas Cruz (D. Planning)

IP Status: Technical (IP2)

PPM Project ID#: PRJ-005134

Total Funding Request: $290,501

Type: Project

Estimated Start Year (IP3 Execution): 2026

Functional grouping: Capacity

Estimated In Service Year (Energized): 2026

Project Description:

New Congress Circuit 2535, originating from the New Congress substation in UI's western area, is a distribution circuit serving approximately 3,139 customers. Over the past three years, this circuit has consistently operated beyond its rated capacity, making it one of the most heavily loaded circuits within the UI territory.

To alleviate this issue, the most feasible and cost-effective solution is to redistribute the load between circuits, utilizing existing circuit ties. The UI distribution planning team has developed a capacity project aimed at reducing the thermal load on Circuit 2535, thereby creating room for future growth. This initiative is crucial, especially considering the beneficial electrification plans, which include the introduction of electric vehicles and the electrification of heating systems, among others.

The proposed solution involves the transfer of approximately 61 A and 658 customers from Circuit 2535 to Circuit 2547. Both circuits are in New Congress substation. This transfer aims to prevent Circuit 2535 from exceeding 90% of its rated capacity in the foreseeable future.

Upon the implementation of this solution, the load on Circuit 2535 is projected to decrease to 80.5% of its rated capacity, a significant reduction from the 102.8% thermal loading experienced in the summer of 2023. This strategic load redistribution will not only ensure the efficient operation of both circuits but also accommodate the region's growing power demand.

System Needs and Justification:

According to the Avangrid Distribution Planning Criteria, a threshold of 90% is set for the ratio of actual loading to circuit normal rating, serving as trigger for a capacity needs assessment. This threshold is designed to prevent potential overloads by starting major circuit work in advance.

Furthermore, the number of customers per circuit should be limited to 2,000 – 2,500 for 15kV class distribution feeders.

As represented in Table 1, the thermal loading of New Congress Circuit 2535 has consistently exceeded 90% of its normal capacity in 2021, even surpassing its rated capacity in 2022 and 2023. During the summer of 2023, the peak load frequently exceeded 90% of the rated capacity, particularly at the start of September. On September 5, 2023, the circuit experienced its highest peak in the last three years, with the load exceeding 100% of the rated capacity, as shown in Figure 1.

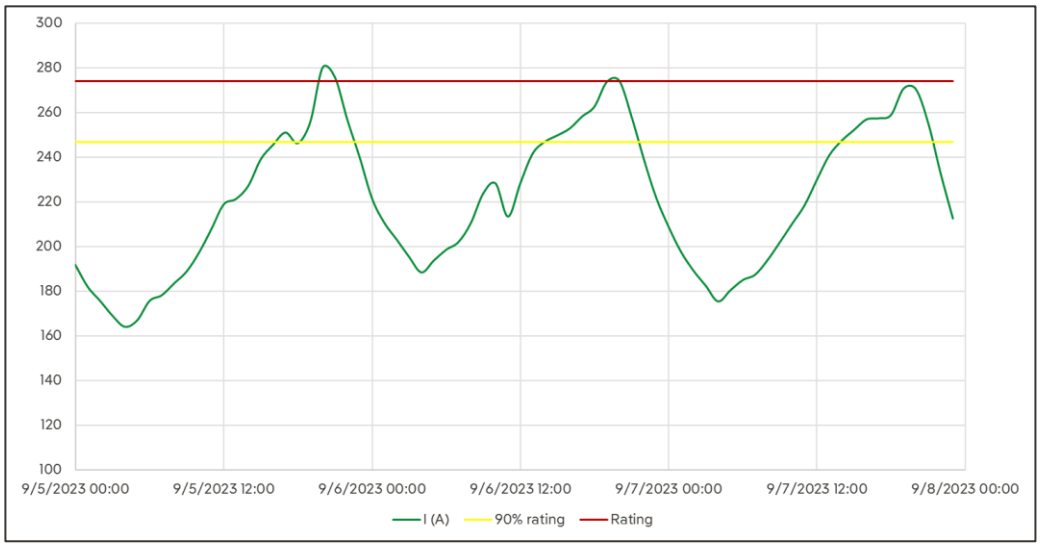

Figure 1: Circuit 2535 peak load in the last 3 years

Table 1: Circuit 2535 peak load in the last 3 years

Circuit	Substation	Normal Rating (A)	2023 Summer peak load (A)	2023 Thermal Loading	2022 Summer peak load (A	2022 Thermal Loading	2021 Summer peak load (A	2021 Thermal Loading	Number of customers
2535	New Congress	274	282	102.8%	275	100.2%	265	96.6%	3,139

The most practical and cost-effective solution to this issue involves redistributing load from one circuit to another, capitalizing on existing circuit ties where possible. As a result, this capacity project was developed to mitigate the potential overload on New Congress Circuit 2535. This proactive measure ensures the continued reliable service to all customers in the area.

Proposed Scope of Work

The project's scope of work involves transferring load from Circuit 2535 to a selected circuit with available capacity and ties to 2535. Circuit 2547, which meets these conditions, has been selected for this purpose.

The process of transferring 61A and 658 customers from Circuit 2535 to Circuit 2547 involves the following steps:

1. Close the existing tie switch between Feeders 2535 and 2547.
2. Open the existing air breaker switch at P7360.
3. Install a new SCADA recloser at Pole P5410 and another one at Pole P4948, which will serve as the new tie switch between Circuits 2535 and 2547.
4. Add a new 3-phase overhead conductor between Poles P3526 & P2134 and between Poles P314 & P6819. This will redirect the power flow of Feeder 2535, as shown in Figure 2.

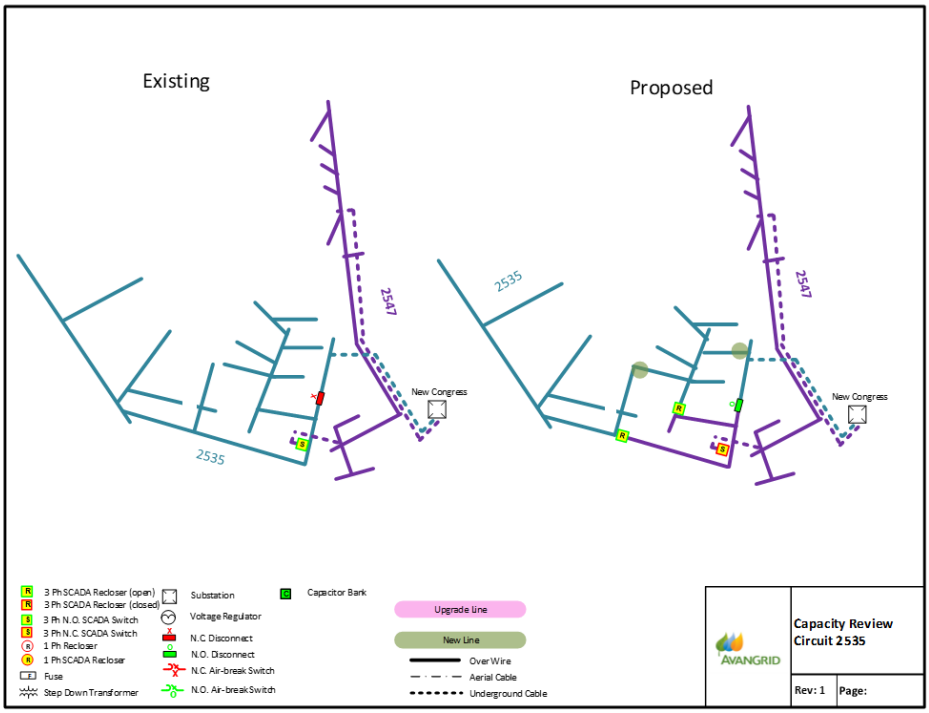

Figure 2: Transfer load from circuit 2535 to circuit 2547 through circuit ties

Table 2 shows the initial conditions, and Table 3 the final conditions of the involved circuits. After Circuit 2575 has absorbed the load from Circuit 2535, it remains under its maximum load, and the number of customers stays within the 2,500 limit. This satisfies the load transfer criteria.

Table 2: Involved circuits initial conditions.

Circuit	Substation	Current				
		Normal Rating (A)	LTE Rating (A)	Max peak Load in the last 3 years (A)	Thermal Loading	Number of customers
2535	New Congress	274	405	283	102.8%	3,139
2547	New Congress	329	498	83	25%	234

Table 3: Involved circuits final conditions.

Circuit	Substation	After Preferred Solution				
		Normal Rating (A)	LTE Rating (A)	Max peak Load in the last 3 years (A)	Thermal Loading	Number of customers
2535	New Congress	274	405	221	80.5%	2,481
2547	New Congress	329	498	144	43%	892

The project's implementation cost is $290,501, as detailed in Table 4. This is considered the cost-effective solution. The outlined scope of work ensures the efficient operation of both substations and accommodates the region's growing power demand.

Table 1: Total cost of the project.

category	Cost Estimate	
Material		
15 kV - SCADA Controlled Recloser - 3 phase (2 reclosers)	$	116,250
15kV - New Three Phase Poles (3 Poles)	$	16,875
15kV - Three Phase OH Conductor (3 sections-per section - 150ft)	$	2,531
Overheads during all phases of the project	$	51,844
Internal Labor		
Evaluation, Design and Support	$	30,000
Support during project construction	$	32,500
Responsible for Design	$	15,000
Allocations assigned to the project	$	22,500
Switching operation at 15 kV - Pad mounted switches (2 switches)	$	3,000
Total Cost	**$**	**290,501**

Solution Alternatives Considered:

In addressing the overload issue on Circuit 2535, two alternative solutions were studied, evaluated, and compared with the chosen solution.

1. **Upgrading Select Sections of the Underground Cable**: This alternative proposes an upgrade to the capacity of the underground cable. Specifically, it involves re-conducting 14 sections of 500 PL, 350 PL and UNK underground cable to 500 CU EPR, extending from the New Congress Substation to Riser Pole 1895 on Washington Avenue. Implementing this solution would effectively resolve the overload issue, as the circuit's new rating would increase to 375 Amps, reducing the thermal loading at the peak to 75%. The estimated cost for this alternative is projected to be $1,121,180, as detailed in Table 5.

Table 2: Total cost of the alternative.

New feeder	Cost Estimate
Material	
15kV - UG 750 CU 3Ø Primary (14 sections-per section - 400ft)	$ 787,500
Overheads during all phases of the project	$ 202,180
Internal Labor	
Evaluation, Design and Support	$ 30,000
Support during project construction	$ 32,500
Responsible for Design	$ 15,000
Allocations assigned to the project	$ 22,500
Remove 15kV - URD 3/C 350 AL Secondary cable (14 sections-per section - 400ft)	$ 31,500
Total Cost	**$ 1,121,180**

2. **Battery Energy Storage System (BESS)**: one potential solution involves installing a Battery Energy Storage System (BESS) with sufficient capacity to prevent overloads during the circuit's peak hours. Considering the last three years peak, the battery would need to provide 1.3 MVA at the peak time to avoid overloading, as depicted in Figure 3. The estimated battery size required for this purpose is 4.28 MWh. However, the cost associated with installing a BESS of this size is approximately $1,415,750, as indicated in Table 6. Despite its effectiveness, this alternative is significantly more expensive than the preferred solution and is no longer under consideration.

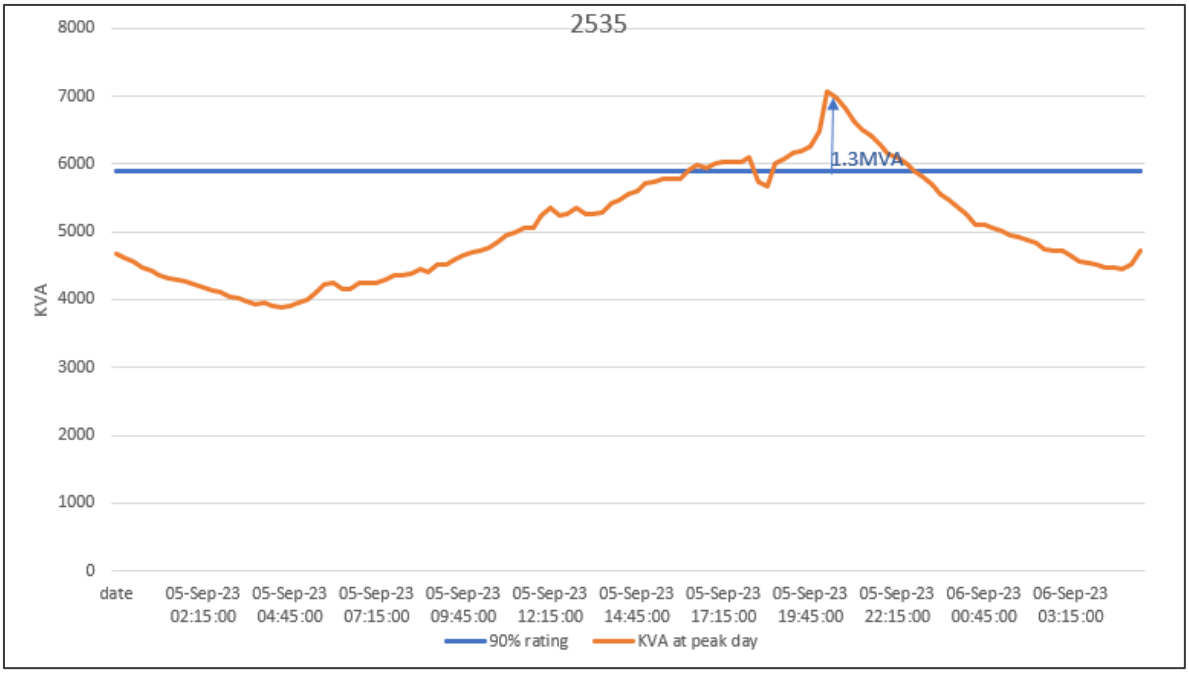

Figure 3: BESS assessment for Circuit 2535.

Table 6: BESS project cost estimate.

BESS Project Cost Estimate	
Engineering and Design	$24,886
Battery System and Electrical	$989,247
Civil/Structural	$69,152
Commissioning	$17,839
Land Lease	$-
Microgrid Equipment	$-
Contingency (30%)	$330,345
Overheads (15%)	$214,725
ITC Tac Credit (50%)	$230,471
Total Cost	**$1,415,750**

Risk of No Action:

1. **Impact on Economic Growth and Development**: Failing to act in advance can lead to capacity bottlenecks, extending the timeline required to accommodate new customer requests. This inaction can negatively impact the economic development of the area, slowing down the roll-out of beneficial electrification plans. These plans include the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development.

2. **Equipment Damage:** Overloading can cause damage to the feeder cables, switches, and other components. It may lead to insulation breakdown, overheating, and premature wear.
3. **Reduced System Reliability:** Overloaded feeders are more prone to faults, which can disrupt power supply and affect reliability.
4. **Increased Energy Loss:** Overloaded feeders consume more energy, leading to higher losses and inefficiency.
5. **Fire Hazard:** Overheating due to prolonged overloading increases the risk of fire in the feeder or nearby equipment.

In summary, overloading a distribution feeder can compromise safety, reduce equipment lifespan, and increase operational costs. Proper load management and preventive measures are crucial to mitigate these risks. Therefore, taking no action is not a viable option, as it could lead to serious consequences.

Project Benefits:

1. **Reliability**: Enhancing capacity in this feeder will help meet reliability requirements by avoiding outages caused by overloads.
2. **Economic Development**: It can facilitate the roll-out of beneficial electrification plans such as the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development. This can stimulate economic growth and progress in the region.
3. **Cost Efficiency**: the solution proposed in this project is the least costly when compared with other alternatives.
4. **Accommodation of New Load**: It will increase capacity of New Congress Circuit 2535 and will allow for the interconnection of new generation and load, effectively managing the increased demand.
5. **Environmental Impact**: Increased capacity can accommodate more distributed energy sources (DER), contributing to a cleaner and more sustainable energy sector.
6. **Safety**: By preventing overloading, these projects can enhance the safety of the power grid.

Project Relationships (if applicable):

This project does not have any correlation with other projects.

2. Funding Detail

Substation	Circuit	3-year highest thermal loading	In service year	Cost preferred solution	Budget - Year 1	IP status	PPM Project ID
New Congress	2535	102.8%	2026	$290,501	$290,501	Technical (IP2)	PRJ-005134

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The United Illuminating Company - Electric Capex Projects/Programs

1. Summary

Project Title: UI Capacity Program – New Congress Circuit 2536

Project Sponsor: Lucas Cruz (D. Planning)

PPM Project ID#: PRJ-005135

Type: Project

Functional grouping: Capacity

Work Category: Other Asset Condition (Thermal)

IP Status: Technical (IP2)

Total Funding Request: $268,642

Estimated Start Year (IP3 Execution): 2027

Estimated In Service Year (Energized): 2028

Project Description:

New Congress Circuit 2536, originating from the New Congress substation in UI's western area, is a distribution circuit serving approximately 2,763 customers. Over the past three years, this circuit has consistently operated close to rated capacity, making it one of the most heavily loaded circuits within the UI territory.

To alleviate this issue, the most feasible and cost-effective solution is to redistribute the load between circuits, utilizing existing circuit ties. The UI distribution planning team has developed a capacity project aimed at reducing the thermal load on Circuit 2536, thereby creating room for future growth. This initiative is crucial, especially considering the beneficial electrification plans, which include the introduction of electric vehicles and the electrification of heating systems, among others.

The proposed solution involves the transfer of approximately 36 A and 246 customers from Circuit 2536 to Circuit 2543. Both circuits are in New Congress substation. To allow this transfer, Circuit 2543 requires more capacity that will be obtained by transferring 23.8 A and 266 customers to New Congress Circuit 2538. These transfers aim to prevent Circuit 2536 from exceeding 90% of its rated capacity in the foreseeable future.

Upon the implementation of this solution, the load on Circuit 2536 is projected to decrease to 72% of its rated capacity, a significant reduction from the 93.2% thermal loading experienced in the summer of 2021. This strategic load redistribution will not only ensure the efficient operation of both circuits but also accommodate the region's growing power demand.

System Needs and Justification:

According to the Avangrid Distribution Planning Criteria, a threshold of 90% is set for the ratio of actual loading to circuit normal rating, serving as trigger for a capacity needs assessment. This threshold is designed to prevent potential overloads by starting major circuit work in advance. Furthermore, the number of customers per circuit should be limited to 2,000 – 2,500 for 15kV class distribution feeders.

As represented in Table 1, the thermal loading of New Congress Circuit 2536 has consistently exceeded 90% of its normal capacity in 2021 and 2022. In 2023 the thermal loading of this circuit was equal 90% of its normal capacity. During the summer of 2021, the peak load frequently exceeded 90% of the rated capacity, particularly at the end of June. On June 30, 2021, the circuit experienced its highest peak in the last three years, as shown in Figure 1.



Figure 1: Circuit 2536 peak load in the last 3 years

Table 1: Circuit 2536 peak load in the last 3 years

Circuit	Substation	Normal Rating (A)	2023 Summer peak load (A)	2023 Thermal Loading	2022 Summer peak load (A	2022 Thermal Loading	2021 Summer peak load (A	2021 Thermal Loading	Number of customers
2536	New Congress	338	304	90.0%	309	91.4%	315	93.1 %	2,763

The most practical and cost-effective solution to this issue involves redistributing load from one circuit to another, capitalizing on existing circuit ties where possible. As a result, this capacity

project was developed to mitigate the potential overload on New Congress Circuit 2536. This proactive measure ensures the continued reliable service to all customers in the area.

Proposed Scope of Work

The project's scope of work involves transferring load from Circuit 2536 to a neighboring circuit with available capacity and exciting or feasible future ties with 2536. Circuit 2543 are close enough to have ties with Circuit 2536, but the available capacity needs to be increased first to have room for the load coming from Circuit 2536.

The process of transferring 36 A and 246 customers from Circuit 2536 to Circuit 2543 involves the following steps:

1. Transfer 23.8 A and 266 customers from Circuit 2543 to Circuit 2538, by:
    - Close the existing tie switch between Circuit 2543 & Circuit 2538 (at Pole 2588).
    - Add a new recloser at Pole 2599 and this will be the new tie between Circuit 2543 and Circuit 2538. As represented in Figure 2.

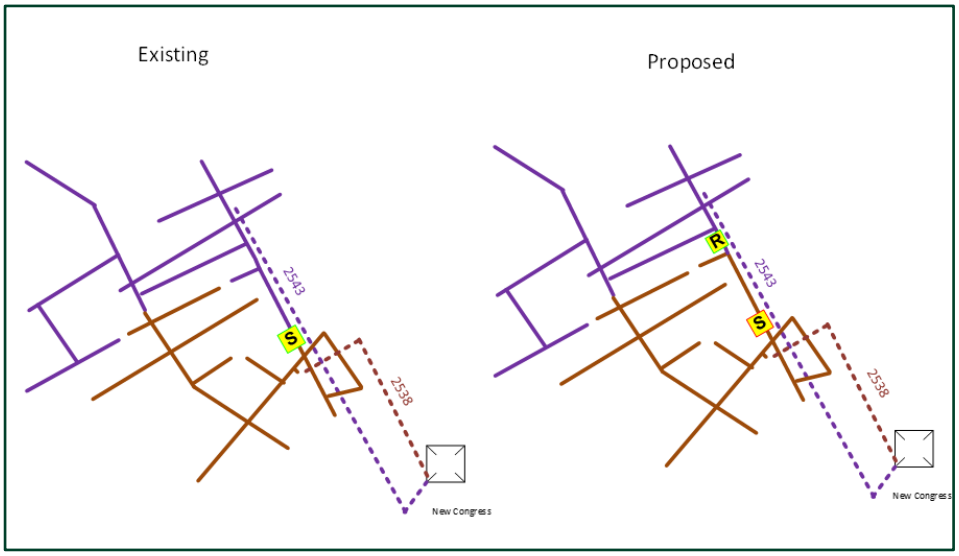

Figure 2: Transfer load from Circuit 2543 to Circuit 2538 through circuit ties.

2. Create a tie connection between Circuit 2536 and Circuit 2543, and transfer around 36 A and 246 customers from Circuit 2536 to Circuit 2543, by:
    - Add a new 3-phase overhead line between Pole 3679 and Pole 4977.
    - Install a new SCADA recloser at Pole 5539, which will be a new tie between feeders 2543 and 2536, as represented in Figure 3.

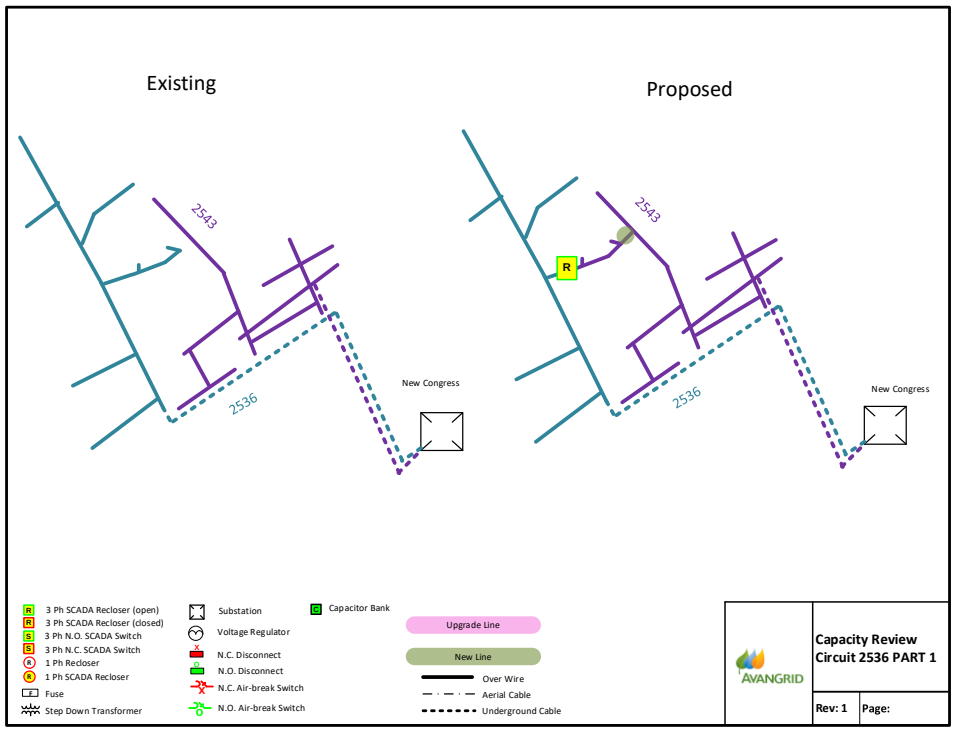

Figure 3: Transfer from Circuit 2536 to Circuit 2543 through circuit ties

Table 2 shows the initial conditions, and Table 3 the final conditions of the involved circuits. After the load transfers, the circuits that picked up load remain under its maximum load, and the number of customers stays as close as possible to the 2,500 limit. This satisfies the load transfer criteria.

Table 2: Involved circuits initial conditions

Circuit	Substation	Current				
		Normal Rating (A)	LTE Rating (A)	Max peak Load in the last 3 years (A)	Thermal Loading	Number of customers
2536	New Congress	338	388	315	93.1%	2,763
2543	New Congress	274	405	198	72%	2,636
2538	New Congress	274	405	167	61%	1,780

Table3: Involved circuits final conditions

Circuit	Substation	After Preferred Solution				
		Normal Rating (A)	LTE Rating (A)	Max peak Load in the last 3 years (A)	Thermal Loading	Number of customers
2536	New Congress	338	388	279	72%	2,517
2543	New Congress	274	405	210	77%	2,616
2538	New Congress	274	405	191	70%	2,046

The project's implementation cost is $268,642, as detailed in Table 4. This is considered the cost-effective solution. The outlined scope of work ensures the efficient operation of both substations and accommodates the region's growing power demand.

Table 1: Total cost of the project.

Category	Cost Estimate
Material	
15 kV - SCADA Controlled Recloser - 3 phase (2 reclosers)	$ 112,500
15kV - New Three Phase Poles (1 Pole)	$ 5,625
15kV - Three Phase OH Conductor (3 sections-per section - 150ft)	$ 844
Overheads during all phases of the project	$ 48,173
Internal Labor	
Evaluation, Design and Support	$ 30,000
Support during project construction	$ 32,500
Responsible for Design	$ 15,000
Allocations assigned to the project	$ 22,500
Switching operation at 15 kV - Pad mounted switches (1 switch)	$ 1,500
Total Cost	**$ 268,642**

Solution Alternatives Considered:

In addressing the overload issue on Circuit 2536, two alternative solutions were studied, evaluated, and compared with the chosen solution:

1. **Upgrading Select Sections of the Open wire Cable**: This alternative proposes an upgrade to the capacity of the open wire cable. Specifically, it involves re-conducting 21 sections of 2/0

Cu open wire cable to either 4/0 or 397 AL, extending from the riser pole to Robin Street for approximately 0.6 mi. Implementing this solution would effectively resolve the overload issue, as the circuit's new rating would increase to 375 Amps, reducing the thermal loading at the peak to 84%. The estimated cost for this alternative is projected to be $320,875, as detailed in Table 5.

Table 2: Total cost of the alternative 1.

New feeder	Cost Estimate
Material	
15kV – Replace three phase poles (21 poles)	$ 141,750
15 KV- replace three phase OH conductor (21 sections- per section 150 ft)	$ 21,263
Overheads during all phases of the project	$ 57,863
Internal Labor	
Evaluation, Design and Support	$ 30,000
Support during project construction	$ 32,500
Responsible for Design	$ 15,000
Allocations assigned to the project	$ 22,500
Total Cost	**$ 320,875**

2. Battery Energy Storage System (BESS): one potential solution involves installing a Battery Energy Storage System (BESS) with sufficient capacity to prevent overloads during the circuit's peak hours. Considering the last three years peak, the battery would need to provide 0.51 MVA at the peak time to avoid overloading, as depicted in Figure 4. The estimated battery size required for this purpose is 1.16 MWh. However, the cost associated with installing a BESS of this size is approximately $383,342, as indicated in Table 6. Despite its effectiveness, this alternative is still more expensive than the preferred solution and is no longer under consideration.

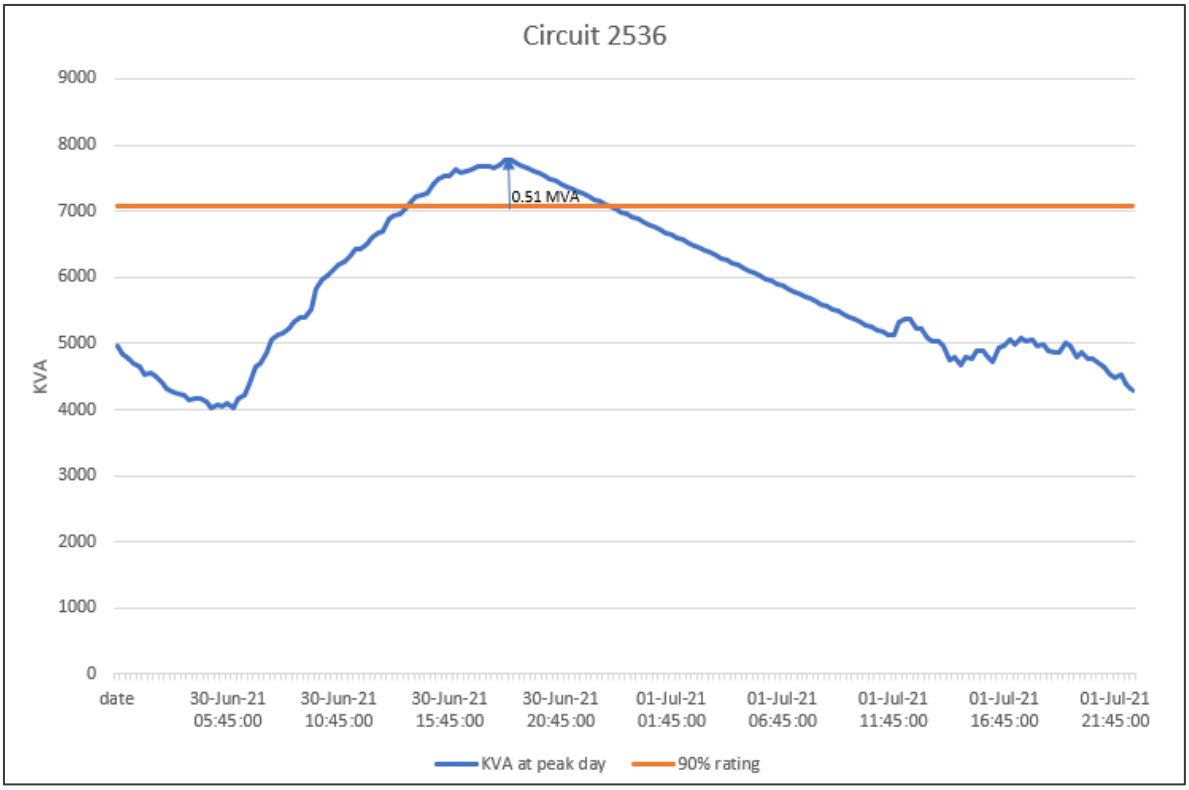

Figure 4: BESS assessment for Circuit 2536.

Table 6: BESS project cost estimate.

BESS Project Cost Estimate	
Engineering and Design	$6,738
Battery System and Electrical	$267,865
Civil/Structural	$18,724
Commissioning	$4,830
Land Lease	$-
Microgrid Equipment	$-
Contingency (30%)	$89,447
Overheads (15%)	$58,141
ITC Tac Credit (50%)	$62,404
Total Cost	**$383,342**

Risk of No Action:

1. **Impact on Economic Growth and Development**: Failing to act in advance can lead to capacity bottlenecks, extending the timeline required to accommodate new customer requests. This inaction can negatively impact the economic development of the area,

slowing down the roll-out of beneficial electrification plans. These plans include the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development.

2. **Equipment Damage:** Overloading can cause damage to the feeder cables, switches, and other components. It may lead to insulation breakdown, overheating, and premature wear.
3. **Reduced System Reliability:** Overloaded feeders are more prone to faults, which can disrupt power supply and affect reliability.
4. **Increased Energy Loss:** Overloaded feeders consume more energy, leading to higher losses and inefficiency.
5. **Fire Hazard:** Overheating due to prolonged overloading increases the risk of fire in the feeder or nearby equipment.

In summary, overloading a distribution feeder can compromise safety, reduce equipment lifespan, and increase operational costs. Proper load management and preventive measures are crucial to mitigate these risks. Therefore, taking no action is not a viable option, as it could lead to serious consequences.

Project Benefits:

1. **Reliability**: Enhancing capacity in this feeder will help meet reliability requirements by avoiding outages caused by overloads.
2. **Economic Development**: It can facilitate the roll-out of beneficial electrification plans such as the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development. This can stimulate economic growth and progress in the region.
3. **Cost Efficiency**: the solution proposed in this project is the least costly when compared with other alternatives.
4. **Accommodation of New Load**: It will increase capacity of New Congress Circuit 2536 and will allow for the interconnection of new generation and load, effectively managing the increased demand.
5. **Environmental Impact**: Increased capacity can accommodate more distributed energy sources (DER), contributing to a cleaner and more sustainable energy sector.
6. **Safety**: By preventing overloading, these projects can enhance the safety of the power grid.

Project Relationships (if applicable):

This project does not have any correlation with other projects.

2. Funding Detail

Substation	Circuit	3-year highest thermal loading	In service year	Cost preferred solution	Budget - Year 1	Budget – Year 2	IP status	PPM Project ID
New Congress	2536	93.2%	2028	$268,642	$134,321	$134,321	Technical (IP2)	PRJ-005135

An Avangrid company

The United Illuminating Company - Electric Capex Projects/Programs

1. Summary

Project Title: UI Capacity Program – North Haven Substation

Project Sponsor: Lucas Cruz (D. Planning)

PPM Project ID#: PRJ-005376

Type: Project

Functional grouping: Capacity

Work Category: Other Asset Condition (Thermal)

IP Status: Technical (IP2)

Total Funding Request: $82,896

Estimated Start Year (IP3 Execution): 2026

Estimated In Service Year (Energized): 2028

Project Description & One-Line:

The UI North Haven substation is a critical infrastructure that serves 7,575 customers in the eastern area of UI through 10 distribution circuits. Currently, it is one of the most loaded substations in the UI territory. Projections based on the 90/10 weather scenario, indicate that this substation is exposed to exceed 90% of its rated capacity in 2024 and exceed full capacity by 2033.

To address this issue, the most practical and cost-effective solution involves redistributing the load from one substation to another, leveraging existing circuit ties. The UI distribution planning team has developed this capacity project to alleviate the potential overload on the North Haven substation and create room for future growth. This is particularly important in light of beneficial electrification plans such as electric vehicles, the electrification of heating systems and others.

The solution involves transferring approximately 6.62 MVA out of the North Haven substation through the existing circuit ties to avoid the risk of exceeding 90% capacity in the next 10 years. This low-cost solution involves two steps:

1. Step 1: Transfer 1.36 MVA from North Haven to Sacket through the existing circuit ties between circuit 1752 and circuit 1645.
2. Step 2: Transfer 4.54MVA from North Haven to Sacket through the existing circuit ties between circuit 1750 and circuit 1643.

After the implementation of step 1, North Haven is expected to reach 92% of its rating in 2028, instead of 95% before this load transfer, and after step 2 it is expected to reach 83% of its rating in 2028. Meanwhile, Sackett is still expected to be below its 90% capacity. This strategic load redistribution will ensure the efficient operation of both substation and provide room for the growing power demand in the region.

Table 1 :North Haven and Sackett substations forecasted 90/10 thermal loading.

Year	Forecasted 90/10 thermal loading					
	North Haven Substation			Sackett Substation		
	Current	After Step 1	After Step2	Current	After Step 1	After Step 2
2025	92%	89%	-	58%	61%	-
2027	94%	91%	81%	64%	67%	74%
2033	102%	99%	90%	66%	69%	76%

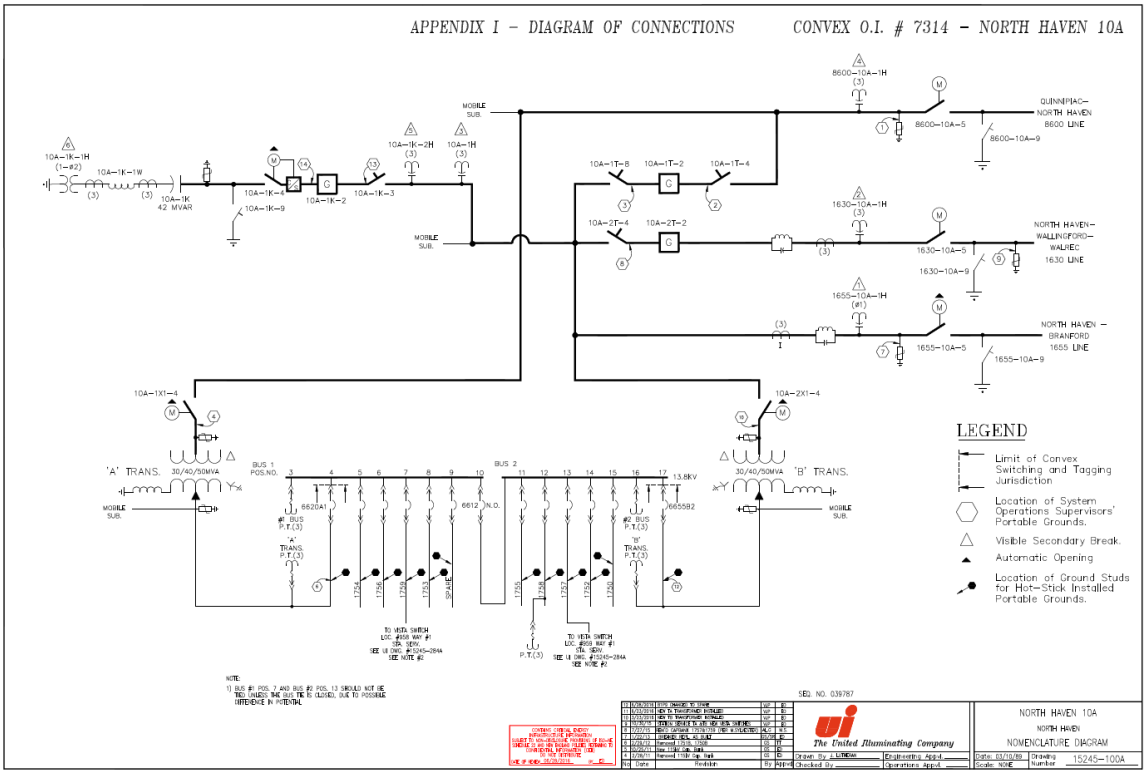

Figure 1: North Haven substation one-line diagram.

System Needs and Justification:

According to Avangrid Distribution Planning Criteria, the load on a substation with multiple transformers should not exceed the LTE (long term emergency) rating of the smallest (lowest rated) transformer. Additionally, a threshold of 90% should be used for transformer normal rating to actual loading to flag a capacity needs assessment. This threshold is established to proactively identify potential overloads and commence necessary work ahead of time, a process that typically extends over several years. This proactive approach assists in maintaining the stability and reliability of the power distribution system.

Based on the 90/10 load forecast scenario, UI North Haven substation is projected to exceed its rated capacity within the next decade. The North Haven substation serves 7,575 customers in the in the eastern Division of UI and is exposed to exceed 90% of its rated capacity in 2024 and reach full capacity by 2030, as indicated in Tables 2 and Table 3.

The most practical and cost-effective solution to this issue involves redistributing the load from on substation to another, leveraging existing circuit ties where possible. Consequently, this capacity project was developed to alleviate the potential overload on the North Haven substation. This proactive approach ensures the continued reliable service to all customers in the area.

Table 2: North Haven 90/10 peak load forecast

Substation	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Sub Rating MVA	2033 Thermal loading (90/10)
North Haven	43.95	44.16	44.39	44.74	45.19	45.69	46.30	46.98	47.77	48.55	47.81	102%

Table 3: North Haven 90/10 thermal loading

Substation	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
North Haven	92%	92%	93%	94%	95%	96%	97%	98%	100%	102%

Proposed Scope of Work

The scope of work for this project involves redistributing the load from the North Haven substation to the Sackett substation. Circuits 1645 and 1643 at the Sackett substation, which have available capacity and ties with the North Haven substation, have been selected for this purpose. Part of the load from North Haven circuit 1752 will be transferred to Sacket circuit 1645, and part of the load from North Haven circuit 1750 will be transferred to Sacket circuit 1643.

The steps to complete this load transfer are as follows:

1. Transfer 57A and 164 customers from circuit 1752 to circuit 1645 by performing the following steps: First, close the existing air breaker switch located at P3450. Next, open the existing recloser (23745) situated on pole P4524. Then, close the existing air breaker switch at pole P555S. Finally, open the existing air breaker switch at pole P723. These actions will establish new connections between circuits 1752 and 1645, as shown represented in Figure 2.

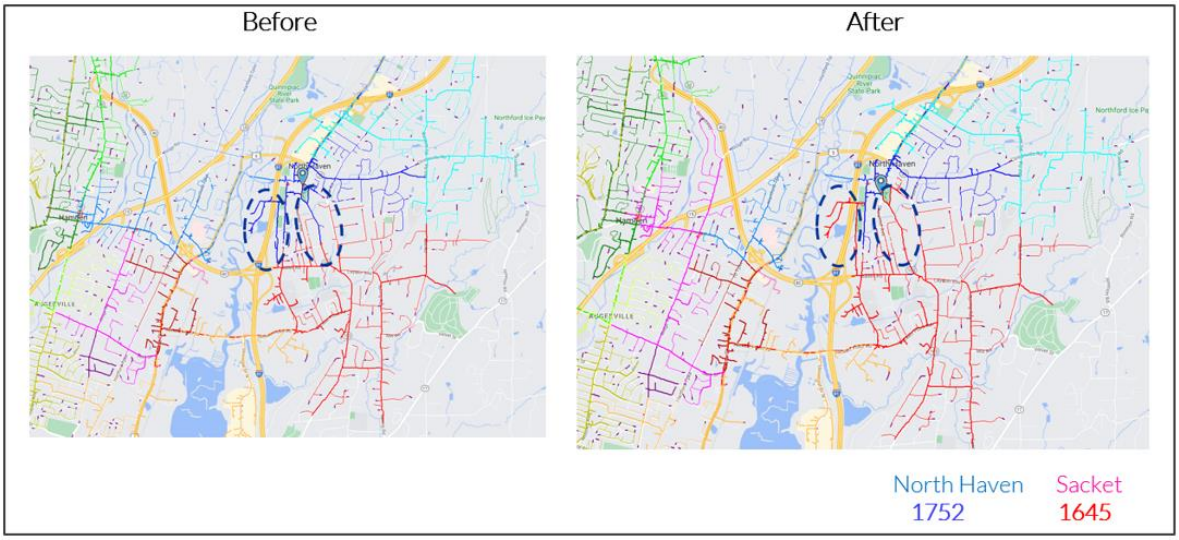

Figure 2: Step 1 - transfer the load through circuit ties.

2. Transfer approximately 60A and 1,172 customers from circuit 1750 to circuit 1643 by closing the existing recloser at pole P1338 and install a new normally open recloser at pole P1333 which will serve as the new ties between circuits 1750 and 1643. This is represented in Figure 3.

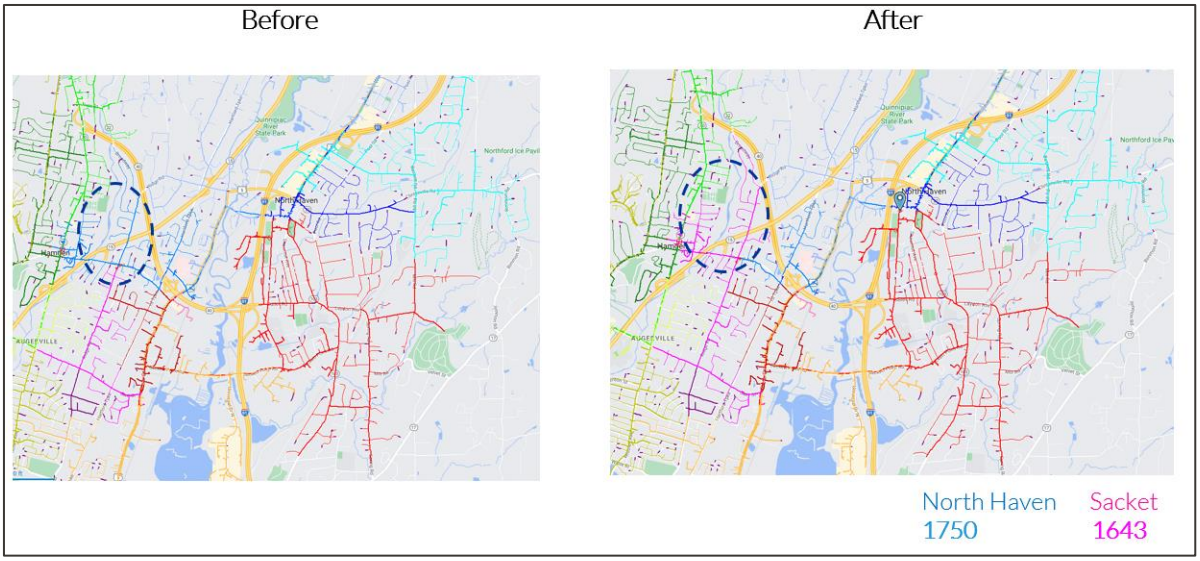

Figure 3: Step 2 - transfer the load through circuit ties.

Table 4 shows the initial conditions and Table 5 final conditions of the involved circuits. After circuit 2502 has picked up the load from the North Haven substation, it is still not overloaded, and the number of customers is below 2,500. This achieves the load transfer criteria.

Table 4: Involved circuits initial conditions.

Description	Substation	Circuit	Current				
			Normal Rating (A)	LTE Rating (A)	Peak Load at the year of implementation (A) *	Thermal Loading	Number of customers
Involved circuits in Step 1	North Haven	1752	438	599	179	41%	988
	Sackett	1645	438	599	302	69%	1,792
Involved circuits in Step 2	North Haven	1750	438	599	341	78%	2,017
	Sackett	1643	438	599	202	46%	565

*Step 1 is implemented in 2025 and step 2 in 2027.

Table 5: Involved circuits final conditions.

Description	Substation	Circuit	After Preferred solution				
			Normal Rating (A)	LTE Rating (A)	Peak Load at the year of implementation (A) *	Thermal Loading	Number of customers
Involved circuits in Step 1	North Haven	1752	438	599	122	28%	834
	Sackett	1645	438	599	359	82%	1,956
Involved circuits in Step 2	North Haven	1750	438	599	167	38%	834
	Sackett	1643	438	599	376	86%	1,737

*Step 1 is implemented in 2025 and step 2 in 2027

The cost of implementing step 1 is $6,000, and for step 2 it is $76,896, which makes the total cost of mitigating the overload through the existing ties is $82,896, as represented in Table 6. This is considered the cheapest solution. This scope of work outlines the steps necessary to ensure the efficient operation of both substations and create room to the growing power demand in the region.

Table 6: Total cost of the project.

Step 1	Cost Estimate
Internal Labor	
Switching 15 kV - Pad mounted switches (4 switches)	$ 6,000
Step 2	
Material	
15 kV - SCADA Controlled Recloser - 3 phase (one recloser)	$ 55,800
Overheads during all phases of the project	$ 13,596
Internal Labor	
Evaluation, Design and Support	$ 3,600
Responsible for Design	$ 2,400
Switching 15 kV - Pad mounted switches (1 switch)	$ 1,500
Total Cost	**$ 82,896**

Solution Alternatives Considered:

To address the overload issue at the North haven substation, one alternative has been studied, evaluated, and compared with the chosen solution. This alternative include:

1. New feeder from Sackett to North Haven:

   This alternative involves extending a new feeder from Sackett substation to North haven at an estimated cost of around $1,990,708, as shown in Table 7. The new feeder can pick up part of the load from North Haven substation and mitigate the overload.

Table 7: new feeder cost estimate.

New feeder	Cost Estimate
Material	
15 kV - SCADA Controlled Recloser - 3 phase (two recloser)	$ 120,900
15kV - UG 750 CU 3Ø Primary (18 sections-per section - 400ft)	$ 1,228,500
15kV - Three Phase Mainline (1 section- 150 ft)	$ 878
15kV - New Three Phase poles (1 pole)	$ 358,980
Overheads during all phases of the project	$ 358,980
Internal Labor	
Evaluation, Design and Support	$93,600
Support during project construction	$111,800
Responsible for Design	$35,100
Allocations assigned to the project	$35,100
Total Cost	**$ 1,990,708**

Risk of No Action:

1. **Impact on Economic Growth and Development**: Failing to act in advance can lead to capacity bottlenecks, extending the timeline required to accommodate new customer requests. This inaction can negatively impact the economic development of the area, slowing down the roll-out of beneficial electrification plans. These plans include the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development.
2. **Reduced Lifespan**: Overloading can significantly reduce the lifespan of a transformer within the substation. It can cause damage to insulation, winding, and other components, leading to premature failure.
3. **Reduced Efficiency**: Overloading also affects the efficiency of the transformer. When a transformer operates beyond its rated capacity, it becomes less efficient.
4. **Safety Hazards**: Overloading can cause the transformer to overheat, posing a fire risk or even an explosion.

In summary, overloading a power substation can compromise safety, reduce equipment lifespan, and increase operational costs. Proper load management and preventive measures are crucial to mitigate these risks. Therefore, taking no action is not a viable option, as it could lead to serious consequences.

Project Benefits:

1. **Reliability**: Enhancing capacity in this substation will help meet reliability requirements by avoiding outages caused by overloads.
2. **Economic Development**: It can facilitate the roll-out of beneficial electrification plans such as the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development. This can stimulate economic growth and progress in the region.
3. **Cost Efficiency**: the solution proposed in this Project is the least costly when compared with other alternatives.
4. **Accommodation of New Load**: It will increase capacity in North Haven and will allow for the interconnection of new generation and load, effectively managing the increased demand.
5. **Environmental Impact**: Increased capacity can accommodate more distributed energy sources (DER), contributing to a cleaner and more sustainable energy sector.
6. **Safety**: By preventing overloading, these projects can enhance the safety of the power grid.

Project Relationships (if applicable):

This project does not have any correlation with other projects.

2. Funding Detail

Substation	90/10 Forecast in 2033	In service year	Cost preferred solution	Budget - Year 1	Budget - Year 2	Budget – Year 3	IP status	PPM Project ID
North Haven	102%	2028	$82,896	$6,000	-	$76,896	Technical (IP2)	PRJ-005376

An Avangrid company

The United Illuminating Company - Electric Capex Projects/Programs

1. Summary

Project Title: UI Capacity Program – Quinnipiac Circuit 1542

Work Category: Other Asset Condition (Thermal)

Project Sponsor: Lucas Cruz (D. Planning)

IP Status: Technical (IP2)

PPM Project ID#: PRJ-005131

Total Funding Request: $148,632

Type: Project

Estimated Start Year (IP3 Execution): 2027

Functional grouping: Capacity

Estimated In Service Year (Energized): 2028

Project Description:

Quinnipiac Circuit 1542, originating from the Quinnipiac substation in UI's western area, is a distribution circuit serving approximately 2,169 customers. Over the past three years, this circuit has consistently operated close to its rated capacity, making it one of the most heavily loaded circuits within the UI territory.

To alleviate this issue, the most feasible and cost-effective solution is to redistribute the load between circuits, utilizing existing circuit ties. The UI distribution planning team has developed a capacity project aimed at reducing the thermal load on Quinnipiac Circuit 1542, thereby creating room for future growth. This initiative is crucial, especially considering the beneficial electrification plans, which include the introduction of electric vehicles and the electrification of heating systems, among others.

The proposed solution involves the transfer of approximately 132 A and 416 customers from Quinnipiac Circuit 1542 to Sacket Circuit 1647. This transfer aims to prevent Circuit 1542 from exceeding 90% of its rated capacity in the foreseeable future.

Upon the implementation of this solution, the load on Circuit 1542 is projected to decrease to 65.2% of its rated capacity, a significant reduction from the 99.1% thermal loading experienced in the summer of 2022. This strategic load redistribution will not only ensure the efficient operation of both circuits but also accommodate the region's growing power demand.

System Needs and Justification:

According to the Avangrid Distribution Planning Criteria, a threshold of 90% is set for the ratio of actual loading to circuit normal rating, serving as trigger for a capacity needs assessment. This threshold is designed to prevent potential overloads by starting major circuit work in advance.

Furthermore, the number of customers per circuit should be limited to 2,000 – 2,500 for 15kV class distribution feeders.

As represented in Table 1, the thermal loading of Quinnipiac Circuit 1542 has consistently exceeded 90% of its normal capacity in 2021, 2022 and 2023. During the summer of 2022 the peak load frequently exceeded 90% of the rated capacity, particularly at the start of August. On August 8th, 2023, the circuit experienced its highest peak in the last three years, with the load exceeding 99% of the rated capacity, as shown in Figure 1.

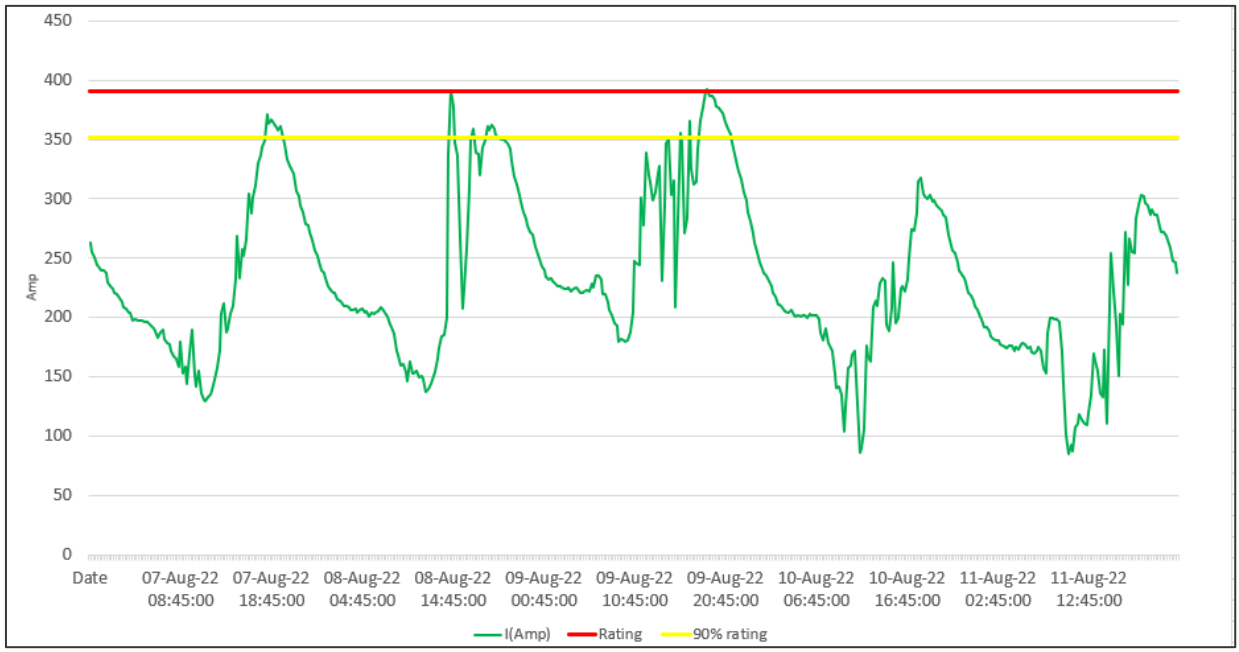

Figure 1: Circuit 1542 peak load in the last 3 years

Table 1: Circuit 1542 peak load in the last 3 years

Circuit	Substation	Normal Rating (A)	2023 Summer peak load (A)	2023 Thermal Loading	2022 Summer peak load (A	2022 Thermal Loading	2021 Summer peak load (A	2021 Thermal Loading	Number of customers
1542	Quinnipiac	391	357	91.2%	387	99.1%	370	94.6%	2,169

The most practical and cost-effective solution to this issue involves redistributing load from one circuit to another, capitalizing on existing circuit ties where possible. As a result, this capacity project was developed to mitigate the potential overload on Quinnipiac Circuit 1542. This proactive measure ensures the continued reliable service to all customers in the area.

Proposed Scope of Work

The project's scope of work involves transferring load from Quinnipiac Circuit 1542 to a selected circuit with available capacity and ties to 1542. Sacket Circuit 1647, which meets these conditions, has been selected for this purpose.

The process of transferring 132 A and 416 customers from Circuit 1542 to Circuit 1647 involves the following steps:

1. Add a new SCADA Recloser at P440, it will be the new tie switch between Circuit 1542 and Circuit 1647.
2. Close the Air breaker switch between circuits 1542 & 1647 (at P4048).
3. Add two Cap banks one at Pole 400 and the other at Pole 612.

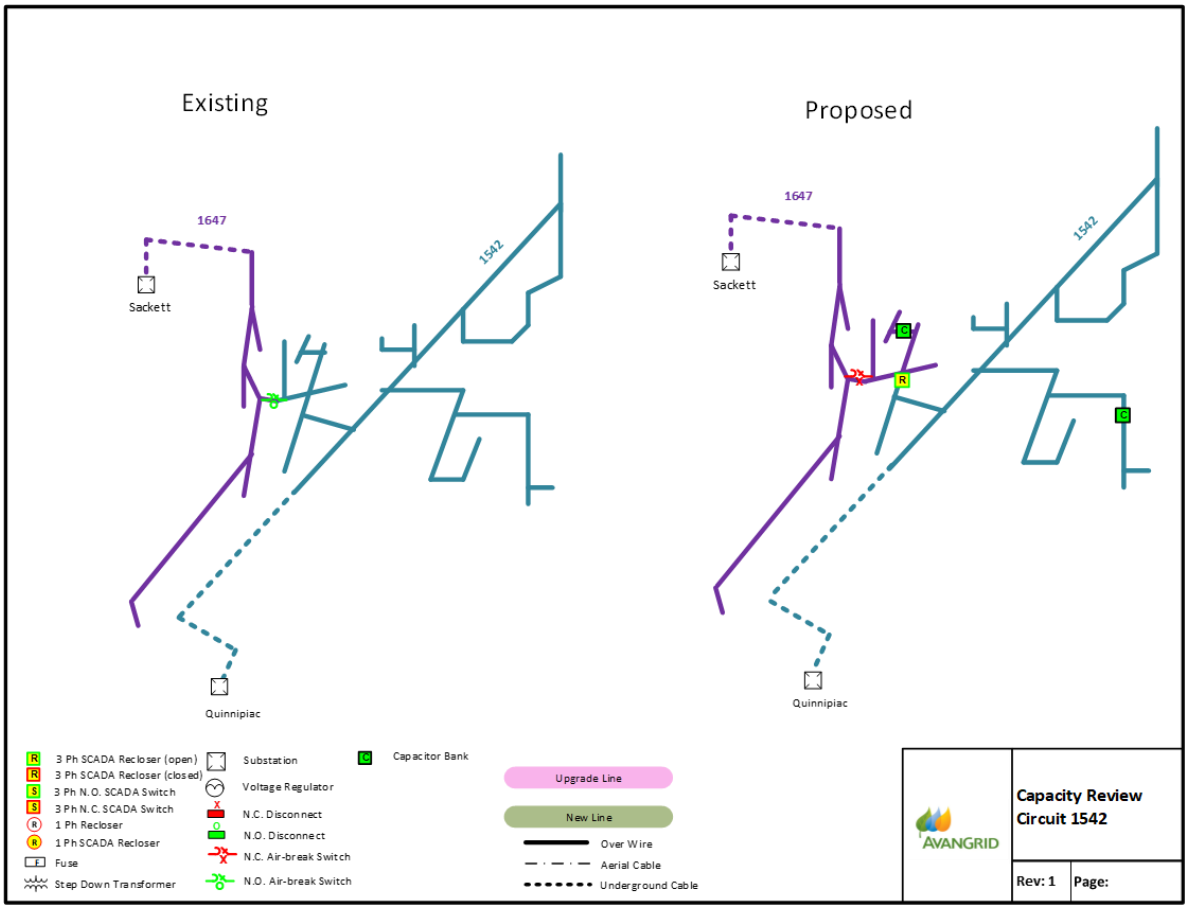

Figure 2: Transfer load from Circuit 1542 to Circuit 1647 through circuit ties

Table 2 shows the initial conditions, and Table 3 the final conditions of the involved circuits. After Circuit 1647 has absorbed the load from Circuit 1542, it remains under its maximum load, and the number of customers stays within the 2,500 limit. This satisfies the load transfer criteria.

Table 2: Involved circuits initial conditions.

Circuit	Substation	Current				
		Normal Rating (A)	LTE Rating (A)	Max peak load in the last 3 years (A)	Thermal Loading	Number of customers
1542	Quinnipiac	391	521	387	99.1%	2,169
1647	Sacket	438	599	187	42.6%	151

Table 3: Involved circuits final conditions.

Circuit	Substation	After Preferred Solution				
		Normal Rating (A)	LTE Rating (A)	Max peak load in the last 3 years (A)	Thermal Loading	Number of customers
1542	Quinnipiac	391	521	255	65.2%	1,753
1647	Sacket	438	599	320	73%	567

The project's implementation cost is $148,632, as detailed in Table 4. This is considered the cost-effective solution. The outlined scope of work ensures the efficient operation of both substations and accommodates the region's growing power demand.

Table 1: Total cost of the project.

Category	Cost Estimate
Material	
15 kV - SCADA Controlled Recloser - 3 phase (1 recloser)	$ 55,800
15kV - OH Cap Bank (2 Cap Banks)	$ 61,200
Overheads during all phases of the project	$ 26,532
Internal Labor	
Evaluation, Design and Support	$ 3,600
Switching operation at 15 kV - Pad mounted switches (1 switch)	$ 1,500
Total Cost	**$ 148,632**

Solution Alternatives Considered:

In addressing the overload issue on Circuit 1542, an alternative solution was studied, evaluated, and compared with the chosen solution. This alternative includes:

1. **Transfer the load to another circuit that has ties with 1542**: East shore Circuit 1701 is another circuit that has ties with Circuit 1542 and have enough capacity to pick up the extra load of 1542, so, the second alternative solution could be transferring 62.4 Amps from Circuit 1542 to

Circuit 1701, which will reduce the thermal loading of Circuit 1542 at the peak to 83%. The estimated cost for this alternative is projected to be $185,464, as detailed in Table 5.

Table 2: Total cost of the alternative

Category	Cost Estimate
Material	
15 kV - SCADA Controlled Recloser - 3 phase (1 recloser)	$ 55,800
15kV - OH Cap Bank (2 Cap Banks)	$ 91,800
Overheads during all phases of the project	$ 33,264
Internal Labor	
Evaluation, Design and Support	$ 3,600
Switching operation at 15 kV - Pad mounted switches (1 switch)	$ 1,500
Total Cost	**$ 185,464**

Risk of No Action:

1. **Impact on Economic Growth and Development**: Failing to act in advance can lead to capacity bottlenecks, extending the timeline required to accommodate new customer requests. This inaction can negatively impact the economic development of the area, slowing down the roll-out of beneficial electrification plans. These plans include the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development.
2. **Equipment Damage:** Overloading can cause damage to the feeder cables, switches, and other components. It may lead to insulation breakdown, overheating, and premature wear.
3. **Reduced System Reliability:** Overloaded feeders are more prone to faults, which can disrupt power supply and affect reliability.
4. **Increased Energy Loss:** Overloaded feeders consume more energy, leading to higher losses and inefficiency.
5. **Fire Hazard:** Overheating due to prolonged overloading increases the risk of fire in the feeder or nearby equipment.

In summary, overloading a distribution feeder can compromise safety, reduce equipment lifespan, and increase operational costs. Proper load management and preventive measures are crucial to mitigate these risks. Therefore, taking no action is not a viable option, as it could lead to serious consequences.

Project Benefits:

1. **Reliability**: Enhancing capacity in this feeder will help meet reliability requirements by avoiding outages caused by overloads.
2. **Economic Development**: It can facilitate the roll-out of beneficial electrification plans such as the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development. This can stimulate economic growth and progress in the region.
3. **Cost Efficiency**: the solution proposed in this project is the least costly when compared with other alternatives.
4. **Accommodation of New Load**: It will increase capacity of New Congress Circuit 1542 and will allow for the interconnection of new generation and load, effectively managing the increased demand.
5. **Environmental Impact**: Increased capacity can accommodate more distributed energy sources (DER), contributing to a cleaner and more sustainable energy sector.
6. **Safety**: By preventing overloading, these projects can enhance the safety of the power grid.

Project Relationships (if applicable):

This project does not have any correlation with other projects.

2. Funding Detail

Substation	Circuit	3-year highest thermal loading	In service year	Cost preferred solution	Budget - Year 1	Budget - Year 2	IP status	PPM Project ID
Quinnipiac	1542	99.1%	2028	$148,632	$74,316	$74,316	Technical (IP2)	PRJ-005131

An Avangrid company

The United Illuminating Company - Electric Capex Projects/Programs

1. Summary

Project Title: UI Capacity Program – Water St Circuit 1526

Work Category: Other Asset Condition (Thermal)

Project Sponsor: Lucas Cruz (D. Planning)

IP Status: Technical (IP2)

PPM Project ID#: PRJ-005130

Total Funding Request: $71,040

Type: Project

Estimated Start Year (IP3 Execution): 2027

Functional grouping: Capacity

Estimated In Service Year (Energized): 2027

Project Description:

Water St Circuit 1526, originating from the Water St substation in UI's eastern area, is a distribution circuit serving approximately 1,948 customers. Over the past three years, this circuit has consistently operated close to its rated capacity, making it one of the most heavily loaded circuits within the UI territory.

To alleviate this issue, the most feasible and cost-effective solution is to redistribute the load between circuits, utilizing existing circuit ties. The UI distribution planning team has developed a capacity project aimed at reducing the thermal load on Circuit 1526, thereby creating room for future growth. This initiative is crucial, especially considering the beneficial electrification plans, which include the introduction of electric vehicles and the electrification of heating systems, among others.

The proposed solution involves the transfer of approximately 36 A and 321 customers from Water St Circuit 1526 to Broadway Circuit 1907. This transfer aims to prevent Circuit 1526 from exceeding 90% of its rated capacity in the foreseeable future.

Upon the implementation of this solution, the load on Circuit 1526 is projected to decrease to 87.5% of its rated capacity, a significant reduction from the 98.2% thermal loading experienced in the summer of 2022. This strategic load redistribution will not only ensure the efficient operation of both circuits but also accommodate the region's growing power demand.

System Needs and Justification:

According to the Avangrid Distribution Planning Criteria, a threshold of 90% is set for the ratio of actual loading to circuit normal rating, serving as trigger for a capacity needs assessment. This threshold is designed to prevent potential overloads by starting major circuit work in advance. Furthermore, the number of customers per circuit should be limited to 2,000 – 2,500 for 15kV class distribution feeders.

As represented in Table 1, the thermal loading of Water St Circuit 1526 has consistently exceeded 90% of its normal capacity in 2021, 2022 and 2023. During the summer of 2022, the peak load frequently exceeded 90% of the rated capacity, particularly at the beginning of August. On August 9th, 2022, the circuit experienced its highest peak in the last three years, as shown in Figure 1.

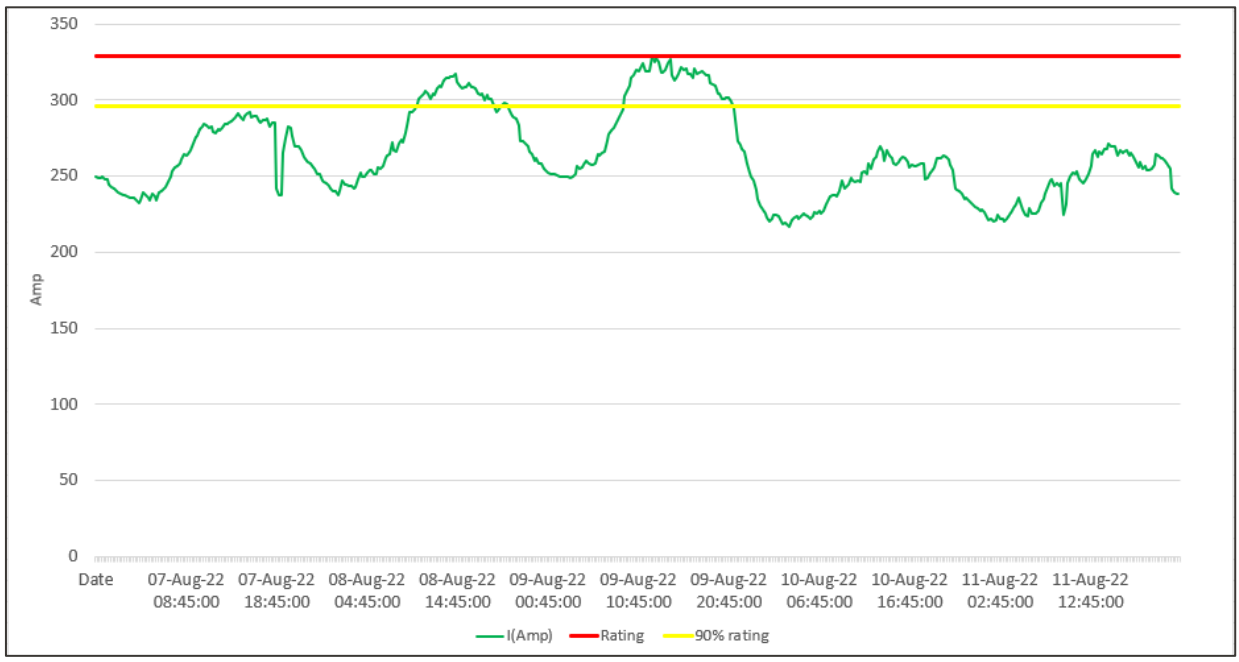

Figure 1: Circuit 1526 peak load in the last 3 years

Table 1: Circuit 1526 peak load in the last 3 years

Circuit	Substation	Normal Rating (A)	2023 Summer peak load (A)	2023 Thermal Loading	2022 Summer peak load (A	2022 Thermal Loading	2021 Summer peak load (A	2021 Thermal Loading	Number of customers
1526	Water St	329	299	91.0%	323	98.2%	310	94.3%	1,948

The most practical and cost-effective solution to this issue involves redistributing load from one circuit to another, capitalizing on existing circuit ties where possible. As a result, this capacity project was developed to mitigate the potential overload on Water St Circuit 1526. This proactive measure ensures the continued reliable service to all customers in the area.

Proposed Scope of Work

The project's scope of work involves transferring load from Water St Circuit 1526 to a selected circuit with available capacity and ties to 1526. Broadway Circuit 1907, which meets these conditions, has been selected for this purpose.

The process of transferring 36A and 321 customers from Circuit 1526 to Circuit 1907 involves the following steps:

1. Install a SCADA Recloser at Pole 4416. It will be the new tie between Circuit 1526 and Circuit 1907.
2. Open the existing air breaker switch at Pole 6754 as shown in Figure 2.

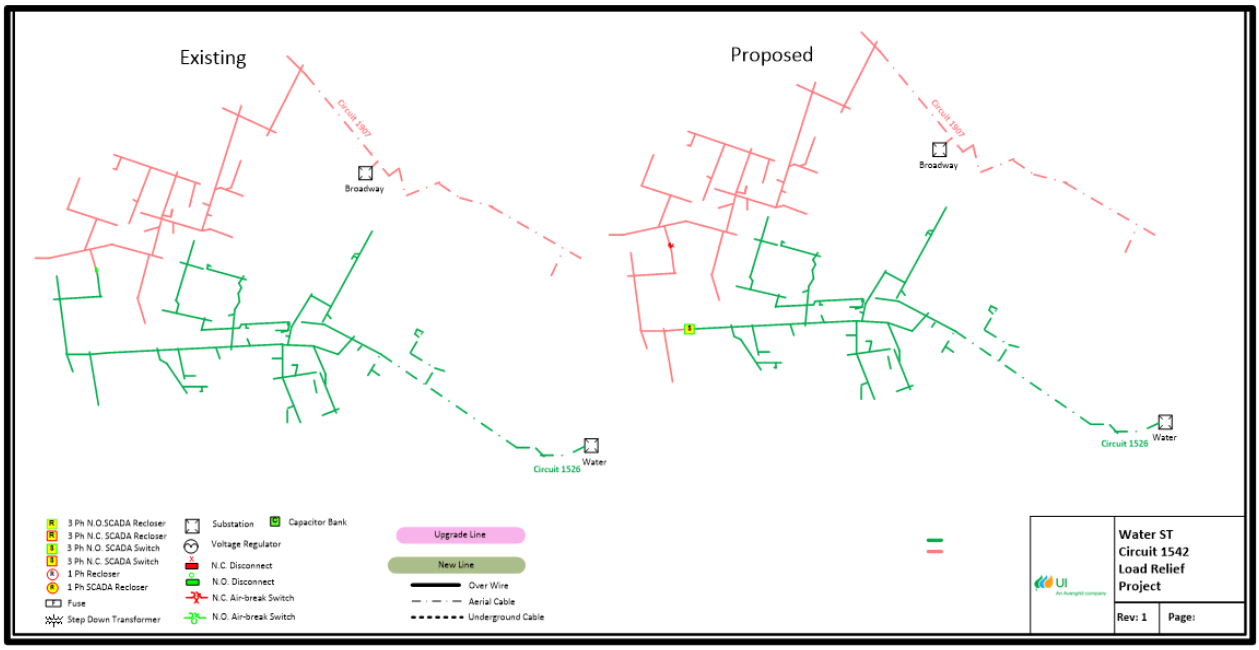

Figure 2: Transfer load from Circuit 1526 to Circuit 1907 through circuit ties

Table 2 shows the initial conditions, and Table 3 the final conditions of the involved circuits. After Circuit 1907 has absorbed the load from Circuit 1526, it remains under its maximum load, and the number of customers stays as close as possible to the 2,500 limit.. This satisfies the load transfer criteria.

Table 2: Involved circuits initial conditions.

Circuit	Substation	Current				
		Normal Rating (A)	LTE Rating (A)	Max peak load in the last 3 years (A)	Thermal Loading	Number of customers
1526	Water St	329	498	323	98.2%	1,948
1907	Broadway	380	448	183	48.2%	2,411

Table 3: Involved circuits final conditions.

Circuit	Substation	After Preferred Solution				
		Normal Rating (A)	LTE Rating (A)	Max peak load in the last 3 years (A)	Thermal Loading	Number of customers
1526	Water St	329	498	287	87.5%	1,627
1907	Broadway	380	448	218	77.8%	2,732

The project's implementation cost is $71,040 as detailed in Table 4. This is considered the cost-effective solution. The outlined scope of work ensures the efficient operation of both circuits and accommodates the region's growing power demand.

Table 1: Total cost of the project.

Category	Cost Estimate
Material	
15 kV - SCADA Controlled Recloser - 3 phase (1 recloser)	$ 55,800
Overheads during all phases of the project	$ 12,540
Internal Labor	
Evaluation, Design and Support	$ 1,200
Switching operation at 15 kV - Pad mounted switches (1 switch)	$ 1,500
Total Cost	**$ 71,040**

Solution Alternatives Considered:

In addressing the overload issue on Circuit 1526, an alternative solution was studied, evaluated, and compared with the chosen solution. This alternative includes:

1. **Upgrading Select Sections of the Underground Cable**: This alternative proposes an upgrade to the capacity of the underground cable. Specifically, it involves re-conducting 3 sections of 500 KCM paper and lead underground cable to 500 KCM EPR underground cable. Implementing this solution would effectively resolve the overload issue, as the circuit's new

rating would increase to 375 Amps, reducing the thermal loading at the peak to 86%. The estimated cost for this alternative is projected to be $355,325, as detailed in Table 5.

Table 2: Total cost of the alternative.

New feeder	Cost Estimate
Material	
15kV – replace UG 500 CU 3Ø Primary (3 sections-per section - 400ft)	$ 191,250
Overheads during all phases of the project	$ 64,075
Internal Labor	
Evaluation, Design and Support	$ 30,000
Support during project construction	$ 32,500
Responsible for Design	$ 15,000
Allocations assigned to the project	$ 22,500
Total Cost	**$ 355,325**

Risk of No Action:

1. **Impact on Economic Growth and Development**: Failing to act in advance can lead to capacity bottlenecks, extending the timeline required to accommodate new customer requests. This inaction can negatively impact the economic development of the area, slowing down the roll-out of beneficial electrification plans. These plans include the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development.
2. **Equipment Damage:** Overloading can cause damage to the feeder cables, switches, and other components. It may lead to insulation breakdown, overheating, and premature wear.
3. **Reduced System Reliability:** Overloaded feeders are more prone to faults, which can disrupt power supply and affect reliability.
4. **Increased Energy Loss:** Overloaded feeders consume more energy, leading to higher losses and inefficiency.
5. **Fire Hazard:** Overheating due to prolonged overloading increases the risk of fire in the feeder or nearby equipment.

In summary, overloading a distribution feeder can compromise safety, reduce equipment lifespan, and increase operational costs. Proper load management and preventive measures are crucial to mitigate these risks. Therefore, taking no action is not a viable option, as it could lead to serious consequences.

Project Benefits:

1. **Reliability**: Enhancing capacity in this feeder will help meet reliability requirements by avoiding outages caused by overloads.
2. **Economic Development**: It can facilitate the roll-out of beneficial electrification plans such as the development of electric vehicle charging infrastructure, electrification of heating systems, and commercial/industrial load development. This can stimulate economic growth and progress in the region.
3. **Cost Efficiency**: the solution proposed in this project is the least costly when compared with other alternatives.
4. **Accommodation of New Load**: It will increase capacity of New Congress Circuit 1526 and will allow for the interconnection of new generation and load, effectively managing the increased demand.
5. **Environmental Impact**: Increased capacity can accommodate more distributed energy sources (DER), contributing to a cleaner and more sustainable energy sector.
6. **Safety**: By preventing overloading, these projects can enhance the safety of the power grid.

Project Relationships (if applicable):

This project does not have any correlation with other projects.

2. Funding Detail

Substation	Circuit	3-year highest thermal loading	In service year	Cost preferred solution	Budget - Year 1	IP status	PPM Project ID
Water St	1526	98.2%	2027	$290,501	$71,040	Technical (IP2)	PRJ-005130

PRJ-002101

UI - Elec Better CAP

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Elec Better CAP

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002101	Electric Distribution	Mitchell, John	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Corrective Reliability	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:

This is an on-going program to improve electric distribution system performance which includes system planned work, municipal project make ready work which would require installation/relocation of overhead and underground lines and infrastructure upgrades to improve system performance.

Project Scope:

This is an on-going program for system planned work, municipal project make ready work which would require installation/relocation of overhead and underground lines and infrastructure upgrades to improve system performance. The scope of this project includes reliability improvements, distribution automation and equipment/asset replacement for overhead and underground lines. Circuit interruptions are reviewed and recommendations made to improve circuit performance through additional protective devices. Follow-up work from outages and trouble calls are implemented for repair/replace of overhead and underground wires and equipment.

Project Benefits:

Electric Better projects aimed at improving reliability of worst performing circuits
Ensures a safe and reliable electric distribution system through infrastructure upgrades, asset replacement and investment in automation.
Enhanced reliability and resiliency.

Project Risks and Mitigation Plan:

Sourcing of materials is a risk (Txfs, Poles, Wire and associated materials) has been limited by supply chain and lead times have significantly increased for certain items.
Distribution Planning and Engineering conduct circuit patrols, perform reliability analysis and develop alternatives where possible to select the most feasible designs.
Any temporary repairs are sent to engineering for follow-up to ensure permanent repairs are made to current construction standards and adherence to industry codes.

Risk of No Action:

No action would result in leaving defective equipment in service and accepting the reliability and safety risk of failure.
Delayed or non-execution of the work could have negative impact on reliability, public safety, workforce safety and could result in penalties and/or reputation damage.

Project Alternatives:
Alternative designs are considered on a case by case basis, in general this program provides like for like replacement of assets.

Basis for Project Estimates
The budget for this program is based on historical actuals and adjusted based upon economic activity. The majority of this program is in the critical path of service to customers. The Company will execute this work based on demand and allocate funds to or from other programs as necessary.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 395**	$ 77	$ -	$ 104	$ 106	$ 108
# CIAC	**$ -153**	$ -153	$ -	$ -	$ -	$ -
# External Services	**$ 2,276**	$ 120	$ 657	$ 490	$ 499	$ 509
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 1,750**	$ 429	$ -	$ 431	$ 440	$ 449
# Internal, Overheads	**$ 824**	$ 179	$ 58	$ 192	$ 196	$ 200
# Materials	**$ 1,532**	$ 221	$ -	$ 428	$ 437	$ 446
# Overheads - External	**$ 1,453**	$ 286	$ 83	$ 354	$ 361	$ 369
Total	**$ 8,076**	**$ 1,159**	**$ 798**	**$ 2,000**	**$ 2,040**	**$ 2,080**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 8,163	$ 1,246	$ 798	$ 2,000	$ 2,040	$ 2,080

Note: 2024 Plant Additions includes the entire calendar year

UI
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UI- Elec Better CAP

All Towns

WBS: UI-U0023

9/27/24

Electric Operations

Index

1. Program Description 3
2. Need Statement 3
3. Work Types 3
4. Actual Costs 4
5. Budget Forecast 5
6. Project Assumptions 6

1. Program Description

This is an on-going program to improve electric distribution system performance which includes system planned work, municipal project make ready work which would require installation/relocation of overhead and underground lines and infrastructure upgrades to improve system performance.

2. Need Statement

The source of this work comes from CIS, ADMS, TDRP, Cir Patrols, trouble and outages. The scope of this project includes reliability improvements, distribution automation and equipment/asset replacement for overhead and underground lines. Circuit interruptions are reviewed and recommendations made to improve circuit performance through circuit reconfiguration and additional protective devices. Follow-up work from outages and trouble calls are implemented for repair/replace of overhead and underground wires and equipment.

3. Work Types

Types of work include

- System improvement (Replace Txf, Install Secondary, Reliability work from TDRP, Make Ready for UG Svc, ADMS, Demo, WPC, Civil, voltage)
- MAT Code 8/22 -12/23
    - 823 – Distribution Betterment
        - URD MR, URD Temp, Voltage Comp, Pole For Pad
        - EWTs (Replace Primary, Secondary, Service, Frontier Replaced pole UI Frame and shift)
        - Reliability, Betterment (Remove bells sleeve thru primary, reconductor secondary, reconfigure circuit, Install recloser)
        - Civil (work done for URD cable fault)
    - 851 – Distirbution Repair - OH
        - EWT, Repair, Maint
    - 853 - Distribution Repair – UG
        - URD Fault, GLI Repairs, GLI replace Txf, URD Cbl Test
    - 868 – Equipment Replacement

- EWT

- Actual Costs 8/22 -12/23
  - 823 - Distribution Betterment, $5,607,556
  - 853 - Distribution Repair – UG, $126,522
  - 851 – Distribution Repair – OH, $30,154
  - 868 – Equipment Replacement, $26,576
  - 466 – Transformer Replacement, $19,351
  - 843, 866, 883 – Other $69,928

4. Actual Costs

	2021 Actual	2022 Actual	2023 Actual
UI - Elec Better CAP	6,872,884	4,563,619	4,265,124

2023 Actual Costs Breakdown

Category	Work Type	Actual 2023	% of Budget
Betterment		4,177,917	4177000
ADMS	Follow-up work for outage, trouble, pole hits, etc.	445,000	10%
Civil/UG/URD		52,500	1.20%
DLI Follow-up		17,000	0.40%
Dist. Betterment		16,000	0.40%
Equipment Install/Replace	Cap Bank, ABS, Txf, Recloser, Regulator, Cutouts, etc.	354,000	8.40%
EWT	Install/Replace Cutouts, Xarm, Txf, Primary, Secondary, SVC	40,000	1.00%
Make Ready	Construction required to connect customers. Examples: Increase OH Txf size 25 kVA to 37 kVA. Pole for Pad, install temp enclosure, electric and civil work. Reconductor copper Sec w/1/0 Al TPX Cable. Replace 35 ft pole w40ft, service upgrade, new secondary riser, muni sewer service. Replace poles for Muni street work.	1,076,700	25%
NESC		32,000	0.80%
Reliability/WPC/TDRP	Remove bells sleeve thru primary, reconductor secondary, reconfigure circuit, Install recloser, Install/Replace ABS, Cutouts, Bells, Insulators, etc.	1,420,000	34%

Telecom Pole Shifts		73,000	1.50%
Other MISC	Civil (UG, URD work), DLI Follow-up work, Replace Txf, Cutout, Pole Shifts, Dist. OH & UG Repairs, Engineering, Voltage Comp, Pole For Pad, etc.	651,717	15%
Total		3,526,200	

2024 Work Breakdown Estimate:

- $130,000 - ADMS (Follow-up work for outage, trouble, pole hits, etc.)

- $109,000 - Equipment Install/Replace (Cap Bank, ABS, Txf, Recloser, etc.)

- $325,000 - Make Ready (Construction required to connect customers)

- $104,000 - NESC (Pole work for compliance)

- $442,000 - Reliability/WPC/TDRP (Remove bells sleeve thru primary, reconductor secondary, reconfigure circuit, Install recloser, Install/Replace ABS, Cutouts, Bells, Insulators, etc.)

- $195,000 - Dist. OH & UG (Civil/UG/URD work, DLI Follow-up work, Replace Txf, Cutout, Pole Shifts, Dist. OH & UG Repairs, Engineering, Voltage Comp, Pole For Pad, etc.)

5. Budget Forecast

Work Type	2025	2026	2027	2028
ADMS	$95,712	$239,942	$244,740	$249,635
Equipment Install/Replace	$79,760	$199,951	$203,950	$208,029
Make Ready	$207,376	$519,874	$530,272	$540,877
NESC	$15,952	$39,990	$40,790	$41,605
Reliability/ WPC/TDRP	$279,160	$699,830	$713,827	$728,104
Other MISC	$119,640	$299,927	$305,926	$312,044
Total	$797,602	$1,999,517	$2,039,508	$2,080,298

6. Project Assumptions

The budget for this program is based on historical actuals and adjusted based upon economic activity. The majority of this program is in the critical path of service to customers. The Company will execute this work based on demand and allocate funds to or from other programs as necessary.

PRJ-002114

UI - Subst Better CAP

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Subst Better CAP

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002114	Electric Distribution	Rebolleda, Alfonso	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Corrective Reliability	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:

The scope of this project is for the reactive replacement of transmission and distribution equipment and devices for substations. The project is used for purchase of capital equipment replacement for transmission and distribution systems such as substation HVACs, bushings, batteries that fail in service. The budget is based on historic failures and replacement costs. Average costs for the last three years were approximately $1M.

Project Scope:

Other than reactive work to attend the regular issues within substations (ie: break or upgrade needs fro HVACs, roof improvement to avoid leaks, battery replacements, etc.) this year we would like to pilot some breaker replacement at Mix Avenue to explore medium term alternatives to get rid of breakers containing asbestos.

Project Benefits:

This allows to keep the system up and running in good condition to avoid reliability issues. In particular the pilot on asbestos contained breakers would help us to check available solutions to avoid the difficulties to execute maintenance and potencial employee exposure.

Project Risks and Mitigation Plan:

Sourcing of materials is a risk (Recloser, Txfs, Battery Systems, Wire and associated materials) has been limited by supply chain and lead times have significantly increased for certain items.
Not having spare equipment on hand or replacing failed equipment leaves the system in abnormal condition creates addtional impact on reliability
Temporary repairs and back up circuti/equipment are utilized temporarilly. Permanent repairs are made to current construction standards and adherence to industry codes.

Risk of No Action:

No action would result in leaving defective equipment in service and accepting the reliability and safety risk of failure. Delayed or non-execution of the work could have negative impact on reliability, public safety, workforce safety and could result in penalties and/or reputation damage.

Project Alternatives:

Alternative designs/solutions are considered on a case by case basis, in general this program provides like for like replacement of assets.

Basis for Project Estimates

The budget for this program is based on historical actuals of corrective/reactive work and adjusted based upon identified equipment replacement needs and substation infrastructure upgrades. The majority scope of this program is providing critical equipment/asset replacements for power delivery. The Company will execute this work based on demand and allocate funds to or from other programs as necessary.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 287**	$ 42	$ 59	$ 61	$ 62	$ 63
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 2,297**	$ 352	$ 443	$ 501	$ 501	$ 501
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 519**	$ 43	$ 115	$ 118	$ 120	$ 122
# Internal, Overheads	**$ 554**	$ 169	$ 91	$ 97	$ 98	$ 99
# Materials	**$ 993**	$ 286	$ 171	$ 175	$ 178	$ 182
# Overheads - External	**$ 772**	$ 175	$ 141	$ 150	$ 152	$ 154
Total	**$ 5,421**	**$ 1,068**	**$ 1,021**	**$ 1,101**	**$ 1,111**	**$ 1,121**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 4,622	$ 268	$ 1,021	$ 1,101	$ 1,111	$ 1,121

Note: 2024 Plant Additions includes the entire calendar year

UI
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UI- Subst Better CAP

All Towns

WBS: UI-U1211

Index

1. Program Description 3
2. Need Statement 3
3. Work Type 3
4. Forecasted CAPEX 3

1. Program Description

This is an on-going program which includes all those capital needs for the maintenance and upgrade of existing substations that either are not significant to have a project or are reactive to a equipment failure.

2. Need Statement

The work done under this program is generally corrective/reactive in nature. Whenever there is an equipment failure which is capital in nature this program is used in order to replace the failed equipment. It also includes some more planned actions as ie:

Control Rooms HVAC systems replacement or upgrades.

Batteries replacement due to aging conditions.

Replacement of aged breakers where asbestos has been found eminating from the breaker into the work environment.

3. Work Type

As discussed previously, being mostly a reactive program the diversity of it is significant and includes the replacement of defective reclosers to air conditioning upgrades or the replacement of Distribution Transformers bushings due to failing testing.

We are also planning to replace a small number of asbestos affected breaker to see if it could be a good solution to extend the life of the rest of the switchgear while avoiding the associated risks for this material.

4. Forecasted CAPEX

2024	2025	2026
$1,074,705	$1,021,138	$1,100,995

Some of the needs covered by this program are un-planned, but these are the already identified needs for this program :

For 2025 :

Purchase spare breakers, we have some subs without spares		$50,000
Baird Training Building - make training cubicles, garage door opening, technology improvement		$50,000
Singer Substation: Replace GIS Hall & Control Room Roof Replacement		$325,000
Gilbert Building, Replace Roof		$70,887
3 Batteries - Woodmont 1, Trap Falls, June St		$150,000
Reactive work	$	375,250
Total	$	1,021,117

For 2026 :

Replacement breaker for Mix Ave $40,000 each, Quantity of 7 = $280,000 Since we found asbestos in the Mix Ave air circuit breakers we will use it as a 3 year pilot to replace existing breakers with vacuum bottle breakers at about $40,000 a unit. We have 21 breakers at Mix Ave, therefore total replacement would be $840,000. We are planning to start in 2026 with 7 breaker replacement.		$280,000
Purchase spare breakers, we have some subs without spares		$50,000
Baird Training Building - make training cubicles, garage door opening, technology improvement		$200,000
3 Batteries - Trumbull 1, Trumbull 2, Barnum		$150,000
Reclosers installation		45,745
Reactive Work	$	375,250
Total	$	1,100,995

802149.01

Core SDB Grove St

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Core SDB Grove St

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	802149.01	Electric Distribution	Lyons, Robin	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	System Resiliency	IP3 Financial Execute	Ongoing	Dec 2024

Project description:

Fairbridge Commons is a complex of five, 6 story apartment buildings with approximately 300 customers located on the east end of the Grove St SDB that is fed by 3 - 100KVA transformers..
For several years, Fairbridge Commons has complained of voltage issues during the summer. When tenants install window air conditioners, peak summer load can reach 350 – 400kVA overloading the existing transformers.
During a recent September heat spell, we saw primary voltage dropping under 114volts. This causes the elevators in the complex to stall during high demand periods.

Due to limitations in the customer owned vault, we can not easly upgrade their transformers to serve this load.

Project Scope:

Convert the eastern most part of Grove St SDB along Norman St and Fairfield Ave up to pole P2175 on Fairfield Ave ("Steps 1&2") to 13.8kV primary voltage:
• Replace pole top txfs at 6 locations
• Replace padmount txfs at 3 locations
• Remove vault transformers in Fairbridge Commons and replace with a 3p pad mount unit.
• Replace 11 sections of secondary wire/cable

Project Benefits:

Removes an overload / low voltage situation at Fairbridge Commons and strengtens electric service to help accomdate newly installed thirty-two (32) 30 Ampere Level 2 AC Electric Vehicle Chargers.
Converts Faribridge and ~50 other customers to 13.8kV standard equipment making it easier for UI to perform maintenance, switching, and restoration in a timely manor. Replacing vault transformers with a padmount unit will alleviate acessibility, clearance, and ventilation issues thereby making it safer for UI to operate and maintain this equipment.
Reduces the load on the existing Grove St SDB for the remaining customers on the SDB
Converting a portion of the distribution system fed by this step-down transformer will eliminate the risk for a prolonged outage event resulting from a step-down transformer failure for 350 customers thereby improving the reliability of the distribution system.
Converting a portion of the step-down area enables the company to continue to maintain/improve reliability and mitigate/reduce hazards to employees and the public by proactivity replacing overhead and underground infrastructure that would otherwise become unsafe to operate while energized and avoids running this equipment to failure thus avoiding negative impacts to SAIDI/SAIFI indices.
Converting a portion of the step-down area will address any concerns ranging from safety hazards, operational difficulties, environmental problems, National Electric Safety Code (NESC) violations, and access issues that will be corrected and this project will bring this area up to modern standards. Additionally, this project will minimize possibility of future thermal or voltage bottlenecks when considering hosting capacity concerns for both electric vehicle charging and distributed energy resources moving forward.

Project Risks and Mitigation Plan:

Risk: Location 583 vault remediation plan requires customer approval for civil construction work.
Mitigation: Develop customer friendly cost options

Risk of No Action:
UI aging infrastructure worsens and overload/low voltage condition persists.
-Cascading effects:
1. Environmental Issues - more expensive, risk of harm to both humans and environment. Failure of vault transformer will hamper restoration efforts.
2. System reliability (SAIDI/ SAIFI) will be affected.
3. Distribution network could experience higher rate of damage in these areas as equipment is reaching the end of their service life and this may also impact communication and third party equipment.
4. Deferring overhead system upgrades for the SDB area will require additional stockroom materials for this primary voltage level.

Project Alternatives:
Do nothing and replace aging infrastructure upon failure. UI does not see this as a recommended alternative but it is an alternative. Assets would be replaced when a failure occurs and is reported.
Take Grove St SDB out-of-service and replace all 6.3% impedance transformers with 4.8% impedance transformers and adjust all transformer no-load taps for 2.5 % boost. Note this improves voltage but does not address transformer overload.
Remove Grove St SDB with full area voltage conversion. This alternative was not selected as it has a higher cost.

Basis for Project Estimates
Estimates were based off similiar step-down bank removal projects completed over the previous five years.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 10**	$ 10	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 107**	$ 107	$ -	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 173**	$ 173	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 90**	$ 90	$ -	$ -	$ -	$ -
# Materials	**$ 149**	$ 149	$ -	$ -	$ -	$ -
# Overheads - External	**$ 132**	$ 132	$ -	$ -	$ -	$ -
Total	**$ 662**	**$ 662**	**$ -**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 699	$ 699	$ -	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

UI
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Engineering Project WBS UH-0000015 Grove St SDB Removal Bridgeport

Final Report

Prepared by:

Distribution Engineering

Date: 01/09/2024

Index

1. Project Description (Summary) 3
2. Existing Conditions 4
3. Need Statement 4
4. Engineering 6
5. Project Milestones 14
6. Project Assumptions 15
7. Engineering Recommendations 16
8. Maps or Electrical Design 29

1. Project Description (Summary)

The United Illuminating Company has several areas within the service territory that are supplied from overhead step down banks (SDB). These banks operate at either 13.8/7.9kV GrdY to 4.16/2.4kV GrdY or 13.8kV Delta to 2.4kV Delta. Modern UI standards adhere to a 13.8kV primary side utilization voltage allowing UI to more effectively operate and maintain its distribution system. Areas supplied by SDBs do not meet the current 13.8kV standards and therefore are a risk to UI's goals of improving resiliency and reliability. However, some areas remain due to a variety of reasons from customer impacts to limitation of resources.

Inspections are conducted by the UI Maintenance Department in order to determine which SDB's are loaded beyond the rating and as such, pose a risk for an outage event due to transformer failure. Most of the SDB's do not have a tie to a backup circuit on the low voltage side. Power flow cannot be restored until the UI crews have replaced the SDB. The conversion of the SDB would eliminate the risk of the transformer failure resulting in a prolonged event for 547 customers thereby improving the reliability of the 13.8 kV distribution system. UI has undertaken a yearly program to prioritize, design, construct and convert to allow for the elimination of the SDB's.

Need to focus on this specific SDB was brought on by customer low voltage compliant at Fairbridge Commons Apartment Complex at 1035 Fairfield Avenue causing their elevators to stall during the summer high demand periods affecting 300 customers at this complex. Review of load records indicate that the peak demand at this location is 350-400 kVA including diversity thus causing the 3-100 kVA vault transformation to be overloaded. The customer has since installed thirty-two (32) 30 Ampere Level 2 AC Chargers for Plug-in Electric Vehicles (PEVs) and Battery Electric Vehicles (BEVs) to date. UI had met with some of the customers served from this SDB back in 2018 while assembling conversion plans and the pandemic and our recent supply shortages have caused us to delay voltage conversion. Review of the electric meter daily 15 minute meter average voltage at this location shows voltages down to 111 volts during the recent September heat spell. Load flow analysis is also showing the primary voltage is down to 115 volts at this location. Elevated temperature was reported in August 2021 on the 2.4 kV side of the SDB transformer having an 18.1 degree Celcuis reading above reference temperature resulting from a minor crack in secondary porclean bushing.

The area is supplied by Pequonnock SS Circuit 2500 and feeds North to South along Grove Street. A 13.8kV-2.4kV step-down bank is located at P11336 and P11335 Grove

Internal Use

Street, Bridgeport which feeds the extents of Circuit 2500. There are some vegetation issues and utility protection zone intrusions from various trees. The area feeding customers off Grove Street SDB does not meet UI's current standards and will require the removal of the SDB, increases in pole classes and pole sizes, replacement of all transformers, vault remediation for L583 (customer with low voltage), and tree trimming in order to improve reliability and resiliency of the 13.8kV distribution system and remediate reported low voltage and hot spot condition.

The following table provides the estimate for the conversion and removal of the Grove St SDB. The tolerance range of accuracy for the values is -25% to +25%. It is suggested that the contingency be 20%.

(Full voltage conversion of Grove St SDB)	
Resource	Cost
# AFUDC	$46,300
# Cost of Removal Ext OH	$64,783
#Cost of Removal Ext Svc	$148,485
# External Services	$82,299
# Internal, Labor	$356,364
# Internal, Overheads	$108,001
# Materials	$252,424
# Overheads - External	$239,267
Total cost of job	**$1,267,513**

2. Existing Conditions

The area is supplied by Pequonnock SS Circuit 2500 and feeds North to South along Grove Street. A 13.8kV-2.4kV step-down bank is located at P11336 and P11335 Grove Street, Bridgeport which feeds the extents of Circuit 2500. The 2.4kV three-phase line continues south along Grove Street for approximately 100 feet to Fairfield Avenue and bifurcates East and West along Fairfield Avenue. The three-phase line continues West along Fairfield Avenue for approximately 400 feet until the three-phase ends at the intersection of Clinton Avenue. There is one two-phase (single-phase delta) tap North along Elmwood Place for approximately 100 feet.

Internal Use

The three-phase line continues East from the intersection of Grove Street along Fairfield Avenue for approximately 1,200 feet until it ends at P2168 Fairfield Avenue. There is a three-phase tap South along Yale Street for approximately 250 feet and then approximately 570 feet with two-phase (single-phase delta). There is one two-phase (single-phase delta) tap North along Sherwood Avenue for approximately 150 feet. There is a three-phase tap North along Norman Street for approximately 300 feet until P991 Norman Street. There is a dead section between P991 and P993 Norman Street. There is a three-phase tap South along Norman Street for approximately 350 feet until the three-phase ends at P976 Norman Street.

19 out of 67 poles in the conversion area are either under-classed being class 3 or 4, undersized being shorter than 40 ft, aged more than 20 years, or a combination of the three justifying replacement and/or removal. Of the 19 poles to be remediated, 13 are UI owned while the remaining 6 are joint ownership. All remaining pole facilities are aged less than 20 years and are sized and classed appropriately.

The SDB area consists of a total of 22 transformer locations. Of the 22 locations, there are 10 single phase overhead transformers, 2 open delta overhead transformer banks, 4 three-phase overhead transformer banks, 4 three-phase pad-mounted transformers, and 2 three-phase vault transformers.

There are a total of 6 cutout locations, all of which are three-phase. During inspections, engineering noted that an additional 4 cutout locations need to be installed on side taps.

The area consists of approximately 43 secondary spans totaling a distance of 3,665 feet and approximately 79 customer service drops.

3. Need Statement

The removal of the Grove Street Step-Down-Bank (SDB) is part of the SDB removal program identified in the Rate Case. Customers fed via this SDB are experiencing low voltage and transformation is overloaded at a large apartment complex which necessitates area voltage conversion and upgrade of transformation to improve voltage levels within PURA voltage levels.

The SDB Removal Program upgrades the 2.4kV area to 13.8kV and removes multi-customer 13.8/2.4 kV SDB, as part of Ul's goal to increase resiliency and reliability of the system.

4. Engineering

Engineering investigated three options.

ELECTRIC:

The removal of the 3-500kVA SDB located on P11336 off of Grove Street will require conversion on five (5) streets in a split residential and commercial area.

Primary

Approximately 1,226 ft of primary OH wire and approximately 2,634 ft of secondary OH wire will be replaced. On the primary portion, multiple spans of 1/0 AL is required to replace bare copper wire down Fairfield Ave, Elmwood Pl, and Yale St. The primary wire on single phase portions of conversion area will require phases of conductor to be removed or one phase of conductor on day of conversion. See section 8 for supporting notes.

Secondary

For the secondary portion, 1/0 TPX and 1/0 Neutral or 4/0 AL OW will replace the bare open wire construction existing throughout the entire area. Secondary will be replaced and secondary break positioned in a manner to maintain existing customer loading per each pole-top transformer for most instances. All other instances will have secondary breaks installed inline with cutouts, dividing up loading where appropriate. See sections 7 and 8 for supporting notes.

Poles

19 of the 67 poles need to be remediated. All non-standard and non-preferred construction including pole top framing, guying, and cross taping shall be removed or remediated to current UI Distribution Standards. The need for additional guying or pole relocations will be examined on a case by case basis. See sections 7 and 8 for supporting notes.

Transformers

All 2.4kV transformers will be replaced with 13.8kV type transformers. The delta-delta transformer bank on P2171 will be completely removed on Day of Conversion (DOC) and replaced with a new 25kVA 120/240V transformer on P12075. The majority of the transformer banks and single transformation can be prebuilt on spare poles while others require new pole installation adjacent to existing locations. The 25 kVA 120/240V transformer on P2181 will need to be replaced on the DOC with a 37 kVA transformer as well as P976 but this can remain 25kVA in size. The 3-37.5 kVA 120/208V bank on P11359 will also need to be replaced on the DOC. The area has two three phase transformer vaults. One will require transformer replacements on DOC while the other vault is being replaced with pre-build pad-mounted transformer. See Design Recommendation for L583". The remaining four pad-mounted transformers will also need to be replaced on the DOC. See sections 7 and 8 for supporting notes.

Major Equipment

The underarm disconnects on P2177 Fairfield Ave will be removed. New underarm disconnects are recommended to be installed in following locations to facilitate equipment upgrading via a phased in approach: Fairfield Ave P2171 and P2175, and Norman St P6139. The conversion area has approximately 567 customers and is downstream of P6139 recloser with 1,003 customers and it is recommended that this recloser be relocated to Laurel Ave P994 and a new recloser be installed on Norman Street P991 to split customer counts across each recloser. See sections 7 and 8 for supporting notes.

Loading Balancing & Phasing

The middle phase open wire on Fairfield Avenue between Clinton Ave and Norman Street is connected to "C Phase" this should be reconfigured on DOC by remaking primary taps on Fairfield Ave P2180 and P2169 as shown on one-line sketches. All single primary wire and transformation will have phase-phase taps changed to phase-ground within the conversion area as shown on one-line sketches.

Internal Use

4.1 Option 1 (Full voltage conversion, Recommended Option)

De-energize portions of Grove Street SDB and sleeve open wire primary at P993 Norman Street c/o Laurel Avenue forming the new 13.8kV trunk line down Norman Street and Fairfield Avenue connecting the mainline from Norman Street North of Laural Avenue in accordance with current UI design criteria and construction standards. Remove the underarm disconnects at P2177 and add disconnects at P2171 and P2175. Add a set of jumpered primary bell insulators at P3925 and P2172. Install jumpered primary bell insulator on Yale Street P3919 and extend 7.9 kV single phase primary on Fremont Street over to Yale Street to pickup the last two transformers on Yale Street. The remaining portions of the 2.4 kV Grove Street SDB can be picked up in three sections working East to West towards the SDB. Remove 3ph vault L583, and replace with newly installed 3ph Pad Txf labeled Lnew. Replace all transformers based on one-line sketches, refuse cutouts, and change primary taps at junction points or on OH transformers as noted. Replace all non-standard primary and secondary wire. Remove Grove Street SDB and sleeve open wire primary on Grove Street P11335, make new primary taps at P2180 and place tie airbreak switch on P11335 online. Below is the construction sequence:

Conversion Part 1

1. Make Ready Work, to be completed as follows…
   - **1.1. Norman St**
     - **1.1.1.** Remove P6139 recloser, fault indicators, in-line switches, and install 600A under-uarm switches. Recloser to be shifted to Laurel St P994.
     - **1.1.2.** Replace poles, reconductor secondary wire between P993 and P2169.
     - **1.1.3.** Install 50kVA txf on P6881 and 37.5 kVA on P6880.
     - **1.1.4.** Install set of jumpered primary bell insulators on P3895
   - **1.2. Laurel Ave**
     - **1.2.1.** Install recloser, fault indicators, and bypass disconnects on P994 shifted from Norman Street P6139.
   - **1.3. Fairfield Ave**
     - **1.3.1.** Replace poles, reconductor secondary wire between P3925 and P2168.
     - **1.3.2.** Install new pole West of P2171 to replace P2171 once voltage conversion is completed. Install under-arm switches on new pole.

1.3.3. Install a set of jumpered primary bell insulators on East side of P2172 for future dead.

1.3.4. Install new pole East of P2173 to replace P2173 once voltage conversion is completed. Install 50/25 kVA open-wye-delta bank on new pole.

1.3.5. Install under-arm switches on P2175.

1.3.6. Install a set of jumpered primary bell insulators on East side of P3925 for future dead section.

1.3.7. As part L583 remediation install 3ph 500kVA 120/208V Pad Txf. Customer outage and civil construction required. Temporarily feed L583 vault thru new pad-mounted Txf.

2. Conversion, to be completed as follows…

Step 1

2.1. Fairfield Ave

2.1.1. Open under-arm switches at P2171 and disconnect leads de-energizing conversion area.

2.1.2. Remove jumpers for across primary bell insulators at P2172.

2.1.3. Remove 2.4 kV power bank and old P2171.

2.1.4. Connect 25 kVA txf on P12075 as noted oneline sketch.

2.1.5. Adjust primary taps at P2169 as noted on oneline sketch.

2.1.6. Open and replace cutouts and LA's on P11317 and fuse at 15K.

2.1.7. Replace L1056 225kVA 120/208V Pad Txf with 300kVA Txf.

2.2. Norman St

2.2.1. Remove 2.4kV 1Ph Txfs on P992 and P975.

2.2.2. Replace 2.4kV 25kVA Txf on P976 with 7.9 kV unit.

2.2.3. Connect 1Ph Txfs on P6881 and P6880 as noted oneline sketch.

2.2.4. Open and replace cutouts and LA's on P3896 and fuse at 25K.

2.2.5. Replace L582 500kVA 120/208V Pad Txf with 300kVA Txf.

2.2.6. Remove jumpers from across primary insulators at P3895 and connect and fuse cutout at 65K.

2.2.7. Sleeve thru primary wire at P993.

3. Connect recloser leads on P991 and close picking up Step 1 conversion area.

Step 2

3.1. Fairfield Ave

3.1.1. Open under-arm switches at P2175 and disconnect leads de-energizing conversion area.

3.1.2. Remove jumpers for across primary bell insulators at P3925.

3.1.3. Remove 2.4 kV power bank and old P2173 and connect 13.8kV bank on new P2173.

3.1.4. Replace P11359 2.4 kV power bank with 13.8 kV bank.

3.1.5. Open and replace cutouts and LA's on P2174 and fuse at 15K.

3.1.6. Replace L1349 225kVA 120/208V Pad Txf with 150kVA Txf.

3.1.7. Open and replace cutouts and LA's on P2172S and fuse at 30K.

3.1.8. Replace L583 3-100kVA 120/208V vaultTxfs with 500kVA Pad Txf.

3.1.9. Sleeve thru primary wire at P2172.

Internal Use

4. Reconnect underarm disconnects leads on P2171 and close picking up Step 2 conversion area.

Conversion Part 2

5. Make Ready Work, to be completed as follows…

5.1. Fremont St

5.1.1. Install 1-1/0 AL primary wire and secondary neutral 70 ft between P968 and P3919.

5.2. Yale St

5.2.1. Replace poles, reconductor primary and secondary between P2176 and P11479.

5.2.2. Install 37.5 kVA Txf on P3921.

5.2.3. Install jumpered primary bell insulator on North side of P3919.

5.3. Sherwood Ave

5.3.1. Replace poles, reconductor secondary wire between P3925 and P1001 and P4755.

5.3.2. Install 37.5 kVA Txf on P19136.

5.4. Elmwood Pl

5.4.1. Replace poles, reconductor primary and secondary between P2184 and P465.

5.4.2. Install new pole South of P6723 to replace P6723 once voltage conversion is completed. Install 37.5 kVA Txf on new pole.

5.5. Fairfield Ave

5.5.1. Replace poles, reconductor primary and secondary wire between P3925 and P2186.

5.5.2. Remove the underarm disconnects at P2177 and install 50kVA txf.

5.5.3. Install 50/25/25 kVA delta-delta bank on P2183.

5.5.4. Install new pole West of P10306 to replace P10306 once voltage conversion is completed. Install 50/37 kVA open-wye-delta bank on new pole.

5.5.5. Install new pole East of P2185 to replace P2185 once voltage conversion is completed. Install 50/25/25 kVA delta-delta bank on new pole.

5.5.6. Install cutouts on P2176 to fuse primary on Yale St to be connected DOC.

5.5.7. Install new cutout on P3925 to fuse primary on Sherwood Ave and P2184 to fuse primary on Elmwood Pl both to be connected on DOC.

6. Conversion, to be completed as follows…

Step 3

6.1. Yale / Fremont Street

6.1.1. Take Txfs on P3918 and P5694 offline and remove jumper from across primary bell insulators on P3919 de-energizing conversion area.

6.1.2. Replace P3918 and P5694 Txfs on Yale St.

7. Connect jumper across primary bell insulators on P968 Fremont energizing Step 3 conversion area and place P3918 and P5694 Txfs online.

Internal Use

Step 4

7.1. Grove St

7.1.1. Open and remove fused cutouts at P11336 de-energizing conversion area.

7.1.2. Remove disconnects and 1500 kVA SDB and H-frame on P11335.

7.1.3. Remove lower gain of primary wire between 11336 and P6620.

7.1.4. Install airbreak switch on P11336 to be open point on primary.

7.2. Sherwood Ave

7.2.1. Remove 2.4kV 1Ph Txf on P1001.

7.2.2. Connect 1Ph Txf on P19136 as noted oneline sketch.

7.2.3. Drop one phase primary between P3925 and P1001 shift remaining phase.

7.3. Yale St

7.3.1. Remove 2.4kV 1Ph Txf on P3922.

7.3.2. Connect 1Ph Txf on P3921 as noted oneline sketch.

7.3.3. Open and replace cutouts and LA's on P9929 and fuse at 15K.

7.3.4. Replace L438 112kVA 120/208V Pad Txf with 75kVA Pad Txf and replace 3-#2 primary concentric between P9929 and L438.

7.3.5. Drop two phases of primary between P3922 and 3919.

7.4. Elmwood Pl

7.4.1. Remove 2.4kV 1Ph Txf and old P6723.

7.4.2. Connect 1Ph Txf on new P6723 as noted oneline sketch.

7.4.3. Drop two phases of primary between P2184 and P6723.

7.5. Fairfield Ave

7.5.1. Connect and fuse cutout at 25K on P3925.

7.5.2. Connect and fuse cutouts at 65K on P2176.

7.5.3. Connect 1Ph Txf on P2177 as noted oneline sketch

7.5.4. Remove 2.4 kV Txf on P2178.

7.5.5. Open and replace cutouts and LA's on P6357 and fuse at 30K.

7.5.6. Replace L576 3-167kVA 120/208V vault Txfs and replace 3-#2 primary concentric between P6357 and L576.

7.5.7. Replace 2.4kV 25kVA Txf on P2181 with 37.5 kVA 7.9 kV unit.

7.5.8. Make primary taps at P2180 as noted on oneline sketch.

7.5.9. Remove 50/25/25 kVA delta-delta bank on P2182.

7.5.10. Connect 50/25/25 kVA delta-delta bank on P2183.

7.5.11. Remove 2.4 kV power bank and old P10306 and connect 13.8kV bank on new P10306.

7.5.12. Connect and fuse cutout at 25K on P2184.

7.5.13. Remove 2.4 kV power bank and old P2185 and connect 13.8kV bank on new P2185.

7.5.14. Sleeve thru primary wire at P3925.

8. Reconnect underarm disconnects leads on P2175 and close picking up Step 4 conversion area.

Risks

1. Tree work needs to be completed prior to the conversion

Internal Use

2. Location 583 vault remediation plan requires customer approval for civil construction work.

Advantages

1. Converting SDB area from 2.4 kV to 13.8 kV eliminates an extended outage (>8-hour duration) of 567 customers for SDB transformer failure and need for extended plan outage to replace transformer with noted hot spot condition.
2. This option resolves low voltage condition for all customers fed via this SDB and eliminates the impending transformer overload condition at Fairbridge Commons.
3. Energy loss savings will be obtained by eliminating SDB and operating the primary distribution system at a higher voltage level.

Disadvantages

1. Planned outage required for voltage conversion.
2. Requires replacement of all 22 transformers, 19 poles, and 12 primary spans and 39 secondary spans making it the highest cost option.

4.2 Option 2 (Partial voltage conversion of Grove St SDB)

Option 2 is only converting the tail end of Grove St SDB or Part 1 of Option 1 which includes conversion steps 1 and 2. This option includes installation of cutouts on pole 991 deferring recloser installation and recloser reconfiguration noted in option 1 until full conversion is completed.

Risks

1. Tree work needs to be completed prior to the conversion
2. Location 583 vault remediation plan requires customer approval for civil construction work.

Advantages

4. Converting only a portion SDB area from 2.4 kV to 13.8 kV only eliminates an extended outage (>8-hour duration) of 391 customers for SDB transformer failure and increases the possibility for extended planned outage for 156 customers to replace transformer with noted hot spot condition.
5. This option resolves low voltage condition for Fairbridge Commons and other customers located at the end of this SDB and eliminates impending transformer overload condition at Fairbridge Commons while deferring good portion of equipment upgrading required to eliminate SDB and therefore requires less capital expenditure.
6. Energy loss savings will be obtained by eliminating a portion of SDB and operating the primary distribution system at a higher voltage level.

Disadvantages

3. Planned outage required for voltage conversion.
4. Requires option requires replacement of 10 transformers, 9 poles, and 11 secondary spans making it the second highest cost option.

Option 2 (Partial voltage conversion of Grove St SDB)	
Resource	Cost
# AFUDC	$10,290
# Cost of Removal Ext OH	$24,601
#Cost of Removal Ext Svc	$32,500
# Cost of Removal Int Labor	$32,947
#Cost of Removal Int OH	$13,247
# External Services	$107,079
# Internal, Labor	$173,259
# Internal, Overheads	$90,420
# Materials	$149,274
# Overheads - External	$131,860
Total cost of job	**$765,476**

2.3 Option 3

Take Grove St SDB out-of-service and replace all 6.3% impedance transformers with cracked bushing with 4.8% impedance transformers and adjust all transformer no-load taps for 2.5 % boost.

Risks

1. Not removing this SDB will result in more outages and negatively impact system reliability and result in having a less resilient distribution system during weather events.

Advantages

1. Avoid high single capital expenditure and spread infrastructure upgrade costs over time without depleting utility equipment inventory.
2. This option improves low voltage condition for Fairbridge Commons and other customers located at the end of this SDB, but new EV charging load could cause marginal voltage levels at this customer.

Disadvantages

1. Does not eliminate impending transformer overload condition at Fairbridge Commons and could require installation of larger transformation in an already under-ventilated and inaccessible vault.
2. SDB failure would result in 567 customers experiencing a long outage (> 8 hours duration).
3. Higher line losses realized operating at lower voltage.
4. Deferring overhead system upgrades for the SDB area will require additional stockroom materials for this voltage level and will negatively impact system reliability and resiliency.

Option 3 Action Items	CAP	O&M	COR
Engineering Closing	$0.00	$0.00	$0.00
Civil Construction	$0.00	$0.00	$0.00
Electrical Construction	$0.00	$30,000.00	$7,200.00
Total	$0.00	$30,000.00	$7,200.00

5. Project Milestones

Engineering offers the following schedule for consideration by the Team. The field work would commence prior to the approval of the Charter for Construction.

1. Engineering Design - Completed
2. Charter Approval - January 2024
3. Field Work – February 2024
4. Make Ready – May 2024
5. Voltage Conversion – June 2024
6. Project Complete – December 2024

6. Project Assumptions

Grove St SDB area has two electric services which should be reconfigured so secondary breaks are in accordance with UI practices of having secondaries not passing primary dead section. It is assumed that 1108 Fairfield Avenue service will be moved to Grove Street secondary sourced from P1012 and that 950 Fairfield Avenue underground service will be moved to secondary supplied via P2171.

The following is the list of standard assumptions which were used to create the estimates for the proposed work.

1. UI will be able to construct the new facilities system as planned.
2. UI will relocate or replace the existing UI supply facilities with new supply facilities in compliance with current standards and construction practices.
3. All budgetary estimates are based on a work product in compliance with existing UI and/or industry accepted standards and specifications.
4. All construction techniques used to install, remove, or replace UI facilities will comply with any and all applicable Federal, State and Local regulations as well as UI Construction Standards.
5. Adequate working clearances would be maintained during and after placement of the UI facilities.
6. UI will be able to obtain any and all of the base maps of above ground and underground utilities in the area.
7. All materials will be ordered and available in time for use by Construction.
8. Labor rates used in creating the estimates are based upon historical averages.
9. All dollars shown are in 2024 dollars and subject to change due to escalation in material, labor, and equipment rates at time of actual construction.
10. The base estimates exclude contingency, overheads, and allocations values.
11. The base estimates are subject to the accuracy bandwidth as indicated within the estimate.

12. The schedule of all work is dependent upon arranging a mutually agreeable outage with the impacted customer(s).
13. All necessary local permits will be obtained per the schedule.
14. There would not be any issues to the site during or after the construction of the UI facilities that would limit or prohibit access by UI.
15. No other projects on Cir 2500 will impact the SDB conversion area.

The following is specific to the Remediation of L583:

16. All Construction Agreements will be signed and accepted by Customer.
17. All easements will be accepted by customer and obtained prior to construction.
18. No ledge or rock will be encountered within new trench path.
19. Test Pitting to find no obstructions or poor soil conditions.
20. Customer existing conduit will be at a minimum depth of 30" from grade.
21. No poured-in-place concrete pad will be needed for LNEW.
22. Customer will require only one (1) full - day outage without need of a UI provided generator for civil construction work.

7. Engineering Recommendations

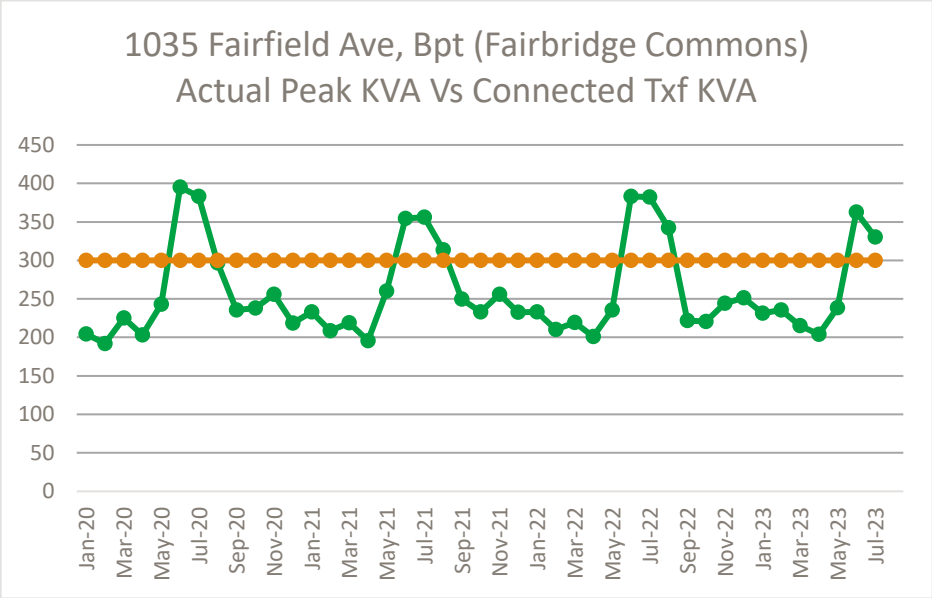
Engineering recommends UI proceed with Option 1. This option would be to bring the SDB area up to the current 15 kV standards and operate at 13.8 kV. This eliminates low voltage condition for all customers off the SDB and eliminates transformer overload condition at a large apartment complex. Upgrading the 2.4kV area to 13.8kV removes multi-customer 13.8/2.4 kV SDB as part of UI's goal to increase resiliency and reliability of the system.

Additional Information

UI Operations - Grove St SDB Conversion notes and reasons for making this a priority:

The customer spoke with UI back in late 2019 or early 2020 and we told the customer that we planned to convert the area by the end of 2022. Towards the end of 2022 the customer was asking us if we were still going to convert. UI told them due to the pandemic and our recent supply shortages we had to adjust our schedule for conversions

and the customer was understanding. The reason why the customer is so insistent on us getting this work done is due to their elevator stalling during the summer months when people are installing their air conditioners. From the end of June to the beginning of September they have issues with their elevators stalling. We had to change out their transformers in 2017 because the transformers failed. To add to their issues, the customer wants to connect 32 small EV charger packs. The customer has them installed but understands that they would have significant voltage issues if they were put into use.

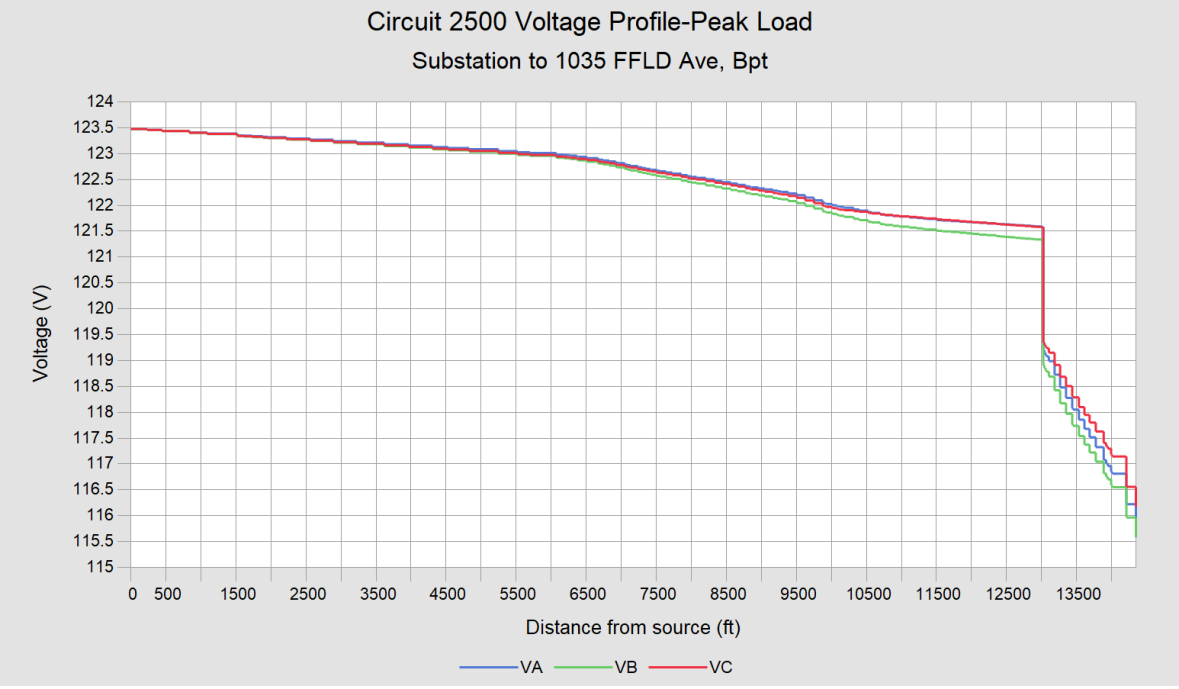


UI Landis & Gyr Meter Data

This is a table of meters downstream of Grove St SDB that were reporting 15 min low voltage(<114) and the lowest average voltage recorded on that day.

Row Labels	Count of 11086832	Min of 113.2969
9/4/2023	13	112.3438
9/5/2023	70	111.8594
9/6/2023	156	111.25
9/7/2023	119	111.4063
9/8/2023	58	112
9/9/2023	163	111.0938
9/10/2023	44	112.8906
9/11/2023	37	112.7656
9/12/2023	29	112.2188
9/13/2023	8	113.0625
Grand Total	**697**	**111.0938**

CYME Loadflow Results

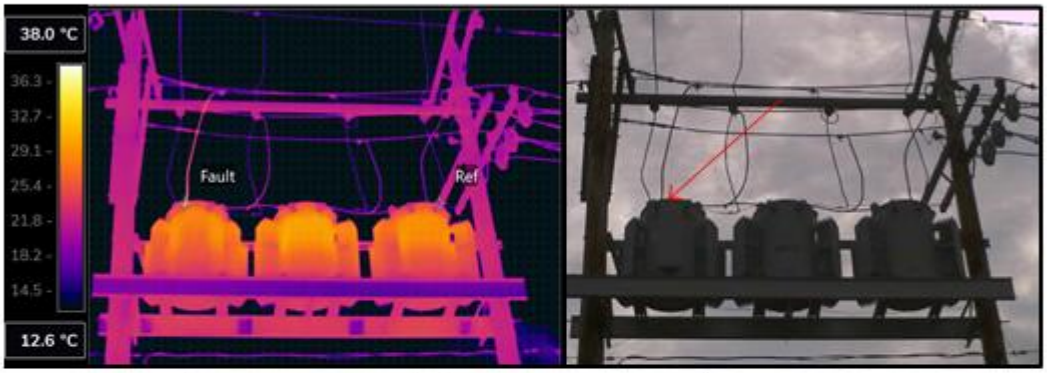


MONROE INFRARED

Infrared Equipment Sales
Infrared Inspection Services
Infrared Training & Consulting
FAULT PAGE # 1

UNITED ILLUMINATING (UI) - AVANGRID - SUMMER T&D INSPECTION 2021

SEQUENCE NUMBER	2021D-595
SUBSTATION NAME	PEQUONNOCK
CIRCUIT NUMBER	2500
TOWN / LOCATION	BRIDGEPORT / 30 GROVE ST
POLE NUMBER (FLD&MAP)	P11336



Date Inspected	8/11/2021 8:44:39 AM
Fault temperature	40.7 °C
Ref Temperature	22.6 °C
Delta T	18.1 °C
AV SEVERITY LEVEL	LEVEL 2
Atmospheric temp.	77°F
CRITICAL FAULT - CALLED IN	☐

VOLTAGE LEVEL	
13.8 kV	☐
4.16 kV	☐
OTHER -	☑

☑ ROAD SIDE ☐ LINE
☐ MIDDLE ☑ LOAD
☐ FIELD SIDE
☐ OTHER:

LEVEL 1 SEVERITY = IMMEDIATE CALL AND REPORT 60 °C OR GREATER DELTA OVER REFERENCE.
LEVEL 2 SEVERITY = 30°C TO 59.9°C DELTA T OVER REFERENCE

DESCRIPTION OF HOT SPOT

ELEVATED TEMPERATURE ON THE 2400 VOLT SIDE OF THE STEP DOWN TRANSFORMER

RECOMMENDED FOLLOW UP

EVALUATE, REPAIR OR REPLACE AS REQUIRED

REPAIRED BY: _ SIGNATURE: _ DATE: _

MONROE INFRARED THERMOGRAPHIC SERVICES

DESIGN & METHODOLOGY:

The following detail reasoning into the design of each component of the design recommendations for the conversion area.

While developing plans for this area consideration was given to converting this area from 2.4 kV delta to 4.16 wye construction as an interim step to moving to 13.8 kV. This idea was ruled out because it would require four padmount transformers to have their internal removable HO-XO link re-inserted by removing each transformer cover and was deemed as being to risky for possible oil contamination and resealing issues.

Secondary

- Multiple spans of copper secondary and neutral are recommended to be replaced specifically due to the age of the existing infrastructure, unknown damage or deterioration of the wire, and for the reassurance of a solid and continuous neutral throughout the conversion area.
- It was also decided that it is better for reliability for our crews to replace all the spans instead of individual spans piece-meal along the pole line. This was also based on taking into consideration the time and resources required to mobilize and setup for installation of a few spans compared to an entire pole line: work efficiencies and the slight increase in cost justified the decision financially.
- Secondary breaks were installed in accordance with UI practices to not feed secondaries past a cutout that are supplied by a source upstream of said cutout or dead section. Two instances where this is corrected are on P2169 and P3925. Both poles prior to converting have or will have secondary energized past primary dead section which may cause confusion for crews in the field during storm or emergency situations. Any minimization of such confusion benefits the safety of our crews, customers, and shareholders, and the reliability of the system.
- Secondary breaks were placed appropriate to load pockets and did not change due to transformer loading. All transformer load pockets followed UI design practices where for customer service loads, and non-streetlight loads, no more than 4 spans of secondary from transformer exist. In instances where services are only for streetlights, pole spans exceed no more than 5 spans but could have gone longer.
    - See document titled "Grove St *SDB Txf Loading*".

Internal Use

Poles

- No pole loading calculations were conducted on any of the existing or proposed poles in the design proposal. It is recommended pole loading calculations are done to verify pole class sizing and determine guying requirements.
- The 13 poles to be removed were identified as UI owned 100% poles pulled from GISlite. Poles were not cross-referenced with UI pole records but is planned to be addressed on an individual basis during pre-construction assessment.

Pole-Top Transformers

- The pole-top transformers on P2181 should be replaced with a 37.5 kVA transformer while P2178 transformer should be replaced with 50 kVA on P2177 both on Fairfield Avenue due to large customer loading.
- The pole-top transformer bank off Fairfield Avenue P11359 should be replaced with transformers having SS #9702431 as dual ratio transformers are the largest quantity UI has in stock of viable transformers to replace the associated transformer bank.
- It is possible some transformers will be fed by fused cutouts instead of CLFs based on new AVANGRID standards.

Major Equipment

- The under-arm disconnects on P2177 will be removed making it possible to install a pole-top transformer. There are no tie points downstream of this device at 2.4kV. Other disconnects have been installed to facilitate converting the 2.4kV areas into smaller chunks.
- It is recommended P6139 recloser with 1,003 customers be relocated to Laurel Ave P994 and a new recloser be installed on Norman Street P991 to split customer counts across each recloser.

Vaults

- Bassick High School at 1174 Fairfield Avenue location 576 is in good shape with the exception of the inside door hinge. It is recommended to replace OH transformers in this vault and the unjacketed primary cable on the DOC.
- Fairbridge Commons at 1035 Fairfield Avenue location 583 is in fair/poor condition.
- This building vault is not readily accessible at all times without restrictions to UI personnel from the outside.

Internal Use

- Transformer removal and installation must be done via the customers underground garage with insufficient horizontal and vertical clearances.
- This vault does not have the minimum two means of access per UI Operating Procedures and does not have sufficient free opening area ventilation for the current or needed transformation (Has 4 ft^2 vs 6 ft^2 for 300 kVA or 10.5 ft^2 for 501kVA) .
- The 2013 environmental testing report indicates the presence of asbestos material on mudded elbow fittings and on air cell piping insulation within the vault. Air sample results were found to be within acceptable occupancy criteria. The vault doors contain trace amounts of lead paint.
- The customer owned ceiling mounted copper secondary bus bar fiberboard supports appear to be asbestos material and would need to be tested if secondary connections had to remain in the vault. It would also be necessary to test customer secondary cables for asbestos as well.
- For the reasons mentioned above it is recommended that this vault transformation be replaced with a 500 kVA pad mounted transformer in the customer courtyard adjacent to the existing vault.
    - See document titled "Design Recommendation for L583".

3ph Pad Replacements

- Most of the existing 2.4 kV pad-mounted transformers can be replaced with smaller sized units. See one-line sketches and document titled "Grove St *SDB Txf Loading*" .
- Location 438 at 1139 Fairfield Avenue should be replaced with a 75 kVA transformer and unjacketed primary cable should be replaced on the DOC. Location 582 (968 Norman Street) and Location 1056 (1020 Fairfield Ave) should be replaced with 300 kVA units. While location 1349 (1062 Fairfield Ave) should replaced with 150 kVA unit.

Fusing

- Cutouts feeding vault and padmounted transformers will be fused according UI DCS 16002.
- It is recommended to add cutouts to primary sides taps off Fairfield Ave mainline and to add a cutout on P3895 Norman Street and fusing sized based on fusing standard DCS 16002.

Internal Use

Photos



Photo 1: Shows the Vault Location 583 at 1035 Fairfield Ave, Bpt.

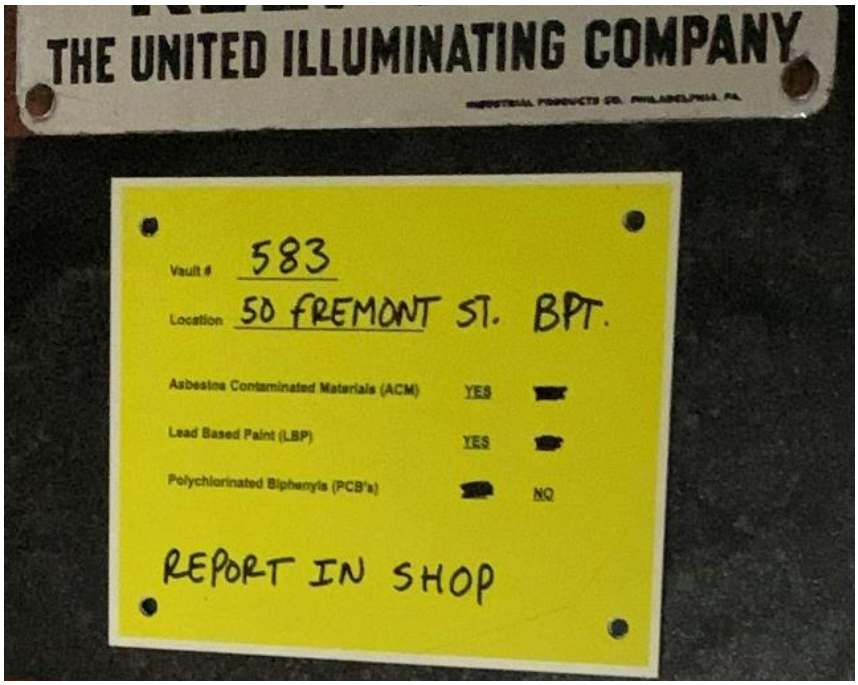


Photo 2: Shows the Vault Door for Location 583 at 1035 Fairfield Ave, Bpt



Photo 3: Shows the Vault Ceiling and Secondary Bus for Location 583 at 1035 Fairfield Ave, Bpt.



Photo 4: Shows Location 583 Transformers at 1035 Fairfield Ave, Bpt.



Photo 5: Shows Location P11336 Grove St SDB Cracked Bushing, Bpt.



Photo 6: Shows Fairfield Ave tree instance between pole P2715 to P2714.

Internal Use



Photo 7: Shows Sherwood Ave tree instance between pole P19136 to P1001.

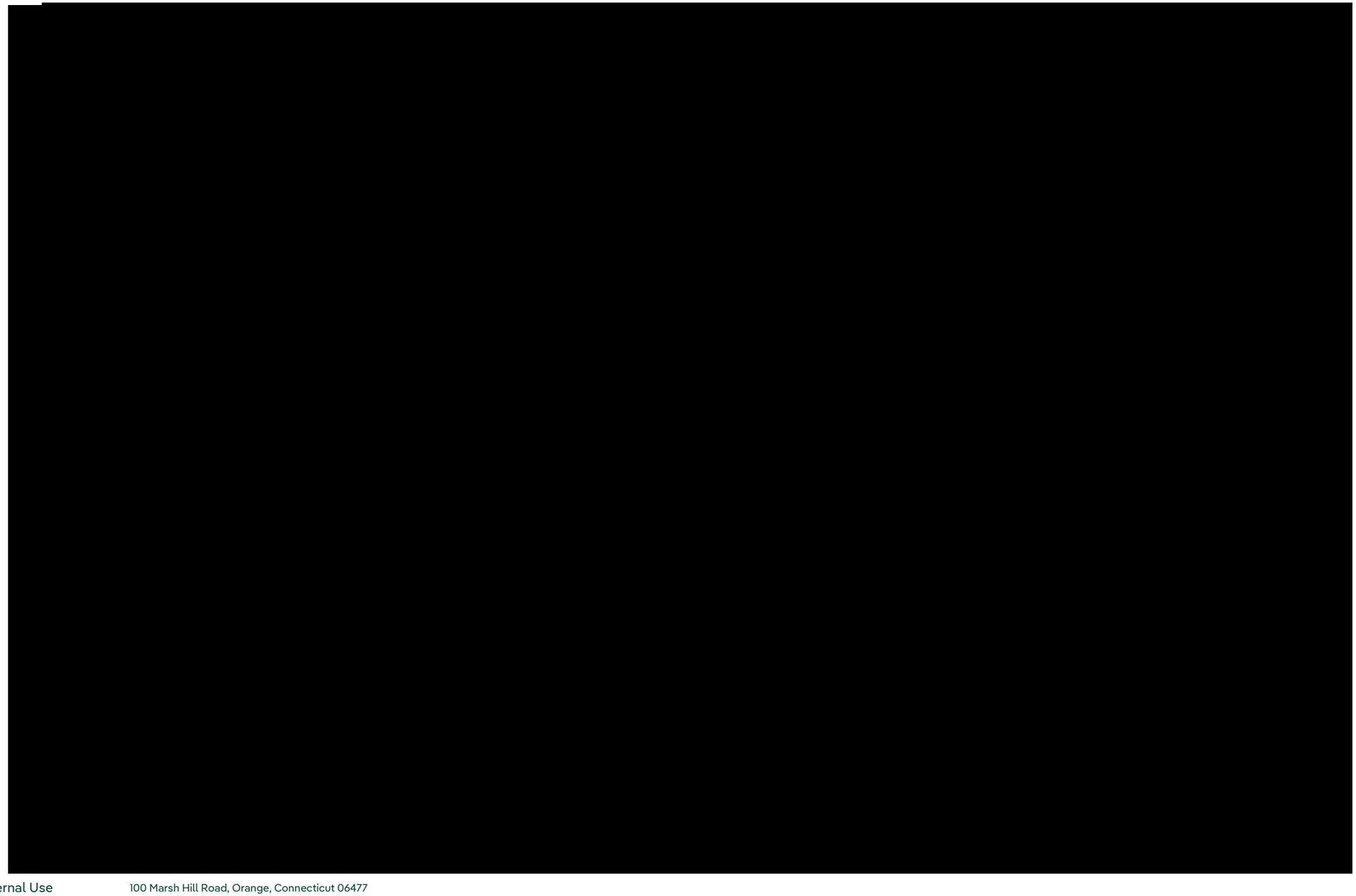


Photo 8: Shows recommended Civil Layout for 1035 FFLD Ave, Bpt.

UI
An Avangrid company

8. Maps or Electrical Design

[redacted]





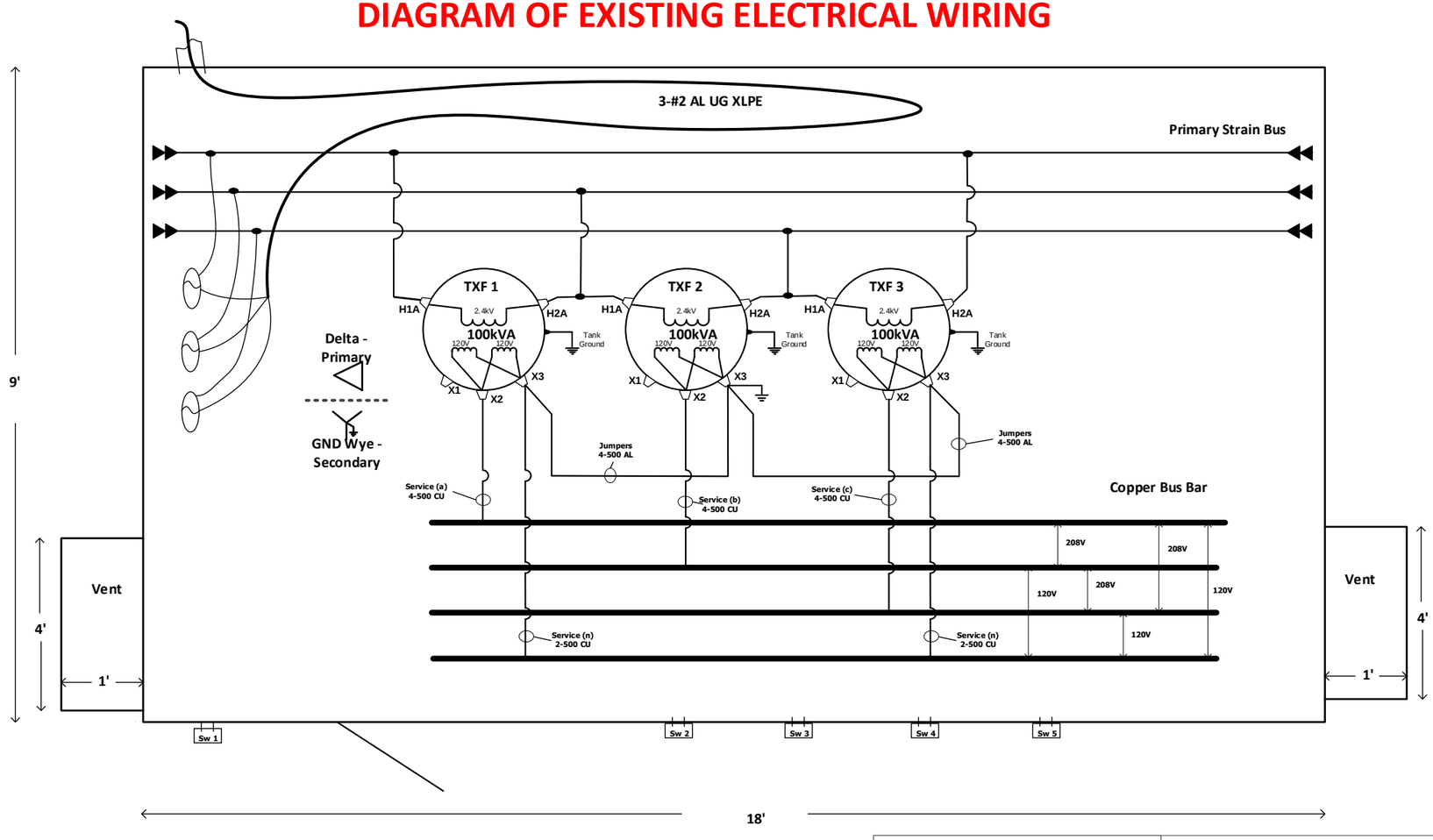






[redacted]

DIAGRAM OF EXISTING ELECTRICAL WIRING



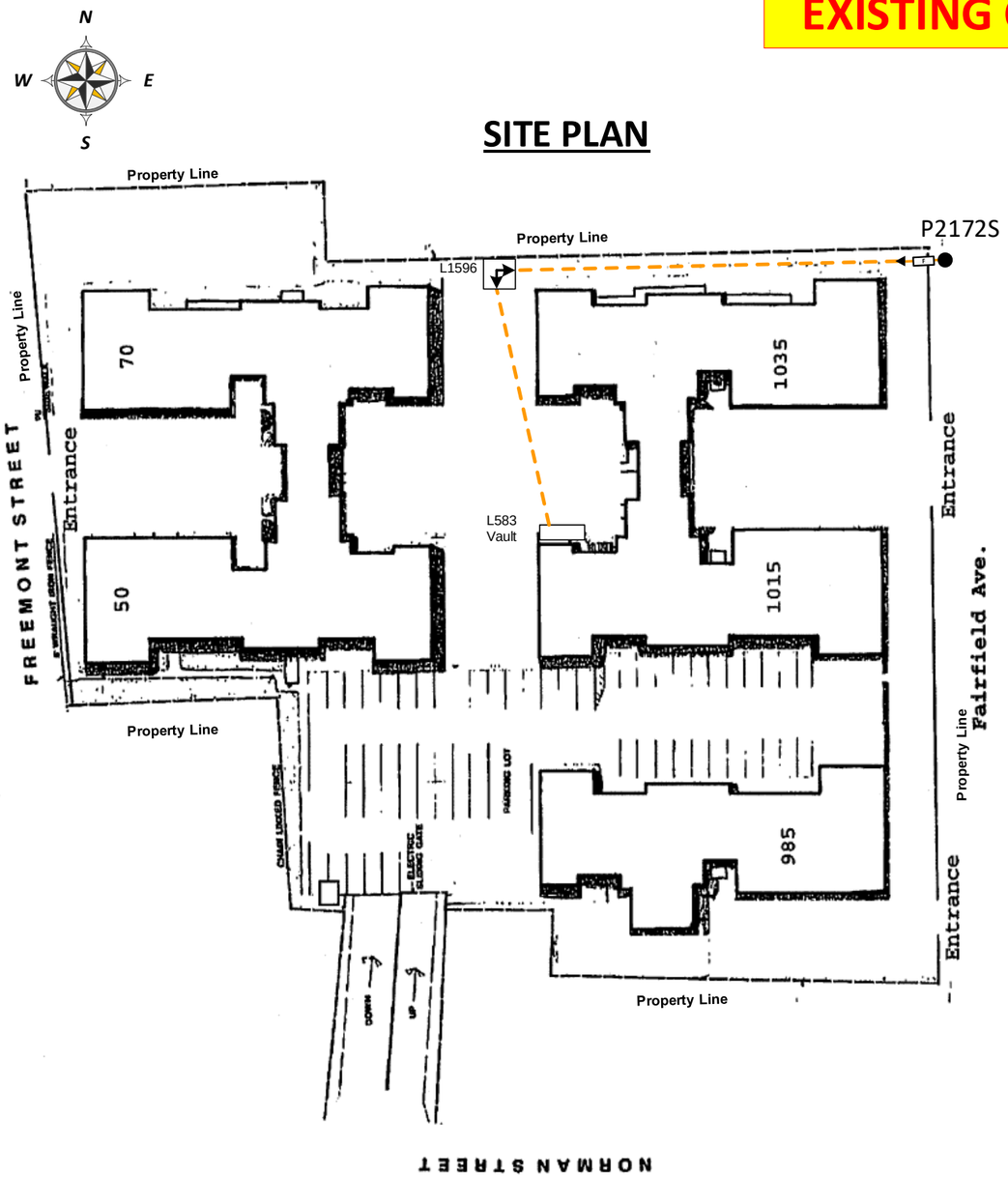
The United Illuminating Co. *Distribution Engineering*		L583 VAULT REMEDIATION 1035 FAIRFIELD AVE, BRIDGEPORT CIR: 2500 PEQUONNOCK SUB, 4.16KV FUSED
Drawn: Troy Testone Revised:	Date: 11/29/2023 Rev:	WORK REQUEST NUMBER: XXXXXXXXX Filename: Design Recommendation for L583 12_4_2023.vsd SHEET No.: 1 of 8

Internal Use

100 Marsh Hill Road, Orange, Connecticut 06477

EXISTING CONDITIONS

SITE PLAN



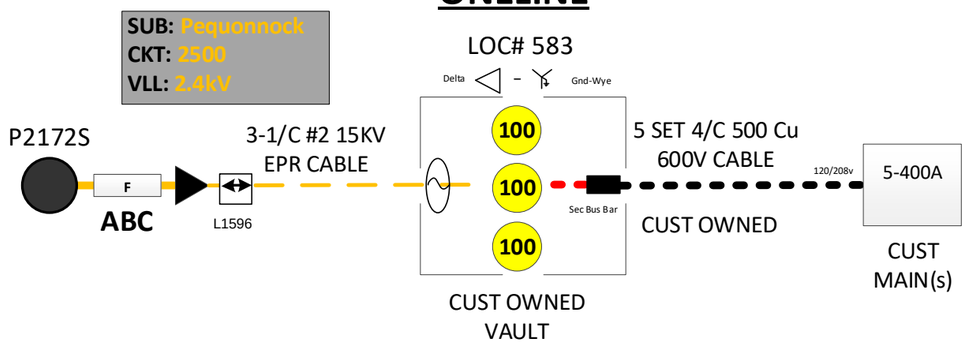
NOTE:

- **In 2010 new primary riser and cable installed to L583.**
- **Vault contains (3) 100kVA 2.4/4.16kV DR Delta Gnd Wye 120/208V Txf Bank believed to have been replaced in 2017.**
- **There are 3 - Oil Cutouts with unknown age.**
- **There are 5 sets of 500 Cu MCM secondary cables that feed the customer's 5-400A main switches.**
- **There are 2 sets of 500 MCM to copper secondary bus bar supported by fiber board to vault ceiling.**
- **4 " PVC primary conduit enters the vault on the Northwest side of vault and the secondary conduits exit Southside of vault to 400A switches.**

Legend

- UI Pole
- Floating Terminator
- T / T DR / Non-DR OH Txf(s)
- xxx Cust Main Switch
- Oil Cutout
- T 3Ø Pad Txf
- Pri AGJ Cabinet
- ### Fused Cutout
- Customer Usage Point
- Existing Primary UG Cbl
- Installed Primary UG Cbl
- Primary OH Wire
- Cust Owned Secy UG Cbl
- UI Owned Secy UG Cbl

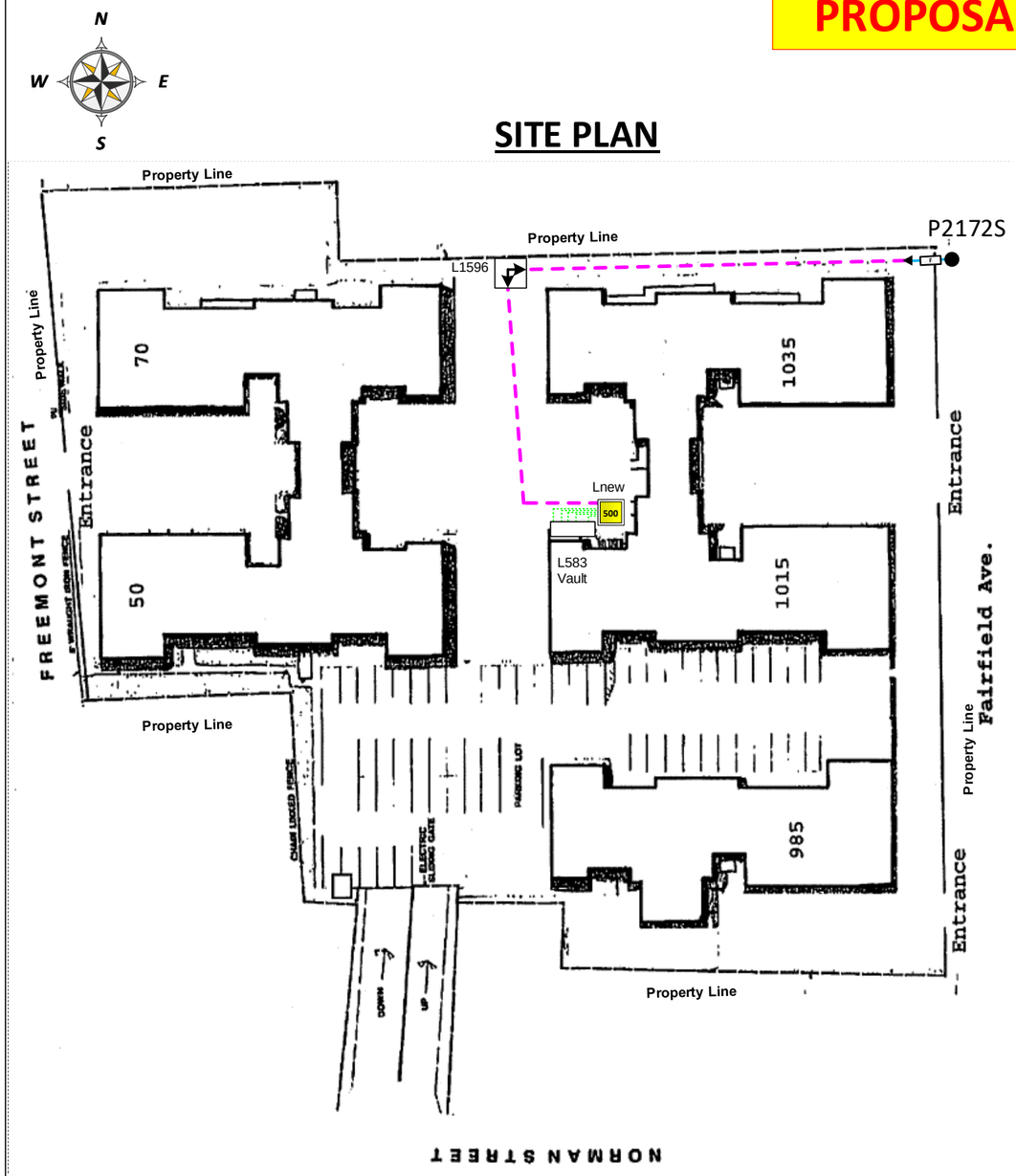
ONELINE



The United Illuminating Co. *Distribution Engineering*		L583 VAULT REMEDIATION 1035 FAIRFIELD AVE, BRIDGEPORT CIR: 2500 PEQUONNOCK SUB, 4.16KV FUSED	
Drawn: Troy testone Revised:	Date: 12/04/2023 Rev:	WORK REQUEST NUMBER XXXXXXXXXX	Filename Design Recommendation for L583 12_4_2023.vsd SHEET No. 1 of 8

PROPOSAL without Secondary Bus

SITE PLAN



NOTE:

- **Vault appears to have additional 20 ft of primary cable and it may be pulled back at L1596.**
- **Install new 3Ø 500kVA 120/208V Pad Txf North of L583. To become Lnew.**
- **UI to redirect 4" PVC primary conduit to Lnew.**
- **UI to install bollards North and West sides of Lnew.**
- **Customer/UI to install 6- 4" GS conduits from Lnew to L583.**
- **Customer to extend 5- 4" GS conduit from main switches thru vault on Day of Conversion after UI removes equipment.**
- **Customer to install 5 sets of 4/C 500 Cu cable between Lnew and customer main switches.**

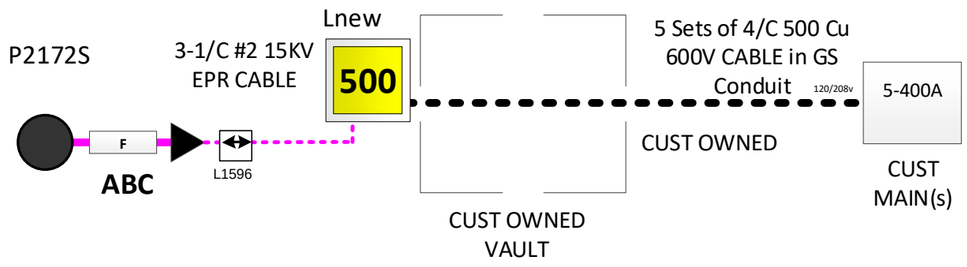
- UI Pole
- Floating Terminator
- T / T DR / Non-DR OH Txf(s)
- xxx Cust Main Switch
- Oil Cutout
- T 3Ø Pad Txf
- Pri AGJ Cabinet
- ### Fused Cutout
- Customer Usage Point

- Existing Primary UG Cbl
- Installed Primary UG Cbl
- Primary OH Wire
- Cust Owned Secy UG Cbl
- UI Owned Secy UG Cbl

ONELINE

SUB: Pequonnock
CKT: 2500
VLL: 13.8kV

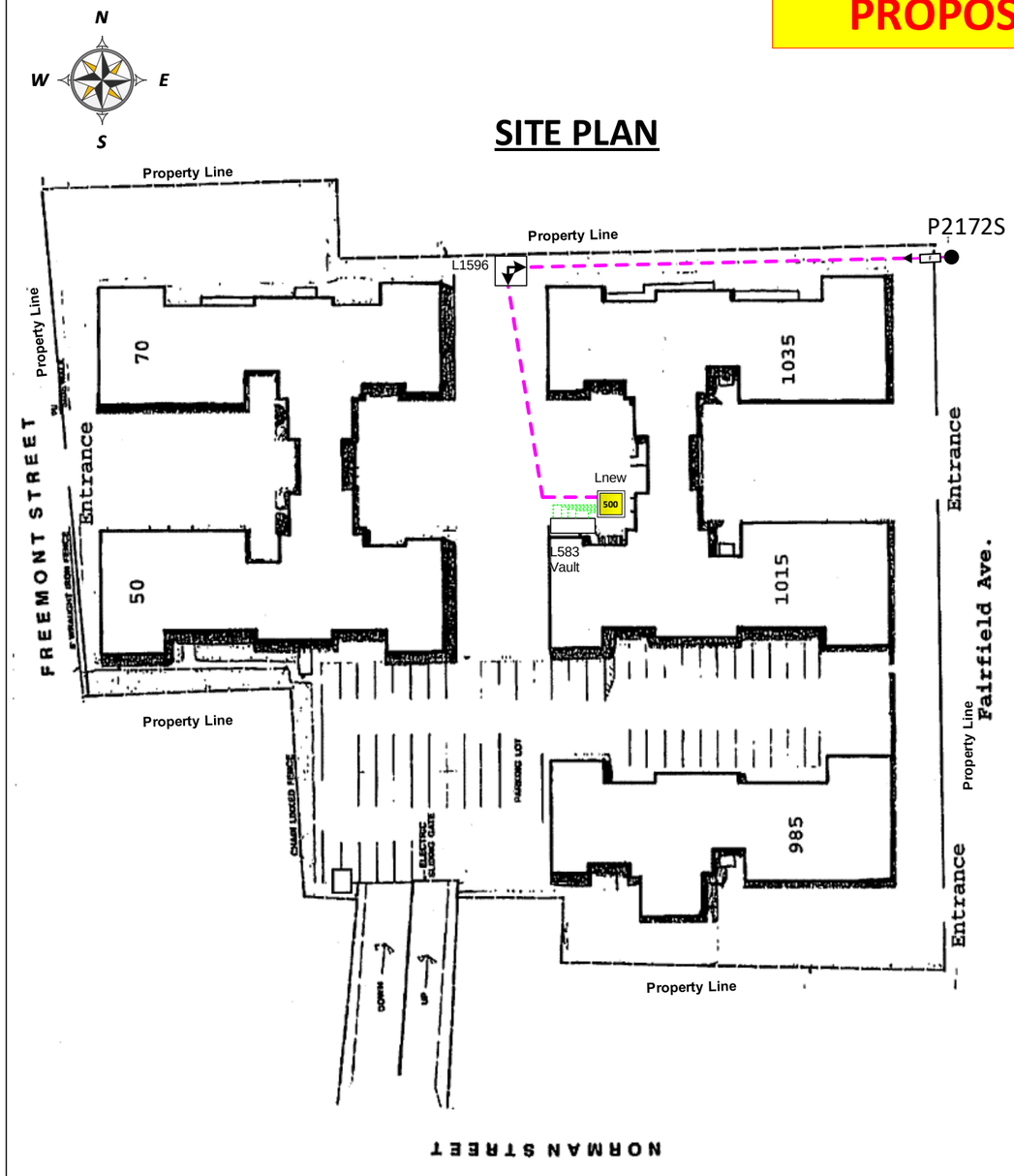
LOC# 583



The United Illuminating Co. *Distribution Engineering*		L583 VAULT REMEDIATION 1035 FAIRFIELD AVE, BRIDGEPORT CIR: 2500 PEQUONNOCK SUB, 4.16KV FUSED	
Drawn: Troy Testone Revised:	Date: 12/04/2023 Rev:	WORK REQUEST NUMBER XXXXXXXXXX	Filename Design Recommendation for L583 12_4_2023.vsd SHEET No. 1 of 8

PROPOSAL with Secondary Bus

SITE PLAN



NOTE:

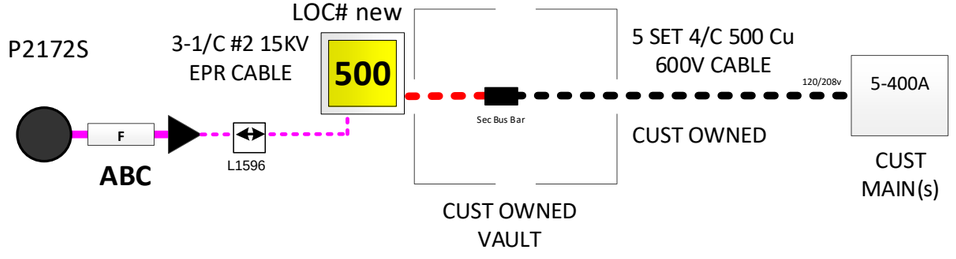
- **Vault appears to have additional 20 ft of primary cable and it may be pulled back at L1596.**
- **Install new 3Ø 500kVA 120/208V DR Pad Txf North of L583. To become Lnew.**
- **UI to redirect 4" PVC primary conduit to Lnew.**
- **UI to install bollards North and West sides of Lnew.**
- **UI to install 6- 4" GS conduits from Lnew to L583.**
- **UI to install 5 sets of 4/C 500 Cu cable between Lnew and L583 secondary bus bar on Day of Conversion after equipment is removed.**

- UI Pole
- Floating Terminator
- T / T DR / Non-DR OH Txf(s)
- xxx Cust Main Switch
- Oil Cutout
- T DR 3Ø Pad Txf
- Pri AGJ Cabinet
- ### Fused Cutout
- Customer Usage Point

- Existing Primary UG Cbl
- Installed Primary UG Cbl
- Primary OH Wire
- Cust Owned Secy UG Cbl
- UI Owned Secy UG Cbl

SUB: Pequonnock
CKT: 2500
VLL: 13.8kV

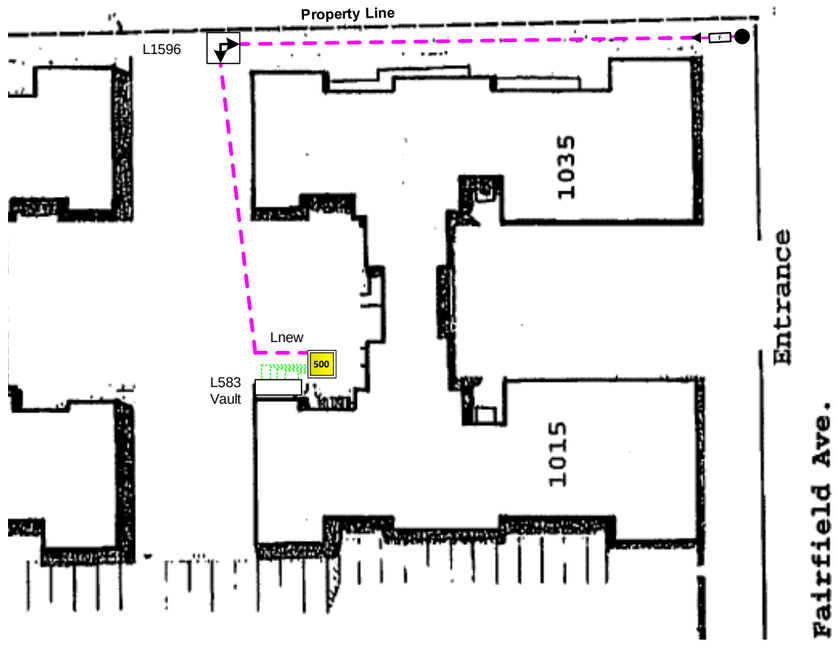
ONELINE



The United Illuminating Co. *Distribution Engineering*		L583 VAULT REMEDIATION 1035 FAIRFIELD AVE, BRIDGEPORT CIR: 2500 PEQUONNOCK SUB, 4.16KV FUSED	
Drawn: Troy Testone Revised:	Date: 12/04/2023 Rev:	WORK REQUEST NUMBER XXXXXXXXXX	Filename Design Recommendation for L583 12_4_2023.vsd SHEET No. 1 of 8

CIVIL DETAIL





LNEW Civil:

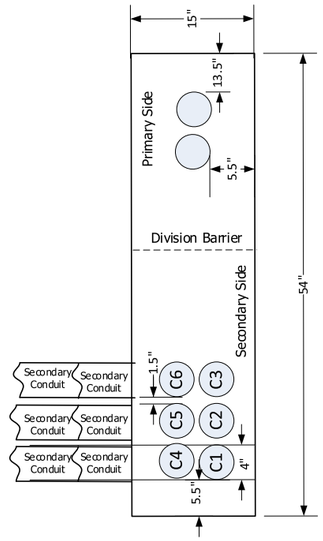
- **Test pits to be done in front and to left of existing L583 and evenly spaced along new conduit path.**
- **New Fabricated, Pre-cast concrete slab to be installed [15" by 54" window].**

L583 Civil:

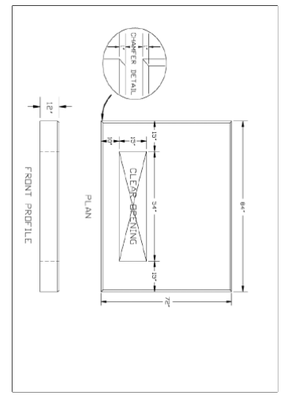
- **5 - 4"GS conduits to be installed between Lnew and L583.**
- **(4) bollards to be installed West/North approx. 5' from edge of pad.**
- **Vent wells to be blocked up.**

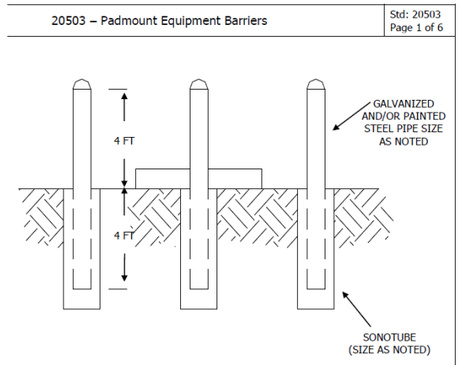
Secondary Conduit Configuration for Lnew

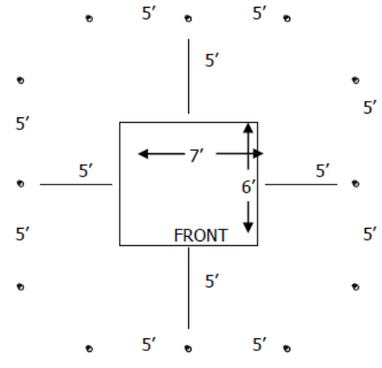
Top View of Pad Window



Pad Detail







3ϕ PADMOUNT
(SMALLER PAD)

The United Illuminating Co. *Distribution Engineering*		L583 VAULT REMEDIATION 1035 FAIRFIELD AVE, BRIDGEPORT CIR: 2500 PEQUONNOCK SUB, 4.16KV FUSED
Drawn: Troy Testone Revised:	Date: 12/04/2023 Rev:	WORK REQUEST NUMBER: XXXXXXXXXX Filename: Design Recommendation for L583 12_4_2023.vsd SHEET No.: 1 of 8

Internal Use

PRJ-003281

Congress Flood Mitigation

Sections

1. Project Summary

Congress Flood Mitigation

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-003281	Electric Distribution	Morin, Chris	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Projects	System Resiliency	IP4 Change	Ongoing	Dec 2024

Project description:

Weather events experienced in the recent years, along with revisions to Federal Emergency Management Agency (FEMA) flood maps have necessitated UI to take action to evaluate the risk and potential impact of a single 100-year coastal flooding event on its coastal substations and evaluate mitigativng solution alternatives. UI Planning commissioned a study, Coastal Substation Flooding Asset Condition Review, to evaluate the flood risks and impact at the Congress substation. The report concluded that the substation is "at-risk" of distruction and or/incapacitation for a FEMA 100-year flood event. The report further concluded the preferred solution to address flooding at the substation is to construct a floodwall system along the sustation perimeter.

The BFE at the Congress Street Substation is elevation 12.0 feet. This station is at risk as all critical equipment elevations are below the BFE (or FEMA 1% annual chance flood level). Loss of equipment would interrupt service to the substation and directly interrupt service to approximately 35,000 customers.

Project Scope:

The overall Congress Floodwall project is to engineer, procure and build a new floodwall system around the substation perimeter. The distribution scope associated with this project is specifically the relocation of existing substation cap banks, which includes the following:

-Removal of 3 substation cap banks to allow the construction of the Congress flood wall.
-Procure 14 pole cap banks to replace the substation cap banks that were removed.
-Install the pole cap banks at different locations within the substation surroundings.
-Commission the pole cap banks which includes: pre-install testing, settings set up to allow proper communication and remote control.

Project Benefits:

By installing 14 pole cap banks, it will replace the voltage and Volt-Amps Reactive (VAR) support to the distribution system that was originally provided by the substation cap banks that were removed.

The pole cap banks will store energy in their components and will be used when needed to correct power factor lags in power supply. This helps maintain optimum efficiency and prevents undesirable dips or surges in voltage which can damage electrical equipment, specially during high demand or summer season.

Project Risks and Mitigation Plan:
Main Risks:

- Availability of Internal Engineering and Construction resources. Mitigation plan: 1) Coordinate with other projects to optimize the workforce availability, 2) Hire or contract additional resources as necessary

- Delays in Equipment and Material Lead times. Mitigation plan: 1) Proactive communication with vendors for schedule management, 2) Identify alternate suppliers and solutions for equipment, 3) Critical path management to prioritize procurements to ensure material onsite as necessary

- Launch of a new standard for pole Cap Banks install within the United Illuminating Company. Mitigation plan: 1) Constant and proactive communication with the different internal departments that are involved in the cap bank functioning & design, 2) Identify gaps in the standard and address them by assigning action items to the proper departments, 3) Continuous follow up until action items have been resolved

- Lack of new cap bank install process. Mitigation Plan: 1) Training by the Cap Bank vendor to UI internal crews on how to properly install the cap banks, 2) Perform a communication test of the communication feature before installing it, 3) Perform a complete pre-install cap bank test, which includes the settings testing to ensure remote communication

Risk of No Action:
Not installing the cap banks will lead to poor performance of the power management system due to lack of VAR load regulation & optimization, which can cause failure and damage of electrical equipment in the substation and, in worst case scenarios, explosions.

Project Alternatives:
For the Distribution portion of this project, this is not applicable. Pole Cap Banks are a need as a result of the removal of the substation cap banks to allow the construction of the flood wall at Congress Substation. Pole Cap Banks were purchase as per UI standards.

Basis for Project Estimates
The project cost estimates are comprised of required internal labor, external resources, material, and appropriate project support costs. The estimates are based on multiply sources: 1) analysis of historical man hour data / construction costs for similar activities, 2) budgetary quotes from suppliers for necessary materials, 3) appropriate project support costs, 4) applicable overheads and allocations.

Project estimates are routinely reviewed and updated as the project progresses and more detailed information becomes available.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 18**	$ 18	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 42**	$ 42	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 13**	$ 13	$ -	$ -	$ -	$ -
# Materials	**$ 3**	$ 3	$ -	$ -	$ -	$ -
# Overheads - External	**$ 26**	$ 26	$ -	$ -	$ -	$ -
Total	**$ 102**	**$ 102**	**$ -**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 608	$ 608	$ -	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

802048.01

Resiliency DN Coastal Sub (Pequonnock)

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Charter

Resiliency DN Coastal Sub (Pequonnock)

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	802048.01	Electric Distribution	Logan, Zachary	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Projects	System Resiliency	IP4 Change	Ongoing	Dec 2024

Project description:

The project consist of rebuilding the existing Pequonnock substation further inland away from coastal flooding concerns and at an elevation of FEMA (Federal Emergency Management Agency) 100 plus 5 feet. Reconfiguring and rerouting of 8 115-kV transmission lines into the new substation location. Installation of 115-kV high voltage gas insulated switchgear, 13.8-kV medium voltage gas insulated switchgear and intercepting 19 distribution circuits and rerouting them into the new substation.

Project Scope:

The project is a combination of Transmission and Distribution. The high voltage transmission scope of the Project includes Electrical and Civil Engineering and Construction, Installation of high voltage gas insulated switchgear and enclosure, high pressure gas filled transmission cable extensions, cross linked polyethylene transmission cable extensions, extension of 5 overhead transmission lines, installation of associated protection and control equipment for the transmission portion.
The distribution scope includes, Electrical and Civil Engineering and Construction, substation distribution power transformers, medium voltage gas insulated switchgear, protection and control equipment, along with associated enclosure and distribution getaways.
The existing Pequonnock Substation will be decommissioned following the construction and subsequent commissioning of the new substation.

Project Benefits:

Historical weather events such as Tropical Storm Irene and Superstorm Sandy along with revisions to Federal Emergency Management Agency (FEMA) flood maps have necessitated The United Illuminating Company (UI) to take action to evaluate the risk and potential impact of a single 100-year coastal flooding event on its coastal Substations and evaluate mitigating solution alternatives.
The Pequonnock Substation is located in Bridgeport, CT immediately adjacent to Long Island Sound and serves approximately 8,100 customers. Placed in service in 1956, Pequonnock Substation consists of seven 115-kV transmission lines, one 115-kV generator interconnection, and a 13.8-kV distribution system. During Tropical Storm Irene the site experienced flooding one to two feet above the yard elevation and approximately 10 feet NADV88 (North American Vertical Datum of 1988) during Superstorm Sandy or within inches of the control room floor. UI preemptively de-energized Pequonnock Substation due to the risk of catastrophic failure and associated long-term recovery issues. Along with the flooding concerns, there are several known asset condition deficiencies at this site.
As a result of a UI commissioned study, “Coastal Substation Flooding Asset Condition Review” to evaluate the risks and impact at the Pequonnock Substation, it was concluded that because this station is built adjacent to Long Island Sound, and the FEMA 100-year flood plain has recently been updated, it is “at-risk” of destruction and/or incapacitation for a FEMA 100-year flood event. In addition, an asset condition assessment identified major structural and equipment deficiencies that need to be addressed.
The Pequonnock Substation Rebuild Project addresses the flooding concerns and the asset condition issues. This project has progressed through the ISO-NE planning process and we are expecting full recovery (regional and local) of all project expenditures.

Project Risks and Mitigation Plan:

Large Capital projects such as this contain many inherent risks and The United Illuminating Company has a process managing and mitigating these risks. There are several primary risks which are common to electric substation projects and each project also has its own unique risks specific to that site and / or scope. Listed below are the main risks and the mitigation plan.

Common Risks:

- Availability of Internal Engineering and Construction resources. Mitigation plan: 1) coordinate with other projects to optimize the workforce availability, 2) hire or contract additional resources as necessary.
- Delays in Equipment and Material Lead times. Mitigation plan: 1) Proactive communication with vendors for schedule management, 2) Identify alternate suppliers and solutions for equipment, 3) critical path management to prioritize procurements to ensure material onsite as necessary.
- Unable to obtain necessary Transmission/Distribution outages required for construction. Mitigation plan: coordinate outage sequencing with Convex, Eversource, and UI operations.
- Permitting delays. Mitigation plan: 1) Identify all required permits with our environmental and permitting department through the permit assessment process, 2) Apply for necessary permits as soon as possible to ensure sufficient approval time.
- Environmental issues identified during Construction. Mitigation plan: 1) early engagement with the environmental and permitting department to perform Environmental Assessment, 2) create and incorporate plan for any remediations as necessary.

Project Unique Risks:

- Coordination with 3rd parties along Railroad corridor (Metro North, CDOT, DOT). Mitigation plan: frequent communication with 3rd parties of construction activities along Railroad corridor.
- Installation delays associated with new technology equipment. Mitigation plan: 1) coordinate/communicate with equipment suppliers for best practices to install 2) communicate with other Electric Utilities that have also installed the new technology.
- Construction risk associated with interfacing with older/existing underground high voltage cable systems. Mitigation plan: contract with experts who have experience with high voltage underground cable splicing.
- Environmental risks associated with significant dewatering required for cable trenching and splice chamber installation. Mitigation: 1) early engagement with the environmental and permitting department to perform Environmental Assessment on dewatering activities, 2) create and incorporate plan for any remediations as necessary, 3) contractor oversight to ensure dewatering activities stay within compliance of permit requirements

Risk of No Action:

Under the No Action Alternative, the existing Pequonnock Substation would continue in-service at the present site, with no improvements made to mitigate coastal flood hazard risks or to upgrade the substation's existing transmission and distribution system infrastructure. Consequently, the substation would remain at risk from flooding due to coastal storms (the control room and yard equipment is below the FEMA-designated 100-year flood elevation of 14 feet) and no action would be taken to resolve the substation's current infrastructure issues (e.g., structural integrity risks due to soil settling, inadequate short-circuit duty margins, insufficient access/clearance for emergency 115/13.8-kV mobile transformers). As a result, the substation would remain vulnerable to damage from coastal storms or to the failure of structural components, either of which could lead to extended duration outages affecting customers and the bulk power system. The No Action Alternative was rejected because it would not mitigate the identified coastal flood hazard risks and would not resolve the asset condition issues at Pequonnock Substation, and thus would not improve the reliability of the electric system.

Project Alternatives:

The proposed Project was selected after various alternatives were identified and assessed. Initially, UI evaluated the asset condition and flood hazard issues at the existing Pequonnock Substation. After that evaluation determined that the consequences of the "No Action" alternative would jeopardize the electric system, thus increasing the risk of long-term customer outages, UI assessed whether the substation could be modified, on the existing site, to both mitigate coastal flood hazard/storm damage risks and upgrade the existing substation facilities. However, UI found that the location, size, and characteristics of the existing substation site poses critical constraints to the required improvements.

Alternatives considered at the existing site:

1) Raise substation equipment components above the 14 foot base flood elevation, however this was eliminated because it doesn't address other site deficiencies.

2) Install a perimeter flood wall system, this option was eliminated because it doesn't address asset condition deficiencies.

3) Rebuild the entire substation in place, this option was eliminated due to the significant construction challenges and extensive outage requirements, along with the need to acquire an adjacent property.

Since all the existing site alternatives were eliminated, UI then investigated alternative sites on which a new Pequonnock Substation could feasibly be built, taking into consideration factors such as site size, availability of property for development, proximity to the eight existing 115-kV lines that must connect to the new substation, ownership, land use, environmental resources, and constructability.

The site selection study resulted in the identification of two potentially viable locations for the new substation: at 1 Keifer Street and 375 Main Street, both in Bridgeport. The 1 Kiefer Street location was identified as preferred based on proximity to the existing substation and transmission lines, size, availability, location within an industrial area, lack of environmental/cultural resources, constructability, and cost. A Gas-Insulated-Substation design was identified as the preferred configuration for the new substation, given that an Air-Insulated-Substation would require a significantly larger parcel.

Basis for Project Estimates

The project cost estimates are comprised of required internal labor, external resources, material, internal / external engineering and appropriate project support costs. The estimates are based on multiply sources: 1) analysis of historical man hour data / construction costs for similar activities, 2) budgetary quotes from suppliers for necessary materials, equipment, and services, 3) appropriate project support costs, 4) applicable overheads and allocations.

Project estimates are routinely reviewed and updated as the project progresses and more detailed information becomes available.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 692**	$ 692	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 1,823**	$ 1,823	$ -	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 268**	$ 268	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 566**	$ 566	$ -	$ -	$ -	$ -
# Materials	**$ 537**	$ 537	$ -	$ -	$ -	$ -
# Overheads - External	**$ 724**	$ 724	$ -	$ -	$ -	$ -
Total	**$ 4,610**	**$ 4,610**	**$ -**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 13,462	$ 13,462	$ -	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

UIL
Project Charter
SAP Project No. 802048 Pequonnock Substation Rebuild Project

1. Project Description

The Pequonnock Substation Rebuild Project ("Project") will entail the construction of a new transmission & distribution Substation in the City of Bridgeport, CT. The Project will include a new 115-kV 80 kA GIS Substation, requiring the relocation of eight existing 115-kV transmission lines and twenty distribution circuits that presently connect to the existing Substation. After the new Substation is placed into service, the existing Pequonnock Substation will be decommissioned.

2. Project Sponsor

David Bradt

3. Project Manager: Richard Pinto

4. Date: 11/01/2018

5. Project Context

Copy and paste the appropriate Mission/Vision Statement(s) listed in Charter – Vision Statements.

We want to be recognized as a utility-industry leader, focused on the customer and engaged in developing and deploying solutions that achieve the delivery of electricity safely, reliably, and at reasonable cost."

6. Business Need

Historical weather events such as Tropical Storm Irene and Superstorm Sandy along with revisions to Federal Emergency Management Agency (FEMA) flood maps have necessitated The United Illuminating Company (UI) to take action to evaluate the risk and potential impact of a single 100-year coastal flooding event on its coastal Substations and evaluate mitigating solution alternatives.

The Pequonnock Substation is located in Bridgeport, CT immediately adjacent to Long Island Sound and serves approximately 8,100 customers. Placed in service in 1956, Pequonnock Substation consists of seven 115-kV transmission lines, one 115-kV generator interconnection, and a 13.8-kV distribution system. During Tropical Storm Irene the site experienced flooding one to two feet above the yard elevation and approximately 10 feet NAVD88 during Superstorm Sandy or within inches of the control room floor. UI preemptively de-energized Pequonnock Substation due to the risk of catastrophic failure and associated long-term recovery issues. Along with the flooding concerns, there are several known asset condition deficiencies at this site.

As a result of a UI commissioned study, "Coastal Substation Flooding Asset Condition Review" (Study) to evaluate the risks and impact at the Pequonnock Substation, it was concluded that because this station is built adjacent to Long Island Sound, and the FEMA 100-year flood plain has recently been updated, it is "at-risk" of destruction and/or incapacitation for a FEMA 100-year flood event. In addition, an asset condition assessment identified major structural and equipment deficiencies that need to be addressed.

The Pequonnock Substation Rebuild Project addresses the flooding concerns and the asset condition issues. This project has progressed through the ISO-NE planning process and we are expecting full recovery (regional and local) of all project expeditures.

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Project Charter
SAP Project No. 802048 Pequonnock Substation Rebuild Project

7. Project Scope

The scope of this project includes and excludes the following items:

In scope:
• Engineering, procurement and construction of the relocated Pequonnock Substation including 115-kV interconnections and 13.8-kV distribution getaways
• Development of technical specifications for all civil and electrical construction
• Design flood elevation of FEMA 100 year flood plus 5 feet for all equipment including acceptable access to elevated equipment for operational and maintenance purposes
• Engineering and design to comply with Bulk Power System requirements as described by NPCC requirements
• Development of technical specifications for all necessary equipment
• Engineering in support of all procurement and construction activities including constructability reviews
• Development of remedial and engineering environmental documentation necessary for the project (Stormwater pollution control plan, soil management plan, remedial action plan, etc.)
• Environmental remediation of the proposed property
• Document and coordinate with HUD in regards to City of Bridgeport resiliency program
• Compliance with the memorandum of understanding (MOU) dated 8/4/2016 between UI and PSEG
• Procurement of parcel from PSEG
• Compliance with the CT Siting Council Decision & Order
• Development and maintenance of a Level 3 Project schedule
• Development of project health and safety plan
• Remote end engineering for protection and controls at 6 UI-owned Substations and RESCO and associated cost estimates
• Engineering and construction to decommission and remove existing Pequonnock 115/13.8-kV Substation once the new station is in-service
• Perform necessary equipment manufacturers factory inspections
• Distribution cutover sequence plan for all distribution circuits
• Project energization plan including testing and commissioning of all new equipment, at Pequonnock and remote ends
• Development of project cost estimates to the +50/-25 at 30% design and +25/-25 at 70% design and +10/-10 at IFC design.
• Issue project Transmisison Cost Allocation “TCA” to ISO-NE prior to start of major construction.
• Engineering to develop 30%, 70%, 90%, and Issue For Construction design packages (above grade, below grade, OH & UG transmission substation, and distribution), bid packages for equipment, materials and construction procurement for rebuilding the Pequonnock Substation and the relocation of 8 transmission lines and all distribution circuits
• Updates and revisions to existing interconnection agreements (with PSEG, Eversource, and Bridgeport Energy)
• Engineering in support of procurement for all electrical, structural and civil materials

UIL
Project Charter
SAP Project No. 802048 Pequonnock Substation Rebuild Project

Project Scope – Continued:

- Procurement of equipment, materials, and contractors for construction, to include but not limited to:
    - All civil and electrical construction activities
    - GIS Enclosure and Equipment
        - 115-kV circuit breakers
        - 115-kV motor-operated line disconnect switches
        - 115-kV motor-operated ground switches
        - 115-kV GIS bus
        - GIS access platforms
        - 115-kV current and potential transformers for metering and equipment protection
        - Local control cabinets for GIS equipment
    - AC station service equipment
    - Overhead crane for equipment installation and maintenance
    - Heating and ventilation equipment (HVAC)
    - Protection and control panels with associated relay and metering equipment
    - 125-V DC battery banks and associated chargers
    - Lavatory facility
    - Communication equipment
    - Two 115-kV/13.8-kV power transformers
    - 115-kV AIS disconnect switches
    - Associated insulators, tubular aluminum bus, surge arrestors, and connectors.
    - Provisions to accommodate a temporary mobile transformer for emergency conditions
    - 90-foot telecommunications wooden pole
    - Prefabricated or pre-engineered equipment enclosure to house 13.8-kV distribution circuit breakers and associated outgoing distribution cable circuits
    - Structural steel
    - Overhead Transmission Structures
    - Overhead line conductor and associated hardware
    - OPGW
    - 115-kV XLPE cable and associated hardware
    - Underground cable splicing chambers (Transmission & Distribution)
    - 115-KV HPGF cable and associated hardware

Out of scope:
• Any work associated with the Coastal Flood Mitigation projects at Congress, Singer, Grand/Mill River, and East Shore
• Remote-end engineering for stations owned by Eversource
• Replacement of existing underground transmission cable systems beyond what is necessary to interconnect the relocated Pequonnock Substation
• Distribution system replacement beyond what is necessary to interconnect the relocated Pequonnock Substation

UIL
Project Charter
SAP Project No. 802048 Pequonnock Substation Rebuild Project

8. Project Objectives (Specific, Measurable, Achievable, Realistic, Time-bound)

The Pequonnock Substation Rebuild Project (the Project) will entail the construction and operation of a new transmission & distribution Substation, along with existing 115-kV transmission lines and various distribution circuits that presently connect to the existing Substation that addresses coastal flooding concerns and asset condition issues at the existing Pequonnock Substation with a projected in-service date of December 2022.

9. Project Deliverables

- Detail design to relocate the Pequonnock Substation
- Construction of Pequonnock Substation with new 115-kV GIS and all associated 115-kV transmission and generation interconnections
- Detail design of distribution getaways in support of the relocated Pequonnock Substation
- Construction of distribution getaways in support of the relocated Pequonnock Substation
- 115-kV GIS Pequonnock Substation completely tested and commissioned
- Project close-out of all assets
- All new assets booked to plant

UIL
Project Charter
SAP Project No. 802048 Pequonnock Substation Rebuild Project

10a. Estimated cost:

Complete the chart below indicating the total project estimate, including the amount for each dollar type and any reimbursement summarized by year.

Transmission ONLY – (excludes AFUDC)

Dollar Type	Category	Pre-2018 Actuals	2018	2019	2020	2021	2022	Total
CAP	UIL Resources	165,837	185,131	182,967	537,148	1,590,940	1,266,719	3,928,743
	External Resources	333,691	463,633	1,020,000	8,835,267	7,632,525	9,426,369	27,711,485
	Materials-Inventory	-	654	-	-	-	-	654
	Materials-Direct Purchase	-	-	2,000,000	13,822,658	15,453,045	4,391,988	35,667,691
	Other	873,533	199,758	2,000,000	156,240	156,240	-	3,385,771
	Contingency		-				16,400,000	16,400,000
	Total	1,373,061	849,175	5,202,967	23,351,313	24,832,750	31,485,077	87,094,344
O&M	UIL Resources	-	-	-	-	-	-	-
	External Resources	-	-	-	-	-	-	-
	Materials-Inventory	-	-	-	-	-	-	-
	Materials-Direct Purchase	-	-	-	-	-	-	-
	Other	747	-	-	-	-	-	747
	Contingency		-					-
	Total	747	-	-	-	-	-	747
COR	UIL Resources	-	-	-	-	-	132,858	132,858
	External Resources	-	-	-	-	-	4,015,000	4,015,000
	Materials-Inventory	-	-	-	-	-	-	-
	Materials-Direct Purchase	-	-	-	-	-	-	-
	Other	-	-	-	-	-	-	-
	Contingency		-					-
	Total	-	-	-	-	-	4,147,858	4,147,858
Total Directs	UIL Resources	165,837	185,131	182,967	537,148	1,590,940	1,399,578	4,061,601
	External Resources	333,691	463,633	1,020,000	8,835,267	7,632,525	13,441,369	31,726,485
	Materials-Inventory	-	654	-	-	-	-	654
	Materials-Direct Purchase	-	-	2,000,000	13,822,658	15,453,045	4,391,988	35,667,691
	Other	874,280	199,758	2,000,000	156,240	156,240	-	3,386,518
	Contingency	-	-	-	-	-	16,400,000	16,400,000
	Indirect CAP*	127,697	180,816	384,528	2,784,655	2,962,507	3,779,901	10,220,105
	Indirect OM*	-	-	-	-	-	-	-
	Indirect COR*	-	-	-	-		101,214	101,214
Total Direct		1,373,808	849,175	5,202,967	23,351,313	24,832,750	35,632,935	91,242,948
Total Indirects		127,697	180,816	384,528	2,784,655	2,962,507	3,881,115	10,321,318
Total Pre-Reimbursements		1,501,505	1,029,992	5,587,495	26,135,968	27,795,257	39,514,050	101,564,267
Reimbursements		-	-					-
Total Post-Reimbursements		1,501,505	1,029,992	5,587,495	26,135,968	27,795,257	39,514,050	101,564,267

Note : (Project cost estimates will be revised as project progresses and bids are received for material and services)

UIL
Project Charter
SAP Project No. 802048 Pequonnock Substation Rebuild Project

Distribution ONLY - (excludes AFUDC)

Dollar Type	Category	Pre-2018 Actuals	2018 total	2019	2020	2021	2022	Total
CAP	UIL Resources	51,670	84,997	9,906	51,424	135,123	936,895	1,270,015
	External Resources	169,825	256,210	252,000	252,000	7,924,348	-	8,854,384
	Materials-Inventory	-	-	-	-	-	-	-
	Materials-Direct Purchase	-	-	-	-	8,794,966		8,794,966
	Other	292,749	66,632	-	-	-	-	359,381
	Contingency		-				3,455,561	3,455,561
	Total	514,244	407,840	261,906	303,424	16,854,437	4,392,456	22,734,307
O&M	UIL Resources	-	-	-	-	-	-	-
	External Resources	-	-	-	-	-	-	-
	Materials-Inventory	-	-	-	-	-	-	-
	Materials-Direct Purchase	-	-	-	-	-	-	-
	Other	-	-	-	-	-	-	-
	Contingency		-					-
	Total	-	-	-	-	-	-	-
COR	UIL Resources	-	-	-	-	-	-	-
	External Resources	-	-	-	-	-	-	-
	Materials-Inventory	-	-	-	-	-	-	-
	Materials-Direct Purchase	-	-	-	-	-	-	-
	Other	-	-	-	-	-	-	-
	Contingency		-					-
	Total	-	-	-	-	-	-	-
Total Directs	UIL Resources	51,670	84,997	9,906	51,424	135,123	936,895	1,270,015
	External Resources	169,825	256,210	252,000	252,000	7,924,348	-	8,854,384
	Materials-Inventory	-	-	-	-	-	-	-
	Materials-Direct Purchase	-	-	-	-	8,794,966	-	8,794,966
	Other	292,749	66,632	-	-	-	-	359,381
	Contingency	-	-	-	-	-	3,455,561	3,455,561
	Indirect CAP*	86,701	63,092	34,982	40,527	2,251,186	586,684	3,063,172
	Indirect OM*	-	-	-	-	-	-	-
	Indirect COR*	-	-	-	-	-	-	-
Total Direct		514,244	407,840	261,906	303,424	16,854,437	4,392,456	22,734,307
Total Indirects		86,701	63,092	34,982	40,527	2,251,186	586,684	3,063,172
Total Pre-Reimbursements		600,945	470,931	296,888	343,951	19,105,623	4,979,141	25,797,478
Reimbursements		-	-					-
Total Post-Reimbursements		600,945	470,931	296,888	343,951	19,105,623	4,979,141	25,797,478

Note : (Project cost estimates will be revised as project progresses and bids are received for material and services)

UIL
Project Charter
SAP Project No. 802048 Pequonnock Substation Rebuild Project

Total Project Transmission & Distribution - (excludes AFUDC)

Dollar Type	Category	Pre-2018 Actuals	2018 total	2019	2020	2021	2022	Total
CAP	UIL Resources	217,507	270,128	192,873	588,572	1,726,063	2,203,615	5,198,758
	External Resources	503,516	719,844	1,272,000	9,087,267	15,556,873	9,426,369	36,565,869
	Materials-Inventory	-	654	-	-	-	-	654
	Materials-Direct Purchase	-	-	2,000,000	13,822,658	24,248,011	4,391,988	44,462,657
	Other	1,166,521	266,390	2,000,000	156,240	156,240	-	3,745,391
	Contingency		-				19,855,561	19,855,561
	Total	1,887,545	1,257,015	5,464,873	23,654,737	41,687,187	35,877,533	109,828,889
O&M	UIL Resources	-	-	-	-	-	-	-
	External Resources	-	-	-	-	-	-	-
	Materials-Inventory	-	-	-	-	-	-	-
	Materials-Direct Purchase	-	-	-	-	-	-	-
	Other	747	-	-	-	-	-	747
	Contingency		-					-
	Total	747	-	-	-	-	-	747
COR	UIL Resources	-	-	-	-	-	132,858	132,858
	External Resources	-	-	-	-	-	4,015,000	4,015,000
	Materials-Inventory	-	-	-	-	-	-	-
	Materials-Direct Purchase	-	-	-	-	-	-	-
	Other	-	-	-	-	-	-	-
	Contingency		-					-
	Total	-	-	-	-	-	4,147,858	4,147,858
Total Directs	UIL Resources	217,507	270,128	192,873	588,572	1,726,063	2,336,473	5,331,616
	External Resources	503,516	719,844	1,272,000	9,087,267	15,556,873	13,441,369	40,580,869
	Materials-Inventory	-	654	-	-	-	-	654
	Materials-Direct Purchase	-	-	2,000,000	13,822,658	24,248,011	4,391,988	44,462,657
	Other	1,167,268	266,390	2,000,000	156,240	156,240	-	3,746,138
	Contingency	-	-	-	-	-	19,855,561	19,855,561
	Indirect CAP*	214,159	243,908	419,510	2,825,182	5,213,693	4,366,585	13,283,038
	Indirect OM*	-	-	-	-	-	-	-
	Indirect COR*	-	-	-	-	-	101,214	101,214
Total Direct		1,888,291	1,257,015	5,464,873	23,654,737	41,687,187	40,025,391	113,977,494
Total Indirects		214,159	243,908	419,510	2,825,182	5,213,693	4,467,799	13,384,251
Total Pre-Reimbursements		2,102,450	1,500,923	5,884,383	26,479,919	46,900,880	44,493,191	127,361,746
Reimbursements		-	-					-
Total Post-Reimbursements		2,102,450	1,500,923	5,884,383	26,479,919	46,900,880	44,493,191	127,361,746

Note : (Project cost estimates will be revised as project progresses and bids are received for material and services)

All previous study costs and conceptual engineering costs have been included in this charter

10b. Project Estimate Classification

Copy and paste the appropriate row of information from the corresponding table in the Instructions (see the section Project Estimate Classification).

Note: An Order of Magnitude estimate (+200 to -50%) can be used for high level estimating, but is NOT acceptable for chartering purposes.

Stage	Level of Project Definition	Target Accuracy of Estimate (Confidence Level)
Planning Design	15 – 40%	+50 to -25%

UIL
Project Charter
SAP Project No. 802048 Pequonnock Substation Rebuild Project

11. Project Organization:

Executive Sponsors – Christian Bilcheck, Charles Eves
Sponsor – David Bradt
Project Manager – Transmission & Substation – Richard Pinto
Project Manager – Distribution - Fred Arnold

Technical Team
Substation Engineers –Rob Sazanowicz, Syed Rahman
Transmission Engineers – Mohammad Pasha, Sara Cullen-Corson
Process & Technology – Scott Butwill
Distribution Engineer – Ken McGovern
Distribution Civil Engineer – Claudio Anania
Transmission Planning – Chris Malone
Environmental – Shawn Crosbie, Todd Berman (Fuss & O'Neil)
Real Estate – Annette Potasz
Construction Manager – Benito Acampora
Operations – Ed DelMonte
Transmission & Substation Supervisor – Pete Leonetti
Test Supervisor – Robert Earley
Maintenance – Jon Allen
SCADA - Paul Robinette

Business Team
Project Analyst – John Montefusco
Legal – Nicholas Cicale
Permitting – Samantha Marone, Amy Hicks
Security – Wendy Wynne
Purchasing – Alex Cienfuegos Hawley, Theresa Terry

Professional Services
Legal – Bruce McDermott (Murtha Cullina LLP)
Surveying – Fuss & O'Neil
Environmental Permitting - Fuss & O'Neil
Engineering – Black & Veatch
Geotechnical Engineering – Fuss & O'Neil
EMF – Exponent
Photo Renderings – All-Points Technology

UIL
Project Charter
SAP Project No. 802048 Pequonnock Substation Rebuild Project

12. Estimated duration: (Clearly Identify the milestone that will be used as the baseline finish date; i.e.: "used and useful" see instructions for a list of acceptable terms. There also MUST be a corresponding activity clearly identified within your schedule.)

	Milestone	Date
1.	Connecticut Siting Council Approval	10/11/2018
2.	Charter Approval – Full Project	10/29/2018
3.	Award Detail Engineering	11/1//2018
4.	Award GIS	12/03/2018
5.	Acquire land from PSEG	12/31/2019
6.	Environmental and Site Development	01/02/2020
7.	File TCA with ISO-NE (10% level cost estimate)	04/01/2020
8.	Major Construction Activities Commence	06/02/2020
9.	Testing & Commissioning	06/01/2022
10.	Project In-Service	12/30/2022

13. Project Assumptions

- Engineering will take approximately 24 months to complete
- PSEG sells UI the requested property no later than 12/31/19 as per the MOU dated 8/4/2016
- UI will have the appropriate internal & external resources to support the project
- Individual dossier is not required for this project
- Procurement process secures resources with the requisite skills necessary to accomplish project in an acceptable timely manner
- Bid packages are sufficiently developed so that change orders will be minimal (project scope well defined)
- UI project team remains relatively consistent throughout the entire project
- All previous project costs have been included in this Charter.

14. Alternatives

Project alternatives are outlined in the "Coastal Substation Flood Mitigation Study" dated January 23, 2017. Evaluations included raising impacted equipment, perimeter flood wall systems, raise and rebuild "Adjacent", raise and rebuild "In-Place", raise and rebuild "Off-Site" along with reviewing any asset condition issues. The raise and rebuild "Adjacent" was chosen as the best solution for Pequonnock since it addresses both flooding concerns and all asset condition issues.

UIL
Project Charter
SAP Project No. 802048 Pequonnock Substation Rebuild Project

15. Project Risks/Dependencies

Risk	% Probability of occurring	$ Impact if risk occurs	Days Impact if risk occurs	Risk Response Plan
See attached risk register				

16. Constraints

UI does not currently own the parcel of land on which the Substation will be built.

17. Supporting Documents (if applicable)

- Risk Register
- Project Schedule
- Communications Plan

UIL
Project Charter
SAP Project No. 802048 Pequonnock Substation Rebuild Project

18. Project approvals

Obtain signatures according to the UIL Grants of Authority. Grants of Authority approvals are based on the total project estimate before reimbursements. Extra lines are provided for any additional signatures; delete any unnecessary lines as needed.

Richard Pinto (Nov 6, 2018)	Nov 6, 2018
Project Manager – Richard Pinto	Date
Manuel Marquez (Nov 7, 2018)	Nov 7, 2018
Director of PM – Manuel Marquez	Date
David Bradt (Nov 6, 2018)	Nov 6, 2018
Project Sponsor – David Bradt	Date
Investment Planning Review – Mary Lou Palmieri	Date
Christian Bilcheck (Nov 6, 2018)	Nov 6, 2018
VP Asset Mgt & Planning – Christian Bilcheck	Date
VP, Business Area – Ellen Miller	Date
Utility President (up to $2.5M) – xxxxx xxxxxx [Gas Co's Only	Date
VP, Information Technology (up to $2.5M)	Date
SVP, Gas Operations (up to $2.5M)	Date
President, CT and MA Ops (up to $10M) – Anthony Marone	Date
CEO, Iberdrola USA Networks (up to $10M) – Robert Kump	Date
	Nov 8, 2018
Director Technical Services - Alfonso Mugueta (up to $1M)	Date

Risk Register	Date Updated	10/16/2018	Contingency Budget	Full Project	Curr Year
Project Name	Pequonnock Rebuild		**Total Approved**		
Project ID	802048		**Spent**		
Project Manager	Richard Pinto		**Released**		
Director	Manuel Marquez		**Remaining**		

DO NOT ADD ROWS OR COLUMNS

Manual Sort	Risk Number	Risk Category	Risk Description	Probability Risk will Occur (%)	Cost if Risk Occurs ($)	Contingency ($)	Schedule Impact if Risk Occurs (Days)	Response Strategy	Response Plan	Event Eliminating Risk	Risk End Date	Primavera Activity ID	Notes	Risk Status
	01	Scope-Schedule-Budget	PSEG not selling UI property (redesign on new parcel)	5%	70,000,000	3,500,000	360	Mitigate	Continue to work in good faith with PSEG in accordance with executed MOU, to date there is no indication from PSEG that they are not going to continue to move forward with the sale of the proposed parcel	Property purchased	12/31/2019			Open
	02	Scope-Schedule-Budget	PSEG not selling UI property (condemn property)	5%	1,500,000	75,000	180	Mitigate	Continue to work in good faith with PSEG in accordance with executed MOU for purchase of the property.	Property purchased	12/31/2019			Open
	03	Budget	Property is contaminated more than anticipated (requires greater remediation)	50%	10,000,000	5,000,000	90	Accept	Perform early environmental analysis of site and develop remediation plan as necessary	Phase 2 environmental complete	12/31/2019			Open
	04	Schedule	PSEG warehouse tenants not vacated when property acquired	15%	150,000	22,500	60	Mitigate	Negotiate with PSEG to have them evict the tenants	Property purchased	12/31/2019			Open
	05	Schedule	Engineering contractor requires additional time due to inexperience with UI standards	40%	250,000	100,000	30	Mitigate	Provide UI standards and guidelines at the time of bid	Engineering complete	6/30/2021			Open
	06	Schedule	Engineering contractor does not have the requisite talent/expertise/hours to execute job	40%	500,000	200,000	90	Accept	Develop detailed specifications and requirements in the RFP	Engineering complete	6/30/2021			Open
	07	Schedule	Engineering contractor does not provide quality/timely deliverables	10%	100,000	10,000	90	Accept	Develop detailed specifications and requirements in the RFP	Specifications Complete	6/30/2020			Open
	08	Scope-Budget	City of Bridgeport requires project to be designed with special requirements	10%	1,000,000	100,000	90	Accept	Proactively meet with local officials and address any concerns	Development and Management Plan complete and approved	12/31/2019			Open
	09	Scope-Schedule-Budget	Adverse impact from HUD levee system	25%	200,000	50,000	60	Mitigate	Proactively work with the City of Bridgeport and HUD to evaluate the levee system design	Levee system design complete	12/30/2019			Open
	10	Scope-Schedule-Budget	Leadership requires additional studies and reports to assist in justification of decision	10%	500,000	50,000	180	Mitigate	Communicate early and often to Project Sponsors	Project Charter Approved	10/31/2018			Open
	11	Schedule	Procurement process takes longer than planned for all procurement packages	35%	10,000,000	3,500,000	60	Avoid	Proactively work with Procurement to develop realistic procurement milestones	Major Contracts awarded	12/30/2020			Open
	12	Scope-Schedule-Budget	CDOT/MNR requires all work to be done on off hours along the railroad corridor	60%	1,500,000	900,000	90	Accept	Work with CDOT to understand the requirements of the work within the CDOT ROW	Cutover complete	12/31/2022			Open
	13	Scope-Schedule-Budget	Eversource not ready for cutover work with associated remote ends	30%	500,000	150,000	60	Mitigate	Early coordination with Eversource on remote end requirements for protection and control	Cutover complete	12/31/2022			Open
	14	Scope-Schedule-Budget	Bridgeport Resco requires outages during certain times of the year	30%	500,000	150,000	60	Mitigate	Early coordination with RESCO on remote end requirements for protection and control	Cutover complete	12/31/2022			Open
	15	Scope-Schedule-Budget	PSEG not ready for cutover work with associated remote ends	25%	500,000	125,000	60	Mitigate	Early coordination with PSEG on remote end requirements for protection and control	Cutover complete	12/31/2022			Open
	16	Scope-Schedule-Budget	Distribution duct bank civil construction encounters environmental remediation	50%	2,000,000	1,000,000	90	Mitigate	Perform early environmental analysis of site and pre-characterize soils, work with engineering to understand routing options and if practical avoid areas of known concerns	Duct bank and splice chambers installed	12/31/2022			Open
	17	Scope-Schedule-Budget	Significant Project design changes as detail engineering progresses, project currently only in conceptual stage.	15%	6,000,000	900,000	90	Accept	Review any design change requirements to ensure they are prudent and warranted based on	Engineering complete	6/30/2021			Open

Risk Register	Date Updated	10/16/2018	Contingency Budget	Full Project	Curr Year
Project Name	Pequonnock Rebuild		**Total Approved**		
Project ID	802048		**Spent**		
Project Manager	Richard Pinto		**Released**		
Director	Manuel Marquez		**Remaining**		

DO NOT ADD ROWS OR COLUMNS

Manual Sort	Risk Number	Risk Category	Risk Description	Probability Risk will Occur (%)	Cost if Risk Occurs ($)	Contingency ($)	Schedule Impact if Risk Occurs (Days)	Response Strategy	Response Plan	Event Eliminating Risk	Risk End Date	Primavera Activity ID	Notes	Risk Status
	18	Budget	MNR requires more personnel than estimated for construction	60%	1,000,000	600,000	30	Accept	Early construction walk through with MNR	Cutover complete	12/31/2022			Open
	19	Scope-Schedule-Budget	Distribution duct bank design requires HDD or jack and bore under the RR	15%	5,000,000	750,000	90	Mitigate	Early inspections and survey for distribution design	Distribution getaway design complete	12/31/2019			Open
	20	Budget-Schedule	Site not ready for delivery of GIS equipment	10%	2,000,000	200,000	60	Mitigate	Negotiate with GIS vendor a period of time to include additional storage of equipment	GIS building completed	6/1/2021			Open
	21	Budget-Schedule	Environmental issues encountered during decommissioning of Old Pequonnock	50%	5,000,000	2,500,000	30	Mitigate	Perform early environmental analysis of Old Pequonnock to properly identify hazards	Decommissioning Complete	6/1/2023			Open
	22	Scope-Schedule-Budget	Pipe type cable unavailable for expansion	30%	3,000,000	900,000	90	Accept	Communicate with pipe type cable suppliers and revise design as necessary if material is not available	Pipe type cable purchased or alternative determined	12/31/2021			Open
	23	Budget-Schedule	Remote end substations have inadequate space for new relay panels	10%	2,000,000	200,000	120	Mitigate	Early inspections and identification of locations for relay panels	Engineering complete	6/30/2021			Open
					$123,200,000	**$20,982,500**								

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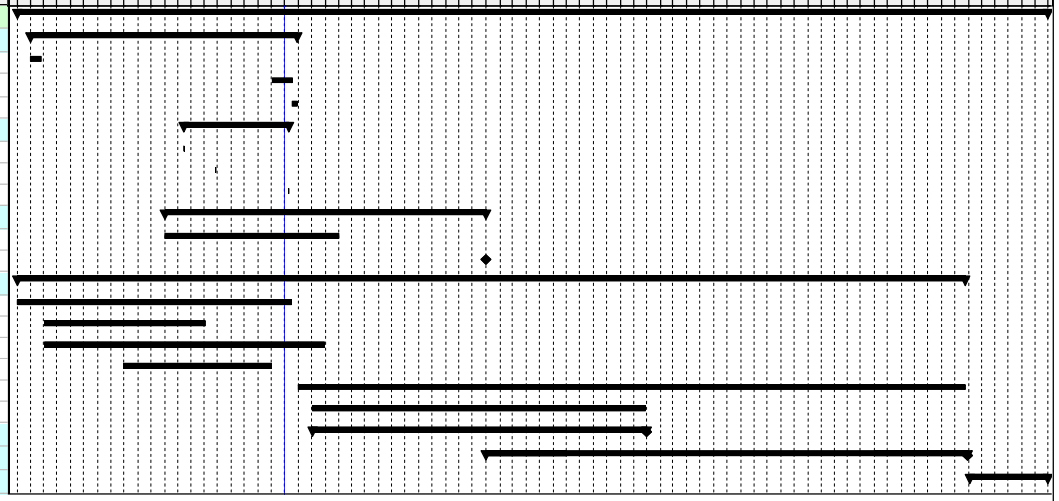
Pequonnock Charter Schedule | 2018 Standard Layout | 16-Oct-18 14:54

Activity ID	Activity Name	At Comp Dur	Start	Finish
Pequonnock Charter Schedule		1599d	01-Feb-17 A	30-Jun-23
Project Administration		417d	01-Mar-17 A	29-Oct-18
A1040	Engineering Charter	19d	01-Mar-17 A	27-Mar-17 A
A1015	Full Project Charter	31d	04-Sep-18 A	17-Oct-18
A1020	Full Project Charter Approval	8d	18-Oct-18	29-Oct-18
Permitting		164d	15-Feb-18 A	11-Oct-18 A
A1025	Permitting - MCF (submitted)	0d	15-Feb-18 A	15-Feb-18 A
A1030	Permitting - CSC Application (submitted)	0d	26-Apr-18 A	26-Apr-18 A
A1050	Permitting - Siting Council Application Approved	0d	11-Oct-18 A	11-Oct-18 A
Real Estate		497d	02-Jan-18 A	31-Dec-19
A1060	Real Estate Property Due Diligence	270d	02-Jan-18 A	31-Jan-19
A1200	Acquire Site (Milestone)	0d	31-Dec-19*	
Engineering		1470d	01-Feb-17 A	23-Dec-22
A1160	GIS Spec	427d	01-Feb-17 A	17-Oct-18 A
A1000	Site Surveys	247d	03-Apr-17 A	02-Apr-18 A
A1010	Site Geotechnical Investigation	434d	03-Apr-17 A	28-Dec-18
A1055	Preliminary Engineering	228d	01-Oct-17 A	31-Aug-18 A
A1070	Detailed Engineering	1032d	01-Nov-18*	23-Dec-22
A1180	GIS Engineering	516d	03-Dec-18*	28-Dec-20
Major Procurements - Equipment, Labor & Material		519d	03-Dec-18	31-Dec-20
Construction & Commissioning		748d	02-Jan-20	30-Dec-22
Close out		125d	03-Jan-23	30-Jun-23



Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

Page 1 of 1

TASK filter: All Activities

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The United Illuminating Company
Project Communications Plan
Pequonnock Substation Rebuild Project

This Project Communication Plan defines the communication and information needs of the project stakeholders and establishes the frequency and methods for disseminating this information.

1. Project Manager: Richard Pinto – Transmission & Substation
Fred Arnold – Distribution Getaway

2. Date: 10/16/18

3. Stakeholders

Executive Sponsors:		**Engineering Contractor:**
Chris Bilcheck		Detail Engineering – Black and Veatch
Charles Eves		
Project Sponsors:		**City of Bridgeport:**
Dave Bradt		Mayor
		City engineer
Project Team Members:		
Richard Pinto		**Regulatory Agencies:**
Robert Sazanowicz		ISO-NE
Benito Acampora		CT Siting Council
Paul Robinette		**Suppliers:**
Fred Arnold		TBD
Mohammad Pasha		
Sara Cullen Corson		
Annette Potasz		**Environmental :**
Ed DelMonte		BL Companies
Shawn Crosby		Fuss & O'Neil
Samantha Marone		
Pete Leonetti		**Other:**
Robert Earley		CTDOT
Marc Mellaly		Metro-North Railroad
Chris Hart		Murtha Calina - Legal

4. Reports to Deliver

Project Updates	Budget/Forecast Information
Meeting Minutes	Accounting Information
Change Control	System Operating Information
Agendas	Daily Construction Reports
Project Close-out	Lessons Learned

The United Illuminating Company
Project Communications Plan
Pequonnock Substation Rebuild Project

5. Communication Schedule

Stakeholder	Report	Person Resp.	Media/Format	Frequency
Sponsors	Status, Issues, Risks, Change Control	PM	E-mail In-person Scheduled Meetings	Monthly
Team Members	Status, Minutes, Risks, Change Control	PM	Meetings E-mail	Weekly
Functional Manager	Status, Issues, Risks,	PM	In-person	Bi-weekly
Municipalities Regulatory Agencies (CSC, ISO)	Status	PM with UI Comm. / Legal review Senior Management	Meetings Formal Communications	As required
Senior Management	Project Updates, Stakeholder Presentations	PM	In person E-mail Meetings	As designated by Senior Management
Other	Status, Minutes	PM	In person E-mail Meetings	Monthly

The United Illuminating Company
Project Communications Plan
Pequonnock Substation Rebuild Project

6. Project Notebook and templates

Project Folder: ECM

Key Project Documents:

1. Project Charter
2. Action Items Checklist
3. Project Communications Plan
4. Risk Register
5. Project Schedule
6. Budget Updates / Forecasts
7 Daily Construction Reports
8. Meeting Agendas & Minutes
9. Monthly status reports
10. Stakeholder Presentations
11. Lessons Learned

7. Action Items Management

Action Items will be tracked in the *Action Items Checklist.xls* spreadsheet. Team members are responsible to identify perceived issues and for reporting them to the Project Manager for entry in the log. The Project Manager will work with the team to assess the issue and resolve it.

8. Project Risk Management

Project Risk will be tracked in the Risk Register. Team members are responsible for identifying risk for their deliverables and the Project Manager is responsible for identifying general project risks. The Project Manager will work with the team to assess the risks and determine the risk response.

9. Project Change Control

Project changes will be tracked in the *Change Log* (see *Manage Project Changes*). All change requests will be assessed by the Project Manager and/or the Project Sponsors.

10. Communication Plan Approvals:

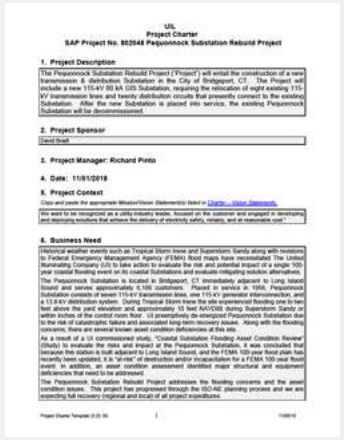
The Project Manager should discuss this plan with the Project Sponsor(s) and get approval before proceeding.

The United Illuminating Company
Project Communications Plan
Pequonnock Substation Rebuild Project

Richard Pinto (Nov 6, 2018)	Nov 6, 2018
Project Manager – (Richard Pinto)	Date
Christian Bilcheck (Nov 6, 2018)	Nov 6, 2018
Executive Project Sponsor – (Christian Bilcheck)	Date
Charles Eves (Nov 12, 2018)	Nov 12, 2018
Executive Project Sponsor – (Charels Eves)	Date
David Bradt (Nov 6, 2018)	Nov 6, 2018
Project Sponsor – (Dave Bradt)	Date
Manuel Marquez (Nov 7, 2018)	Nov 7, 2018
Project Director – (Manuel Marquez)	Date

The following instructions describe the fields to be filled out in the Communication Plan Template.

Template Fields	
Project Name (Header)	Short name used as common identifier for the project among the team and stakeholders.
Project Manager	List the Project Manager (and date assigned to the project).
Date	Date Communication Plan submitted to the sponsors for approval.
Stakeholders	List of project stakeholders. Each will require some type of communication during the project
Reports to Deliver	List of reports which will be delivered to one or more stakeholder groups.
Communication Schedule	This table lists which reports go to which stakeholders, the frequency of the report being delivered, the person responsible for creating the report, and the medium of delivery. The primary source for this information should be the stakeholders who should tell you what information they want, how often they want to see it and how they would like to receive it.
Project Notebooks and Templates	List the folder containing project information (a template for a directory structure is available) and any key documents and/or templates associated with the project.
Project Issues Management	List Project Issues spreadsheet and high level issues management procedure.
Project Risk Management	List Risk Register spreadsheet and high level risk management procedure. (This may be omitted if a separate Risk Plan is developed.)
Project Change Control	List Change Log spreadsheet and high level change control procedure. (This may be omitted if a separate Change Control Plan is developed.)
Project Approvals	Acquire the signatures of the major stakeholders. At a minimum, the Charter should be signed off by the Project Sponsor(s). These approvals signal the official authorization of the project to move forward and commit the sponsors to their role and responsibilities.



802048 Pequonnock Charter 11052018 Package

Adobe Sign Document History 11/12/2018

Created:	11/06/2018
By:	Al Torrens (alvis.torrens@avangrid.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAAeHG9T76RpHu6mzGl-5r45Kx-Py-Iw6ui

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PRJ-001277

UI Resiliency Program

Sections

1. Project Summary

UI Resiliency Program

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-001277	Electric Distribution	de Andrade Cruz, Lucas	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Planning & Coordination	System Resiliency	IP1 Originate	Program/As Spent	Program/As Spent

Project description:

The UI Resilience Program aims to enhance the reliability and resilience of the electric grid by implementing infrastructure upgrades across nine priority circuits. These upgrades include automation, topology improvements, and hardening measures to reduce customer outage costs and improve service continuity during major storms.

Project Scope:

The UI Resilience Program encompasses a comprehensive set of infrastructure upgrades across nine priority circuits to enhance the reliability and resilience of the electric grid. The scope of the project includes the following key components:

Infrastructure Upgrades:
Cutouts: Installation of 10 cutouts to improve the reliability of the circuits.
Disconnects: Addition of 9 disconnects to facilitate easier isolation of faulty sections.
Air-break Switches: Implementation of 10 air-break switches to enhance operational flexibility.
Reclosers: Deployment of 32 reclosers to automatically restore power after temporary faults.
Aerial Cable: Installation of 9,600 feet of aerial cable to strengthen overhead lines.
Underground Cable: Laying of 19,800 feet of underground cable to protect critical sections from weather-related disruptions.

Project Benefits:

Avoided Interruption Costs: Significant reduction in customer outage costs, with annual avoided interruption costs due to hardening estimated at $1.2 million and automation/topology measures at $0.2 million
Improved Reliability: Reduction in outage frequency and duration, leading to a more reliable power supply.
Economic Benefits: Positive benefit-cost ratios over 5, 10, 20, and 30-year periods, indicating strong economic justification for the investments.

Project Risks and Mitigation Plan:

This project is still underdevelopment and the project risks are still being evaluated. However, currently the following Project Risks and Mitigation are being developed:

Cost Overruns: Mitigated by using conservative cost estimates with a tolerance of -50 to +200 percent.
Implementation Delays: Addressed through detailed project planning and scheduling.

Risk of No Action:
Failure to implement the UI Resilience Program could result in continued high outage costs for customers, increased frequency and duration of outages, and greater vulnerability to major storms. This would negatively impact customer satisfaction and economic stability in the affected areas.

Project Alternatives:
Three alternative solution sets were analyzed for each circuit, considering different combinations of automation, topology, and hardening measures. The optimal proposals were selected based on their benefit-cost ratios and effectiveness in reducing customer outages.

Basis for Project Estimates
Cost estimates were developed using budgetary estimates for capital with a tolerance of -50 to +200 percent. Benefits were calculated using the ICE Model and historical outage data, projecting future storm outage frequency and intensities to estimate avoided interruption costs.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ -**	$ -	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 3,541**	$ -	$ -	$ 429	$ 1,568	$ 1,545
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 310**	$ -	$ -	$ 37	$ 137	$ 135
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ 444**	$ -	$ -	$ 54	$ 197	$ 194
Total	**$ 4,295**	**$ -**	**$ -**	**$ 520**	**$ 1,901**	**$ 1,874**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 4,295	$ -	$ -	$ 520	$ 1,901	$ 1,874

Note: 2024 Plant Additions includes the entire calendar year

PRJ-003973

Ansonia - CAP

Sections

1. Project Summary

Ansonia - CAP

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-003973	Electric Distribution	Logan, Zachary	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Projects	Infrastructure Replacement - Substations	IP4 Change	Jan 2024	Nov 2026

Project description:

The purpose of this project is to remove the use of a mobile station that has been deployed since 2020 at the Ansonia Substation by replacing a new transformer B and getting the substation back to normal conditions. The project also intends to completely replace the existing exterior non-segregated busway with a new cable bus system to ensure continued reliability for the Ansonia Substation.

In 2010, Transformer B (40MVA 115kV/13.8kV) experienced gassing issues which led to a repair on site immediately after. In 2020, gassing issues were reported again on the same transformer. After a thorough inspection, no root cause was found, and the transformer was reconnected. Months later, gassing levels increased up to critical levels. The Transformer was taken out of service and a Pauwels Mobile Station deployed.

In 2023, a fault occurred due to moisture permeation on busduct between transformer A and switchgear room #3. A temporary cable bus connection was installed between power transformer A and switchgear room #3 to keep the substation in service.

Project Scope:

Scope of the project includes electrical and civil engineering, civil and electrical construction, equipment installation and commissioning. Construction scope includes the disconnect and removal of the existing Transformer B and the in-kind replacement of a 40 MVA transformer and the disconnect and removal of the existing non-segregated 13.8kV busways with cable bus. Cable bus will be used to replace the existing non-segregated busways to eliminate the risk of future failures due to moisture entering the bus enclosure.

Project Benefits:

The Ansonia transformer B failed and was removed from service in 2020. Since that time, the substation has been utilizing a mobile substation transformer. The utilization of a mobile substation transformer is intended for emergency / temporary installation, not as a permanent solution. The replacement of the transformer with a permanent asset is required to ensure system reliability, reduce the risk of Substation equipment failure, and reduce the burden on the mobile substation transformer. Additionally, the installation of a new transformer at Ansonia Substation will allow the mobile substation transformer to be available for use as an emergency backup for the system.

The existing 13.8kV exterior busway at Ansonia Substation failed due to moisture permeation. Although temporary connections were implemented to supply the 13.8kV distribution switchgear, a permanent solution will ensure future reliability of the substation.

Project Risks and Mitigation Plan:

Large Capital projects such as this contain many inherent risks and The United Illuminating Company has a process managing and mitigating these risks. There are several primary risks which are common to electric substation projects and each project also has its own unique risks specific to that site and / or scope. Listed below are the main risks and the mitigation plan.

Common Risks:

- Availability of Internal Engineering and Construction resources. Mitigation plan: 1) coordinate with other projects to optimize the workforce availability, 2) hire or contract additional resources as necessary.
- Delays in Equipment and Material Lead times. Mitigation plan: 1) Proactive communication with vendors for schedule management, 2) Identify alternate suppliers and solutions for equipment, 3) critical path management to prioritize procurements to ensure material onsite as necessary.
- Unable to obtain necessary Transmission/Distribution outages required for construction. Mitigation plan: coordinate outage sequencing with Convex, Eversource, and UI operations.
- Permitting delays. Mitigation plan: 1) Identify all required permits with our environmental and permitting department through the permit assessment process, 2) Apply for necessary permits as soon as possible to ensure sufficient approval time.
- Environmental issues identified during Construction. Mitigation plan: 1) early engagement with the environmental and permitting department to perform Environmental Assessment, 2) create and incorporate plan for any remediations as necessary.

Project Unique Risks:

- Delays risks associated with concurrent Transmission line project in this area (Derby to Ansonia project) Mitigation plan: 1) Proactive planning with the Transmission Line Project Team and 2) frequent communication and coordination between construction management crews.

Risk of No Action:

Under the No Action Alternative, the Ansonia Substation would continue to operate with mobile substation transformer in place and the temporary cables in place. The following risks are associated with the No Action Alternative:

-Extended Transformer outage due to failure of the mobile substation transformer - Since the mobile substation transformers were not designed for constant / prolonged / permanent use, there is an increasing risk of its failure if it were to become a permanent installation.
-Extended Transformer outages at other substations – since the mobile substation transformer is dedicated to use at Ansonia, it would not be available for use as an emergency backup for other critical assets.
-Transformer outage due to a failure of the temporary cable connection - The temporary solution was not designed for long term use, and there is a reliability risk of substation outages due to a failure of the temporary connection.
-Transformer outage due to a failure of the existing busway – the existing busway is vulnerable to the same moisture permeation failures as the busduct between transformer A and switchgear room #3.

Project Alternatives:

There were two alternatives considered for this project.
The first (preferred) alternative is to install an in-kind replacement of Transformer B. The replacement transformer rating will be rated at 40 MVA nameplate rating and have the same capabilities of the currently installed transformer.
The second solution alternative is the installation of a transformer with a nameplate rating of 50 MVA. This would be a rating increase from 40 MVA to 50 MVA. The benefits of this alternative solution would allow a potential to upgrade Transformer A to 50 MVA in the future and increase the available capacity of the substation by 10 MVA. This alternative was rejected for the following reasons:
-Uncertainty regarding the foundation support of a larger transformer - an in-depth analysis would be required to ensure the foundation would be able to support a different sized transformer. Modifications to the foundation may be necessary.
-Uncertainty regarding the oil containment associated with a larger transformer - The oil containment would need to be analyzed to ensure that it is the proper size for a 50 MVA transformer and could result in necessary modifications.
-Space constraints at the substation with a larger transformer. This could also result in structural and low voltage bus modifications.
-The substation would have mismatched transformer sizes.
-The additional 10 MVA would be unavailable for utilization until Transformer A is upgraded to 50 MVA. The projected load demand of the substation in 2030 does not indicate the need for a capacity increase.
Projected load demand for Ansonia Substation was reviewed up to 2030. The projected demand of the substation is less than 85% of its rated capacity with both transformers at 40 MVA nameplate rating. Moreover, load demand was analyzed with a potential project to offset load from Indian Well Substation to Ansonia Substation. This offset would leave the projected load demand for Ansonia Substation to be at 82% of its rated capacity with both transformers at 40 MVA nameplate rating. Since the in-kind replacement would not require any changes to the structures or foundation on site and would meet anticipated load demands, it was selected as the preferred solution.

Basis for Project Estimates

The project cost estimates are comprised of required internal labor, external resources, material, internal / external engineering and appropriate project support costs. The estimates are based on multiple sources: 1) analysis of historical man hour data / construction costs for similar activities, 2) budgetary quotes from suppliers for necessary materials, equipment, and services, 3) Analogous cost estimated from similar projects within Avangrid 4) appropriate project support costs, 5) applicable overheads and allocations.
Project estimates are routinely reviewed and updated as the project progresses, and more detailed information becomes available.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	$ 368	$ 138	$ 231	$ -	$ -	$ -
# CIAC	$ -	$ -	$ -	$ -	$ -	$ -
# External Services	$ 3,652	$ 375	$ 3,276	$ -	$ -	$ -
# Internal - Non-AC	$ 9	$ 9	$ -	$ -	$ -	$ -
# Internal, Labor	$ 304	$ 177	$ 127	$ -	$ -	$ -
# Internal, Overheads	$ 717	$ 379	$ 338	$ -	$ -	$ -
# Materials	$ 947	$ 784	$ 162	$ -	$ -	$ -
# Overheads - External	$ 897	$ 395	$ 502	$ -	$ -	$ -
Total	$ 6,895					

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 7,872	$ -	$ 2,053	$ 5,820	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

PRJ-004732

Sackett Busway Replacement

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Charter

Sackett Busway Replacement

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-004732	Electric Distribution	Logan, Zachary	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Projects	Infrastructure Replacement - Substations	IP3 Financial Execute	Jan 2024	Apr 2026

Project description:

The Sackett Busway Replacement project will replace the existing exterior busways at Sackett Substation with a new cable bus. Cable bus will be used to replace the existing non-segregated busway to eliminate the risk of future failures due to moisture entering the bus enclosure.

Project Scope:

Scope of the project includes electrical and civil engineering, civil and electrical construction, equipment installation and commissioning. Construction scope includes the disconnect and removal of the existing 13.8kV non-segregated exterior busway and the installation of new cable bus from the existing transformers to the switchgear building.

Project Benefits:

The existing 13.8kV exterior busway at Sackett Substation has failed due to moisture permeation. Temporary connections were implemented to supply the 13.8kV distribution switchgear. A permanent solution must be implemented to ensure future reliability of the substation.

Project Risks and Mitigation Plan:

Large Capital projects such as this contain many inherent risks and The United Illuminating Company has a process managing and mitigating these risks. There are several primary risks which are common to electric substation projects and each project also has its own unique risks specific to that site and / or scope. Listed below are the main risks and the mitigation plan.

Common Risks:

- Availability of Internal Engineering and Construction resources. Mitigation plan: 1) coordinate with other projects to optimize the workforce availability, 2) hire or contract additional resources as necessary
- Delays in Equipment and Material Lead times. Mitigation plan: 1) Proactive communication with vendors for schedule management, 2) Identify alternate suppliers and solutions for equipment, 3) critical path management to prioritize procurements to ensure material onsite as necessary
- Unable to obtain necessary Transmission/Distribution outages required for construction. Mitigation plan: coordinate outage sequencing with Convex, Eversource, and UI operations.
- Environmental issues identified during Construction. Mitigation plan: 1) early engagement with the environmental and permitting department to perform Environmental Assessment, 2) create and incorporate plan for any remediations as necessary

Project Unique Risks:

- No major unique risks, all are identified and captured above as common project risks.

Risk of No Action:
Under the No Action Alternative, the Sacket Substation would continue to operate with the temporary cables in place. The temporary solution was not designed for long term use, and there is a reliability risk of substation outage due to a failure of the temporary connection. Similarly, the No Action Alternative does not address the moisture permeation risk of the other associated busway, leaving the bus vulnerable to the same failures. Although the temporary cables are contained within the substation, they are inherently exposed. Long term and continued operation this way is not ideal, and the safest solution would be to replace these cables with new cable bus.

Project Alternatives:
There were 3 Alternatives considered for this project.

The first Alternative solution was allowing the temporary connections to remain in place as a permanent solution. This alternative requires no repair or replacement of the existing busway.

This second Alternative is also the No Action Alternative. The reason for the rejection of the No Action Alternative is described above. The second Alternative solution was to repair the existing failed busway. This alternative includes a thorough inspection and implementation of all necessary repairs to return the damaged busway to service. Included in this alternative, the second busway would be inspected for any points of failure. If any potential points of failure were identified, repairs would be made as needed. After careful consideration, it was decided that repairing the existing busway would not be the most effective solution to ensure future reliability of the Sackett Substation. The existing type of exterior busway has failed at other Substations in the UI territory. Even after repair, there remains a risk of moisture permeating the enclosure and causing another fault.

The third Alternative is the complete replacement of the existing exterior non-segregated busway with a new cable bus system. This solution will ensure continued reliability for the Sackett Substation. The cable bus system utilizes insulated conductors rather than exposed bus bars. This eliminates the risk of possible faults due to moisture entering the enclosure. The new cable bus system would be installed from the transformer secondary to the inside of the existing switchgear building. The new cable bus would then be connected to the existing busway inside the existing switchgear building. The entire exterior portion of the existing busway will be removed. Although this alternative has a higher initial cost, it will be the most effective and will be a reliable long-term solution for the Sackett Substation repair.

Basis for Project Estimates
The project cost estimates are comprised of required internal labor, external resources, material, internal / external engineering and appropriate project support costs. The estimates are based on multiple sources: 1) analysis of historical man hour data / construction costs for similar activities, 2) budgetary quotes from suppliers for necessary materials, equipment, and services, 3) cost estimating template 4) appropriate project support costs, 5) applicable overheads and allocations.

Project estimates are routinely reviewed and updated as the project progresses and more detailed information becomes available.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 97**	$ 7	$ 90	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 2,387**	$ 356	$ 1,766	$ 266	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 39**	$ 39	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 271**	$ 54	$ 194	$ 23	$ -	$ -
# Materials	**$ 180**	$ -	$ 180	$ -	$ -	$ -
# Overheads - External	**$ 356**	$ 77	$ 245	$ 33	$ -	$ -
Total	**$ 3,330**	**$ 532**	**$ 2,475**	**$ 323**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 3,355	$ -	$ -	$ 3,355	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

PROJECT CHARTER FORM

1. This form shall be filled out for projects seeking PM020 approval within the Projects Group.

2. Attach the completed and approved Project Information Form for reference (if applicable).

3. Fill in the information below to identify the Project Name, Project Sponsor, Project Manager and other basic information.

Project Name:	Sackett Substation Busway Replacement		
Project Sponsor:	Zach Logan	**Project Manager:**	Praveen Kumar / Sam LaDoux
Date:	2024-05-20	**Revision:**	0
Operating Company:	UI	**Business Area:**	Electric
Project Definition:	UH-U0002032	For electric projects, has the NERC-CIP Assessment (CIP-002) been considered? See NERC-CIP tab for additional information.	No

4. Provide below the reasons why the project is needed and what problems the project is going to solve. Describe the scope of work for the project in more detail than what was provided in the Project Information Form, such as the geographical region the work is located in, what AVANGRID sites are in the scope and what work will be done. For the Project Constraints, define any deadlines, regulatory requirements or other hard requirements the project must achieve to be successful (if none, PM should state NA). For Related Projects or Initiatives, list any other projects or initiatives in the company that are related to the Project.

Project Purpose or Justification from Sponsor:	Sackett Substation is a 115kV to 13.8kV substation. The substation is connected to two 115kV lines 84004 and 8400 that supply transformers TA and TB. Transformers TA and TB feed 13.8kV switchgear busses #1 and #2. The secondary side of the transformers are connected to the 13.8kV switchgear using non-segregated 3000A, 15kV class bus duct. The bus duct from transformer B to Bus #2 has failed due to moisture inside the enclosure and temporary connections have been made to keep the 13.8kV distribution switchgear energized until a permanent solution can be implemented. A permanent solution is required to properly restore the substation to normal configuration and eliminate the need for the temporary connections.
Project Scope:	Disconnect and remove the exisiting 13.8kV non-segregated exterior busway. Install new cable bus from the existing transformers to the switchgear building. Cable bus will be used to replace the existing non-segregated busway to eliminate the risk of future failures due to moisture entering the bus enclosure
Project Constraints (if none, state NA):	System load and transformer outage.
Related Projects or Initiatives (if none, state NA):	N/A

5. Identify in the "Stakeholders" tab the organizations within AVANGRID that are involved with the project. List the individual contact person from each organization at the time the Charter is created. Describe the involvement the stakeholder will have on the project and what needs of theirs will be addressed by the project. If the organization will have little to no involvement in the project, state this.

Project Stakeholder Matrix Completed?	Yes	All Stakeholders need to formally accept or comment on Charter (see SOP.P.04.01C).

6. The Project Manager must meet with all stakeholders to review the project scope, the project requirements, the needs from the stakeholders and obtain feedback from the stakeholders on the project. The minutes of this meeting shall be recorded and provided on the "Stakeholder Minutes" tab. All stakeholders are required to accept or comment on the scope prior to Steering Committee approval.

Project Stakeholder Meeting Held?	Yes	**Project Stakeholder Meeting Minutes Completed?**	Yes

7. Define the schedule milestones of the project below based on the standard schedule milestones.

Define Schedule Milestones:

Milestone	Date
PM010: Demand Clarification, PIF Completed	2024-03-20
PM020: Project Defined, Charter Completed	2024-05-20
PM030: Project Approved	2024-05-20
PM040: Project Set Up	2023-11-08
PM050: Detailed Planning, Project Management Plan Completed	2024-05-08
PM060: Delivery Approval, Procurement	2025-09-01
PM070: Material On Site	2026-01-05
PM080: Construction Completed	2026-01-20
PM100: Commissioning Completed	2026-01-20
PM200: Project Completion, Energization	2026-01-20
PM300: Project Closeout	2026-02-20

8. Specify below the amount of funding required for the entire project. List the funding needs by year based on the anticipated cash flow. Split the cash flow by funding required under Availability Control (AC), Non-AC, and Contribution (for externally funded projects only). Additional detail is requested on the Budget Split tab.

Project Budget Cash flow (Capex only)

		Prior 2024	Year 2024	Year 2025	Year 2026	Year 20xx	Year 20xx	Total
AC			$389,380	$1,720,201	$492,799			$2,602,380
Non AC		$34,836	$113,757	$808,090	$78,246			$1,034,929
Contribution								$0
TOTAL		$34,836	$503,137	$2,528,291	$571,045	$0	$0	$3,637,308

Contingency Included:	10	%	**Estimate Accuracy:**	-	25	%	+	50	%

9. More detailed or complex projects may need more details as to how they will be planned. Please use the "Planning Strategy" tab to provide this information.

Planning Strategy tab used?	Yes

10. Identify below the resources required from each organization to support the project. This shall indicate the organizations that will need to assign resources to the project.

Asset Management		**Hydro Engineering**		**Public Outreach**	Yes
Distribution Engineering/Planning	Yes	**Hydro Operations**		**Energy Land Management**	Yes
ECC/Programming		**Investment Planning**	Yes	**Security**	
Electric System Planning	Yes	**IT**		**Strategic Sourcing**	Yes
Projects Env. Permitting	Yes	**Legal**		**Substation Engineering**	Yes
EHS Environmental Mgmt.	Yes	**Local Health & Safety Rep.**	Yes	**Substation Operations**	Yes
Gas Design		**Maintenance Engineering**	Yes	**System Protection**	
Gas System Planning		**Marketing**		**Transmission Engineering**	
Gas Engineering		**OT**		**Transmission Operations**	
Gas Operations		**PMO**	Yes	**Vegetation Management**	
Integrated System Planning					

11. Complete the "Risk Register" tab. List both risks that can affect all projects (weather, obtaining resources, obtaining contracts, etc.) as well as Project specific risks. Consider environmental risks in addition to cost and schedule. Review lessons learned master spreadsheet.

Risk Register Completed?	Yes

12. If the project required an options analysis to determine the scope of work, indicate this here. If an options analysis was done, populate the "Options Analysis" tab to describe the options considered and the preferred option selected.

Options Analysis Required & Done?	Yes	**Options Analysis Tab Completed?**	Yes

13. Define the project team on the "Project Team" tab.

Project Team Tab Completed?	Yes

14. Complete the Appendices tab as needed for support documents.

Appendices Tab Completed?	No

15. Indicate here if the Project Screening Questionnaire (EFORM-IUSA.009 or ANEM-FOR.009) and the Aspects and Impacts Analysis (ANEM-FOR.013) have been completed. Charter can not be approved without final Project Screening Questionnaire (reviewed by Permitting and EHS Environmental). Aspects and Impacts Analysis can be done now, or prior to construction.

Project Screening Questionnaire Completed and Reviewed?	Yes	**Final (reviewed) Project Screening Questionnaire Link**	Yes
Aspects and Impacts Analysis Completed?	No	**Aspects and Impacts Analysis Link**	No

16. Has the Lessons Learned Master Spreadsheet been reviewed? Please add link to master spreadsheet and use to populate Lessons Learned as project progresses.

Lessons Learned Reviewed:	Yes	**Master Spreadsheet Link to ProjectWise: pw://AWWNSUP25057P33.amer.iberdrola.local:COMMON/Documents/D%7bc52cdf23-79b3-40f4-8c35-aa44ed10c11f%7d**

17. Has a folder structure been set up in ProjectWise for the project according to Quality Management System procedures?

ProjectWise Folder Structure Set Up?	Yes

18. Obtain the signatures below of the Steering Committee Members that indicate their approval of the charter.

Steering Committee Signatures

	Committee Member	Signature	Signature Date
Projects VP	Jim Cole		
Projects Line Sr. Director	Jenna Muzzy		
Projects SS Sr. Director	Omar Guevara		
Projects Gas Sr. Director	Cely Vano (on behalf of Brian Horgan)		
Projects Integrated Projects Sr. Director	Jim Yeske		
P&C Technical Services Sr. Director	Sandy Bensley (on behalf of Jennifer Treash)		

800842.01

Whitney Sub Decommissioning LVSS UH-U0000005

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Whitney Sub Decommissioning LVSS UH-U0000005

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	800842.01	Electric Distribution	Lyons, Robin	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Infrastructure Replacement -	IP4 Change	Ongoing	Jun 2026

Project description:

This project is part of Low Voltage Substation Removal Program. The program objective is to complete the removal of service and retirement of assets associated with all 4.16 kV and 2.4 kV substations on the distribution system due to the age of the equipment and the inability to maintain this obsolete equipment. The age range of these substations is 50-70 years old. Removal of low voltage (4.16kV) substations is accomplished through either total conversion of the distribution infrastructure supported by the low substation to 13.8kV or through partial conversion to 13.8kV and the utilization of Step Down Banks where there is significant remaining life in the distribution infrastructure. Whitney Avenue Substation is one of two remaining substations left in this program to be de-commissioned.

Project Scope:

This project is part of Low Voltage Substation Removal Program. The program's objective is to complete the removal of service and retirement of assets associated with all 4.16 kV and 2.4 kV substations on the distribution system due to the age of the equipment and the inability to maintain this obsolete equipment. The age range of these substations is 50-70 years old. Removal of low voltage (4.16kV) substations is accomplished through either total conversion of the distribution infrastructure supported by the low substation to 13.8kV or through partial conversion to 13.8kV and the utilization of Step Down Banks where there is significant remaining life in the distribution infrastructure. Whitney Avenue Substation is one of two remaining substations left in this program to be de-commissioned. The remaining scope on the project is the conversion of Circuits 270, 273 and 275.

Project Benefits:

The Low Voltage Substation Removal program was developed as a result of a formal condition assessment of all low voltage substations in 2006. The main concerns resulting from this assessment were:

- Potential safety hazards associated with the risk of failure of equipment that has exceeded its useful life.
- The risk of long duration power outages related to obsolete or end of useful life substation equipment
- Continued maintenance required to keep obsolete substation equipment operational

This program mitigates the risks associated with age, obsolescence, inadequate maintenance practices, and exposure to adverse/harsh service conditions. Harsh service conditions or inadequate maintenance practices can accelerate the aging process, and can cause failures to occur. Obsolescence can result in long lead times, high costs, or complete unavailability for repair parts, and could result in long outages if equipment fails. From the perspective of operability and maintainability, in some cases, the condition of the equipment and the clearances around it can make access to the equipment difficult and can raise potential safety concerns for the Company’s field personnel. Overall, this program helps to maintain reliability and reduces hazards to our employees and the public by reducing the risk of failure of equipment that has exceeded its useful life.

Project Risks and Mitigation Plan:
Required vegetation management and clearance could impede the necessary construction that abide UI standards. Approvals from town/city and adjacent customers for vegetation clearance could result in scheduling delays or inability to complete required construction. This is mitigated by using alternate construction to avoid vegetation areas with no clear solution or approval from interested parties as mentioned previously. Additionally, UI would work closely with interested parties to determine a solution that would allow required construction.

Premature failure of substation equipment could lead to long duration outages and the execution emergency voltage conversions impacting project budget. This can be mitigated by preparing voltage conversion plans well in advance to prepare for emergency scenarios.

Access to UI equipement on customer property and/or customer owned equipment impacting the ability to perform required work. Working closely with customers with constant communication and properly developed action plans which would mitigate schedule delays and control cost.

Customer unwilling to cooperate with required equipment replacements and/or the inability of customer equipment to operate at the higher required voltage can cause scheduling delays. This can be mitigated by working closely with customers with constant communication and properly developed action plans. As a last resort, step-down bank transformers can be installed to allow voltage conversions to be completed.

Risk of No Action:
The substation equipment will fall into further decline leading to potential safety hazards to employees and public associated with the risk of failure of equipment and the maintence of obsolete equipment, the risk of unreliable service and long duration power outages related to obsolete or end of useful life substation equipment.

Project Alternatives:
1) Do Nothing. – Whitney Ave substation was constructed prior to 1940. In 2024 it is over 80 years old and the equipment has exceeded it's useful life. Doing nothing increases the risk of failure, the associated performance risk to customers and safety risk to our employees. Doing nothing is not a viable alternative.

2) Leverage the remaining life in the 4kV assets through implementation of step down banks. At the outset of the program cost savings could be achieved by installing voltage step down banks on areas of the system where the 4kV overhead infrastructure was relatively new and in good condition. UI began installing infrastructure rated for 15 kV in the late 60s so any 4kV infrastructure remaining has exceeded it's useful lfe and should be replaced. Step down banks are no longer a viable option to remediate the cost of conversion.

Basis for Project Estimates
Cost estimates are based on secific designs for the remaining work to be done to execute the conversion.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 122**	$ 46	$ -	$ 76	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 323**	$ 63	$ -	$ 260	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 734**	$ 278	$ -	$ 456	$ -	$ -
# Internal, Overheads	**$ 261**	$ 75	$ -	$ 186	$ -	$ -
# Materials	**$ 525**	$ 40	$ -	$ 485	$ -	$ -
# Overheads - External	**$ 498**	$ 153	$ -	$ 346	$ -	$ -
Total	**$ 2,463**	**$ 654**	**$ -**	**$ 1,810**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 1,827	$ 17	$ -	$ 1,810	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

UI
An Avangrid company

Whitney Substation Decommissioning Project

Whitney Ave, Hamden/New Haven

Engineering Project 800842
Final Design Report

Prepared By: Distribution Engineering
Revision date: 02/22/2021

Index

1. Project Description (Summary) 4
2. Existing Conditions 4
3. Need Statement 4
4. Engineering 5
Conversion work 9
Voltage Conversion Sequence 1.3 10
Voltage Conversion Sequence 1.4 10
Voltage Conversion Sequence 2.1 11
Voltage Conversion Sequence 2.2 12
Voltage Conversion Sequence 2.3 13
Switching Sequence 3.1 13
Voltage Conversion Sequence 3.2 13
Voltage Conversion Sequence 3.3 14
Voltage Conversion Sequence 3.4 15
Voltage Conversion Sequence 3.5 15
Switching Sequence 3.6 16
Switching Sequence 3.7 17
Switching Sequence 3.8 17
Cable Splicing Sequence 3.9 18
Switching Sequence 3.10 18
Voltage Conversion Sequence 4.1 19
Voltage Conversion Sequence 4.2 20
Switching Sequence 4.3 21
Switching Sequence 4.4 22

Switching Sequence 4.5 22

Final Configuration Sequence 6 25

5. Project Assumptions 26

6. Alternatives Considered 27

7. Maps or Electrical Design 28

1. Project Description (Summary)

Whitney Substation has been identified for decommissioning. As such, the seven 4.16kV circuits serviced by the substation are to be converted to 13.8kV. The Whitney Substation Decommissioning Project will make the required infrastructure changes to the area to be compliant with the NESC and UI standards, and to allow conversion from 4.16 kV to 13.8 kV. Engineering's suggested changes will be outlined in this report and sequenced into three distinct phases: pre-conversion work, conversion work, and post-conversion work. For construction efficiency, and to limit the impact to customers, i.e., outage durations, the majority of work will be completed during the pre-conversion phase(s). Once all pre-conversion work is complete, a conversion schedule will be outlined and will consist of planned outages to the affected areas, in which each circuit will permanently de-energized, and the area(s) will be converted to 13.8 kV by tying into surrounding circuits.

2. Existing Conditions

Whitney Substation, located at 905 Whitney Ave, is a 4.16kV substation providing power to customers in the Whitneyville portion of south Hamden and the East Rock portion of northern New Haven. The circuits feeding this are 270, 271, 272, 273, 274, 275, and 277. The substation is fed by Mill River substation 13.8kV circuits 1888 and 1886 and has circuit 1880 as a backup.

3. Need Statement

Whitney Ave substation was constructed prior to 1940. In 2024 it is over 80 years old and the equipment in the substation has exceeded it's useful life. The distribution system connected to the substation has a combination of 4kv and 15 kV equipment. The Company stopped installing 4kV infrastructure in the mid 1960s, so this distribution equipment is 60 years or older and has reached the end of it's useful life. This project will eliminate Whitney Ave Substation, the last of over 100 low voltage subs on UI's system, and will renew the old 4kV infrastructure in New Haven and Hamden both economic justice communities.
The need for this program was covered in the two studies below:
A study, titled 'Substation Removal' was presented to upper management in November 2000 which indicated UI had 27 Distribution Substations on the UI system whose age ranged from 35 to 55 years old. It was noted there were seven instances of failures resulting in loss of power to customers and suggested that the company would experience increased distribution substation failures, as well as increased maintenance costs for these aging substations.

A subsequent study, 'Twenty 4 kV Substations: Relative Condition Assessment' by Mantis Associates in June 2006 also found Whitney Substation as having a risk of failure. Inspections conducted by the UI Maintenance Department in 2007 confirmed the findings of both reports and listed this Substation among the distribution substations with a risk for failure. As result of these findings UI developed a low voltage substation removal program and has removed or has developed plans for removing these substations and this design will address the final substation.

4. Engineering

Removal of the substation will require conversion of all the facilities served from the station to a 15 kV voltage rating.

The smaller 4kV circuits will also be combined to form larger 15 kV Circuit(s) requiring the installation of addition protection / sectionalizing devices to optimize reliability and reduce exposure.

The following work sequences may be worked concurrently 1, 1.1, 1.2, 2, 3, 4, and 5. As sequences are completed it is recommended that the conversion sequences be carried out while the remaining pre-conversion work is still in progress. This will allow for a steady reduction in load on Whitney Substation.

Make Ready Sequence 1
Construct the make ready work to convert Whitney circuit 274Y.

Make Ready Sequence 1.1
Re-conductor Foster St. between Willow St. and Edwards St. with 397 tree wire. Re-conductor Edwards St. between Orange St. and State St. with 397 tree wire. Re-conductor Willow St from Livingston Ave. to Orange Ave. Willow St. and Edwards St. will provide the Mill River circuit 1890 source and backup as circuits 271, 275, and 277 are converted. This will also create a feeder tie with Mill River circuit 1889 on State St. south of Edwards St. to further support the area during conversion.

Make Ready Sequence 1.2
Construct the make ready work to convert Bishop St. between Orange St. and Whitney Ave. and change feed from Whitney Ave. circuit 277Y to Orange St. circuit 271Y. Construct the make ready work to convert Humphrey St. between Orange St. and Whitney Ave. Convert Humphrey St to 13.8 kV via Mill River circuit 1859 on Orange St. The work on these streets is to prepare Whitney Ave. between Edwards St. and Sachem St. for possible undergrounding at the request of Yale University.

Make Ready Sequence 2
Construct the make ready work to convert Whitney circuits 272Y.

Make Ready Sequence 3
Construct the make ready work to convert Whitney circuits 271Y, 275Y, & 277Y.

Make Ready Sequence 4
Construct the make ready work to convert Whitney circuits 270Y & 273Y.

Make Ready Sequence 5
Re-conductor Armory St. west of Edgehill with 397 tree wire. Re-conductor Prospect St. between armory St. and Morse St. with 397 tree wire. Re-conductor Morse St. between Prospect St. and Winchester Ave with 397 tree wire. This will create a feeder tie between Mix `circuit 1691 and Mill River 1880 which will later be circuit 1888.

Make-Ready Work Scope

- Replace poles in poor condition or those that do not meet structural or clearance requirements for the new 15 kV construction.
- Re-conductor primary wire as required per UI Distribution Construction Standard 19007.
- Re-conductor open wire secondary to triplex.
- Add/remove primary wire as shown on the make ready and conversion drawings.
- Replace 4.16 kV transformers with dual ratio transformers as required.
- Replace 4.16kV cutouts and switches with 13.8 kV cutouts and switches as required.
- Re-insulate 4kv insulators with 15 kV insulators.
- Install current limiting fuses on transformers as required.

- It is recommended that the following vault, transclosure, and pad-mount transformer locations and their underground cable and conduit be prioritized and completed before the OH make ready work in Sequences 1, 2, 3 & 4. This work should be further prioritized in the following order: Whitney circuit 274, 272, 271, 277, 275, 270, and finally 273 as noted in the following table.

Circuit	Loc. #	Street Address	#Ph	Transformer	Type	Recommendation
274	**423**	1220 Whitney Ave	1	3x50	Vault	Replace primary cable,
274	**424**	1400 Whitney Ave	3	112	Pad	Ready for Conversion
272	**110**	1151 – 1169 Whitney Ave	1	167	Pad	Replace primary cable, conduit, transformer & LA's
272	**111**	1171 – 1179 Whitney Ave	1	100	Submersible	Replace primary cable, conduit, transformer & LA's
272	**304**	1204 Whitney Ave	3	500	Pad	Replace primary cable, extend conduit, transformer
272	**408**	1204 Whitney Ave	3	300	Pad	Replace primary cable, conduit, & transformer
272	**409**	1199 Whitney Ave	3	3x100	Vault	Replace primary cable, conduit, sub. transformers, & grate
272	**501**	1108 Whitney Ave	3	300	Pad	Ready for Conversion

271	**665**	625 Orange St	3	25 - 5/5	Vault	Install OH transformer bank, conduit, and secondary cable to vault
271	**860**	655 Orange St	1	100	Pad	Ready for Conversion
271	**1507**	180 Canner St	3	150	Pad	Ready for Conversion
277	**360**	255 Whitney Ave	3	75	Pad	Replace primary, transformer & extend riser conduit
277	**546**	201 & 205 Whitney Ave	3	3x50	Vault	Ready for Conversion
277	**941**	193 Whitney Ave	3	300	Pad	Ready for Conversion
277	**1377**	285 Whitney Ave	3	75	Pad	Ready for Conversion
277	**1400**	345 Whitney Ave	3	225	Pad	Ready for Conversion
277	**1470**	245 Whitney Ave	1	50	Pad	Ready for Conversion
277	**1638**	315 Whitney Ave	1	75	Pad	Ready for Conversion. Remove OH Service
277	**1639**	315 Whitney Ave	1	50	Pad	Ready for Conversion
275	**599**	70 Livingston St	3	37/100	Vault	Install SDB on riser leave service at 4.16kV
275	**662**	389 Whitney Ave	3	75	Pad	Ready for Conversion
275	**944**	438 Whitney Ave	1	25	Pad	Ready for Conversion
270	**15**	703 Whitney Ave	1	50 ~~100~~	Pad	Recently replaced service
270	**30**	704 Whitney Ave	3	150	Pad	Ready for Conversion
270	**73**	691 Whitney Ave	3	500	Pad	Ready for Conversion
270	**593**	725 Whitney Ave	3	15/100	Transclosure	Replace transformers & barrier boards
270	**1941**	703 Whitney Ave	3	500	Pad	Ready for Conversion. NEW SERVICE
270	**1070**	50 Loomis Pl	3	300	Pad	Ready for Conversion
270	**1195**	600 Prospect St	1	167	Pad	Ready for Conversion
270	**1723**	50 Loomis Pl	3	150	Pad	Ready for Conversion
273	**56**	240 Sheffield Ave	1	50	Pad	Replace primary cable, conduit & transformer. Clear and/or raise pad
273	**664**	760 Prospect St	1	37	Pad	Replace primary cable, conduit & transformer
273	**945**	303 Huntington St	3	300	Pad	Ready for Conversion
273	**1338**	123 Huntington St	3	225	Pad	Ready for Conversion
273	**1354**	123 Huntington St	3	500	Pad	Ready for Conversion
273	**1636**	75 Prospect St	3	75	Pad	Ready for Conversion
273	**594/ 9999-24**	750 Whitney Ave	3	3x50	Vault	Replace primary cable, submersible transformers, cutouts & LAs

Major Equipment

- Install in-line air-break switch for future use (leads disconnected) at the following locations:
  - P.2389 Whitney Ave. s/o Servoss St (circuit 274Y).
  - P.3147 Prospect St. s/o Highland St.
  - P.996 Willow St. e/o Orange St.
  - P.3261 Huntington St. e/o Winchester Ave.

- Install in-line air-break switch at the following locations:
  - P.758 Mather St. s/o Lake St (circuit 274Y).
  - P.9479 Mitchell Dr. e/o Orange St.
  - P.413 Whitney Ave. n/o Edwards St.
  - New Pole Edwards St. w/o Foster St.
  - P.2631 Whitney Ave. s/o Treadwell St.
  - New Pole Putnam St. e/o Glendale St.
  - P.1539 Whitney Ave. s/o Putnam Ave.
- Install vertical disconnect switches for future use as bypass switches for reclosers to be installed after conversion:
  - New Pole Cold Spring St. w/o Orange St.
  - P.808 Orange St. s/o Cold Spring St.
  - New Pole Whitney Ave. s/o Armory St.
  - P.2303 Whitney Ave. n/o Armory St.
- Install line reclosers after conversion:
  - New Pole Cold Spring St. w/o Orange St.
  - P.808 Orange St. s/o Cold Spring St.
  - New Pole Whitney Ave. s/o Armory St.
  - P.2303 Whitney Ave. n/o Armory St.
- Install or replace disconnect switches with under-arm switches at the following locations:
  - P.5225 Cold Spring St. e/o Livingston St.
  - P.12873 Livingston St. s/o Cold Spring St.
  - P.1123 Livingston St. n/o Willow St.
  - P.1008 Willow St. e/o Whitney Ave.
  - P.4657 Whitney Ave. n/o Cottage St.
  - P.417 Whitney Ave. s/o Cottage St.
  - P.401 Edwards St. e/o Whitney Ave.
  - P.410 Edwards St. w/o Orange St.
  - P.1258 Edwards St. e/o Orange St.
  - New Pole Orange St. s/o Edwards St.
  - P.2109 Orange St. n/o Edwards St.
  - P.4227 Orange St. s/o Cottage St.
  - P.2391 Orange St. n/o Willow St.
  - P.7736 Ogden St. w/o Whitney Ave.
  - P.7731 Ogden St e/o Edgehill Rd.
  - P.963 Whitney Ave. s/o E Rock Rd.
  - P.957 Whitney Ave. n/o Highland St.
  - P.3141 Highland St. w/o Loomis Pl.
  - P.6074 Prospect St. n/o Highland St.
  - P.1043 Prospect St. s/o Huntington St.

- P.3198 Prospect St. n/o Huntington St.
- P.3176 Huntington St. w/o Prospect St.
- P.992 Willow St. w/o Foster St.
- New Pole Foster St. s/o Willow St.
- Foster St. n/o Edwards St.
- P.2799 Mather St. n/o Whitney Ave.
- P.73 Putnam St. w/o Whitney Ave. (taps off)
- P.14 Putnam Ave. e/o Clifford St.
- P.2076 Clifford St. n/o Putnam Ave.

- Install vertical disconnect switches:
  - P.966 Whitney Ave. c/o Ogden St.
  - P.1898 Whitney Ave. c/o Armory St.
  - P.3993 Willow St. e/o Whitney Ave. (future cable dip)
  - P.5220 Cold Spring St. w/o Orange St. (future circuit 1886 riser)
- Remove inline disconnect switches:
  - P.2634 Whitney Ave. n/o Treadwell St.
- Remove fixed capacitor banks:
  - P.1558 Whitney Ave s/o Servoss St (300 kVAR, ckt 274Y)
  - P.1537 Whitney Ave n/o Augur St (150kVAR, ckt 272Y)
  - P.2080 Augur St w/o Whitney Ave (300 kVAR, ckt 272Y)
  - P.2314 Whitney Ave s/o Deepwood Dr (150 kVAR, ckt 272Y)
  - P.3200 Prospect St s/o E. Rock Rd (150 kVAR, ckt 273Y)
  - P.3139 Highland St w/o Edgehill Rd (300 kVAR, ckt 270Y)
  - P.4864 Whitney Ave s/o Linden St (300 kVAR, ckt 275Y)
  - P.388 Whitney Ave n/o Humphrey St (150 kVAR, ckt 277Y)
  - P.2391 Orange St n/o Willow St (300 kVAR, ckt 271Y)
  - P.2110 Orange St n/o Edward St (150 kVAR, ckt 271Y)
- Install radio-controlled capacitor banks:
  - P.2623 Whitney Ave n/o Davis St (600 kVAR, ckt 1888)
  - P.1884 Whitney Ave n/o Cliff St (600kVAR, ckt 1888)
  - P.1040 Prospect St s/o Huntington St (600kVAR, ckt 1888)
  - P.4864 Whitney Ave s/o Linden St (600 kVAR, ckt 1886)
  - P.2395 Orange St s/o Canner St (900 kVAR, ckt 1886)
- Install additional fused cutouts as shown on make ready drawings:

Conversion work

Reference one-line drawings for the following sequences for this work:

Voltage Conversion Sequence 1.3

Design, construct and prepare Whitney Ave. 274 for conversion from 4.16 kV to 13.8 kV distribution. Sequence 1 must be completed.

- Convert a portion of Circuit 274Y to Mix circuit 1684 by performing the following switching:
  - Step 1 – P.2389 Whitney Ave. s/o Servoss St. confirm ABS open and taps off with dead span north to P.1569.
  - Step 4 - Area is de-energized and isolated. Install worker's grounds, switch primary tap changer on all OH, pad, and UG transformers within clearance, and remove worker's grounds when complete.
  - Step 5 – P.2389 install taps on open ABS.
  - Step 6 – P.1569 install jumpers on bells on south side of pole.
  - Step 7 – P.2389 confirm ready to re-energize and close ABS.

Voltage Conversion Sequence 1.4

Design, construct and prepare Whitney Ave. 272 and 274 for conversion from 4.16 kV to 13.8 kV distribution. Sequence 1 must be completed.

- Convert a portion of Whitney circuit 274Y to Mix circuit 1684 and transfer remaining load of Whitney 274Y to 272Y by performing the following switching:
  - Step 1 – P.758 Mather St. s/o Lake St. confirm ABS closed.
  - Step 2 – P.2799 Mather St. n/o Whitney Ave. confirm disconnects closed.
  - Step 3 – P.2631 Whitney Ave. s/o Treadwell St. confirm ABS closed.
  - Step 4 – P.2634 Whitney Ave. c/o Mather St. confirm open and offline disconnects and dead span south to P.2633.
  - Step 5 – P.528 Mather St. n/o Gessner Pl. confirm dead span between P.528 and P.2815.
  - Step 6 – P. 1539 Whitney Ave. s/o Putnam Ave. close disconnects tying Whitney circuits 272Y and 274Y.
  - Step 7 – P.2631 Whitney Ave s/o Treadwell St. open ABS and lift taps. Transferring part of Whitney circuit 274Y to 272Y.
  - Step 8 – P.2630 Whitney Ave s/o Treadwell St. remove jumpers from bells on north side of pole creating dead span to P.2631.
  - Step 9 – Whitney Substation open and rack out position 5 feeder breaker to circuit 274Y de-energizing circuit.
  - Step 10 – P.2633 Whitney Ave. c/o Treadwell St. open riser disconnects, remove taps, remove disconnects, and ground riser.
  - Step 11 – P.758 Mather St. s/o Lake St. open ABS and lift taps de-energizing portion of Mix circuit 1684.
  - Step 12 - Area is de-energized and isolated. Install worker's grounds, switch primary tap changer on all OH, pad, and UG transformers within clearance, and remove worker's grounds when complete.

- P.2632 Whitney Ave. c/o Mather St. remove cutouts and install taps this is now main line junction.
- P.2633 Whitney Ave. c/o Treadwell St. cut and remove grounded riser, spike remaining end of riser conductor for future removal, install 25 KVA Xmfr. and connect to B phase with CLF.
- P.2631 Whitney Ave. s/o Treadwell St. make secondary break on south side of pole.
- P.2799 Mather St. n/o Whitney Ave. make secondary break on south side of pole.
- P.2815 Mather St. c/o Clifford St. make secondary break to Clifford St. and close secondary break on south side of pole for Mather St.

- Step 13 – P.528 Mather St. c/o Gessner Pl. install jumpers on bells on north side of pole.
- Step 14 – P.2815 Mather St. c/o Clifford St. install jumpers on bells on south side of pole.
- Step 15 – P.2633 Whitney Ave. c/o Treadwell St. install jumpers on bells on north side of pole.
- Step 16 – P.2634 Whitney Ave. n/o Mather St. confirm ready to re-energize, install taps on open disconnects, and close disconnects re-energizing area at 13.8 kV.
- Step 17 – P.758 Mather St. s/o Lake St. confirm phasing across bells and reinstall open ABS switch taps creating tie between Mix 1684 and itself.

Voltage Conversion Sequence 2.1

Design, construct and prepare Whitney Ave. 272 and 274 for conversion from 4.16 kV to 13.8 kV distribution. Sequences 1 through 2 must be completed.

- Convert a portion of Whitney circuit 272Y by performing the following switching:
  - Step 1 - P.2631 Whitney Ave. n/o Ralston Ave. confirm ABS open, and taps are offline.
  - Step 2 - P.2630 Whitney Ave. n/o Ralston Ave. confirm dead span to P.2631.
  - Step 3 - P.1539 Whitney Ave. s/o Putnam Ave. confirm ABS closed.
  - Step 4 - P.73 Putnam Ave. w/o Whitney Ave. confirm disconnects are open and taps are offline.
  - Step 5 - P.14 Putnam Ave. e/o Clifford St. confirm disconnects are closed.
  - Step 6 - P.2076 Clifford St. n/o Putnam Ave. confirm disconnects are closed.
  - Step 7 - New Pole Putnam Ave. e/o Glendale St. between P.7465 and P.148 confirm ABS closed.
  - Step 8 – P.1542 Whitney Ave. c/o Putnam Ave. confirm dead span to P.73.
  - Step 9 - P.1539 Whitney Ave. s/o Putnam Ave. open ABS and lift taps de-energizing area.
  - Step 10 – P.1538 Whitney Ave. s/o Putnam Ave. remove jumpers from bells on north side of pole creating dead span to P.1539.
  - Step 11 - Area is de-energized and isolated. Install worker's grounds, switch primary tap changer on all OH, pad, and UG transformers within clearance, and remove worker's grounds when complete.

- Step 12 – P.2630 Whitney Ave. n/o Ralston Ave. install jumpers on bells on north side of pole.
- Step 13 – P.1542 Whitney Ave. c/o Putnam Ave. Install junction taps such that A phase is road on Whitney Ave. and field phase on Putnam Ave., B phase is middle on both streets, and C phase is field on Whitney Ave. and road phase on Putnam Ave.
- Step 14 – P.2631 Whitney Ave. n/o Ralston Ave. confirm ready to re-energize, install taps on open ABS, and close ABS re-energizing area at 13.8 kV.
- Step 15 – P.73 Putnam Ave. w/o Whitney Ave. confirm phasing across bells, install taps on open disconnects, and close disconnects tying Mix circuit 1684 to itself.
- Step 16 – New Pole Putnam Ave. e/o Glendale St. between P.7465 and P.148 open ABS breaking Mix circuit 1684 tie.

Voltage Conversion Sequence 2.2

Design, construct and prepare Whitney Ave. 272 and 274 for conversion from 4.16 kV to 13.8 kV distribution. Sequences 1 through 2.1 must be completed.

- Transfer a portion of Whitney circuit 272Y to Circuit 273Y and convert portion of Whitney circuit 272Y by performing the following switching:
  - Step 1 – P.1539 Whitney Ave. s/o Putnam Ave. confirm ABS open; taps are off, and dead span to P.1538.
  - Step 2 – P.2309 Whitney Ave. s/o Deepwood Dr. close disconnects tying Whitney Circuit 272Y and 273Y.
  - Step 3 – P.1531 Whitney Ave. s/o Augur St. open disconnects breaking tie between Whitney 272Y and 273Y and transferring southern half of circuit to circuit 273Y.
  - Step 4 – P.1530 Whitney Ave. s/o Augur St. remove jumpers from bells on north side of pole creating dead span to P.1531.
  - Step 5 - Whitney Substation open and rack out position 9 feeder breaker to circuit 272Y de-energizing circuit.
  - Step 6 – P.2079 Augur St. w/o Whitney Ave. open riser disconnects, lift high side taps, test riser for potential, ground riser, and remove riser disconnects.
  - Step 7 - Area is de-energized and isolated. Install worker's grounds, switch primary tap changer on all OH, pad, and UG transformers within clearance, and remove worker's grounds when complete.
    - P.9563 Augur St. e/o Frederick St. remove 3 cutouts and sleeve through wire.
    - P.1535 Whitney Ave. c/o Augur St. remove junction taps, install 3 cutouts, and fuse at 100K.
  - Step 8 – P.1538 Whitney Ave. s/o Putnam Ave. install jumpers on bells on north side of pole.
  - Step 9 – P.1539 Whitney Ave. s/o Putnam Ave. confirm ready to re-energize, install taps on ABS, and close ABS re-energizing area at 13.8 kV.
  -

Voltage Conversion Sequence 2.3

Design, construct and prepare Whitney Ave. 272 and 274 for conversion from 4.16 kV to 13.8 kV distribution. Sequences 1 through 20A must be completed.

- Convert remainder of former Whitney circuit 272Y being fed by circuit 273Y by performing the following switching:
    - Step 1 - P.1531 Whitney Ave. s/o Eli Rd. confirm disconnects open, taps are off, and dead span to P.1530.
    - Step 2 – P.2304 Whitney Ave. n/o Armory St. confirm dead span to P.2305.
    - Step 3 – P.2303 Whitney Ave. n/o Armory St. confirm line recloser has been placed in service and is closed.
    - Step 4 - Whitney Substation open and rack out position 7 feeder breaker to circuit 273Y de-energizing circuit.
    - Step 5 - P.2305 Whitney Ave. n/o Armory St. open riser disconnects, lift high side taps, test riser for potential, ground riser, and remove riser disconnects.
    - Step 6 - Area is de-energized and isolated. Install worker's grounds, switch primary tap changer on all OH, pad, and UG transformers within clearance, and remove worker's grounds when complete.
    - Step 7 – P.2303 Whitney Ave. n/o Armory St. open line closer de-energizing small portion of Mill River circuit 1888 n/o Armory St.
    - Step 8 – P.2304 Whitney Ave. n/o Armory St. install jumpers on bells on north side of pole.
    - Step 9 – P.2305 Whitney Ave. n/o Armory St. install jumpers on bells on south side of pole.
    - Step 10 – P.1530 Whitney Ave. s/o Eli Rd. install jumpers on bells on north side of pole.
    - Step 11 – P.1531 Whitney Ave/ s/o Eli Rd. confirm ready to re-energize, install taps on disconnect switches, and close disconnects re-energizing area at 13.8 kV from Mix circuit 1684.

Switching Sequence 3.1

Design, construct and prepare Whitney Ave 271, 275, and 277 for conversion from 4.16 kV to 13.8 distribution. Sequences 1 through 3 must be completed.

- Temporarily transfer a portion of Mill River 1890 to Mill River 1892 by performing the following:
    - Step 1 - Close ABS on P.15246 Ferry St. s/o English Street.
    - Step 2 - Open ABS on P.14480 Ferry St. n/o Fox Street.

Voltage Conversion Sequence 3.2

Design, construct and prepare Whitney Ave 271, 275, and 277 for conversion from 4.16 kV to 13.8 distribution. Sequences 1.1 through 3.1 must be completed.

- Convert a portion of Whitney circuit 271Y by performing the following switching:
  - Step 1 - Open disconnects on P.808 Orange St. s/o Cold Spring St and lift taps.
  - Step 2 – Remove jumpers from bells on south side of P.3228 Cold Spring St. c/o Orange St. creating dead span south to P.808.
  - Step 3 – Confirm open and lift taps on disconnects on P.401 Edwards St. e/o Whitney Ave.
  - Step 4 - Remove jumpers from bells on east side of P.392 Whitney Ave. c/o Edwards St. creating dead span east to P.401.
  - Step 5 – Area is de-energized and isolated. Install worker's grounds, switch primary tap changer on all OH, pad, and UG transformers within clearance, and refuse cutout at P.4647 Whitney Ave s/o Edwards St. to 25K. Remove worker's grounds when complete.
  - Step 6 - Open ABS New Pole between P.1032 and P.1259 Edwards St. e/o Orange St. de-energizing a portion of Mill River circuit 1890.
  - Step 7 - Install junction taps on P.1031 and P.10045 to maintain phase orientation on Edwards St.
  - Step 8 – Install junction taps on P.3051 Orange St. c/o Willow St. such that A phase is road phase on Orange St. and field phase on Willow St. B phase is middle phase on both streets. C phase is field phase on Orange St. and road phase on Willow St.
  - Step 9 – Confirm area is ready to re-energize and worker's grounds are removed. Close ABS on New Pole on Edwards St. e/o Orange St.
  - Step 10 – Complete second feeder tie at Willow St.
    - P.801 Willow St. e/o Orange St. install jumpers on three bells.
    - P.995 Willow St. w/o Anderson St. install jumpers on three bells.
    - P.996 Willow St. e/o Orange St. confirm phasing across bells and install taps to open ABS.

Voltage Conversion Sequence 3.3

Design, construct and prepare Whitney Ave 271, 275, and 277 for conversion from 4.16 kV to 13.8 distribution. Sequences 1 through 3.2 must be completed.

- Convert Whitney circuit 277Y by performing the following switching:
  - Step 1 – Whitney Substation open position 25 feeder breaker to circuit 277Y and rack out.
  - Step 2 – Open riser disconnects at P.5675 Edwards St. w/o Whitney Ave. Lift high side taps, test riser for potential, ground riser, and remove riser disconnects.
  - Step 3 – Confirm open ABS on P.413 Whitney Ave. s/o Lawrence St. lift taps on ABS.
  - Step 4 – Remove jumpers on bells at P.6254 Whitney Ave. n/o Edwards St. creating dead span to P.413.
  - Step 5 - Area is de-energized and isolated. Install worker's grounds, switch primary tap changer on all OH, pad, and UG transformers within clearance, and remove worker's grounds when complete.
  - Step 6 - Remove jumpers from bells on south side of P.392 Whitney Ave. c/o Edwards St. Connect cutouts on south side of pole and fuse at 100K to protect Whitney Ave.

south of Edwards St. Install 3 jumpers on bells on east side of pole to prepare to re-energize from P.401 on Edwards St.

- Step 7 – P.401 Edwards St. e/o Whitney Ave. confirm area is ready to re-energize and worker's grounds are removed. Install taps on disconnect switches and close switches re-energizing area.

Voltage Conversion Sequence 3.4

Design, construct and prepare Whitney Ave 271, 275, and 277 for conversion from 4.16 kV to 13.8 distribution. Sequences 1 through 3.3 must be completed.

- Convert Whitney circuit 275Y and a portion of circuit 271Y by performing the following switching:
  - Step 1 – Close disconnects on P.1123 Livingston St. n/o Willow St. tying Whitney circuits 275Y and 271Y.
  - Step 2 – Open disconnects on P.12873 Livingston St. s/o Cold Spring St. breaking tie in Whitney circuits 271Y and 275Y. Remove taps on disconnects.
  - Step 3 – Remove jumpers on bells on south side of P.5296 Cold Spring St. c/o Livingston St. creating dead span to P.12873.
  - Step 4 - Whitney Substation open position 31 feeder breaker to circuit 275Y and rack out.
  - Step 5 - Open riser disconnects at P.884 Linden St. e/o Whitney Ave. Lift high side taps, test riser for potential, ground riser, and remove riser disconnects.
  - Step 6 - Area is de-energized and isolated. Install worker's grounds, switch primary tap changer on all OH, pad, and UG transformers within clearance, and remove worker's grounds when complete.
  - Step 7 – Install 3 – 50 KVA step down bank on P.7609 Livingston St. n/o Cottage St to feed existing riser to L.599 at 4.16 kV, and fuse bank at 25K.
  - Step 8 – Install 3 cutouts and fuse at 100K on P.945 Whitney Ave c/o Linden St. to protect Linden St.
  - Step 9 – Install 3 jumpers on bells on P.6254 Whitney Ave. n/o Edwards St.
  - Step 10 - P.413 Whitney Ave. s/o Lawrence St. confirm area is ready to re-energize and worker's grounds are removed. Install taps on open ABS and close ABS re-energizing area.

Voltage Conversion Sequence 3.5

Design, construct and prepare Whitney Ave 271, 275, and 277 for conversion from 4.16 kV to 13.8 distribution. Sequences 1 through 3.4 must be completed.

- Convert Whitney circuit 271Y by performing the following switching:
  - Step 1 - Whitney Substation open position 23 feeder breaker to circuit 271Y and rack out.

- Step 2 - Open riser disconnects at P.5220 Cold Spring St. w/o Orange St. Lift high side taps, test riser for potential, ground riser, and remove riser disconnects.
- Step 3 - Area is de-energized and isolated. Install worker's grounds, switch primary tap changer on all OH, pad, and UG transformers within clearance, and remove worker's grounds when complete.
- Step 4 - Replace junction taps on P.3226 Cold Spring St. c/o Orange St. such that A phase is field phase on Orange St. and field phase on Cold Spring St. B phase is middle phase on both streets. C phase is road phase on Cold Spring St. and road phase on Orange St. Install jumpers on bells on south side of pole.
- Step 5 - Replace junction taps on P.5296 Cold Spring St. c/o Livingston St. such that A phase is road phase on Livingston St. and field phase on Cold Spring St. B phase is middle phase on both streets. C phase is field phase on Livingston St. and road phase on Orange St. Install jumpers on bells on south side of pole and jumper bells on east side of pole.
- Step 6 - P.9479 Mitchell Dr. e/o Orange St. confirm area is ready to re-energize and worker's grounds are removed. Open ABS de-energizing one span of Mill River circuit 1890.
- Step 7 - P.808 Orange St. s/o Cold Spring St. install taps on open disconnect switches.
- Step 8 – P.12873 Livingston St. s/o Cold Spring St. install taps on open disconnect switches.
- Step 9 – P.14096 Mitchell Dr. e/o Orange St. install jumpers on bells on west side of pole.
- Step 10 – P.9479 Mitchell Dr. e/o Orange St. close ABS re-energizing Cold Spring St. area at 13.8 kV.
- Step 11 – P.808 Orange St. s/o Cold Spring St. confirm phasing across open disconnects and close disconnects tying Mill River circuit 1890 to 1890.
- Step 12 – P.12873 Livingston St. s/o Cold Spring St. confirm phasing across open disconnects and close disconnects tying Mill River circuit 1890 to 1890.
- Step 13 – P.413 Whitney Ave. s/o Lawrence St. open ABS breaking tie between Mill River circuit 1890 and 1890.
- Step 14 – New Pole Edwards St. w/o Foster St. open ABS breaking tie between Mill River circuit 1890 and 1890 and transferring the load of the former Whitney circuits 271Y, 275Y, 277Y from Edwards St. to Mitchell Dr.

Switching Sequence 3.6

Design, construct and prepare Whitney Ave 271, 275, and 277 for conversion from 4.16 kV to 13.8 distribution. Sequences 1 through 3.5 must be completed.

- De-energize and isolate Whitney Substation TXF2 and Low Voltage BUS2 by performing the following switching:
  - Step 1 - Whitney Substation confirm station service is fed from 4.16 kV side of TXF1 and isolated from TXF2.

- Step 2 – Whitney Substation LV BUS2 confirm breaker positions 23, 25, and 31 are open and racked out confirming former circuits 271, 275, and 277 are isolated from LV BUS2.
- Step 3 – Mill River Substation open circuit 1888 feeder breaker de-energizing circuit.
- Step 4 – Whitney Substation confirm open TXF2 RA switch from circuit 1880.
- Step 5 – Whitney Substation open TXF2 RA switch from circuit 1888 isolating TXF2 from 13.8 kV sources.
- Step 6 – Mill River Substation close circuit 1888 re-energizing circuit.
- Step 7 – Whitney Substation open LV BUS2 breaker position 29 and rack out isolating spare position. Open LV BUS2 breaker position 27 and rack out isolating bus feed from TXF2 from LV BUS2. Open LV BUS2 breaker position 17 and rack out isolating mobile sub feed from LV BUS2.
-

Switching Sequence 3.7

Design, construct and prepare Whitney Ave 270 and 273 for conversion from 4.16 kV to 13.8 distribution. Sequences 1 through 3.6 must be completed.

- Switching to transfer Whitney Substation TXF1 / LV BUS1 load from Mill River circuit 1886 to 1880 by performing the following switching:
  - Step 1 – Audubon Arts Center Switch Gear confirm open Mill River circuit 1886 switch.
  - Step 2 – Whitney Substation TXF1 RA switch close Mill River circuit 1880 switch tying Mill River circuits 1886 and 1880.
  - Step 3 – Mill River Substation open circuit 1886 feeder breaker breaking tie between circuits 1880 and 1886 and transferring Whitney Sub load to circuit 1880.
  - Step 4 - Whitney Substation TXF1 RA switch open Mill River circuit 1886 switch de-energizing feed cable from Mill River circuit 1886.
  - Step 5 - Mill River Substation close circuit 1886 feeder breaker re-energizing circuit 1886.
  -

Switching Sequence 3.8

Design, construct and prepare Whitney Ave 270, and 273 for conversion from 4.16 kV to 13.8 distribution. Sequences 1 through 3.7 must be completed.

- Switching to de-energize Mill River circuits 1886 and 1888 for splicing at Whitney Ave. c/o Armory St. by performing the following switching:
  - Step 1 – Audubon Arts Center Switch Gear confirm open Mill River circuit 1886 switch.
  - Step 2 - Whitney Substation TXF1 RA switch confirm open Mill River circuit 1886 switch.
  - Step 3 - Whitney Substation TXF RA switch confirm open Mill River circuit 1886 switch.
  - Step 4 – P.490 Armory St. w/o Whitney Ave. confirm open ABS Mill River circuit 1886 riser.
  - Step 5 – Mill River Substation open circuit 1886 feeder breaker de-energizing circuit 1886. Rack out breaker and ground getaway.

- Step 6 - Mill River Substation open circuit 1888 feeder breaker de-energizing circuit 1888. Rack out breaker and ground getaway.
- Step 7 – P.490 Armory St. w/o Whitney Ave. lift high side taps on ABS, test riser for potential, ground riser.

Cable Splicing Sequence 3.9

Design, construct and prepare Whitney Ave 270, and 273 for conversion from 4.16 kV to 13.8 distribution. Sequences 1 through 3.8 must be completed.

- Break and remake splices in chamber L.512 Whitney Ave. s/o Armory St. Mill River circuits 1886 and 1888 by performing the following switching:
  - Step 1 – Audubon Arts Center Switch Gear confirm open Mill River circuit 1886 switch to confirm clearance boundary.
  - Step 2 – Mill River Substation confirm grounded Mill River circuit 1886 getaway to confirm clearance boundary.
  - Step 3 - Mill River Substation confirm grounded Mill River circuit 1888 getaway to confirm clearance boundary.
  - Step 4 - Whitney Substation confirm open TXF1 RA Switch Mill River circuit 1886 to confirm clearance boundary.
  - Step 5 - Whitney Substation confirm open TXF2 RA Switch Mill River circuit 1888 to confirm clearance boundary.
  - Step 6 – P.490 Armory St. w/o Whitney Ave. confirm Mill River circuit 1886 riser ground to confirm clearance boundary.
  - Step 7 – Chamber L.512 Whitney Ave. s/o Armory St. preform following clearance work:
    - Mill River circuit 1888 spike 350PL cable side of splice to confirm dead and grounded and leave 350PL cable in safe condition to Whitney Sub.
    - Break circuit 1888 splice.
    - Mill River circuit 1886 break Y splice to separate riser cable (500 EPR) to P.490 from splice.
    - Mill River circuit 1886 make straight splice feed from Mill River (500 EPR) to circuit 1886 feed to Whitney Sub (350 PL).
    - Make straight splice Mill River circuit 1888 feed (500 EPR) to riser cable (500 EPR) to P.490 Armory St. w/o Whitney Ave.
    - Test splices Mill River circuits 1886 and 1888. - NOTE- former circuit 1888 feed to Whitney Substation now spiked for later removal.

Switching Sequence 3.10

Design, construct and prepare Whitney Ave 270, and 273 for conversion from 4.16 kV to 13.8 distribution. Sequences 1 through 3.9 must be completed.

- Switching to re-energize Mill River circuits 1886 and 1888 after splicing at Whitney Ave. c/o Armory St., transferring Armory St. load to Mill River circuit 1888, and transferring Whitney Substation load back to Mill River circuit 1886 by performing the following switching:

- Step 1 – P.490 Armory St. w/o Whitney Ave. confirm ABS high side taps are off and switch is open and remove riser grounds.
- Step 2 – Mill River Substation circuit 1886 feeder breaker remove grounds and rack in breaker.
- Step 3 - Mill River Substation circuit 1888 feeder breaker remove grounds and rack in breaker.
- Step 4 – Mill River Substation close circuit 1888 feeder breaker re-energizing circuit to P.490 Armory St. w/o Whitney Ave.
- Step 5 – P.490 Armory St. w/o Whitney Ave. confirm phasing riser to line, reinstall high side taps on ABS, and close ABS tying Mill River circuits 1880 and 1888.
- Step 6 – P.8658 Whitney Ave. c/o Armory St. open ABS breaking tie between Mill River circuits 1880 and 1888 and transferring Armory St. load to 1888.
- Step 7 - Mill River Substation close circuit 1886 feeder breaker re-energizing circuit to Whitney Substation.
- Step 8 – P.4320 State St. close ABS tying Mill River circuits 1880 to 1890.
- Step 9 – P.4312 State St. open ABS breaking tie Mill River circuits 1880 and 1890 and transferring State St. load to circuit 1890.
- Step 10 – P.4877 Fox St. close ABS tying Mill River circuits 1880 and 1892.
- Step 11 – P.4878 Fox St. open ABS breaking tie between Mill River circuits 1880 and 1892 and transferring Fox St. load to circuit 1892.
- Step 12 - Whitney Substation TXF1 RA switch close Mill River circuit 1886 switch tying Mill River circuits 1886 & 1880.
- Step 13 – Mill River Substation open feeder breaker to circuit 1880 breaking tie between Mill River 1880 and 1886 and transferring Whitney Substation to circuit 1886.
- Step 14 - Whitney Substation TXF1 RA switch open Mill River circuit 1880 switch de-energizing Mill River circuits 1880 getaway.
- Step 15 - Mill River Substation close feeder breaker to circuit 1880 re-energizing Mill River 1880.
- Step 16 - P.4878 Fox St. close ABS tying Mill River circuits 1880 and 1892.
- Step 17 - P.4877 Fox St. open ABS breaking tie between Mill River circuits 1880 and 1892 and transferring Fox St. load to circuit 1880.
- Step 18 - P.4312 State St. close ABS tying Mill River circuits 1880 and 1890.
- Step 19 - P.4320 State St. open ABS breaking tie between Mill River circuits 1880 and 1890 and transferring State St. load to circuit 1880.
-

Voltage Conversion Sequence 4.1

Design, construct and prepare Whitney Ave 270 and 273 for conversion from 4.16 kV to 13.8 kV distribution. Sequences 1 through 3.10 must be completed.

- Convert a portion of Whitney circuit 270Y by performing the following switching:
  - Step 1 – P.966 Whitney Ave. c/o Ogden St. confirm open disconnects and lift disconnect taps.

- Step 2 – 7519 Whitney Ave. c/o Ogden St. remove jumpers from bells on east side of pole creating dead span to P.966.
- Step 3 - P.1043 Prospect St. s/o Huntington St. confirm open disconnects and lift disconnect taps.
- Step 4 - P.3339 Prospect St. c/o Huntington St. remove jumpers from bells on south side of pole creating dead span to P.1043.
- Step 5 - Whitney Substation open position 11 feeder breaker to circuit 270Y and rack out.
- Step 6 – P.11207 Whitney Ave. n/o Ogden St. open riser disconnects and remove high side taps, test riser for potential, ground riser, and remove riser disconnects.
- Step 7 - Area is de-energized and isolated. Install worker's grounds, switch primary tap changer on all OH, pad, and UG transformers within clearance, and remove worker's grounds when complete.
  - P.2433 Whitney Ave. n/o Huntington St. refuse cutout at 25K.
  - P.8509 Whitney Ave. s/o Huntington St. refuse cutouts at 30k.
  - P.13997 Highland St. w/o Loomis Pl. refuse cutouts at 25K.
  - P.12775 Highland St. e/o Prospect St. refuse cutouts at 25K.
  - P.11692 Highland St. w/o Prospect St. refuse cutout at 25K.
- Step 8 – P.3147 Prospect St. s/o Highland St. confirm open and install taps on ABS.
- Step 9 – P.6071 Prospect St. s/o Highland St. confirm ready to re-energize and install jumpers on bells on north side of pole.
- Step 10 – Close ABS re-energizing area at 13.8 kV.

Voltage Conversion Sequence 4.2

Design, construct and prepare Whitney Ave 270 and 273 for conversion from 4.16 kV to 13.8 kV distribution. Sequences 1 through 4.1 must be completed.

- Convert a portion of Whitney circuit 273Y by performing the following switching:
  - Step 1 – Whitney Substation open position 7 feeder breaker to circuit 273Y de-energizing circuit.
  - Step 2 – P.2305 Whitney Ave. n/o Armory St. remove jumpers from bells on south side of pole.
  - Step 3 – P.2304 Whitney Ave. n/o Armory St remove jumpers from double deadend creating dead span north to P.2305.
  - Step 4 - Whitney Substation confirm dead span between P.2304 and P.2305, and close position 7 feeder breaker to circuit 273Y re-energizing circuit. **-NOTE- circuit 273Y will have nominal load north of riser P.2305 and will remain as backup to Whitney Substation circuits 272Y and 274Y until those circuits are converted.**
  - Step 5 - Area is de-energized and isolated. Install worker's grounds, switch primary tap changer on all OH, pad, and UG transformers within clearance, and remove worker's grounds when complete.
    - P.1025 Huntington St. e/o Prospect St. refuse cutouts at 25K.
    - P.1024 Huntington St. e/o Prospect St. refuse cutouts at 30K.
    - P.1021 Huntington St. e/o Prospect St. remove jumpers from bells, connect cutouts, and fuse cutouts at 100K.
    - P.3258 Huntington St. w/o Prospect St. refuse cutouts at 25K.

- P.4170 Prospect St. c/o Ogden St. remove 3 junction taps to Ogden St., connect 1 cutout to B Phase and east on Ogden St. tap middle phase, fuse cutout at 25K. **–NOTE- Outside phases on Ogden St. and Reservoir St. will be removed after conversion.**
- P.6429 Reservoir St. s/o Cliff St. remove jumper on middle phase bell to make dead span to P.6430. **–NOTE- Outside phases on Ogden St. and Reservoir St. will be removed after conversion.**
- P.3351 Edgehill Rd. c/o Cliff St. remove 3 junction taps to Cliff St., connect 1 cutout to B Phase and west on Cliff St. tap middle phase, fuse cutout at 25K. **–NOTE- Outside phases on Cliff St. will be removed after conversion.**
- P.6726 Cliff St. w/o Edgehill Rd. remove jumper on middle phase bell to make dead span to P.6430. **–NOTE- Outside phases on Cliff St. will be removed after conversion.**
- P.6430 Cliff St. c/o Reservoir St. remove 3 junction taps to create middle phase dead spans between P.6429 and P.6340 on Reservoir St. and P.6430 and P.6726 on Cliff St. **–NOTE- Outside phases on Ogden St., Reservoir St., and Cliff St. will be removed after conversion.**

- Step 6 – P.3339 Prospect St. c/o Huntington St. install jumpers on bells on south side of pole.
- Step 7 – P.3621 Winchester St. c/o Huntington St. install junction taps such that A phase is road phase on Winchester St. and road phase on Huntington St., B phase is middle phase on both streets, and C phase is field phase on Winchester St. and field phase on Huntington St.
- Step 8 – P.1043 Prospect St. s/o Huntington St. confirm ready to re-energize, install taps on disconnects, and close disconnects re-energizing part of circuit Prospect St. n/o Huntington St., Huntington St. w/o Edgehill Rd., Sheffield St., Ogden St. e/o Edgehill Rd., and Reservoir St.
- Step 9 – P.3261 Huntington St. e/o Winchester St. confirm phasing across bells, and install taps on open ABS.
- Step 10 – P.7519 Ogden St. c/o Whitney Ave. install taps on bells on east side of pole.
- Step 11 – P.966 Whitney Ave. c/o Ogden St. confirm ready to re-energize, install taps on disconnects such that A phase is road phase on Whitney Ave. and field phase on Ogden St., B phase is middle phase on both streets, and C phase is field phase on Whitney Ave. and road phase on Ogden St., and close disconnects re-energizing remainder of circuit.
- Step 12 – P.3351 Edgehill Rd. c/o Cliff St. install jumpers on bells on north side of pole.
- Step 13 – P.326 Edgehill RD. n/o Cliff St. confirm phasing across bells and install taps on open ABS tie point to Mill River circuit 1888.
- Step 14 – **After Conversion** remove outside phases and arms on Cliff St. w/o Edgehill Rd., Reservoir St., and Ogden St. between Prospect St. and Reservoir St.

Switching Sequence 4.3

Design, construct and prepare Whitney Ave 270, and 273 for conversion from 4.16 kV to 13.8 distribution. Sequences 1 through 4.2 must be completed.

- Switching to transfer the load of former Whitney Substation circuits 270Y and 273Y from Broadway circuit 1912 to Mill River circuit 1888 and complete tie point at Armory St. and Whitney Ave., and install circuit recloser on Whitney Ave. s/o Armory St. by performing the following switching:
    - Step 1 – P.326 Edgehill Rd. n/o Cliff St. close ABS tying Broadway circuit 1912 to Mill River circuit 1888.
    - Step 2 – P.3147 Prospect St. s/o Highland St. open ABS breaking tie between Broadway circuit 1912 and Mill River circuit 1888 and transferring former Whitney circuit 270Y and 273Y load to Mill River circuit 1888.
    - Step 3 – P.8658 Armory St. w/o Whitney Ave. install jumpers on bells west side of pole re-energizing span east to P.1898.
    - Step 4 – P.1898 Whitney Ave. c/o Armory St. confirm phasing between Whitney Ave. and Armory St., install taps on disconnects, and close disconnects tying Mill River circuit 1888 to itself.
    - Step 5 – P.326 Edgehill Rd. n/o Cliff St. open ABS breaking Mill River circuit 1888 at its final configuration.
    - Step 6 – New Pole Whitney Ave s/o Armory St. between P.1898 and P.1896 install, test, and place in service line recloser. Open bypass switches once in service.

Switching Sequence 4.4

Design, construct and prepare Whitney Ave. 272 and 274 for conversion from 4.16 kV to 13.8 kV distribution. Sequences 1 through 4.3 must be completed.

- Transfer former Whitney circuits 272Y and 274Y load from Mix circuit 1684 to Mill River circuit 1888 by performing the following switching:
    - Step 1 – P.2389 Whitney Ave. s/o Servoss St. confirm ABS closed.
    - Step 2 – P.758 Mather St. s/o Lake St. confirm ABS open.
    - Step 3 – New Pole Putnam Ave. w/o Whitney Ave. between P.7465 and P.148 confirm ABS open.
    - Step 4 – P.2303 Whitney Ave. n/o Armory St. confirm line recloser is open and confirm phasing across open point.
    - Step 5 – P.2303 Whitney Ave. n/o Armory St. close line recloser tying Mill River circuit 1888 to Mix circuit 1684.
    - Step 6 – P.2389 Whitney Ave. s/o Servoss St. open ABS breaking tie and transferring load from Mix circuit 1684 to Mill River circuit 1888.

Switching Sequence 4.5

Design, construct and prepare Whitney Ave. 272 and 274 for conversion from 4.16 kV to 13.8 kV distribution. Sequences 1 through 4.4 must be completed.

- De-energize Whitney substation TXF1 and LV BUS1, install temporary OH station service, complete Mill River circuit tie between 1886 and 1888, and transfer load from Mill River circuit 1890 to 1886 by performing the following switching:

- Preparatory underground Work as follows:
  - P.5220 Cold Spring St. w/o Orange St. confirm 5 kV riser removed, new riser disconnects are open and not connected.
  - P.5220 Cold Spring St. w/o Orange St. install 500 EPR riser cable from L.759 to P.5220, terminate riser on pole and ground riser.
  - L.759 Orange St. c/o Cold Spring St. install 500 EPR cable from L.759 to L.758 and straight splice with new riser cable to P.5220.
  - L.758 Orange St. s/o Cold Spring St. install 500 EPR cable from L.758 to L.406 and straight splice with new cable from L.759.
  - P.3993 Willow St. e/o Whitney Ave. install 500 EPR riser cable from L.759 to P.3993, terminate riser on pole, install fault indicators on riser and ground riser.
- Step 1 Out – Audubon Arts Center Switch Gear Audubon St. confirm Mill River circuit 1886 switch is open.
- Step 2 Out – Whitney Substation Whitney Ave. confirm open TXF1 RA switch from circuit 1880.
- Step 3 Out – P.4320 State St. e/o Willow St. close ABS tying Mill River circuits 1880 and 1890.
- Step 4 – Out P.4312 State St. w/o Willow St. open ABS breaking tie and transferring load to 1890.
- Step 5 Out – P.4877 Fox St. close ABS tying Mill River circuits 1880 and 1892.
- Step 6 Out – P.4878 Fox St. open ABS breaking tie and transferring load to 1892.
- Step 7 Out - P.8658 Armory St. c/o Whitney Ave. confirm riser ABS is open lift high side taps isolating riser from Mill River circuit 1888. –NOTE- riser still energized Mill River circuit 1880.
- Step 8 Out – Mill River Substation open circuit 1880 feeder breaker, rack out, and ground.
- Step 9 Out – P.8658 Armory St. c/o Whitney Ave. test riser for potential, finding none, ground on riser.
- Step 10 Out – P.11951 Mitchell Dr. n/o Willow St. confirm ABS open, lift high side taps, test riser for potential and finding none, ground riser.
- Step 11 Out – Mill River Substation open circuit 1886 feeder breaker, rack out, and ground.
- Step 12 Out - Whitney Substation Whitney Ave. open TXF1 RA switch from circuit 1886 isolating Whitney Sub from 13.8 kV sources.
- Step 13 Out – P.5220 Cold Spring St. w/o Orange St. confirm riser disconnect taps are off and new riser cable is grounded.
- Step 14 Out – P.3993 Willow St. e/o Whitney Ave. confirm riser disconnect taps are off and new riser cable is grounded. Mill River circuits 1880 and 1886 de-energized, grounded, and ready for cable splicing.
- Clearance Work as follows:
  - Step 1 Clearance – Chamber L.512 Whitney Ave. s/o Armory St. Mill River circuit 1886 spike cable on lead side of splice to L.WYSUB, break splice, Mill River circuit 1880 spike cable on lead side of 3 way splice to L.WYSUB, Mill

River circuit 1880 spike cable on lead cable feed from Mill River Substation, break splice, make splice circuit 1886 feed cable from Mill River substation to former circuit 1880 riser cable to P.8658 creating north end of circuit tie between Mill River circuit 1886 and 1888.

- Step 2 Clearance – Chamber L.403 Willow St. w/o Whitney Ave. Mill River circuit 1886 break splice, ground feed cable from L.404, splice cable from L.402 to new riser cable to P.3993 creating south end of circuit tie between Mill River 1886 and 1888.
- Step 3 Clearance – Chamber L.406 Willow St c/o Orange St. Mill River circuit 1886 break splice, ground cable to L.405, splice feed cable from L.849 to new cable to L.758 creating circuit feed Mill River 1886 to riser P.5220.
- Step 4 Clearance – Chamber L.753 Willow St c/o Mitchell Dr. Mill River circuit 1880 break 3-way splice, ground cable to L.1243, splice feed cable from L.752 back to riser cable to P.11951 creating circuit feed Mill River 1880 to riser P.11951.
- Step 5 Clearance – Whitney Substation Whitney Ave. confirm open cutout feeding station service from TXF2 and remove cutout and high side tap, open cutout feeding station service from TXF1 and remove cutout and high side tap, remove station service 4.16 kV wire to station service Xfmr., remove station service Xfmr., and install 1/0 TPX temporary feed from P.1893 to station service secondary entrance conductors on rear of Whitney Substation to provide temporary construction power for remediation of site.

- Step 1 In – P.3993 Willow St. w/o Whitney Ave. confirm ready to re-energize all clearance work complete and worker's grounds removed, confirm high side taps are off open riser disconnects, and remove grounds from riser.
- Step 2 In – P.8658 Whitney Ave. c/o Armory St. confirm high side taps are off open riser ABS and remove grounds from riser.
- Step 3 In – P.3993 Willow St. w/o Whitney Ave. hi-pot riser cable to P.8658 if test confirms cable is good proceed, install high side taps, and close riser disconnects energizing Mill River circuit tie cable to P.8658.
- Step 4 In – 8658 Whitney Ave. c/o Armory St. confirm phasing from riser to line and install taps on open ABS creating tie point between Mill River circuits 1886 and 1888.
- Step 5 In – P.5220 Cold Spring St. w/o Orange St. confirm high side taps are off open riser disconnects and remove grounds from riser.
- Step 6 In - Mill River Substation circuit 1886 feeder breaker remove grounds, if hi-pot circuit 1886 getaway cable is good proceed to rack in breaker, and close feeder breaker re-energizing Mill River circuit 1886 getaway to P.5220.
- Step 7 In – P.5220 Cold Spring St. w/o Orange St. confirm phasing riser to line, install taps on open disconnects, and close riser disconnects tying Mill River circuits 1886 and 1890.
- Step 8 In – P.9479 Mitchell Dr. e/o Orange St. open ABS breaking tie between Mill River 1886 and 1890, transferring final load to circuit 1886.

- Step 9 in – P.11951 Mitchell Dr. n/o Willow St. remove grounds on riser and install high side taps on open ABS.
- Step 10 In – Mill River Substation remove grounds on feeder breaker 1880, if hi-pot circuit 1880 getaway cable is good proceed to rack in breaker, and close feeder breaker re-energizing Mill River circuit 1880 getaway to P.11951 riser tie point.
- Step 11 In – P.4878 Fox St. close riser ABS tying Mill River circuits 1880 and 1892.
- Step 12 In – P.4877 Fox St. open riser ABS breaking tie and transferring load to 1892.
- Step 13 In – P.4312 State St. w/o Willow St. close ABS tying Mill River circuits 1880 and 1890.
- Step 14 In – P.4320 State St. e/o Willow St. open ABS breaking tie and transferring load to 1880.

Final Configuration Sequence 6

Whitney Substation completely converted and de-energized. Final OH and UG work to Mill River circuits 1880, 1886, 1888, and prepare Whitney Substation for remediation. Sequences 1 through 5 must be completed.

- P.808 Orange St. s/o Cold Spring St. install, test, and place in service line recloser Mill River Circuit 1886 and open bypass switches once in service.
- New Pole Cold Spring St. w/o Orange St. between P.5220 and P.5221 install, test, and place in service line recloser Mill River Circuit 1886 and open bypass switches once in service.
- Chamber L.WYSUB Whitney Ave. in front of Whitney Substation spike cables former Whitney circuits 270Y, 271Y, 272Y, 273Y, 274, 275Y, and 277Y on east side of chamber of cut cables west side of chamber.
- Chamber L.WYSUB Whitney Ave. in front of Whitney Substation spike cables former Mill River circuits 1880, 1886, and 1888 on east side of chamber of cut cables west side of chamber.
- Chamber L.WYSUB to P.2633 Whitney Ave. n/o Treadwell St. remove 19 sections of former Whitney circuit 274Y UG cable.
- Chamber L.WYSUB to P.2305 Augur St. w/o Whitney Ave. remove 14 sections of former Whitney circuit 272Y UG cable.
- Chamber L.WYSUB to P.2305 Whitney Ave. n/o Armory St. remove 4 sections of former Whitney circuit 273Y UG cable.
- Chamber L.WYSUB to L.512 Whitney Ave. s/o Armory St. remove 1 section of former Mill River circuits 1886 and 1888 UG cables.
- Chamber L.WYSUB to P.11207 Whitney Ave. c/o Ogden St. remove 8 sections of former Whitney circuit 270Y UG cable.
- Chamber L.WYSUB to P.884 Linden St. e/o Whitney Ave. remove 25 sections of former Whitney circuit 275Y UG cable.
- Chamber L.WYSUB to P.5675 Edwards St. w/o Whitney Ave. remove 32 sections of former Whitney circuit 277Y UG cable.
- Chamber L.WYSUB to chamber L.753 Willow St. c/o Mitchell Dr. remove 24 sections of former Whitney circuit 274Y UG cable.
- Chamber L.403 to L.406 Willow St. c/o Orange St. remove 3 sections of former Mill River circuit 1886 UG cable.

- Chamber L.WYSUB to chamber L.759 Cold Spring St. c/o Orange St. remove 18 sections of former Whitney circuit 271Y UG cable.
- Restore Circuit 1890 load that was temporarily offloaded to Mill River 1892 by performing the following:
- Step 1 - Close ABS on P.14480 Ferry St. n/o Fox Street.
- Step 2 - Open ABS on P.15246 Ferry St. s/o English Street.
- Install the following radio-controlled capacitor banks:
    - 600 kVar P.4864 Whitney Ave. s/o Linden St. on Mill River Circuit 1886.
    - 900 kVar P.2395 Orange s/o Canner St. on Mill River Circuit 1886.
    - 600 kVar P. 1040 Prospect St. s/o Huntington St. on Mill River Circuit 1888.
    - 600 kVar P. 1884 Whitney Ave. n/o Cliff St. on Mill River Circuit 1888.
    - 600 kVar P.2623 Whitney Ave. n/o Davis St. on Mill River Circuit 1888.

5. Project Assumptions

This design assumes that proper clearances can be achieved through tree trimming and open wire construction is specified. If any street cannot be trimmed to proper clearances, it is recommended that Hendrix spacer cable be installed to achieve reliable operation.
The design assumes pole replacements are based on the following criteria:

- Wherever overhead wires are being replaced, whether it be primary or secondary wire, the poles supporting the wires are evaluated, determining their overall condition, and ensuring they are compliant with current UI standards of pole sizing for the indicated wire size. The pole must be of the correct height and class size to support the new wire. Larger wire typically leads to larger pole heights, due to wire sag, and larger class size, due to the larger weight of the wire.
- Current UI standards indicate that primary wire, and subsequently the associated poles, be sized according to the following criteria:
    - If a street is to be mainline, the wire is to be 397 Al wire. The minimum pole requirement for mainline wire is a 45-foot, class 2 pole.
    - If a street is a radial tap, or side-tap, the wire is to be 1/0 Al wire. The minimum pole requirement for radial wire is 40-foot, class 2 pole.
- Current UI Standards indicate that secondary wire consists of 1/0 AL triplexed tree wire, or quadriplexed in some instances.
- Properly supporting a pole can affect the class of the pole, especially in cases where guying requirements cannot be fully met. Larger wire puts larger moment forces on poles increasing these guying requirements.
- In the area electrically sourced by Whitney SS, the following conditions drive the pole replacements based on the criteria above:
    - There are currently numerous streets that have outdated, or undersized wire based on the wire selection criteria mentioned above. Several areas have jacketed or unjacketed copper wire smaller than the suggested 1/0 or 397 Al conductor sizes.
    - The project design calls for various streets to become mainline when they are not currently. Some of these areas are currently radial taps, whether single phase or three phase, and require upsized poles for the larger wire.
    - The project design calls for more mainline streets to increase the amount of circuit ties and increase system reliability.

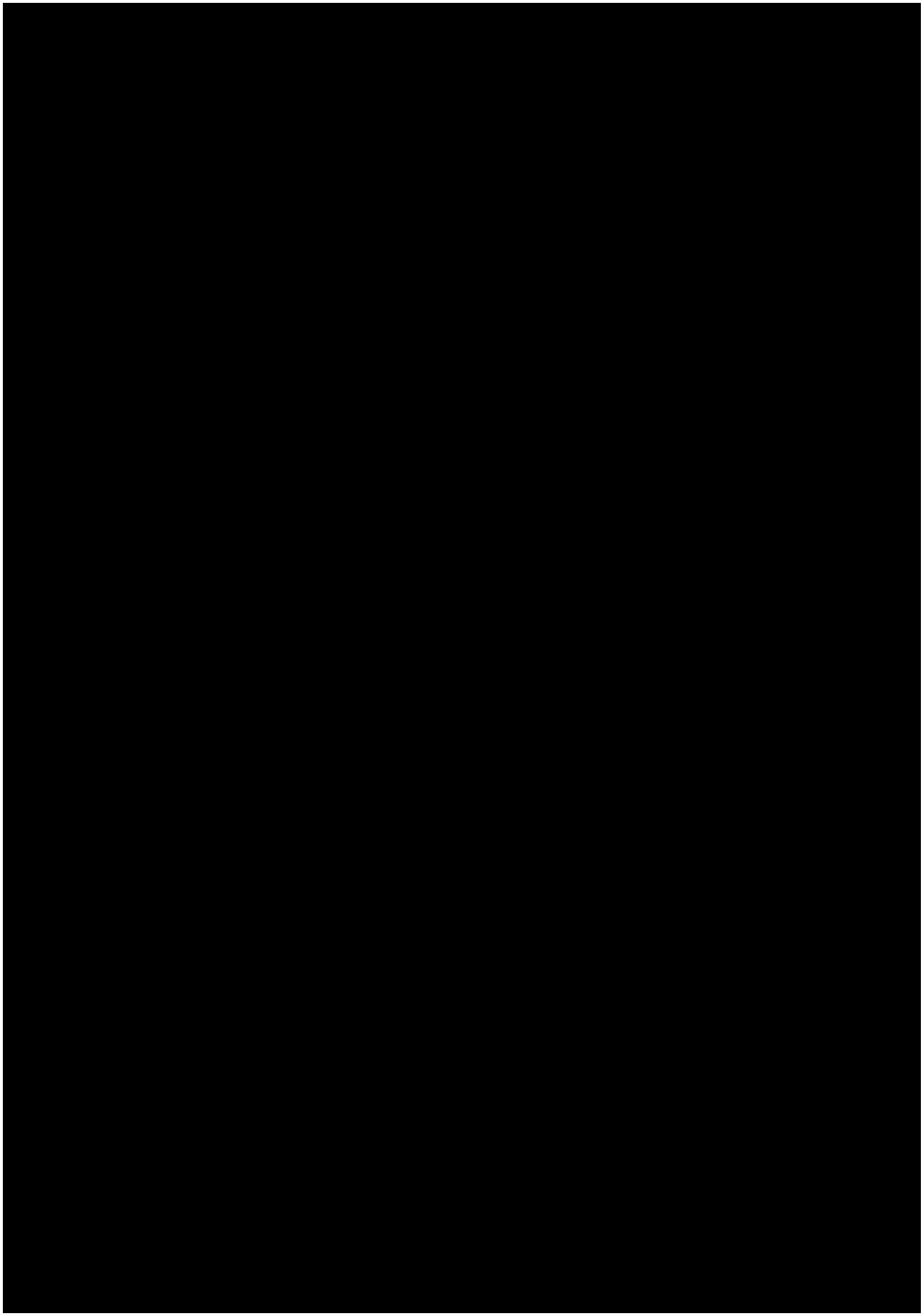
- There are numerous street conditions that limit the feasibility of standard guying, thus requiring upsized poles.
- There are currently various streets that consist of undersized secondary in an open wire configuration, and/or correctly sized secondary but in an open wire configuration.

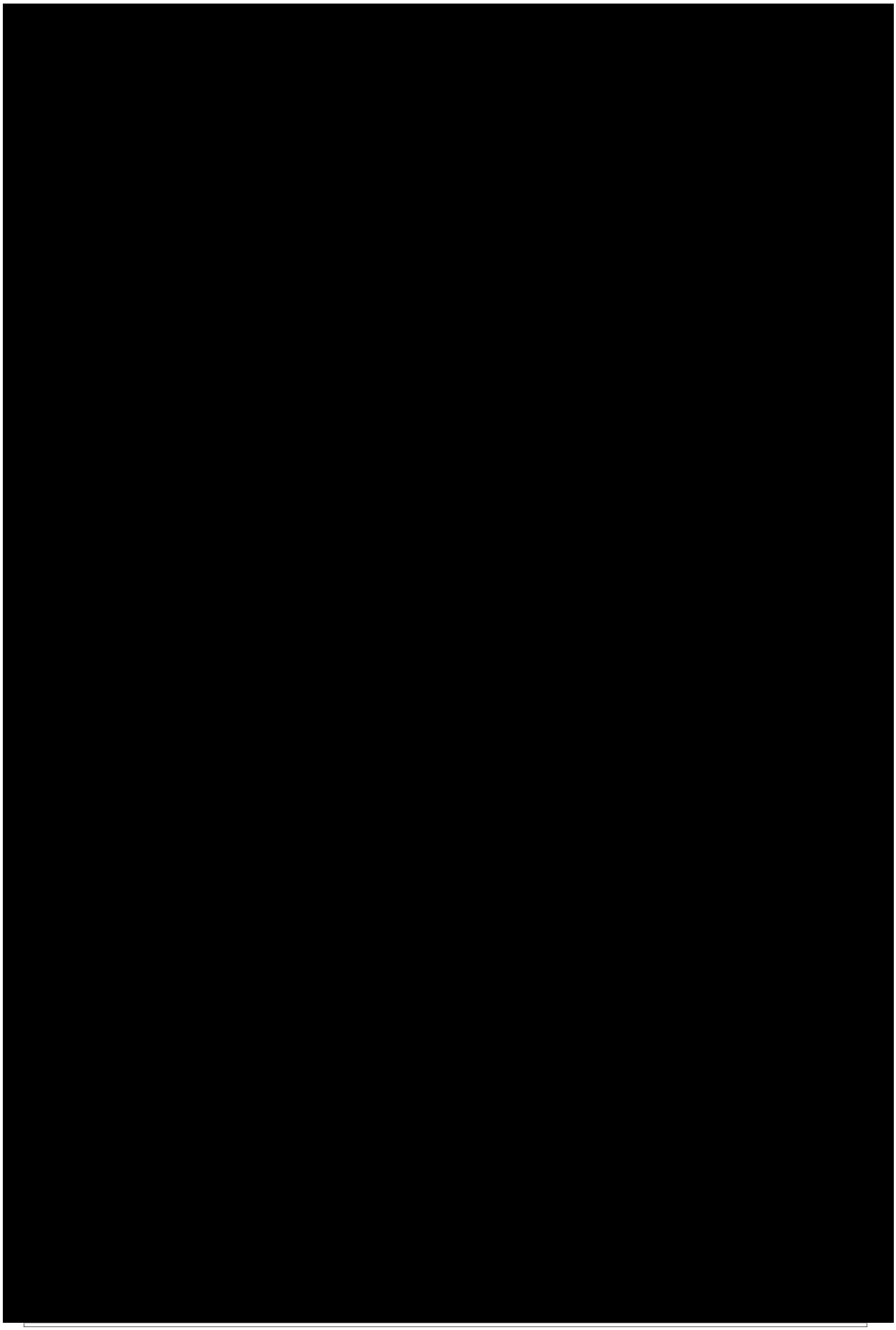
6. Alternatives Considered

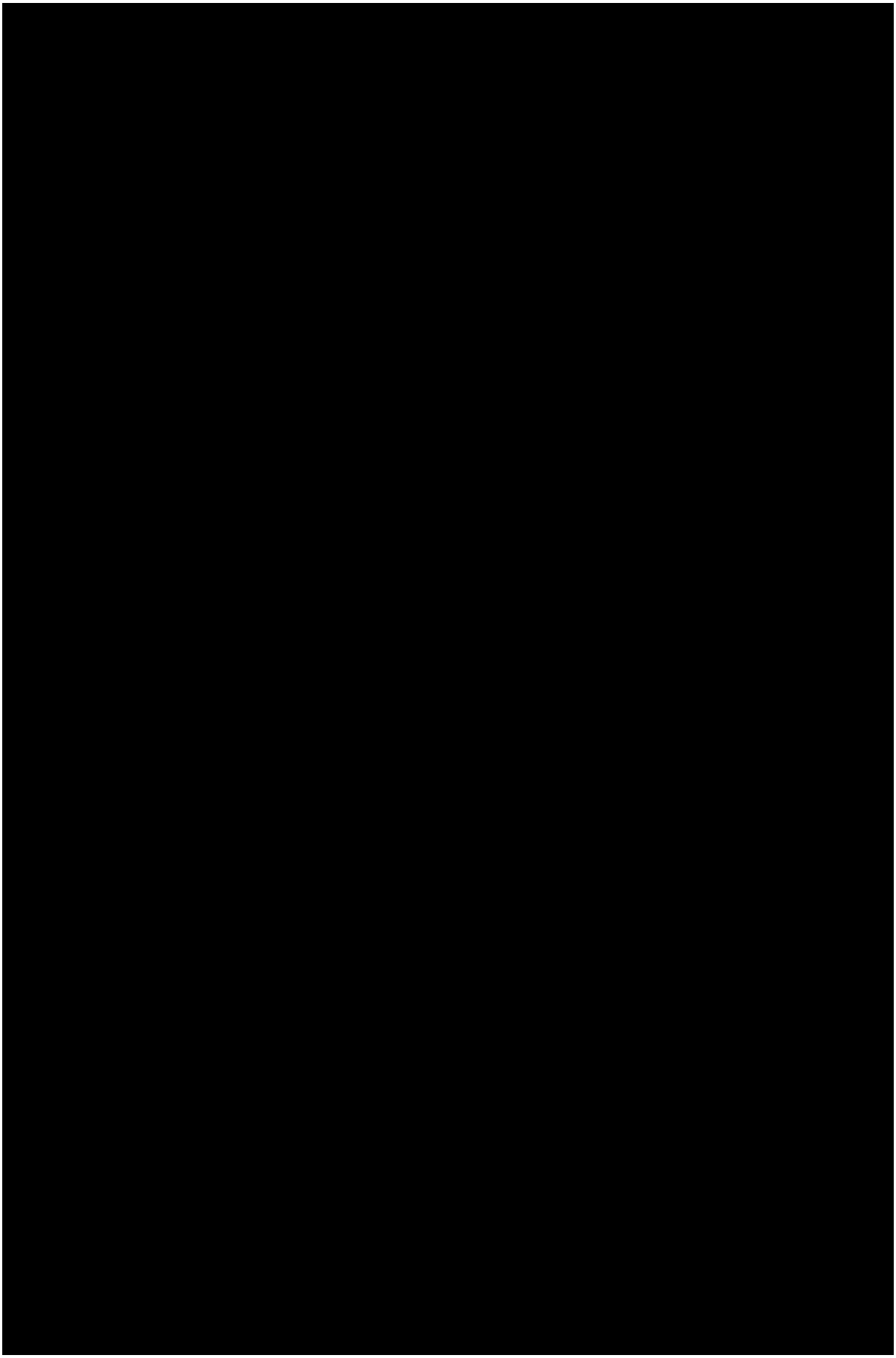
1) Do Nothing. – Whitney Ave substation was constructed prior to 1940. In 2024 it is over 80 years old and the equipment has exceeded it's useful life. Doing nothing increases the risk of failure, the associated performance risk to customers and safety risk to our employees. Doing nothing is not a viable alternative.

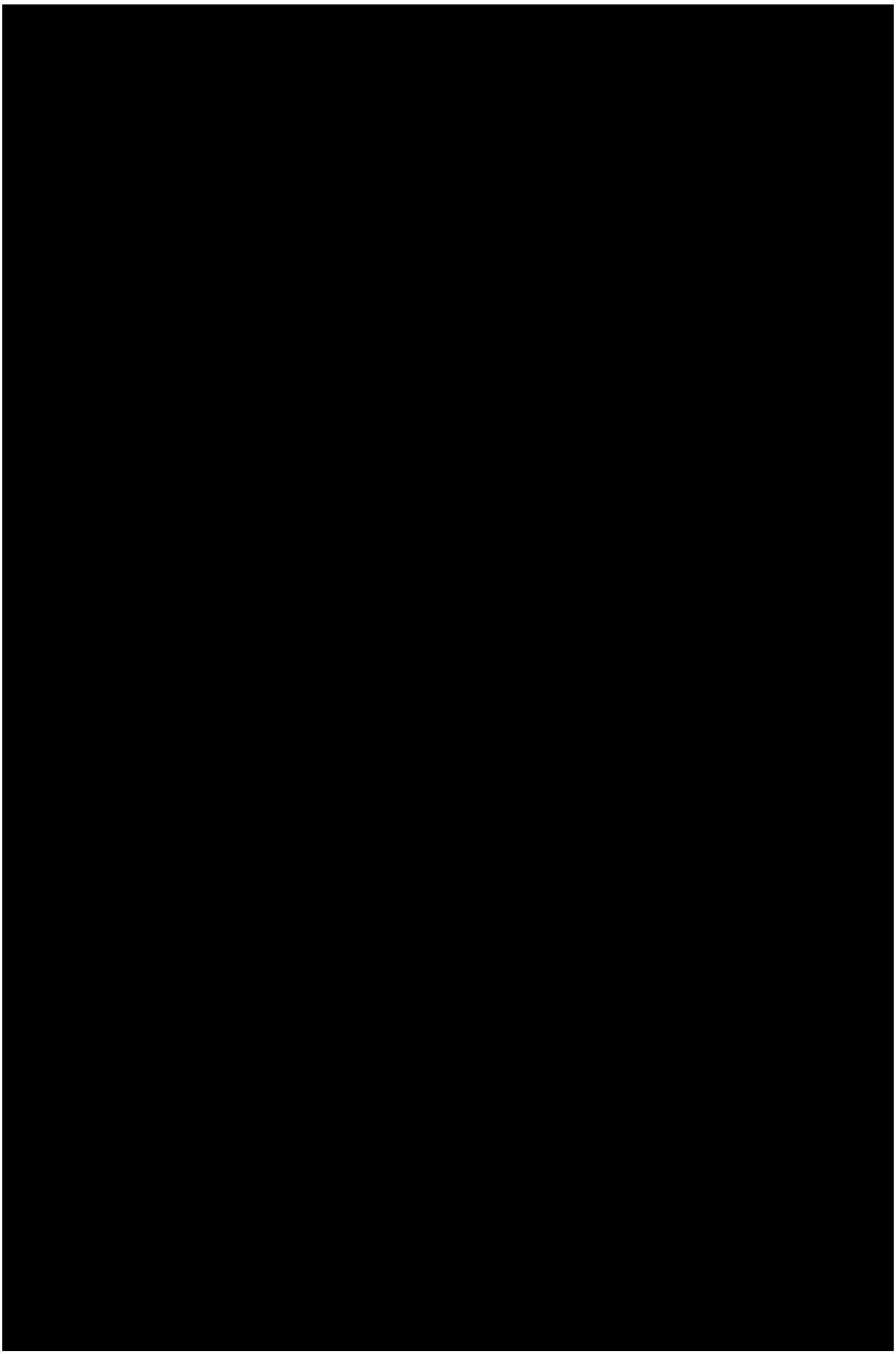
2) Leverage the remaining life in the 4kV assets through implementation of step down banks. At the outset of the program cost savings could be achieved by installing voltage step down banks on areas of the system where the 4kV overhead infrastructure was relatively new and in good condition. UI began installing infrastructure rated for 15 kV in the late 60s so any 4kV infrastructure remaining has exceeded it's useful lfe and should be replaced. Step down banks are no longer a viable option to remediate the cost of conversion.

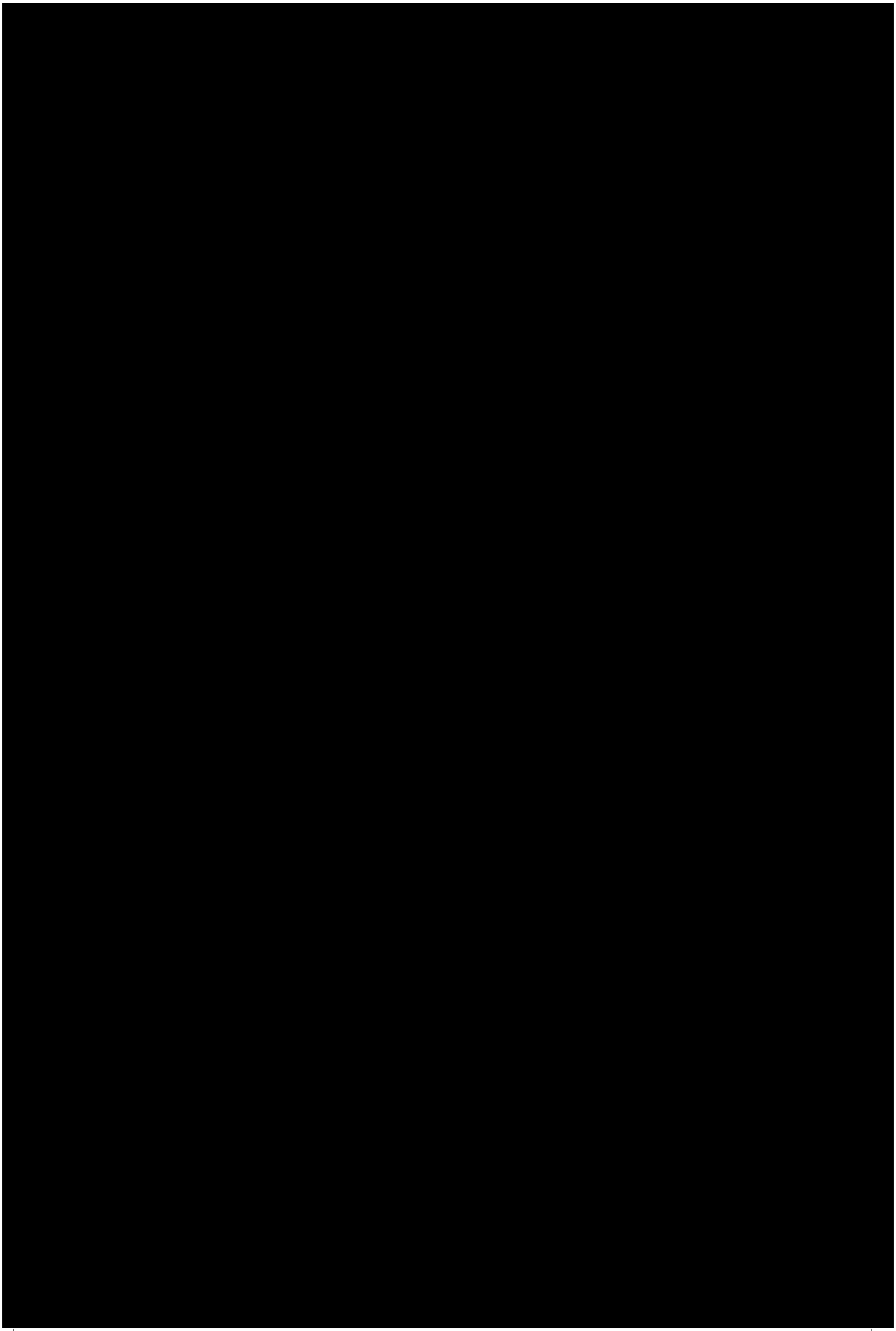
7. Maps or Electrical Design

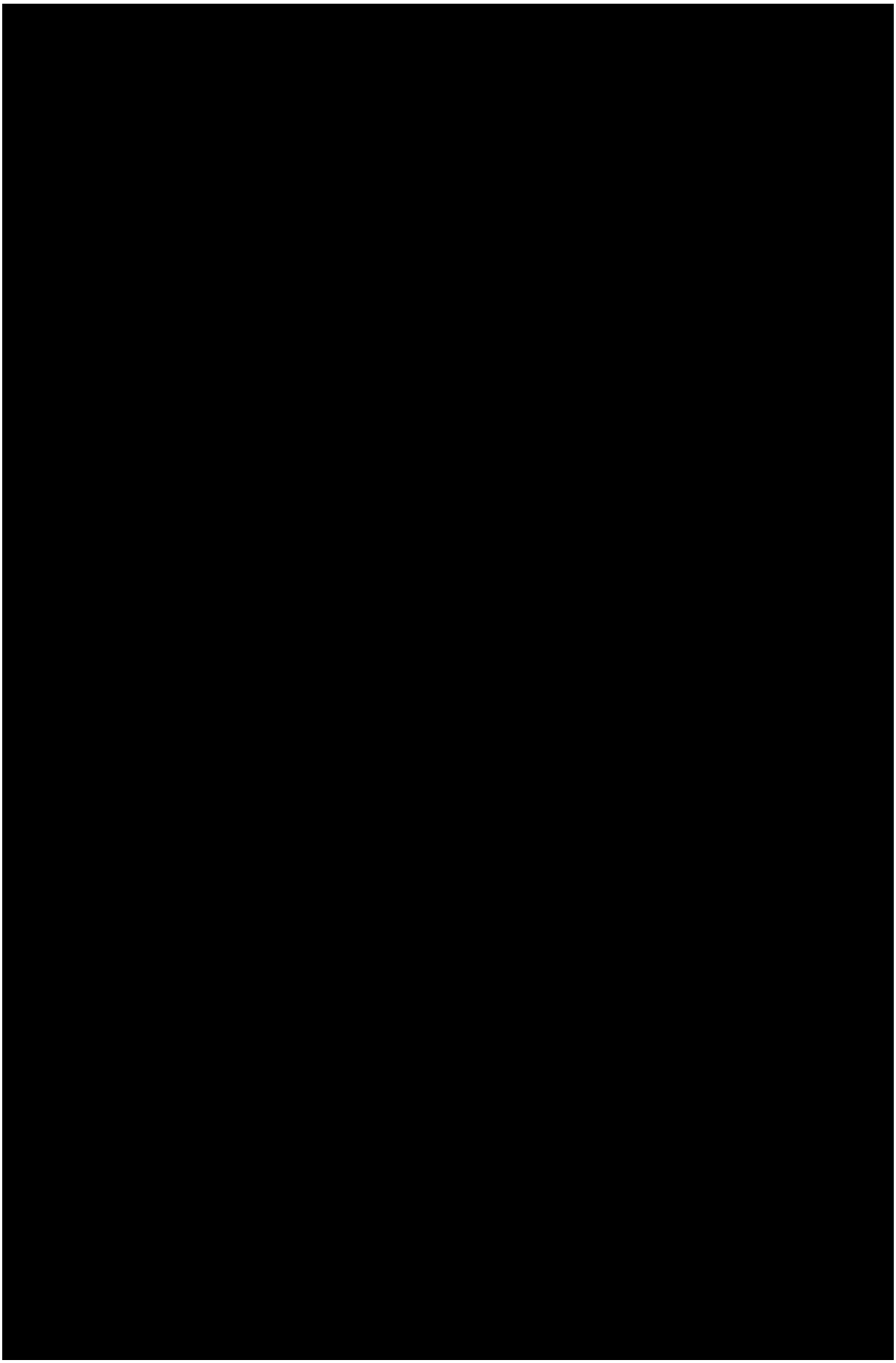












PRJ-005563

Chapel St - between State and Temple (NH)

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Chapel St - between State and Temple (NH)

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005563	Electric Distribution	Eves, Charles	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Infrastructure Replacement - Dist	IP1 Originate	Program/As Spent	Program/As Spent

Project description:

"The existing UI underground civil/electrical facilities along Chapel Street between Church Street and State Street is over 100 years old. The civil system cannot supply additional load without expansion. This project would provide additional underground splice chamber and duct-bank infrastructure space in downtown New Haven in the area referred as the ''Lower Chapel Street Neighborhood''. The proposed civil path would tie into civil work completed in 2023 with the installation of a new 16'x9'x7' triangular splice chamber at the intersection of Church and Chapel Streets to provide for new service to the new 848 Chapel Street building.
The objective of the project is to create a new 8-way conduit path between SC2050 at the intersection of Church and Chapel to SC13 at the intersection of Chapel with State. This would consist of the reconstruction of existing brick and rail roof style SC31 at the corner of Chapel and Orange Streets, installation of a new 6'x14'x7' splice chamber in place of SC142 and a new 6'x14'x7' splice chamber on Chapel Street and the installation of approximately 1,400 feet of an 8-way, 4" encased PVC conduit bank along Chapel Street connecting the chambers. It would allow for the removal of three brick splice chambers (Sc31, SC141, SC142) and roughly 500 feet of the 4-way tile duct."

Project Scope:

•Install a new splice chamber, 6x14x7, at the intersection of Chapel and State.
•Install 50' 8-4" conduit system from new chamber to SC13.
•Remove existing SC142 and install a new splice chamber, 6x14x7, same location.
•Install 400' 8-4" conduit system from the new chamber to new SC142; remove 400 feet of the existing 4-way tile system; remove existing SC142
•Rebuild SC31 in place; overcast, new size to be at least 5x12x7
•Install 400' 8-4" conduit system between new SC142 to SC31
•Install 410' 8-4" conduit system between rebuilt SC31 to SC57
•Install 100' 8-4" conduit system between SC57 and SC2050
•Redirect temporarily street light supply. Remove the network secondary between SC144 and SC142. Remove network secondary between SC139 and SC142. This allows removal of SC142.
•Install ground ring, racks, and hooks at new SC142 and new chambers. Install network secondary from SC13 to new chamber to new SC142 (500'). Re-establish permanent street light supply.
•Install protective blankets and support the cables at SC31 to allow for the rebuild. Install ground ring, racks, and hooks at completion of rebuild.

Project Benefits:

UI would be able to supply new customer load and developed properties in this area in a timely manner. Splice chambers would be built to the latest version of the NESC providing the required horizontal working space to splice and train cables properly.

Project Risks and Mitigation Plan:

Currently we have limited capacity to serve any new load along this corridor. Having this ductline gives us options for future capacity needs, by not claiming this corridor now we run the risk of loosing it forever. Environmental contamination may be discovered during construction, we will accept that risk and dispose of the spoils according to the Avangrid Excess Soil Management Plan. This project mitigates and reduces hazards to employees and the public by proactivity replacing underground infrastructure that would otherwise become unsafe to enter and work in while energized and avoids running this equipment to failure thus impacting the SAIDI/SAIFI indices.

Risk of No Action:
No action presents the risk of not having suitable available underground infrastructure to be able to connect new service to the growing number of customers redeveloping the older buildings in this neighborhood. There is also the risk of not being able to replace a faulted network supply or secondary cable. If U.I. does not act now and install a new duct-bank within this available corridor, we run the risk of another utility (communications) installing their infrastructure in the only remaining corridor.

Project Alternatives:
UI would have to find another path around the block – a potential distance of 2,300 feet instead of the 1,200 feet proposed. Assuming a viable path exists this longer path would at least double the cost of both the civil and electrical components of the project.

Basis for Project Estimates
The Basis of these estimates are based on historical projects and current material prices from the manufacturers detailed below:
• Engineering /Management time
• Materials Cost from the vendor (Ductbank, Splice chambers)
• Materials Cost stockroom items (Primary Secondary Cable, Splices,)
• Labor cost from the vendor to install splice chamber and duct bank.
• Labor cost to install Primary and Secondary Cables.
• Labor cost to cutover each circuit.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 200**	$ -	$ -	$ 120	$ 80	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 3,433**	$ -	$ -	$ 2,060	$ 1,373	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 33**	$ -	$ -	$ 20	$ 13	$ -
# Internal, Overheads	**$ 306**	$ -	$ -	$ 184	$ 123	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ 450**	$ -	$ -	$ 270	$ 180	$ -
Total	**$ 4,423**	**$ -**	**$ -**	**$ 2,654**	**$ 1,769**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 4,423	$ -	$ -	$ 2,654	$ 1,769	$ -

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Chapel Street Splice Chamber and Duct-Bank Remediation

Between Church and State Street in New Haven

PRJ-005563

Index

1. Project Description (Summary) 3
2. Existing Conditions 4
3. Need Statement 8
4. Engineering 9
5. Project Benefits 10
6. Project Milestones 10
7. Project Assumptions 11
8. Maps or Electrical Design 12

1. Project Description (Summary)

The existing UI underground civil/electrical facilities along Chapel Street between Church Street and State Street is over 100 years old. The civil system cannot supply additional load without expansion. This project would provide additional underground splice chamber and duct-bank infrastructure space in downtown New Haven in the area referred as the "**Lower Chapel Street Neighborhood**". The proposed civil path would tie into civil work completed in 2023 with the installation of a new 16'x9'x7' triangular splice chamber at the intersection of Church and Chapel Streets to provide for new service to the new 848 Chapel Street building.

The objective of the project is to create a new 8-way conduit path between SC2050 at the intersection of Church and Chapel to SC13 at the intersection of Chapel with State. This would consist of the reconstruction of existing brick and rail roof style SC31 at the corner of Chapel and Orange Streets, installation of a new 6'x14'x7' splice chamber in place of SC142 and a new 6'x14'x7' splice chamber on Chapel Street and the installation of approximately 1,400 feet of an 8-way, 4" encased PVC conduit bank along Chapel Street connecting the chambers. It would allow for the removal of three brick splice chambers (Sc31, SC141, SC142) and roughly 500 feet of the 4-way tile duct. The proposed civil work is:

- Install a new splice chamber, 6x14x7, at the intersection of Chapel and State.
- Install 50' 8-4" conduit system from new chamber to SC13.
- Remove existing SC142 and install a new splice chamber, 6x14x7, same location.
- Install 400' 8-4" conduit system from the new chamber to new SC142; remove 400 feet of the existing 4-way tile system; remove existing SC142
- Rebuild SC31 in place; overcast, new size to be at least 5x12x7
- Install 400' 8-4" conduit system between new SC142 to SC31
- Install 410' 8-4" conduit system between rebuilt SC31 to SC57
- Install 100' 8-4" conduit system between SC57 and SC2050
- Redirect temporarily street light supply. Remove the network secondary between SC144 and SC142. Remove network secondary between SC139 and SC142. This allows removal of SC142.
- Install ground ring, racks, and hooks at new SC142 and new chambers. Install network secondary from SC13 to new chamber to new SC142 (500'). Re-establish permanent street light supply.
- Install protective blankets and support the cables at SC31 to allow for the rebuild. Install ground ring, racks, and hooks at completion of rebuild.

Table 1. Budget Request for the Recommended Option

	2026	2027	Total
A.F.U.D.C.	$120,000	$80,000	$200,000
Cost of Removal External OH	$89,880	$59,900	$149,780
Cost of Removal - External Serv	$206,000	$137,300	$343,300
External Services	$2,060,000	$1,373,300	$3,433,300
Internal Labor	$20,000	$13,400	$33,400
Overheads, Internal	$183,840	$122,570	$306,410
Overheads, External	$269,930	$179,960	$449,890
Total	**$2,949,650**	**$1,966,430**	**$4,916,080**

2. Existing Conditions

Currently there are two splice chamber and duct-bank systems along Chapel Street between Church and State Streets: on the northern and southern sides of the roadway. Each system is roughly 1,200 feet in length. There are multiple chambers of varying sizes, installed prior to 1920 and all are brick built with brick and rail roofs. The conduits are 3.5" tile with some that are partially blocked due to settling. Most of the buildings in this area of Chapel Street are supplied from the low voltage secondary network. There are six network vaults along the path.

At the intersection of Church with Chapel, UI has placed a new chamber and new conduits to facilitate providing service to a new building on Chapel Street. The new service exceeded the supply capability of the secondary network in the area. This new chamber, SC2050, was connected to two existing chambers, SC1768 and SC150, with 4" PVC conduits.

The existing chambers along the southern path are narrow brick-built chambers (4' and 5' wide), with a brick and rail roof. The connecting duct system is an 8-way tile system. The installation date for the chambers is 1907. Field inspections found that the tiles have shifted slightly resulting in partial blockage of the spares. Additional conduits (4" Schedule 40 PVC) cannot be added to the existing brick chambers without compromising structural integrity. There is a lack of space to install, train, and rack additional cables in the chambers.

The northern civil path along Chapel Street consists of similar brick chambers with brick and rail roofs. Most of these chambers are very small since they are/were only used for secondary cables. The connecting duct system in this path between Orange Street and State Street is a 4-way tile system. The installation date for the chambers is 1907. A

portion of the system, from SC141 to SC142 to SC12 is no longer usable. The connecting duct system between Church and Orange Street a tile system.

There are multiple underground utilities besides UI along Chapel Street between Church Street and State Street. The result is an extremely limited space to place any new underground electrical facilities. UI Distribution Engineering and Civil Construction has confirmed there is a 3' wide corridor with Chapel Street from Church Street to Orange Street with a series of test pits in 2023 when working on the new service installation to the new 808 Chapel Street building. This 3' wide corridor could accommodate the installation of a new duct-bank. There is no space between Church and Orange for UI to enlarge the existing chambers nor install new ones. Between Orange and State along Chapel, the road is a bit wider, with a space to enlarge a chamber or two.



This is a photo of the existing condition of SC #147 on Chapel Street between Church and Orange Streets. This chamber is brick walls with brick and rail style roof.



This is a photo of the brick and rail style roof for SC #151 on Chapel Street east of Church Street. This chamber is very narrow (only 39" wide). The narrow width restricts the ability to add additional cables. The end wall does not have space for additional conduits.



This is a photo of SC #145 on Chapel Street west of West of Orange Street. It is brick walls, brick and rail roof and very narrow (39” wide).



This is a photo of SC #147 on Chapel Street east of Church Street. It is shallow, brick walls, brick and rail roof and very narrow (only 38" wide).

3. Need Statement

The existing UI underground civil/electrical facilities along Chapel Street between Church Street and State Street is over 100 years old. The 13.8kV supply circuits for the low voltage secondary network in New Haven pass through these facilities along with multiple sets of low voltage secondary cables. The civil system cannot supply additional load without expansion. Additionally, there is the possibility that a faulted network primary circuit cable could not be replaced. There is a very limited amount of available underground infrastructure to provide capacity to supply the expanding downtown area of New Haven. There is limited available lane assignment for placing additional underground utilities.

The construction of the new 808 and 848 Chapel Street buildings in 2023 and the current 300 State Street development under construction are examples of the growth in the downtown area. There is the potential for additional buildings and load growth in the area. New underground facilities for UI can take two to three years from design to

construction completed. UI should react now by designing and installing 1,200 feet of new underground duct-bank while there is an available lane assignment. The replacement, expansion, or additional underground facilities along Chapel Street would position UI to meet the growth.

4. Engineering

Option 1 – Establish New Underground Path

This is the recommended Option.

Civil

Create a new 8-way conduit path between SC2050 at the intersection of Church and Chapel to SC13 at the intersection of Chapel with State. This would consist of the reconstruction of existing brick and rail roof style SC31 at the corner of Chapel and Orange Streets, installation of two new 6'x14'x7' splice chambers on Chapel Street and the installation of approximately 1,200 feet of an 8-way, 4" encased PVC conduit bank along Chapel Street. It would allow for the removal of three brick splice chambers and roughly 500 feet of the 4-way tile duct. The proposed civil work is:

- Install a new splice chamber, 6x14x7, at the intersection of Chapel and State.
- Install 50' 8-4" conduit system from new chamber to SC13.
- Remove existing SC142 and install a new splice chamber, 6x14x7, same location.
- Install 400' 8-4" conduit system from the new chamber to new SC142; remove 400 feet of the existing 4-way tile system; remove existing SC142.
- Rebuild SC31 in place; overcast, new size to be at least 5x12x7.
- Install 400' 8-4" conduit system between new SC142 to SC31.
- Install 410' 8-4" conduit system between rebuilt SC31 to SC57.
- Install 100' 8-4" conduit system between SC57 and SC2050.

Electrical

In preparation of the civil work:

- Redirect temporarily street light supply. Remove the network secondary between SC144 and SC142. Remove network secondary between SC139 and SC142. This allows removal of SC142.

At the completion of the civil work:

- Install ground ring, racks, and hooks at new SC142 and new chambers. Install network secondary from SC13 to new chamber to new SC142 (500'). Re-establish permanent street light supply.
- Install protective blankets and support the cables at SC31 to allow for the rebuild. Install ground ring, racks, and hooks at completion of rebuild.

Option 2 – Do Nothing

U.I. Distribution Engineering and Civil Construction has confirmed there is one remaining 3' wide corridor on Chapel Street from Church Street to Orange Street with a series of test pits in 2023 when working on the new service installation for the new 808 Chapel Street building. This 3' wide corridor can accommodate the installation of a new duct-bank as depicted above. If U.I. does not act now and install a new duct-bank within this available corridor, we run the risk of another utility (communications) installing their infrastructure. UI would have to find a path around the block – a potential distance of 2,300 feet instead of the 1,200 feet proposed. No action presents the risk of not having suitable available underground infrastructure to be able to connect new service to the growing number of customers redeveloping the older buildings in this neighborhood. There is also the risk of not being able to replace a faulted network supply or secondary cable.

5. Project Benefits

The duration of underground infrastructure remediation can take two to three years. With this project, UI would be planning, engineering, and constructing in a "pro-active" approach in keeping pace with the remediation and upgrading of the UI underground infrastructure. This would allow UI to be able to supply and connect the new customer load or developing properties in this area in a timely manner.

6. Project Milestones

Assuming the project is authorized to proceed, Distribution Engineering expects the following milestones and durations. The civil construction would be divided into two sections to accommodate traffic detours and City of New Haven moratoriums. One section would be Church to Orange and the other section would be Orange to State.

1. Engineering Distribution Design Completed for Civil – March 2025
2. Civil Work starts – September 2026

3. Civil Work completed – May 2027
4. Electrical work starts – July 2027
5. Electrical work completed – October 2027
6. Project closeout completed – Dec 2027

7. Project Assumptions

- The City of New Haven will approve all traffic plans submitted for this project in a timely manner and issue all required permits to U.I. 's civil contractor.
- No other utility will install any new infrastructure within the last available 36" wide corridor on Chapel Street between Church and Orange Streets.
- This project will be approved internally within U.I. in a timely manner.
- All materials (SC's, conduit, concrete, etc. will be readily available as needed.

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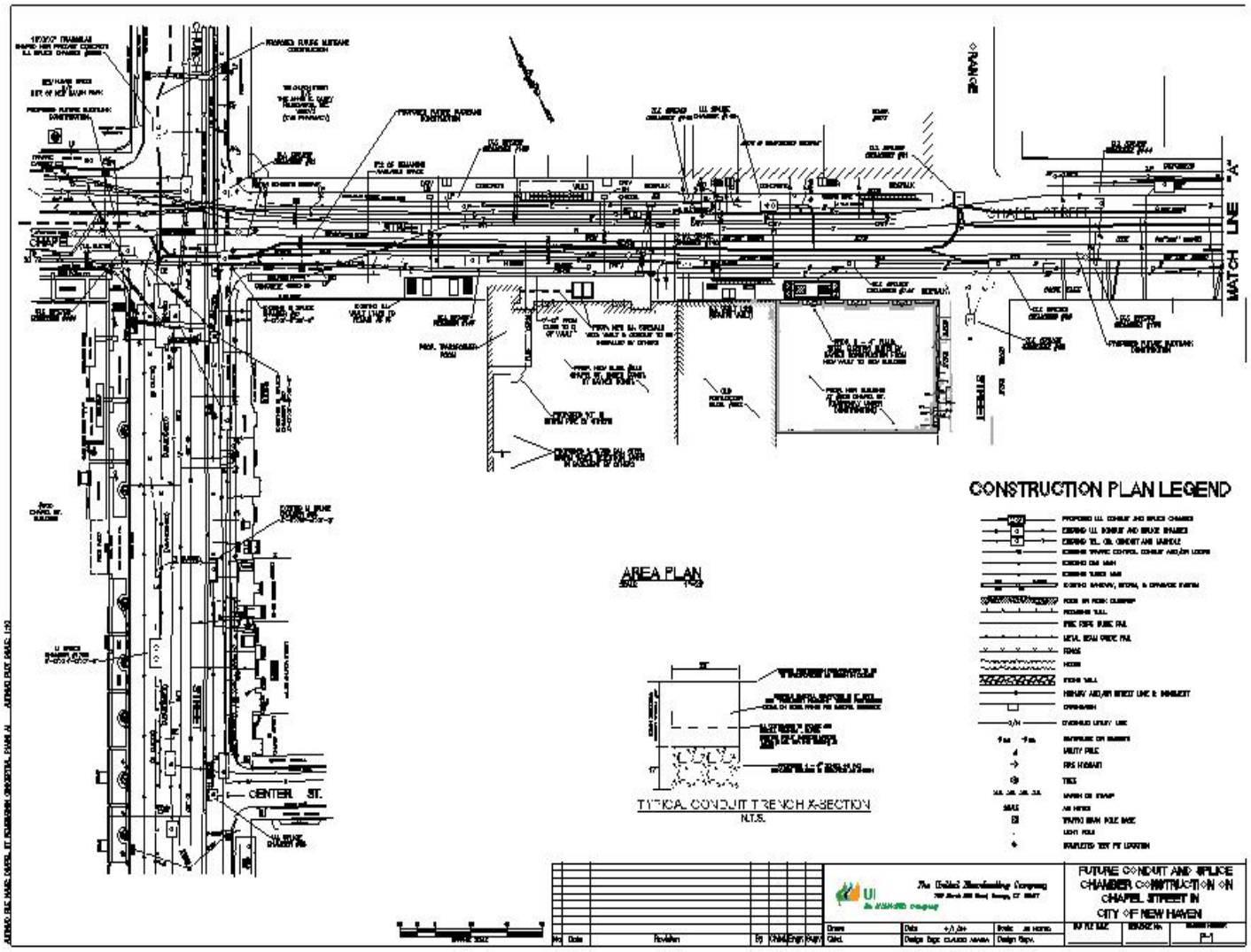
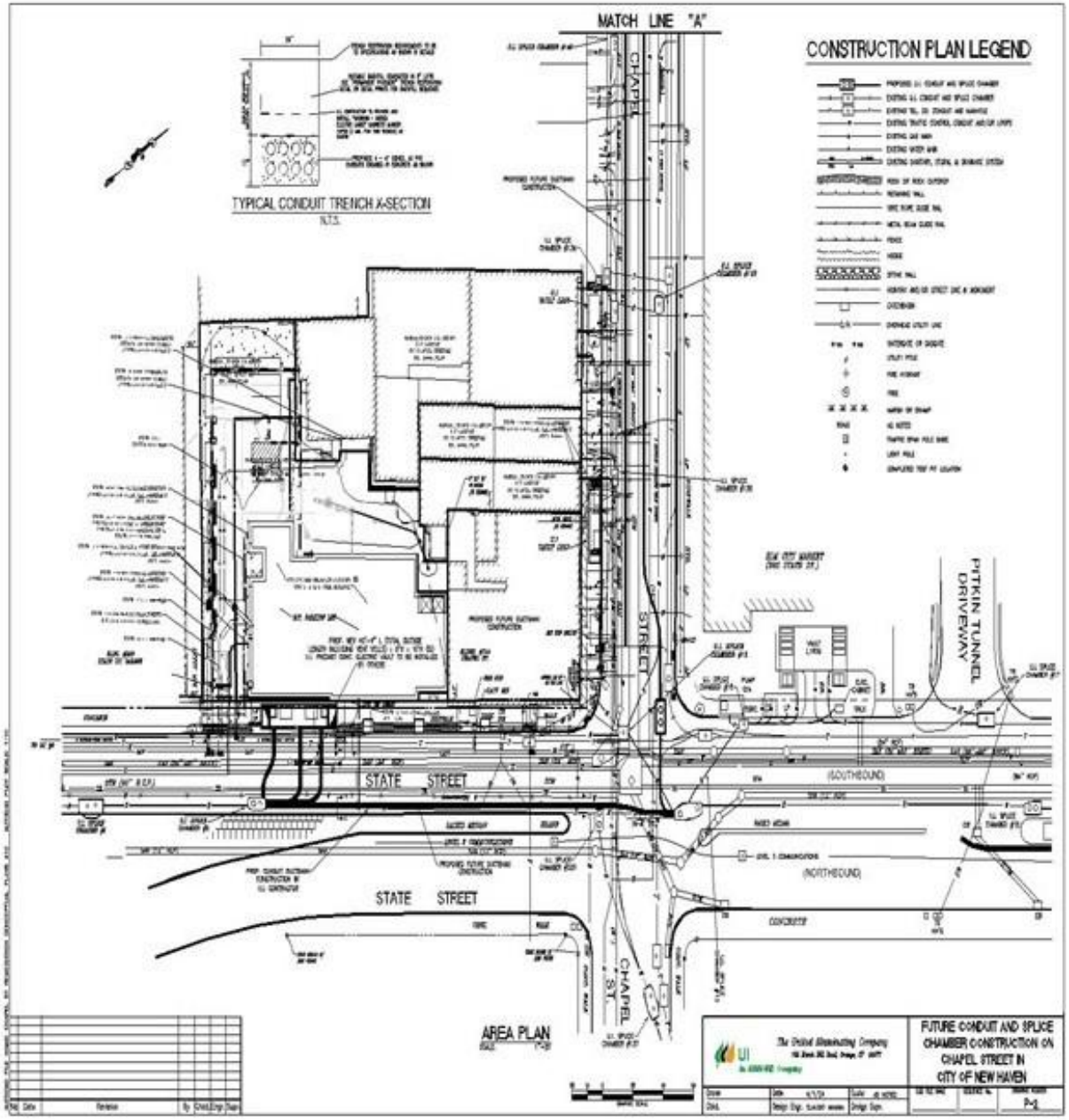
8. Maps or Electrical Design

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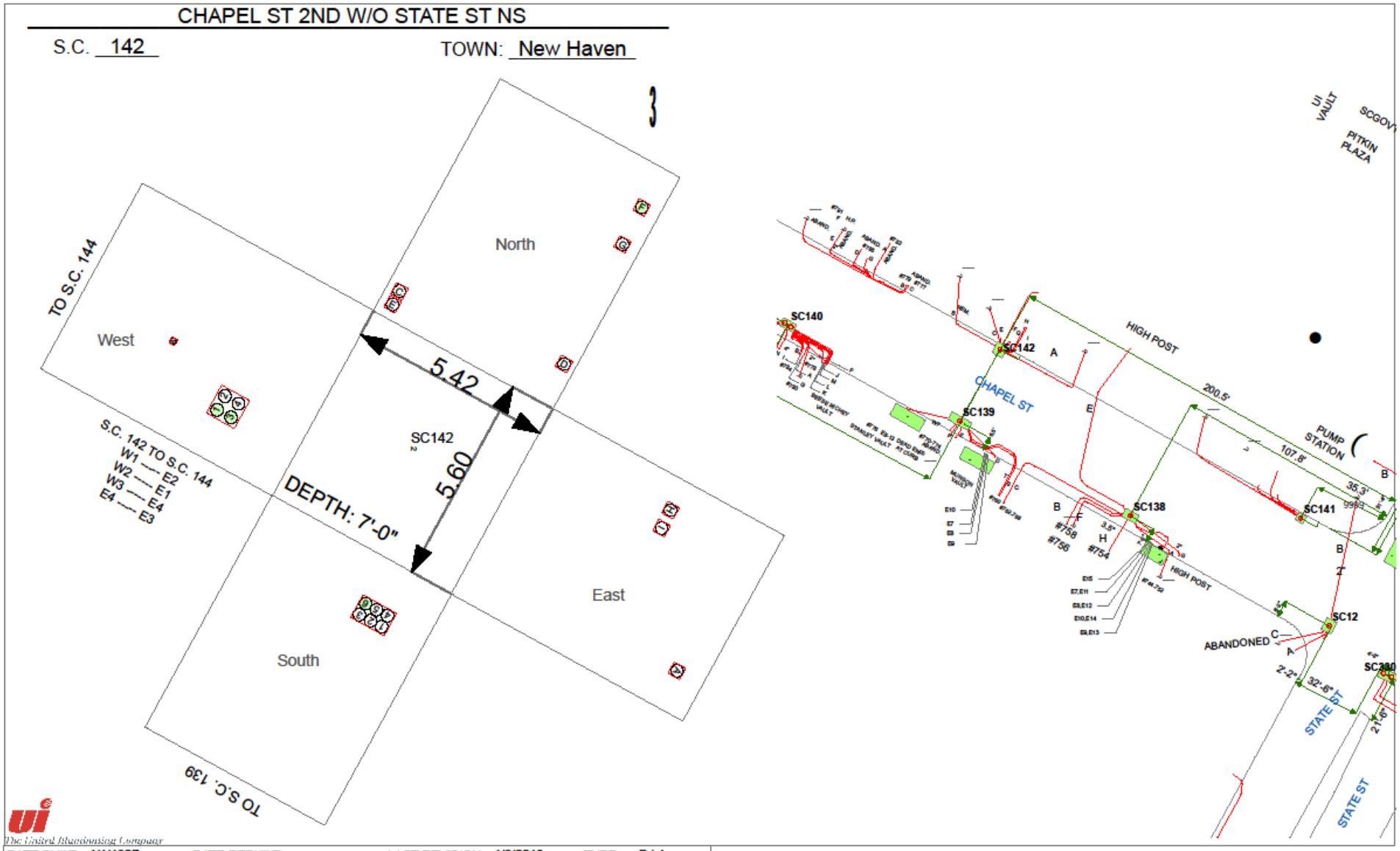
PITKIN TUNNEL DRIVEWAY
STATE STREET
(SOUTHBOUND)
(NORTHBOUND)
STATE STREET
CHAPEL ST.
AREA PLAN
FUTURE CONDUIT AND SPLICE CHAMBER CONSTRUCTION ON CHAPEL STREET IN CITY OF NEW HAVEN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5.60
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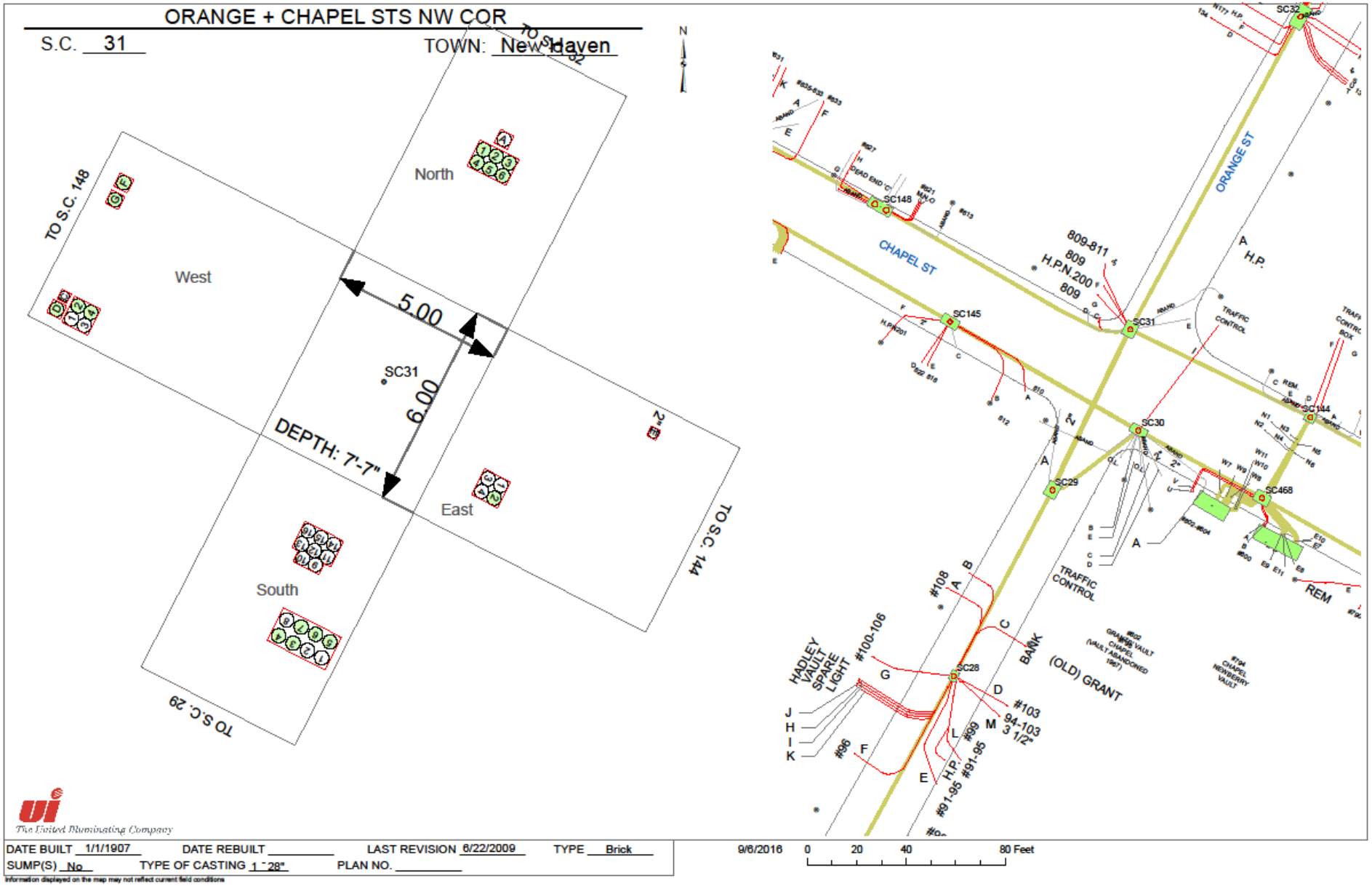
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LAST REVISION 6/22/2009
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PRJ-002131

UI - Splice Chamber Rebuilds CAP

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Splice Chamber Rebuilds CAP

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002131	Electric Distribution	Lyons, Robin	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Infrastructure Replacement - Dist	IP4 Change	Program - Ongoing	Program - Ongoing

Project description:

The Company owns and maintains approximately 3,000 underground splicing chambers. Many of these chambers are located under public roads. Chamber infrastructure continues to age with many approaching greater than 60 years old. These older chambers tend to be constructed with roofs supported by steel railroad rails and bricks. As these rails age, the direct contact of the steel in commonly wet environments, are susceptible to high levels of corrosion. Additionally, prior to the 1950s, these structures were typically constructed with dimensions that do not meet current working clearance requirements.

The Company executes an inspection process for splicing chambers by incorporating a methodology to assess the condition of the chambers and to prioritize action items. The key replacement criterion for spicing chambers is the structural integrity of the roof and walls, along with NESC working clearances.

Deficient chambers are also discovered during the design phase of a capital, customer, or reliability projects.

This program reserves the funds intended for future individual projects.

The Company executes an inspection process for splicing chambers by incorporating a methodology to assess the condition of the chambers and to prioritize action items. The key replacement criterion for spicing chambers is the structural integrity of the roof and walls and the working clearances.

Deficient chambers are also discovered during the design phase of a capital, customer or reliability projects.

This program reserves the funds intended for future individual projects.

Project Scope:

Scope of work for 2025

• Build 75ft of duct bank remediation between vault location 270 and splice chamber SC 865 in New Haven.

Scope of work for 2026

• Build 355ft of duct bank remediation between splice chamber SC1314 and splice chamber 1315 in New Haven.
• Build 230ft of duct bank remediation between splice chamber SC996 and SC105 in New Haven.
• Build 550ft of duct bank remediation between splice chamber SC156 and splice chamber SC94 in New Haven

Project Benefits:

The Splice Chamber Rebuild Program replaces underground cable splicing structures before they fail which could cause bodily injury or an extended system outage. By prioritizing these structures based on an annual inspection program, a systematic approach can be taken to design, procure and construct the replacement structures before failure. Replaced structures comply with the latest version of the NESC and the latest advances in materials. These projects are costly, complicated, and impactful to the local communities because they impact busy urban roadways. The Company's strategy is to mitigate these risks steadily over time, to avoid lengthy widespread outages to public and safety impacts.

Project Risks and Mitigation Plan:

Based on feedback from inspection program and work executed in splice chambers, chambers needing remediation are individually evaluated and prioritized.

Some common risks in remediation of these chambers include the following items. There is minimal space around current chamber to rebuild in place causing a new chamber to be built and duct banks to be reconnected to new location. Ether in planning phase of project or during construction phase, contaminated soil may be discovered and that needs additional environmental work. To mitigate these risks, detailed investigations are preformed whenever possible during early development and planning stages. These may include performing soil sampling or test pits where work is planned to be performed.

To help mitigate risks, each project goes through an engineering and financial review per company procedures, before any civil or electrical work is started.

Risk of No Action:
The risk of no action can cause safety concerns for both utility employees and public.

The risk of not doing anything in these situations could be as catastrophic as a roof collapse while a car or truck is over the chamber, or to collapse on high voltage circuits leading to extended commercial and residential outages. As the nearly 3000 splice chambers continue to age in the UI territory, structural and electrical deficiencies will be discovered. These chambers are inspected on a minimum of a 10-year bases. Not keeping up with the smaller deficiencies when discovered, can lead to potentially more costly, complicated solutions, with larger customer impact.

Project Alternatives:
Each Splice chamber is evaluated on an individual bases. Possible solutions could be: rebuild in place, replace with new, or a simple roof replacement.

Additionally, where a deteriorated chamber is found and alternative circuit routes are available, a chamber can be reviewed for demolition. This re-routing of circuits through alternative paths however can be more costly than rebuilding of the existing chamber or may cause other consequences such as circuit de-rated due to thermal constrains of having circuits near each other. This thermal issue shows up most common in highly utilized duct banks between splice chambers.

Basis for Project Estimates
The cost estimate for this project is based off a ground up estimate and include the following:
• Engineering /Management time
• Materials Cost from the vendor (Splice chambers, duct bank,)
• Labor cost to install splice chambers.
• Labor cost to install duct bank in New Haven.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 4**	$ 4	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 12,483**	$ 268	$ 357	$ 1,857	$ 4,286	$ 5,714
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 21**	$ 21	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 1,130**	$ 55	$ 31	$ 163	$ 377	$ 503
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ 1,613**	$ 78	$ 45	$ 233	$ 539	$ 718
Total	**$ 15,252**	**$ 427**	**$ 433**	**$ 2,254**	**$ 5,202**	**$ 6,936**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 15,016	$ 191	$ 433	$ 2,254	$ 5,202	$ 6,936

Note: 2024 Plant Additions includes the entire calendar year

UI
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Splice Chamber Remediation Program



Engineering Project PRJ-002131
Splice Chamber Remediation Program

Prepared by:

Distribution Engineering

Date of Report: 10/03/2024

Index

1. Project Description (Summary) 3
2. Existing Conditions 3
3. Need Statement 3
4. Engineering 4
5. Project Milestones 11
6. Project Assumptions 12
7. Engineering Recommendations ..... **Error! Bookmark not defined.**
8. Maps or Electrical Design 12

1. Project Description (Summary)

The Company owns and maintains approximately 3,000 underground splicing chambers. Many of these chambers are located under public roads. Chamber infrastructure continues to age with many approaching greater than 60 years old. These older chambers tend to be constructed with roofs supported by steel railroad rails and bricks. As these rails age, the direct contact of the steel in commonly wet environments are susceptible to high levels of corrosion. Additionally, prior to the 1950s, these structures were typically constructed with dimensions that do not meet current NESC working clearance requirements.

The Company executes an inspection process for splicing chambers by incorporating a methodology to assess the condition of the chambers and to prioritize action items. The key replacement criteria for spicing chambers are the structural integrity of the roof and walls, as well as with NESC working clearances.

Deficient chambers are also discovered during the design phase of a capital, customer, or reliability projects.

This program reserves the funds intended for future individual projects.

2. Existing Conditions

Maintenance inspections for every splice chamber are performed on a minimum 10-year basis. Every year approx. 300 (10%) are inspected by this program and another approx. 100 are inspected as part of other company work being performed in the chambers.

Depending on the found deficiency and severity a complete replacement or partial remediation may be required. Structures that only have a deteriorated roof may require just a roof replacement. Splice chambers that have significant structural deterioration present in the walls or floor or are not in compliance with the latest version of the NESC for horizontal working clearance must be wholly replaced.

During replacement of these chambers, connecting duct banks are also evaluated. Some of the chambers in the system are approaching 100 years old along with the duct banks as well. Technology and materials have improved greatly since these where installed. At the time, it was not uncommon to utilize sections of clay conduit. These sections can shift and collapse causing ducts to become unusable. Additionally, these conduits are of a smaller internal diameter compared to current standards which limits what cables can be installed in them. Another duct material that was used for a period of time in the UI territory was fiber. This duct construction consisted of layers of material with tar or similar compound impregnating them. Unfortunately, as this conduit material ages and absorbs water, blisters and swelling occur, causing the conduits to become unusable.

3. Need Statement

The Splice Chamber Rebuild Program replaces underground cable splicing structures before they fail which can lead to bodily injury or an extended system outage. By prioritizing these structures based on an annual inspection program, a systematic approach can be taken to design, procure and construct the replacement structures before failure. Replaced structures comply with the latest version of the NESC and the latest advances in materials. These projects can be costly, complicated, and impactful to the local communities because they impact busy urban roadways. The Company's strategy is to mitigate these risks steadily over time to avoid lengthy widespread outages to public and safety impacts.

4. Engineering

Each splice chamber location is evaluated on an individual basis. When it is possible, and the current chamber meets the latest applicable NESC code requirements the chamber may be a candidate for partial replacement or rebuild. This might include overbuilding of a chamber, or a roof replacement that leaves existing walls and electrical in place.

Additionally, when a deteriorated chamber is found, and alternative circuit routes are available the chamber can be reviewed for demolition. The re-routing of circuits through alternative paths can be more costly than rebuilding of the existing chamber or may cause other consequences such as circuit de-rated due to thermal constrains of having circuits near each other. This thermal issue shows up most commonly in highly utilized duct banks between splice chambers.

Depending on structural issue, the following are potential options or combination of options that can be chosen to mediate the issue. This is not an all-inclusive list. The estimates are based on previous similar projects.

Option 1 (Do Nothing)
The risk of no action can cause safety concerns for both utility employees and the public. An example of this is deterioration in the structural integrity of a roof or wall. The risk of not doing anything in these situations could be catastrophic such as: a roof collapse while a car or truck is over the chamber, or collapsing on high voltage circuits that can lead to extended commercial and residential outages. As the nearly 2800 splice chambers continue to age in the UI territory, structural and electrical deficiencies will be discovered. These chambers are inspected on a minimum of a 10-year bases. Not keeping up with the smaller deficiencies when discovered, can lead to potentially more costly, complicated solutions, with larger customer impact.

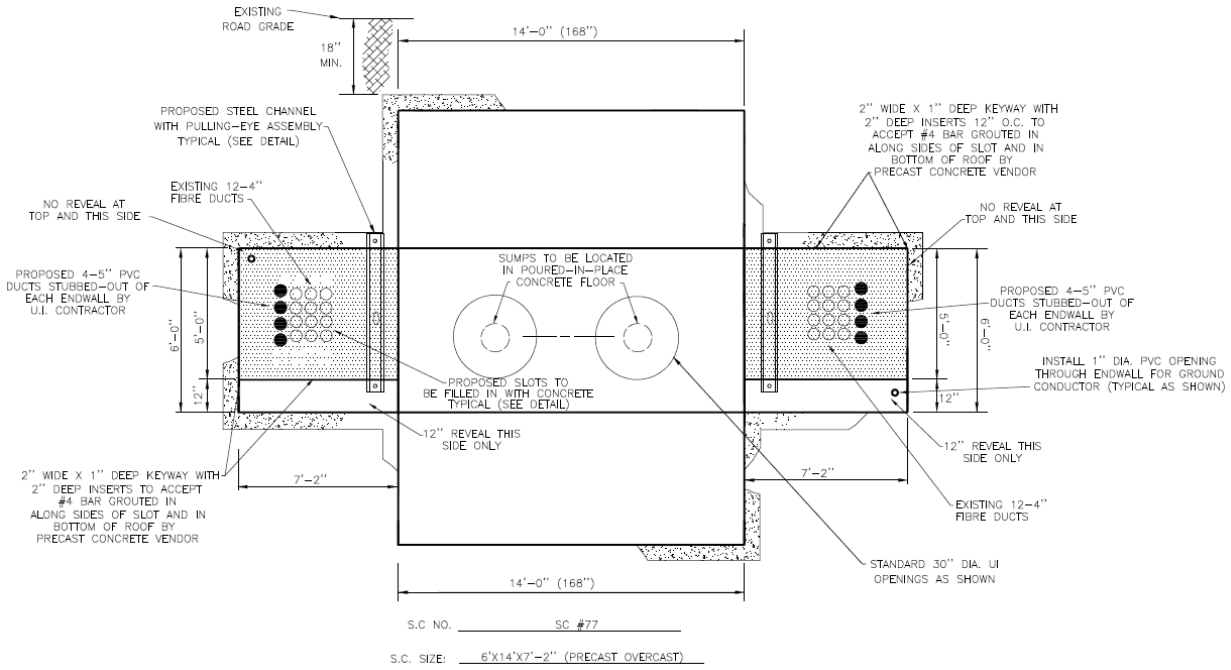
When chamber issues are beginning to present themselves, the decision may be made to monitor the defect on a more timely basis. This does not solve the underlying cause, but can help discover potential other pitfalls, such as the chamber continuing to shift. This information can lead to re-prioritizing of this chamber as a higher priority for remediation work.

Option 2 (Rebuild chamber in place)

There are two commonly used options to rebuild a chamber without the need to rebuild connecting duct banks. Depending on available underground real estate, there is also the potential to increase the chamber size. However, due to current cable lengths, electrical work is commonly needed to allow for required cable slack needed to re-rack the cables. The two commonly used remediation methods allowing the chamber to be rebuilt in place are: utilization of a precast structure or utilizing built in-place block structure with a precast roof. The following contain simplified estimates for just the civil portion of the work, not including demolition of the old chamber or electrical cutovers.

Overcast Built Chamber (Pre-Cast Chamber)

Design and construct an overcast splice chamber to replace current splice chamber. The new chamber is to be in accordance with all UI design criteria and construction standards. In addition to meet all applicable NESC standards. The following is an example design of an overcast splice chamber installed in Derby CT.



Risks

1. Encounter contaminated soil, requiring remediation.
2. There is not enough room to install a larger chamber in current chambers location. Pit needs to be larger than new external dimensions to allow for needed for safety shoring.
3. Discover ledge or similar soil condition in area of excavation.

Advantages

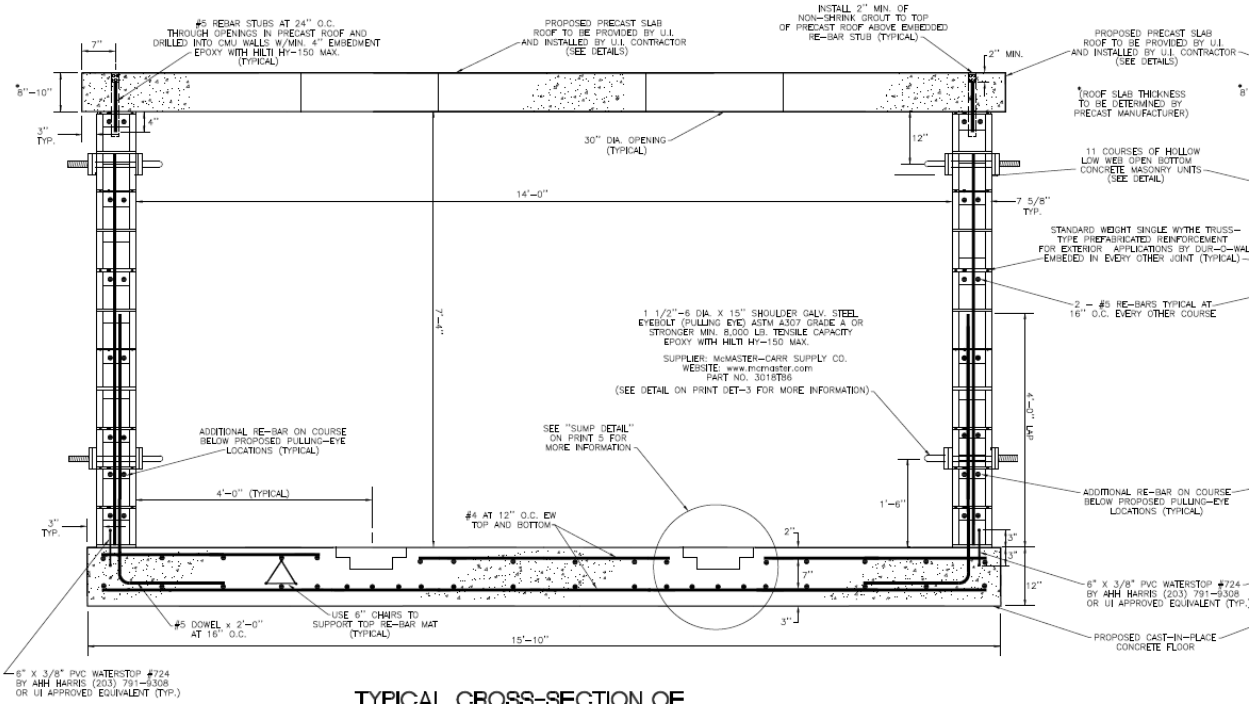
1. Civil work can be performed without need to de-energize chamber circuits.
2. Possibility of performing structural remediation without needing to do electrical circuit cutovers. However, commonly the chambers are made larger to meet NESC standards. When this enlargement occurs, there are times there is not enough slack in cables to re-rack on walls. If this occurs new HV cable may need to be installed.

Disadvantages

1. Increased potential risk to UI personnel and contractors from working around energized cables.

Overcast Built Chamber (Block Build)

Design and construct a block splice chamber to replace current splice chamber. Original chamber will be demolished. Compared to an overcast chamber, this chamber's walls are built onsite out of cement construction block, and a pre-cast roof is placed on the chamber. While the overcast has a singular monolithic cast section including the walls and roof produced at a precast concrete company. The new chamber is to be built in accordance with all UI design criteria and construction standards. In addition to meet all applicable NESC standards. The following is an example design of a block-built splice chamber installed in Derby CT.



TYPICAL CROSS-SECTION OF

Risks

1. Encounter contaminated soil, requiring remediation.
2. There is not enough room to install a larger chamber in current chambers location. Pit needs to be larger than new external dimensions to allow for needed for safety shoring.
3. Discover ledge or similar soil condition in area of excavation.

Advantages

1. Allows work to be performed without safety concern of working around energized circuits.
2. Lower overhead clearance requirement compared to pre-cast methods.
3. Can have more irregular shaped walls as needed.

Disadvantages

1. Circuits must be cutover to run through new chamber.
2. Takes longer to construct then other methods.
3. More complicated than alternate of rebuild in place methods.

Option 3 (Build New Chamber Next to Original Chamber)
A new chamber would be built near to the existing chamber. New duct bank would be installed to connect the new chamber to the existing chamber system. All circuits in old chamber would be re-routed through new chamber. Finally, the old chamber would be demolished. The following is an overview of the civil construction of the new chamber, it does not take into account new duct bank, electrical cutovers, or demolition of old splicing chamber. The new chamber is to be in accordance with all UI design criteria and construction standards. In addition to meet all applicable NESC standards.

Risks

1. Encounter contaminated soil, requiring remediation.
2. There is not enough room to install a new chamber while keeping existing chamber in place.

Advantages

1. Allows work to be performed without safety concern of working around energized circuits.

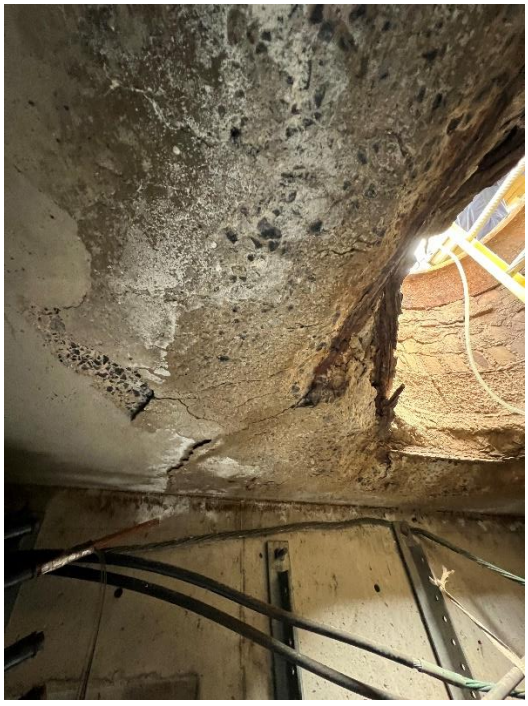
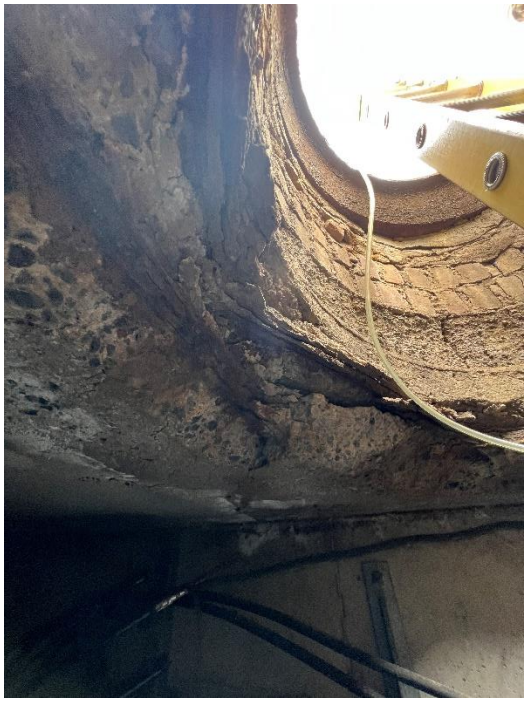
Disadvantages

1. Circuits must be cutover to run through new chamber.

Option 4 (Repair Current Splice Chamber)
Where only a roof is presenting structural degradation and current chamber meets latest NESC clearance requirements, there may be the possibility of doing a roof replacement. This is most common on older splice chambers that have a roof produced with trolly tracks and brick. These roofs have exposed sections of train rail that in the UI territory came from dismantling of the trolley system. With the dampness and exposure to ice treatments, these rails can show high levels of degradation. These roofs also are not approved to meet latest loading standards.




While roof replacement is more common with chambers build with brick and rail, there are times where a cast in place or a precast roof needs replacement. These roof replacements are more complicated since the old roofs need to be saw cut from the top of the chamber compared the brick and rail that can be lifted off in sections without cutting. As such the cost to perform a roof replacement on a pre-cast structure costs approx. 1.8 times that of a brick and rail replacement. This is due to fact the precast roof must be cut off the top of the existing chamber. The following is an example *emergency* roof replacement that occurred in 2023.

Roof Replacement of a Brick and Rail Roof Chamber

Removal of the current chamber roof and replacement with new precast chamber roof in a method applicable to local and state codes. The new roof will be constructed to meet latest company load specifications.

Risks

1. Encounter contaminated soil, requiring remediation.

Advantages

1. Can be performed without need to remove or de-energize circuit cables from chamber.

Disadvantages

1. Does not remove risks with existing wall construction.
2. Exposes workers to energized cables while performing civil work.

Option 5 (Demolition of Current Splice Chamber)

Where a chamber is no longer useful to the company or customers, the decision may be decided to remove the chamber. This is commonly in conjunction with new splice chamber builds or loss of customer load in a given area.

Demolition of Splice Chamber

Removal of the current chamber in a method applicable to local and state codes. This may include full removal, flow filling the chamber, or roof removal and filling.

Risks

1. Encounter contaminated soil, requiring remediation.

Advantages

1. Removes need to upkeep and inspect asset.
2. Allow for location in street or right of way for other utility to utilize.

Disadvantages

1. Loss of a potential path for future electrical circuits to take.

Option 6 (Duct Bank Replacement)
Duct banks connect all of the spice chambers together allowing for cables to pass between the chambers. A duct bank can be as small as a single conduit or have more than 20 conduits in them. This size is based on current and proposed future needs to support the underground system at that specific location.

Conduit technology and materials have improved greatly since many of the older duct banks where installed. In older chambers, it was not uncommon to utilize sections of clay conduit. These sections can shift and collapse causing ducts to become unusable. These clay tile conduits are of a smaller internal diameter compared to current standards, limiting what cables can be installed in them. Another duct material used previously in the UI territory was fiber. This duct construction consisted of layers of material with tar or similar compound impregnating them. Unfortunately, as this conduit material ages and absorbs water, blisters and swelling occur, causing the conduits to become unusable.

Duct Bank Replacement

The most common sided duct bank in the UI system is a PVC conduit encased in concreate, arranged in a two wide by four tall configuration. Installation of a standard eight conduit duct bank in a method applicable to local and state codes, in parallel to existing duct bank. This does not account for any electrical cutovers, including cable work, needed to utilize the new duct bank.

5. Project Milestones

Based on feedback from inspection program and work executed in splice chambers, chambers needing remediation are individually evaluated and prioritized.

Some common risks in remediation of these chambers include the following items. There is minimal space around current chamber to rebuild in place causing a new chamber to be built and duct banks to be reconnected to new location. Either in the planning phase of project or during construction phase, contaminated soil may be discovered and that needs additional environmental work. To mitigate these risks, detailed investigations are preformed whenever possible during early development and planning stages. These may include performing soil sampling or test pits where work is planned to be performed.

Engineering offers the following common schedule for splice chamber remediation for consideration by the Team. This is not all inclusive and not all may be applicable to each chamber remediation.

1. Notice of splice chamber deficiency received either from inspection or alternative path.
2. Prioritization of splice chambers.

3. Engineering Design
4. Engineering and Financial initial review.
5. Field Work
6. Electrical Work such as circuit cutovers
7. Project Completion

6. Project Assumptions

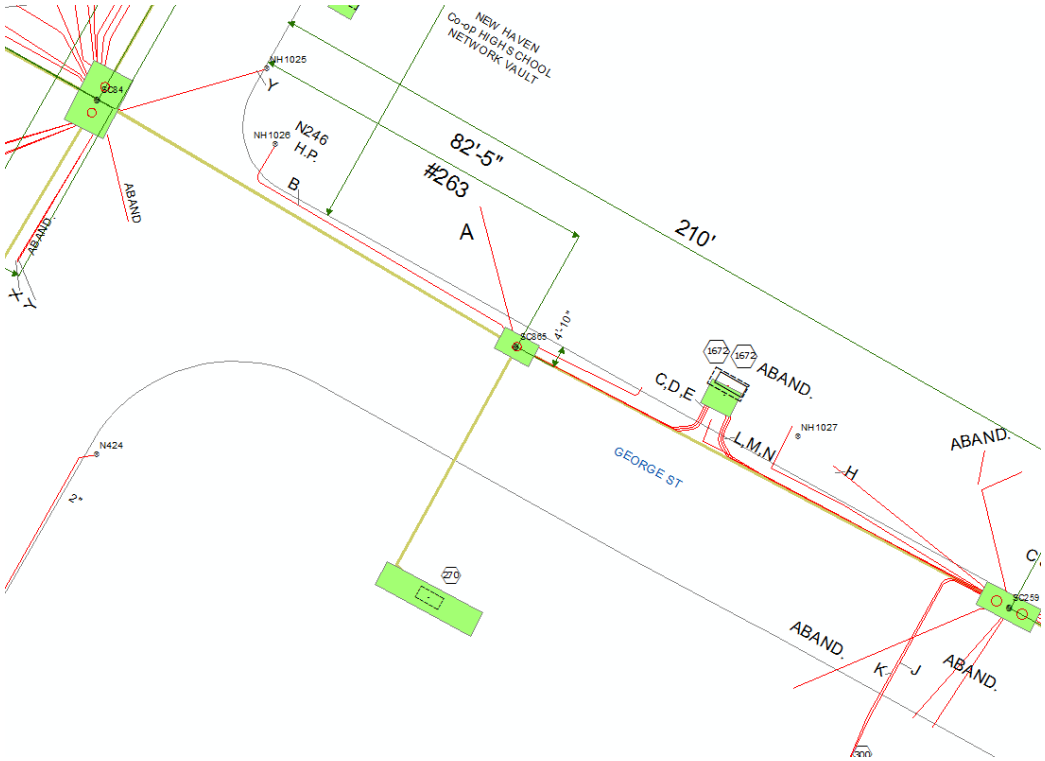
The following is the list of assumptions which were used to create the estimates for the proposed work.

1. All budgetary estimates are based on a work product in compliance with existing UI and/or industry accepted standards and specifications.
2. All construction techniques used to install, remove, or replace UI facilities will comply with any and all applicable Federal, State and Local regulations as well as UI Construction Standards.
3. UI will be able to obtain accurate and relevant base maps of above ground and underground utilities in the area of splice chamber remediation.
4. All UI construction work will be done during the normal business week and hours.
5. UI will not have to relocate any other utility structures to accommodate needed remediation.
6. Labor rates used in creating the estimates are based upon historical averages.
7. All dollars shown are in 2024 dollars and subject to change due to escalation in material, labor, and equipment rates at time of actual construction.
8. The base estimates are subject to the accuracy bandwidth as indicated within the estimate.
9. There would not be any issues to the site during or after the construction of the UI facilities that would limit or prohibit access by UI.
10. Minimal to no environmental remediation work is required.
11. No electrical work such as circuit cutovers is required to complete work.

7. Scope 2025

The 2025 scope of work includes a plan to remediate a duct bank between network vault location 270 and splice chamber 865. This location currently has six laterals running to it. Four of these conduits carry network secondaries to splice chamber 865. The other two conduits carry circuits 810 and 813 to feed the network transformers. To recover from unforeseen issues such as faults and to enable proposed attachment of this vault location

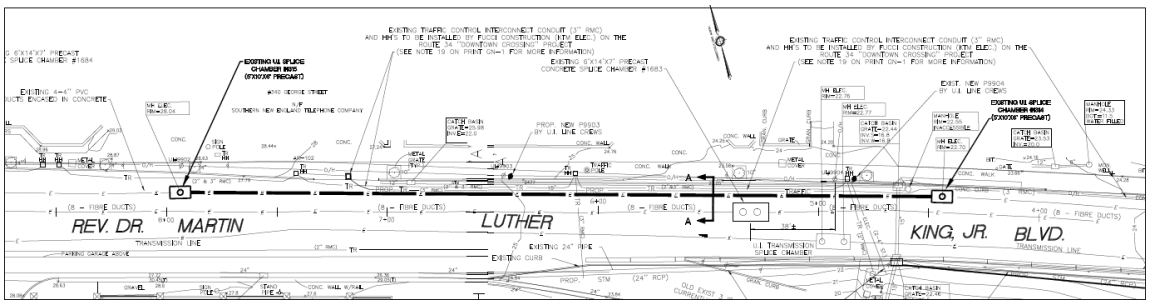
to the fiber optic monitoring network, it is proposed that two additional conduits be added. These conduits would either be 4in PVC encased in concrete or galvanized steel conduits.



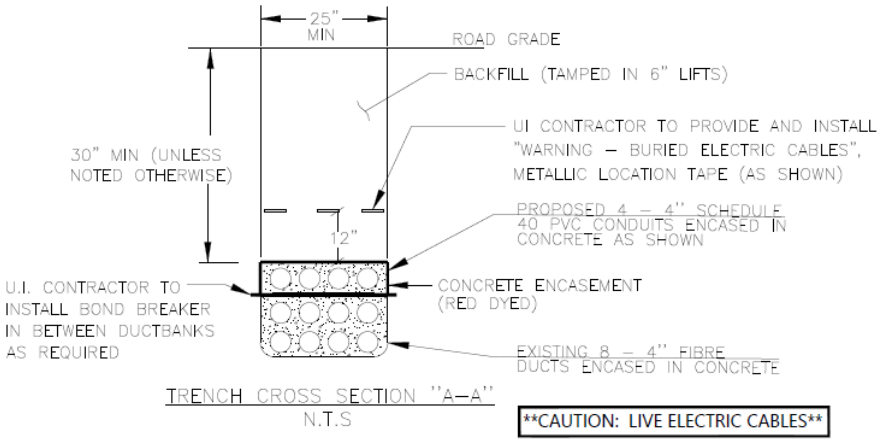
This 75-foot conduit path crosses two lanes of traffic and under the sidewalk. As such only approximately twenty feet of the conduit can pe installed per a day. This area is also in downtown New Haven and will require most work to be performed at night.

8. Scope 2026

The scope of work to be performed in 2026 includes a project to remediate a duct bank in New Haven on Martin Luther King Blvd. This specific duct bank is between splice chamber 1314 and splice chamber 1315 and has no available conduits in current eight conduit duct bank. This bank supports major circuits including those that service areas of the Yale Healthcare Facilities. If an issue occurred in this duct bank, such as a fault, a fix would take a significant amount of time. This would not only be a major risk to UI SAIFI and CAIDI indices, but also potentially to yale patients. The four unused conduits of this duct bank are all clogged at a depth ranging from 30ft to 155ft from splice chamber 1314. It is proposed to install 355 feet of additional four conduit duct bank between these two chambers to support both emergency work and future needs.

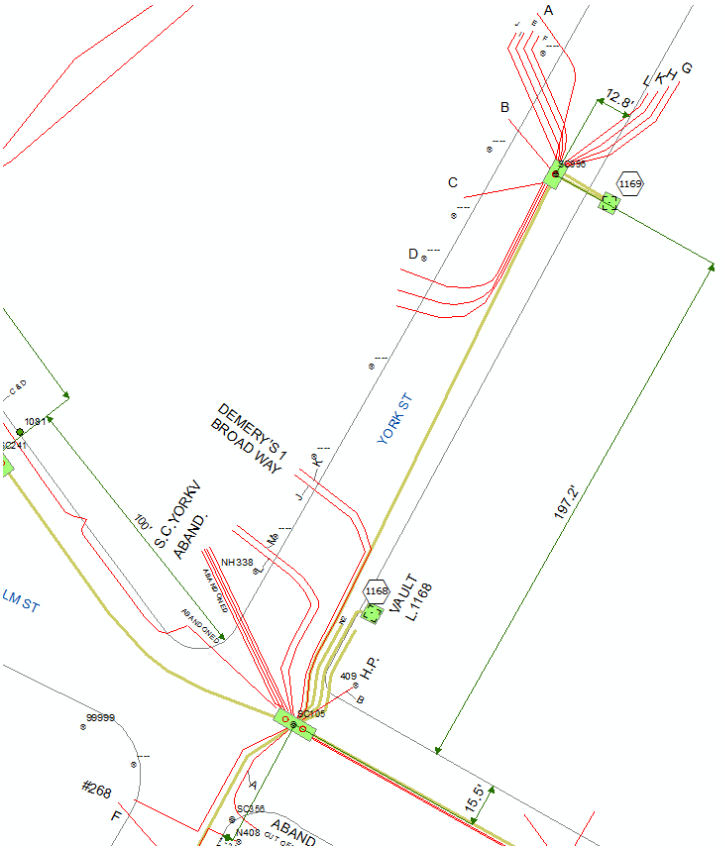


The proposed duct bank would be in a four conduits wide, one tall pattern placed directly above the existing duct bank. The four-inch diameter PVC schedule 40 conduits would be encased in red dyed concrete. Warning tape will be buried 12 inches above the concrete encasement. Work will be performed without de-energizing of existing circuits, limiting impact to customers.

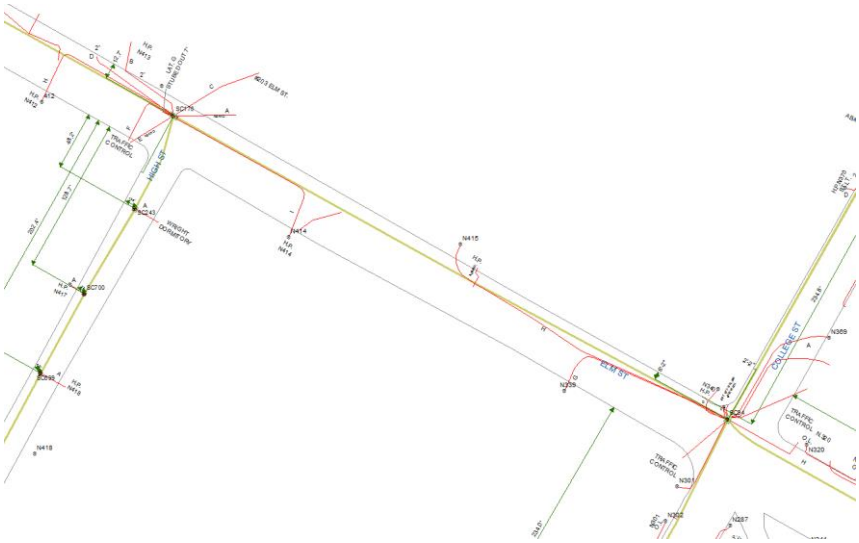


Note, this area of Martin Luther King Blvd in New Haven is being reviewed by the city as a potential area for street scape improvements. This may influence final design of the proposed remediation solution for this duct bank.

The 2026 scope of work also includes a plan to remediate a duct bank between splice chamber 996 and splice chamber 105 on York Street in New Haven. This section of duct bank supports a feed circuit to network vault location 1169 along with network secondaries. The two unused conduits both are impassible. This is due to being filled to approximately half their diameter with flow fill. The proposed solution would be to install 230 ft of three or four conduits between these two chambers.



The 2026 scope of work includes a duct remediation located on Elm Street in New Haven between splice chamber 176 and splice chamber 94. This duct bank is built with clay tile duct and is in the process of failing. Of the currently six unused ducts that are in the bank, five of them are blocked, broken, or misaligned. This remediation would consist of installing 550 ft of eight conduit bank between splice chamber 176 and splice chamber 94.



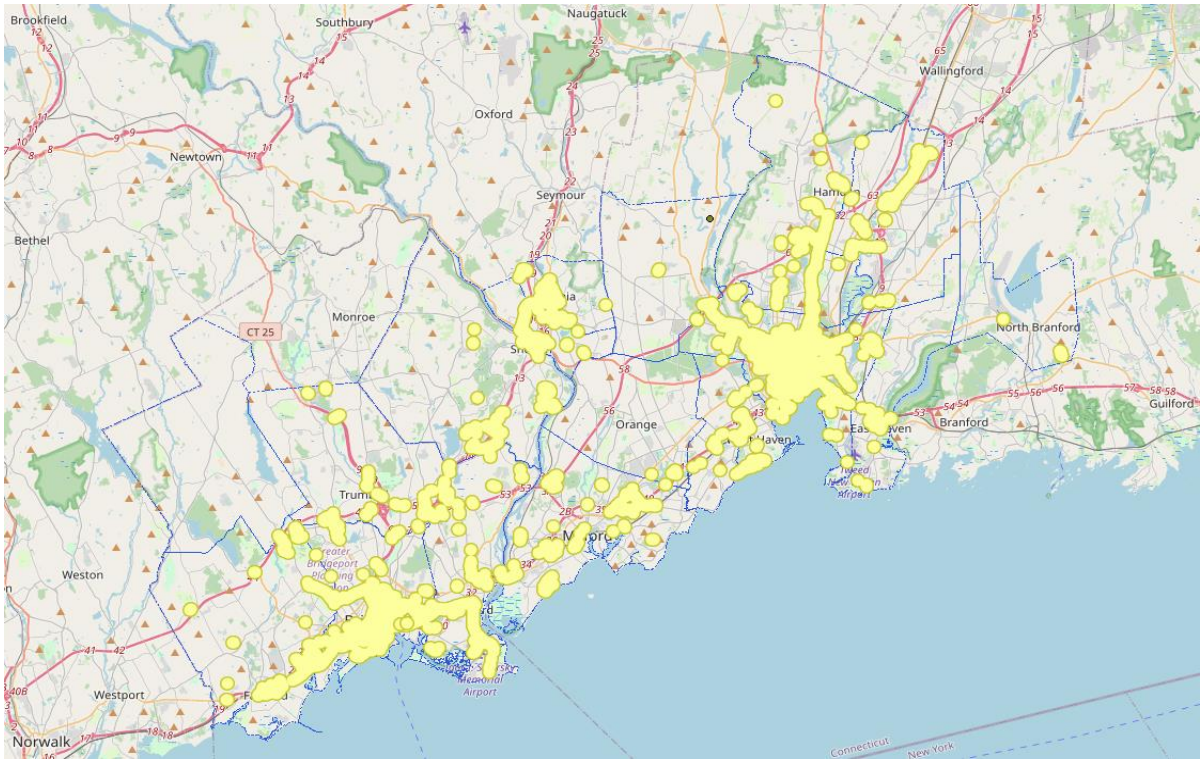
Proposed Estimates for Scope of work 2025/2026

The proposed cost estimate is for the scope of work 2025/2026. The following are the budgetary estimates for the capital, expense, and removal work as outline with the assumptions listed in the appendix. These values have a tolerance of +25% and -25%.

Resources	2025	2026
# Internal, Labor		
#External Services	$357,143	$1,857,143
# Materials		
# AFUDC		
# Overheads - External	$44,899	$233,476
# Internal, Overheads	$31,437	$163,475
Total cost of job	**$433,479**	**$2,254,093**

8. Maps or Electrical Design

The following is a map of splice chambers located in the UI territory.



PRJ-002121

UI - Transformer CAP

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Transformer CAP

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002121	Electric Distribution	Lyons, Robin	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Infrastructure Replacement - Dist	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:

This program replaces transformers that are in poor physical condition, inadequately sized to meet customer loads, and could contain greater than 5 ppm of PCBs (manufactured before 1982) . This program was developed as a result of a field audit

Project Scope:

A survey was conducted from circuit riser to customer point of attachment was used to identify transformers needed to be replaced along with associated work to support transformer replacement.
This is a 20 year program which concentrates on eliminating PCB and overload conditions during the first half of the program and replacements in the second period due to age and condition. The rate of replacement is evaluated each year and CAPEX requirements are based on program progress and balanced with resource and material availablity.

This program has been significantly reduced in funding over recent years (2020-2023) due to supply chain issues. And in 2024, the program was deferred entirely with no funding forecasted. However, as other work is performed in UI Distribution Operations, if a pole has been previously identified as a TARP location, that work is reviewed and may be required to be done in conjunction with the other distribution work.

Project Benefits:

The Transformer Asset Replacement Program enables the Company to maintain/improve reliability and mitigate/reduce hazards to employees and the public by replacing transformers that are in poor physical condition, inadequately sized to meet customer loads, and contain greater than 5 ppm of PCBs.

Project Risks and Mitigation Plan:

Risk: Supply Shortage
Mitigation: Logistics Forecasting

Risk: Resource Shortage
Mitigation: Replace transformers prior to storm season

Risk: Major Storm
Mitigation: Accept

Risk of No Action:
This program is a proactive program to replace transformers before failure. Failure of a transformer in service creates outages either to the customers on the txf, the circuit or the entire feeder depending on the failure mode. Failing transformers have ignited and cause fires to the pole and potentially the surrounding area. They can leak oil and create an environmental issue that requires costly cleanup.

Project Alternatives:
Run to failure and accept the risks and consequences are not preferred.

Basis for Project Estimates
Project estimate was determined based on pending TARP locations in GIS defining a scope of 500 transformers per year, taking the average transformer cost for each location, times an estimate of labor installation costs.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 670**	$ 50	$ 18	$ 197	$ 201	$ 205
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 2,947**	$ -1	$ 102	$ 930	$ 949	$ 968
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 3,494**	$ 80	$ 48	$ 1,100	$ 1,122	$ 1,144
# Internal, Overheads	**$ 1,434**	$ 44	$ 41	$ 441	$ 449	$ 458
# Materials	**$ 3,267**	$ 87	$ 120	$ 1,000	$ 1,020	$ 1,040
# Overheads - External	**$ 2,720**	$ 61	$ 55	$ 851	$ 868	$ 885
Total	**$ 14,533**	**$ 320**	**$ 384**	**$ 4,519**	**$ 4,609**	**$ 4,701**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 14,529	$ 316	$ 384	$ 4,519	$ 4,609	$ 4,701

Note: 2024 Plant Additions includes the entire calendar year

UI
An Avangrid company

UI – Transformer Cap Plant Additions WBS: UH-U1241

Index

1. Program Description 3
2. Scope 3
3. Benefit 3
4. Work Types That Drive Replacement 4
5. Engineering 4
6. Budget 5
7. Project Milestones 11
8. Project Assumptions 12
9. Appendix 13

1. Program Description

TARP is an acronym for Transformer Asset Replacement Program. This program reduces the occurrence of violent transformer failures due to overloads and the associated risk to public safety in the area of the transformers. Transformers that contain or may contain PCB (Polychlorinated Biphenyl) insulating oils are being removed to avoid the extensive impacts of cleaning up known or suspected PCB oil spills. In addition, this program reduces the overall duration of outages caused by transformer failures by replacing overloaded and deteriorating transformers before they fail in-service. The planned replacement of transformers can be scheduled and coordinated more efficiently than emergency replacements, and replacement transformers will operate more efficiently (with lower electrical losses) than transformers of older designs.

2. Scope

This is an on-going program which includes an assessment of all overhead and padmounted transformers on UI's distribution system for the purposes of remediating transformers due to poor physical condition, inadequate capacity to meet the customer demand, and/or contains greater than 5 parts per million of polychlorinated biphenyls. Remediating these transformers aligns with UI's goal to meet company standards of construction and reliability improvements.

The source of this work comes from a system wide survey performed circa 2007 by OSMOSE of all overhead and padmount transformers . Transformers determined to need replacement were identified in GIS with a polygon. TARP is a 20 year program that began in 2010 and has a goal of replacing 500 transformers per year. The scope of this project includes infrastructure related work necessary to support directly replacing transformers. Padmount foundations will be changed if needed due to a change in the padmount transformer footprint.

Out of Scope: Distribution system modifications and miscellaneous maintenance work.

The budget is based on historical average actual costs.

3. Benefit

- Maintain safety for the public and utility workers.
- Maintain system reliability and integrity.
- Mitigate environmental cleanup costs.
- More efficient units have less electrical losses.

- Systematic planned approach prior to failure of units in service.

4. Work Types That Drive Replacement

- NESC: The Company utilized design standards and complies with the National Electric Safety Code when engineering and constructing the electric system infrastructure. Upgrade, repair and replacement of transformers, poles, and equipment to correct NESC non-compliance issues.
- DPNP: Pole replacements for customer driven work
- Voltage Complaint: All troubleshooting and system work to find and correct the abnormal service condition.
- Environmental: Transformers that contain >5PPM PCB's could have a negative impact to the environment through the spread of PCB's should a transformer failure occur
- Maintenance: Replacement of aged infrastructure ensures healthy and robust electrical system
- Emergency: Some transformers that get replaced as part of emergency work happen will sometimes be TARP transformers

5. Engineering

Engineering is necessary and is a component of the value of the installed assets. In order to properly asses the condition and size of the new transformer assets that will be installed; it is necessary to perform an engineering survey of the existing transformer locations and determine the physical condition, PCB label color, connected load, and pole conditions, as well as information such as the size and length of secondary wire from the transformer to the customers. The newly collected engineering information will be stored in our Geographic Information System (GIS) for analysis and design of solutions.

It should be noted that the TARP program can be worked along with a project concurrently. For example. If an area is being converted from a lower voltage to the standard 13.8 kV that is on UI's distribution system, one of the first steps in a step-down bank removal/conversion project is to replace the TARP transformers as part of the make-ready work. In that way, the TARP program can be used to charge for the labor and material to replace those transformers in the conversion area. After TARP transformers have been replaced, the project can continue on, and if any other

transformers replacements are required, the project itself is charged for the labor and material associated with replacing and of the rest of the transformers in the conversion area.

The strategy for this program is summarized in the following steps:

1. Conduct an Engineering Survey to collect the necessary information to determine the age, condition, and marginal capacity of all transformers.
2. Update the information in our Geographic Information System (GIS) to perform the engineering analysis.
3. Replace transformers that have an overload condition.
4. Replace transformers that have an unknown PCB content. These transformers represent the older population of our installed transformer base.
5. Replace transformers that do not pass our condition assessments.

6. Budget

Over 6000 transformer replacements are needed to complete the TARP program. Based on the criteria described in the paragraph above, a GIS query was performed to determine not only what transformers should be replaced first, but an overall plan for replacement by the numbers. The following represents some of the data that was yielded from the query.

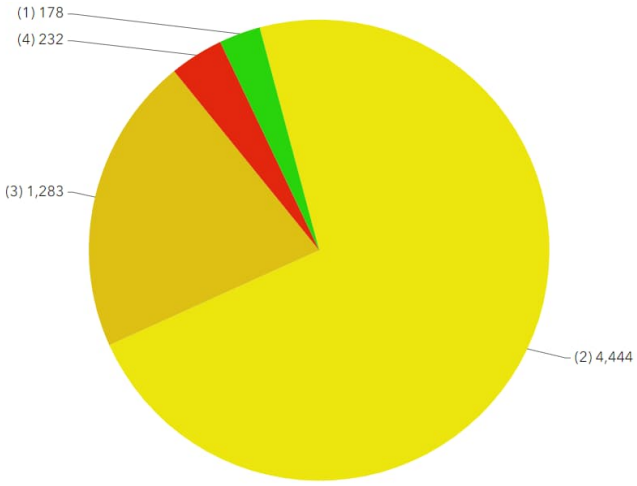


Figure 1: GIS TARP Extract showing total amount of replacements in system needed

At the time of the extract above, there were 6,137 TARP locations that are considered for replacement. Looking at the numbers more closely, the locations were assigned a score from 0-4 based on the following criteria:

- No green label

- Overvoltage issue
- Voltage drop issue
- PCB's > 5PPM, Install date older than 12/31/2014

0: No location met this as the transformer would not qualify as a TARP transformer

1: Meets one of the conditions above – 178 total

2: Meets two of the conditions above – 4,444 total

3: Meets three of the conditions above – 1,283 total

4: Meets four of the conditions above – 232 total

From there, each color could be represented in each town to come up with a comprehensive plan for replacement going forward. Each town is color coded on a gradient to show which towns needs to be addressed over others should the plan for replacement follow that format. Also, each town's scores of (1), (2), (3), and (4) are clearly represented should the plan be to repalce all the (4)'s first.

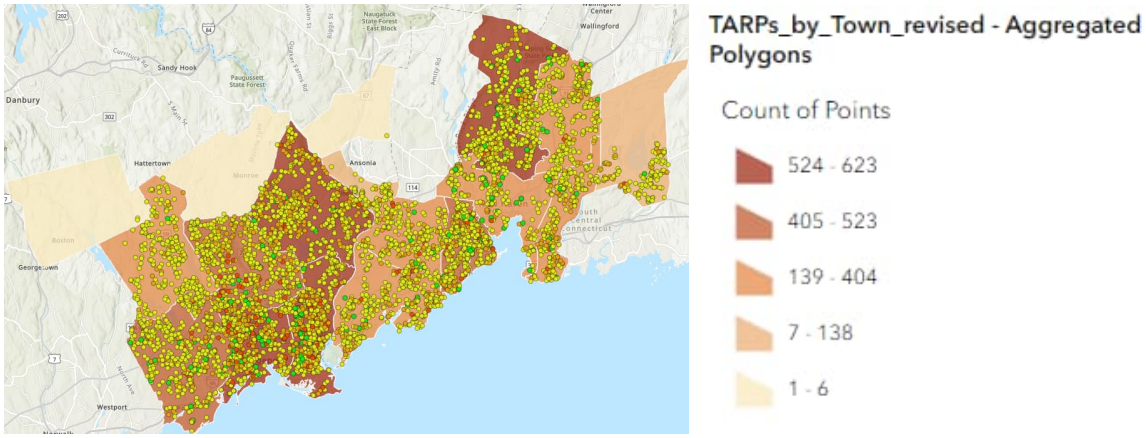


Figure 2: Total territory TARP by the colors

Once the data was produced and organized, a budget could be formed using transformer pricing data as well as current labor rates. This data will need to scrubbed as emergency work, storms, and projects where TARP transformers were replaced under the specific project rather than the TARP project all could contribute to data inconsistencies. Remedation for these inconsistencies is covered under the Project Milestones section of this report. Material and labor for a transformer replacement averaged out to around ~$8,400/replacement.

Based on these estimates, the following budget is required for 2025-2027:

WORK TYPE **1/1/2025 – 12/31/2027**	**COUNT Txf Loc's**	**AVE COST**	TOTAL
UI WO Needed - 2025	500	$8,435	$4,217,500
UI WO Needed - 2026	500	$8,435	$4,217,500
UI WO Needed - 2027	500	$8,435	$4,217,500
TOTAL	1500		$12,652,500

Figure 4: Plant additions (2025 -2027 for TARP program).

These numbers are estimated figures using current transformer pricing and labor rates

Assumes no markup to write and execute a transformer replacement work order

Overall, considering around 500 replacements per year using the over 6000 transformer replacement locations, this puts the program completion out 12 years. Using the average cost of replacing a single phase padmounted transformer, a three phase padmounted transformer, and a single/double/triple overhead transformer replacement and averaging these costs, a full program replacement estimated cost can be realized.

The total estimated cost of the program is shown to be ~$58 Million over 12 years.

Sum of Total Cost	
Row Labels	Grand Total
1p Pad	$5,890,225.68
Pad-1p	$5,890,225.68
25	$594,374.90
50	$1,354,876.01
75	$1,749,827.88
100	$1,910,932.30
167	$280,214.59
3p Pad	$9,610,931.41
Pad-3p	$9,610,931.41
75	$256,297.96
150	$2,023,779.43
300	$3,581,814.74

500	$1,474,127.60
750	$1,095,396.88
1000	$674,056.49
1500	$428,408.79
2000	$77,049.51
Pole	$42,628,955.71
1-Single	$34,064,962.72
25	$14,652,324.48
37	$16,726,904.59
50	$2,542,789.94
75	$117,438.73
100	$25,504.98
2-Double	$1,809,478.89
100 100	$6,917.15
25 25	$310,174.46
25 37	$842,125.70
25 50	$396,972.35
25 75	$14,189.32
37 37	$25,975.25
37 50	$184,722.56
37 75	$14,221.16
50 50	$14,180.94
3-Triple	$6,754,514.10
100 100 100	$436,717.91
167 167 167	$26,992.72
25 100 25	$21,054.66
25 25 25	$1,202,010.51
25 25 37	$994,226.62
25 25 50	$176,700.67
25 37 37	$18,443.45
37 37 37	$1,311,706.64
37 37 50	$945,460.61
37 37 75	$137,961.80
50 50 100	$23,561.95
50 50 50	$634,369.88
50 50 75	$509,506.03
75 75 100	$117,927.08

75 75 75	$197,873.58
Grand Total	$58,130,112.80

Figure 5: Total estimated cost of completion of TARP program

In terms of a starting point for the program in the beginning of 2025, UI considered the town of Bridgeport to be a prime candidate for the TARP Program. The territory has not only the most TARP locations, but also the most transformer locations that have all four criteria checked off. A budget for the replacement of TARP locations in Bridgeport alone is shown under the figure below:

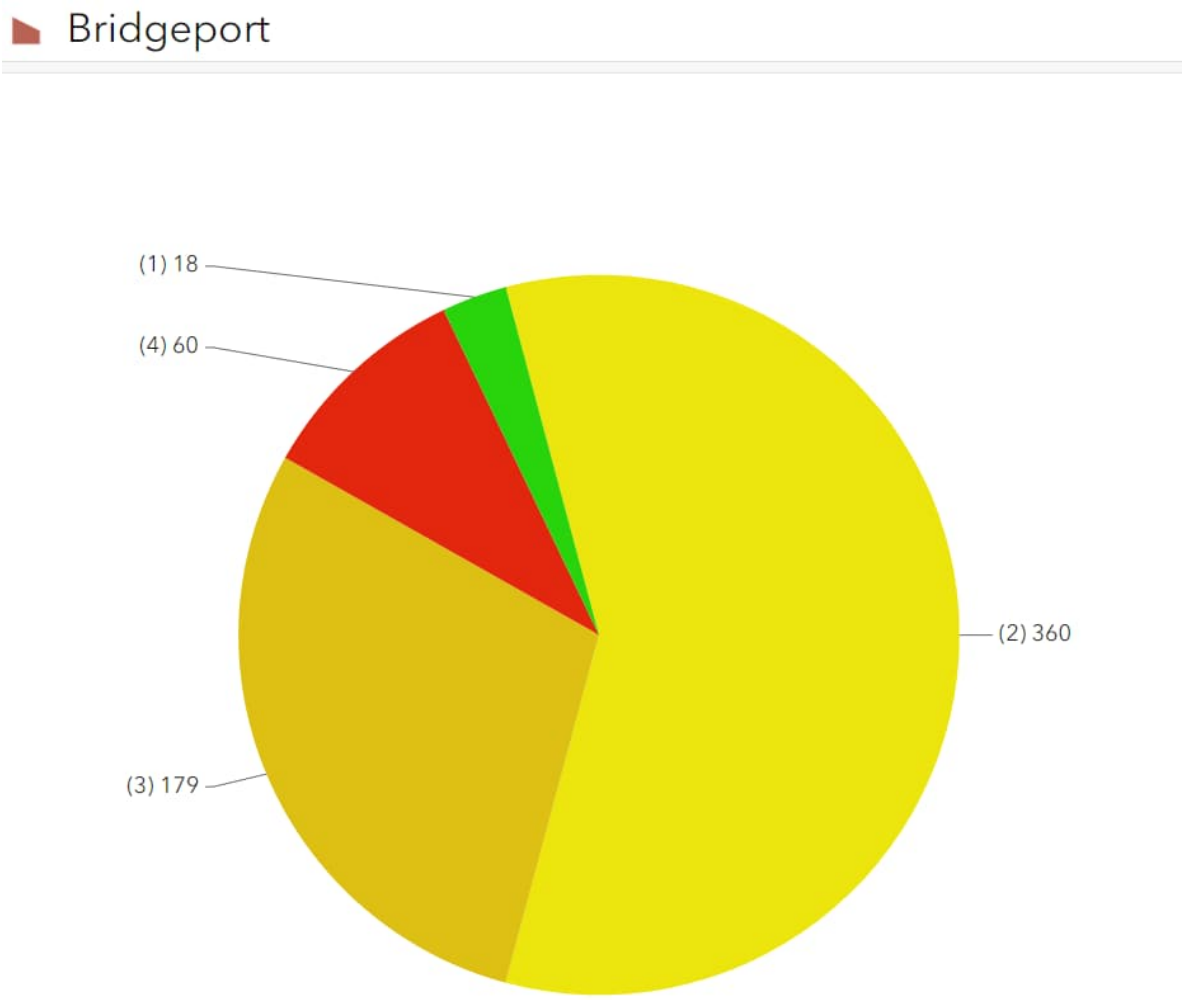


Figure 6: Example of Town with most work needed

STATUS		
	Bridgeport - not green	Bpt - Green label
Sum of Total Cost		
Row Labels	N	Y
1p Pad	$505,233.58	$26,308.27
Pad-1p	$505,233.58	$26,308.27
25	$24,260.20	
50	$105,233.09	$26,308.27
75	$205,862.10	
100	$117,337.95	
167	$52,540.24	
3p Pad	$646,791.13	$376,901.69
Pad-3p	$646,791.13	$376,901.69
75		
150	$157,458.25	$134,878.74
300	$392,195.63	$130,718.47
500	$97,137.25	$31,650.02
750		$79,654.46
1000		
1500		
2000		
Pole	$2,840,863.21	$670,795.63
1-Single	$2,526,480.16	$670,795.63
25	$1,081,339.61	$137,407.80
37	$1,253,312.74	$377,600.63
50	$171,365.92	$155,787.20
75	$11,960.24	
100	$8,501.66	
2-Double	$295,971.44	
100 100		
25 25	$38,771.81	
25 37	$129,557.80	
25 50	$113,420.67	
25 75		
37 37		
37 50		

37 75	$14,221.16	
50 50		
3-Triple	$18,411.60	
100 100 100		
167 167 167		
25 100 25		
25 25 25		
25 25 37	$18,411.60	
25 25 50		
25 37 37		
37 37 37		
37 37 50		
37 37 75		
50 50 100		
50 50 50		
50 50 75		
75 75 100		
75 75 75		
Grand Total	$3,992,887.92	$1,074,005.59

Total cost = $5,066,893

Figure 7: Full TARP replacement in Bridgeport (Non Green label+Green Label)

7. Project Milestones

- System wide inspection to find False positives from GIS extract – (Sep 2024 – Dec 2024)
- Prioritization from inspection results – (Dec 2024 – Jan 2025)
- Replacement – (Jan 2025 – Nov 2025)
- Planning/Prioritization for Following Fiscal Year (Nov 2025 – Dec 2025)
- Follows same path for 2026, 2027,.....end of program

8. Project Assumptions

- Material shortages do not exist – any transformer needed for replacement is available
- Budget supports the need for timely replacement to finish the program within 12 years
- Crew availability to support effort – Enough crews to finish the planned spend for each year
- No major storms – material shortages can happen as emergency work takes inventory out of the planned spend for the year

9. Appendix



Figure 8: Example of black label transformer (between 50 and 500 PPM PCB's)



Figure 9: Example of green label transformer (less than 1 PPM PCB's)



Figure 10: Burnt and leaking transformer



Figure 11: Very old transformer



Figure 12: Yellow label transformer



Figure 13: Aging infrastructure ready for replacement



Figure 14: Older style overhead pots (Visible Leak)



Figure 15: Another example of older pot-style transformer



Figure 16: Example of vault style transformers that are aging and leaking

PRJ-002129

UI - Line Inspect (DLI) CAP

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Line Inspect (DLI) CAP

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002129	Electric Distribution	Mitchell, John	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Infrastructure Replacement - Dist	IP4 Change	Program - Ongoing	Program - Ongoing

Project description:

This program replaces deteriorated poles identified in the UI maintenance pole inspection program that do not meet established NESC standards for the amount of solid wood remaining at the based of the pole. Additionally, this program also replaces poles identified by visual inspections or resulting from field visits by UI field personnel performing daily work activities.

Project Scope:

Inspections are performed of poles to identify those that do not meet established NESC standards for the amount of solid wood remaining at the base of the pole.

The volume of pole replacements is forecast based on the planned number of poles to be inspected multiplied by the historical average failure rate per year. (typically 3.1%). This level of reject rate has typically required $4M of capex to remediate.

The inspections conducted in 2023 produced a reject rate of 1.6%. This reject rate has been applied to the planed inspection volume to forecast the number of program reject replacements in 2024 and through the end of the inspection cycle. This reject rate will be reviewed updated as the program progresses.

Poles identified for replacement are analyzed and designed to meet current NESC standards. Clearance and loading analysis are performed with industry standard software, utilizing NESC Northeast wind and radial ice modeling parameters. The new pole height and class are determined and work orders are created

Project Benefits:

This program is necessary to achieve compliance with NESC requirements, which maintains safety for the public and utility workers. Additionally, the UI distribution system reliability and and resiliency are improved, as poles are replaced based on current standards and as pole loading analysis determines (per the NESC Northeast NESC wind and radial ice modeling parameters).

Project Risks and Mitigation Plan:

Risks that are typically encountered with deteriorated pole replacements include:
1) Encountering rock/ledge when drilling new hole for pole replacement, requiring core-boring equipment (not typical equipment utilized for daily pole setting activities). Scheduling core-boring increases completion schedules.
2) Environmental concerns such as contaminated soil. Handling of contaminated soil and proper disposal delay completion of replacement and increase cost.
3) Outages may be required to transfer wires once poles are set. This takes coordiation with customers and often causes delays in work completion.

Risk of No Action:
If no action is taken and deteriorated poles are not replaced, this will cause non-compliance with NESC requirements and the safety for the public and utility workers will be at risk.

Project Alternatives:
Do nothing/do not perform inspection programs - leads to NESC non-compliance and potential safety risk to the public and utility workers.

Inspection-based replacements - leads to NESC compliance and improves the safety to the public and utility workers. Additionally, UI distribution system reliability and resiliency are positively impacted from this program, as poles are replaced based on current standards and as clearance and loading analysis determines (which is based on the NESC Northeast wind and radial ice modeling parameters).

Basis for Project Estimates
The estimated funding for this program is based on the volume of pole replacements forecasted. The forecast considers current historical reject rates, reject rates by pole age, volume of poles to be inspected, and typical historical unit costs to perform this work. The projected reject rate (which is based on historical or actual reject rate as well as the ages of the poles to be inspected) is multiplied by the forecasted # of poles to be inspected to determine the expected volume of replacements. The replacements are then evaluated for typical work operations to be performed (unit cost per pole),

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 622**	$ 85	$ -	$ 176	$ 179	$ 183
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 4,871**	$ 47	$ 693	$ 1,350	$ 1,377	$ 1,405
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 1,219**	$ 186	$ -	$ 338	$ 344	$ 351
# Internal, Overheads	**$ 1,318**	$ 80	$ 61	$ 385	$ 392	$ 400
# Materials	**$ 3,240**	$ 141	$ -	$ 1,013	$ 1,033	$ 1,053
# Overheads - External	**$ 1,701**	$ 121	$ 87	$ 488	$ 498	$ 508
Total	**$ 12,971**	**$ 660**	**$ 841**	**$ 3,748**	**$ 3,823**	**$ 3,899**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 13,137	$ 826	$ 841	$ 3,748	$ 3,823	$ 3,899

Note: 2024 Plant Additions includes the entire calendar year

UI
An Avangrid company

UI- Line Inspect (DLI) CAP

All Towns

WBS: UI-U0120

Index

1. Program Description 3
2. Need Statement 3
3. Work Type 3
4. Engineering 4
5. Forecasted CAPEX 4

1. Program Description

This program replaces deteriorated poles identified by the groundline inspection program that do not meet established NESC standards for the amount of solid wood remaining at the base of the pole. Additionally, this program replaces poles identified by the overhead visual inspection program (known as Distribution Line Inspection or DLI) and by UI field personnel performing daily work activities.

2. Need Statement

This program is necessary to achieve compliance with NESC requirements, which maintains safety for the public, UI employees, and field personnel from any company that may be required to perform work on poles in the UI service territory. The UI distribution system reliability and resiliency are positively impacted from this program, as poles are replaced based on current standards and as clearance and loading analysis determines (which is based on the NESC Northeast wind and radial ice modeling parameters).

3. Work Type

There are three sources by which deteriorated poles replacements are identified at UI; Ground Line Inspection (program-based), Distribution Line (Overhead) Inspection (program based), Visual Inspections (observations from field engineering or power delivery crews, non-program based).

1. Groundline Inspection: A groundline inspection cycle is performed on a 10-year cycle for all UI custodian distribution poles. Wood poles in service for greater than 10 years are sounded to determine rot and voids, excavated at ground-line, and bored to determine shell thickness below ground-line. Poles are rejected and identified for replacement based on two criteria; minimum circumference and remaining strength.
    - Minimum Circumference – Circumference is measured at or below groundline, wherever the least sound wood is present. If the effective shell thickness is less than two inches, the pole is rejected.
    - Remaining Strength – Remaining strength is calculated by input of inspection results into standard industry software and through adherence with NESC Rule 260B and Table 261-1 (which states that wood poles and

reinforced structure shall be replaced or rehabilitated when deterioratioin reduces the strength to 2/3 or 66% of strength when installed).

2. Distribution Line Inspection (DLI) - Distribution Line Inspection (DLI) is conducted on a 6-year cycle. This is a detailed visual inspection from the base to the top of the Distribution pole/structure which includes looking at the condition of the: pole, cross arm, insulators, braces, conductors, tie wire, taps, switches, transformers, and other pole-mounted equipment. Poles with significant visible rot, excessive cracking, hollow pockets, or deteriorated tops are identified and reported for replacement.
3. Visual Inspections (poles identified by employees) - Non-program poles are observations reported by field personnel, whereas program poles are inspected cyclically. The criteria that determines replacement similar to that utilized for Distribution Line Inspection, but may also consider other factors such as the number of customers affected.

4. Engineering

Poles identified for replacement are analyzed and designed to meet current NESC standards. Clearance and loading analysis are performed with industry standard software, utilizing NESC Northeast wind and radial ice modeling parameters. The new pole height and class are determined and work orders are created.

5. Forecasted CAPEX

The forecasted capital expenditures are as follows:

2024	2025	2026
$2,457,330	$840,950	$3,747,936

The following is the forecasted breakdown by work type of the plant additions during the time period of 2024 through 2026:

WORK TYPE	2024	Poles Set	2025[2]	Poles Set	2026	Poles Set	TOTAL
Groundline Inspection (Program)	$1,054,604	103	$573,375	75	$1,800,639	221	$3,428,618
Distribution Line Inspection[1] (Program)	-	-	-	-	-	-	-
Visual Inspection (Non-program)	$1,402,726	137	$267,575	35	$1,947,297	239	$3,617,598
Total	$2,457,330	240	$840,950	110	$3,747,936	460	$7,046,216

1. The Distribution Line Inspection is off cyle until 2026, at which point a new inspection cycle will resume and any work identified will be performed in 2027.

2. CAPEX Priortization and Resource Constraints cause a reduction in work the can be performed in 2025. Poles inspection results from 2024 are being prioritized and highest priority poles will be replaced in 2025.

2024

Groundline Inspection Forecast Assumptions:

103 rejects were identified during 2023 inspections *(1.63% reject rate = 103 rejects/6309 poles inspected).*

Visual Inspection Forecast Assumptions:

137 replacements

Historically between 125 – 150 non-program poles are identified annually; average is approximately 137 poles.

2025

Groundline Inspection Forecast Assumptions:

75 replacements planned

149 rejects are estimated to be identified during 2024 inspections *(assuming the 1.63% reject rate continues in 2024, 1.63% x 9,144 poles inspected = 149).* Due to CAPEX

prioritization and resource constraints, 75 poles (50% of the poles identified) will be replaced in 2025.

Visual Inspection Forecast Assumptions:

35 replacements planned

Historically between 125 – 150 non-program poles are identified annually; average is approximately 137 poles. Due to CAPEX prioritization and resource constraints, 35 poles (25% of the poles identified) will be replaced in 2025.

2026

Groundline Inspection Forecast Assumptions:

221 replacements planned

146 rejects are estimated to be identified during 2025 inspections *(assuming the 1.63% reject rate continues in 2025, 1.63% x 8,930 poles inspected = 146).* In addition, 75 pole rejects identified from the 2024 inspections remain. The total rejects to replace = 146 + 75 (backlog) = 221.

Visual Inspection Forecast Assumptions:

239 replacements planned

Historically between 125 – 150 non-program poles are identified annually; average is approximately 137 poles. In addition, 102 remain from 2025 visual inspections. The total rejects to replace = 137 + 102 (backlog) = 239.

PRJ-004276

808 Chapel Street Network Vault

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

808 Chapel Street Network Vault

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-004276	Electric Distribution	Lyons, Robin	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Infrastructure Replacement - Dist	IP4 Change	Ongoing	Dec 2024

Project description:

CA Ventures (the owner of several apartment buildings in New Haven) approached UI with plans to build a new seven story mixed retail / residential building on an empty lot at 808 Chapel St, New Haven, Ct. (corner of Chapel and Orange St).
This project is moving FAST. The new building is expected to be completed at the end of the 4th quarter of 2023.
The customer is requesting a service of 2500A @ 120/208V. As per UI's OPD-10N, this new facility meets the requirements to be connected to New Haven' secondary network.

Project Scope:

• Install a 6 – 4" ductbank from existing SC 148 to the new vault.
• Install two 3 – 4" Galvanized steel conduits from existing SC 148. One from SC 145 and one from SC 148 to the new vault.
• Install the following equipment in the vault:
• Two 500KVA 125/216V network transformers
• Two 125/216V network protectors
• Collector bus, lighting, primary switches and vault guard communication equipment.
• Install ~175 feet of 500 kcmil UG secondary cable (4 sets at 175' each) from SC 148 to the new vault.
• Vault will be fed by network circuits 812 and 813
• Install ~250 feet of 500 CU EPR UG Primary Cable
• Install ~200 feet of 4/0 CU EPR UG Primary Cable
• Install a 6 – 4" ductbank from existing SC 148 to the new vault.
• Install two 3 – 4" Galvanized steel conduits from existing SC 148. One from SC 145 and one from SC 148 to the new vault.

Advantages of proposed scope:

• A customer connected to the secondary network which provides a very reliable service
• The new vault will contribute to the existing secondary network grid
• UI will not need to relocate any underground utilities
• UI will have access to the new network vault L2081 and make use of an existing chamber
• The new vault may reduce the outage time for all network primary feeders
• The new vault gives UI the opportunity to balance the New Haven network load
• UI will be able to meet the customer demand and be ready to energize by 4th quarter of 2023.

Project Benefits:

This is a new customer project.
UI has an obligation to serve the customer, including design, procurement, and management of the civil and electrical work
• A customer connected to the secondary network which provides a very reliable service
• The new vault will contribute to the existing secondary network grid
• UI will not need to relocate any underground utilities
• UI will have access to the new network vault LXXXX and make use of an existing chamber
• The new vault may reduce the outage time for all network primary feeders
• The new vault gives UI the opportunity to balance the New Haven network load
• UI will be able to meet the customer demand and be ready to energize by 4th quarter of 2023

Project Risks and Mitigation Plan:

There are several risks that can arise from this project. One of the risks is that there maybe existing utilities or obstructions underground that would prevent the installation of the new network vault on the right of way. To avoid this, the company will forming Test Pitting to verify locations of utilities. There may also be ongoing work in the area that may delay the Company's construction. To mitigate this, the company will work with the State and Customer for optimal Construction timelines. Lastly the Customer could pull out of building at the site at anytime during construciton. The best practice is to formulate a customer agreement and verify their commitment before the Company begins their construction.

Risk of No Action:
As per the UI's General Terms and Conditions, the customer must provide UI a location to install the required network vault equipment such as, the transformers, protectors, vault guard and primary switches to meet the customer request of 2500 Amps. The customer prefers to be fed from the network system for its reliability and flexibility. As per UI's operating procedure OPD-10N, the new building will require a network transformer vault to meet their demand. If UI does not provide power to a customer requesting, there is a Public Relations Risk with Yale, the City and even the State.

Project Alternatives:
Option 1: This Option is to not do anything. UI cannot deny a new customer Power if they are requesting it. UI will not install a new network vault in the area and not perform any civil work. The area will continue to operate as normal.

Option 2: This Option calls to install a new two unit network transformer vault and a new splice chamber in the right of way in accordance with OPD-10N, UI construction standards DEG 50.4 and the NESC. Install (3) 6 – 4" Schedule 40 PVC duct banks for Network Secondary from the new Splice chamber to the new network transformer vault located in the right of way in Chapel St in addition to connecting to SC.145 to SC.30.

Furthermore, install two (2) 3 – 4" galvanized steel ducts from the new Splice Chamber to the network Vault for feeders and communications. The Customer would install secondary conduits from the new network vault into the building's switchgear . UI will install the following equipment in the vault: two (2) 500 KVA 125/216V network transformers, two (2) 125/216 network protectors, a collector bus, lighting, primary switches, and VaultGard. Then UI will take two network feeders Circuit 812 and 813 and feed the two new network transformers. Lastly install four (4) sets of 5 – 500 KCMIL Network Secondaries from the new vault into the street grid of the new splice chamber.

Basis for Project Estimates
The Basis of these estimates are based on historical projects and current material prices from the manufacturers detailed below:

• Engineering /Management time
• Materials Cost from the vendor (Ductbank, Communication Equipment, Primary Switches, Collector Bus, Lighting, Neutral Bus, Precast Vault, Vents, Grates, Ladders, and Access Hatches)
• Materials Cost stockroom items (Primary & Secondary Cable, Splices, Network Transformers and Protectors, and Terminators)
• Labor cost to install the Network Vault, Duct Bank and all associated Civil equipment.
• Labor cost to install Network Transformers, Protectors, Communication Equipment, Primary Switches, Collector Bus, Lighting, and Neutral Bus
• Labor cost to install Primary and Secondary Cables as well as splicing and terminations
• Labor cost to cutover each circuit.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 53**	$ 53	$ -	$ -	$ -	$ -
# CIAC	**$ -41**	$ -41	$ -	$ -	$ -	$ -
# External Services	**$ 592**	$ 592	$ -	$ -	$ -	$ -
# Internal - Non-AC	**$ 0**	$ 0	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 368**	$ 368	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 322**	$ 322	$ -	$ -	$ -	$ -
# Materials	**$ 353**	$ 353	$ -	$ -	$ -	$ -
# Overheads - External	**$ 443**	$ 443	$ -	$ -	$ -	$ -
Total	**$ 2,090**	**$ 2,090**	**$ -**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 849	$ 849	$ -	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

808 Chapel St, New Haven

New Network Vault L.2081



10/3/24

Distribution Engineering

1. Contents

1. Contents 2
2. Introduction 3
3. Existing Conditions 3
3.1. Pictures 4
4. Need Statement 8
5. Alternatives 8
5.1. Do not Install new network Vault 8
5.1.1. Advantages: 8
5.1.2. Disadvantages 8
5.1.3. Risks 8
5.2. Install New Two Unit Network Vault and New Splice Chamber in Right of Way 9
5.2.1. Advantages: 9
5.2.2. Disadvantages 9
5.2.3. Risks 9
5.2.4. Cost Alternative II 10
5.3. Preferred Option: Install New Two-Unit Network Vault to feed Customer and replace SC.145 roof 10
5.3.1. Advantages: 10
5.3.2. Disadvantages 10
5.3.3. Risks 11
5.3.4. Cost Proposal Alternative 11
5.3.5. Work Breakdown 11
6. Project Assumptions 13
7. Used and Useful 14

2. Introduction

CA Ventures is the owner of several apartment buildings at several locations in New Haven. CA Ventures is planning on constructing a new 7 story building on 808 Chapel St, New Haven that is expected to be completed in the 4th quarter of 2023. This will be a new residential facility with commercial business at the ground level.

On Chapel St, there are several Buildings in the area supplied by the low voltage 120/208V secondary network. The new building on 808 Chapel St is requesting a service of 2500 Amps 120/208V. As per UI OPD-10N, this new facility meets the requirements to be connected to the New Haven Secondary Network. UI is currently in talks with the customer to construct a new Network Vault that houses two 500kVA 125/216V network transformers. This preliminary report covers the work needed to commission this new two-unit network vault.

3. Existing Conditions

Chapel St, New Haven is one of the Busiest streets in New Haven. It has several Businesses and is home to a lot of traffic with access to the Train Station down the road. 808 Chapel St is a large empty plot of land that is a prime location due to its easy access to the Train Station, Church St Park, and the Yale Campus. Additionally, Chapel St also has all major utilities traveling through it. In the right of way, there is Telco, Electric, Water, Sewer, and Gas. There are also several chambers in the area that are incredibly small and are not up to UI Standard. Due to the existing utilities in the area, there is little to no available space for expansion of chambers or new ducts.

The existing splice chambers nearby in area have all Mill River Network Feeders, 810, 811, 812, and 813. There also exists several sets of Network Secondary on the street that the proposed Vault can be tied to. Based on field inspections between UI and the customer, it has been determined that is sufficient space in the sidewalk near the corner of Chapel St and Orange St to situate a vault for two network transformer units. New Haven network feeders Circuits, 810, 811, 812, and 813 continue between SC.145 and SC.30 in which the proposed Vault would situate in-between. Additionally, there is SC.148 across the street that can also feed the vault. However, no primary can run through it. There are also secondary sets that run through the all the chambers. There is a minimum of 2 sets of 5/C 500 CU Network Secondary that runs through each of the chambers.

The proposed location of the network vault will be situated near a couple vaults in the area. Next door, there is the Network Vault at 824 Chapel St Vault Location 259, that there exists five (5) sets of 5/C – 500kcmil network secondary cable from the vault into the street grid in SC.146. At 775 Chapel St Location 258, there is a network vault that contains one 500 KVA 120/208 Network Transformer with one Network Protector. There exists four (4) sets of 5/C – 500kcmil network secondary cable from the vault into the street grid in SC.140. At 860 Chapel St Vault Location 1429 there are two 500 KVA 120/208 Network Transformers with two Network Protectors. There exists four (4) sets of 5/C – 500kcmil network secondary cable from the vault into the street grid in SC.147. At 91 Orange St Vault Location 1146, there are two 750 KVA 120/208 Network Transformers with two Network Protectors. There exists four (4) sets of 5/C – 500kcmil network secondary cable going from the vault to the street grid in SC.27.

3.1. Pictures



Figure 1: SC.145 East Side



Figure 2: SC.145 West Wall



Figures 3 & 4: SC.145 South Views



Figure 5: SC.149 East Wall



Figure 6: SC.149 West Wall



Figure 7: SC.146 West Wall

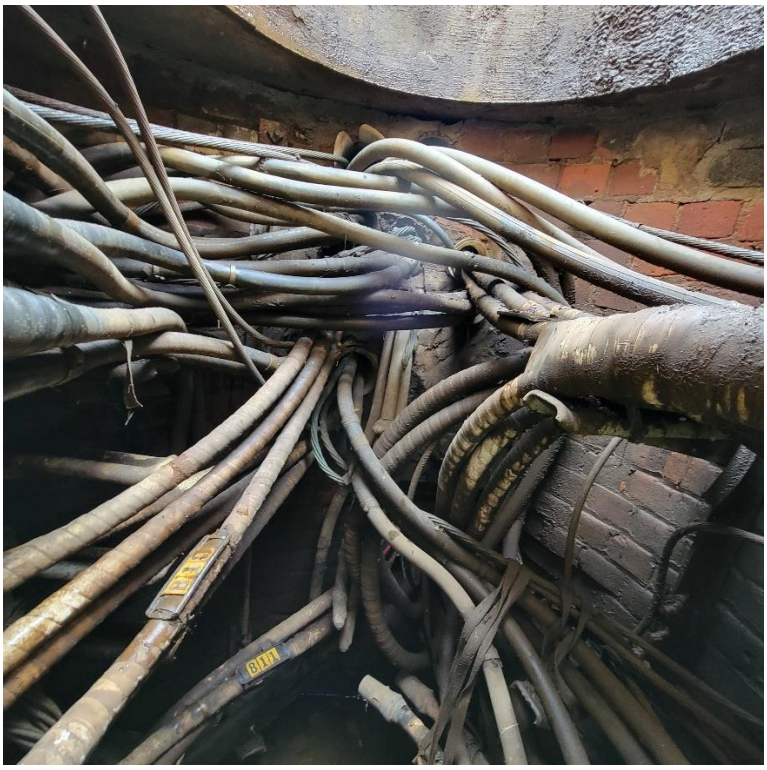


Figure 8: SC.146 East Wall

4. Need Statement

There are low voltage secondary networks in specific areas of the City of New Haven. The low voltage secondary network was design and constructed to provide for N – 1 operation: loss of one primary supply circuit. With the correct number of network vaults which are strategically located, the secondary cable grid system provides the needed supply so that the connected load is not impacted. In addition, the system is design so that when there is a fault on the secondary system, the connected vaults all contribute to the fault current. The concept is to generate enough fault current to clear the fault before significant damage can occur to the low voltage secondary system.

The building planned to be built by CA Ventures at 808 Chapel St will be a 7-story building. The top 6 floors will be used for residential purposes while the bottom floor will be used allocated to commercial facilities. The customer is requesting a secondary service of 2500 Amps 120/208V. The entire building is expected to be energized by 3rd quarter of 2024.

As per the UI's General Terms and Conditions, the customer must provide UI a location to install the required network vault equipment such as, the transformers, protectors, vault guard and primary switches to meet the customer request of 2500 Amps. The customer prefers to be fed from the network system for its reliability and flexibility. As per UI's operating procedure OPD-10N, the new building will require a network transformer vault to meet their demand.

5. Alternatives

5.1. Do not Install new network Vault

This Option is to not do anything here. UI cannot deny a new customer Power if they are requesting it. UI will not install a new network vault in the area and not perform any civil work. The area will continue to operate as normal.

5.1.1. Advantages:

1. Avoids expensive Capital Spending of Electrical and Civil Construction

5.1.2. Disadvantages

1. No electrical contribution to the existing network secondary grid
2. No new Customer revenue

5.1.3. Risks

1. Public Relations risk from denying customer power with Yale, the city and even the State.

5.2. Install New Two Unit Network Vault and New Splice Chamber in Right of Way

This Option calls to install a new two unit network transformer vault and a new splice chamber in the right of way in accordance with OPD-10N, UI construction standards DEG 50.4 and the NESC. Install (3) 6 – 4" Schedule 40 PVC duct banks for Network Secondary from the new Splice chamber to the new network transformer vault located in the right of way in Chapel St in addition to connecting to SC.145 to SC.30. Furthermore, install two (2) 3 – 4" galvanized steel ducts from the new Splice Chamber to the network Vault for feeders and communications. The Customer would install secondary conduits from the new network vault into the building's switchgear . UI will install the following equipment in the vault: two (2) 500 KVA 125/216V network transformers, two (2) 125/216 network protectors, a collector bus, lighting, primary switches, and VaultGard. Then UI will take two network feeders Circuit 812 and 813 and feed the two new network transformers. Lastly install four (4) sets of 5 – 500 KCMIL Network Secondaries from the new vault into the street grid of the new splice chamber.

5.2.1. Advantages:

1. New Commercial Custom Revenue.
2. Provides customer with a more reliable service.
3. Supports the existing network secondary grid on Chapel St and Orange St.
4. Opportunity to balance the load on network feeders.
5. The Vault will be accessible 24/7.

5.2.2. Disadvantages

1. Expensive Civil construction costs with the new splice chamber
2. New Splice Chamber will sit in between existing splice chambers and require UI to break into the existing Ductbank between SC.30 and SC.145
3. UI will need to install additional cables and take feeder outages to cutover to new cable in the new Ductbank between SC.145 to the new Splice Chamber and from the New Splice Chamber to SC.30

5.2.3. Risks

1. The procurement process may delay installation of the new splice chamber.
2. There may be some existing utilities or obstructions under that would prevent the installation of the new network vault on the right of way.
3. Customer could pull out of building at the site anytime during construction.
4. There may be ongoing work in the area and civil worm may conflict with other UI work.
5. Chambers in the area, SC.30 and SC.145 may require an expansion due to congestion.

5.2.4. Cost Alternative II

	2024 CAP
External Services	$1,750,000
Material	$700,000
UIL Resources	$500,000
External Overheads	$1,009,821
Internal Overheads	$728,103
Total	$4,687,923

5.3. Preferred Option: Install New Two-Unit Network Vault to feed Customer and replace SC.145 roof

This option would have UI build a new two-unit network transformer vault in the right of way in accordance with OPD-10N and within UI Construction Standards DEG 50.4 and the NESC. UI would use existing splice chambers SC.148 and install 6 – 4" schedule 40 PVC duct bank along with one (1) 3 – 4 " galvanized steel conduits to new transformer vault. Additionally, another set of 3 – 4" galvanized steel conduits will be installed to the new transformer vault. The customer would install secondary conduits from the new network vault into the building's switchgear. UI will install the following equipment in the vault: two (2) 500 KVA 125/216V network transformers, two (2) 125/216 network protectors, a collector bus, lighting, primary switches, and VaultGard. Then UI will take two network Mill River feeders Circuit 812 and 813 and feed the two new network transformers in the network vault. Lastly install 4 sets of 5 – 500 KCMIL network secondaries from the new vault into the existing street grid in SC.145. In addition to the vault, SC.145 will have its roof replaced due to the structural integrity.

5.3.1. Advantages:

1. New Commercial Custom Revenue
2. Provides customer with a more reliable service.
3. Supports the existing network secondary grid on Chapel St and Orange St
4. Opportunity to balance the load on network feeders.
5. The Vault will be accessible 24/7.
6. Civil construction is cheaper compared to Option 2
7. Cheaper electrical costs as there is no need to pull an additional feeder cable between new chambers and existing.

5.3.2. Disadvantages

1. Construction costs for the new vault and conduit is still very expensive.
2. SC.145 is already crowded and adding additional cable increases congestion.

5.3.3. Risks

1. There may be some existing utilities or obstructions underground that would prevent the installation of the new network vault on the right of way.
2. There may be ongoing work in the area and civil work may conflict with other UI work.
3. Congestion in the Splice Chamber SC.145 and SC.148 could induce thermal issues in the duct bank.
4. Outages required for the network may not meet the customer's schedule
5. There may be environmental complications during construction.
6. Customer could pull out of building at the site anytime during construction.

5.3.4. Cost Proposal Alternative

	2024 CAP
External Services	$1,000,000
Material	$625,000
UIL Resources	$425,000
External Overheads	$735,330
Internal Overheads	$536,543
Total	$3,321,873

5.3.5. Work Breakdown

1) Civil Phase I
   a) Install new L.2081 Two-unit Network Vault
   b) Install Duct Bank Approx. 100' from SC.148 on Chapel St to L.2081 Network Vault
   c) Install Duct Bank Approx. 50' from SC.145 on Chapel St to L.2081 Network Vault
   d) Replace the Splice Chamber Roof of SC.145
2) Electrical Make Ready L.2081 Network Vault
   a) Install 2 – Vault Ladders
   b) Install Vault Lighting
   c) Install Neutral Bus
   d) Install Collector Bus
3) Electrical Make Ready Mill River CKT-812
   a) Prep & Test 1 – 500 KVA 125/216V Network Transformer and Install in L.2081
   b) Prep & Test 1 – 1875A 125/216V Network Protector and Install in L.2081
   c) Prep & Test 1 – Primary Switch and Install in L.2081
   d) Install Approx. 95' of 3 – 500 CU FS CBL from SC.149 to SC.148 on Chapel St
   e) Install Approx. 100' of 3 – 4/0 CU FS CBL from SC.148 to L.2081 on Chapel St.
   f) Install Straight 500-4/0 Splice in SC.148
   g) Install 2 Sets of 600A Elbows for Primary Switch in L.2081
   h) Install Approx. 40' of 3 – 4/0 CU FS UG Primary Cable from Primary Switch to Network Transformer
   i) Install 1 Set of 600A Straight Terminations for Network Transformer

j) Install 4 Sets of Network Secondaries from Network Protector to Collector Bus
k) Install Network Communications

4) Electrical Make Ready Mill River CKT-813
   a) Prep & Test 1 – 500 KVA 125/216V Network Transformer and Install in L.2081
   b) Prep & Test 1 – 1875A 125/216V Network Protector and Install in L.2081
   c) Prep & Test 1 – Primary Switch and Install in L.2081
   d) Install Approx. 50' of 3 – 4/0 CU FS UG Primary Cable from SC.145 to L.2081
   e) Install 2 Sets of 600A Elbows for Primary Switch in L.2081
   f) Install Approx. 40' of 3 – 4/0 CU FS UG Primary Cable from Primary Switch to Network Transformer
   g) Install 1 Set of 600A Straight Terminations for Network Transformer
   h) Install Network Communications
5) Electrical Make Ready Secondary
   a) Connect Customer Secondary Cables to Collector Bus in L.2081
   b) Install 4 Sets of 5/C 500 NWK Secondaries Approx. 100' each from L.2081 to SC.148
   c) Install 3 10 Position Hy-Crabs in SC.148
   d) Connect Street Network Secondaries to Collector Bus in L.2081
6) Electrical Cutover Mill River CKT-812
   a) Check Alternate feed for all 480V networks and Open CKT-812 Protectors
   b) SW & GND Mill River Bus 3 Pos 34 to De-eng CKT-812
   c) Open all High Side Switches at each Network Transformer fed from CKT-812
   d) Check all Grid Network Protectors and Open
   e) Breakdown Splices in SC.149 on Chapel St
   f) Install 500 – 500 – 500 Wye Splice in SC.149
   g) Phase and Test Cable
   h) Close Primary Switch in L.2081
   i) Close High Side Switch in L.2081
   j) Put Network Protector in the Automatic Position in L.2081
   k) Close in High Side Switches at all Network Transformer fed from CKT-812
   l) Close Bus 3 Pos 34 to Re-eng CKT-812
   m) Put all Network Protectors back into the Automatic Position
7) Electrical Cutover Mill River CKT-813
   a) Check Alternate feed for all 480V networks and Open CKT-812 Protectors
   b) SW & GND Mill River Bus 4 Pos 44 to De-eng CKT-813
   c) Open all High Side Switches at each Network Transformer fed from CKT-813
   d) Check all Grid Network Protectors and Open
   e) Breakdown Splices in SC.145 on Chapel St
   f) Install 500 – 500 – 4/0 Wye Splice in SC.145
   g) Phase and Test Cable
   h) Close Primary Switch in L.2081
   i) Close High Side Switch in L.2081
   j) Put Network Protector in the Automatic Position in L.2081
   k) Close in High Side Switches at all Network Transformer fed from CKT-813
   l) Close Bus 4 Pos 44 to Re-eng CKT-813
   m) Put all Network Protectors back into the Automatic Position

6. Project Assumptions

The following is a list of standard assumptions which were used to create the estimates for the proposed work.

1. UI will be able to apply and get the permit on time to start this project.
2. UI to perform test pits to confirm or verify the location of other Utilities in the area after receiving and review the based maps.
3. All UI construction work will be done during the normal business week and hours.
4. UI will not have to relocate any other utility structure to accommodate the proposed UI Construction plan based on the results of the test pit.
5. UI will be able to maintain conduit trench typical depth; no more than 3.5 feet.
6. All materials ordered will be available in time for use by Construction.
7. All budgetary estimates are based on a work product in compliance with existing UI and/or Industry accepted and specifications.
8. Labor rates used in creating the Estimates are based upon historical averages.
9. All dollars shown are in 2020 dollars and subject to change due to escalation in material, labor, and equipment rates at the time of actual construction.
10. Customer will be able to install their secondary conduits from new network vault to their switchgear.
11. UI will be able to install Wye Splices for Mill River Feeders 812 and 813 in existing chambers.
12. All civil and electrical work will be completed in accordance with the customer's schedule which is the 4th quarter of 2024.

7. Used and Useful

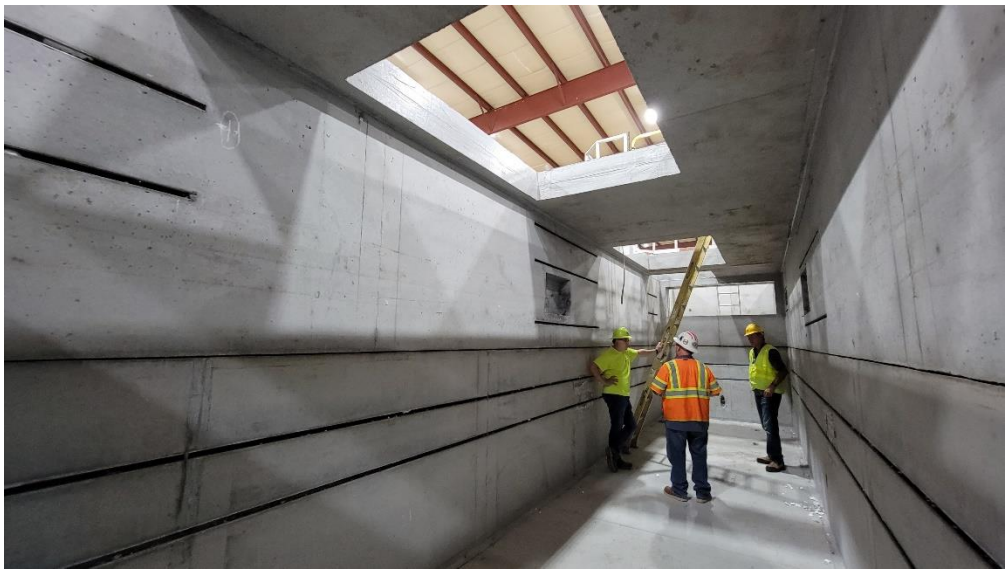


Figure 9: Dry Fitting of Network Vault before installation

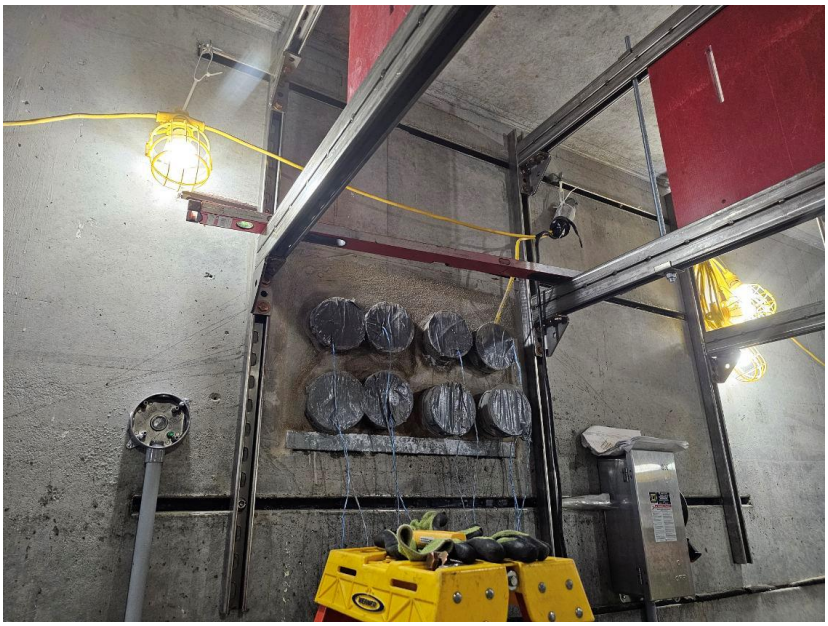


Figure 10: Customer Conduits entering Network Vault



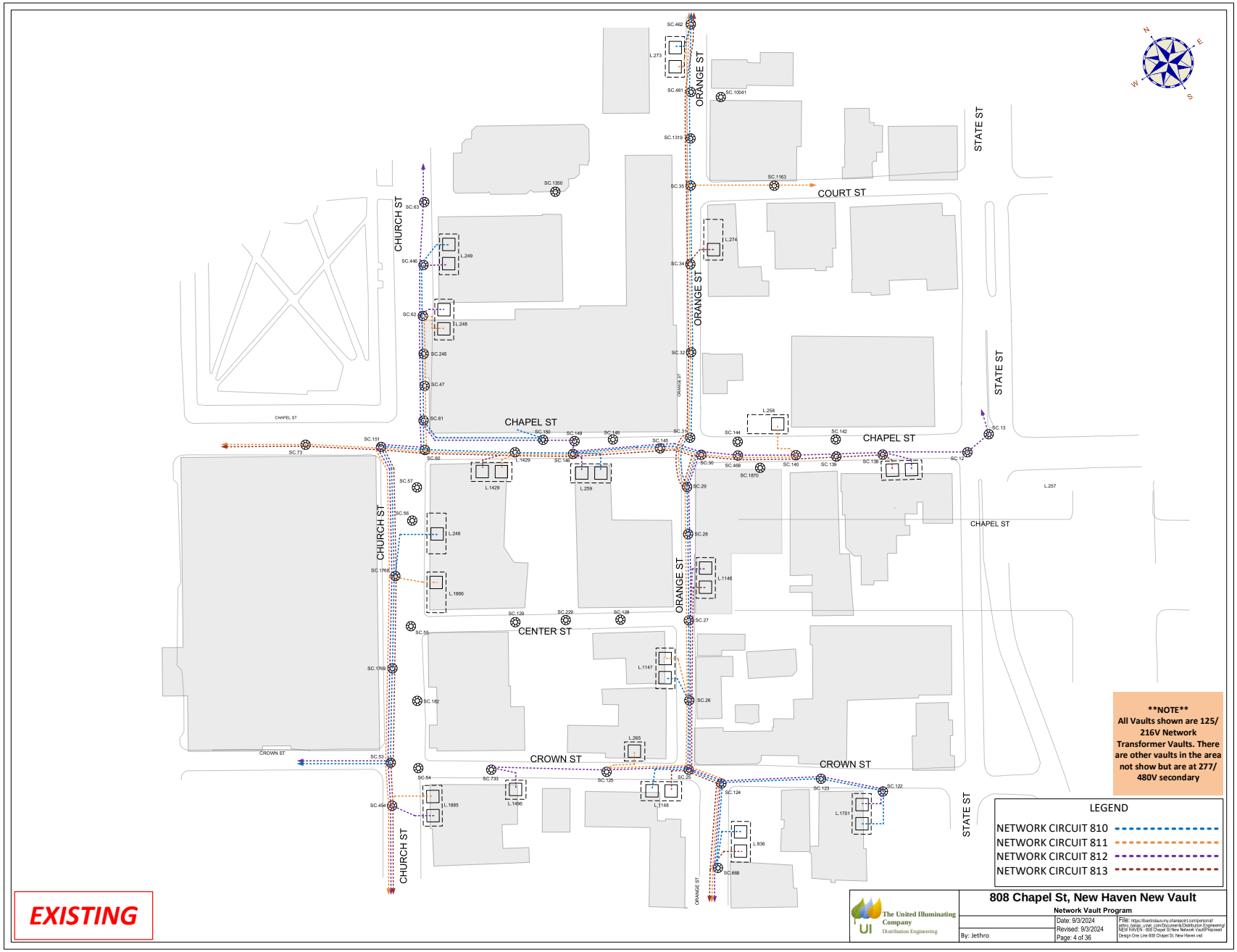
Figure 11: Collector Bus in Network Vault w/ Network Street Secondaries Connected



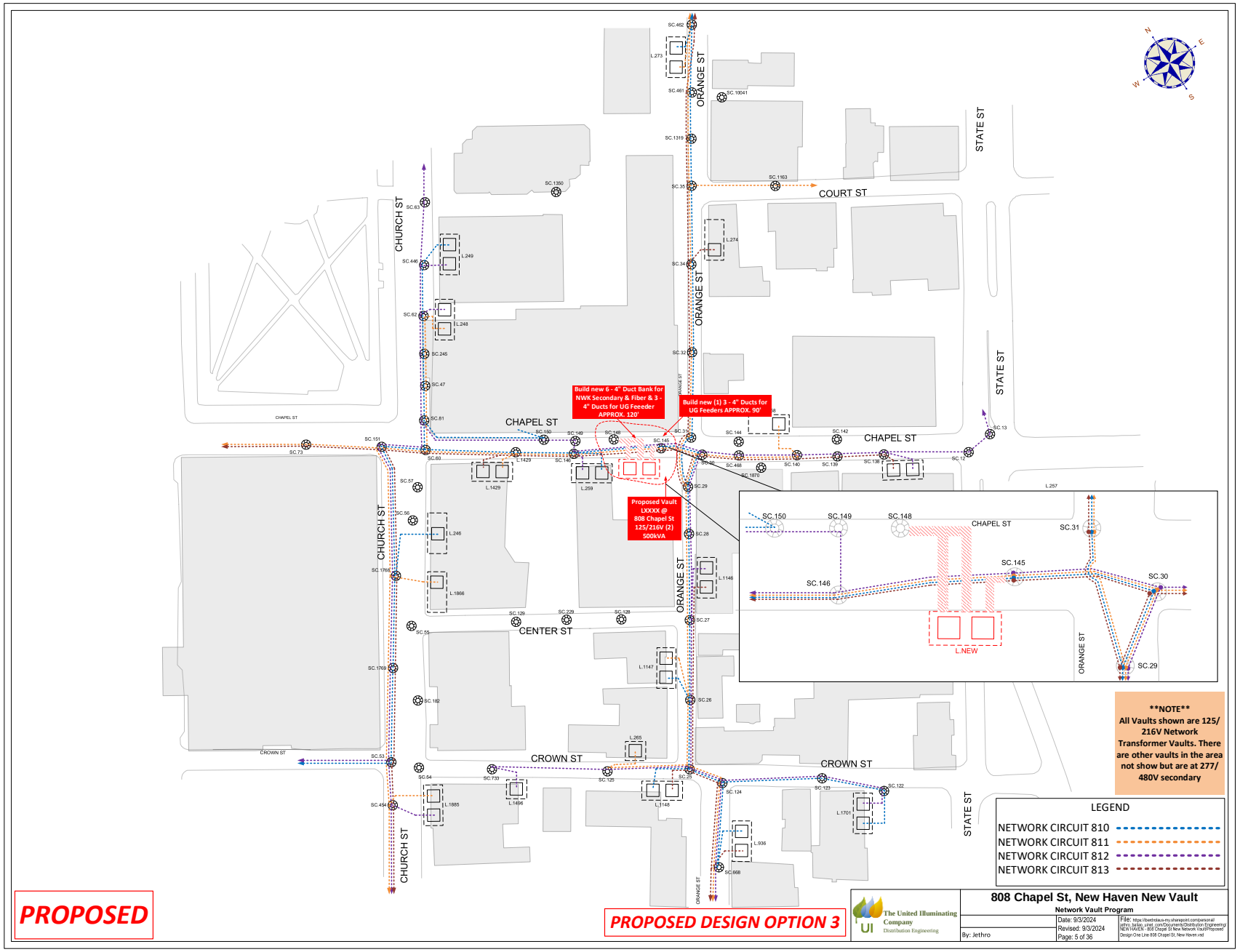


Figures 12 & 13: Network Transformers and Protectors Installed in the Vault

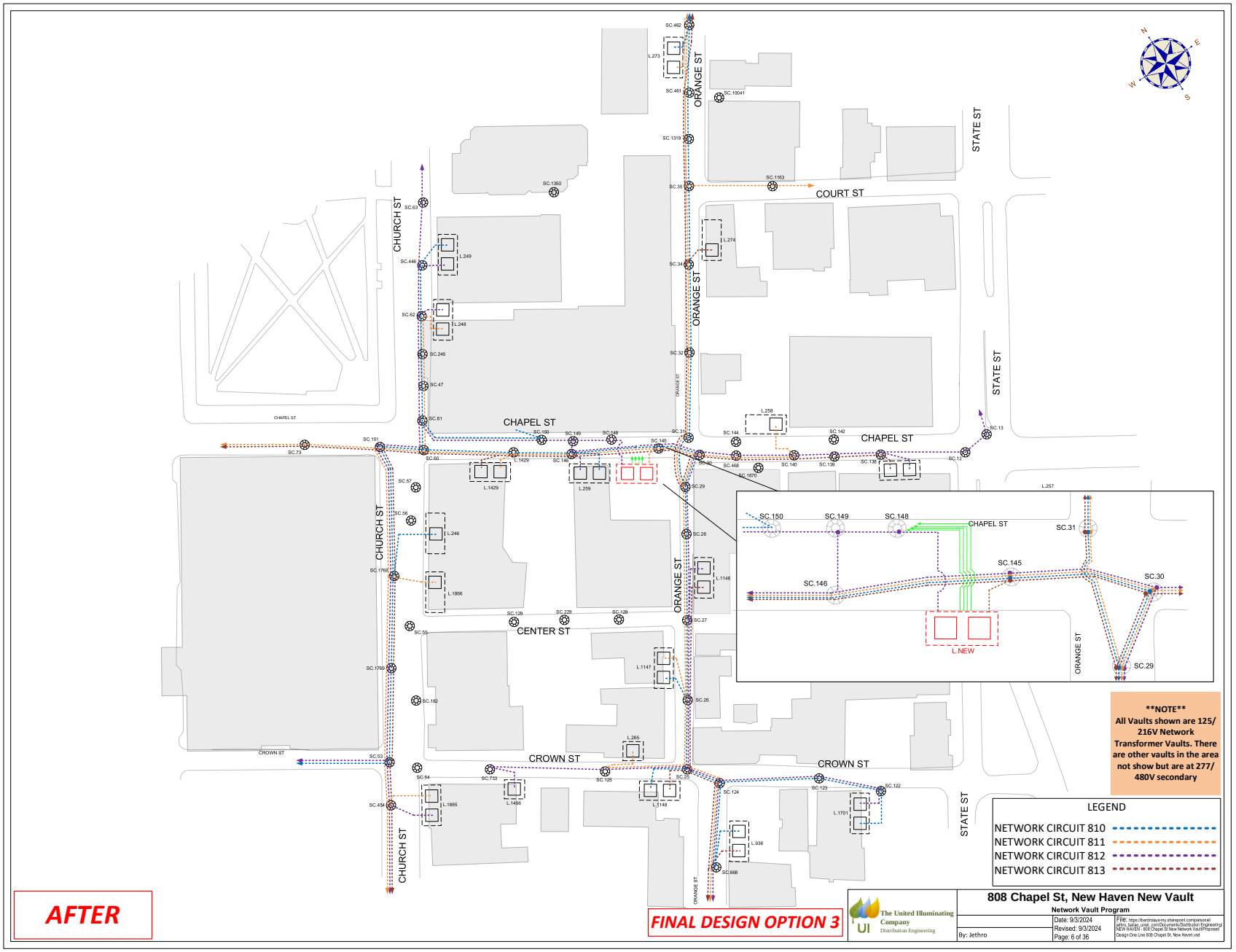
EXISTING


ORANGE ST
STATE ST
COURT ST
CHURCH ST
CHAPEL ST
CENTER ST
CROWN ST
NOTE
All Vaults shown are 125/ 216V Network Transformer Vaults. There are other vaults in the area not show but are at 277/ 480V secondary
LEGEND
NETWORK CIRCUIT 810
NETWORK CIRCUIT 811
NETWORK CIRCUIT 812
NETWORK CIRCUIT 813
EXISTING
The United Illuminating Company
Distribution Engineering
808 Chapel St, New Haven New Vault
Network Vault Program
Date: 9/3/2024
Revised: 9/3/2024
Page: 4 of 36
By: Jethro

PROPOSED DESIGN



AFTER


ORANGE ST
STATE ST
COURT ST
CHURCH ST
CHAPEL ST
CENTER ST
CROWN ST
SC.462
SC.461
SC.10041
SC.1319
SC.1350
SC.1163
SC.35
SC.34
SC.32
SC.31
SC.30
SC.29
SC.28
SC.27
SC.26
SC.63
SC.446
SC.62
SC.245
SC.47
SC.81
SC.151
SC.73
SC.60
SC.57
SC.56
SC.1766
SC.55
SC.1769
SC.182
SC.53
SC.454
SC.54
SC.733
SC.125
SC.123
SC.122
SC.124
SC.668
SC.144
SC.142
SC.140
SC.139
SC.138
SC.13
SC.468
SC.1870
SC.150
SC.149
SC.148
SC.146
SC.145
SC.129
SC.229
SC.128
L.273
L.274
L.249
L.248
L.258
L.1429
L.259
L.246
L.1856
L.1146
L.1147
L.265
L.1148
L.1496
L.1885
L.1701
L.936
L.257
L.NEW
NOTE
All Vaults shown are 125/ 216V Network Transformer Vaults. There are other vaults in the area not show but are at 277/ 480V secondary
LEGEND
NETWORK CIRCUIT 810
NETWORK CIRCUIT 811
NETWORK CIRCUIT 812
NETWORK CIRCUIT 813
AFTER
FINAL DESIGN OPTION 3
The United Illuminating Company
Distribution Engineering
808 Chapel St, New Haven New Vault
Network Vault Program
Date: 9/3/2024
Revised: 9/3/2024
Page: 6 of 36
By: Jethro

PRJ-005556

Network Vault Roof Replacement

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Network Vault Roof Replacement

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005556	Electric Distribution	Eves, Charles	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Infrastructure Replacement - Dist	IP1 Originate	Program/As Spent	Program/As Spent

Project description:

UI has an ongoing program to inspect network vaults in New Haven and Bridgeport, CT.
A number of vaults have been identified with deteriorated roofs that should be replaced.

Project Scope:

Current scope is to replace the roofs on the following network vaults:
L270 (WNCH 266 George St)
L271 (Madison Tower)
L851 (140 Fairfield Ave,Bpt)

Project Benefits:

Replacing the roof is significantly less expensive than replacing the entire vault. New roofs extend the life of the exisiting vault

Project Risks and Mitigation Plan:

Risk - the roof could deteriorate faster than we expect. Mitigation - take action to replace the roof or install temporary supports until the roof can be replaced.

Risk - concrete to fall into the equipment causing hazard or a fault. Mitigation - install temporary barrier to prevent debris hitting the equipment.

Risk of No Action:

The risk of no action is the roof will continue to deteriorate and eventually fail and collapse. It's hard to predict when the failure will occur, it could be next year, in five years, or in ten years. The certainty is it will fail and collapse without a full replacement creating a U.I. and public risk and hazard.

Project Alternatives:

There are no alternatives, the deteriorating roof must be replaced or eventually it will fail and collapse creating a present risk and danger for U.I. employees and the general public

Basis for Project Estimates

Based on other similar projects completed in U.I. territory, project costs can be broken down as:

-Engineering, Project and Construction Management.
-Materials (roof, metal hatch doors, vent grates, etc.
-Labor to demo old roof and install new roof, doors & restoration.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 111**	$ -	$ -	$ 44	$ 45	$ 22
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 1,759**	$ -	$ -	$ 680	$ 692	$ 387
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 252**	$ -	$ -	$ 100	$ 102	$ 50
# Internal, Overheads	**$ 186**	$ -	$ -	$ 72	$ 74	$ 40
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ 359**	$ -	$ -	$ 140	$ 143	$ 76
Total	**$ 2,667**	**$ -**	**$ -**	**$ 1,037**	**$ 1,055**	**$ 575**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 2,667	$ -	$ -	$ 1,037	$ 1,055	$ 575

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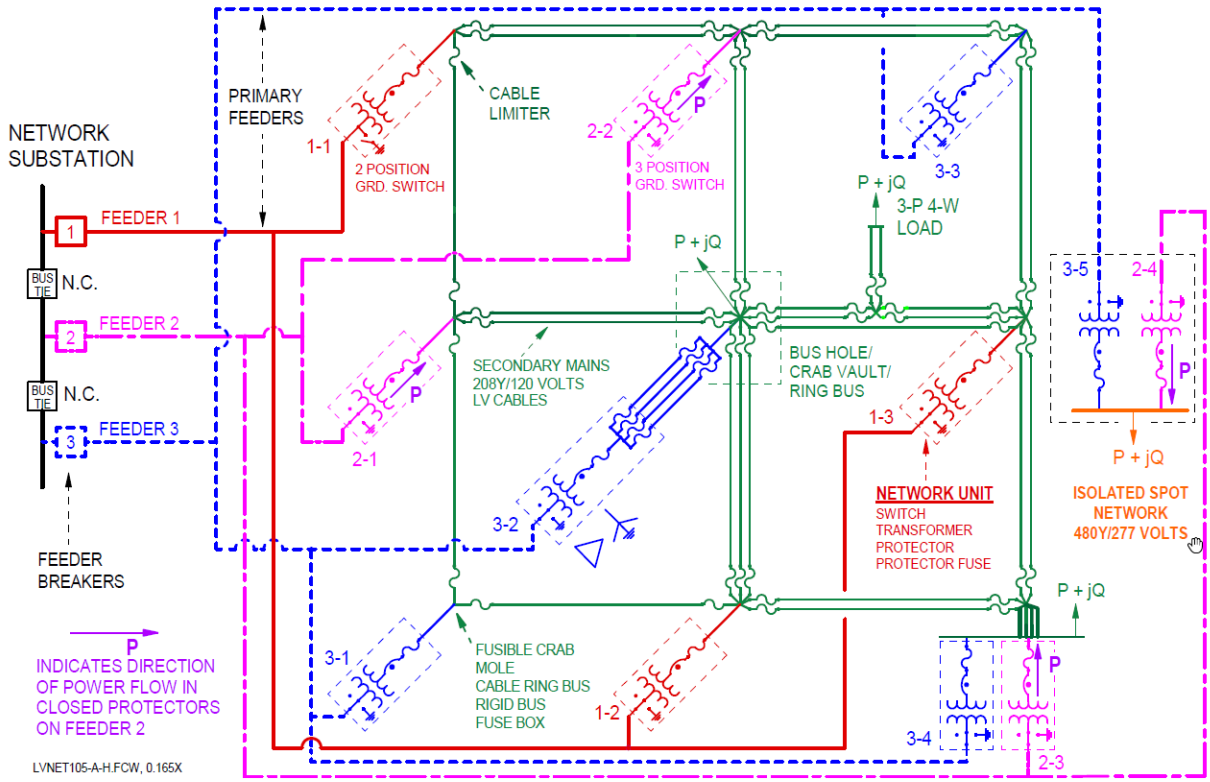
Network Vault Roof Replacement



Engineering Project PRJ-005556

Report Network Vault Roof Replacement

Prepared by:

Distribution Engineering

Date of Report: 08/26/2024

Index

1. Project Description (Summary) 3
2. Existing Conditions 3
3. Need Statement 11
4. Engineering Alternative Solutions 11
5. Project Milestones 12
6. Project Assumptions 13
7. Engineering Recommendations 13
8. Maps or Electrical Design 14

1. Project Description (Summary)

UI has low voltage secondary networks in specific areas of the Cities of New Haven and Bridgeport. The low voltage secondary network was designed and constructed to provide for N-1 operation. Loss of one of the primary supply circuits, with the correct number of network vaults which are strategically located, the secondary cable grid system provides the needed supply so that the connected load is not impacted. In addition, the system is designed so that when there is a fault on the secondary system, the connected vaults all contribute to the fault current. The concept is to generate enough fault current to clear the fault before significant damage can occur to the low voltage secondary system.

Some of UI underground network vaults were designed and installed over 60 years ago. UI performs annual inspections and has a program to remediate vaults that show structural or electrical issues which can compromise the operation of the network as designed. UI Distribution Engineering Group reviews the inspection results, evaluates and makes their recommendations as to the prudent course of action. As result of this ongoing inspection program, network vaults L271, L270, L851 located respectively at 111 266 George Street in New Haven, and L851 at 140 Fairfield Ave in Bridgeport were selected for roof replacement due to structural and electrical issues that can compromise the operation of the network as designed.

2. Existing Conditions

Network vault L271 was built over 60 years ago according to UI records. It has two network primary feeders: 810 and 812 feeding two 500 KVA 125/216V network transformers and two 1875 amps 125/216V network protectors. This vault has four (4) sets of 5/C-500kcmil secondary cables supplying power to the network secondary grid.

Network vault L271 was built over 50 years ago according to UI records. It has two network primary feeders: 810 and 813 feeding two 750 KVA 125/216V network transformers and two 2825 amps 125/216V network protectors. This vault has six (6) sets of 5/C-500kcmil secondary cables supplying power to the network secondary grid.The roofs and walls of these two are deteriorated, and also have some structural and electrical issues that can compromise the operation of the network vault. The primary agent of damage to underground concrete structures is the inflow of concentrated salt solution created by deicing salts being dissolved into the melt-water. These solutions penetrate through the concrete mass, corroding the embedded reinforcing steel and creating a breakdown of the concrete itself. Network vault L270 is located approximately 427ft away UI existing network vault L1473 located at 123 York St in New Haven. Network vault L1473 has two (2) network primary feeders 812 and 813 feeding two 500 KVA 125/216V network transformers and two 1875 amps 125/216V network protectors.

This vault has four (4) sets of 5/C-500kcmil secondary network cables that supply power to the network secondary grid.

Network vault L271 is located approximately 442ft away UI existing network vault L1896 located at 301 George St in New Haven. Network vault L1896 has two (2) network primary feeders 810 and 811 feeding two 500 KVA 125/216V network transformers and two 1875 amps 125/216V network protectors. This vault has four (4) sets of 5/C-500kcmil secondary network cables that supply power to the network secondary grid. The pictures below show the damage caused by this solution that compromised the structural integrity of the vault roof, primarily in the area of the vault hatches. These structural issues make these vaults a priority to replace the roofs.

Roof for Network Vault L271 located at 111 George St



Roof for Network Vault L271 located at 111 George St





Roof for Network Vault L271 located at 111 George St





Roof for Network Vault L271 located at 111 George St



Roof for Network Vault L270 located at 266 George St





Roof for Network Vault L270 located at 266 George St





Roof for Network Vault L851 located at 140 Fairfield Ave Bridgeport





3. Need Statement

The inspection of these vault was prompted by safety concerns, brought up by the Transmission and Substation Department, which were observed during normal working procedures. A full structural and electrical inspection was performed by UI civil and electrical engineers from the distribution engineering team, and structural engineer from the maintenance engineering team. The purpose of the Civil/Structural/Electrical inspection was to determine the severity of the issues brought up. These vaults are +/- 30' long below grade structure, located in the sidewalk, in front of these buildings located respectively at 111 and 266 George Street , in the city of New Haven. These vaults were designed and constructed over 60 years ago according UI record, and is a four-piece precast structure, which includes an upper and lower half of the vault, and two precast ventilation wells attached to either end of the vault.

The roofs and the walls are deteriorated causing the concrete to fall into the equipment, and also have some structural and electrical issues that can compromise the operation of these network vaults.The primary agent of damage to underground concrete structures is the inflow of concentrated salt solution created by deicing salts being dissolved into the melt-water. These solutions penetrate through the concrete mass, corroding the embedded reinforcing steel and creating a breakdown of the concrete itself. The structural issues discovered in these vaults include, but not limited to:

1. Erosion of concrete cover, including areas over the rebar reinforcing
2. Spalling of concrete sections from the lower corbels and hatch openings
3. Degradation and section loss of reinforcing rebar

As mentioned above, these issues are mainly attributed to the infiltration of saline solutions, leaching into the concrete, that are transported by runoff from the sidewalk above.

4. Engineering Alternative Solutions

Alternative I: Keep these vaults as they are and do nothing.

Do nothing is not an option here, as shown in the pictures above; the roof and the walls are deteriorated, and it also has some structural and electrical issues that can compromise the operation of the network as designed. UI crew will not be able to enter this vault and perform switching to denergize the two network feeders. This alternative was not pursued, therefore no estimate was created.

Alternative II: Replace the roof of these network vaults

The scope of the work consists of the following:

1. Deenergize all the network transformers in the vault.
2. Deenergize the network secondary collector bus from the secondary grid.
3. Demo and removal of the existing roofs.
4. Procure a new precast roofs.
5. Install a new roofs by doweling and grouting.
6. Install new access panels and ventilation grade.
7. Energize the existing network transformers and secondary collector bus.

Table II Proposed Estimates for alternative II

The following are the budgetary estimates for the capital, expense, and removal work as outline with the assumptions listed in the appendix. These values have a tolerance of +25% and -25%.

	2026	2027	2028
# Internal, Labor	$100,000	$102,000	$50,000
# External Services	$680,000	$691,600	$387,000
#COR-Ext OH	$52,355	$53,402	
#COR-Ext Svc	$120,000	$122,400	
# AFUDC	$44,200	$45,084	$21,905
# Overheads - External	$140,263	$142,816	$76,040
# Internal, Overheads	$72,401	$73,673	$40,338
Total cost of job	**$1,209,219**	**$1,230,975**	**$575,283**

5. Project Milestones

Assuming the project is approved by UI, we expect the following duration of each step. The exact schedule would depend upon coordination with the customer.

1. Engineering Design Completed Q1 2025.
2. Purchase new precast roofs Q2 2026.
3. Deenergize all the equipment in the vault Q3 2026.

4. Demo and Remove the old roofs from the vault Q3 2026.
5. Install the new precast roof Q3 2026.
6. Electric Work Completed Q4 2026.
7. Project Close Out Completed.

6. Project Assumptions

The following is the list of standard assumptions which were used to create the estimates for the proposed work.

1. UI will be able to apply and get the permit on time to start this project.
2. UI will be able to procure the new roofs on time
3. UI will be able to get the access panels and ventilation grade on time.
4. UI will be able to deenergize the vault without any electrical issue.
5. UI will be able to deenergize the vault without affecting the customer.
6. All UI construction work will be done during the normal business week and hours.
7. All materials ordered will be available in time for use by Construction.
8. All budgetary estimates are based on a work product in compliance with existing UI and/or industry accepted and specifications.
9. Labor rates used in creating the estimates are based upon historical averages.
10. All dollars shown are in 2024 dollars and subject to change due to escalation in material, labor, and equipment rates at time of actual construction.

7. Engineering Recommendations

Engineering recommends alternative II which is roofs replacement because the roofs and the walls are deteriorated causing the concrete to fall into the equipment, and also have some structural and electrical issues that can compromise the operation of these network vaults.The primary agent of damage to underground concrete structures is the inflow of concentrated salt solution created by deicing salts being dissolved into the melt-water. These solutions penetrate through the concrete mass, corroding the embedded reinforcing steel and creating a breakdown of the concrete itself.

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UI
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PRJ-005548

Radial Vault Replacement Program

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Radial Vault Replacement Program

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005548	Electric Distribution	Eves, Charles	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Infrastructure Replacement - Dist	IP1 Originate	Program - Ongoing	Program - Ongoing

Project description:

UI has many radial vaults located in buildings or in public rights-of-ways with pole-type transformers that are over thirty (30) years old and are approaching their end of life. These vaults are typically just large enough to fit the transformer(s) and lack proper working clearances, access, and ventilation. The radial vaults may have electrical issues (overloads, arcing, equipment near end of life, etc.), structural issues (cracks, crumbling concrete, rust, etc.), environmental issues (oil leaks, asbestos, lead, dust & debris, etc.). Issues identified above may put UI personnel and the public at risk.

This is an on-going yearly blanket program that targets, repairs, or replaces the above-mentioned issues with radial vaults for a given year.

Project Scope:

Each individual radial vault replacement is a unique project which has its own design scope of work, schedule, and cost. Where applicable, the radial vaults identified as needing to be remediated will be replaced per UI's current construction standards and practice. New pad-mounted, or pole-mounted transformers, or equipment that meets NESC & OSHA requirements will be used to remediate the vaults. The project document lists the vaults identified for remediation.

Project Benefits:

The program allows UI to address/mitigate the radial vaults that are in need of replacement due to electrical, environmental, structual, etc. issues. Bring grandfathered/legacy radial vaults into compliance with current NESC & OSHA requirements and UI construction standards & practice.

Project Risks and Mitigation Plan:

Delay or non-execution of addressing or replacing radial vaults could result in equipment failure, environmental clean-up, extended outage, and public safety due to vault grates or door failure, etc. The Radial Vault Replacement Program allows UI to respond to each vault as identified and prioritized annually.

Risk of No Action:

No action could result in UI equipment failing causing damage to property & personnel, environmental clean-up & repair costs, and extended outage. UI crews continue to perform vault inspections and identify issues that must be addressed.

Project Alternatives:
Each individual vault is a unique project under the Radial Vault Replacement Program. Alternatives will be evaluated as required for each project.

Basis for Project Estimates
The overall budget for the Radial Vault Replacement Program will primarily be based on past practice and historical costs together with known radial vault replacement project cost estimates.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 147**	$ -	$ -	$ 48	$ 49	$ 50
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 539**	$ -	$ -	$ 176	$ 180	$ 183
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 122**	$ -	$ -	$ 40	$ 41	$ 42
# Internal, Overheads	**$ 394**	$ -	$ -	$ 131	$ 131	$ 132
# Materials	**$ 1,500**	$ -	$ -	$ 500	$ 500	$ 500
# Overheads - External	**$ 332**	$ -	$ -	$ 110	$ 111	$ 112
Total	**$ 3,034**	**$ -**	**$ -**	**$ 1,005**	**$ 1,011**	**$ 1,018**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 3,034	$ -	$ -	$ 1,005	$ 1,011	$ 1,018

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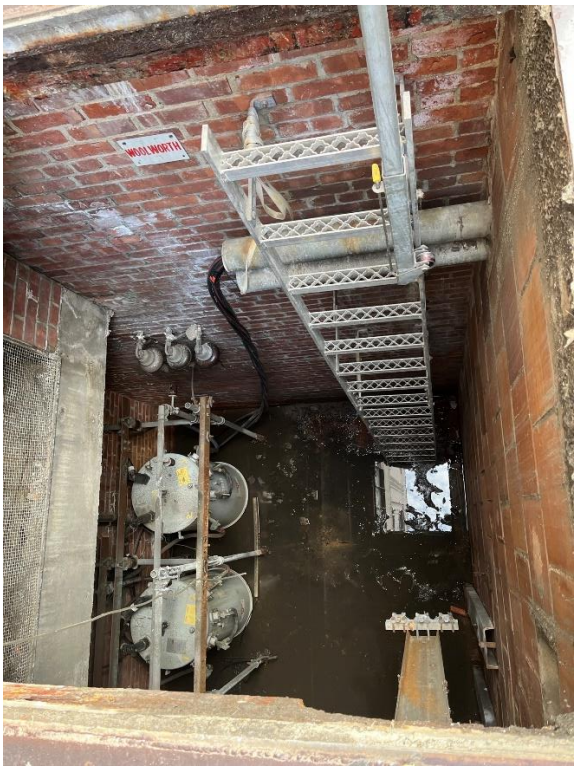
Radial Vault Replacement Program





Business Report

All Towns

Prepared by:

Distribution Engineering

Date of Report: 10/03/2024

Revised date:

Index

1. Program Description (Summary) 3
2. Scope 3
3. Benefit 3
4. Program Objectives 4
4.1. Program Deliverables 4
Table I – Actuals: 5
4.2. Alternatives 5
5. Program Assumptions 6
6. Program Conclusion 6

1. Program Description (Summary)

Radial transformer vaults are used to connect the customers service entrance equipment to UI's electric distribution system in urban areas where overhead facilities are not practical or real estate is limited for UI's equipment. The radial vaults are typically constructed in buildings or in public rights-of-way with pole-type transformers that are over thirty (30) years old and are approaching their end of life. These vaults are typically just large enough to fit the transformer(s) and lack proper working clearances, access, and ventilation. The radial vaults may have electrical issues (overloads, arcing, equipment near end of life, etc.), structural issues (cracks, crumbling concrete, rust, etc.), environmental issues (oil leaks, asbestos, lead, dust & debris, etc.). Issues identified above may put UI personnel and the public at risk.

This is an on-going yearly blanket program that targets, repairs, or replaces the above-mentioned issues with radial vaults for a given year.

2. Scope

Each individual radial vault replacement is a unique project which has its own design scope of work, schedule, and cost. Where applicable, the radial vaults identified as needing to be remediated will be upgraded or replaced per UI's current construction standards and practice. New pad-mounted, or pole-mounted transformer(s), or equipment that meets NESC & OSHA requirements will be used to remediate/replace the vaults. Examples of typical projects include:

- Eliminate radial vault and install pole-mounted or pad-mounted transformer(s)
- Replace pole-type transformer(s) within the vault with either single-phase submersible transformer(s) or a single three-phase submersible transformer.
- Replace vault doors, ventilation grates, etc.
- Remove environmental hazards (such as asbestos, lead, dust & debris, etc.)
- Etc.

3. Benefit

The program allows UI to identify and address/mitigate the radial vaults that need replacement due to safety, electrical, structural, environmental, etc. issues in a timely

manner. Bring grandfathered/legacy radial vaults into compliance with current NESC & OSHA requirements along with UI' construction standard and practice.

4. Program Objectives

This program identifies (utilizing UI's vault inspection guide) and remediates/replaces radial vaults that are failing and are not up to current UI construction standards and does not meet NESC & OSHA requirements. Civil and/or Environmental construction services might be required to remediate/replace the radial vault. All costs will be incurred between January 1 and December 31 of each year.

All radial vault replacement efforts shall use prudent engineering judgement, in accordance with good industry practice, and shall conform to all applicable UI and industry standards, and regulatory requirements.

4.1. Program Deliverables

Identify and resolve issues around radial vaults in a timely, cost-effective, and safe manner.

4.2. Program Budget

The overall budget for the Radial Vault Replacement Program is primarily based on past practice and historical costs together with known radial vault replacement cost estimates.

Table I – Known Projects:

Known Vault Replacement Project List

Name	Address	Loc #	Type	Comments
2025				
Park City Plaza	10 Middle St., Bridgeport	1373	Walk-in	Deteriorating Switchgear, high volage equipment not isolated from non qualified personell
The Advocate Press Inc.	441 Chapel St., New Haven	L501	Walk-in	Structural issue: interior vault walls & roof failing. Visible oil leak. Poor primary & secondary supports.

				Overall condition poor. **Vault Restriction in Place**
Chapel Medical	1417 Chapel St., New Haven	L424	Below Grade	Structural issue: interior vault walls failing
Hamilton Industrial Center	65 St. John St., New Haven	L520	Below Grade	Condemned/Abandoned building: Transformers susceptible to vandalism leading to environmental clean up
2026				
Webber Building	435 East Main St, Ansonia	L61	Below Grade	Structural issue: interior vault roof failing. Limited access.
Knights of Columbus	1 State St., New Haven	L537	Below Grade	Clearance issue: Vault does not meet NESC & OSHA requirements.
Carofano's Opticians Inc.	1215 Chapel St., New Haven	L561	Below Grade	Transformer vault repair: doors deteriorated and should be replaced.
Justice Building	100 Fairfield Ave., Bridgeport	L1077	Below Grade	Structural issue: interior vault roof & walls failing. Access via parking garage. Limited access.

Table II – 2025 & 2026 Estimates:

PRJ-005548
Radial Vault Replacement Program

	2025	2026
CAP		
COR		
Program Total	**$1,004,686**	**$1,004,686**

4.3. Alternatives

None – UI is obligated to provide a safe working condition for its employees and the general public.

5. Program Assumptions

This budget is a high-level estimate based on past estimates and current construction practice.

The following factors can impact the overall budget and cause volatility from month to month or year to year:

- **Complexity of Electric design** – Electric service requirements, location, area electric distribution system (ex. service voltage & size, primary voltage, single or three-phase, overhead or underground distribution, etc.) will determine how complex the design will be.
- **Civil Construction Services** – Location such as downtown Bridgeport or New Haven and the complexity of the design will determine how much civil construction services is required.
- **Environmental Construction Services** – With transformer vault remediation/replacement work, environmental clean is often a given. Depending on the vault condition, whether PCB is contained in the transformer(s) or not will determine the level of an environmental contractor services.

Due to the high variability of this program, the team reviews each project based on emergent need annually to determine what projects can be done for a given year. **Program is NOT expected to exceed its authorized budgeted amount for the year**.

6. Program Conclusion

Each individual project under this program will complete the plan construction work and close out all aspects of the work to make it used and useful.

PRJ-005555

UI Network Communications Program

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI Network Communications Program

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005555	Electric Distribution	Eves, Charles	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Infrastructure Replacement - Dist	IP1 Originate	Program - Ongoing	Program - Ongoing

Project description:

The UI network feeds the downtown areas of New Haven and Bridgeport., CT
Currently, UI has no systems in place in the underground network system that can provide the communication link between the grid devices and operators in remote locations. This project's long term goal is to connect all of our netowrk vaults to our SCADA system.

Project Scope:

Scope of this project is to install network communication equipment in every network vault and connect them via fiber optics back to UI control centers. This may also include civil work to install ductline between vaults where no path exists.

Project Benefits:

A monitoring and control system allows remote operators to check on the status of the transformers and protectors, as well as telimetry from the vault including liquid temperature gauge, pressure gauge, vault water float switch, ambient temperature probe as well as electrcial data: voltage, amps, phasing, current flow, and protector status.

Having a robust commincation system allows for data collection helping UI identify problems before they occur. When problems do occur, it allows UI to identify the specific vault that is causing the issue, which results in faster restoration time and less impact on our customers.

Project Risks and Mitigation Plan:

Currently, UI installed only Eaton CM52 network protectors in the network systems. Therefore, UI is obligated to use Eaton Network Monitoring System in the network. If Eaton Corporation is out of business or no longer provide network monitoring system, UI will not be able to complete this project, and this will affect the capital budget. The Mitigation plan is to investigate if Richard's Company network monitoring system can work with Eaton CM 52 network protector.

Risk of No Action:

A network monitoring system can be used to prevent incidents from becoming major events. The network monitoring system would allow the System Operators to identify a stuck network protector and attempt to open it remotely, or dispatch a crew to identify the location and open it locally before any damage can occur. If No Action is taken, the crew has to search the location of the stuck network protector and this can take several hours or days to fine the backfeed and attend to open it manually.

Project Alternatives:

Alternative I: Install Eaton VaultGard and Power Line Carrier

One of the problems that are faced by the power line carrier is that the electrical power lines are usually very noisy due to the high amount of energy that they transmit. The signal strength and the operating frequency is also another challenge in power line carrier. The carrier frequency suffers reflection losses at various points in its path from transmitter, coaxial cable, line tuner unit, coupling capacitor, power line to transmitter. Power line communication is not secure. Based on these issues, this alternative was not pursued.

Alternative II: Install Eaton VaultGard and Twisted Pair

The Twisted pair cable provides poor security and is relatively easy to tap. It can be easily breakable. It has a low durability and is susceptible to electromagnetic interference. Twisted pair cable can only transmit signals over shorter distances, which makes it unsuitable for large networks. Based on these issues, this alternative was not pursued.

Basis for Project Estimates

The cost estimate is based on similar projects and include the following:

•Ten network vaults will be completed per year.
•Engineering /Management time
•Materials Cost from the vendor (Fiber and associated hardware, Eaton Monitoring)
•Labor cost to install 30,000ft of fiber and splices.
•Labor cost to install 26,000ft of inner ducts.
•Labor cost to install 1000ft of corrugated innerduct.
•Labor cost to install fiber rack-mounted termination panel.
•Labor cost to install and test Eaton monitoring system in ten network vaults.
•Labor cost to terminate and test the operation of the fiber as design.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

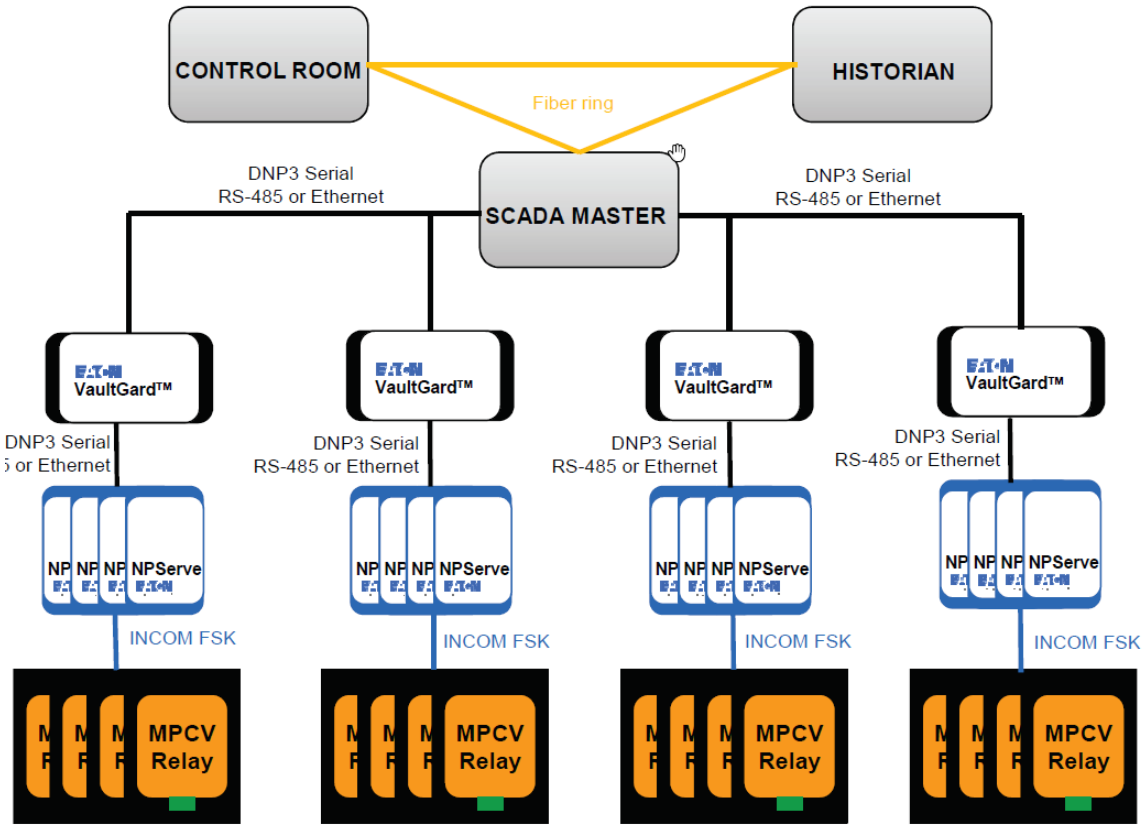
	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 449**	$ -	$ -	$ 147	$ 150	$ 152
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 2,525**	$ -	$ -	$ 825	$ 842	$ 858
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 1,316**	$ -	$ -	$ 430	$ 439	$ 447
# Internal, Overheads	**$ 1,248**	$ -	$ -	$ 413	$ 416	$ 419
# Materials	**$ 3,900**	$ -	$ -	$ 1,300	$ 1,300	$ 1,300
# Overheads - External	**$ 1,552**	$ -	$ -	$ 510	$ 517	$ 524
Total	**$ 10,989**	**$ -**	**$ -**	**$ 3,625**	**$ 3,663**	**$ 3,701**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 10,989	$ -	$ -	$ 3,625	$ 3,663	$ 3,701

UI
An Avangrid company

UI Network Communication Program



Engineering Project PRJ-005555

Report UI Network Communication Program

Prepared by:

Distribution Engineering Department

Date of Report: 10/02/2024

Index

1. Project Description (Summary) 3
2. Existing Conditions 4
3. Need Statement 7
4. Engineering Alternative Solutions 8
5. Project Milestones 10
6. Project Assumptions 10
7. Engineering Recommendations 11
8. Maps or Electrical Design 25

1. Project Description (Summary)

UI Network Communication Program CAP project consists of the installation of the network monitoring system which includes the Eaton VaultGard, Transformer Ruggedized Telemetry Link (TRTL), HIM Screen, POE Swicth, DRAM, DIM, Cisco Switch, Power Supply, Water Float Switch, Ambient Temperature Probe, Pressure gauge, Liquid Temp Gauge, and Fiber Optic. The network is the most sophisticated type of distribution system since it does not employ a radial power flow concept, but instead relies on the fact that each load receives its power from several parallel paths operating simultaneously. For low voltage networks, the secondary sides of the network transformers are tied together. The transformers are fed from different primary feeders. This type of distribution system is the most reliable, however, it is also the most expensive to implement and maintain. The complexity of such a system also gives to many challenges for the operation and protection of its components.

Electric Utilities realize the benefits of connecting two-way communications technologies into the distribution assets. This project provides more reliable and cost-effective service on the distribution grids. The United Illuminating Company has installed CM52 network protectors with microprocessor-controlled network relays (MPCV-D) in the underground network vaults within the City of New Haven and the City of Bridgeport. This MPCV-D relays are equipped with communication capabilities that allow remote monitoring and control of the network protector. Currently, United Illuminating Company has no systems in place in the underground network system that can provide the communication link between the grid devices and operators in remote locations. United Illuminating Company’s objective is to analyze several of the available communication technologies in order to determine the solution best suited for this application. Distribution Engineering is tasked with evaluating multiple technologies that would provide United Illuminating Company with ability to get monitoring and control communication to the network protector relays serviced by the Mill River, New Congress, and Broadway substations.

Due to the complexity of this project and the number of network transformers and protectors, there will be multiple phases of implementations, which are detailed below.The project is expected to take nine years to complete once construction starts.

2. Existing Conditions

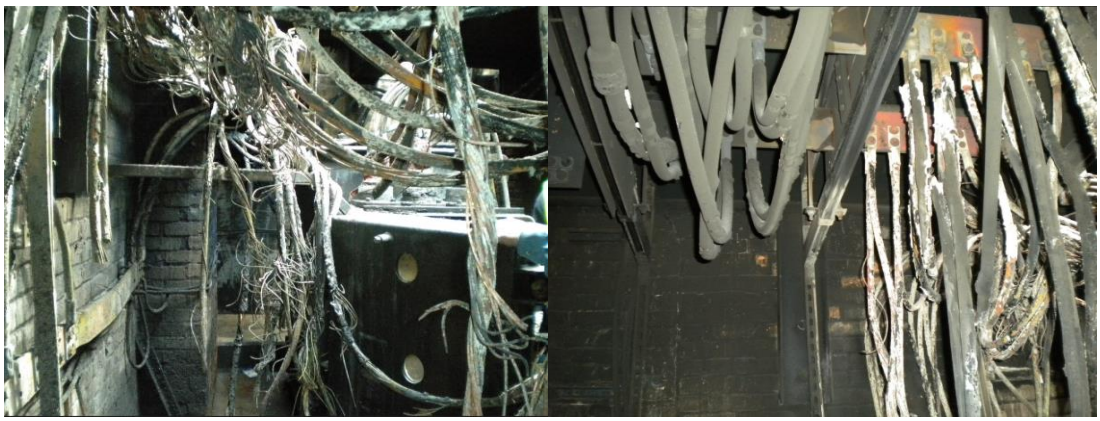
The United Illuminating Company has installed CM52 network protectors with a microprocessor-controlled network relays (MPCV-D) in the underground network vaults within the City of New Haven and the City of Bridgeport. The MPCV relays are equipped with communication capabilities that allows remote monitoring and control of the network protector. There are a total of 107 network transformers and 107 network protectors in the City of New Haven and 58 network transformers and 58 network protectors in the City of Bridgeport. Currently, United Illuminating Company has no systems in place in the underground network system that can provide the communication link between the grid devices and operators in remote locations. In 2010 a fault occurred in the New Haven Network System and this fault led to a fire in a customer network vault L264. The initial feeder fault occurred and escalated into a two-feeder fault as a result of a stuck network protector that caused an alive on backfeed condition (see pictures below). Incidents such as the one just described poses a safety risk for the general public and UI workers. A network monitoring system can be used to prevent such incidents from becoming major events. The network monitoring system would allow the System Operators to identify the stuck network protector and attempt to open it remotely, or dispatch a crew to identify the location and open it locally before any damage can occur.

Pictures showing the fire in the Shubert network vault L264 caused by a network protector that failed to open.

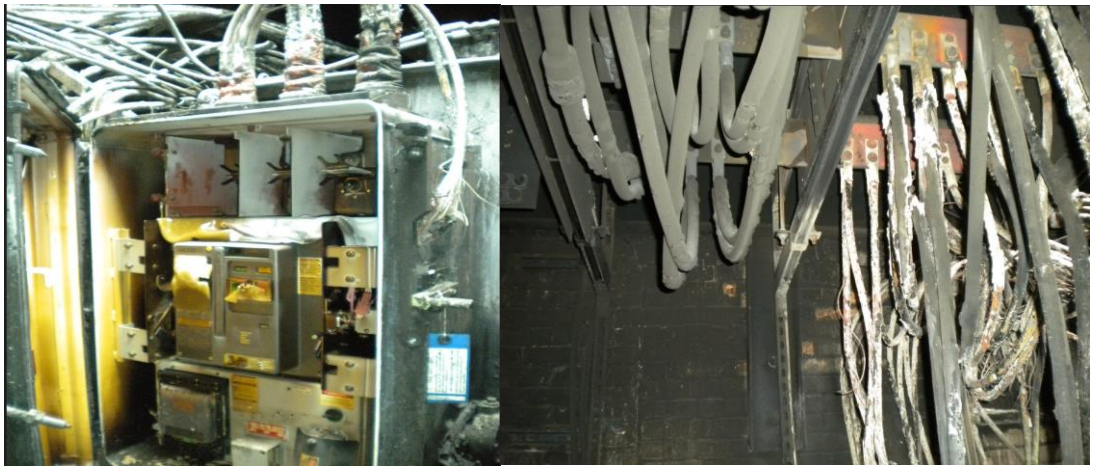




Picture showing the excessive damage due to the fire on the secondary cables.



Picture showing the excessive damage due to the fire on the network protector.



Picture showing the excessive damage due to the fire on the customer cables.

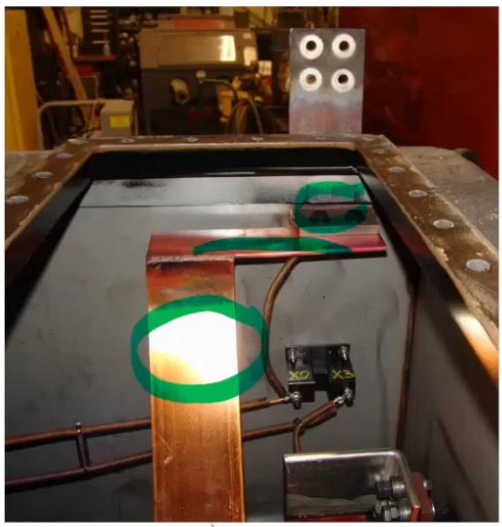


DAMAGED NETWORK TRANSFORMER FROM FAILURE OF INTERNAL NEUTRAL PA



Short circuit testing of network transformers, per present standards, is done only for a three-phase fault, which does not pass current through the X0 path.

UNIT WITH THERMAL DAMAGE AT CONNECTION TO X0 BUSHING



UNIT WHICH FAILED AT INTERNAL CONNECTION TO X0 BUSHING



FLEXIBLE CONNECTION TO NEUTRAL POINT OF WYE-CONNECTED SECONDARY WINDINGS

STAINLESS STEEL NEUTRAL BUSHING WELDED TO SS TANK



3. Need Statement

The need for network monitoring system in UI's underground distribution secondary networks is very important since there is limited visibility into this part of the distribution system. This need became evident during an unscheduled outage in 2010 when a fault in the New Haven Network led to a fire in a customer network vault L264. The initial feeder fault occurred and escalated into a two-feeder fault as a result of a stuck network protector that caused an alive on backfeed condition. This incident caused prolonged customer outage and the Company incurred approximately $1.2 million dollars in cost to remediate the situation. Incidents such as the one just described pose a safety risk for the general public and UI workers. A monitoring and control system for the secondary networks can be used to prevent such incidents from becoming major events. A network monitoring system is also extremely beneficial to the Company day-to-day operation. This can be used by the System Operators in the Control Center to identify the stuck network protectors and attempt to open it remotely, or dispatch a crew to identify the location and open it locally. Currently, when a network protector get stuck, UI crews must go to each network vault to find the protector that is stuck closed and open it manually. Locating the stuck protector can take several hours depending on the number of vaults on the feeder and the time it will take to find it.

4. Engineering Alternative Solutions

Alternative I: Do nothing.

Do nothing is not an option here, as shown in the pictures above. UI will continue the risk of having a network protector that failed to open during network feeder switching. As a result of that, the network protector will continue to backfeed the network system.The System Operator must dispatch the crew to find the stuck network protector and open it manually and this effort can take several hours.

Alternative II: Proposed Solution
Install Eaton VaultGard monitoring system in 10 network vaults and run approximately 30,000 ft of Fiber Optic Per Year.

UI has two underground network systems; one in New haven and a second one is in Bridgeport. The New Haven network system has 60 network vaults (55 vaults for Mill River substation and 5 for Broadway substation). Bridgeport network system has 28 network vaults and they are from New Congress substation. In total UI has 88 network vaults in it network system. The plan is to install Eaton network monitoring system in ten (10) network vaults and run 30, 000 ft of fiber to connect them per year. Due to the complexity of this project and the number of network vaults, it will nine years to complete this project.

The Fiber Optic would be extremely reliable network communication system. A ring topology, combined with multiple fiber loops, is resilient against cable breaks caused by natural disasters, rodents, excavation, and other events that could damage the fiber cable. If a break were to occur on the twenty-four-count fiber cable, the managed Ethernet switches would recognize the link loss, and re-direct data communication through the remaining link to the substation. The level of physical security of fiber optic systems from espionage or manipulation is relatively high. The Fiber Optic also has a high bandwidth with a great capability to transfer content or data coming from the network equipment. Due to the complexity of the network, and the number of network vaults that need to be connected to the Network Monitoring System, this proposed alternative will be completed by phase.

Phase I : Install Eaton VaultGard monitoring system in ten (10) network vaults and 25,000 ft of 48 Fiber Optic (Already completed)

Phase II: Install Eaton VaultGard and TRTL in ten (10) network vaults and 30,000ft of Fiber Optic

1. Install Eaton VaultGard Network Communication in ten (10) network vaults.
2. Install Eaton NPServe Network Communication in ten (10) network vaults
3. Install Eaton Gauges Network Communication in ten (10) network vaults
4. Install Cisco Ethernet 2000U Series -switch-16 ports in ten (10) vaults.
5. Install Cisco-Power Supply part # PWR-IE50W-AC-IEC in ten (10) vaults.
6. Install ductline to various splice chambers to accommodate the fiber.
7. Install approximately 26,000ft of inner ducts in various splice chambers.
8. Install approximately 30,000ft of 48 strand single mode fiber.
9. Install approximately 1000ft of corrugated innerduct.
10. Install 48 fiber rack-mounted terminations.
11. Install splice cases for the selected splice locations.
12. Terminate the fiber at the appropriate locations.
13. Test the fiber to make sure it is working as designed.

Table II Estimates for Alternative II Phase II

The following are the budgetary estimate to install Eaton network monitoring system in ten (10) network vaults and run 30, 000 ft of fiber to connect them per year. Due to the complexity of this project and the number of network vaults, it will take nine years to complete this project. These values have a tolerance of +25% and -25%.

	2026	2027	2028
# Internal, Labor	$430,000	$438,600	$450,000
# External Services	$825,000	$841,500	$858,330
# Materials	$1,300,000	1,300,000	$1,300,000
# AFUDC	$146,575	$149,507	$152,497
# Overheads - External	$510,016	$62,747	$496,903
# Internal, Overheads	$413,341	$415,961	$418,543
Total cost of job	**$3,625,346**	**$3,662,693**	**$3,700,788**

Alternative III: Install Eaton VaultGard monitoring system to various network vaults and Power Line Carrier.

One of the problems that are faced by the power line carrier is that the electrical power lines are usually very noisy due to the high amount of energy that they transmit. The signal strength and the operating frequency is also another challenge in power line carrier. The carrier frequency suffers reflection losses at various points in the its path from transmitter , coaxial cable, line tuner unit, coupling capacitor, power line to transmitter. Power line communication is not secure. Based on these issues, this alternative was not pursued. Therefore no cost estimate was created.

Alternative IV: Install Eaton VaultGard monitoring system to various network vaults and Twisted Pair.

The Twisted pair cable provides poor security and is relatively easy to tap. It can be easily breakable. It has a low durability and is susceptible to electromagnetic interference. Twisted pair cable can only transmit signals over shorter distances , which makes it unsuitable for large networks. Based on these issues, this alternative was not pursued. Therefore no cost estimate was created because this alternative is not feasible.

5. Project Milestones

Assuming the project is approved by both UI and customer, we expect the following duration of each step. The exact schedule would depend upon coordination with the customer.

1. Engineering Design Completed Q1 2025.
2. Procure all the materials for the network monitoring system Q2 2025.
3. Select ten (10) network vaults per year Q3 2025.
4. Inspect the duct bank to make sure there are no issue Q4 2025
5. Install Eaton networking monitoring system in network vaults Q1 2026.
6. Install innerduct on selected splice chambers and selected vaults Q2 2026.
7. Install 30,000ft of 48 Fiber Optics cables and splices Q3 2026.
8. Perform fiber cable testing Q4 2026.

6. Project Assumptions

The following is the list of standard assumptions which were used to create the estimates for the proposed work.

1. UI will be able to apply and get the permit on time to start this project.
2. The maximum tensile rating of the fiber must not exceed during the installation.

3. The installer will not exceed the fiber cable bend radius.
4. The installer will not exceed the maximum pulling load rating.
5. UI will be able to have two ways communication in the network.
6. UI will be able to monitor all the network transformers and protectors.
7. UI will be able to operate remotely all network protectors.
8. UI will be able to identify any network protector that failed to open in a manner of time during switching and take the necessary step to correct it.
9. UI will be able to prevent any catastrophic failure in the network system.
10. All UI construction work will be done during the normal business hours.
11. All materials ordered will be available in time for use by Construction.
12. All budgetary estimates are based on a work product in compliance with existing UI and/or industry accepted and specifications.
13. Labor rates used in creating the estimates are based upon historical averages.
14. All dollars shown are in 2023 dollars and subject to change due to escalation in material, labor, and equipment rates at time of actual construction.
15. The base estimates are subject to the accuracy bandwidth as indicated within the estimate.
16. The schedule of all work is dependent upon arranging a mutually agreeable outage with the impacted customer(s).
17. All necessary local permits will be obtained per the schedule.

7. Engineering Recommendations

After evaluating the available underground network communication systems, Distribution Engineering recommends installing Eaton VaultGard and Fiber Optic.

The Eaton VaultGard is the next generation communications product for network protectors. It allows United Illuminating Company to have remote access and monitor the following parameters in the network transformers and protectors:

1. Phase Current (A, B, and C)
2. Network Transformer, Secondary Voltage at the protector
3. Phasing Voltage at the Protector (Across Open Breaker)
4. Transformer Loading in Amps
5. Power (Watts, VAR, VA)
6. Power Factor
7. Phasing Angle
8. Status of the Network Protector (Open, Close)
9. Network Protection Operations Counter-Pumping Alarms
10. Transformer Temperature and Oil Level

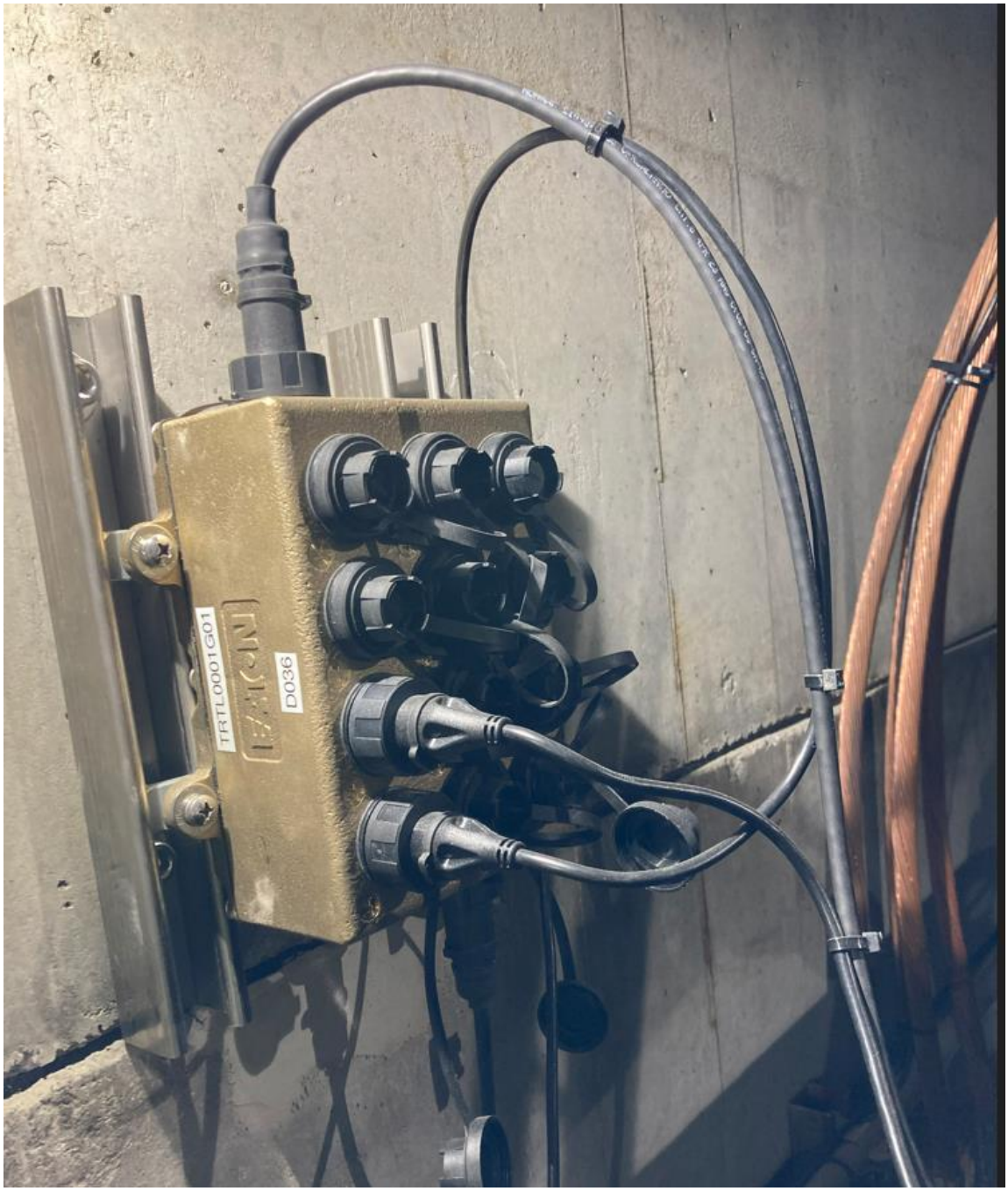
11. Pressure at the Network Protector

The Fiber Optic would be extremely reliable network communication system. A ring topology, combined with multiple fiber loops, is resilient against cable breaks caused by natural disasters, rodents, excavation, and other events that could damage the fiber cable. If a break were to occur on the twenty-four-count fiber cable, the managed Ethernet switches would recognize the link loss, and re-direct data communication through the remaining link to the substation. The level of physical security of fiber optic systems from espionage or manipulation is relatively high. The Fiber Optic also has a high bandwidth with a great capability to transfer content or data coming from the network equipment.

Picture showing the HMI to display data collected



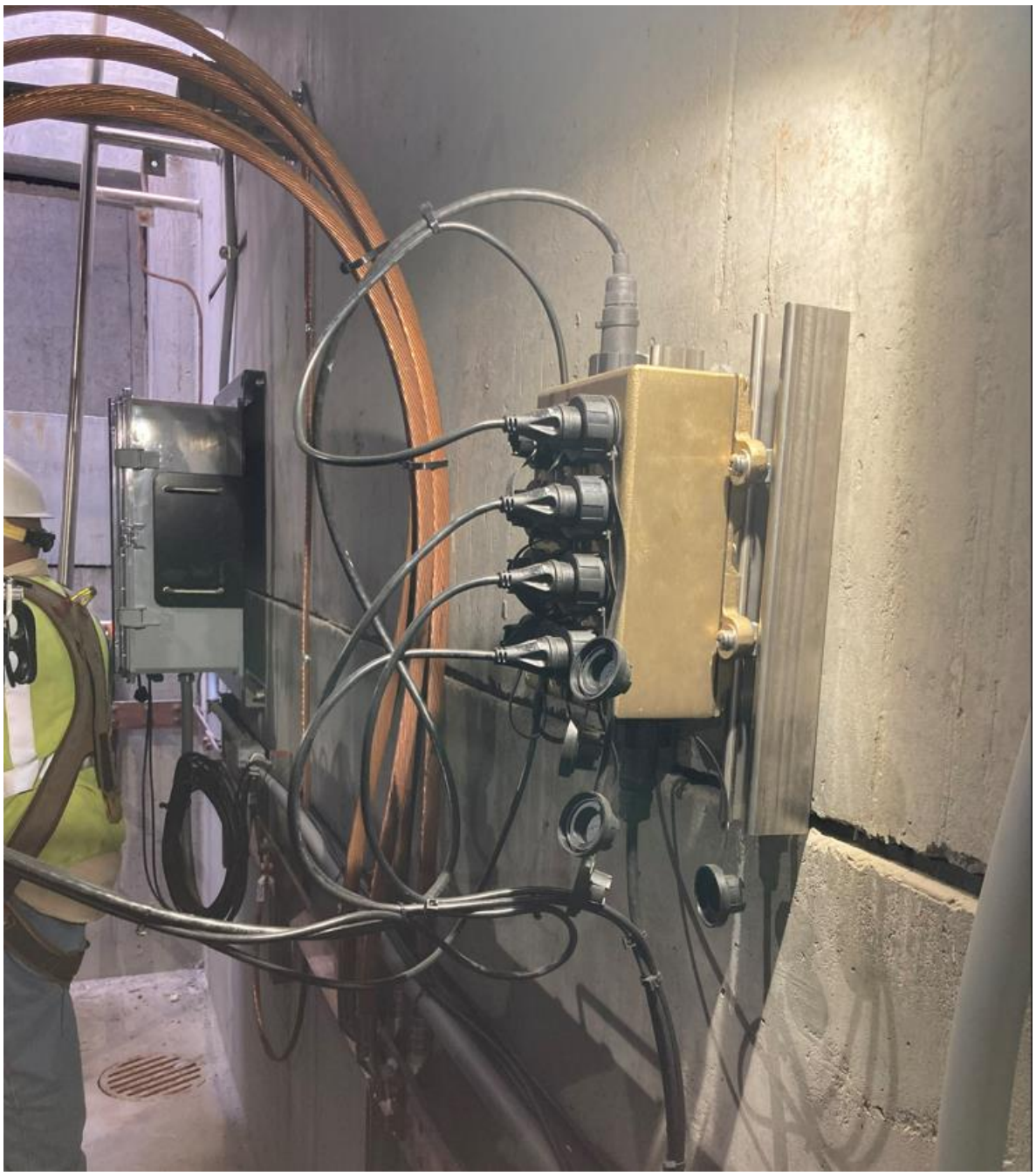
Picture showing the Transformer ruggedized telemetry link collecting the data from the network protector



Picture showing the nitrogen gauge in the transformer to detect the leak



Picture showing the Transformer ruggedized telemetry link sending data to the HMI.



Picture showing nitrogen and transformer liquid gauges monitoring the txf oil.



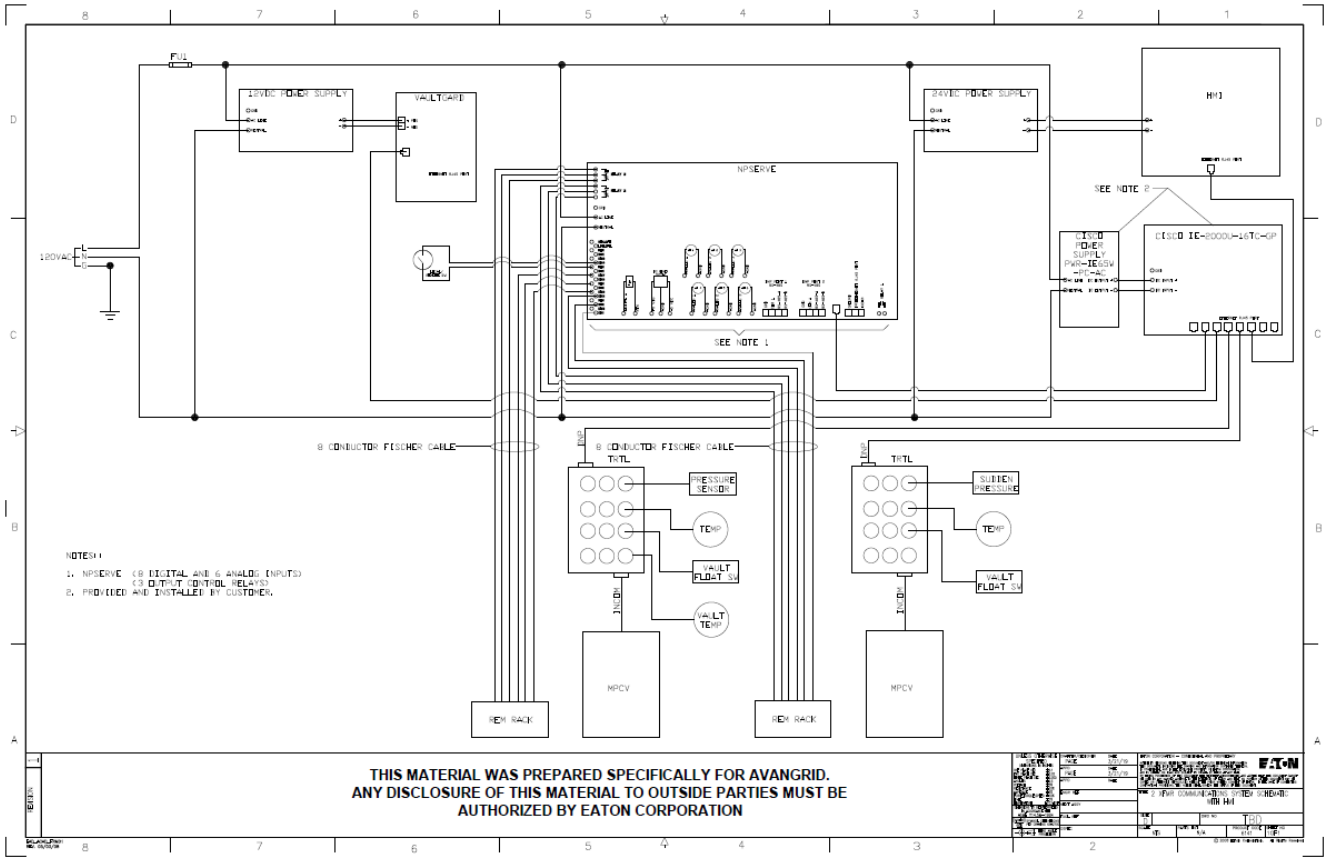
Picture showing the temperature switch to monitor the temperature in the vault.



Picture showing the float switch to monitor the water level.



One-Line showing the network monitoring system wiring diagram.



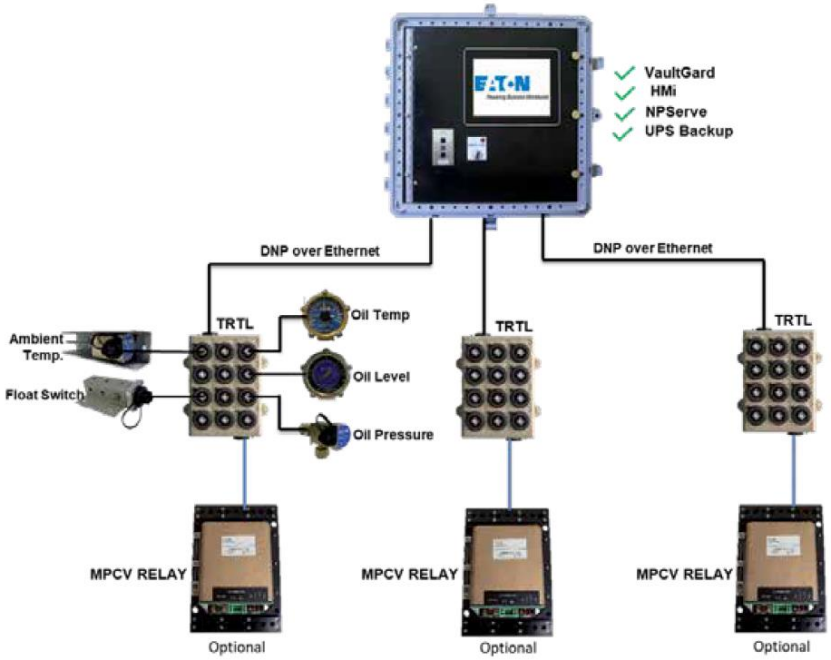
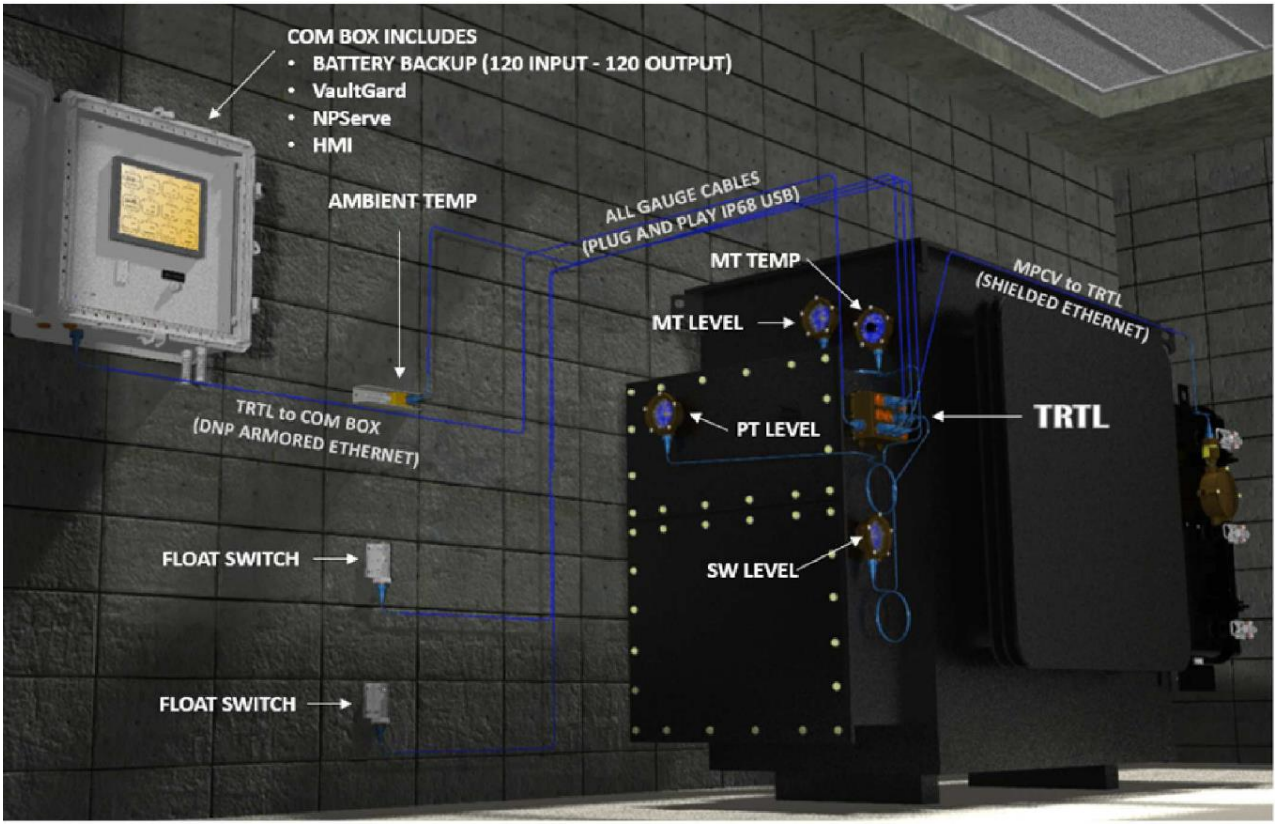
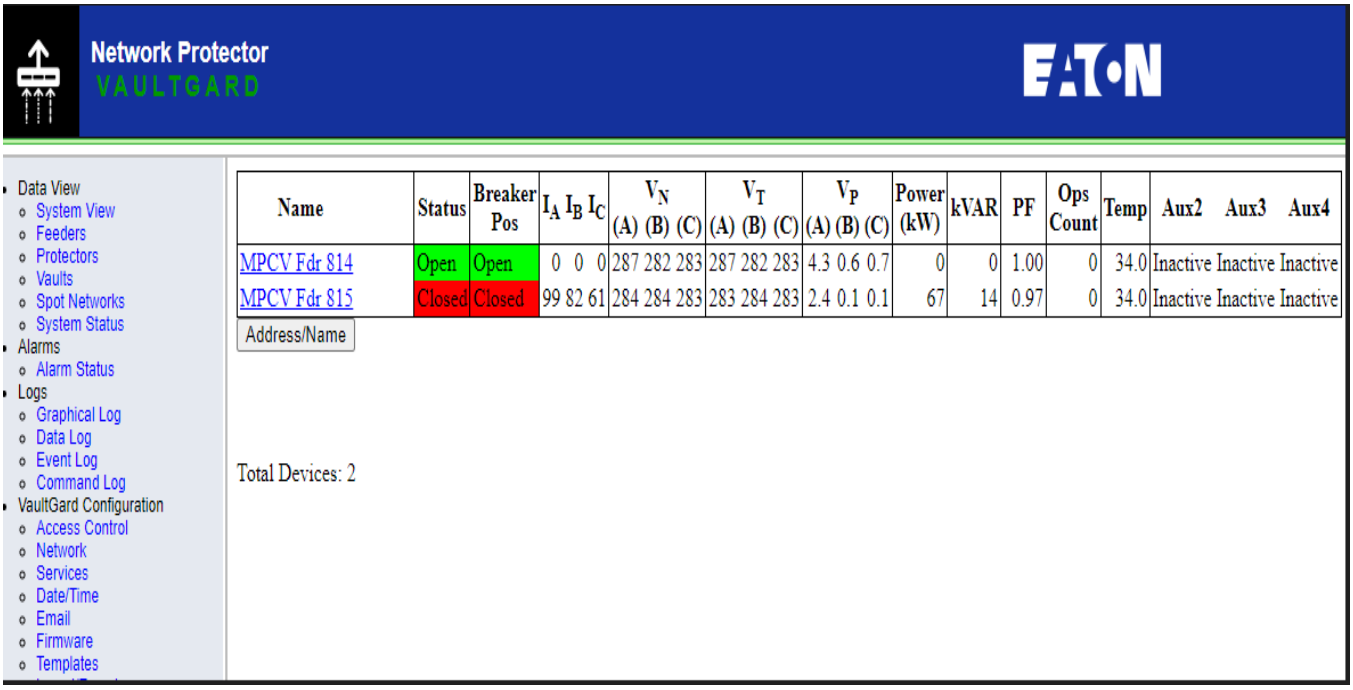


Figure 2. System architecture layout.

Network monitoring system layout.



VaultGard showing the net protector in OPEN position, load, voltage, current, and VAR

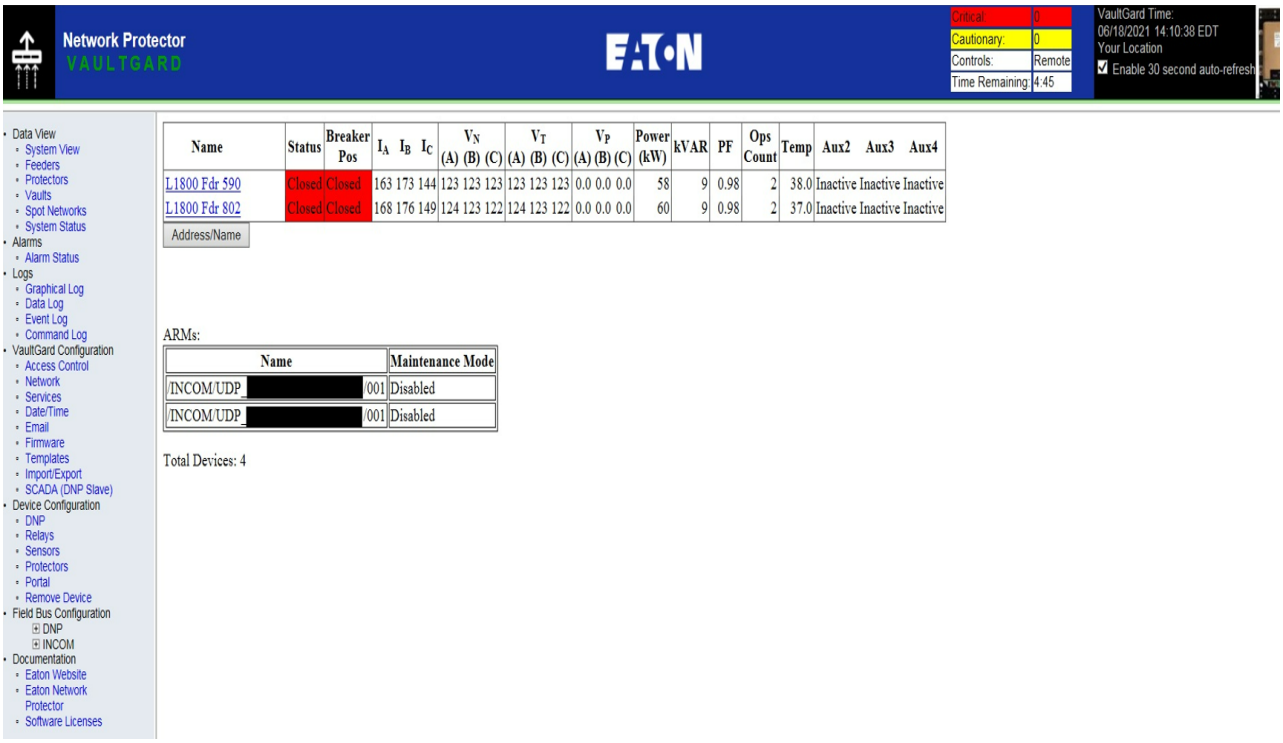


Name	Status	Breaker Pos	I_A I_B I_C	V_N (A) (B) (C)	V_T (A) (B) (C)	V_P (A) (B) (C)	Power (kW)	kVAR	PF	Ops Count	Temp	Aux2	Aux3	Aux4
MPCV Fdr 814	Open	Open	0 0 0	287 282 283	287 282 283	4.3 0.6 0.7	0	0	1.00	0	34.0	Inactive	Inactive	Inactive
MPCV Fdr 815	Closed	Closed	99 82 61	284 284 283	283 284 283	2.4 0.1 0.1	67	14	0.97	0	34.0	Inactive	Inactive	Inactive

Address/Name

Total Devices: 2

VaultGard showing the net protector in CLOSE position, load, voltage, current, and VAR



Name	Status	Breaker Pos	I_A I_B I_C	V_N (A) (B) (C)	V_T (A) (B) (C)	V_P (A) (B) (C)	Power (kW)	kVAR	PF	Ops Count	Temp	Aux2	Aux3	Aux4
L1800 Fdr 590	Closed	Closed	163 173 144	123 123 123	123 123 123	0.0 0.0 0.0	58	9	0.98	2	38.0	Inactive	Inactive	Inactive
L1800 Fdr 802	Closed	Closed	168 176 149	124 123 122	124 123 122	0.0 0.0 0.0	60	9	0.98	2	37.0	Inactive	Inactive	Inactive

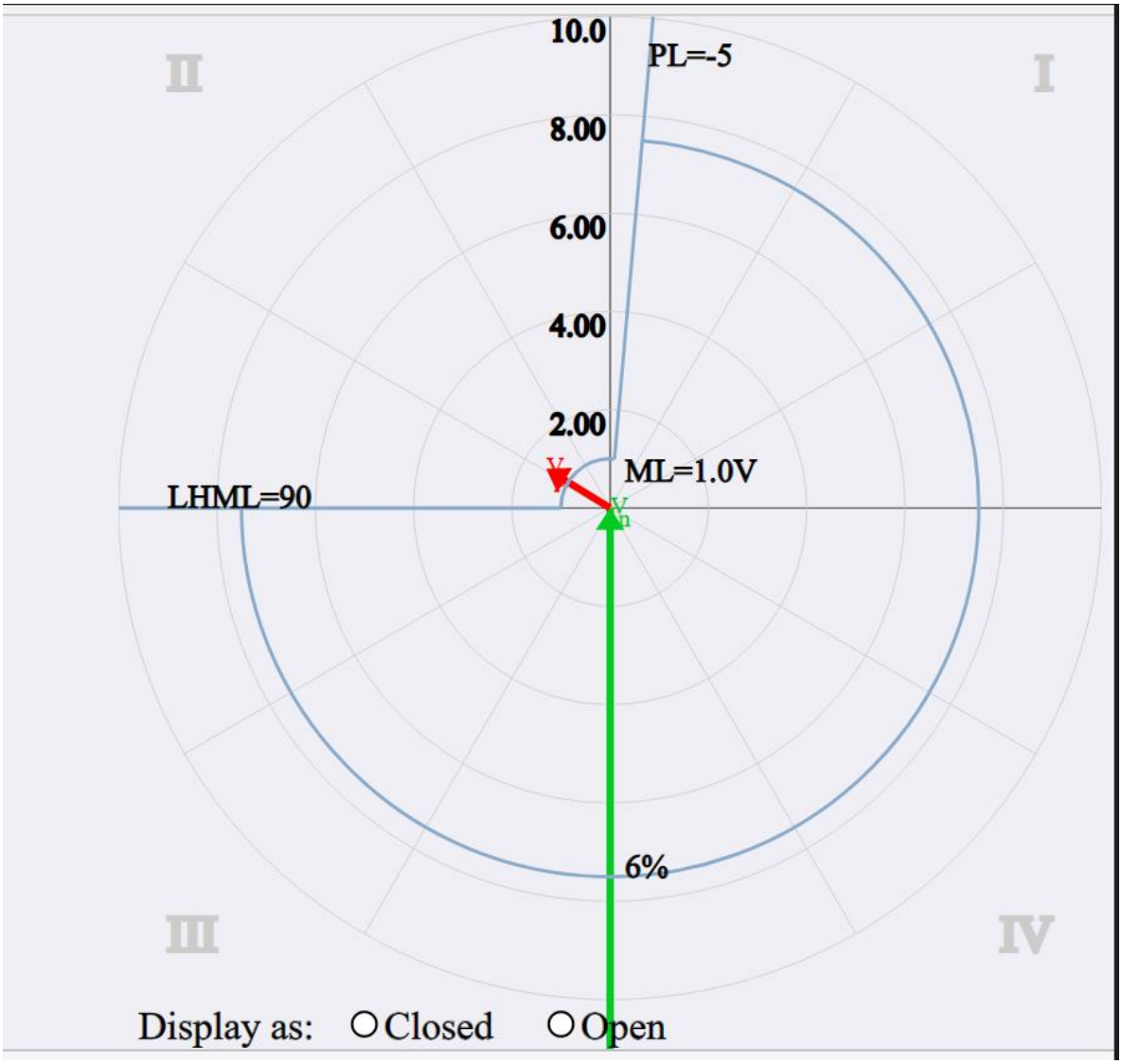
Address/Name

ARMs:

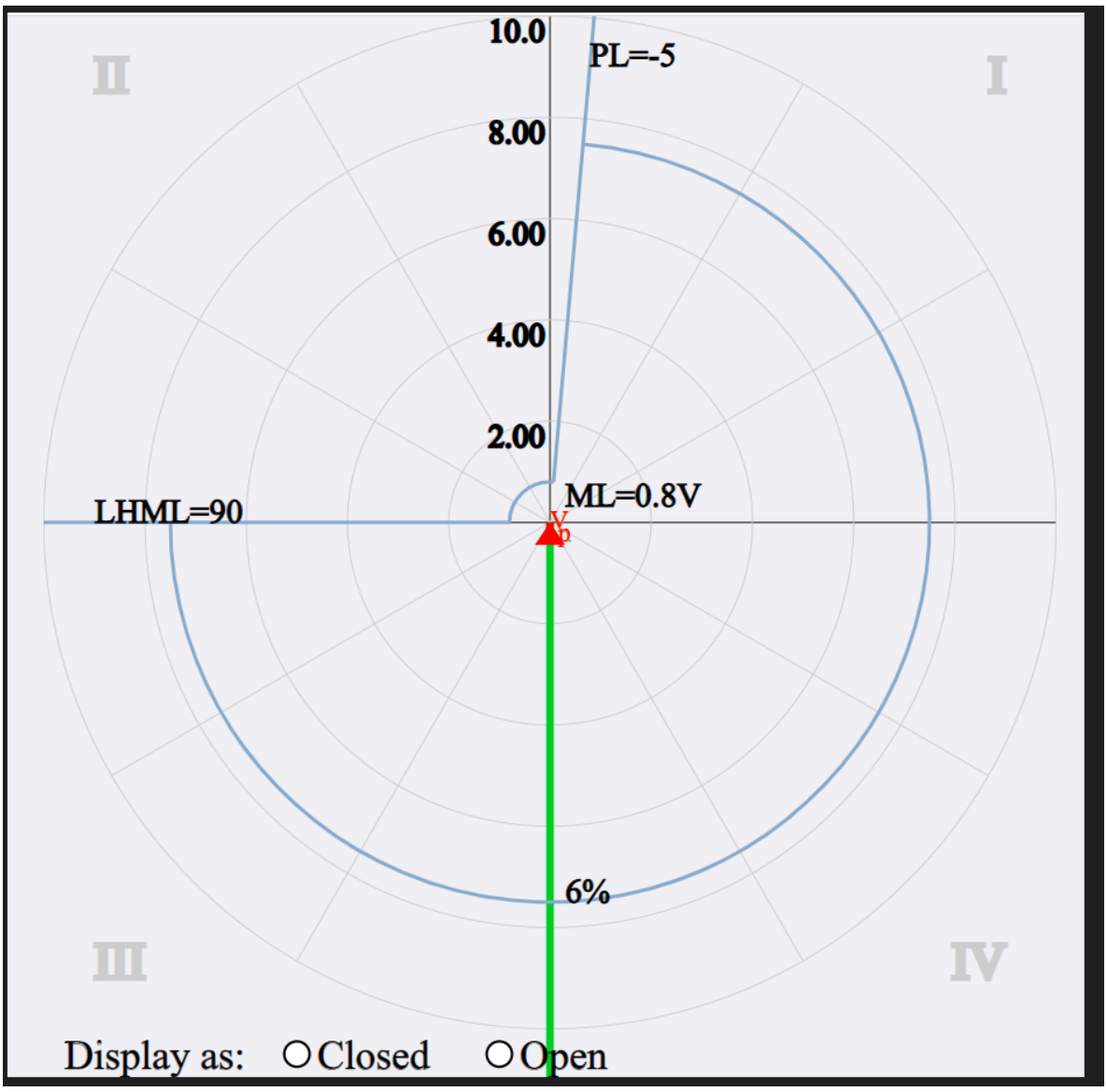
Name	Maintenance Mode
/INCOM/UDP_[redacted]/001	Disabled
/INCOM/UDP_[redacted]/001	Disabled

Total Devices: 4

VaultGard showing the status of network protector (Close Position)



VaultGard showing the status of network protector (Open Position)

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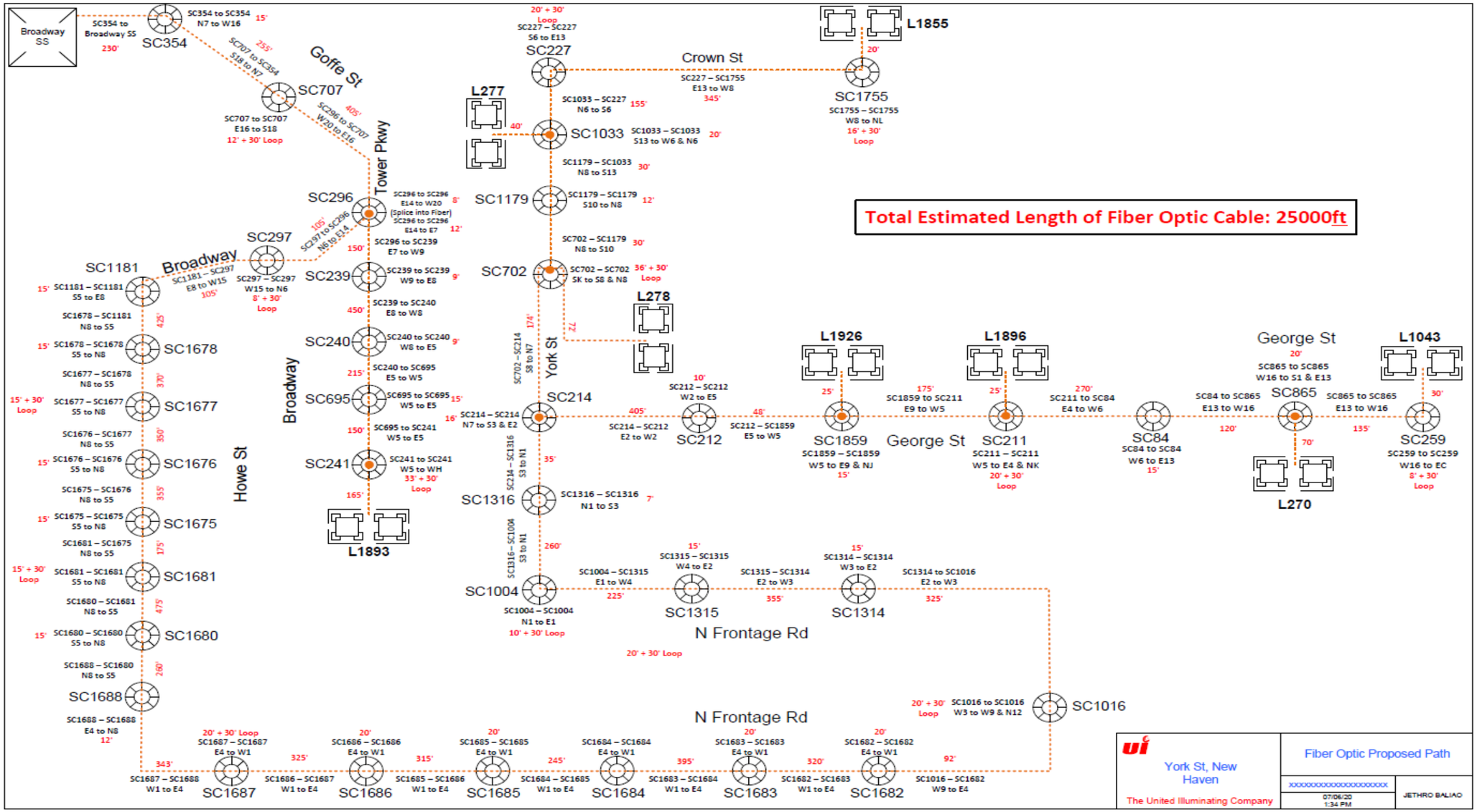
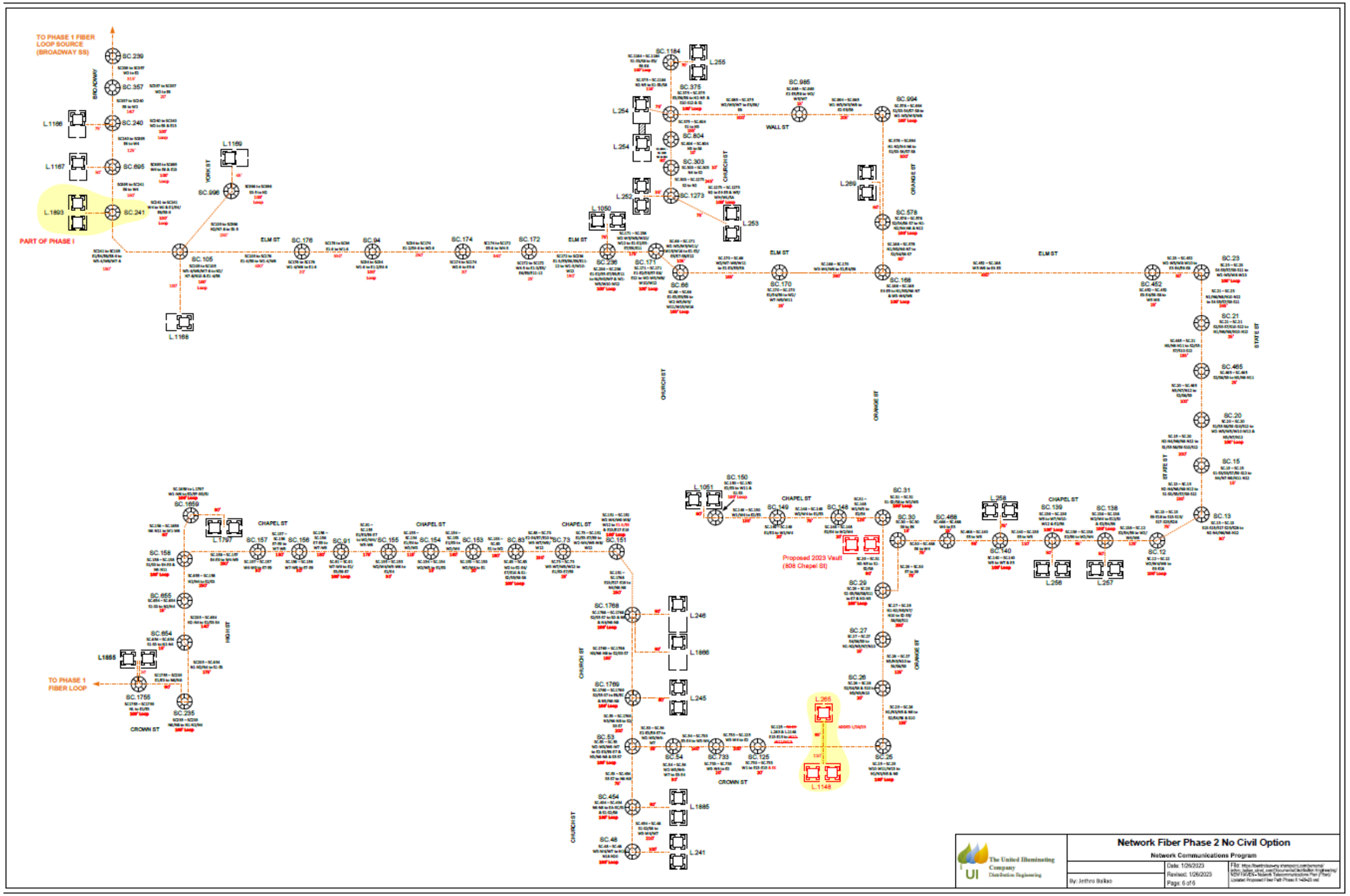
8. Maps or Electrical Design




TO PHASE 1 FIBER LOOP SOURCE (BROADWAY SS)
PART OF PHASE I
BROADWAY
SC.239
SC.357
SC.240
SC.695
SC.241
L.1166
L.1167
L.1893
L.1169
YORK ST
SC.996
L.1168
ELM ST
SC.176
SC.94
SC.174
SC.172
SC.105
SC.236
SC.171
SC.86
L.1050
L.1184
L.255
SC.375
L.254
L.254
SC.804
SC.303
SC.1273
L.252
L.253
CHURCH ST
WALL ST
SC.985
SC.994
L.269
ORANGE ST
SC.578
SC.166
SC.170
ELM ST
SC.452
SC.23
SC.21
SC.465
SC.20
SC.15
SC.13
STATE ST
SC.1659
L.1797
CHAPEL ST
SC.157
SC.156
SC.91
SC.155
SC.154
SC.153
SC.83
SC.73
SC.151
SC.158
SC.865
SC.854
L.1855
HIGH ST
TO PHASE 1 FIBER LOOP
SC.1755
SC.235
CROWN ST
SC.1768
SC.1769
SC.53
SC.54
SC.454
SC.48
L.246
L.1886
L.245
L.1885
L.241
CHURCH ST
SC.150
L.1051
SC.149
SC.148
SC.31
SC.30
Proposed 2023 Vault (805 Chapel St)
SC.29
SC.27
SC.26
SC.28
SC.733
SC.125
SC.25
L.265
L.1148
CROWN ST
ORANGE ST
L.258
SC.139
SC.138
SC.140
L.256
L.257
SC.12
Network Fiber Phase 2 No Civil Option
Network Communications Program
The United Illuminating Company
Distribution Engineering
By: Jethro Balkao
Date: 1/26/2023
Revised: 1/26/2023
Page: 6 of 6

801055.01

Ground Level Inspection

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Ground Level Inspection

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	801055.01	Electric Distribution	Lyons, Robin	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Infrastructure Replacement - Dist	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:
Ground Level Equipment Maintenance & Replacement

Project Scope:
The source of this work is generated from the RCM 09 - Ground Level Inspection and maintenance program for all padmounted & below grade dist. equipment, vaults, transclosures, and switches. The inspections are performed on a 5 year cycle. There are approx. 13500 location throughout the territory. Inspecting 2800 location per year will maintain a 5 yr inspection cycle.
The project scope and budget will include follow-up inspections, emergency repairs, replacement of equipment, damaged foundations, Oil spill remediation, secondary pedestals, Ug street light work, direct buried cable/conduit install.
Replacements: 365 Jct Enclosures, 59 Padmounted Switches, 69 Padmounted Txf, 240 Pedestals.

Project Benefits:
The scope of this program ensures security and safe operation of equipment.
Proactive maintenance and replace of equipment and remediation of deficiencies mitigated risks to public safety, eliminates safety hazards for employees and maintains system reliability.

Project Risks and Mitigation Plan:
Risk: Sourcing of materials (Txfs, Switches, Junction, Elbows, Wire and associated materials) has been limited by supply chain and lead times have significantly increased for certain items.
Risk: Abnormal/deteriorated equipment creates public and worker safety and environmental risks.
Mitigation: Routine inspections identify the aging assets and those are prioritized for replacement. Corrective repairs and temporary actions are taken to address the immediate issues, i.e. oil weep is contained. Engineering then works replacing the equipment and scheduling customer outages and looks for alternatives solutions if necessary due to supply chain delays.
Any temporary repairs are sent to engineering for follow-up to ensure permanent repairs are made to current construction standards and adherence to industry codes.
Alternative solutions have been implemented. These may be temporary and need a permanent solutions.
1. Utilizing enclosures with overhead Txf
2. Install Pole for pad
3. Sourcing equipment internationally

Risk of No Action:
Aging infrastructure conditions further deteriorate leading to public/working injuries and environmental remediation.
-Cascading effects:
1. Environmental Issues - expensive, risk of harm to both humans and environment
2. System reliability is affected. SAIDI, SAIFI numbers suffer
The consequences of not undertaking this project will lead to system abnormal conditions and unsafe conditions for the public and workforce. Leaving failed equipment, failed cable and non-standard construction will have a negative impact on reliability and lead to legal and regulatory scrutiny. Connecting customers and ensuring reliable service is our fundamental goal; taking no action to restore customers after equipment failure or MVA is not an option. Delayed or non-execution of customer restoration could result in fines, penalties and reputation damage.

Project Alternatives:
Alternatives have been implemented and continue to be designed with lack of availbale equipment/materials through supply chain.
These are done on a case by case basis, in general this program provides like for like replacement of assets.

Basis for Project Estimates
The program budget is based on actual costs of equipment replacements, environmental remediation, civil work and the projected replacement volume from inspections. The annual replacements are prioritized ensuring the assets rated as high priority are being replaced first. The replacements and remedial work will be adjusted based on the actual variable costs (environmental remediation, civil excavation, PCB content). The program actual costs from 2022 -2024 were less than forecast due to supply chain availability of transformers, enclosures, switchgear and material. As a result, a back log of equipment replacements exists and is being spread over future years. Prior to the COVID pandemic replacements were done throughout the year as they were identified and prioritsed based on environmental risk and customer exposure.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 138**	$ 6	$ -	$ 43	$ 44	$ 45
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 353**	$ 37	$ 184	$ 43	$ 44	$ 45
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 1,092**	$ 102	$ -	$ 324	$ 330	$ 337
# Internal, Overheads	**$ 370**	$ 72	$ 16	$ 92	$ 94	$ 96
# Materials	**$ 755**	$ 94	$ -	$ 216	$ 220	$ 225
# Overheads - External	**$ 770**	$ 101	$ 23	$ 211	$ 215	$ 220
Total	**$ 3,478**	**$ 411**	**$ 223**	**$ 929**	**$ 948**	**$ 967**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 3,384	$ 317	$ 223	$ 929	$ 948	$ 967

Note: 2024 Plant Additions includes the entire calendar year

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UI- GLI CAP

All Towns

WBS UI-U0042

Index

1. Program Description 3
2. Need Statement 3
3. Work Types 3
4. Engineering 5
5. Budget 7
6. Project Assumptions 7

1. Program Description

This is an on-going program which concentrates on follow up work from preventive maintenance inspections.

The source of this work is generated from the RCM 09 - Ground Level Inspection and Maintenance program for all padmounted & below grade distribution equipment, vaults, transclosures, and switches.

The inspections are performed on a 5 year cycle. There are approx. 13,500 locations throughout the territory. Inspecting 2,800 locations per year will maintain a 5 year inspection cycle.

2. Need Statement

The scope of this program ensures safety and secure operation of ground level padmounted assets. Proactive maintenance and replace of equipment and remediation of deficiencies mitigated risks to public safety, eliminates safety hazards for employees and maintains system reliability.

The scope and budget will include follow-up inspections, emergency repairs, equipment replacement, civil work for damaged foundations, oil spill remediation, secondary pedestals, underground street light work, replacing direct buried cable in conduit.

Based on inspections performed 2022 – 2024 there is a need for equipment replacements as follows:

- Replacements: 365 Jct Enclosures, 59 Padmounted Switches, 69 Padmounted Txf, 240 Pedestals.

Environmental Costs:

- Based on costs from last 7 Transformer replacements, range $900 - $3,000
- Environmental Remediation
    - Transformer pump out ($1500)
    - Extensive cleanup and excavation ($12000 - $15000)
    - Oil disposal costs (based on PCB content and volume)

3. Work Types

Types of work include

- Padmounted and ground level equipment replacement
    - Single Phase Transformer Replacement



        - Replace/Raise foundation
        - Replace deteriorated Txf
        - Required civil work
        - Required environmental remediation
        - Replace primary, secondary
    - Three Phase Transformer Replacement
        - Replace/Raise foundation
        - Replace deteriorated Txf
        - Required civil work
        - Replace primary
    - Replace Enclosures
        - Replace Transclosure with Padmount Txf
        - Required civil work
        - Required environmental remediation
        - Replace primary
    - Secondary pedestal replacements
        - Replace pedestal
        - Replace cover
        - Required civil work
    - Single Phase and Three Phase switch device replacement
        - Replace/Raise foundation
        - Replace deteriorated switch
        - Required civil work
        - Required environmental remediation
        - Replace primary
    - Splice box replacement
        - Replace splice box
        - Replace cover
        - Required civil work

- Install Conduit to replace direct buried cable
  - Padmount to Padmount
  - Padmount to Pedestal
  - Padmount to PAL
  - Install primary

4. Engineering

Estimate examples:

- Transclosure to Padmount Change out (801000607146) $22,000
  - 421 Pine St, Bpt. 3-75 kVA to 150 kVA, 120/208
- 3 Phase Padmount Change out (801000607206) $26,000
  - 155 Brewster St, Bpt. Loc 96
  - Replace pole
  - Replace UG primary pole to pad
  - Replace Txf
- 1 Phase Padmount Change out (801000602280) $17,200
  - Replace Txf
  - Remediate soil
- Replace 3-Transformers in Transclosure (801000608549) $30,000
  - 259 Roosevelt Dr. Derby, Loc 62
  - 3-333 kVA replaced with 3 – 250 kVA 240/480V
- Replace 3-Transformers in Transclosure (801000614064) $76,000
  - 599 Hollister Ave, Bridgeport
- Install new 3 phase Padmount 500kVA (801000617594) $64,000

- Install 500kVA & foundation
- Pull in 15kV #2 Primary

- Replace existing 225 kVA w/ 300kVA, $22,000
  - 917 Bridgeport Avenue, Shelton
  - Switch at Pole # 1422 to Padmounted Transformer Loc. 298, re-energize when ready. Customer to replace concrete transformer pad, install protective bollards and curbing around the transformer.

Table 1: Cost estimates for equipment replacement and units per year

Asset	Unit Estimate	2025 Units	2026 Units	2027 Units
Replace secondary pedestal cover	$1,711	7	6	14
Replace Blown LA 1ph	$1,121			
Replace Blown LA 3ph	$1,850			
Install Fault Indicators 1ph	$1,121			
Install Fault Indicators 3ph	$2,185			
Replace agjb	$8,687	10	10	10
Replace 240/120 25kVA TXF	$11,381	22	15	7
Replace 240/120 50kVA TXF	$12,554	15	10	20
Replace 240/120 75kVA TXF	$13,727	9	3	9
Replace 240/120 100kVA TXF	$16,074	1	3	4
Replace 240/120 167kVA TXF	$17,750		1	
Replace 208/120 75kVA TXF	$29,224		1	3
Replace 208/120 150kVA TXF	$32,072	4	3	2
Replace 208/120 300 kVA TXF	$35,593		1	1
Replace 208/120 500kVA TXF	$42,464	1	1	1
Replace 208/120 750kVA TXF	$48,833		1	
Replace 480/277 75kVA with 150kVA	$30,732		1	1
Replace 480/277 150kVA TXF	$30,732		1	
Replace 480/277 300 kVA TXF	$33,078		1	1
Replace 480/277 500 kVA TXF	$35,593		1	1
Replace 480/277 750 kVA TXF	$42,464		1	
Replace 480/277 1000 kVA TXF	$46,822			
Replace 480/277 1500 kVA TXF	$55,537			
Replace 480/277 2000 kVA TXF	$61,906			
Replace bank in vault	$35,594	1		
Civil Work 3ph TXF	$29,658	2	2	2
Civil Work 1ph TXF	$11,863	5	5	5
Environmental Remediation(Pump only)	$2,224	5	5	5
Environmental Remediation(Pump and clean)	$4,449	4	2	2

Rectify clearance issue w/customer	$590	45	25	5

Table 2: Annual estimated costs based on number of replacements

	2024	2025	2026	2027
AFUDC	12,000	42,291	43,150	43,950
EXT SVC	16,000	99,500	99,500	99,500
INT OVH	41,000	200,000	200,514	207,427
MAT	95,000	244,600	278,300	277,700
EXT OVH	72,000	205,008	205,008	205,008
INT LAB	150,000	266,200	252,400	266,700
TOTAL	344,000	1,057,599	1,078,872	1,100,285

5. Budget

The program budget is based on actual costs of equipment replacements, environmental remediation, civil work and the projected replacement volume from inspections. The annual replacements are prioritized ensuring the assets rated as high priority are being replaced first. The replacements and remedial work will be adjusted based on the actual variable costs (environmental remediation, civil excavation, PCB content). The program actual costs from 2022 -2024 were less than forecast due to supply chain availability of transformers, enclosures, switchgear and material. As a result, a back log of equipment replacements exists and is being spread over future years. Prior to the COVID pandemic replacements were done throughout the year as they were identified and prioritized based on environmental risk and customer exposure.

	2025	2026	2027	2028
GLI UI-U0042	223,346	929,091	947,673	966,627

6. Project Assumptions

- The GLI inspection data accurately represents the work that is required
- Locations that can't be opened are due to customers having obstacles present
- Any switching required will not require police for traffic control
- Any work on equipment will not require police for traffic control
- There is enough slack on the Primary and secondary/service wires on locations that will be lifted/raised up

- Secondary Pedestals with broken covers do not require the replacement of the base
- Locations with vegetation violations do not require an outage to be brought to standard
- Locations with obstacles obstructing access do not require the device to be repositioned/relocated
- Locations with obstacles obstructing access do not require an outage to be brought to standard
- Transformer sizes do not need to be resized due to loading
- Transformer replacements do not require civil or environmental contractors
- Three phase transformers requiring replacement sit on standard transformer foundation
- Estimate created using open GLI items as of 5/1/24
- Equipment and resources required are available
- Transformer locations listed for minor clean up/repairs do not evolve to require transformer change out

PRJ-005550

Mark III – Sikorsky

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Mark III - Sikorsky

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005550	Electric Distribution	Eves, Charles	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Infrastructure Replacement - Dist	IP1 Originate	Jan 2026	July 2026

Project description:

Sikorsky Airport in Stratford, CT has two vintage Mark III switches on site that power the main buildings at the airport - including the control tower. Both units are in poor condition and require change out. The Airport used to have two primary feeds with one currently from Main St and the back up from Access Rd. The Primary feeds also run underground accross the tarmac to the customer's facilities. In the late 1990s, the back up feed from Access Rd failed due to a conduit collapse. Customer owns the UG infrastrucutre in the area, while UI owns the Primary Cable feed up to the Switches, and Switches themselves.

Project Scope:

Change out both units aging units with two PME-9 Switches, and change out old concentric neutral cable with new EPR primary cable. Negotiate with customer on ownership after the riser pole due to difficulty of maintaining underground equipment accross the Tarmac, cleareances, and scheduling. Looking to install primary metering before the riser pole.

Project Benefits:

Proactively replacting old infrastructure that is prone to failure allows UI to schedule the outage at the customers convienence. Changing these units will avoid a prolonged, unscheudled outage for a major customer with critical infrastructure.

Project Risks and Mitigation Plan:

PME-9 switches are long lead devices which then can potentially delay the project. To mitigate this risk, the Company will order the PME-9 switches ahead of time so it is ready in time of construction.

Another risk is scheduling the work. Because this is an active airport, scheduling the work is difficult and the window to perform the construction is very small. To mitigate this, the company will have to work with the airport to perform the work.

Risk of No Action:

The risk of not executing this project is that the airport can potentially lose all power and not be able to function due to the Padmounted switches failing. If this were to happen, the outage would be incredibly long and greatly impact the customer.

Project Alternatives:
Option 1: A Single Vista switch and install Above grade junction box on site. Change out one of the concrete throats with Vista Foundation. Change out old UG Primary Cable, and live terminations with new EPR underground Primary Cable and Load Break Elbows.
Option 2: Replace Mark III Switches and equipment as needed and transfer ownership to the customer. The Company will install Primary Metering before the riser that feeds the entire complex.

Basis for Project Estimates
The costs are based on a gound up estimate using elements of past projects and quoted materials.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 30**	$ -	$ -	$ 30	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 260**	$ -	$ -	$ 260	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 25**	$ -	$ -	$ 25	$ -	$ -
# Internal, Overheads	**$ 54**	$ -	$ -	$ 54	$ -	$ -
# Materials	**$ 125**	$ -	$ -	$ 125	$ -	$ -
# Overheads - External	**$ 63**	$ -	$ -	$ 63	$ -	$ -
Total	**$ 556**	**$ -**	**$ -**	**$ 556**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 556	$ -	$ -	$ 556	$ -	$ -

1000 Great Meadow Rd, Stratford

PRJ-005550 Mark III – Sikorsky



9/27/24

Distribution Engineering

1. Project Description (Summary) 3
2. Initial Conditions 3
2.1. Pictures 4
3. Need Statement 7
4. Alternatives 8
4.1. Do not replace the Switches and continue to Operate as Normal 8
4.1.1. Advantages: 8
4.1.2. Disadvantages 9
4.1.3. Risks 9
4.2. Replace Both Mark III Switches with new PME-9 Dead-Front Switches 9
4.2.1. Advantages: 9
4.2.2. Disadvantages 9
4.2.3. Risks 9
4.2.4. Cost Alternative II 9
4.2.5. Work Breakdown 10
5. Project Milestones 10
6. Project Assumptions 11
7. Engineering Recommendations 11

1. Project Description (Summary)

Ui has identified that Several S&C Padmounted Switchgears of the Mark III, and Mark II and PMH-9 Vintage are prone to failure. These classes of switches are live-front and operate at High Voltage. A majority of these switches will have two incoming positions with two outgoing positions. Other units like the PMH-12 have a single incoming position with three outgoing positions. All outgoing positions are equipped with E-Rated fuses for medium voltage. This Mark III Sikorsky project is to replace the existing switches out in the field before a catastrophic failure.

2. Initial Conditions

Sikorsky Memorial Airport in Stratford, CT is a public airport that is currently owned by the City of Bridgeport. It was formally known as the Bridgeport Municipal Airport and has facilities for Police Helicopters, Blimps, and Medical Transport Helicopters for Yale and Bridgeport Hospital. There are two vintage Mark III Switches on site that power the main buildings at the airport – including the control tower. Both units are in poor condition and require change out. Furthermore, both units sit atop a concrete throat and over a splice chamber. The Airport used to have two primary feeds with one currently from Main St and the back up from Access Rd. The current Primary feed runs underground across the tarmac to the Mark III switches and then to Customer Facilities. Upstream from the Mark III Switches are several splice chambers across the runway and up to a Riser Pole on P.7022 on Main St. All Underground primary at the airport 3 - #2 CU EPR Primary, with only a couple of sections of old concentric neutral primary cable between the Mark III Switches. Downstream from the Mark III switch are customer own splice chambers and several three Phase Transformers.

The second feed also runs through the tarmac but is maintained by the Customer. Sometime during the late 90s or early 2000's, the second feed's conduit collapsed and damaged the cable. The cable is now direct buried and cannot be removed. Since then, the entire area has been fed sole source from Baird CKT – 2639. Due to financial complications the customer is facing, there has been no effort for restoring the backup feed.

2.1. Pictures



Figure 1. L.401 Mark III Incoming Side (Ways 1 & 2)



Figure 2. L.401 Mark III Incoming Side (Ways 1 & 2) Doors open



Figure 3: L.401 Mark III Outgoing Side (Ways 3 & 4)



Figure 4: L.401 Mark III Outgoing Side (Ways 3 & 4) Open



Figure 5. L.607 Mark III Incoming Side (Ways 1 & 2)



Figure 6. L.607 Incoming Side, former Second Feed Way 1

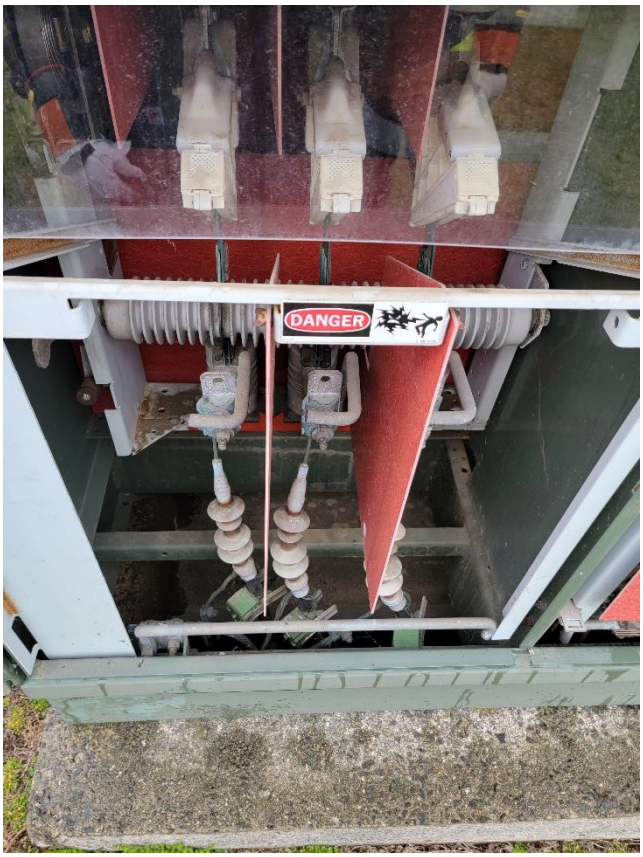


Figure 7. L.607 Mark III Incoming Side, Way 2 from L.401

3. Need Statement

Over the years, UI has experienced several instances where the Live front Mark III switches have failed and caused extended power outages to customer. The biggest contributor to the failure of these switchgears was the tracking inside the switch due to condensation and the resulting contamination. Another big issue with these live front switches are mini-interrupters inside the switches. The enclosure that encapsulates the arc suppression beads will break from the recoil of the blade. If this happens the switch can no longer be operated.

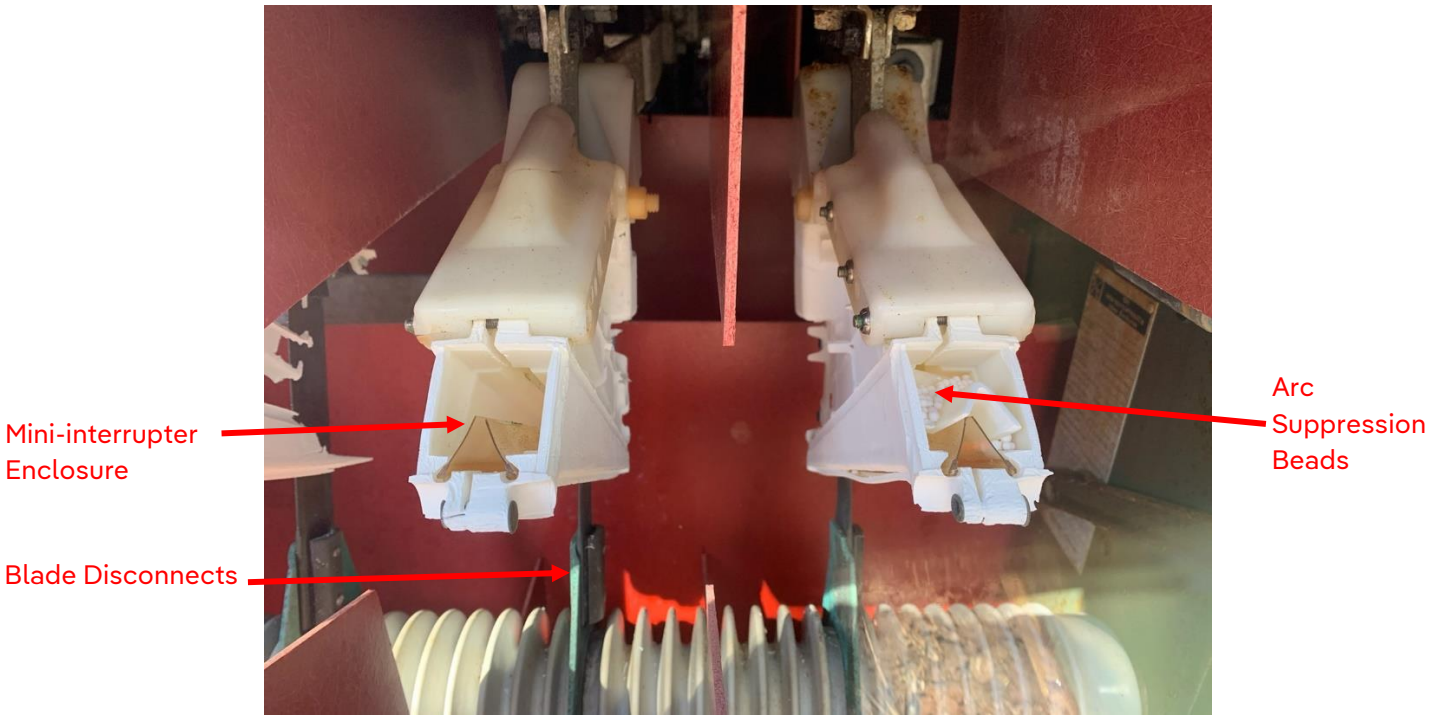


Figure 8. Picture of Mini-interrupter. Cover is missing and Arc Suppression Beads are exposed. Some Enclosures do not even have anymore beads, making one of the ways no longer safe to operate.

The Sikorsky Airport also serves as the main hub for medical helicopters connecting Bridgeport Medical and Yale Hospital. In addition to Police and Traffic Helicopters. Loss of power due to the switches can severely impact the operations of these facilities. Outages can potentially go over 16 hours as Mark III switch replacements are a very lengthy process. This would greatly impact the Company's SAFI and CAIDI metrics.

4. Alternatives

4.1. Do not replace the Switches and continue to Operate as Normal

This Option is to not do anything here. UI will not change out any old concentric neutral cable or the aging and failing switches. The area will continue to operate as normal with the switches running until failure. Any equipment in the field will be replaced during an emergency.

4.1.1. Advantages:

1. Avoids expensive Capital Spending of Electrical and Civil Construction

4.1.2. Disadvantages

1. Live Front Switches are not Safe to Operate
2. Failing Switches will continue to operate and a fault can occur at any time
3. Potential high operations and maintenance costs in the long run

4.1.3. Risks

1. Severe impact to the company's SAIFI and CAIDI metrics
2. Impact to customer operations, particularly to Medical Facilities at the airport
3. Switch/Material availability can impact the company's response to an emergency.

4.2. Replace Both Mark III Switches with new PME-9 Dead-Front Switches

This Option is to install replace both Mark III Switches with the modern PME-9 Switch. These dead front switches have the same protection capabilities as a Mark III Switch but much more reliable and not Live Front. The existing Concrete throats will be replaced with PME-9 throats which are slightly bigger and sit flush with the switch. Primary Cable will also be replaced to accommodate the PME-9's height and terminations.

4.2.1. Advantages:

1. Replaces old Live-Front Switches with new Dead Front Switches which are much safer and more reliable.
2. Simple Design and Straight Forward with little to no obstructions
3. Complete the Objective of the project and replaces any old non-standard equipment/cable.
4. Uses existing UG infrastructure.

4.2.2. Disadvantages

1. All work will have to be done day-of and require significant amount of overtime.

4.2.3. Risks

1. Driveways to customer buildings may be blocked during construction.
2. Outage to replace the switches may impact customer operations.

4.2.4. Cost Alternative II

	CAP
External Services	$40,000
Material	$134,200

UIL Resources	$84,600
AFUDC	$5,638
External Overheads	$107,662*
Internal Overheads	$80,958*
Total	$458,357

Table 1. High Level Estimate with -50%/+100% Accuracy. *Overheads Calculated from OH Rate Calculator

4.2.5. Work Breakdown

1. Prep Work
    a) Prep & Test 2 – PME-9 Switches
    b) Install 6 – 600A/200A Reducers for Ways 1 & 2 for both Switches
2. Old Castle Concrete Throat
    a) Purchase two 22" Old Castle Concrete Throats for PME-9 Switches
3. Day of Construction
    a) Customer Electrician to Open Main Breakers at all Building at the Sikorsky Memorial Airport
        i. Stratford School for Aviation
        ii. Three Wing Aviation
        iii. Azimuth Aviation
        iv. Atlantic Aviation BDR
        v. Flex Jet
    b) SW & GND Cutouts at P.7022
    c) Remove old connections to old Mark III Switch
    d) Remove Mark III Switch
    e) Remove old 200A Elbows from L.404 Below Grade Junction Box
    f) Remove All old Primary Cable
    g) Breakdown Old Concrete Throat and Replace with new Concrete Throat
    h) Install 2 new PME-9 Switches to replace L.401 and L.607 units
    i) Install new 200A Elbows at the PME-9 Switches
    j) Close in all Ways except for Way 1 at L.607 PME-9 Switch
    k) Close in Main Breakers at all Customer Breakers
    l) Close in Fused Cutouts on P.7022

5. Project Milestones

Upon project approval from UI and confirmation from the Customer, below is a high-level schedule of the project. Specific dates are dependent on customer coordination.

1. Engineering Design Completed – Early Q2 2025
2. Purchase PME-9 Switches – Early Q2 2025
3. Purchase Concrete Throats – Late Q3 2025

4. Electrical Cutover – Mid Q2 2026

6. Project Assumptions

The following is a list of standard assumptions which were used to create the estimates for the proposed work.

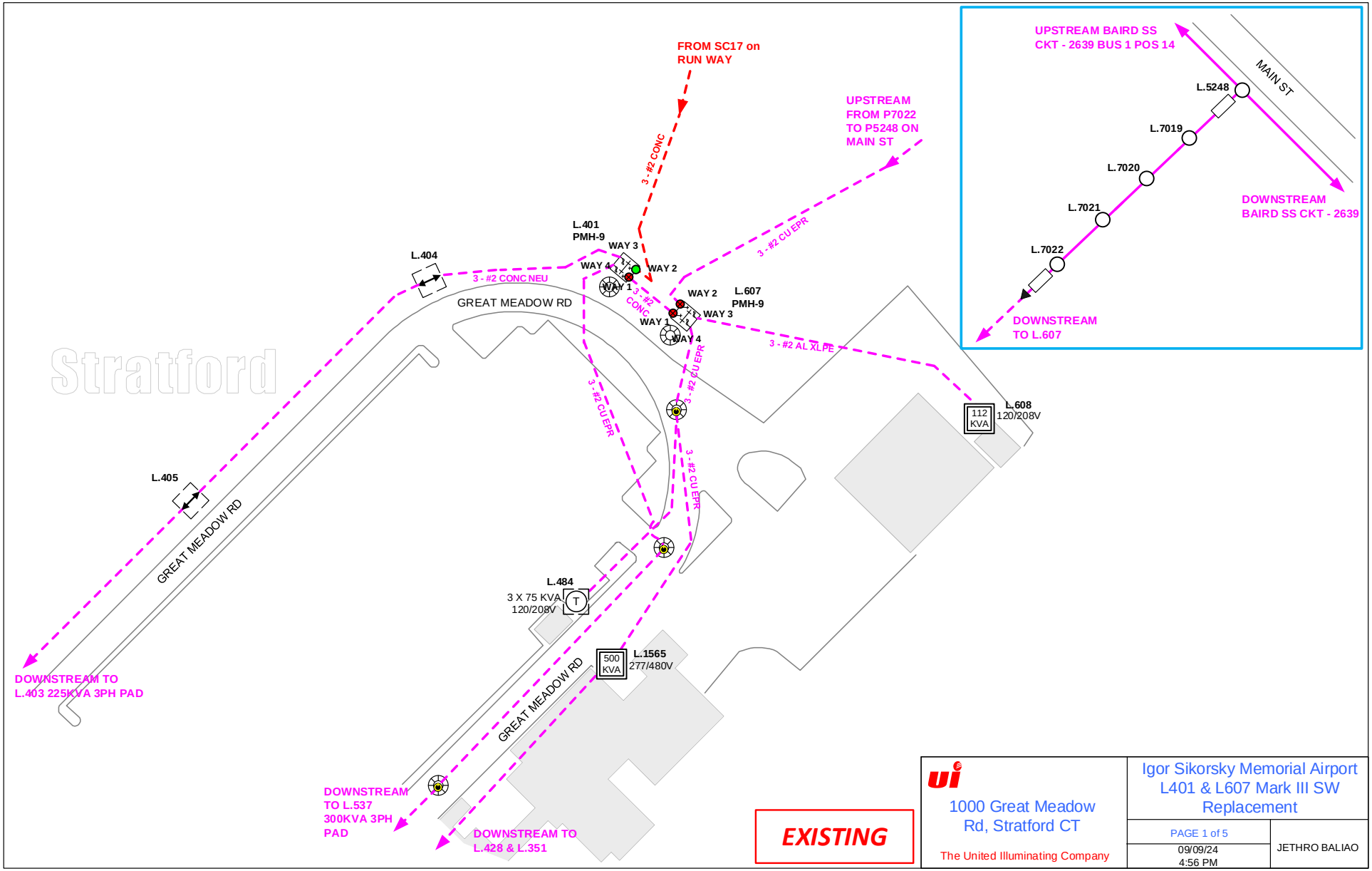
1. UI will not have to relocate any other utility structure to accommodate the proposed UI Construction plan based on the results of the test pit.
2. All customer owned conduit and splice chambers are still in good condition.
3. All materials ordered will be available in time for use by Construction.
4. All budgetary estimates are based on a work product in compliance with existing UI and/or Industry accepted and specifications.
5. Labor rates used in creating the Estimates are based upon historical averages.
6. All dollars shown are in 2023 dollars and subject to change due to escalation in material, labor, and equipment rates at the time of actual construction.
7. The schedule of all work is dependent upon arranging a mutually agreeable outage with the impacted customer(s).

7. Engineering Recommendations

Engineering recommends the Option 2 for the following reasons:

- UI will not need to relocate any underground facilities as the location of the switches will stay the same.
- UI will have access to the switches 24/7.
- The PME-9 Provides the customer with a reliable service.
- Helps maintain or improve SAIFI and CAIDI metrics.
- Achieves the goal of replacing the Faulty live front switches with new Dead Front Switches

EXISTING


FROM SC17 on RUN WAY
3 - #2 CONC
UPSTREAM FROM P7022 TO P5248 ON MAIN ST
3 - #2 CU EPR
L.401
PMH-9
WAY 3
WAY 4
WAY 2
WAY 1
L.404
3 - #2 CONC NEU
GREAT MEADOW RD
3 - #2 CONC
WAY 2
L.607
PMH-9
WAY 3
WAY 1
WAY 4
3 - #2 AL XLPE
3 - #2 CU EPR
3 - #2 CU EPR
3 - #2 CU EPR
L.608
120/208V
112 KVA
L.405
GREAT MEADOW RD
L.484
3 X 75 KVA
120/208V
T
500 KVA
L.1565
277/480V
GREAT MEADOW RD
DOWNSTREAM TO L.403 225KVA 3PH PAD
DOWNSTREAM TO L.537 300KVA 3PH PAD
DOWNSTREAM TO L.428 & L.351
Stratford
UPSTREAM BAIRD SS CKT - 2639 BUS 1 POS 14
MAIN ST
L.5248
L.7019
L.7020
L.7021
L.7022
DOWNSTREAM BAIRD SS CKT - 2639
DOWNSTREAM TO L.607
EXISTING
1000 Great Meadow Rd, Stratford CT
The United Illuminating Company
Igor Sikorsky Memorial Airport
L401 & L607 Mark III SW Replacement
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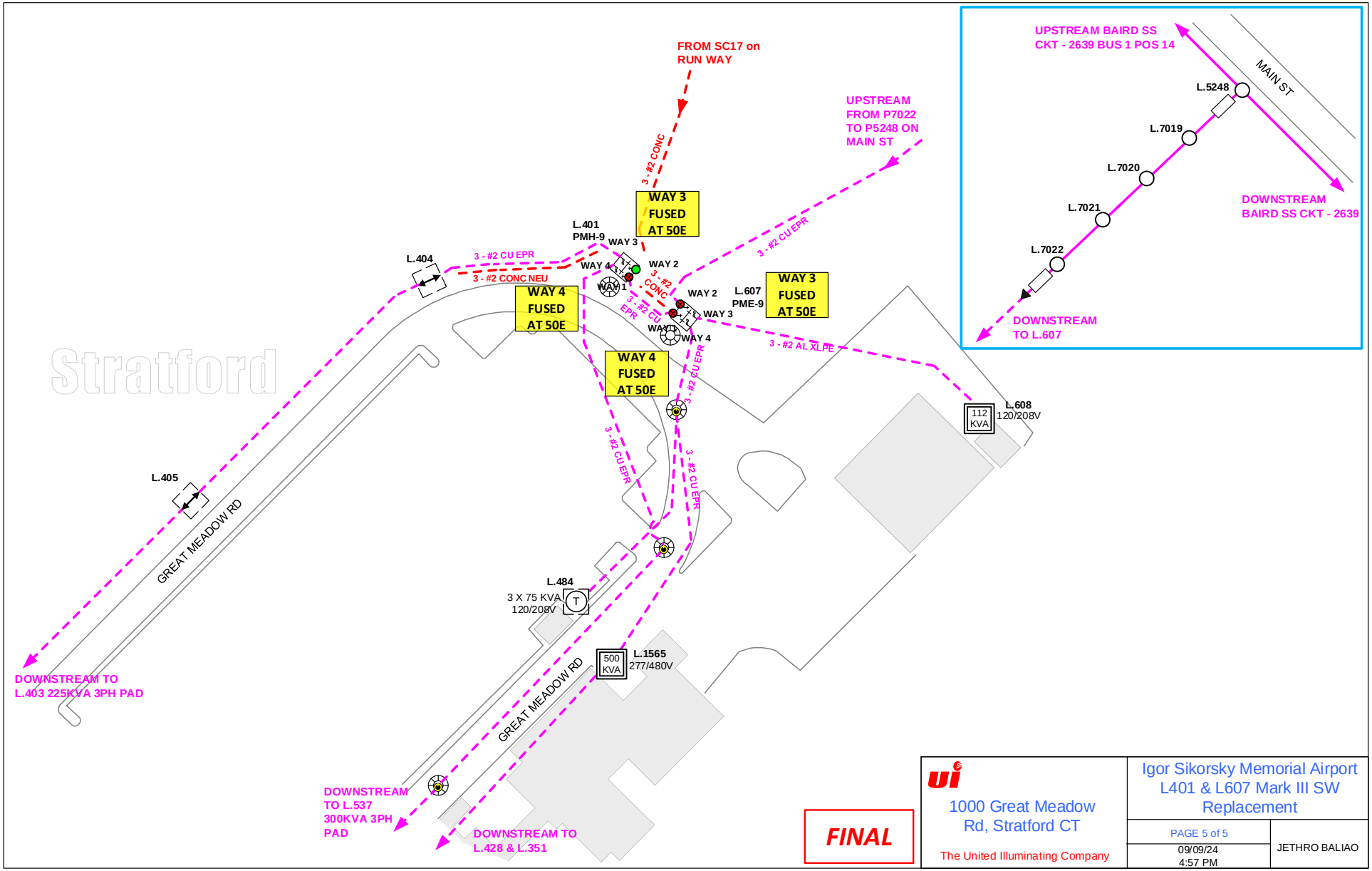
AFTER


FROM SC17 on RUN WAY
3 - #2 CONC
WAY 3 FUSED AT 50E
L.401 PMH-9
WAY 3
WAY 4
WAY 2
WAY 1
L.404
3 - #2 CU EPR
3 - #2 CONC NEU
WAY 4 FUSED AT 50E
UPSTREAM FROM P7022 TO P5248 ON MAIN ST
3 - #2 CU EPR
3 - #2 CONC
L.607 PME-9
WAY 3 FUSED AT 50E
WAY 4 FUSED AT 50E
3 - #2 AL XLPE
L.608 120/208V
112 KVA
L.405
GREAT MEADOW RD
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DOWNSTREAM TO L.403 225KVA 3PH PAD
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UPSTREAM BAIRD SS CKT - 2639 BUS 1 POS 14
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L.7021
L.7022
DOWNSTREAM BAIRD SS CKT - 2639
DOWNSTREAM TO L.607
Stratford
FINAL
1000 Great Meadow Rd, Stratford CT
The United Illuminating Company
Igor Sikorsky Memorial Airport
L401 & L607 Mark III SW Replacement
PAGE 5 of 5
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PRJ-002742

Switchgear Replacement Program

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Switchgear Replacement Program

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002742	Electric Distribution	Lyons, Robin	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Infrastructure Replacement - Dist	IP4 Change	Program - Ongoing	Program - Ongoing

Project description:

There are over 100 high voltage non-network services (>600volts) across UI's service territory which we operate, maintain, and in many cases own the switching demarcations. Through a specific inspection plan, UI is to identify and prioritize the locations that have reached the end of their useful life, and/or present concerns ranging from safety, operational difficulties, code/access issues, and environmental. Prepare engineering designed solutions for addressing the issues, up to and including replacement of service demarcations. Work with each customer to execute the plan, as we continue the program until all locations have been identified, and shortfalls have been addressed.

There will also be locations that include UI owned transformers in customer owned vaults that are also in poor condition and may need to be relocated as part of the program, on a case by case review.

Project Scope:

a. Create specific switchgear inspection plan for the program.
b. Perform field inspects.
c. Identify and prioritize the locations requiring immediate or near term solutions.
d. Prepare civil/electrical designs, and budgets for each location. (Note: Each plan will need customer involvement and acceptance, as the majority of UI equipment and construction will be on private property.)
e. Purchase equipment.
f. Working with the customers, execute the plan to either replace or upgrade the equipment to eliminate the identified problem(s).
g. Continue the cycle until all identified problems are corrected.

This program purchased replacement swichgear for two locations in 2023. Funding was provided for the gear in 23, but deliveries were delayed until '24 due to supply chain issues. A budget change of 500k with offset is being developed to allow delivery of this gear in '24 and execution of the replacment.

In 2024, UI will replace L142 at Bella Vista 321 Eastern St New Haven.

In 2025, UI plans to replace L742 at Knights of Columbus New Haven.

In 2026, UI plans to replace L152 at Bella Vista 339 Eastern St New Haven.

Project Benefits:

Standup switch and fuse gear has a finite operational life. It is implemented at sensitive loads: Elderly housing, hospitals, large manufacturing plants. Failures create long term outages to these facilties. Proactive replacement of this gear in advance of failure can mitigate the risks to these critical facilities.

Financial Benefits: If the equipment fails and UI cannot obtain replacement parts, it can lead to extremely long and costly outages (that are O&M, not capital), and may require temporary generator hook-ups.
Examples - Swithgear failure in Downtown New Haven Hotel cost over $100k in O&M and the customers went days without power. Swithgear failure at one building in an eldery care facility in New Haven cost UI over $75k in O&M. The developer had to send all the residents to Hotels since the power was out for days.

Non-Financial benefits:
a. Safety of UI workers.
b. Correct operational and environmental issues.
c. Increase the overall reliability of services and UI system.

Project Risks and Mitigation Plan:
The long lead time for equipment is a high risk for the project. UI has seen lead times for high voltage switchgear increase from 16 weeks pre-covid, to 52 weeks post-covid, to 76+ weeks mid 2024 due to the amount of equipment orders placed for infrastucture investments by other utilities, government agencies, and private institutions. UI is planning to order long lead items as early as possible to prepare for equipment replacement.

Risk of No Action:
If no action is taken, the potential for equipment failure is high. This is a safety concern as it places our crews at risk if the the equipment fails when operated. Many parts are not able to be procured, leading to custom fabrication by local vendors (if at all possible). This can lead to significantly longer outage durations for our customers. It also results in higher O&M costs for the repairs. Equipment in two locations at Bella Vista experienced failures within the past 6 months that resulted in UI operational changes for safety reasons. Until these two locations at Bella Vista can be replaced, UI will no longer operate the outgoing switches while energized. This will result in the entire building losing power whenever UI needs to operate a single outgoing switch.

Project Alternatives:
Each customer location is unique. Estimates were based on conditions at each site and built from ground up with historic costs of materials for the projects and construction services, as well as labor estimates from similar projects.

Basis for Project Estimates
As each location is unique, the overall estimates are based on previously similar projects. Each location will require individual detailed engineering plans to create a more accurate cost estimate that will be reviewed one at a time, and require approval thru the UI investment process.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 264**	$ 13	$ 75	$ 49	$ 75	$ 53
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 2,235**	$ 242	$ 418	$ 300	$ 700	$ 575
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 745**	$ 1	$ 234	$ 150	$ 200	$ 160
# Internal, Overheads	**$ 670**	$ 65	$ 199	$ 133	$ 164	$ 109
# Materials	**$ 1,525**	$ -	$ 600	$ 400	$ 350	$ 175
# Overheads - External	**$ 947**	$ 88	$ 260	$ 173	$ 244	$ 183
Total	**$ 6,385**	**$ 408**	**$ 1,785**	**$ 1,205**	**$ 1,732**	**$ 1,255**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 5,946	$ (31)	$ 1,785	$ 1,205	$ 1,732	$ 1,255

Note: 2024 Plant Additions includes the entire calendar year

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Engineering Project PRJ-002742 Switchgear Replacement Program

Prepared by:

Distribution Enginering

Date of Report: 09/24/2024

Index

1. Project Description (Summary) 3
2. Existing Conditions 3
3. Need Statement 4
4. Engineering 5
5. Project Milestones 7
6. Project Assumptions 8
7. Engineering Recommendations 8
8. Maps or Electrical Design 9

1. Project Description (Summary)

There are over 100 customers with high voltage non-network services (>600volts) across UI's service territory. These locations have multiple primary circuits terminating in switchgear that we operate, maintain, and in many cases own the switching demarcations.

Many of these locations were built in the 60's and 70's and the switchgear is approaching the end of its service life. There are challenges getting spare parts for this vintage switchgear today and we expect this to get worse in the future.

In addition, many of these locations present concerns ranging from safety hazards, operational difficulties, environmental problems, NESC violations, and access issues that must be corrected to bring them up to modern standards.

This program is expected to address the highest priority locations first, then continually access conditions and priorities each year to plan for the next locations. It is expected to take at least 10 years to replace the switchgear units that are currently identified. UI expects the program will continue beyond 10 years as equipment conditions change, degrade, or reach the end of their useful life and they are identified thru maintenance inspections.

2. Existing Conditions

Many 15kV switchgear locations at customer sites are reaching the end of their service life. Their structural integrity in some locations is severely degraded and at some point in the near future will become unsafe to operate while energized. Case in point – two switchgear locations at Bella Vista in New Haven (L142 & L152) both of which are in the process of being replaced in the program have recently experienced unplanned outages. At L142, a switch component failed during manual operation and as a result, for safety reasons UI implemented an OP in August 2024 where the switchgear L142 and L152 shall be de-energized before operating any of the six outgoing switches. This has a significant impact to the residents at the high-rise tower, as the entire building will need to be de-energized to operate any one of the outgoing switches at the metal enclosed switchgear.

Some locations have non-standard equipment making it difficult for UI workers to safely operate or apply grounds at the switchgear.

Some locations are plagued with access issues making it difficult for UI to perform maintenance, switching, and restore circuits in a timely manner, which affects other customers on our system.

Obtaining parts can be difficult if not impossible, as many of the vintage switchgear equipment in the field is no longer supported by manufacturers, or they are no longer in business.

3. Need Statement

The Switchgear Replacement Program is intended to identify and replace the equipment before it fails which could cause injury or extended customer and/or system outages. By prioritizing the equipment based on inspections, a systematic approach can be taken to design, procure and install replacement units before failure. Replacement switchgear will comply with the latest version of the NESC and take advantage of the latest equipment designs. These projects can be costly, complicated, and impactful to the customers they serve, as extended outages (multiple days) are required to replace the equipment. The Company's strategy is to mitigate these risks steadily over time, to avoid lengthy widespread outages to public and safety impacts.

There are two classes of 15kV switchgear in this program.

- UI owned and operated: we have no choice and must replace the switchgear and bring the location up to current standards.
- Customer owned and UI operated: if the customer is not willing to replace their gear, UI will investigate moving our demarcation to a new switching point outside on their property and upstream of the existing customer owned switchgear to allow for safe UI operation. This will also allow UI to isolate our feeders from the customer equipment during our normal system switching, maintenance, and circuit restoration efforts following outage.

Examples of high priority locations:

- Bella Vista Apartments (three separate S&C switchgear lineups), New Haven.
    - Unplanned outages in the past two years at L142 & L152 switchgear locations.
    - 1970's vintage switchgear.
    - Outgoing switch components have failed during operation at L142.
    - Parts need to be fabricated, as it is difficult to find from 3rd party vendors.
    - Inverted S&C 15kV switch – blades energized when open and cable dead.
    - Switchgear enclosure rusting.
    - No ground studs on switchgear.
    - Auto-throwover not working, parts not available.

- Knights of Columbus Headquarters, New Haven (L742).
    - 1970 vintage ITE 15kV switchgear.
    - Water in the vault resulted in severe rusting of switchgear lower rails/frame.
    - No worker clearance at front of gear.
    - No worker clearance at rear of gear – cannot safely phase at this location.
    - Roof mounted bushings with unjacketed 15kV cabling.

- Soundview at Savin Rock, West Haven (L148).
  - 1970 vintage S&C 15kV switchgear.
  - Autothrow controls – no spare parts, S&C no longer supports this equipment.
  - Water in the vault resulted in severe rusting of switchgear lower rails/frame.
  - Poor access – would need to remove a wall to replace any sw-gr bays.
  - Rigging would be difficult.

- CT Post Publishing (Hearst), 600 State St Bridgeport (674).
  - 1969 S&C 15kV switchgear with roofmounted bushings.
  - Inverted switches – switch blades energized when open & cables dead.
  - Switchgear rusting.
  - No ability to ground in gear. Grounding performed at open wire strain bus at back of gear with extremely limited space.

4. Engineering

Each location will be evaluated individually.

Option 1 (Do Nothing)
The risk of no action will cause safety concerns for both UI's employees and the public. The risk of not doing anything in these situations will lead to equipment failure, extended customer outages, and potential injury.

If the switchgear equipment fails and UI cannot obtain replacement parts, it can lead to extremely long and costly outages (that are O&M, not capital), and may require temporary generator hook-ups.

Switchgear components that need to be located under emergency situations (during unplanned outages) are often done by using third party companies that have accumulated older components, who can and do charge high prices since the items are so rare.

Case in point, a vintage 15kV switchgear failure at a downtown New Haven Hotel, residential complex, and shopping mall during a holiday shopping weekend, resulted in UI incurring over $100k in O&M costs from a high voltage contractor to make repairs and fabricate parts. The customers fed from the switchgear went days without power. The switchgear at that location has since been replaced and relocated.

Option 2 (Strategically replace the 15kV switchgear)

Establish a 10+ year program to identify, engineer, and replace existing primary switchgear locations.

- Develop inspection criteria/reporting data.
- Perform field inspections.
- Identify and prioritize the locations requiring immediate or near-term solutions.
- Prepare civil/electrical designs, and budgets for each location. Note: Each plan will need customer involvement and acceptance, as the majority of UI equipment and construction will be on private property.
- Each specific location will exceed $500k so they will go to the D-SRG as individual projects for approval as they are identified.
- Costs are expected to be approximately $1.5M per year, assuming two locations per year. Note that the costs will vary per location and will be highly variable depending on site specific requirements.

In 2024, UI will replace L142 at Bella Vista 321 Eastern St New Haven.

In 2025, UI plans to replace L742 at Knights of Columbus New Haven.

In 2026, UI plans to replace L152 at Bella Vista 339 Eastern St New Haven.

Costs for each year are estimated from past similar projects and may change with site conditions and solutions agreed upon between UI and each customer.

Charge Code	Resource	2024	2025	2026
Electric Distribution	# AFUDC	16,050.22	74,880.00	48,750.00
Electric Distribution	# External Services	241,883.03	418,000.00	300,000.00
Electric Distribution	# Materials	-	600,000.00	400,000.00
Electric Distribution	# Internal, Overheads	64,510.89	198,548.89	133,491.16
Electric Distribution	# Overheads - External	88,053.08	259,688.60	172,521.22
Electric Distribution	# Internal, Labor	942.69	234,000.00	150,000.00
Electric Distribution	# COR - Ext Svc		150,000.00	150,000.00
Electric Distribution	# COR - Ext OH	-	65,443.80	65,443.82
Electric Distribution	# COR - Int OH	-		
Electric Distribution	# COR - Int Labor	92.49		
CAP		**411,439.91**	**1,785,117.49**	**1,204,762.38**
COR		**92.49**	**215,443.80**	**215,443.82**
Total		**411,532.40**	**2,000,561.29**	**1,420,206.20**

The program estimates are based on past projects with similar construction.

For example – Bella Vista switchgear replacement is one of two projects included in the cost table above for yr2025. The estimated cost for Bella Vista (yr2025) is as follows.

$273,000 (5 bays of S&C 15kV custom metal enclosed switchgear with auto-throw controls)

$15,000 (S&C service technician on site for 3 days)

$15,000 (Rigging company, including equipment delivery, rigging, and removals)

$12,000 (Augmented contractor support for equipment assembly & testing)

$55,000 (internal labor for switching, cable, splicing, and equipment assembly)

$ 5,500 (internal labor for removals)

$ 16,000 (inventory components for cable work)

$15,000 (internal engineering support)

$140,000 (external overhead)

$ 85,000 (internal overhead)

$126,300 (contingency)

$ 8,700 (afudc)

$766,500 TOTAL Estimated Cost to replace one switchgear location at Bella Vista.

5. Project Milestones

To help mitigate risks, each project goes through an engineering and financial review and approval process per company procedures, before any civil or electrical work is started.

Engineering offers the following common schedule for the switchgear replacement program. This is not all inclusive and not all may be applicable to each location.

1. Develop inspection criteria/reporting data.
2. Begin Field Survey.
3. Review data from the field.
4. Identify and prioritize the locations requiring immediate or near-term solutions.
5. Perform engineering for the selected locations.
    - Bella Vista Apartments, (L142) Eastern St New Haven;
    - Knights of Columbus Headquarters (L742), New Haven;
    - Bella Vista Apartments, (L152) Eastern St New Haven;
    - Soundview Tower, (L148) Savin Rock, West Haven;

- CT Post Publishing, (L674) 600 State St Bridgeport.

6. Perform Civil and Electrical work as required for each location.
7. Continue to identify, engineer, and obtain financial approvals for future switchgear locations needing replacement.

6. Project Assumptions

The following is the list of assumptions used to create the estimates for the proposed work.

1. All budgetary estimates are based on a work product in compliance with existing UI and/or industry accepted standards and specifications.
2. All construction techniques used to install, remove, or replace UI facilities will comply with all applicable Federal, State and Local regulations and UI Construction Standards.
3. UI will be able to obtain A-2 survey maps, and all of the base maps of above ground and underground utilities in the area.
4. All UI construction work will be done during the normal business week and hours.
5. UI will not have to relocate any other utility structures to accommodate proposed solutions.
6. Labor rates used in creating the estimates are based upon historical averages.
7. All dollars shown are in 2024 dollars and subject to change due to escalation in material, labor, and equipment rates at time of actual construction.
8. The base estimates are subject to the accuracy bandwidth as indicated within the estimate.
9. There would not be any issues to the site during or after the construction of the UI facilities that would limit or prohibit access by UI.
10. No environmental remediation work is required.
11. UI is not providing temporary emergency generators for the customer facilities.

7. Engineering Recommendations

Engineering recommends the first switchgear locations to be replaced are Bella Vista (L142), Knights of Columbus (L742), Bella Vista (L152), Soundview (L148), then CT Post Publishing (L674). Continue to evaluate additional switchgear locations to determine which locations should be replaced in the future.

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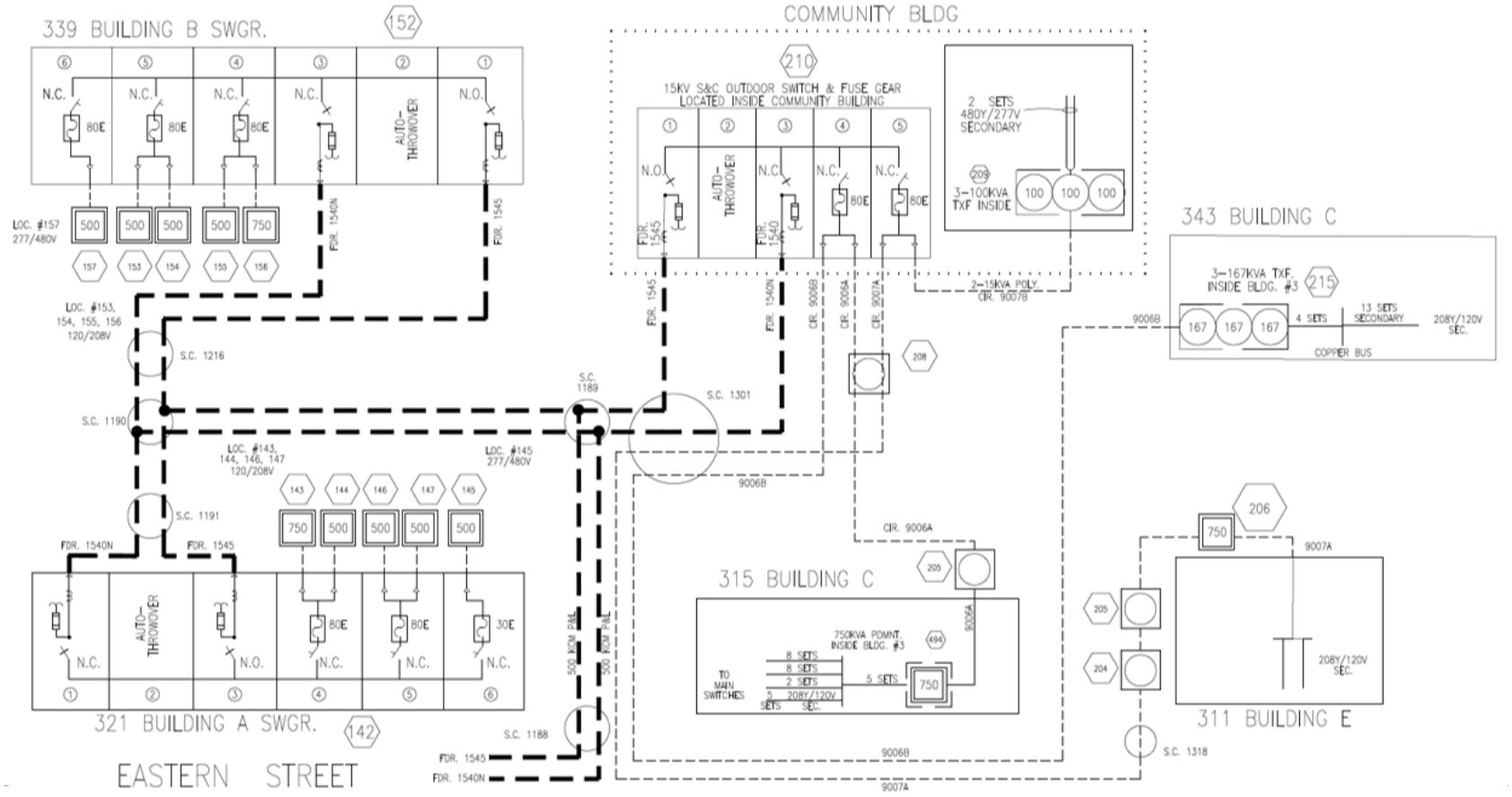
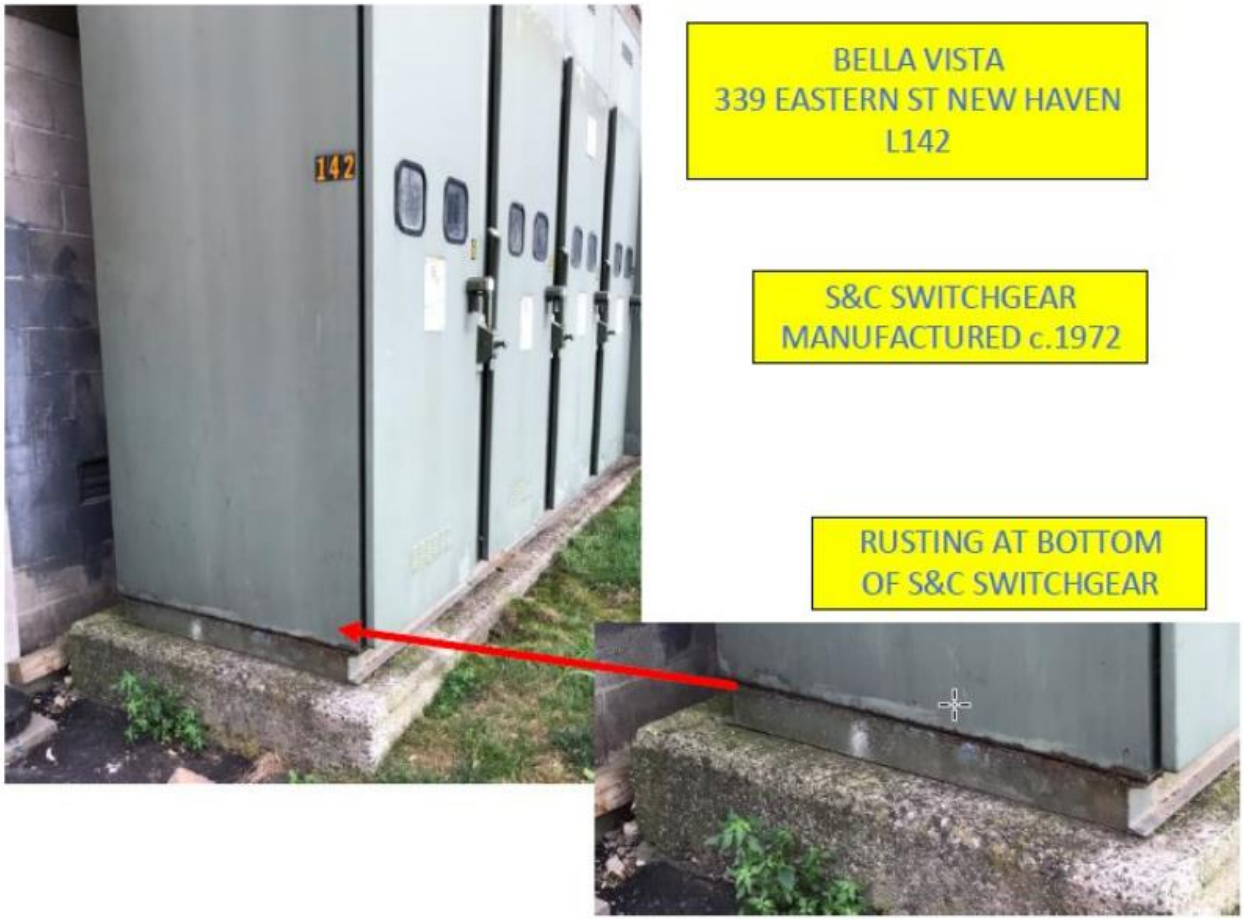
8. Maps or Electrical Design

The following is a oneline of the underground feed and three switchgear locations serving Bella Vista in New Haven, CT.



UI switchgear L142 @ Bella Vista in New Haven, CT.

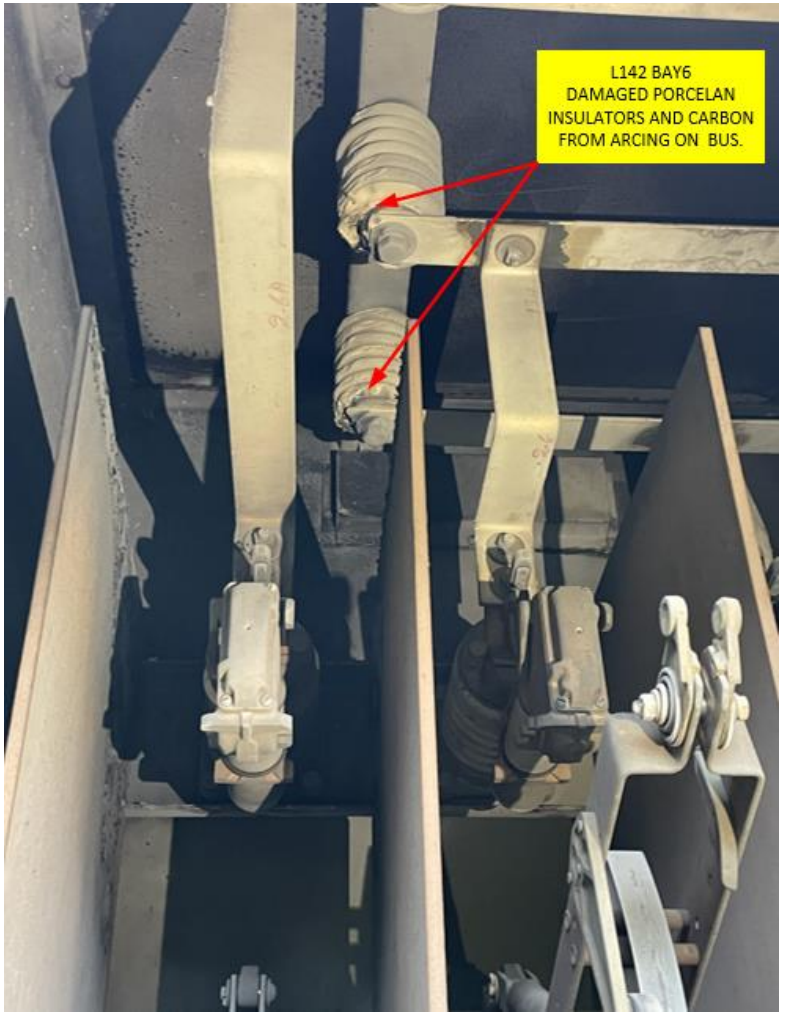


Incoming switches “inverted” at switchgear serving Bella Vista in New Haven, CT.

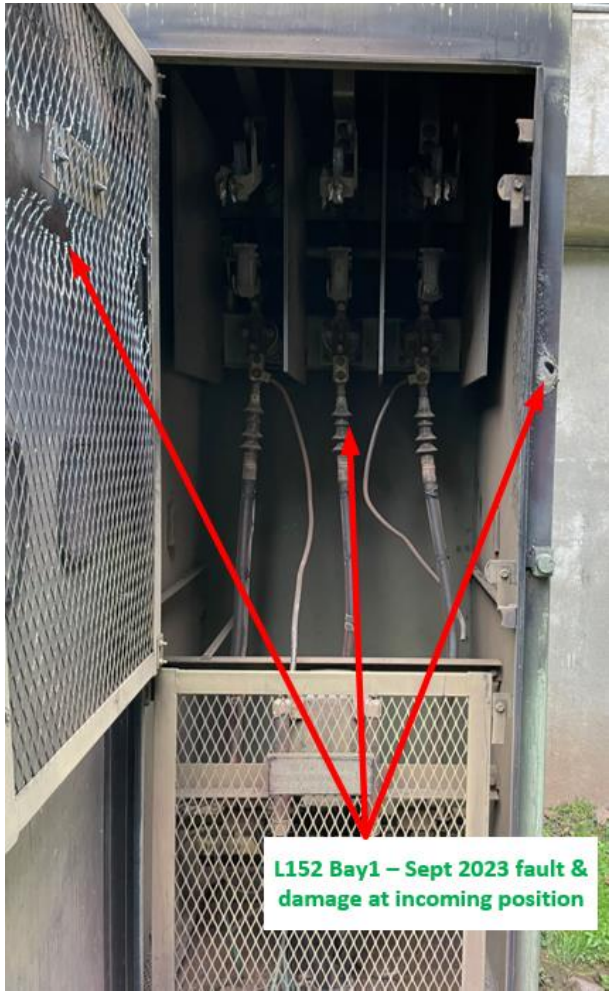


August 2024 equipment failure at UI L142-Bay6 (Bella Vista).





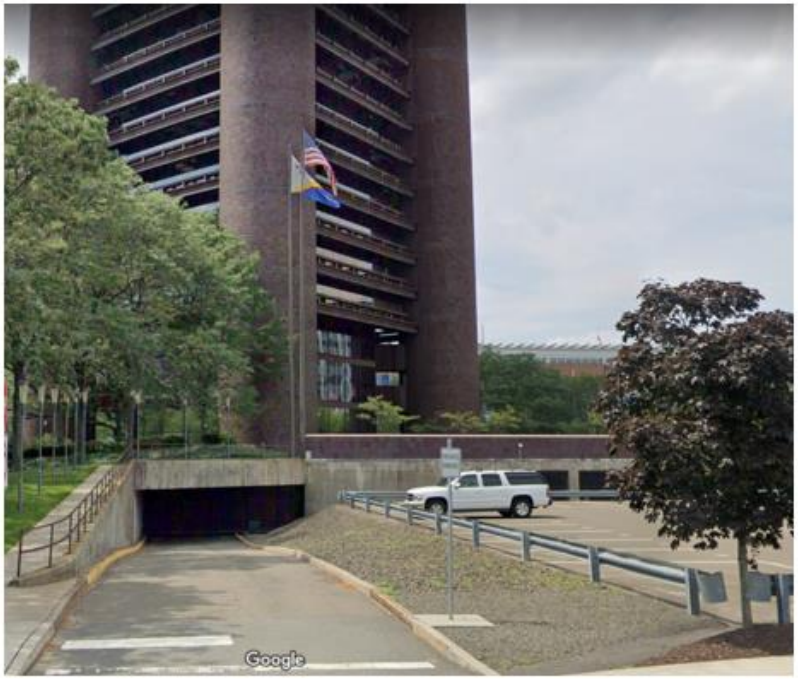
Sept 2023 fault and damage at Bella Vista L152 Incoming Bay-1.





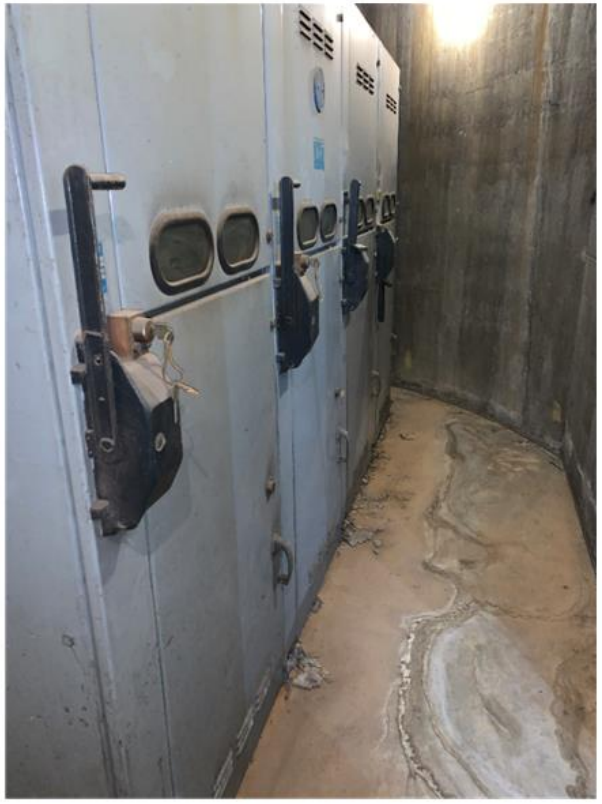
Knights of Columbus Headquarters (KofC) L742 – 1 Columbus Plaza, New Haven, CT:

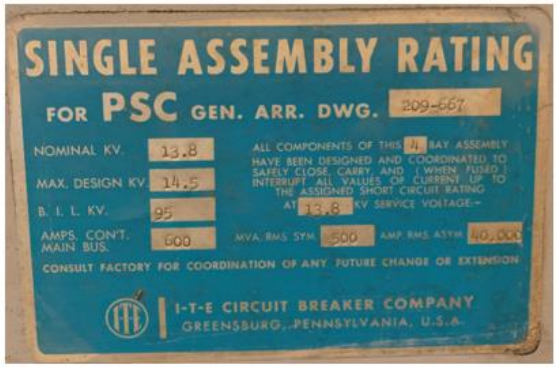




The Knights of Columbus Building is a 321' (23) story reinforced concrete Tower built in 1969 located in downtown New Haven CT. It is the headquarters to the Roman Catholic fraternal organization, the Knights of Columbus. It was built next to the previously demolished New Haven Coliseum – now the Square 10 Development.

KofC L742 Existing switchgear in walk-in vault:



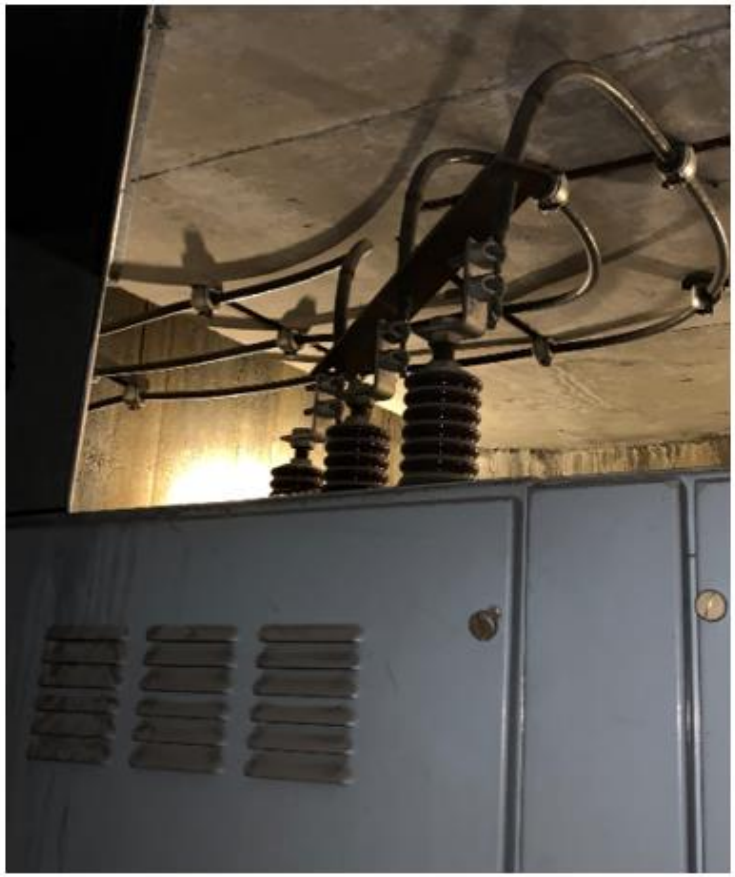


ITE switchgear installed in 1970.
Owned and operated by UI.
Only ~ 3' clearance in front of the switchgear for switchers.

KofC L742 switchgear- poor structural condition:



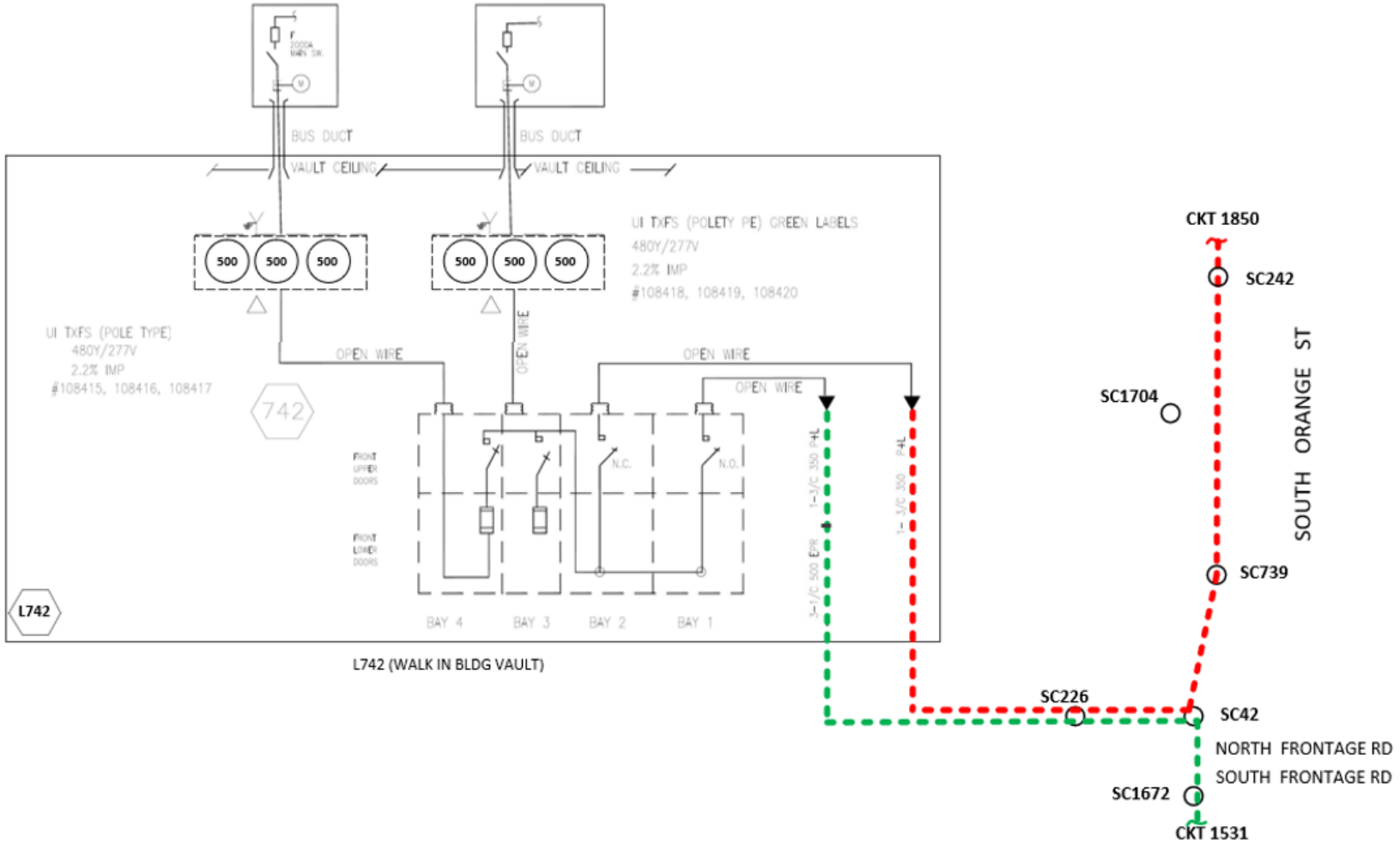
KofC L742 existing switchgear in walk-in vault:



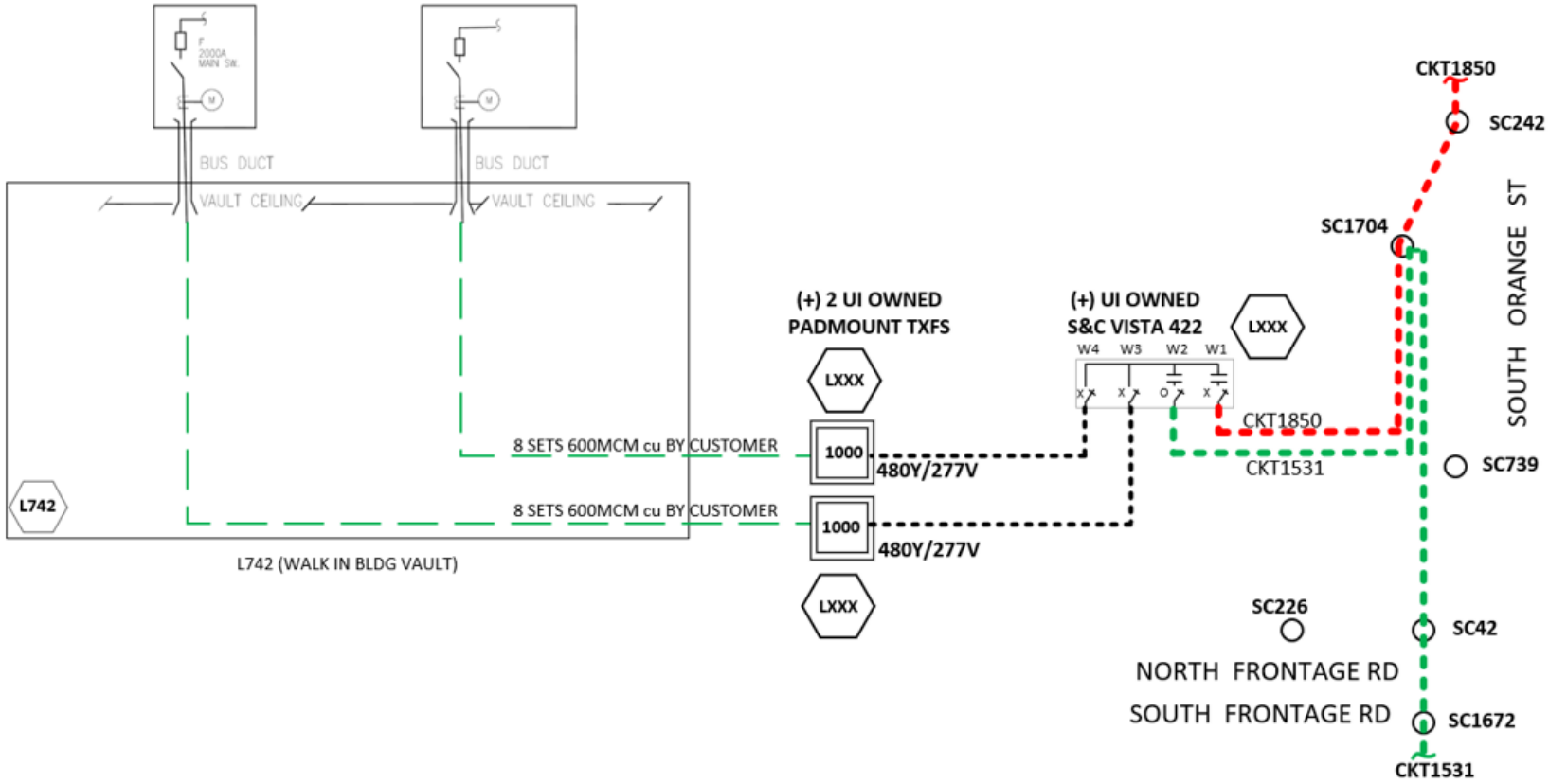


Roof-top insulators, with unjacketed conductors for incoming feeders and outgoing positions.

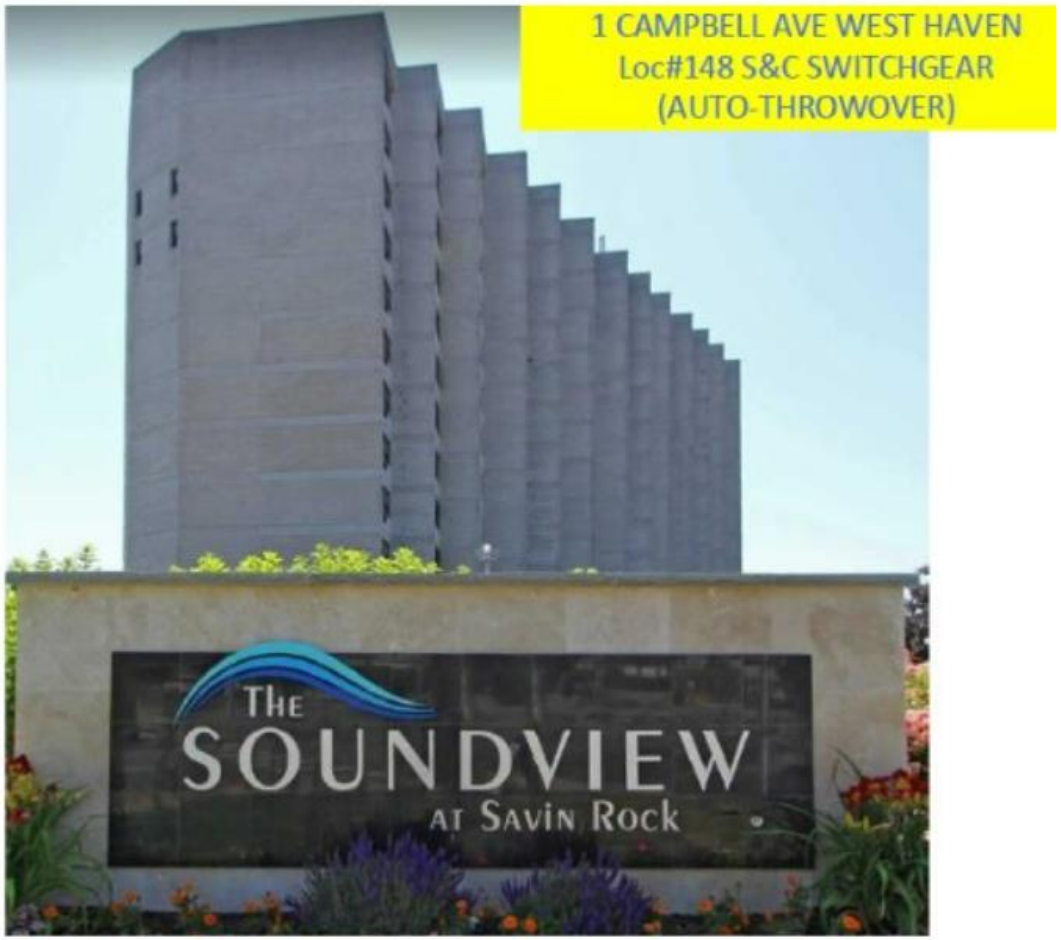
KofC L742 Existing oneline:



KofC L742 Proposed oneline:



Soundview Residential building at Savin Rock, West Haven, CT (L#148)



L#148 (S&C switchgear-1974) walk-in building vault @ Soundview Residential building Savin Rock, West Haven, CT

Water flood line is visible near base of gear at vent slots approximately 12” above the floor.



L#148 (S&C switchgear-1974) walk-in building vault @ Soundview Residential building Savin Rock, West Haven, CT





L674 CT Post Publishing, 600 State St Bridgeport





L674 CT Post Publishing, 600 State St Bridgeport





PRJ-005553

UI Network - Primary Switch Install

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI Network - Primary Switch Install

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005553	Electric Distribution	Eves, Charles	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Infrastructure Replacement - Dist	IP1 Originate	Program/As Spent	Program/As Spent

Project description:

UI's current practice to replace a netowrk transformer or protector is to de-energize the entire feeder serving that transformer. This is a costly and complex process that takes multiple days since each transformer on that circuit must de-energized.

Installing primary switches in each vault allows UI crews to safely isolate any given transformer and replace it without de-energizing the feeder. This will save time and money over the exisiting procedure.

Project Scope:

The scope of work includes the following:
•UI to complete two network vaults per year.
•Install 4 network primary switches (2 switches per network vault).
•Install approximately 400 ft of 4/0 primary cables (100 ft per switches)
•Install 8 sets of 600 amps elbows for the primary switches (2 sets of elbows per switch).
•Install 4 sets of straight terminations 4/0 EPR.
•Install straight and wye splices for the primary cables.
•Prep and install 4 network primary switches.
•Deenergize and reenergize the network feeders.

Project Benefits:

It currently takes 9 men x 2 full days to de-energize or and another 2 full days to re-energize a network work feeder.

Once all vaults have G&W primary switches, it will only take less than 2 hours to set up and de-energize or re-energize a vault. This will result in enormous savings of time and labor.

Safety of the network due to it's paralell feeders contain tremendous amounts of fault energy. These devices will improve our workers ability to de-energize transformers and vaults to reduce the safety risks.

Project Risks and Mitigation Plan:

UI underground two unit network vault has internal dimensions of 34ft long, 10ft height, and 8ft wide. Most of the space is taken by the equipment: two network transformers, two protectors, associated cables, a collector bus and communication equipment. UI underground network vault is limited to primary switches that have a maximum length of 44” long and maximum width of 28”. Some of the old existing vaults do not have the space required to install two primary switches and this can jeopardize the completion of the project on time. The Mitigation plan is to find available space in the Street right away, perform test pit to make sure there are no other utilities in the ground, install a small vault that can hold the primary switches.

Risk of No Action:

UI will continue to de-energize the entire network feeder in order to replace a network transformer or network protector.

Project Alternatives:

UI is aware of two other companies that make underground primary switches; Elastimold, and Eaton Corporation. After evaluating these underground primary switches, it was determined that the Elastimold primary switch has the right dimensions but does not have the SafeVu window. Therefore it does not meet UI specifications. Eaton VisoVac has the SafeVu window but it is 53.4” long and 20.8” wide; does not meet UI specifications. There is not sufficient additional available space in the service network vault to install this kind of underground primary switch.

Basis for Project Estimates

The cost estimate is based on similar projects and include the following:
- Two network vaults will be completed per year.
- Engineering /Management time
- Materials Cost from the vendor
- Labor cost to prep and install the network primary switches.
- Labor cost to install primary cables and splices.
- Labor cost to install primary cable terminations.
- Labor cost to deenergize the network feeders.
- Labor cost to reenergize the network feeders.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 67**	$ -	$ -	$ 22	$ 22	$ 23
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 297**	$ -	$ -	$ 97	$ 99	$ 101
# Internal, Overheads	**$ 199**	$ -	$ -	$ 65	$ 66	$ 68
# Materials	**$ 734**	$ -	$ -	$ 240	$ 245	$ 250
# Overheads - External	**$ 259**	$ -	$ -	$ 85	$ 86	$ 88
Total	**$ 1,557**	**$ -**	**$ -**	**$ 509**	**$ 519**	**$ 529**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 1,557	$ -	$ -	$ 509	$ 519	$ 529

UI
An Avangrid company

UI Network Primary Switch Program



Business Project PRJ-005553

Engineering Report UI Network Primary Switch Program

Prepared by:

Distribution Engineering Department

Date of Report: 10/2/2024

Index

1. Project Description (Summary) 3
2. Existing Conditions 3
3. Need Statement 4
4. Alternative Solutions 9
5. Project Milestones 10
6. Project Assumptions 10
7. Engineering Recommendations 11

1. Project Description (Summary)

UI Network Primary Switch Program project consists of installing the G&W Trident Primary Switches in all UI underground network vaults and two network vaults will be completed per year. A total of four network primary switches (two per network vault) will be installed per year. The G&W Trident with Safe Vu switches are solide dielectric switches available for load break and fault interrupting applications. They are available in both two-way and multi-way configurations. The Trident with Safe Vu is a mechanically ganged three phase switch and is equipped with a vacuum interrupter capable of interrupting load and fault currents. In series with each vacuum interrupter is a blade type switch that provides a visible break, which is viewable through a window molded into each solid dielectric module. The vacuum bottle and bushings are insulated by solid dielectric epoxy. The visible break switch is sealed in a air insulated chamber. The outside of the device is completely dead front. The switch includes a viewing window on the mechanism housing to see the OPEN/CLOSE flag for the vacuum interrupter position. The Trident with Safe Vu is supplied with two different operating handles. One is exclusively for the operation of the Interrupter. The other is exclusively for operation of the Visible Break Switch. It is also equipped with a motor and a pendant that allow the crew to operate the switch aways from the vault using the pendant.

Due to the complexity of this project and the number of network transformers and protectors, there will be multiple phases of implementations, which are detailed below.

2. Existing Conditions

UI has a low voltage secondary networks in specific areas of the Cities of New Haven and Bridgeport. The low voltage secondary network was designed and constructed to provide for N-1 operation; loss of one of the primary supply circuits. With the correct number of network vaults which are strategically located, the secondary cable grid system provides the needed supply so that the connected load is not impacted. In addition, the system is designed so that when there is a fault on the secondary system, the connected vaults all contribute to the fault current. The concept is to generate enough fault current to clear the fault before significant damage can occur to the low voltage secondary system. UI current operating practice when replacing a network transformer or network protector requires UI to take an outage on the affected network primary circuit. The duration of the effort to switch a network primary circuit is typically two days to denergize the circuit and two more days to energize the circuit because of the number of locations that must be visited before and after the outage. UI distribution engineering was tasked to

find a way to replace the network transformer without deenergizing the network circuit. UI distribution engineering has reviewed and found underground primary switches that can provide circuit isolation points, provide overcurrent protection, and/or to reroute power without the need to take the circuit outage. UI would like to install, operate and evaluate, on a trial basis, the use of underground primary switches in the network vaults. These underground primary switches would allow UI to replace a network transformer or network protector without taking an outage on the circuit which would significantly reduce the required labor hours of the replacement.

3. Need Statement

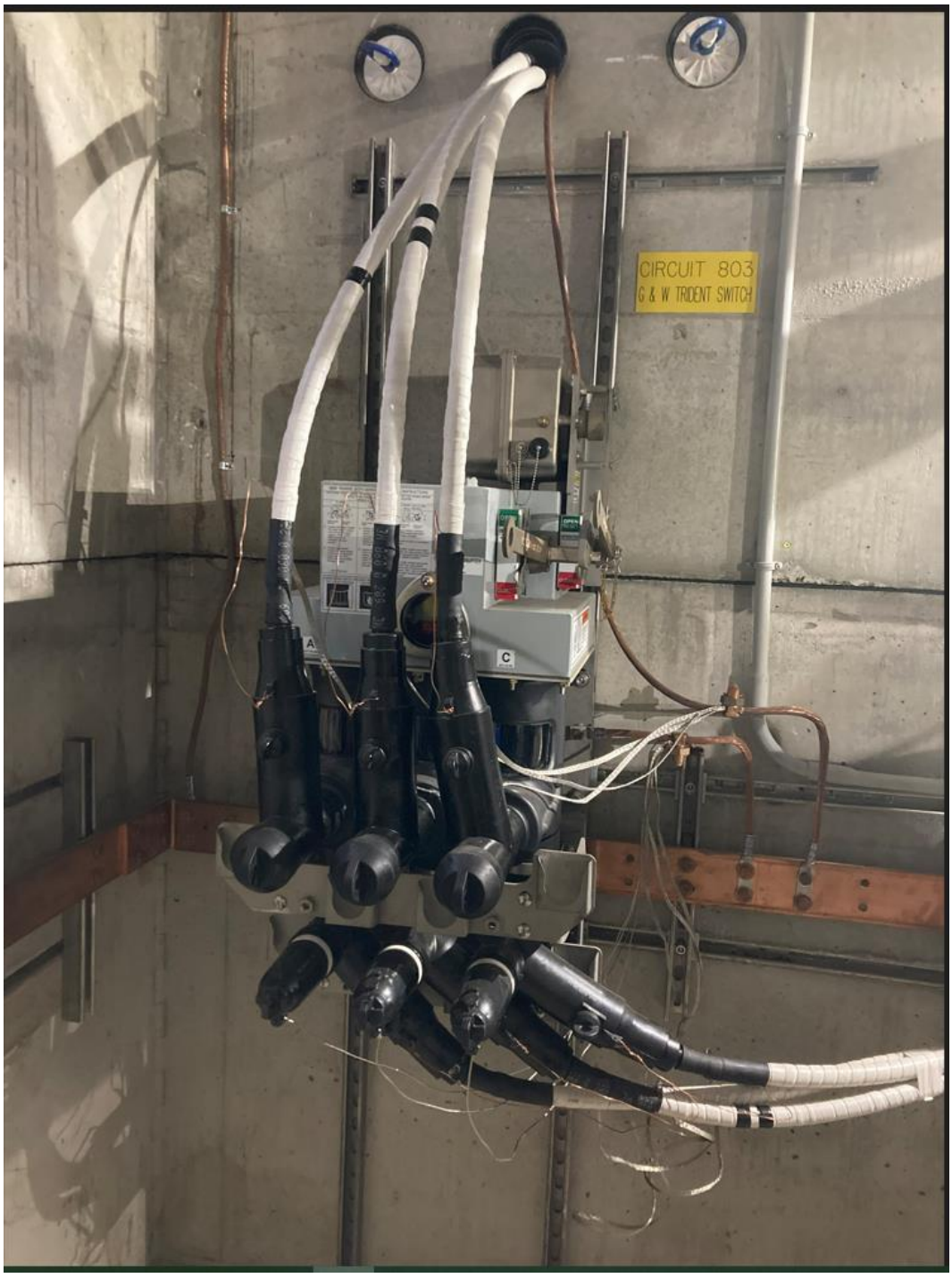
UI current operating practice when replacing a network transformer or network protector requires UI to take an outage on the affected network primary circuit. The duration of the effort to switch a network primary circuit is typically two days to denergize the circuit and two more days to energize the circuit. The reason why the duration is long because of the number of locations that must be visited before and after the outage. UI has reviewed and found primary underground switches that can provide circuit isolation points, provide overcurrent protection, and/or to reroute power without the need to take the circuit outage. UI would like to install, operate and evaluate, on a trial basis, the use of underground primary switches in the network vaults. These underground primary switches would allow UI to replace a network transformer or network protector without taking an outage on the circuit which would significantly reduce the required labor hours of the replacement.

UI underground two unit network vault has internal dimensions of 34ft long, 10ft height, and 8ft wide. Most of the space is taken by the equipment: two network transformers, two protectors, associated cables, a collector bus and communication equipment. UI underground network vault is limited to primary switches that have a maximum length of 44” long and maximum width of 28”. The safety protocol for UI requires the underground primary switch to have a SafeVu window to visually ensure the switch state. Additionally, for spot network vaults, due to arc flash issues, UI must be able to operate the primary switch from the area above (outside) the vault.

UI is aware of three companies that make underground primary switches; Elastimold, Eaton Corporation and G&W Electric. After evaluating these underground primary switches, it was determined that the Elastimold primary switch has the right dimensions but does not have the SafeVu window. Therefore it does not meet UI specifications. Eaton VisoVac has the SafeVu window but it is 53.4” long and 20.8” wide; does not meet UI specifications. There is not sufficient additional available space in the service network vault to install this kind of

underground primary switch. The G&W Trident Solid Dielectric primary switch has a SafeVu window and meets the dimensions above required by UI.

Based on the space requirement, safety procedures and overall ability to allow for remote switching, UI Distribution Engineering recommends the trial of the G&W Trident primary switch. If the trial is successful, this will be the standard switch for all network vaults going forward.


CIRCUIT 803
G & W TRIDENT SWITCH


H3
H2
H1
HIGH SIDE CHAMBER
FILLED WITH FR3 FLUID
100019464381


CIRCUIT 59
G & W TRIDENT SWI
VACUUM INTERRUPTER STATUS
OPEN RESET
CAUTION
A
B
C

4. Alternative Solutions

Alternative I: Install G&W Trident Solid Dielectric Load Break Switch with Safe Vu

1. Two network vaults will be completed per year.
2. Prep G&W Trident Solid Dielectric Primary Switches.
3. Install G&W Trident Solid Dielectric Primary Switches.
4. Install 600 amps elbows.
5. Install 4/0 EPR CU cable from the splice chamber to the G&W primary switches
6. Install 4/0 EPR CU from the G&W primary switch to the network transformers.
7. Terminate the 4/0 EPR CU cables.
8. Deenergize the network primary circuits.
9. Install the 500-4/0 EPR CU at the splices chambers.
10. Phase and energize the network primary circuits.
11. Close the G&W Trident primary switches energizing the network transformers.

Table I Proposed Estimates for Alternative I

The proposed cost estimate is to install fours network primary switches (two per network vault) and two network vaults will be completed per year.
The following are the budgetary estimates for the capital, expense, and removal work as outline with the assumptions listed in the appendix. These values have a tolerance of +25% and -25%.

Resources	2026	2027	2028
# Internal, Labor	$97,000	$98,940	$100,919
# Cost of Removal Ext OH	$26,178	$26,701	$27,235
#Cost of Removal Ext Svc	$60,000	$61,200	$62,424
# Materials	$240,000	$244,800	$249,696
# AFUDC	$21,905	$22,343	$22,790
# Overheads - External	$84,718	$86,412	$88,140
# Internal, Overheads	$65,128	$66,431	$67,759
Total cost of job	**$594,929**	**$606,827**	**$618,964**

Alternative II: Install Elastmold Primary Switch Switch

After reviewing the Elastimold underground primary switches, it was determined that the Elastimold primary switch has the right dimensions but does not have the SafeVu window. Therefore it does not meet UI specifications. No estimate was developed.

Alternative III: Install Eaton VisoVac Primary Switch

Eaton VisoVac has the SafeVu window but it is 53.4" long and 20.8" wide. There is not sufficient additional available space in the underground network vault to install this kind of underground primary switch. Due to the limited of space this alternative was not pursue. Therefore, no estimate was created.

5. Project Milestones

Assuming the project is approved by both UI and customer, we expect the following duration of each step. The exact schedule would depend upon coordination with the customer.

1. Engineering Design Completed Q1 2025.
2. Procure Materials Q3 2025
3. Install ductbanks and conduit laterals Q2 2026.
4. Electric Work Completed Q3 2026.
5. Project Close Out Completed.

6. Project Assumptions

The following is the list of standard assumptions which were used to create the estimates for the proposed work.

1. UI will be able to apply and get the permit on time to start this project.
2. All materials ordered will be available in time for Construction.
3. All budgetary estimates are based on a work product in compliance with existing UI and/or industry accepted and specifications.
4. All dollars shown are in 2026 dollars and subject to change due to escalation in material, labor, and equipment rates at time of actual construction.
5. UI to perform test pit and confirm the presence of ledge or not.
6. UI to perform test pits and confirm or verify the location of other Utilities in the area after receiving and reviewing the based maps.

7. All UI construction work will be done during the normal business week and hours.
8. Labor rates used in creating the estimates are based upon historical averages.

7. Engineering Recommendations

As mentioned earlier, UI underground two unit network vault has internal dimensions of 34ft long, 10ft height, and 8ft wide. Most of the space is taken up by the electrical equipment: two network transformers, two protectors, associated cables, a collector bus and communication equipment. UI underground network vault is limited to primary switches that have a maximum length of 44" long and maximum width of 28". The safety protocol for UI requires the underground primary switch to have a SafeVu window to visually ensure the switch state. Additionally, for spot network vaults, due to arc flash issues, UI must be able to operate the switch from the area above (outside) the vault. Based on the limited space, engineering recommends Alternative I which is the G&W Trident Solid Dielectric Load Break with Motor and Safe Vu. The motor allows UI crew to operate the switch 25ft away from the network vault using the pendant.

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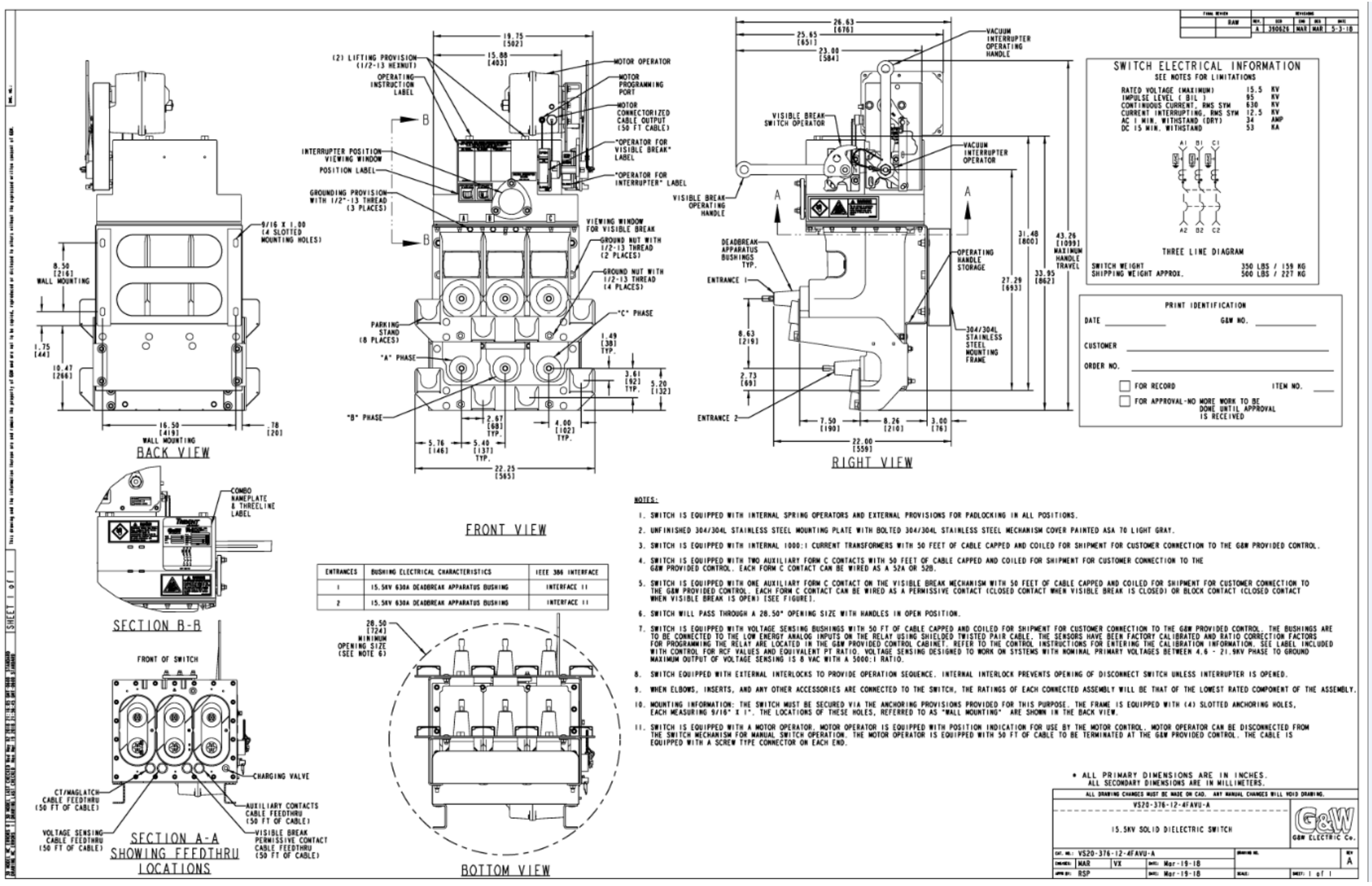

ENTRANCES	BUSHING ELECTRICAL CHARACTERISTICS	IEEE 386 INTERFACE
1	15.5KV 630A DEADBREAK APPARATUS BUSHING	INTERFACE 11
2	15.5KV 630A DEADBREAK APPARATUS BUSHING	INTERFACE 11

[redacted]



801701.01

Spare G&W Reclosers and Controls (UI-U0054)

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

Spare G&W Reclosers and Controls (UI-U0054)

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	801701.01	Electric Distribution	Rebolleda, Alfonso	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Infrastructure Replacement - Dist	IP4 Change	Program - Ongoing	Program - Ongoing

Project description:
This program provides operational stock of reclosers and controls for replacements and upgrades to standards according to the system needs

Project Scope:
Based on the historical failure rate, units needing replacement and current inventory the company will be in a position to replace the 14 units and the estimated failures in 2025. The budget forecast for 2026 will provide spares for units found through inspections and other failures in 2025 and 2026, estimating an additional 19 units. The estimated unit cost for a Recloser is $38,000, the forecast presented would permit the purchase of 23 units.

Project Benefits:
Keeping the recloser fully operational allows the system to reduce the number of customers affected and therefore this spare equipment is critical to keep realiability levels.

Project Risks and Mitigation Plan:
Risk: Not having recloser stock available to address the failure rates will expose the system to larger outages
To mitigate this risk units need to be available to reduce the off line equipment time (52 week lead time for procurement)

Risk of No Action:
The number of reclsoers off line increases and impacts reliability (SAIDI, SAIFI)

Project Alternatives:
Distribution circuit reliability studies are performed and altenatives considered and recommendations are made for installing/relocating system protection devices.
This program replaces like for like.

Basis for Project Estimates

The budget is based on historical failure rates and number of units needed to restore reclosers back in service.
Currently there are 14 units that need to be replaced. This number may increase as the 2024 Recloser Inspection program is implemented and as other failures occur.
Based on the historical failure rate, units needing replacement and current inventory the company will be in a position to replace the 14 units and the estimated failures in 2025. The budget forecast for 2026 will provide spares for units found through inspections and other failures in 2025 and 2026, estimating an additional 19 units. The estimated unit cost for a Recloser is $38,000, the forecast presented would permit the purchase of 23 units.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 142**	$ 52	$ -	$ 30	$ 30	$ 31
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 315**	$ -	$ -	$ 103	$ 105	$ 107
# Internal, Overheads	**$ 384**	$ -	$ -	$ 125	$ 128	$ 131
# Materials	**$ 1,561**	$ -	$ -	$ 510	$ 520	$ 531
# Overheads - External	**$ 378**	$ -	$ -	$ 124	$ 126	$ 129
Total	**$ 2,780**	**$ 52**	**$ -**	**$ 892**	**$ 909**	**$ 928**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 2,752	$ 23	$ -	$ 892	$ 909	$ 928

Note: 2024 Plant Additions includes the entire calendar year

UI
An Avangrid company

UI- Spare Reclosers and Controls

All Towns

WBS: UI-U0054

Index

1. Program Description 3
2. Need Statement 3
3. Budget Forecast 3
4. Project Milestones 4
5. Project Assumptions 4

1. Program Description

This program provides operational stock of reclosers and controls to replace existing failed reclosers installed on the distribution system.

2. Need Statement

Recloser obsolescence and failures need to be replaced to maintain reliability. The process for commissioning and replacement on average takes 90-120 days. Reclosers have significant long lead times that can go over 52 weeks. This program provides the required stock to keep up with the failure rates that occur on the system and for replacements from inspections.

Reclosers are critical to the system's reliability as they allow us to reduce the impact of outages by limiting the number of customers affected. The current installed base is over 400 units.

As of 9/1/24 the company has 30 units in stock.

Over the past 3 years the company experienced a failure rate of:

- 2021- 18 failures
- 2022 28 failures
- 2023 11 failures

3. Budget Forecast

	2025	2026	2027	2028
Spare Reclosers and Controls (UI-U0054)	$0	$891,628	$909,460	$927,650

The budget is based on historical failure rates and number of units needed to restore reclosers back in service.

Currently there are 14 units that need to be replaced. This number may increase as the 2024 Recloser Inspection program is implemented and as other failures occur.

Based on the historical failure rate, units needing replacement and current inventory the company will be in a position to replace the 14 units and the estimated failures in 2025. The budget forecast for 2026 will provide spares for units found through inspections and other failures in 2025 and 2026, estimating an additional 19 units. The estimated unit cost for a Recloser is $38,000, the forecast presented would permit the purchase of 23 units.

4. Project Milestones

The Company orders these reclosers a year in advance because of the extended lead time. Due to supply chain constraints, it can take up to a year for delivery.

5. Project Assumptions

The Company has used the historic average of failures to budget this project. YTD 2024 there are 14 reclosers through June that require(d) replacement due to dielectric leaks. Inspections will occur through the late summer and fall, and it is expected that these inspections will drive more need.

PRJ-002103

UI - Gen Equipment - OPS-SO

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Gen Equipment - OPS-SO

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002103	Electric Distribution	Rebolleda, Alfonso	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Operations	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:
Purchase of necessary Tools and equipment for the execution of maintenance and testing.

Project Scope:
Includes the purchase of equipment that is needed for workers to perform construction, maintenance and troubleshooting of the Substation distribution system. Additionally, specialty tools are purchase as needed as IR camera for the IR program or doble testing equipment. Some of these tools go from remote racking systems to PPE and other needed elements.

Project Benefits:
Tools and equipment periodically break down or need upgrades to improve the safety of the operations.

Project Risks and Mitigation Plan:
1. Workers do not have the required tools to perform contraction and maintenance.
2. Utilizing manual equipment more often leads to increased muscle fatique and injuries
3. Lack of proper PPE for ARC FLASH, elelctrical testing tools, hazardous gas sensors, blast blankets and confined space entry equipment leads to injury/fatality
Mitigation Plan:
Continue to invest in safety gear, mechanized tools and up dated technology to keep up with industry changes

Risk of No Action:
High Risk Work, confined space entry, work at heights, working on live parts, critical mechanical tools/lifts, hot work, line breaking or hot tapping, working near unguared moving parts all create risks for workers. Without the proper safety gear, tooling and testing equipment will lead to worker injuries and possible fatality.

Project Alternatives:
The company sources this gear and equipment through framework agreements and suppliers to ensure quality and low cost.
There are no alternatives for working safely with proper safety gear and tools.

Basis for Project Estimates

The budget for this program is typically based on 3 years average actual costs. And adujusted for known needs Covid saw a decline in spending, the needs and availaibility have rebounded back to more stable levels.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ -**	$ -	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 1,233**	$ 193	$ 300	$ 240	$ 250	$ 250
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 383**	$ 82	$ 77	$ 73	$ 75	$ 76
# Materials	**$ 1,103**	$ 155	$ 229	$ 234	$ 240	$ 245
# Overheads - External	**$ 337**	$ 82	$ 68	$ 61	$ 63	$ 64
Total	**$ 3,056**	**$ 512**	**$ 674**	**$ 607**	**$ 628**	**$ 634**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 3,056	$ 512	$ 674	$ 607	$ 628	$ 634

Note: 2024 Plant Additions includes the entire calendar year

UI
An Avangrid company

UI- Gen Equipment -OPS-SO

WBS: UI-U0031

Index

1. Program Description 3
2. Need Statement 3
3. Forecasted CAPEX 3

1. Program Description

Purchase and replacement of hydraulic tools, battery tools, safety gear, testing tools, special maintenance equipment...

Includes the purchase of equipment that is needed for workers to perform construction, maintenance and troubleshooting of the substations system. Additionally, specialty tools and multi-functional testing devices are purchased to outfit vehicles with the tools required for specific need like infrared cameras for inspections. Some of these items are high speed pumps, hydraulic operated cutters and drills, Arc Flash Blankets, fault locating equipment, doble testing sets, infrared cameras, FR protection gear over 8K cal..

Also includes the purchase of equipment to increase safety within operations as remote racking systems.

2. Need Statement

Tools and equipment periodically break down and therefore it is necessary to replace them. Safety has also improved over the years due to more ergonomic tools that are lighter and have safety measures integrated to protect employees during use when performing heavy construction work.

Other equipment needed to test and confirm the correct status of the system needs updates over time like IR cameras or Doble testing sets in order to be able to be ahead of the incident by early identification of potential issues.

3. Forecasted CAPEX

2024	2025	2026
$495,294	$674,065	$607,440

Already identified needs for 2025 are:

Purchase remote racking devices for substations, old units are not working	$140,000
Stainless tanks for oil handling	$50,000
Doble Test Equipment	$100,000
IR Camera - FLIR (Our IR camera is old and needs to be updated.)	$150,000
Battery Hoist for New Pequonnock. (The batteries are very large and heavy, and we need to have a safe way to change them out.)	$10,000
SF6 gas carts - Grand Ave	$ 100,000
Tool committee – Tools and equipment (General tools purchases.)	$50,000
Total	$ 600,000.00

Already identified needs in 2026:

Purchase remote racking devices for substations, old units are not working	$200,000
Doble Test Equipment	$100,000
2 SF6 gas carts - New Pequonnock, Singer	$200,000
Tool committee – Tools and equipment (General tools purchases.)	$50,000
Total	$ 550,000.00

Rest of the budget is for replacement of broken tools or other unplanned needs.

PRJ-002105

UI - Gen Equipment - OPS-TD

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Gen Equipment - OPS-TD

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002105	Electric Distribution	Mitchell, John	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Operations	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:
Purchase and replacement of hydraulic tools, battery tools, emergency response trailer and specialty safety gear.

Project Scope:
Includes the purchase of equipment that is needed for workers to perform construction, maintenance and troubleshooting of the overhead and underground distribution system. Additionally, specialty tools and multi-functional testing devices are purchased to outfit vehicles with the tools required for the craft workers. Some of these tools are high speed pumps, hydraulic operated cutters and drills, Arc Flash Blankets, fault locating equipment, climbing gear, and saws

Project Benefits:
Tools and equipment periodically break down and therefore it is necessary to replace them. Safety has also improved over the years due to more ergonomic tools that are lighter and have safety measures integrated to protect employees during use when performing heavy construction work.

Project Risks and Mitigation Plan:
Risks:
1. Workers do not have the required tools to perform contraction and maintenance.
2. Utilizing manual equipment more often leads to increased muscle fatique and injuries
3. Lack of proper PPE for ARC FLASH, elelctrical testing tools, hazardous gas sensors, blast blankets and confined space entry equipment leads to injury/fatality
Mitigation Plan:
Continue to invest in safety gear, mechanized tools and up dated technology to keep up with industry changes

Risk of No Action:
High Risk Work, confined space entry, work at heights, working on live parts, critical mechanical tools/lifts, hot work, line breaking or hot tapping, working near unguared moving parts all create risks for workers. Without the proper safety gear, tooling and testing equipment will lead to worker injuries and possible fatality.

Project Alternatives:
The company sources this gear and equipment through framework agreements and suppliers to ensure quality and low cost.
There are no alternatives for working safely with proper safety gear and tools.

Basis for Project Estimates
The budget for this program is typically based on 3 years average actual costs. Covid saw a decline in spending, the needs and availaibility have rebounded back to more stable levels.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ -**	$ -	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 3,082**	$ 389	$ 750	$ 643	$ 650	$ 650
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 609**	$ 168	$ 115	$ 107	$ 109	$ 110
# Materials	**$ 1,279**	$ 358	$ 224	$ 228	$ 233	$ 237
# Overheads - External	**$ 622**	$ 163	$ 124	$ 111	$ 112	$ 113
Total	**$ 5,592**	**$ 1,077**	**$ 1,213**	**$ 1,089**	**$ 1,104**	**$ 1,110**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 5,592	$ 1,077	$ 1,213	$ 1,089	$ 1,104	$ 1,110

Note: 2024 Plant Additions includes the entire calendar year

UI
An Avangrid company

UI- Gen Equipment -OPS-TD

WBS: UI-U0030

Index

1. Program Description 3
2. Need Statement 3
3. Actual Costs 4
4. Budget Forecast 4
5. Project Assumptions 4

1. Program Description

Purchase and replacement of hydraulic tools, battery tools, emergency response trailer and specialty safety gear.

Includes the purchase of equipment that is needed for workers to perform construction, maintenance and troubleshooting of the overhead and underground distribution system. Additionally, specialty tools and multi-functional testing devices are purchased to outfit vehicles with the tools required for the craft workers. Some of these tools are high speed pumps, hydraulic operated cutters and drills, Arc Flash Blankets, fault locating equipment, climbing gear, and saws

2. Need Statement

Tools and equipment periodically break down and therefore it is necessary to replace them. Safety has also improved over the years due to more ergonomic tools that are lighter and have safety measures integrated to protect employees during use when performing heavy construction work. The following items are tools and materials purchased by the business area that aren't part of inventory.

Battery Tools – Greenlee, Makita, Milwaukee

- Drill
- Impact
- Crimper
- Cutter
- Stapler
- Grinder
- Jackhammer
- Polesaw
- Sawzalls, etc.

Zoll AEDs

Tablets

Hydraulic Tools – Stanley, Reliable, Greenlee

Saws (gas) – Chop & Chainsaw - Stihl

PPE:

- Hard hats – lighting, ear muff and faceshield attachments
- Specialty safety equipment

Climbing gear – belts, hooks, harnesses, buck squeeze

Blocks and winch lines

Infrared tools/cameras

Estex flash blankets

Load Break tools – Pickup Jumpers

UG chamber rescue gates

Remote cutters or Underground Work

Service Testers & fault locators

Primary URD Fault Tester

Derrick truck kelly bar & anchor

URD trailer

3. Actual Costs

The budget amount for 2025 is based on 3 yrs historical actuals and aligns with the 2024 budget for $1,056,000

Project Name	2021 Actuals	2022 Actuals	2023 Actual
UI - Gen Equipment - OPS-TD	$490,060	$512,659	$1,056,749

4. Budget Forecast

Work Type	2025	2026	2027	2028
Tools/Equipment/PPE	$1,212,736	$1,088,914	$1,103,580	$1,109,873
Total	$1,212,736	$1,088,914	$1,103,580	$1,109,873

5. Project Assumptions

The budget for this program is based on historical actuals and adjusted based upon specific needs . The majority of this program costs are for investment in tool for the trade not part of other projects.. The Company will execute this program to support improvements for worker ergonomics, reduce injuries and improve safety based on demand and allocate funds to or from other programs as necessary.

PRJ-003548

Derby Jct to Ansonia

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Charter

Derby Jct to Ansonia

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-003548	Electric Distribution	Logan, Zachary	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Projects	Operations	IP4 Change	Mar 2024	Sep 2025

Project description:

As part of recent asset condition studies, UI conducted inspections and analyses of the three 115-kV lines along the Derby Junction – Ansonia ROW. These analyses included evaluations of conductor tensile strength; thermal-mechanical cycling and combined mechanical-electrical test of insulators; and climbing, visual inspections, mechanical loading, and conductor sway simulations of the existing structures. UI's evaluations found that the copper conductors, which exhibited reductions in tensile strength, are at the end of their useful life, and the insulators demonstrated certain electrical failures. As a result, UI determined that all three of the lines would require new conductor, shield wire, and Optical Ground Wire (OPGW), as well as new insulators.

After determining that the lines must be reconductored and reinsulated, UI analyzed the integrity of 36 existing transmission line structures to assess whether these structures could support the mechanical loading associated with the new conductors, shield wire, and OPGW, while still conforming to present electrical standards and conductor clearance requirements. These investigations concluded that a majority of the existing structures could not support the additional structural loads associated with the reconductoring and that the 2017 NESC conductor clearance requirements could not be met. Therefore, UI determined that a complete rebuild of the 115-kV lines is required.

Specifically, the distribution work planned for 2025 is to relocate the distribution overhead lines in Ansonia back to theirr original location. This includes the distribution wires atWakelee Ave; Roosevelt Drive; and Hawthorne Ave in Ansonia.

Project Scope:

- Rebuild the 115-kV lines on 40 new self-supporting steel monopoles (24 double-circuit monopoles and 16 single-circuit monopoles) and remove all old lattice towers.
- Replace the existing 4/0 copper conductor with 795 kcmil 26/7 aluminum conductor steel reinforced (ACSR) "DRAKE" conductor, 7 No. 7 Alumoweld Shieldwire, and install OPGW DNO-12503 (96 fiber) between Derby Junction and Indian Well Substation (to maintain continuity with Eversource's OPGW to which UI's 115-kV lines will connect) and DNO-11467 OPGW (72 fiber) between Indian Well Substation and Ansonia Substation. For the Housatonic River crossing (between Structures 359 and 360), UI will use 19 No. 8 Alumoweld Shieldwire and DNO-12503-OPGW (96 fiber).

Specifically, the distribution work planned for 2025 is to relocate the distribution overhead lines in Ansonia back to their original location. This includes the distribution wires at Wakelee Ave; Roosevelt Drive; and Hawthorne Ave in Ansonia.

Project Benefits:

The benefits of relocating the distribution wires for this project include accommodating the space so that the 115kV transmission line from Derby Junction-Ansonia substation can be upgraded. This aids to bring the electric grid up to current standards and replace outdated equipment. This benefit allows the electric grid to have new conductors, shield wire, and OPGW in the current electrical standards.

Project Risks and Mitigation Plan:

The top risks associated with the project is scheduling the distribution and coordinating the construction work.
This risk will impact the project timeline, budget, and quality minimally. This work is to tie the distribution wire back to its original location after the transmission line project work is completed.

The prevention measures that can be implemented to mitigate these risks include excellent communication between the transmission line and distribution line construction team.The contingency plan that can be put in place in case primary mitigations strategies fail is to ensure that there are propoer accounting channels and scheduling for the distribution work, and well as excellent communication for managing and scheduling this work, including field meetings.

Risk of No Action:

If this project is not undertaken to relocate the distribution wire from their temporary location back to their original location, the consequences are that the system will be left with a lesser integrity and work clearances for safety could be reduced. There are safety implications of not proceeding with the project due to this. The potential financial impact, including costs associated with delays or failure to proceed would mean increasing overheads and rates due to doing the work later.

Project Alternatives:

The solution alternatives being considered are to avoid relocating the distribution lines back. This may be able to be done in certain segments if the new locations meet the same integrity and clearance requirements. The cost estimate for not relocating them back would be nothing. If this is able to be done, the project will do this alternative, but this is not expected to be able to be done based on the space and specific streets.

Basis for Project Estimates

The basis for estimation for the distribution relocation of the distribution wires back to their original location is based upon the cost of the original distribution relocation completed in 2024 to move the wires originally out of the way of the transmission line project.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 64**	$ 11	$ 54	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 298**	$ -	$ 298	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 95**	$ 95	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 69**	$ 43	$ 26	$ -	$ -	$ -
# Materials	**$ 39**	$ 39	$ -	$ -	$ -	$ -
# Overheads - External	**$ 108**	$ 71	$ 37	$ -	$ -	$ -
Total	**$ 673**	**$ 259**	**$ 415**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 1,215	$ -	$ 1,215	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

Project Name: Derby Junction to Ansonia Substation Transmission Line Upgrade
SAP Project Number: 801594; 801893

Engineering Charter			
Date:	2/28/2020	**Project Manager:**	Hallie Friedman

Description of Engineering Work	**Business Need**
This Engineering charter involves the creation of engineering deliverables for the Derby Junction to Ansonia Substation Transmission Line Upgrades. These transmission line sections run from Derby Junction to Indian Well and to Ansonia substations. The project will upgrade these sections of 115kV transmission line, including re-conductoring, upgrading insulators, and installing several steel monopoles to maintain right-of-way clearances. The engineering will be carried out by an appointed engineering firm who will produce 30%, 70%, IFB, IFC Engineering Packages. Full details of the key deliverables are detailed in the deliverables section of this charter. Full charter will be undertaken after Issue for Construction (IFC) Drawings May 2021. The budget for this engineering charter includes all costs of project until May 2021, including engineering, labor, real estate preparation work, legal, and permitting efforts.	▪ A detailed analysis of United Illuminating's (UI) transmission assets from Derby Junction in Shelton, CT to Ansonia substation in Ansonia, CT was performed to determine the health of the assets after over 50 years in service for the conductors and hardware and over 80 years for the structures. To determine the overall condition of the assets, visual inspections, both ground level and aerial, were performed along with lab testing of conductor and insulators samples taken from the lines. ▪ The results of the study have shown that while the structures are not overstressed based on applicable code loadings, the conductors have shown loss of tensile strength while, and insulators have shown signs of deglazing and mechanical failure below their rated strength. ▪ Following the study, an alternatives analysis was performed to determine the best solution to address the conductor and insulator issues discovered. ▪ This project was presented to and approved by the Planning Advisory Committee (PAC) Oct 24, 2019 ○ The project presented 3 solutions to the PAC, the other 2 solutions included upgrading the structures (Double circuit towers or single circuit towers with 795kcmil ACSS), the PAC agreed with UI's preferred solution: replace existing hardware, reconductor the existing lines, perform structure modifications and install 8 new monopoles in between strcts ▪ Please see study white paper attachment, and PAC presentation: Ansonia_Derby_White Paper.docx Ansonia-Derby Jct Replacement_201910

Project Name: Derby Junction to Ansonia Substation Transmission Line Upgrade
SAP Project Number: 801594; 801893

Objectives of Engineering Work	Scope
The objective is a complete detailed engineering design to move on to the next critical steps of the project. This includes: ▪ The 30%, 70%, 90% and IFC Design Packages for the rebuild of the 115kV Transmission Line from Derby Junction to Ansonia Substation These design packages are key defined milestones in the Engineering Firm contract to support timely delivery of: ▪ CSC Application* Q1 2021 to Q1 2022 ▪ Property Acquisition** Q1 2022 to Q2 2023 ▪ ITT Long lead & construction Q2 2021 to Q4 2022 ▪ Construction start Q3 2023 *CSC Application will be filed for the project to aid real estate acquisition and any condemnations. **Timely property acquisition is a key lesson from previous projects to ensure all real estate temporary and permanent easements are in place ahead of the construction and removals.).	• This 115kV transmission line rebuild project consists of reconductoring the lines, replacing insulators and related hardware, structure modifications & installing 8 new steel monopoles along approximately 8.2 circuit miles of overhead transmission lines to meet electrical safety codes. • Project will use 300 kcmil ACSR conductor due to similar physical and electrical characteristics • Project will replace existing shield wire with Optical Ground Wire (OPGW) • Shall do full real estate and permitting activities as described in deliverables (UI does not have full access rights in current real estate agreements)

Project Name: Derby Junction to Ansonia Substation Transmission Line Upgrade
SAP Project Number: 801594; 801893

Engineering Charter

Deliverables	Project Milestones
30% Submittal • Design Criteria Document – IFR • LIDAR Survey – IFU • Cost Estimation at +-25% – IFR • Design Criteria Document – IFU • Plan and Profile Drawings - IFR • PLS-CADD Model – IFR • PLS-Pole and PLS-Tower Models – IFR • Draft material list– IFR • Soil investigation– IFU • Preliminary foundation type– IFR • Preliminary analysis of total "site disturbance" acres– IFU • Additional total acreage impact calculation– IFU • Structure drawings including load table– IFR • Access drawings– IFR • Phasing diagram– IFR • Key Map– IFR • Draft Compatible Unit Spreadsheet– IFR • Cross section drawings– IFR 70% Submittal • Base Map – IFR • Civil Construction Plans – IFR • Compatible Unit Spreadsheet – IFR • Cost Estimation +-10% – IFU • Construction Sequence Plan – IFR • Construction Outage Plan – IFR • Construction Specification – IFR • Crossing Detail Drawings – IFR	▪ Key Milestones ○ 30% Design Package Q3 2020 (Sept) ○ 70% Design Package Q4 2020 (Dec) ○ 90% Design Package Q1 2021 (Mar) ○ IFC Design Package Q2 2021 (May) ▪ Incl. Permitting requirements

Project Name: Derby Junction to Ansonia Substation Transmission Line Upgrade
SAP Project Number: 801594; 801893

• Electrical Calculations- Impedance – IFR • Material List – IFR • Plan and Profile Drawings – IFR • PLS-CADD Model – IFR • PLS-Pole and PLS-Tower Models – IFR • Removal Drawings – IFR • SEC Form – IFR • Specifications for Long Lead Time Materials – IFR • Structure Detail and Assembly Drawings – IFR • Structure List – IFR • Structure drawings including load table– IFR • Hardware Assemblies– IFR • Structure Offset drawings– IFR • Access drawings– IFR • Phasing diagram– IFR • Sag tension charts– IFR • Foundation Detailed drawings– IFR • Conductor and OPGW damper assembly drawings – IFR • Cross bonding drawings as necessary– IFR • OPGW routing into substation, and patch panel location (Drawings as necessary) – IFR • Aeolian vibration report and Damper design verification– IFR 90% Submittal • Base Map – IFB • Civil Construction Plans – IFB • Compatible Unit Spreadsheet – IFU • Construction Sequence Plan – IFB • Construction Specification – IFB • Crossing Detail Drawings – IFB • Electrical Calculations – IFU • Material List – IFB • Plan and Profile Drawings – IFB • PLS-CADD Model – IFR	

Project Name: Derby Junction to Ansonia Substation Transmission Line Upgrade
SAP Project Number: 801594; 801893

• PLS-Pole and PLS-Tower Models – IFR • Removal Drawings – IFB • SEC Form – IFU • Specifications for Long Lead Time Materials – IFB • Structure Detail and Assembly Drawings – IFB • Structure List – IFB • Structure drawings including load table– IFB • Hardware Assemblies– IFB • Structure Offset drawings– IFR • Access drawings– IFU • Phasing diagram– IFU • Sag tension charts– IFR • Foundation Detailed drawings– IFB • Conductor and OPGW damper assembly drawings– IFB • Cross bonding drawings as necessary– IFR • OPGW routing into substation, and patch panel location (Drawings as necessary) – IFR • Aeolian vibration report and Damper design verification– IFU • Outage plan– IFU 100% Submittal • Base Map – IFC • Civil Construction Plans – IFC • Construction Sequence Plan – IFC • Construction Specification – IFC • Crossing Detail Drawings – IFC • Material List – IFC • Plan and Profile Drawings – IFC • PLS-CADD Model – IFR • PLS-Pole and PLS-Tower Models – IFR • Removal Drawings – IFC • Structure Detail and Assembly Drawings – IFC • Structure List – IFC • Structure drawings including load table	

Project Name: Derby Junction to Ansonia Substation Transmission Line Upgrade
SAP Project Number: 801594; 801893

• Hardware Assemblies– IFC • Structure Offset drawings– IFC • Access drawings– IFC • Phasing diagram– IFC • Sag tension– IFC • Stringing Chart– IFC • Foundation Detailed drawings– IFC • Conductor and OPGW damper assembly drawings– IFC • Cross bonding drawings as necessary– IFC • OPGW routing into substation, and patch panel location (Drawings as necessary) – IFC • Aeolian vibration report and Damper design verification– IFU • Construction Charts– IFC • Outage plan– IFU • Existing drawing revisions– IFR ▪ Permitting ▪ Environmental Control Measures drawings ▪ Technical support for permitting ▪ Technical support for CT Siting Council Application o Input for EMF calculations o 3D models for project photo renderings o Site meetings with CSC or Municipal stakeholders o Participation in CSC hearing(s) o Input in CSC interrogatories o Municipal open house meetings (at least 1 meeting per municipality) o Real estate inputs and survey needs	

Project Name: Derby Junction to Ansonia Substation Transmission Line Upgrade
SAP Project Number: 801594; 801893

Cost Summary		Pre-2020 Actuals	2020	2021	Total
CAP	UIL Resources	82,075	68,315	46,069	196,459
	External Resources	519,412	594,441	421,539	1,535,392
	Materials-Inventory		-	-	-
	Materials-Direct Purchase		-	-	-
	Other (Permitting)		-	-	-
	Contingency		-	50,000	50,000
	Total				-
O&M	UIL Resources	-	-	-	-
	External Resources	-	-	-	-
	Materials-Inventory	-	-	-	-
	Materials-Direct Purchase	-	-	-	-
	Other	-	-	-	-
	Contingency				-
	Total	-	-	-	-
COR	UIL Resources	-	-	-	-
	External Resources	-	-	-	-
	Materials-Inventory	-	-	-	-
	Materials-Direct Purchase	-	-	-	-
	Other	-	-	-	-
	Contingency				-
	Total	-	-	-	-
Total Directs	UIL Resources	82,075	68,315	46,069	196,459
	External Resources	519,412	594,441	421,539	1,535,392
	Materials-Inventory	-	-	-	-
	Materials-Direct Purchase	-	-	-	-
	Other (Permitting)	-	-	-	-
	Contingency	-	-	50,000	50,000
	Indirect CAP*	170,660	94,792	74,032	339,484
	Indirect OM*				-
	Indirect COR*				-
Total Direct		601,487	662,756	517,608	1,781,851
Total Indirects		170,660	94,792	74,032	339,484
Total		772,147	757,547	591,640	2,121,335

Project Name: Derby Junction to Ansonia Substation Transmission Line Upgrade
SAP Project Number: 801594; 801893

Cost Estimate	$ 1,349,187
Total	$ 2,121,335

Authorization	Name	Signature	Signature Date
Project Manager	Hallie Friedman	Hallie Friedman Hallie Friedman (Mar 5, 2020)	Mar 5, 2020
Director of PM	Michal Bartczak		Mar 9, 2020
Sponsor	Ed Roedel	Edward A Roedel Edward A Roedel (Mar 5, 2020)	Mar 5, 2020
VP, Business Area	Jim Cole	James A Cole James A. Cole (Mar 9, 2020)	Mar 9, 2020
Dir. Technical Services	Alfonso Mugueta		Mar 6, 2020
Investment Planning Review	Mary Lou Palmeri		Mar 31, 2020
VP Asset Management & Planning	Chris Bilcheck	Christian Bilcheck Christian Bilcheck (Mar 31, 2020)	Mar 31, 2020

PRJ-002099

UI - Dist Line CAP

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Report

UI - Dist Line CAP

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002099	Electric Distribution	Mitchell, John	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Electric Operations	Operations	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:
Electric Distribution System corrective/reactive work.

Project Scope:
This is an on-going program which includes all overhead and underground distribution system work for customer connections, emergency repairs, corrective/reactive work, customer restoration resulting from failures, compliance work to meet company standards of construction, reliability improvements for red circuits and work related to replacing items found during infrared inspections, and all minor storm work. Types of work include, pole replacements, NESC adjustments, cable faults, equipment failure, and damage to electric system plant. The source of this work comes from customer requests, trouble calls, outages, emergency response, damage to electric infrastructure, preventive maintenance inspections and field inspections to meet standards and compliance. The budget is based on historical actual costs.

Project Benefits:
Ensures a safe and reliable electric distribution system by maintaining the infrastructure and performing maintenance and restoration activities.
1. Maintain safety for the public and utility workers.
2. Maintain system reliability and integrity.

Project Risks and Mitigation Plan:
Sourcing of materials is a risk (Txfs, Poles, Wire and associated materials) has been limited by supply chain and lead times have significantly increased for certain items.
While this program is corrective/reactive in nature and limited to planning alternatives, the first priority is to restore customers first.
Any temporary repairs are sent to engineering for follow-up to ensure permanent repairs are made to current construction standards and adherence to industry codes.

Risk of No Action:
The consequences of not undertaking this project will lead to system abnormal conditions and unsafe conditions for the public and workforce. Leaving failed equipment, broken poles, failed cable and non-standard construction will have a negative impact on reliability and lead to legal and regulatory scrutiny. Connecting customers and ensuring reliable service is our fundamental goal; taking no action to restore customers after equipment failure or MVA is not an option. Delayed or non-execution of customer restoration could result in fines, penalties and reputation damage.

Project Alternatives:
Since this project is corrective/reactive in nature there are minimal alternatives to restore customers and the system to normal operation. With each event, temporary and/or permanent actions are taken to restore customers as quickly as possible. The alternatives considered for this project are temporary, i.e. a broken pole can possibly be braced and made safe until next day for a schedule replacement. When an underground cable fails load can be transferred to a back up circuit temporarily until permanent repairs can be made.

Basis for Project Estimates

The budget for this program is based on historical average costs and adjused based on the forecasted volumes of corrective/reactive work types (Pole replacements, OH/UG Infrastructure repairs, NESC compliance, trouble related follow up work).

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 635**	$ 635	$ -	$ -	$ -	$ -
# CIAC	**$ -50**	$ -50	$ -	$ -	$ -	$ -
# External Services	**$ 27,374**	$ 1,074	$ 6,500	$ 6,600	$ 6,600	$ 6,600
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 6,305**	$ 6,305	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ 4,486**	$ 2,171	$ 572	$ 581	$ 581	$ 581
# Materials	**$ 1,907**	$ 1,907	$ -	$ -	$ -	$ -
# Overheads - External	**$ 7,183**	$ 3,877	$ 817	$ 830	$ 830	$ 830
Total	**$ 47,841**	**$ 15,920**	**$ 7,889**	**$ 8,011**	**$ 8,011**	**$ 8,011**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 44,099	$ 12,178	$ 7,889	$ 8,011	$ 8,011	$ 8,011

Note: 2024 Plant Additions includes the entire calendar year

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UI- Dist Line CAP

All Towns

WBS: UI-U0219

10/2/24

Distribution Engineering

Index

1. Program Description 3
2. Scope 3
3. Benefit 3
4. Work Type 3
5. Engineering 4
6. Budget 5

1. Program Description

Electric Distribution System corrective/reactive work.

2. Scope

This is an on-going program which includes all overhead and underground distribution system work for emergency repairs, maintenance, corrective/reactive work, customer restoration, compliance work to meet company standards of construction and reliability improvements.

All work done under this program is corrective/reactive in nature. The source of this work comes from customer requests, trouble calls, outages, emergency response, damage to electric infrastructure, preventive maintenance inspections and field inspections to meet standards and compliance. The budget is based on historical average actual costs.

3. Benefit

Ensures a safe and reliable electric distribution system by maintaining the infrastructure and performing maintenance and restoration activities.

- Maintain safety for the public and utility workers.
- Maintain system reliability and integrity.

4. Work Type

- Emergency Work: Emergency work is completed in the field using a general construction order. The crew uses the EWT to capture the work that was completed, then a notification is created in SAP, then a construction order is created (Reverse Engineered) to capture the labor and material used for the functional location. Emergency Work Types:
    - Transformer, Cutout, ABS, equipment replacement
    - Pole, Guy wire, Anchor replacement
    - URD Failure, electrical and civil work
    - Primary, Secondary and/or Service repairs, replace and shifting
    - MVA: The process for Motor vehicle accidents is the same as the EWT process. Poles, wires, equipment is replaced as needed to restore the asset(s) to normal operation.

- ADMS Referral: Trouble calls are received and dispatched to the Line Restoration Leaders, who in turn correct the abnormal conditions but may have other work that is required. An ADMS referral is sent to the business areas to address an abnormal condition that is beyond the scope of work of original trouble call. This includes wires (primary, secondary, service) guy/anchor, equipment and pole hardware to restore the infrastructure to normal.
- NESC: The Company utilized design standards and complies with the National Electric Safety Code when engineering and constructing the electric system infrastructure. Upgrade, repair and replacement of wire, poles, and equipment to correct NESC non-compliance issues.
- DPNP: Pole replacements for customer driven work
- Feeder Cable Faults: When aeriel and/or underground cable fails crews perform restoration of the feeder through swithing to isolate the failed section of cable. Crews perform fault locating tests to find the faulted section then work to replace the cable to restore to normal operation.
- Damage to Electric System Plant: All work required to repair/replace damages to assets by third party
- Voltage Complaint: All troubleshooting and system work to find and correct the abnormal service condition.

5. Engineering

Examples:

NESC Compliance:

Replace 40 ft pole with 45 ft Class 3 pole. Install a new service carrying pole to correct the NESC clearance for service overtop a roof. Requires replacement 2 poles, transformer power bank, 3C-4/0 Service and secondary reconductoring.

Voltage Complaint:

Customer was experiencing intermintent surges and low voltage. Troubleshooting tasks identified overload condition. Created new single phase tap with installation of 2 poles, primary wire, transformer and secondary wire replacement.

6. Budget

The 3 year (2021-2023) average costs for this project is $15,014,998

The table shows work type breakdown with actual costs for 2023.

WORK TYPE	Jobs	AVE COST	2023
ADMS/OMS/REFERRAL/VOLTAGE	343	$2,522	$865,296
DPNP/POLEHOLD/PRCD	38	$5,233	$171,141
DER	34	$2,979	$26,327
EWT	2811	$3,106	$8,732,378
FTRPL/F/T/3P	63	$4,927	$310,406
MAKEREADY	92	$6,499	$597,960
MVA/POLEHIT	833	$3,700	$3,074,166
RELI/RELIAB/WPC/IR/NESC/HSPOT	80	$6,313	$505,064
SVC/REP/DEMO	69	$1,688	$116,474
STLT	3	$1,043	$3,264
URD/CIVIL	42	$4,195	$176,191
MISC WORK	276	$408	$102,946

The forecast is based on historical average costs and adjused based on the forecasted volumes of corrective/reactive work types (Pole replacements, OH/UG Infrastructure repairs, NESC compliance, trouble related follow up work).

Budget Forecast 2025 – 2028:

Work Type	2025	2026	2027	2028
ADMS/OMS/ REFERRAL/VOLTAGE	473,359	480,642	480,642	480,642
DPNP/POLEHOLD/ PRCD	94,671	96,128	96,128	96,128
DER	78,893	80,107	80,107	80,107
EWT	4,654,702	4,726,313	4,726,313	4,726,313
FTRPL/F/T/3P	157,786	160,214	160,214	160,214
MAKE READY	315,573	320,428	320,428	320,428
MVA/POLEHIT	1,656,758	1,682,247	1,682,247	1,682,247
RELI/RELIAB/WPC/ IR/NESC/HSPOT	236,679	240,321	240,321	240,321
SVC/REP/DEMO	63,114	64,085	64,085	64,085
URD/CIVIL	94,671	96,128	96,128	96,128
MISC WORK	55,225	56,074	56,074	56,074
TOTAL	**7,889,327**	**8,010,701**	**8,010,701**	**8,010,701**

PRJ-005836

UI Rate Design – Time of Use Rate Structure Phase 1

Sections

1. Project Summary

UI Rate Design - Time of Use Rate Structure Phase 1

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005836	Common	Bartczak, Mike	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Customer Service	Compliance & Safety	IP1 Originate	Sep 2024	Jun 2025

Project description:

In the next rate case, UI is required by PURA to be able to adjust the time-of-use ("TOU") and seasonal periods used for billing. The SAP billing system currently bills on energy (kWh) and demand (kW) register reads consisting of either two (peak and off-peak) or three (peak, shoulder, and off-peak) daily TOU periods and two seasons (summer and winter). Currently, the meter data management system ("MDMS") sends data to the SAP billing engine as register reads corresponding to the appropriate daily TOU periods and seasons. Today, the register read amounts are recorded at the meter, then sent to the MDMS, and finally sent to SAP from the MDMS.

Changing the TOU and seasonal periods for a meter installed in the field can only be done today by either reprogramming that meter physically at its location or exchanging that meter for one with the new TOU and seasonal periods programmed into it at the metering office. There is no way to reprogram the meter over the air. Therefore, changing the existing TOU and seasonal periods to new periods cannot feasibly be done because that would require either visiting each meter to reprogram it in the field, or exchanging each meter with a new meter. There are over 340,000 meters deployed, so either option will cost tens of millions of dollars to complete.

There are two basic feasible approaches the Company can take to change TOU and seasonal periods. One approach is to reconfigure the MDMS to calculate the register reads based on the 15-minute interval data each meter sends to the MDMS daily. The other approach is to reconfigure SAP to accept the 15-minute interval data from the MDMS and to calculate the register reads in the billing engine. Both options will require extensive modifications to the respective existing systems. The Company does not have the expertise to determine which option is better, or if there are other options available.

For the former option, the Company recently asked its metering and MDMS vendor, Landis+Gyr ("L+G"), to estimate the cost and time required to determine the register read values in the MDMS and send those register values to the SAP billing engine. Landis+Gyr expects that it will take a few months to develop a proposal to do this but has given no certain date by which to provide UI with this information.

For the latter option, the Avangrid Technical Support & Solutions team put together the following high-level proposal.

Both options will be expensive and take considerable time to implement. However, UI cannot by itself determine which option is preferable or what the costs and time required may be. For the requirements to file a new rate case that were ordered by PURA in UI's last rate case, Docket No. 22-08-08, we can produce the necessary analyses regarding TOU and seasonal periods to comply with the new filing requirements. However, it may be long after the final decision in the next rate case before UI can implement new TOU and seasonal periods.

Project Scope:

Scope for Phase 1:

- Issue an RFP for engaging a system integrator (SI) to evaluate existing suite of applications – e.g., SAP, MDMS, BW, system capabilities, meter-to-cash process, etc.
- The SI, with appropriate Company support, will develop a proposal, including resources, timeline and budget, for achieving the TOU and interval-based system enhancements
- Estimate of time for development of proposal: 37-45 weeks

Prepare a full system(s) assessment formatted in an accurate, timely and comprehensive document that will serve as a foundation for expansion by the incoming system integrator.

Collaborate with procurement to issue a meticulously drafted RFP that includes:

- Project scope
- Requirements
- Project schedule
- Testing strategy
- Cut over plan
- Hyper Care plan
- Strict legal language aligning project deliverables to payment structure,
- Severe SLAs

Project Benefits:
PURA requirement. This project is necessary for regulatory compliance and to determine the next steps for implementing Time of Use enhancements.

Project Risks and Mitigation Plan:
August 25, 2023 Final Decision in Docket 22-08-08 set forth several directives regarding the Embedded Cost Study (ECOS) and Rate Design that UI must address in its next distribution rate filing. One of the items here is Time Of Use Rates (TOU) - Propose new TOU periods and Propose Seasonality in all rate components.
In order to be in compliance with this, we need to invest in the Assessment Of implementing the TOU Rates.

Risk of No Action:
Severe penalities potentially resulting in a lower ROI in the upcoming UI rate case.

Project Alternatives:
Due to the nature and complexity of the SAP Billing System enhancements, we cannot design or implement any alternate solutions. The only possible alternate solution would be performing manual billing outside of the SAP Billing System. This would require a tremendous resource pool to calculate and create manual bills which would introduce the risk of manual errors, delayed bills, delays in payment collection thus impacting company's abilty to collect the monies, increased complaints to PURA, etc.

Basis for Project Estimates
Estimates are based on projected number of contracted and internal labor hours to complete these efforts based on historical efforts of similar scope and complexity multiplied by assumed hourly rates.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ -**	$ -	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 370**	$ 79	$ 291	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 520**	$ 160	$ 360	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 891**	**$ 239**	**$ 651**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 651	$ -	$ 651	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

PRJ-003947

Rider LIDR

Sections

1. Project Summary

Rider LIDR

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-003947	Common	Bartczak, Mike	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Customer Service	Compliance & Safety	IP4 Change	Jan 2024	Dec 2024

Project description:

To comply with directives within Docket No. 17-12-03RE11, PURA Investigation into Distribution System Planning of Electric Distribution Companies – New Rate Designs and Rates Review.

Project Scope:

Enhancements to SAP ERP/CRM systems are required to implement new Low-Income Discounted Rates (LIDR) and automate the identification and enrollment of eligible customers through data file exchanges with state assistance agencies / programs (e.g., Community Action Agencies / Department of Social Services, Federal Fuel Assistance, etc.) along with implementing an automated annual recertification of elgibility for existing participating customers requiring various SAP correspondence letters. Automated removal from the LIDR if/when the customer fails to recertify eligibility for the program.

Project Benefits:

As this is a mandated program, some implementation costs are recoverable. The Authority directs UI to submit their incurred costs associated with the implementation of a LIDR in a given calendar year they believe to be prudently incurred into the subsequent year's annual review of the Revenue Adjustment Mechanisms (RAM) proceeding (e.g., costs incurred in 2023 shall be submitted into the 2024 RAM proceeding, etc.). All costs shall be reconciled through the SBC and included as separate line items in the corresponding RAM exhibits (i.e., discount provided vs. LIDR design IT costs vs. administration costs, etc.). In addition, the Authority directs UI to quantify and include a narrative explanation of any variance of the annual SBC net expenses (e.g., hardship uncollectibles, MPP, etc.) that may be impacted by the establishment of a LIDR in their respective RAM proceeding(s).

To demonstrate prudency in their annual RAM filings, UI will need to provide sufficiently detailed cost information and evidence to support the finding that all efforts were taken to minimize costs, including, but not limited to, evidence that: (1) reasonable competitive procurement processes were held, as applicable; (2) existing internal resources were leveraged to the extent possible; (3) investments in new resources were selected with current and future investments, programs, and public policies in mind; and (4) unnecessary costs were avoided. Out of an abundance of caution, the Authority is in no way pre-approving the IT and administrative costs to implement the LIDR as described herein; as discussed above, the approval of any implementation costs will be done through the appropriate RAM proceedings.

With respect to the cost allocation methodology among rate classes through the SBC, the Authority concludes there is insufficient record evidence to date, and that cost allocation is more appropriately considered within the broader context of a rate case proceeding.

Project Risks and Mitigation Plan:
Implementation of the UI Low-Income Disount Rate (LIDR) was mandated by the CT Public Utility Regulatory Authority (PURA) in which the Company could be subject to fines and penalties for failing to implement the new LIDR by the implementation date which was pre-determined by PURA. Many elements of the LIDR program design were pending a PURA decision up to two months prior to the planned LIDR go-live. To mitigate this risk, the project team was able to prioritize development items that had to be completed for LIDR implementation and other items that could be implemented post go-live. Some changes also had dependencies on external state agencies that also needed to make system changes to support data shared between the agency and the company. This is an example of one item that was able to be delivered post LIDR go-live. The LIDR project also had to manage dependencies with other reguatory driven projects (e.g., the UIL Bill Redesign project) with the same implementation date which was later delayed and allowed the LIDR to proceed on schedule.

Risk of No Action:
No action could have caused a delay to the project implementation schedule and potential fines or penalties as a result.

Project Alternatives:
Analysis of development items in scope was completed to determine the priority order and/or sequence in which various elements of the new LIDR program would or could be implemented. This approach was followed which allowed the LIDR to be implemented on time and subsequent development items were implemented on time for key milestone requirements (e.g., budget payment plans calculated with the new LIDR were implemented prior to the timing of the 6-month recalculation of budgets, implementation of the annual LIDR renewal program was implemented post go-live prior to timing of when first LIDR renewal would be required, etc.). Managing the project deliverables with agile project methodology enabled a successful implementation.

Basis for Project Estimates
Project cost and timeline estimates were determined from estimates provided by vendors supporting the project, that were based on the project scope, complexity of development for the objects in scope, along with the cost estimates for internal resource labor working on the project. Additional costs were incurred due to the late decisions by PURA that increased the scope and timeline that carried over to 2024.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 32**	$ 32	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 143**	$ 143	$ -	$ -	$ -	$ -
# Internal - Non-AC	**$ 74**	$ 74	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 127**	$ 127	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 375**	**$ 375**	**$ -**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 905	$ 905	$ -	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

PRJ-003872

Security ASD-UI

Sections

1. Project Summary

Security ASD-UI

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-003872	Common	Hicks, Roger	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Security	Compliance & Safety	IP1 Originate	Ongoing	Dec 2024

Project description:
Security work to be completed at various facilities to continue implementing the ASD/Security System program. Work includes security system design, the installation or upgrade of security systems, last-mile fiber connection of the site to the new fiber telecom network and telecom equipment for that connection. Security systems to be installed are based on a security tier the facility is placed based on risk. Tier 1 and 2 facilities (e.g., bulk substation) receive card access control systems, PA systems, video surveillance, video analystics and thermal cameras (Tier 1 also receive additional physical hardening due to critical nature). Tier 3 facilities (e.g., large office/service center, cash office, hydro) receive card access control systems, video surveillance and video analystics. Tier 4 facilities (e.g., small offices, store yards) receive card access control systems and video surveillance.

Project Scope:
Historical dossier document available if needed please contact Dwight Tolliver. Security capital - *NERC CIP 006 R1-R8 mandates physical security measures. Program includes the following WBS: UW-CSSD1, UW-CSSD2, UW-CSSD3, UW-CSSD4, UW-CSSD5.

Provide a secure, reliable private network that exceeds NIST Cyber Security Standards and supports bandwidth for Avangrid future growth and innovation. Meeting this goal will allow AVANGRID to comply with the regulatory obligations including the NERC CIP (North American Electric Reliability Corporation - Critical Infrastructure Protection) Standards and other standards at the federal and state levels.

Project Benefits:
Compliance with NERC CIP, FERC, DHS and other security requirements; security of personnel and asset protection.

The ASD, as a privately owned Avangrid network, will allow the company to retire many legacy circuits that are leased through third-parties

Financial: The ASD, as a privately owned Avangrid network, will allow the company to retire many legacy circuits that are leased through third-parties under OPEX. The timing of the retirement of these circuits will be based on the expansion of the ASD. Likewise, future smart grids projects would require more of these OPEX intensive circuits if not for the ASD. OPEX savings due to the retirement of the third-party circuits is still being assessed, but it is estimated to offset the cost to staff, operate and maintain the ASD, resulting in a net savings between 2020 and 2025 of well over $10 million.

Non-Financial: The AVANGRID ASD Program will also have a further series of qualitative benefits, primarily in connection with company risk reduction or synergies with other company business areas. Reduction in regulatory, financial and reputational risks for company assets and employees as the protection level increases, reducing the risk of theft, vandalism and other potential security incidents. Improvements in the communications network and increased bandwidth will benefit IT (Information Technology) and OT (Operating Technology) areas, helping them run current and future applications (e.g., Operational Smart Grid technology).

Project Risks and Mitigation Plan:
Potential risks of this project are financial, physical, and reputational. FERC (Federal Energy Regulatory Commission) / NERC (North American Electric Reliability Corporation) is a prime example, as it applies to Networks and businesses, and is capable of levying fines of $1 million/day for a standard compliance violation. Not continuing to upgrade the systems in place would open the companies up to potenitial physical and cyber attackes as threat actors become more educated and equip themselves with enhanced tools for breaches. Such breaches has a potential to cause damage to the reputation of Avangrid with FERC, NERC, DHS and other Government organizations, and the public.

Risk of No Action:
Failure to implement the ASD Program would expose AVANGRID to significant security, regulatory, reputational and financial risks. To date, federal and state regulators have shown strong support for the ASD Program and moving forward is recommended based on state regulatory orders on the importance of security.

In addition to compliance with regulatory requirements, the purpose of this program includes reducing the risks of theft and vandalism at Company facilities, and protecting our employees by attaining efficiencies and synergies through the standardization of security systems. Government agencies warn that there is a greater possibility of cyberattacks against critical infrastructure in the near future. As a consequence, there is a risk that traditional cyber security systems don't have sufficient protection capacity. The ASD provides the infrastructure for Avangrid to securely manage and protect our most critical operations and assets.

Delayed or non-execution of the critical asset protection could result in fines, penalties and reputation damage. FERC (Federal Energy Regulatory Commission) / NERC (North American Electric Reliability Corporation) is a prime example, as it applies to Networks and Renewables businesses, and is capable of levying fines of $1 million/day for a standard compliance violation

Project Alternatives:
A potential alternative to not completing the full program would be to reduce the scope into smaller Phases. The projects can be broken out to site surveys. Then move on to the design. Finally completing the installation if the proposed equipment. Another alternative would be to break the project down by facility type. The top Tier facilities would be completed first followed by lower tiered locations. Third option would be to keep the existing infrastructure, systems, and security equipment currently deployed. If a site does not have security installed it would not receive any modifications.

There is no Pro to not continuing the program. The Cons would be that the company would continue to be reliant on third-party network connectivity. The antiquated systems would remain in place and the Security Operations Center we would not have sufficient capabilities to monitor and respond to incidents as they occur.

It would be more cost effective to complete the project at one time because the same teams would have to mobilize and demobilize several times causing delays and increased costs to the overall program.

Basis for Project Estimates
The cost estimates are primarily based on external quotes, estimates, and current contracts. Corporate Security contracts a Project Management Office that creates estimates, creates, and manages the RFP process. PMO then evaluates the responses for accuracy.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 0**	$ 0	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ -119**	$ -119	$ -	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 6**	$ 6	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ 163**	$ 163	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 50**	**$ 50**	**$ -**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 50	$ 50	$ -	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

PRJ-004225

UI - Regulatory Driven Efforts

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Definition Document

UI - Regulatory Driven Efforts

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-004225	Common	Bartczak, Mike	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Customer Service	Compliance & Safety	IP4 Change	Program - Ongoing	Program - Ongoing

Project description:
Implement on-going billing and customer care system upgrades as required by regulators.

On an annual basis, there are anticipated regulatory requests which would require business, internal IT, and external Software Factory resources to develop and implement the system changes necessary.
The forecasted estimates are based on the expected developments required along with historical hours/costs of similar complexity for system changes.
This program covers the portion of the costs of these initiatives for the support that is required by the Technical Services & Support team.

Project Scope:
Scope for 2025:

This PDD is to cover any potential billing software changes resulting from the on-going UI Rate Case. The draft decision should be available in August 2024 for all the changes that will need to be implemented and delivered in 2025.

Anticipated items:
TOU – 22-08-08, 17-12-03RE02, future UI rate case
Economic Development Rate – 22-08-08
New Tier LIDR – 17-12-03RE11
EV Tariff - Medium to Heavy duty fleets (potential to use same structure as our current sliding scale) – 21-09-17
EV Tariff - Medium to Heavy duty fleet (KW charge for Distribution rest all kwh) – 21-09-17
Special Contract Rates - with individual customer's needs – 22-08-08, and future UI rate case

Project Benefits:
Regulatory and rate case compliance requirements. This budget is a placeholder for CAPEX funds that can be used for system upgrades to keep the business in compliance with Tariffs.

Project Risks and Mitigation Plan:
Impacts to various functional areas of the overall SAP Billing System, including but not limited to Billing and Rates, FICA/Credit and Collections, Retail Access, Device Management, Customer Service. Many Regulatory-required efforts are unknown at this time, as work/requirements are driven by PURA future efforts.
Additionally, lack of ability to deliver system enancements could result in being Out Of Compliance therefore being exposure to potential fines and penalities.

Since these Regulatory projects can entail enhancing the entire Customer Journey, in other words a customers Meter-2-Cash process, there is no manual solution possible, all our applications - AMI, MDMS interfaces, Device, Billing, Billprint will need to be enhanced in order to introduce these new Billing Regulations. Mitigation plans to avoid identified risks are to create a detailed schedule as soon as mandate is known, monitor and the schedule developing back up plans and allocating additional resources if needed.

Risk of No Action:
Potential administrative and financial penalties, reputational risk.

Project Alternatives:
Due to the nature and complexity of the SAP Billing System enhancments we cannot design or implement any alternate solutions. The only possible alternate solution would be performing manual billing outside of the SAP Billing System. This would require a tremendous resource pool to calculate and create manual bills, introduce risk of manual errors, delayed bills, delays in payment collection thus impacting company's abilty to collect the monies, increased complaints to PURA, etc.

Basis for Project Estimates
Estimates are based on projected number of contracted and internal labor hours to complete these efforts based on historical efforts of similar scope and complexity multiplied by assumed hourly rates.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 5**	$ 5	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 1,791**	$ 125	$ 407	$ 407	$ 420	$ 432
# Internal - Non-AC	**$ 21**	$ 21	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 857**	$ 165	$ 169	$ 169	$ 174	$ 179
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 2,673**	**$ 315**	**$ 576**	**$ 576**	**$ 594**	**$ 612**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 2,605	$ 247	$ 576	$ 576	$ 594	$ 612

Note: 2024 Plant Additions includes the entire calendar year

Project Definition

PDD Name - Following new Naming Convention*	Project Number - CS PMO Only	PDD Submitter*
PDD-AGR-NET-2025-CS-10-Regulatory Efforts-UIL		Shelina Mohammed

Business Area*	Business Portfolio Leader (CS Sr Team)	Business Process Director	Business Process Liaison (CS Functional Area Mgr)	CS PM	Number of Users*
NET APPS Networks Customer Service	Tracey Pelella Dan Canavan	N/A	Sabrina Hern Lisa Rosso Hanane Mark Marini Mark Colca	Srinivas Punati	20

CS Project Management Office (PMO)	CS Center of Excellence (COE) Lead	IT Area*	IT/OT*	PDD Initiative Type
Dave Harrington Roxxie Brochu	Shelina Mohammed	NET-APPS	N/A	Project (1 year)

Negative Revenue Adjustment (NRA) and/or Non-Compliance Penalties/Fees Risk	Project Type*	Classification of Investment*	Special recovery of costs (if applicable)
No direct ties to NRA's or clear monetary penalties defined - however items are tied to specific PURA orders and tariffs.	Apps – Business Funded Project	Mandatory Compliance	Potential Recovery possible through rate case

Requested Start Date*	Requested Delivery Date(s)*	Mandated by Statute or Regulatory Order (PURA/NERC/CIP)*	Identify the specific Statute or Order	Customers Affected by Project
2025-01-01	2025-12-31	Yes	Please see description for detail docket numbers	Common (el & gas)

Business Objectives/Goal of the Project*

The goal for this PDD is to, wherever possible, independantly deliver the Billing ONLY solution within the SAP System with the meter-2-cash customer journey. Please note: Cost estimates for Billing items have been broken into Core SAP Billing changes where billing automation can be independently delivered and Configuration Changes on the same PDD.

Description*

This PDD is to cover all known UIL Regulatory request where Billing automation can be independantly delivered.

This PDD is to cover any potential changes resulting from the on-going UI Rate Case. The draft decsion should be available sometime in August 2024 for all the changes that will need to be implemented and delivered in 2025
This PDD is also to cover any changes that will be a result of the potential CNG & SCG rate case. The draft decsion should be available sometime in August 2024 for all the changes that will need to be implemented and delivered in 2025
This PDD is to cover any potential enhancments for BG Regulatory changes

CNG & SCG - Energy Assistance Charge- New line item charge firm and transportation customer - proposal - potential - final decision 11/01/2024 with effective 04/01/2026
CNG & SCG - New LIDR Tariff - Applicable for firm and transportation customers (residential heating) - LIDR is proposed to become effective on 9/1/2025
Any new fees - CNG/SCG - Identify restoration fee - just G/L remapping
Non Rates charges - Lisa R

Justification*

Meet Regulatory requirements as mandated in rate case and PURA orders

Estimated Annual Benefits ($'s) & Benefit Description*
(Information related to benefits must be collected for all projects, despite the project purpose/justification)

N/A

Impact if this project does not get implemented

Regulatory impacts in terms of not being in compliance with the Tariffs
Potential Administrative & Financial penalties - General risk awareness

Dependencies with other Ideas and projects*

Will require changes to the UIL SAP Billing System, Bill print, FICA and SAP CRM among other areas. Nearly every item under Billing will require changes to Billing Master Data (BMD) which can conflict with other projects, such as CRM Front Office Improvements, CS BO Improvements, various other Regulatory projects refrenced on the High Level Req. tab

Comments: Include Issues, Risks, Constraints, Technical Solution thoughts, Problems and/or other considerations

PRJ-003280

Fire Protection

Sections

1. Project Summary

Fire Protection

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-003280	Common	Stevens, Mark	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Security	Compliance & Safety	IP3 Financial Execute	Ongoing	Dec 2024

Project description:

Project scope encompasses the installation of fire protection systems and equipment to achieve and maintain compliance with the Connecticut State Fire Prevention Code, Connecticut State Fire Code, and AVANGRID/UI internal standards using planned and budgeted capital and associated Outline Agreement fire protection vendor (OA 4600005175). Project objectives include life safety for employees and the public, ensuring business continuity through protection of assets from fire related emergencies, and business reputation.

Project Scope:

"Implement fire protection system at AGR United Illuminating (UI) locations in line with the AVANGRID Security Fire Protection Standards.
-Design fire extinguisher (FE) automation system.
-Install new FE automation infrastructure and hardware.
-Network to building fire alarm system to take advantage of Central Station Monitoring.
-Test and commission new system.
-Design new nitrogen generation and pressurization system.
-Install new nitrogen generation and pressurization system infrastructure and hardware.
-Network to building fire alarm system to take advantage of Central Station Monitoring.
-Test and commission new system
Fire protection system cost assumptions were derived from previous (P-2022 and P-2023) system program/ project actuals that are scaled/adjusted to reflect P-2024 program scope.

Project Benefits:

Implement fire protection standards and systems for AVANGRID UI Common locations to improve regulatory compliance with fire extinguisher inspection and maintenance requirements through the design and installation of an automation system. Also install nitrogen generation and pressurization systems to protect the pre-action and dry sprinkler piping from corrosion and system failure. Nitorgen Generation and Pressurization Systems are new technology and have not previously been deployed at the UIL OpCo's which have experienced multiple leaks as a result of corrosion.

Project Risks and Mitigation Plan:
The risk of a failure within the fire protection system could occur. If a failure were to occur the life safety of employees could be jeopardized. There would also be a significant impact on the resiliency of the buisness if a fire system failed. Lastly, the company could face regulatory violations if we were not in compliance with Connecticut State Fire Code.

Risk of No Action:
If no action was to be taken the company would be directly violating Connecticut State Fire life safety code.

Project Alternatives:
There is an option of doing nothing and accepting the risk of being out of compliance. Another option would be make fire system repairs as they occur. However, the lack of being proactive can lead to an unexpected large scale life safety system failure.

Basis for Project Estimates
Estimates were obtained by using a pre-negotiated master service agreement between Avangird and a fire protection vendor.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 1,278**	$ 1,278	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 1,278**	**$ 1,278**	**$ -**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 2,099	$ 2,099	$ -	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

800521.01

UI Fleet Vehicle Replacement Plan

Sections

1. Project Summary

UI Fleet Vehicle Replacement Plan

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	800521.01	Common	Catalano, Amy	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
General Services	Fleet	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:

The Fleet Replacement Programs' overall objective is to provide a safe, reliable, regulatory compliant and cost-effective fleet of vehicles and equipment for the Companies. The capital expenditures ("CapEx") for Fleet are for the replacement of light-, medium- and heavy-duty vehicles and equipment, and are based on established life cycle criteria (years, mileage, and/or hours). Increased funding will aid in the acquisition, maintenance and disposal of fleet vehicles and equipment.

Project Scope:

Capital purchase of vehicles and equipment to support growth in operations and need for new vehicles and replacements at all OpCos. To support Operations growth and need for additional vehicles to allow the business partners to be cost effective and productive. The proposal also supports replacements of the existing Fleet based on replacement life cycles established by vehicles type.

2024 Purchases: 6 Aerials
2025 Purchases: 4 Aerials, 1 Stakebody Trucks, 12 Trailers, 50 Pickup Trucks, 12 Vans, 17 Cars, 2 Forklifts
2026 Purchases: 10 Aerials, 1 ATV, 13 Trailers, 20 Pickup Trucks, 4 Utility Trucks, 8 Vans, 1 Car, 2 Forklifts, 2 Equipment
2027 Purchases: 11 Aerials, 4 Trailers, 26 Pickup Trucks, 1 Utility Truck, 8 Vans, 6 Cars
2028 Purchases: 19 Aerials, 2 Trailers, 13 Vans, 3 Cars, 1 Equipment
2029 Purchases: 21 Aerials, 3 Stakebody Trucks, 8 Trailers, 22 Pickup Trucks, 2 Utility Trucks, 16 Vans, 1 Equipment

Project Benefits:

Fleet Services strives to achieve economies of scale that result in cost reduction opportunities by utilizing national contracts, standardized or "Off the Shelf" specifications and, wherever feasible, to take advantage of preferential purchasing terms in accordance with procurement guidelines. The annual Fleet Replacement Program is based on unit age and/or usage (Miles/Hours). Understanding that units achieving the replacement criteria based on age and/or mileage are proposed for replacement and the results checked and collated to form the Fleet Replacement Matrix. This criterion ensures that the optimum combination of age and mileage is attained, while also taking into consideration the total cost of ownership. Model year advancements by the vehicle and equipment manufacturers are factored into the acquisition process to ensure that the latest technical and safety features are included when applicable. Changes in operational requirements are also considered, based on feedback from the end-users of the fleet.

Project Risks and Mitigation Plan:
The risk of reducing the fleet replacement program would be major compenant failures in vehicles and equipment beyound the useful life, reliability and safety of vehicles for employees and the customers, increase to O&M for maitenance and repairs, inability to support operations/business growth, and need to rental additional vehicles. Mitigation would be increase rentals and increase O&M to fund additional repairs.

Risk of No Action:
If the Companies are unable to replace aging fleet vehicles, there would be impacts to reliability and operations, which would negatively affect customers. Examples of these impacts include: (1) Slower Response Times – Older vehicles have reduced reliability and performance capabilities, resulting in slower response times to emergencies, such as gas leaks. This delay can put customers at risk and exacerbate the impact of the situation. Additionally, aging fleet vehicles are more prone to breakdowns and mechanical failures, leading to increased downtime for repairs and maintenance, which strains the Companies' workforce and reduces the ability to meet customer demands promptly. (2) Reduced Efficiency – Aging fleet vehicles tend to be less fuel-efficient and have higher maintenance costs, leading to higher operating expenses for the companies. As older vehicles may have higher emissions and contribute to air pollution, delaying fleet replacements can hinder the Companies' efforts to reduce its carbon footprint and meet environmental sustainability goals. (3) Safety Risks – Older vehicles may lack modern safety features and technologies, putting employees and customers at increased risk of accidents and injuries during field operations. (4) Increased O&M Spend – without increased Capital funding to purchase vehicles, the Companies' will be forced to lease or rent vehicles, increasing operational costs that are passed onto the customer.

Project Alternatives:
Increase to O&M for rental vehicles and additional repairs as the fleet continues to age.

Basis for Project Estimates
The project is based on the age of vehicles by class (7 years light duty, 10 years heavy duty, 7-20 years for equipment) along with vehicle realibility and downtime. The replacement critera is applied to the current fleet to develop those vehicles beyond their useful life and a replacement value is target for each unit, this amount is increased by any additional growth or company requirements to add to fleet.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 4**	$ 4	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 24,872**	$ 2,137	$ 2,853	$ 5,671	$ 6,885	$ 7,325
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ 419**	$ 419	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 25,295**	**$ 2,560**	**$ 2,853**	**$ 5,671**	**$ 6,885**	**$ 7,325**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 25,738	$ 3,003	$ 2,853	$ 5,671	$ 6,885	$ 7,325

Note: 2024 Plant Additions includes the entire calendar year

PRJ-002731

UI BMS System

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Capital Investment Overview

UI BMS System

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002731	Common	Hulk, Thomas	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
General Services	Facilities	IP3 Financial Execute	Ongoing	Dec 2026

Project description:

The Building Management System (BMS) will provide local / remote access to control and monitor all building systems including, but not limited to: Heating equipment, Cooling Equipment, Temperature Balancing, Electrical switchgear, Electrical Loads, UPS, Generators, Lighting, OH Doors, Elevators, Sumps, OWS, Fuel Levels, Fire Panel Monitoring, and Utility Monitoring. The system will allow for automatic alarm monitoring and alerting to maintenance technicians. The system will be based on the newest technology available and on an open protocol interface allowing for non-proprietary maintenance and support.. Similar systems have been installed at Iberdrola SA and Scottish Power.
This project will align / enhance COVID and ESG strategies by creating the ability to monitor: air quality, building system performance, real time alarming, integration to FACIL, energy management, and building condition metrics.

Project Scope:

To design and install a new BMS (Building Management System) system throughout a majority of High Priority / High Occupancy Facilities across AVANGRID occupied BAM Assets. The BMS systems is the starting point for Smart Building Technology and will be installed at 180 Marsh Hill Rd, 100 Marsh Hill Rd & Trumbull Training Center.

Project Benefits:

1) The current systems are end of life and not supported by IT anymore.
2) Current systems are only throughout a small portion of our facilities.
3) Current systems are Proprietary and require sole source contracts.
4) Consolidating 5 systems into one – Reliable and efficient.
5) Allows for monitoring of air quality, air flow, and utility management.
6) Reduction of OPEX – Maintenance and Service contracts.
7) Installation of the new systems allows for data collection and real time monitoring that can be used for benchmarking and KPIs.
8) New system / technology is expandable allow for the installation in future sites as AVANGRID portfolio increases.
9) New BMS system is expandable and can interface with: Security Systems, Fire and Life Safety Systems, and future IT systems.

Project Risks and Mitigation Plan:
So many unforeseen conditions in all the systems that are going to be controlled by the BMS system. Mitigation: Verify that As built are accurate and do site visits inspections.

Risk of No Action:
"OPEX Increases such as:
1) Maintenance and repair
2) Increased onsite troubleshooting
3) Sole Source Contracts continue

IT Migration / Integration Issues such as:
1) Old servers
2) Old software
3) Non compatible with Windows 10 "

Project Alternatives:
There is no alternative other than just not installing a Building Management System. This would reduce efficiency in problem diagnostics. Increasing efficiency identifying problems means addressing issues before problems become more costly.

Basis for Project Estimates
Contract awarded with the vendor.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 52**	$ 52	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 247**	$ -	$ 247	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 298**	**$ 52**	**$ 247**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 1,452	$ -	$ -	$ 1,452	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

General Services – BMS Project

Capital Investment overview

GS Capital Investment New Idea Proposal

Total Project Cost	$1,794,409

Project Name	BMS Project (Smart Building Technology)	Project VP	Project Manager	New idea or Change Order
Description	Building Management System			New

Scope	To design and install a new BMS (Building Management System) system throughout a majority of High Priority / High Occupancy Facilities across AVANGRID occupied BAM Assets. The BMS systems is the starting point for Smart Building Technology

Reason (why)

The BMS system will provide local / remote access to control and monitor all building systems including, but not limited to: Heating equipment, Cooling Equipment, Temperature Balancing, Electrical switchgear, Electrical Loads, UPS, Generators, Lighting, OH Doors, Elevators, Sumps, OWS, Fuel Levels, Fire Panel Monitoring, and Utility Monitoring. The system will allow for automatic alarm monitoring and alerting to maintenance technicians. The system will be based on the newest technology available and on an open protocol interface allowing for non-proprietary maintenance and support.. Similar systems have been installed at Iberdrola SA and Scottish Power..

This project will align / enhance COVID and ESG strategies by creating the ability to monitor: air quality, building system performance, real time alarming, integration to FACIL, energy management, and building condition metrics.

Benefits (impact to shareholders)

- The current systems are end of life and not supported by IT anymore
- Current systems are only throughout a small portion of our facilities.
- Current systems are Proprietary and require sole source contracts.
- Consolidating 5 systems into one – Reliable and efficient
- Allows for monitoring of air quality, air flow, and utility management
- Reduction of OPEX – Maintenance and Service contracts
- Installation of the new systems allows for data collection and real time monitoring that can be used for benchmarking and KPIs
- New system / technology is expandable allow for the installation in future sites as AVANGRID portfolio increases
- New BMS system is expandable and can interface with: Security Systems, Fire and Life Safety Systems, and future IT systems.

Impact of not doing project

- OPEX Increases
  - Maintenance and repair
  - Increased onsite troubleshooting
- Sole Source Contracts continue
- IT Migration / Integration Issues
  - Old servers
  - Old software
  - Non compatible with W10

Schedule and Profiling

BMS Project – additional information

Additional Information

Provide responses to the following and provide additional relevant information:

- **Efficiencies and Impacts:**
  - Remote monitoring of systems for all BAM technicians
  - Reduce Proprietary Alarm Monitoring $ – *to be determined after Phase 1*
  - Reduce Maintenance $ – *to be determined after Phase 1*
  - Reduce OT Labor $ – *to be determined after Phase 1*
  - Reduce Utility Consumption – Data gathering to begin in 2023
  - Reduce Carbon Footprint
  - Extend the life of the assets
  - Emergency resilience with remote monitoring
  - Increase workplace conditions and comfort
  - Expandable system to use in other locations
  - Interface with current IT systems
  - Data analytics and KPIs



BMS Project – additional information

Additional Information

Provide responses to the following and provide additional relevant information:

Utilities: $21,500/yr

- 5% Utility savings for non-interco utilities across all upgraded facilities on an annual basis and cost of $432k

Operation & Maintenance (Including Staff Efficiency): $30,000/yr

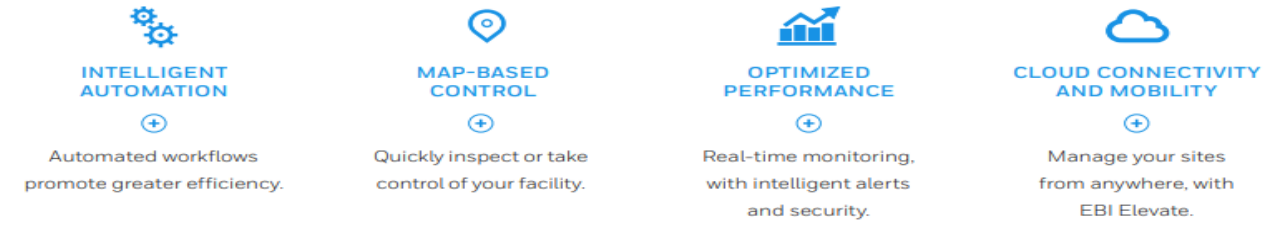
- 7.5% Opex savings of annual HVAC maintenance costs of $400k

Service & Monitoring: $105,000/yr

- 25% Opex savings of maintenance monitoring on an annual basis, based on BMS service provider annual costs of $420k
  New System will be direct alarm monitoring and automate workflows to optimized response times

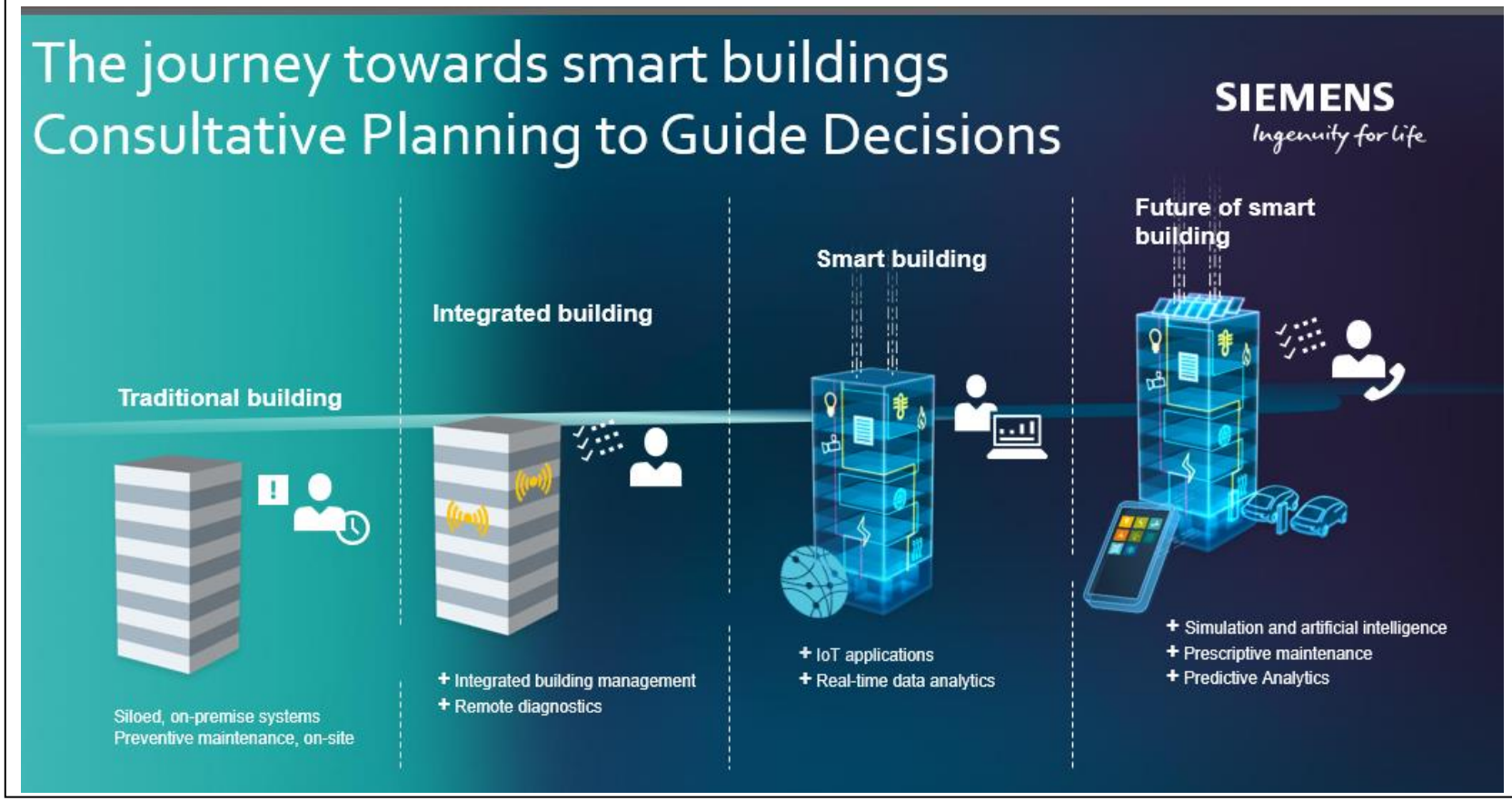
Total Projected Savings - $1.43m over 10 years

Includes 2% yoy reduction in cost savings w/ inflationary estimate



BMS Project – additional information

Additional Information – Creating Smart Buildings



BMS Project – additional information

Additional Information – Creating Smart Buildings

The stages of the smart revolution

Smart buildings are only in their relative infancy in terms of the evolution of the built environment. However, they are already very much a reality. If we take the smart office as a guide, then there have so far essentially been three stages.

Stage 1 (1996 – 2006) – the adoption of smart technology effectively started. The use of laptops, mobile phones and the Internet were introduced to enhance productivity.

Stage 2 (2006 – 2016) – marked a significant development in the sophistication of the technological innovations, with the introduction of smartphones and other devices. This heralded the development of apps, software and cloud computing.

Stage 3 (2017 to date) – smart spaces are now a trend, with companies increasingly understanding the concept and integrating automated systems to improve efficiencies, reduce operating costs and create a well-connected and better working environment for employees.

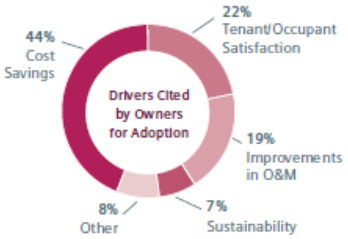
The demand for high-tech infrastructure is increasing. **Employees, tenants and customers want technology** to improve their in-building experiences.



Smart buildings offer more benefits to owners AND occupants:

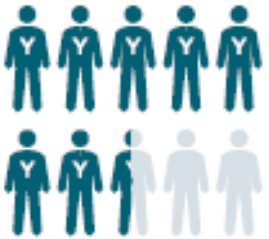
REDUCE capital costs	ENHANCE user experience	OPTIMIZE building performance
REDUCE operation costs	INCREASE revenue streams	ADAPT to future needs

Building owners have many reasons for investing in smart building technologies.[1]



1. Source: "10 Trends for Intelligent Buildings in 2017 and Beyond", Navigant Research

By 2025 **millenials**



will represent **75%** of the workforce in office buildings

Global energy consumption



40% buildings

of which up to 50% is wasted

BMS Project – additional information

Additional Information

The trend toward digitalization and connected devices creates vast amounts of data that can be leveraged strategically by building owners.

Data enables building owners and their organizations to make informed decisions and drive business outcomes.

TRACK & COMPARE PATTERNS in consumption and performance	**IDENTIFY MEASURES** for optimization and energy savings on a continuous basis	**DETECT IRREGULARITIES** in systems immediately
IMPROVE PRACTICES in energy procurement	**INCREASE TRANSPARENCY** into energy billing	**MONITOR TARGETS** for sustainability
OPTIMIZE UTILIZATION of space and assets	**ENHANCE EXPERIENCES** of occupants and visitors	**MAKE SAFE & SECURE** the lives of building occupants

Improved efficiency and operations contribute to **improved profit margins.** Creating environments that enable success raises the value of a facility, leading to **increased revenues.**



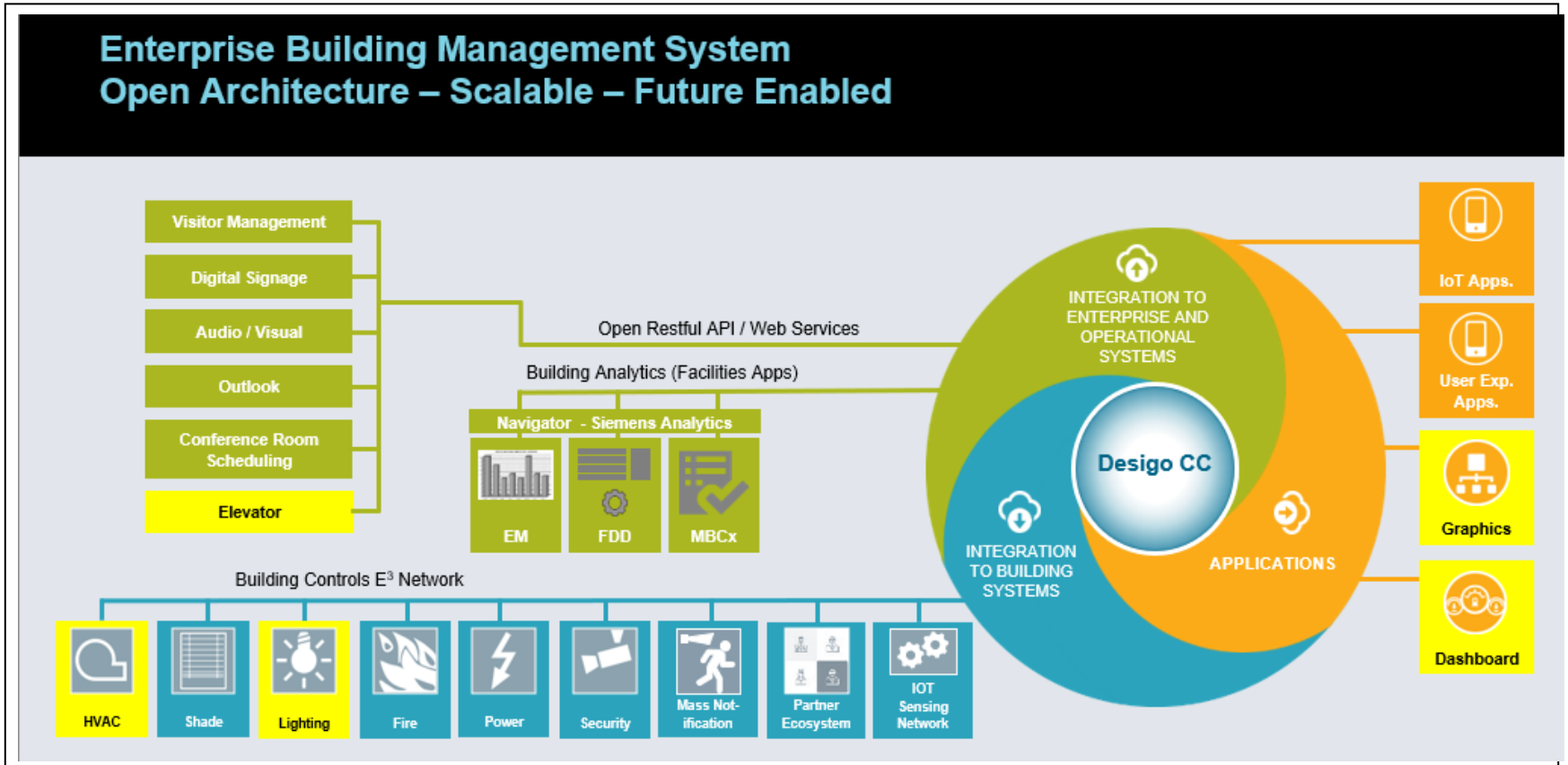
By 2021, 74% of all smart building devices will be in commercial and industrial buildings, collecting data to drive improved operations and better user experiences.[2]

2. Source: "The IoT in Smart Comercial Buildings"; Memoori, 2016

A well-planned, smart building infrastructure increases the long-term value of buildings — moving them from being solely costs to becoming value-generating assets.

BMS Project – additional information

Additional Information – Integrating to others Systems



BMS Project – additional information

Additional Information

"We spend more than 90% of our lives in buildings, so individuals and businesses are right to expect more from their buildings.

Smart buildings today should actively contribute to the well-being and business success of those who rely on it."

Cedrik Neike, CEO Smart Infrastructure

PRJ-002887

UI Church St Upgrades

Sections

1. Project Summary

UI Church St Upgrades

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002887	Common	Hulk, Thomas	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
General Services	Facilities	IP3 Financial Execute	Jan 2024	Dec 2025

Project description:
Power Distribution Units (PDUs) are original and we don't have more space to connect the new racks that OT/OSG wants to install in the back up data center at 157 Church St. We need a more reliable electrical PDU and with more space for new equipment.

Project Scope:
Replacement of (3) three existing PDU's with new PDU's per plans and specs supplied by the engineering design.

Project Benefits:
Eliminate the risk of outage to the ECC.

Project Risks and Mitigation Plan:
Create an outage during construction. Mitigation plan**:** Working only when the primary ECC is totally operable.

Risk of No Action:
Potential electrical outages in the backup Energy Control Center (ECC).

Project Alternatives:
No Alternatives - Not implementing would pose a large risk in the ECC.

Basis for Project Estimates
Contract awarded with the vendor.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 3**	$ 3	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 639**	$ 392	$ 247	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 642**	**$ 395**	**$ 247**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 685	$ -	$ 685	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

PRJ-004626

UI Upgrade Parking Lot Drainage

Sections

1. Project Summary

UI Upgrade Parking Lot Drainage

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-004626	Common	Hulk, Thomas	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
General Services	Facilities	IP1 Originate	Apr 2025	July 2025

Project description:
UI Upgrade Parking Lot Drainage. The current drainage is insufficient and can lead to serious safety issues and deterioration of the existing parking lot.

Project Scope:
Upgarde parking and drainage systems with new asphalt, new manholes, electrical conduit and new parking layout

Project Benefits:
Reduce maintenance cost and increase the safety due to the ponding it creates because the surface because drainage is not working properly and the holes and bumps due to the conditions of the asphalt

Project Risks and Mitigation Plan:
Safety risks and heavy machinery working during business time. Create a proper safety plan, with circulation and barrier plans.

Risk of No Action:
Safety issues due to the water ponds and then ice and the poor conditions of the asphalt requiring salting more often, close some parking areas and patch all the holes several times per year.

Project Alternatives:
No Project Alternative - this would cause continuous deterioration of the parking lot and would eventually need to be fully replaced.

Basis for Project Estimates
Cost Estimate by Engineering Company.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	$ -	$ -	$ -	$ -	$ -	$ -
# CIAC	$ -	$ -	$ -	$ -	$ -	$ -
# External Services	$ 1,408	$ -	$ 1,408	$ -	$ -	$ -
# Internal - Non-AC	$ -	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	$ -	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	$ -	$ -	$ -	$ -	$ -	$ -
# Materials	$ -	$ -	$ -	$ -	$ -	$ -
# Overheads - External	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ 1,408**	**$ -**	**$ 1,408**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 1,408	$ -	$ 1,408	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

PRJ-001783

AGR – IOC-Microsoft Deployment LC-UI

Sections

1. Project Summary

AGR - IOC-Microsoft Deployment LC-UI

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-001783	Common	DeFrutos Salgado, Eduardo	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Information Technology	Business Effectiveness	IP4 Change	Jan 2026	Dec 2026

Project description:
Continue deployment and enhancements of Microsoft projects extending the current agreement

Project Scope:
This project captures the capital expenditures associated with Microsoft Enterprise Agreements. These agreements include business collaboration (email, messaging, and virtual meetings), operating system and applications, and security protection.

Project Benefits:
The Information Technology infrastructure is based on Microsoft operating systems and applications. Microsoft Enterprise Agreements are necessary and enable the Company to provide access to all users within the Company.

Project Risks and Mitigation Plan:
There are no risks associated with this project as it serves as a cost collector for the various SW cloud based subscriptions benefiting UI.

Any specific reference to risk would be addressed by reviewing each SW subscription aligned with this IP project

Risk of No Action:
Unable to install, use and support MS products.

Project Alternatives:
There are no alternatives to MS products.

Basis for Project Estimates
The project cost was estimated based on the pricing in our global framework agreement with Microsoft.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	$ -	$ -	$ -	$ -	$ -	$ -
# CIAC	$ -	$ -	$ -	$ -	$ -	$ -
# External Services	$ 2,807	$ -	$ -	$ 1,331	$ -	$ 1,476
# Internal - Non-AC	$ -	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	$ -	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	$ -	$ -	$ -	$ -	$ -	$ -
# Materials	$ -	$ -	$ -	$ -	$ -	$ -
# Overheads - External	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ 2,807**	**$ -**	**$ -**	**$ 1,331**	**$ -**	**$ 1,476**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 1,331	$ -	$ -	$ 1,331	$ -	$ -

PRJ-001810

AGR - IOC-NET-END USER LC-UI

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. 2024 Annual Memo

AGR - IOC-NET-END USER LC-UI

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-001810	Common	DeFrutos Salgado, Eduardo	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Information Technology	Business Effectiveness	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:

The overall goal of this project is to refresh Company's computing devices following the refresh lifecycle defined for this technology (four years) for users in scope. This project also provides personal computers (PC) in support of new hires and refresh demand requirements enterprise wide.

Project Scope:

For 2024, the project will continue to refresh at least 25% of computer environment (four year life cycle) and provide end user equipment for new employees joining the company

Project Benefits:

Replace aged equipment with new PCs to avoid service disruptions due to PCs not working properly due to their age. New computers also provide higher computing capabilities. This project also provides PCs in support of new hires and refresh demand requirements.

Project Risks and Mitigation Plan:

The top risk associated with this project is the potential for underfunding all the required equipment lifecycle. Lack of funding for this project will impact the number of assets in the scope of the lifecycle project.

Mitigation plan is to increase the Lifecylce from the current 4 years to 5 or more years, and to provide already used equipment to new hires.

Risk of No Action:

The main risk associated with this project is the obsolescence of the Avangrid workstation, reducing the availability and reliability of the end users equipment and their productivity. Also, an increase of the number of incidents reported by the end users because of their equipment's low performance, shorter batery duration and other issues related to the equipment obsolescence.

Project Alternatives:
Increase the lifecycle period of the equipment accepting the workstation's performance degradation because of the older equipment.

Basis for Project Estimates
The project cost was estimated based on budgetary quotes from the different vendors, and when in place, based on the pricing in our framework agreements. The number of assets to be included in the scope of the project is calculated based on the information of when the assets to be replaced were purchased, thus the scope includes all the workstations equipment older than 4 years, plus the expected new hires that will need end user equipment.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	$ -	$ -	$ -	$ -	$ -	$ -
# CIAC	$ -	$ -	$ -	$ -	$ -	$ -
# External Services	$ 4,171	$ 1,526	$ 565	$ 706	$ 704	$ 671
# Internal - Non-AC	$ -	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	$ -	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	$ -	$ -	$ -	$ -	$ -	$ -
# Materials	$ -	$ -	$ -	$ -	$ -	$ -
# Overheads - External	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ 4,171**	**$ 1,526**	**$ 565**	**$ 706**	**$ 704**	**$ 671**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 4,171	$ 1,526	$ 565	$ 706	$ 704	$ 671

Note: 2024 Plant Additions includes the entire calendar year

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IT

Annual Memo End User LC

Year 2024

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Version History:

Version	Date	Change History Summary
1.0	12/07/2022	Initial version of the document

Elaboration control, review and acknowledgement:

Responsibility	Responsible name	Role	Date
Elaboration	Edgar Cruz Granados	Sernior Manager End User	1/23/2024
Review	Barbara Hart	Local Portfolio Responsible	1/23/2024
Review	Edu de Frutos Salgado	Executive Sr Director	
Review	Carl Young	Avangrid CIO	
Review	Maru Reyes Unanue Ana Martinez Peláez	IOC Global Responsible	
Review	David Bravo	Global Director TPO	
Acknowledgement	Sergio Merchan	Global Chief Technology Officer	

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INDEX

Chapter/Section *Página*

1. RECURRING INVESTMENTS 4
1.1. INITIAL PROJECT DESCRIPTION 4
1.1.1. PR0000023451 AGR-TAS-24-EUS INITIAL DESCRIPTION 4
1.1.2. PR0000023455 AGR-TAS-24-EUS REN INITIAL DESCRIPTION 4
1.2. REVIEW DESCRIPTION 5
1.3. SAP 4/HANA COMPATIBILITY 5
1.4. ANNUALIZED BUDGET 5
2. INVESTMENT IN NEW IT SYSTEMS OR SIGNIFICANT ADDITIONS OF FUNCTIONALITY 7
2.1. PROJECT 1 7
2.1.1. INITIAL PROJECT DESCRIPTION 7
2.1.2. REVIEW DESCRIPTION 7
2.1.3. SAP 4/HANA COMPATIBILITY 7
2.1.4. ANNUALIZED BUDGET 7
2.1.5. PROJECT JUSTIFICATION 7
3. RENEWAL OF CLOUD SOLUTIONS 8
3.1. CONTRACT 1 8
3.1.1. NEXTHINK 8
3.2. CONTRACT 2 8
3.2.1. AUTODESK 8

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1. RECURRING INVESTMENTS

1.1. INITIAL PROJECT DESCRIPTION

IT End User Lifecycle Project 2024 is designed to provide new devices (laptops, monitors, video conference and peripherals homologated by Iberdrola Group) and services.

This effort will meet availability, performance and scalability requirements while following IT Infrastructure global standards. governance services required by AVANGRID IT and to ensure the quality end user.

Lifecycle will require external resources to develop solutions, provide support, and perform necessary activities. These professional services will be supported by global framework agreements like Inetum, Babel and NTT.

The 2024 scope of the project plan includes the following activities:

- Hardware deployment and configuration.
- Software installation and development.
- Services.
- Cloud subscriptions Nexthink and Autodesk.

1.1.1. PR0000023451 AGR-TAS-24-EUS INITIAL DESCRIPTION

Activities like organic Growth – New Hires and new projects.

- Hardware Lifecycle - Replacement of end of life, end of vendor warranty equipment.
- Professional Services required to support life cycle services.
- Hardware simplification and optimization.
- Software cloud subscriptions (Nexthink and Autodesk).

The following equipment will be deployed as part of this LC activity:

Replacement of Laptops.
Replacement of Monitors with Docking Station.
Replacement of Video Conference devices (including TVs).
Mobility Kits (keyboards, mice, backpacks, peripherals)

Start Date – 2/5/2024

Finish Date - 12/31/2024

1.1.2. PR0000023455 AGR-TAS-24-EUS REN INITIAL DESCRIPTION

Activities like organic Growth – New Hires and new projects.

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- Hardware Lifecycle - Replacement of end of life, end of vendor warranty equipment.
- Professional Services required to support life cycle services.
- Hardware simplification and optimization.
- Software cloud subscriptions (Nexthink and Autodesk).

The following equipment will be deployed as part of this LC activity:

Replacement of Laptops
Replacement of Monitors with Docking Station
Replacement of Video Conference devices (including TVs).
Mobility Kits (keyboards, mice, backpacks, peripherals).

Start Date – 2/5/2024

Finish Date - 12/31/2024

1.2. REVIEW DESCRIPTION

N/A

1.3. SAP 4/HANA COMPATIBILITY

N/A

1.4. ANNUALIZED BUDGET

Project ID	(Multiple Ite)		
WBS Elem	**AO**	**Single/Dual posting**	**Sum of EAC**
UW-IT395	**8900000574**	Dual Posting Renewables - 9200	1,297,299.00
	9900004980	Dual Posting - 9331 UI	1,491,716.00
	9900005062	Dual Posting CNG - 9332	511,612.00
	9900005063	Dual Posting SCG - 9333	605,287.00
	9900005064	Dual Posting BGC - 9334	166,167.00
	9900006368	Dual Posting NYSEG - 9301	1,510,793.00
	9900006369	Dual Posting RGE - 9302	1,049,014.00
	9900006370	Dual Posting CMP - 9310	950,251.00
	9900008717	Single Posting - 9317 AMC	84,100.00
UW-IT395 Total			**7,666,239.00**
Grand Total			**7,666,239.00**

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Project ID	Project name	WBS Eleme	AO	Single/Dual posting	Sum of EAC
PR0000023451	**AGR-TAS-24-EUS**	UW-IT395	**9900004980**	Dual Posting - 9331 UI	1,491,716.00
			9900005062	Dual Posting CNG - 9332	511,612.00
			9900005063	Dual Posting SCG - 9333	605,287.00
			9900005064	Dual Posting BGC - 9334	166,167.00
			9900006368	Dual Posting NYSEG - 9301	1,510,793.00
			9900006369	Dual Posting RGE - 9302	1,049,014.00
			9900006370	Dual Posting CMP - 9310	950,251.00
			9900008717	Single Posting - 9317 AMC	84,100.00
PR0000023451 Total					**6,368,940.00**
PR0000023455	**AGR-TAS-24-REN EUS**	UW-IT395	**8900000574**	Dual Posting Renewables - 9200	1,297,299.00
PR0000023455 Total					**1,297,299.00**
Grand Total					**7,666,239.00**

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2. INVESTMENT IN NEW IT SYSTEMS OR SIGNIFICANT ADDITIONS OF FUNCTIONALITY

N/A

2.1. PROJECT 1

2.1.1. INITIAL PROJECT DESCRIPTION

2.1.2. REVIEW DESCRIPTION

Not Applicable

2.1.3. SAP 4/HANA COMPATIBILITY

Not Applicable

2.1.4. ANNUALIZED BUDGET

Not Applicable

2.1.5. PROJECT JUSTIFICATION

Not Applicable

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3. RENEWAL OF CLOUD SOLUTIONS

3.1. CONTRACT 1

3.1.1. NEXTHINK

Clarity – PR00000023453

Clarity Name: AGR-TAS-24-IT-SW Cloud Subscriptions.

Vendor – Inetum Spain (Nexthink)

Renewal Term – 2024 – 2027

Amount $ 109,924

3.2. CONTRACT 2

3.2.1. AUTODESK

Clarity – PR00000023453

Clarity Name: AGR-TAS-24-IT-SW Cloud Subscriptions.

Vendor – Autodesk

Renewal Term – 2024 – 2027

Amount $ 1,161,339

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PRJ-001803

AGR - IOC-WINTEL LC-UI

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. 2024 Annual Memo

AGR - IOC-WINTEL LC-UI

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-001803	Common	DeFrutos Salgado, Eduardo	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Information Technology	Business Effectiveness	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:

This program entails refreshing Company Wintel infrastructure following the five-year refresh lifecycle defined for these companies. Wintel infrastructure includes primarily servers, chassis, and server blades. This infrastructure primarily hosts applications and Structured Query Language (SQL) databases. This will provide Wintel Infrastructure that supports the company's organic growth.

Project Scope:

In 2024, the project will continue to refresh at least 20% of all Wintel Server infrastructure per year (five year life cycle). Project scope also includes supporting company with new Server, computer needs and growth

Project Benefits:

This project ensures Wintel company infrastructure operates under support of Wintel, with hardware within the defined lifecycle period for this technology. This minimizes the risk of hardware failures that may lead to applications outages and data loss. The project seeks to avoid service disruptions by refreshing aging hardware.

Replacing aged equipment with new Wintel equipment avoids application performance issues or service disruptions. New devices also provide higher performance and capabilities for a better application performance.

Additionally, this program supplies new devices and equipment as necessary to follow company growth.

Project Risks and Mitigation Plan:

The top risk associated with this project is the potential for underfunding all the required equipment lifecycle. Lack of funding for this project will impact the number of assets in the scope of the lifecycle project.
Replacing production equipment requires a maintenance window, this maintenance window needs to be agreed upon with the business area impacted by the equipment replacement and it has to be done when the business area is out of storm. This implies the risk of not being able to replace all the required Windows equipment at the pace required by the Lifecycle project to complete all the replacements during the given year.

The mitigation plan is to first test the replacement in non production environment when feasible, and have high availability and redundant systems so the replacement can be done with out requiring downtime.

Risk of No Action:

The main risk associated with this project is the obsolescence of the Avangrid Windows equipment, reducing the availability and reliability of the systems, and increasing the outages and downtime of critical systems impacting Avangrid businesses, end users, and customers.

Other risks are:
- Security: Legacy Windows systems might not be compatible with the latest security patches and measures, creating a security risk for the Avangrid systems.
- Support: Windows systems that are not upgraded following the vendor's End of Life period, are not supported by the vendor and Avangrid won't be able to submit support cases with the vendor to get the required support to ensure the equipment correctly functioning. This includes the access to new security patches and hotfixes.
- Scalability: legacy equipment has limited scalability and in case there is a demand increase of our business users, we might not be able to cover this increase.

Project Alternatives:

There are no alternatives to the Windows equipment replacement.

Basis for Project Estimates

The project cost was estimated based on budgetary quotes from the different vendors, and when in place, based on the pricing in our framework agreements. The number of assets to be included in the scope of the project is calculated based on the information of when the assets to be replaced were purchased, thus the scope includes all the Windows equipment older than 5 years, which is the lifecycle period for the Windows equipment.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ -**	$ -	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 3,172**	$ 730	$ 739	$ 759	$ 944	$ -
# Internal - Non-AC	**$ -0**	$ -0	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ 969**	$ -	$ -	$ -	$ -	$ 969
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 4,141**	**$ 730**	**$ 739**	**$ 759**	**$ 944**	**$ 969**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 4,141	$ 730	$ 739	$ 759	$ 944	$ 969

Note: 2024 Plant Additions includes the entire calendar year

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TAS Technologies

Annual Memo

PR23461 AGR-TAS-24-SERVERS WINTEL_LC

PR23459 AGR- TAS-24-REN- SERVERS WINTEL_LC

PR23462 AGR-TAS-24-STORKBKP_LC

PR23458 AGR-TAS-24-REN-STORKBKP_LC

PR23460 AGR-TAS-24-SERVERS-UNIX_LC

PR23452 AGR-TAS-24-Data Center Leases

Year 2024

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Version History:

Version	Date	Change History Summary
1.0	1/12/2024	Initial version of the document

Elaboration control, review and acknowledgement:

Responsibility	Responsible name	Role	Date
Socialization	Unai Anton	Director of Technology	1/18/2014
Review	Barbara Hart	Local Portfolio Responsible	1/16/2024
Review	Eduardo De Frutos	Executive Sr Director	1/19/2024
Review	Carl Young	CIO	
Review	David Bravo	Global Director TPO	
Acknowledgment	Sergio Merchan	Global Chief Technology Officer	

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IBERDROLA

INDEX

Chapter/Section *Page*

1. RECURRING INVESTMENTS 5
1.1. INITIAL PROJECT DESCRIPTION 5
1.1.1. PR0000023461 - AGR-TAS-24-SERVERS WINTEL_LC 5
1.1.2. PR0000023459 - AGR-TAS-24-REN-SERVERS WINTEL 5
1.1.3. PR0000023462 - AGR-TAS-24-STORKBKP 5
1.1.4. PR0000023458 - AGR-TAS-24-REN STORKBKP 5
1.1.5. PR0000023460 - AGR-TAS-24-SERVERS UNIX 6
1.2. REVIEW DESCRIPTION 6
1.3. SAP 4/HANA COMPATIBILITY 6
1.4. ANNUALIZED BUDGET. 6
2. INVESTMENT IN NEW IT SYSTEMS OR SIGNIFICANT ADDITIONS OF FUNCTIONALITY 9
2.1.1. INITIAL PROJECT DESCRIPTION 9
2.1.2. REVIEW DESCRIPTION 9
2.1.3. SAP 4/HANA COMPATIBILITY 9
2.1.4. ANNUALIZED BUDGET 9
2.1.5. PROJECT JUSTIFICATION 9
3. RENEWAL OF CLOUD SOLUTIONS 10
3.1 10
3.1.1 MAINLINE SUSE SLES 10
3.1.2 CA BROADCOM UC4 10
3.1.3 BMC HELIX ITSM 10
3.1.4 SAILPOINT TECHNOLOGIES 10
3.1.5 APPDYNAMICS SYNTHETIC TRANSACTIONS 11

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1. RECURRING INVESTMENTS

1.1. INITIAL PROJECT DESCRIPTION

The goal of these projects is to replace Avangrid infrastructure that is aging on a recurring 5year cycle. Each project will meet availability, performance and scalability requirements while following IT Infrastructure global standards and Cloud first strategy.

The 2024 effort will focus in these areas:

- Replacement of EOL servers
- Journey to Cloud migrations
- On prem virtualization consolidation with HCI

All the projects are intended to start in January and be completed before the end of December 24

1.1.1. PR0000023461 - AGR-TAS-24-SERVERS WINTEL_LC

- Lifecycle and modernization projects:
  - Decommissioning of MS HyperV legacy farms and consolidating into new HCI farms for PROD and TEST virtualizations.
  - Dell parts aligned with the Global FA for replacements and upgrades
- Lifecycle Services
  - Capitalization of existing out-task services for 4 TPO support areas that will support the LC projects, whether it is for a decom, upgrade, or migration to the Cloud.

1.1.2. PR0000023459 - AGR-TAS-24-REN-SERVERS WINTEL

- Lifecycle and modernization projects:
  - Decommissioning of MS HyperV legacy farms and consolidating into new HCI farms for PROD and TEST virtualizations.
- Lifecycle Services
  - Capitalization of existing out-task services for 4 TPO support areas that will support the LC projects, whether it is for a decom, upgrade, or migration to the Cloud.
- Architecture services
  - Capitalization of existing architecture services for PoC, new solutions design, and standards definition.

1.1.3. PR0000023462 - AGR-TAS-24-STORKBKP

- Lifecycle and modernization projects:
  - X7 Switch replacement for X5 switches at EC which are EOS 4/2024, reduced port count due to Cloud migration.
  - CVO for Cloud to integrate Cloud ONTAP with local Netapp storage.
- Lifecycle Services
  - Capitalization of existing out-task services for 4 TPO support areas that will support the LC projects, whether it is for a decom, upgrade, or migration to the Cloud.
- Architecture services
  - Capitalization of existing architecture services for PoC, new solutions design, and standards definition.

1.1.4. PR0000023458 - AGR-TAS-24-REN STORKBKP

- Lifecycle and modernization projects:
  - Refresh storage capacity downsizing from 6 to 2 nodes because of the cloud migrations impact.
- Lifecycle Services

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- Capitalization of existing out-task services for 4 TPO support areas that will support the LC projects, whether it is for a decom, upgrade, or migration to the Cloud.

1.1.5. PR0000023460 - AGR-TAS-24-SERVERS UNIX

- Lifecycle and modernization projects:
  - Refresh of WC HMC (CR1) to current model (CR2)
  - Add 2nd HMC for redundancy.
- Lifecycle Services
  - Capitalization of existing out-task services for 2 TPO support areas that will support the LC projects, whether it is for a decom, upgrade, or migration to the Cloud.
- Architecture services
  - Capitalization of existing architecture services for PoC, new solutions design, and standards definition.

1.1.6 PR0000023452 - AGR-TAS-24-DATA CENTER LEASES

- Lifecycle Services
  - Cost collection associated with Data Center real estate leases which are now capitalizable. These leases are processed via the SAP-RE module.

1.2. REVIEW DESCRIPTION

1.3. SAP 4/HANA COMPATIBILITY

1.4. ANNUALIZED BUDGET.

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Project ID	(Multiple Items)		
WBS Element	**AO**	**Single/Dual posting**	**Sum of EAC**
N/A	**992004244**	Single Posting - 9001 ASC	1,236,966.00
	992005496	Single Posting - 9200	2,195,971.00
N/A Total			**3,432,937.00**
UW-01033	**8900000224**	Single Posting - 9200	349,736.00
	8900000227	Single Posting - 9200	700,414.00
	9900002780	Single Posting - 9200	20,000.00
	9900002781	Single Posting - 9200	10,000.00
UW-01033 Total			**1,080,150.00**
UW-IT346	**9900001250**	Dual Posting NYSEG - 9301	186,992.00
	9900001251	Dual Posting RGE - 9302	87,510.00
	9900001252	Dual Posting CMP - 9310	98,974.00
	9900004966	Dual Posting - 9331 UI	118,899.00
	9900005020	Dual Posting CNG - 9332	52,350.00
	9900005021	Dual Posting SCG - 9333	72,973.00
	9900005022	Dual Posting BGC - 9334	8,189.00
UW-IT346 Total			**625,887.00**
UW-IT347	**9900001253**	Dual Posting NYSEG - 9301	302,110.00
	9900001254	Dual Posting RGE - 9302	190,745.00
	9900001255	Dual Posting CMP - 9310	261,703.00
	9900004965	Dual Posting - 9331 UI	259,130.00
	9900005017	Dual Posting CNG - 9332	84,608.00
	9900005018	Dual Posting SCG - 9333	111,874.00
	9900005019	Dual Posting BGC - 9334	17,856.00
UW-IT347 Total			**1,228,026.00**
UW-IT348	**9900001256**	Dual Posting NYSEG - 9301	799,697.00
	9900001257	Dual Posting RGE - 9302	575,227.00
	9900001258	Dual Posting CMP - 9310	604,461.00
	9900004964	Dual Posting - 9331 UI	726,105.00
	9900005014	Dual Posting CNG - 9332	295,027.00
	9900005015	Dual Posting SCG - 9333	251,415.00
	9900005016	Dual Posting BGC - 9334	118,051.00
UW-IT348 Total			**3,369,983.00**
Grand Total			**9,736,983.00**

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Project ID	Project name	WBS Element	AO	Single/Dual posting	Sum of EAC
PR0000023452	**AGR-TAS-24-Data Center Leases**	N/A	**992004244**	Single Posting - 9001 ASC	1,236,966.00
			992005496	Single Posting - 9200	2,195,971.00
PR0000023452 Total					**3,432,937.00**
PR0000023458	**AGR-TAS-24-REN STORKBKP**	UW-01033	**8900000224**	Single Posting - 9200	349,736.00
			9900002781	Single Posting - 9200	10,000.00
PR0000023458 Total					**359,736.00**
PR0000023459	**AGR-TAS-24-REN-SERVERS WINTEL**	UW-01033	**8900000227**	Single Posting - 9200	700,414.00
			9900002780	Single Posting - 9200	20,000.00
PR0000023459 Total					**720,414.00**
PR0000023460	**AGR-TAS-24-SERVERS UNIX**	UW-IT346	**9900001250**	Dual Posting NYSEG - 9301	186,992.00
			9900001251	Dual Posting RGE - 9302	87,510.00
			9900001252	Dual Posting CMP - 9310	98,974.00
			9900004966	Dual Posting - 9331 UI	118,899.00
			9900005020	Dual Posting CNG - 9332	52,350.00
			9900005021	Dual Posting SCG - 9333	72,973.00
			9900005022	Dual Posting BGC - 9334	8,189.00
PR0000023460 Total					**625,887.00**
PR0000023461	**AGR-TAS-24-SERVERS WINTEL**	UW-IT348	**9900001256**	Dual Posting NYSEG - 9301	799,697.00
			9900001257	Dual Posting RGE - 9302	575,227.00
			9900001258	Dual Posting CMP - 9310	604,461.00
			9900004964	Dual Posting - 9331 UI	726,105.00
			9900005014	Dual Posting CNG - 9332	295,027.00
			9900005015	Dual Posting SCG - 9333	251,415.00
			9900005016	Dual Posting BGC - 9334	118,051.00
PR0000023461 Total					**3,369,983.00**
PR0000023462	**AGR-TAS-24-STORKBKP**	UW-IT347	**9900001253**	Dual Posting NYSEG - 9301	302,110.00
			9900001254	Dual Posting RGE - 9302	190,745.00
			9900001255	Dual Posting CMP - 9310	261,703.00
			9900004965	Dual Posting - 9331 UI	259,130.00
			9900005017	Dual Posting CNG - 9332	84,608.00
			9900005018	Dual Posting SCG - 9333	111,874.00
			9900005019	Dual Posting BGC - 9334	17,856.00
PR0000023462 Total					**1,228,026.00**
Grand Total					**9,736,983.00**

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2. INVESTMENT IN NEW IT SYSTEMS OR SIGNIFICANT ADDITIONS OF FUNCTIONALITY

2.1.1. INITIAL PROJECT DESCRIPTION

2.1.2. REVIEW DESCRIPTION

Not Applicable

2.1.3. SAP 4/HANA COMPATIBILITY

Not Applicable

2.1.4. ANNUALIZED BUDGET

Not Applicable

2.1.5. PROJECT JUSTIFICATION

Not Applicable

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IBERDROLA

3. RENEWAL OF CLOUD SOLUTIONS

3.1

3.1.1 MAINLINE SUSE SLES

Clarity – PR0000023453, AGR-TAS-24-IT-SW Cloud Subscriptions

Vendor – Mainline

Contract – SuSe SLES

Description – SuSe SLES , SW renewal

Renewal Term – 6/17/2024 – 6/17/2027

Amount - $739,200.00

3.1.2 CA BROADCOM UC4

Clarity – PR0000023453, AGR-TAS-24-IT-SW Cloud Subscriptions

Vendor – CA Broadcom

Contract – UC4

Description – Workflow scheduler

Renewal Term – 08/01/2024 - 07/31/2026

Amount - $ 426,483.00

3.1.3 BMC HELIX ITSM

Clarity – PR0000023453, AGR-TAS-24-IT-SW Cloud Subscriptions

Vendor – BMC

Contract – BMC Helix ITSM

Description – Service Management Tool

Renewal Term – 1/1/24- 12/31/2025

Amount - $ 308,032.00

3.1.4 SAILPOINT TECHNOLOGIES

Clarity – PR0000023453, AGR-TAS-24-IT-SW Cloud Subscriptions

Vendor – Sailpoint Technologies

Contract – Sailpoint

Description – Identity SecurityTool

Renewal Term – 1/1/24- 12/31/2025

Amount - $ 288,750.00

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3.1.5 APPDYNAMICS SYNTHETIC TRANSACTIONS

Clarity – PR0000023453, AGR-TAS-24-IT-SW Cloud Subscriptions

Vendor – AppDynamics

Contract – Synthetic Transactions

Description – Performance Monitoring Tool

Renewal Term – 1/1/24- 12/31/2025

Amount - $ 126,924.00

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PRJ-002837

AGR-2022-NET-CS-02-Digital Journey EDB Transformation-UI

Sections

1. Project Summary
2. Additional Supporting Documentation
    a. Project Definition Document

AGR-2022-NET-CS-02-Digital Journey EDB Transformation-UI

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-002837	Common	Paterson, Craig	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Customer Service	Business Effectiveness	IP4 Change	Ongoing	Dec 2024

Project description:

Customer Digital Experience is one of the key areas of focus in Avangrid Every Day Better (EDB) transformation in order to provide strong value and better services for our customers by making customer-centric decisions based on end-to-end journeys and Design Thinking, enabled by the implementation of new technology and CX platforms, with a data-driven approach supported by enriched customer insights.

This CX Digital Journey is a Program that will be structured around three key pillars:

1) Experience Journeys: Re-designing key journeys through the lens of our customers using Design Thinking. The Customer Journey Redesign Program is rooted in an iterative process called Design Thinking. Design Thinking is used by some of the world's largest brands, including Bank of America, TMobile, Airbnb, and Apple. Through this process, Avangrid will go through five phases per journey to understand the end user and identify solutions that will result in new end-to-end journey maps and customer-tested prototypes for IT production and implementation.

2) Platform Enablement: New digital technology platforms and CX journey orchestration capabilities

3) Customer Insights: Get a 360 view of our customers from every touch point they have with us to garner greater segmentation and empower personalization.

Project Scope:

Customer Digital Experience is one of the key areas of focus in Avangrid Every Day Better transformation in order to provide strong value and better services for our customers by making customer-centric decisions based on end-to-end journeys and Design Thinking, enabled by the implementation of new technology and CX platforms, with a data-driven approach supported by enriched customer insights.

This CX Digital Journey is a Program that will be structured around three key pillars:

1) Experience Journeys: Re-designing key journeys through the lens of our customers using Design Thinking. The Customer Journey Redesign Program is rooted in an iterative process called Design Thinking. Design Thinking is used by some of the world's largest brands, including Bank of America, TMobile, Airbnb, and Apple. Through this process, Avangrid will go through five phases per journey to understand the end user and identify solutions that will result in new end-to-end journey maps and customer-tested prototypes for IT production and implementation.

2) Platform Enablement: New digital technology platforms and CX journey orchestration capabilities

3) Customer Insights: Get a 360 view of our customers from every touch point they have with us to garner greater segmentation and empower personalization.

Project Benefits:

This project is included as part of the EDB initiative and included in Networks and Customer Service Strategy Plan.
This project will allow to improve all the Customer KPIs, enabled by:
- Self-service options to lower call volume, wait times and increase customer service and satisfaction.
- Improved customer communication about online services, outages, and safety.
- Clarity of info on billing and provide different methods/options to pay bills that would contribute to increase the cashflow and reduce bad debts.
- Provide energy usage and efficient information.
- Simplify key processes that are more easily accessible and enhance customer digital experience through digital channels (websites, mobile app, chat and IVR).

Project Risks and Mitigation Plan:

Main risk of the program is lost revenue due to funding shortage.
The risk to Platform enablement is, internal people availability and timing/schedule due to competing projects.

Mitigation plan: Collaborate with other project managers and other teams/departments to review the interdependencies and schedules, optimize the resource plan, testing and deployment plan.

The risks to building a 360 view of our customers is the quality of the data available, the shortage of the resources and the conflicting priorities to build other analytic metrics. Also, the unavailability of Power BI on the Azure data lake presents the challenge of having a visualization tool that is user friendly. Our mitigation plan for these risks are to seek approval from the product owners and general consensus on what is deemed as high priority and handle the requests accordingly. Also, we are building schemas in MicroStrategy that will make it easier for our power users to build reports and dashboards.

Risk of No Action:

If funds for the program are not approved, the company would incur a loss in revenue. Additionally, there could be reputational risk as the program would close suddenly subverting customer expectations and potential safety risk as customers may be without surge protection.
It is crucial for UI to invest in and maintain scalable and reliable digital platforms that can withstand the challenges posed by storms and cyber threats. The absence of a robust Digital platforms and system can negatively impact customer experience by hindering effective communications and lack of customer access to outage information during the storms and can lead to prolonged service disruptions, which can have cascading effects on services and regulatory penalties.

Project Alternatives:

While conversations to explore newer technologies and discussions around potential additional or expanded product offerings have been made, there are no plans at this time to change the program. The only alternative to running the program would be to close the program.

Basis for Project Estimates

In 2025 we expect the following activity:
Projected Installs: 121 installs at an average price of $625

When we have storm-related outages, we see an increase in demand. We carry an inventory of roughly 75 units to cover the increased demand in the event of a storm outage event.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 35**	$ 35	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 0**	$ 0	$ -	$ -	$ -	$ -
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 35**	**$ 35**	**$ -**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 938	$ 938	$ -	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year

Project Definition

PDD Name - Following Agreed to Naming Convention	Clarity Project Name - IT Only	PDD Submitter
PDD-AGR-2022-NET-CS-02-Digital Journey EDB Transformation-All	AGR-2022-NET-CS-02-Digital Journey EDB Transformation-All	Tracy Maus

Business Director (BD)	Business Process Liaison (BPLS)	Business Area Coordinator (BAC)	IT Portfolio Lead (ITPL)	IT Application Manager (AM)
Craig Paterson	Tracy Maus	Dave Harrington	Carl Young	Kumar Jaladanki

Business Area*	IT Area*	Project Type*	Classification of Investment*	Purpose
NET APPS Networks Customer Service	NET-APPS	Apps – IT Funded Activity Line	Strategic	Strategy

Requested Start Date*	Requested Delivery Date(s)*	Quantity of Users*	Regulatory (PURA/NERC/CIP)		
2022-01-01	2022-12-31	High	No		

Business Objectives/Goal of the Project*

Enabler of CSAT, reliability, increased self-service adoption, support CS Priority Targets and deliver EDB efficiency goals

Description*

Customer exerperience Transformation aligned with the Every Day Better initiative with focus on eBill, Sign-up work, High Bill complaints, Collections, Next Best Action (increase adoption though personalized cross-promotion), WebChat/Service strategy, Service Appointments and EV's in conjunction with the seven charters below developed with McKinsey.
-End to end journey redesign Web/App: Receive/Pay bill -Review customer issues associated withreceive and pay my bill journey. Find pain points/barriers to address. Ideate solutions and evaluate feasibility of each solution for addition to digital initiatives/roadmap.
-End to end journey redesign Web/App: Issues paying my bill - Review customer issues associated with paying my bill journey. Find pain points/barriers to address. Ideate solutions and evaluate feasibility of each solution for addition to digital initiatives/roadmap.
-End to end journey redesign Web/App: Signup/Move - Review customer 'Sign up or move" web journey. Find pain points/barriers to address. Ideate solutions and evaluate feasibility of each solution for addition to digital initiatives/roadmap.
-End to end journey redesign Web/App: Experience Outage - Identify gaps between current experience and customer expectations. Ideate opportunities to address gaps. Develop and prioitize specific plans.
-IVR: Sign up/Move - Create self serve for start, stop and transfer service
-IVR: Make Account Changes - Add account management option in main menu with choices to confirm/ change account details
-IVR: Receive and Pay my bill/Authentication improvements

Justification*

EDB Charters:
-End to end journey redesign: Receive/Pay bill - Call Reduction Opportunity = 39,000 - 77,000, Improvement opportunity = 14-28%; Opportunity = $0.2-0.5M (Avg = $0.4)
-End to end journey redesign: Issues paying my bill - Call Reduction Opportunity = 39,000 - 77,000; Improvement opportunity = 14-28%; Opportunity = $0.2-0.5M (Avg = $0.4)
-End to end journey redesign: Signup/Move - Call Reduction Opportunity = 94,000 - 188,000; Future Web containment = 14-28%; Opportunity = $0.6-1.2M (Avg = $0.9)
-End to end journey redesign: Experience Outage - This initiative is only based on improving CSAT with minimal financial impact
-IVR: Sign up/Move: Call Reduction Opportunity = 101,000 - 168,000; Future IVR Containment rate = 15-25%; Opportunity = $0.6-1.1M (Avg = $0.9)
-IVR: Make Account Changes: Call Reduction Opportunity = 30,000 - 40,000; Opportunity = $0.2-0.3M (Avg = $0.2); Future IVR Containment rate = 30-40%
-IVR: I Receive and Pay My Bill/Authentication - Call Reduction opportunity 134,000 - 201,000; Opportunity + 844,000 - $1,266,000; Future IVR Containment rate 20% --30%

Estimated Annual Benefits ($'s) & Benefit Description*
(Information related to benefits must be collected for all projects, despite the project purpose/justification)

See seven EDB Charters

Impact if this project does not get implemented

It will affect negatively the achievment of Customer Service efficiency goals, priority targets in order to transform the customer experience tp make it simple for customers to do business with us and achieve our EDB goals.

Dependencies with other Ideas and projects*

Liferay, NY AMI, Energy Manager, Alerts RPF implementation, payment platform upgrades to get to mobile repsonsive web pages, mobile app

Comments: Include Issues, Risks, Constraints, IT Solution thoughts, Problems and/or other considerations

IVR: Make Account Changes - Conversational AI, Voice to Text or Visual IVR technology

PRJ-005665

Azure SW Cloud Subscription – UI

Sections

1. Project Summary

Azure SW Cloud Subscription – UI

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-005665	Common	Santacoloma, Asier	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Information Technology	Business Effectiveness	IP1 Originate	Program - Ongoing	Program - Ongoing

Project description:

UI is now capitalizing the cost of SW Cloud-based Subscriptions. This project is required to collect budget and costs associated with various SW Cloud Subscription. These costs are now able to be capitalized due to an IFRS Capitalization rule change and are managed in the SAP RE Module.

Project Scope:

UI is now capitalizing the cost of SW Cloud-based Subscriptions. This project is required to collect budget and costs associated with Azure SW Cloud Subscription. These are now able to be capitalized due to an IFRS Capitalization rule change and are managed in the SAP RE Module. Costs associated with the renewal of this contract are capitalized in the first year of the contract.

Project Benefits:

UI is now capitalizing the cost of SW Cloud-based Subscriptions. Azure SW Cloud Subscription is now able to be capitalized due to an IFRS Capitalization rule change and are managed in the SAP RE Module. These costs were historically OPEX so there is a reduction to operating costs.

Project Risks and Mitigation Plan:

There are no risks associated with this project as it serves as a cost collector for the various SW cloud based subscriptions benefiting UI.

Any associated risk would need to be addressed in the review of each SW subscription included in this project.

Risk of No Action:
Obsolescence of the onprem infrastructure and not achieving Cloud First strategy's goals,

Project Alternatives:
Moving all the onprem infrastrcutrue and workloads to the Amazon Web Services cloud

Basis for Project Estimates
The cost estimates are developed from actual quotes from the current coverage periods. Some inflation and or growth assumptions are added to the base (current cost) for the out-year renewal periods.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	$ -	$ -	$ -	$ -	$ -	$ -
# CIAC	$ -	$ -	$ -	$ -	$ -	$ -
# External Services	$ 917	$ -	$ -	$ 532	$ -	$ 385
# Internal - Non-AC	$ -	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	$ -	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	$ -	$ -	$ -	$ -	$ -	$ -
# Materials	$ -	$ -	$ -	$ -	$ -	$ -
# Overheads - External	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ 917**	**$ -**	**$ -**	**$ 532**	**$ -**	**$ 385**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 917	$ -	$ -	$ 532	$ -	$ 385

PRJ-001956

Client Project Requests & Integration Projects – UI

Sections

1. Project Summary

Client project requests & integration Projects - UI

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-001956	Common	Santacoloma, Asier	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Information Technology	Business Effectiveness	IP3 Financial Execute	Program/As Spent	Program/As Spent

Project description:

The program is for business initiatives identified by the Networks business areas for future IT projects. UI have a rigorous process of identifying the technology needs of the business, gathering information, vetting the project list and prioritizing based on need, business value and resource availability. The Project Demand Planning cycle runs annually and involves collating the requirements across all business areas for projects requiring IT expenditure. Projects are prioritized by each business area before completing the estimation and capacity planning process. This process runs from the beginning of May through the end of August each year. The final portfolio is then presented back to senior management at the end of August for acceptance.

Project Scope:

Business initiatives identified by the Networks business areas for future efficiency projects.

Project Benefits:

The Company is focused on continually improving performance through the application of best practices and effective technology. The various Avangrid Networks business areas identify initiatives annually during planning cycles that require IT support.

Project Risks and Mitigation Plan:

The top risk associated with this project is the potential for underfunding of future projects subsequently identifited. Lack of funding for a project that must be initiated in a given year will impact the project timeline, causing delays and postponements.

A good prioritization of the projects to be executed is the best preventive meassure to mitigate this risk

Risk of No Action:

The elimination of this project would result in the lack of funding for future business projects requiring IT investment.

Project Alternatives:
Due to conventional project planning processes which typically do not allow for accounting for unknowns in the future, there are no alternative project solutions/approaches considered. When considering a forecast that spans over ten years (TYP), it is inevitable there will be what's referred to as "known unknowns". This client project request & initiative project allows planning for those unknowns, ensuring that sufficient funding may be available.

Basis for Project Estimates
The cost estimates for the Client project requests & initiatives have been based on the two (2) most substantial components/assumptions - identified initiatives which potentially will be started in future years (i.e. global SAP system updates - i.e. now named project Global S4 Hana) would have been included in this type project back in approximately the 2020 TYP), and an average run rate assumption for unidentified projects.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	$ -	$ -	$ -	$ -	$ -	$ -
# CIAC	$ -	$ -	$ -	$ -	$ -	$ -
# External Services	$ 3,495	$ -	$ 627	$ 627	$ 627	$ 1,613
# Internal - Non-AC	$ -	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	$ -	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	$ -	$ -	$ -	$ -	$ -	$ -
# Materials	$ -	$ -	$ -	$ -	$ -	$ -
# Overheads - External	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ 3,495**	**$ -**	**$ 627**	**$ 627**	**$ 627**	**$ 1,613**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 3,495	$ -	$ 627	$ 627	$ 627	$ 1,613

PRJ-003613

Telecomm Infrastructure

Sections

1. Project Summary

Telecomm Infrastructure

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-003613	Electric Distribution	Amato, Steve	Annual Program
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Operational Smart Grids	Business Effectiveness	IP3 Financial Execute	Program - Ongoing	Program - Ongoing

Project description:

The Telecom Infrastructure Program is the third of the critical programs necessary for the transportation and security of our network that carries our critical data. The infrastructure is portion of the network made up of the core elements of the network, switches routers etc., that connects the Fiber backbone to the core data collection points such as the ECC where the data resides and the grid is managed. The Telecom infrastructure connectivity to the wireless network is also part of the infrastructure where data converts from a wireless network to a physical network. Infrastructure also entails towers and tower construction as well as data center connectivity, Meet Me Points and other critical locations. These elements provided the necessary connectivity for all critical functions of our business, provide re-routing and redundancy for our traffic and assure private and secure connectivity. This project will continue to deploy and expand telecom infrastructure in order to enhance communications capabilities and connectivity throughout all territories for distribution automation, AMI, Resilience, DG and PV along with any and all Network Management Center activity.

Project Scope:

This scope addresses lifecycle replacements of equipment that is approaching end of life. Telecommunications equipment that are classified as lifecycle equipment replacement are the following; routers, switches, equipment that supports the fiber network, mobile radio communications equipment, SCADA communications transport equipment, battery backup systems, are of the many. These systems must be maintained and upgraded to ensure safe and reliable operation.

Project Benefits:

Life-cycle replacements of the existing infrastructure is required in order to ensure that telecomm systems continue to be resiliant and function properly. Most of the telecommunication systems at UI have a direct impact on Electric Operations. Telecommunications systems support Electric Operations via mobile radio communications, Substation Operations via SCADA communications, etc. The UI Infrastructure program allows the systems to remain functional, resiliant, and safe.

Project Risks and Mitigation Plan:
The program comes with minimal risk as it supports the telecommunications networks. The primary role is lifecycle replacement of telecommunication networks. At the time of equipment replacement, a mitigation plan is put in place before equipment migration is set forth.

Risk of No Action:
If the equipment or systems do not continue to be maintained or upgraded, the risk includes the following: safety of equipment and people, reliability and resiliency of systems dependant upon the telecommunications network.

Project Alternatives:
This program enables UI to support and maintain the telecommunication systems currently installed. There are no project alternatives.

Basis for Project Estimates
Cost estimates were established from previous years' cost estimates provided for similar work.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 477**	$ 9	$ 117	$ 117	$ 117	$ 117
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 1,028**	$ 215	$ 387	$ 192	$ 110	$ 124
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 378**	$ 5	$ 160	$ 96	$ 55	$ 62
# Internal, Overheads	**$ 588**	$ 37	$ 239	$ 141	$ 81	$ 91
# Materials	**$ 2,020**	$ 60	$ 837	$ 507	$ 290	$ 327
# Overheads - External	**$ 622**	$ 57	$ 246	$ 144	$ 82	$ 93
Total	**$ 5,113**	**$ 383**	**$ 1,986**	**$ 1,197**	**$ 734**	**$ 813**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 4,730	$ -	$ 1,986	$ 1,197	$ 734	$ 813

Note: 2024 Plant Additions includes the entire calendar year

PRJ-004473

UI Smart Metering

Sections

1. Project Summary

UI Smart Metering

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-004473	Electric Distribution	Bean, Jacquelyn	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Operational Smart Grids	Business Effectiveness	IP3 Financial Execute	Program/As Spent	Program/As Spent

Project description:

UI Smart Metering asset replacement program. Historically UI Smart Metering created projects for each asset replacement. However, this is an ongoing and continuous effort to ensure the AMI network is constantly upgraded, fully functional, and able to support all new systems. Thus a program was created instead of treating the continuous work as separate projects.

Project Scope:

Upgrade and replace AMI assets (MDMS, MV90, AMI network equipment), ensure all components remain under vendor support, while meeting all future regulatory and legislative requirements. The MDMS is required to be within 2 versions of the latest release to remain in support by the vendor. MV90 also has to be updated periodically to remain in support. The AMI Network equipment (routers, take-out points) need to be replaced due to pole hits, lightning strikes, and other damaging events. This program consolidates all these efforts into a single program instead of treating this continous maintenance as isolated, separate projects.

Project Benefits:

Ensuring all assets are replaced upon failure or obsolescence, that additional functionality is implemented when available, and that all regulatory and legislative requirements are fulfilled. Without this constant upgrading and updating, the software and hardware become obsolete and not able to provide needed functionality.

Project Risks and Mitigation Plan:

In the past, Smart Metering created a project (budget line item) for every maintenance and upgrade needed on software or hardware. This was time consuming and repetitive. By creating the Smart Metering program, we have an annual budget to replace failed or failing equipment, perform upgrades, and ensure that all systems are meeting regulatory and legislative requirements.
The mitigation plan would be to create single projects for each maintenance and upgrade project instead of having a single, annual line.

Risk of No Action:
This project is to ease budget processes, reduce work in creating individual line items in budgets, and simplify getting approvals to spend dollars to maintain the network and upgrade software. No action on this project means more manual work and efforts required to obtain budget, approvals, and spending of budgets.

Project Alternatives:
Create a budget line item for each upgrade or maintenance projects, seek individual approvals for each line, and much more paperwork to accomplish the same tasks.

Basis for Project Estimates
Inflation was applied to previous projects that were completed in recent years.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 74**	$ -	$ 1	$ 35	$ 2	$ 36
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 1,126**	$ 247	$ -	$ 446	$ 108	$ 326
# Internal - Non-AC	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Labor	**$ 850**	$ 169	$ 16	$ 317	$ 23	$ 325
# Internal, Overheads	**$ 285**	$ 68	$ 31	$ 85	$ 32	$ 69
# Materials	**$ 251**	$ -	$ 133	$ 29	$ 89	$ -
# Overheads - External	**$ 702**	$ 185	$ 26	$ 233	$ 38	$ 219
Total	**$ 3,288**	**$ 669**	**$ 206**	**$ 1,145**	**$ 292**	**$ 975**

Plant Additions, all amounts shown below in thousands ($000's)

Total	2024	2025	2026	2027	2028
$ 2,619	$ -	$ 206	$ 1,145	$ 292	$ 975

Note: 2024 Plant Additions includes the entire calendar year

PRJ-004311

New Scheduler UI

Sections

1. Project Summary

New Scheduler UI

PROJECT INFORMATION

OpCo:	Project ID:	Charge Code:	Project Sponsor:	Project Type:
United Illuminating	PRJ-004311	Common	Santiago Vale, Felipe	Project
Business Area:	**Category:**	**IP Stage:**	**Start Date:**	**In-Service Date:**
Processes and Technologies	Business Effectiveness	IP4 Change	Program/As Spent	Program/As Spent

Project description:

Description: Implementation of New Scheduling and Dispatching Solution, replacing the actual Click and ABB Systems, evolving to an unified and integrated solution in Avangrid where the different corporate and business applications could be accessed from the field with a new user experience and enabling an improved communication and collaboration between the Field Workforce.

Main Project Goals: 1. Single Scheduler System, 2. Improve the User Experience and 3. Optimize the Mobile System.

Main Deliverables: 1. Current Scheduling Systems Migration for the Salesforce Scheduling System, 2. Salesforce Field Service for ShortCycle Implementation, 3. FWM Integration for Long Cycle and 4. New Process Harmonization.

Project Scope:

Phase I: Long cycle for UI. This phase will substitute the existing Click V8.3 installed on premise which end of life is December 2023.
Phase III: Short cycle for CUI, this phase will migrate the ABB VSS solution to the new platform.

Process in the Scope:
Long cycle: Construction, Maintenance and Inspections
Short Cycle: Meter Work / Customer Work
OpCos in the Scope:
CT/MA State: UI
Networks Business Areas in the Scope:
Electric Operations
Customer Service

Project Benefits:

The project aims to reach beneficial contributions on the field services planning, scheduling, and dispatching for the mobility tools as well as implementing a new mobility solution integrated with this system. The expected benefits for the business are:

Streamline the data processing and analyzing, to guarantee a more agile and flexible field services, reducing travel and time restoration.
Maximize the capacity to collect and combine field services data across the several business areas involved.
Capture accurate information from/to the field services and keep the systems integrated and updated for a better decision making.
Consolidate and organize the data by its location, to ensure safe operations and to provide more accurate staff and material allocation.
Harmonization of the process, evolving a common process model across the Avangrid and enabling the standardization of different applications by Process/Roles.
Transform the Company on a data driven company.
Costs and travel time reduction, trough of a more agile and accurate resource/material scheduling.
More accurate materials predictions, mitigating part of the impact of the materials shortage or overstock.
Increase internal employees' satisfaction, providing the opportunity to review the present system and their respective integration and improve the usability of the tools.

Project Risks and Mitigation Plan:

- Due to lack of proper documentation of SAP and the Service Suite solution used today, there may be integrations that get missed as part the development. To mitigate, we are reviewing integrations at the server level to ensure all processes are properly documented.

- Lack of schedulers and dispatchers for some departments may impact user adoption needed with field workers to use the tool and minimize overtime.To remediate, we have developed auto dispatching capabilities according to UI's business rules.

Risk of No Action:

- Current tool, Click v8.3, deployed for UI is used for construction, maintenance, and inspection of major OL and UGL assets is no longer supported by the vendor and will impact day-to-day operations if any issues arise. To remediate we will require to take a backup of the software image and database to failover in the case of an outage.

- UI would have to continue using the existing Service Suite tool for customer / meter work that has some stability and connection issues today impacting the efficiency of day-to-day operations. To remdiate, schedulers and dispatchers are organizing the work manually to ensure Field Workers have work packages readily available to do the work.

- This will impact UIs ability to properly track and report SLAs to the regulators for blue sky and grey sky.

- There will be an increase of operational costs, as more workers are required to manage the inefficiencies of both systems.

Project Alternatives:

In 2021, a detailed assessment was done to look for a replacement for the for the current scheduling, dispatching, and mobile application tools in the market. Currently in UI there are 4 systems used today by UI to manage their day to day work: SAP, Arcos, Click v8.3, and Service Suite by ABB. To streamline processes and avoid maintaining various systems, across UI and the other operating companies, we evaluated the following vendors for potential solutions: IFS, Salesforce, Oracle, and Microsoft. Each vendor had their own system that could be used and from the technical assessment done from an IT and business point of view Salesforce came with the best platform in terms of business needs, pricing, and maintenance.

Basis for Project Estimates

The project estimates are based on costs forecasted from the previous implementation done for Service Suite. These relate to software services that are required to ensure SAP, and ADMS are properly integrated from an E2E point of view and ensure all regulatory reporting is properly reflected with data from the new system. In addition, we require additional two additional services from the System Integrator to properly assess the documentation and provide the scope of what is needed to develop UI's custom solution.

5 Year Capital Plan, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
# AFUDC	**$ 0**	$ 0	$ -	$ -	$ -	$ -
# CIAC	**$ -**	$ -	$ -	$ -	$ -	$ -
# External Services	**$ 2,338**	$ 2,091	$ 247	$ -	$ -	$ -
# Internal - Non-AC	**$ 0**	$ 0	$ -	$ -	$ -	$ -
# Internal, Labor	**$ -**	$ -	$ -	$ -	$ -	$ -
# Internal, Overheads	**$ -**	$ -	$ -	$ -	$ -	$ -
# Materials	**$ -**	$ -	$ -	$ -	$ -	$ -
# Overheads - External	**$ -**	$ -	$ -	$ -	$ -	$ -
Total	**$ 2,338**	**$ 2,091**	**$ 247**	**$ -**	**$ -**	**$ -**

Plant Additions, all amounts shown below in thousands ($000's)

	Total	2024	2025	2026	2027	2028
	$ 2,938	$ 2,691	$ 247	$ -	$ -	$ -

Note: 2024 Plant Additions includes the entire calendar year