

1704/1722 Underground Cable Rebuild Project

Planning Advisory Committee Meeting

June 15th, 2023

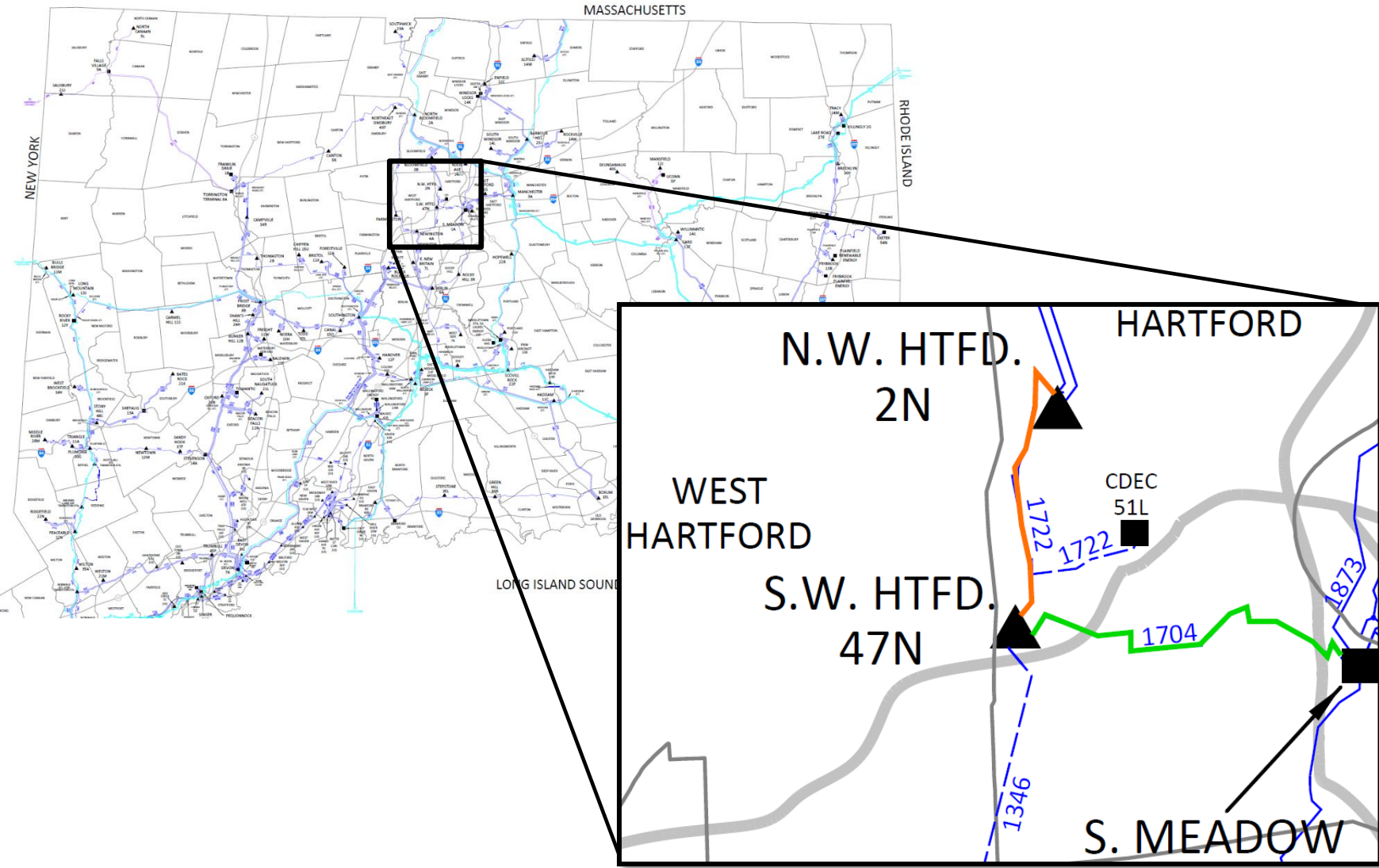
Agenda

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- Project Location
- Drivers – Asset Condition
 - Asset Condition Photographs
- Drivers – Reliability
- Project Alternatives
- Preliminary Ratings
- Hartford Area Future Needs
- Project Scope & Summary

Background

- Eversource has approximately 300 miles of 115 kV and 345 kV underground Pipe-Type Cable (PTC) throughout MA and CT (70+ circuits)
 - Mix of PTF and non-PTF circuits
 - Earliest Eversource PTC lines were built in 1949
- Line 1704 runs between South Meadow and Southwest Hartford 115kV substations
 - Total length: approximately 4 miles high-pressure fluid filled (HPFF) PTC
 - Built in 1974
- Line 1722 runs between Northwest Hartford and Southwest Hartford 115kV substations
 - Total length: approximately 3 miles HPFF PTC
 - Built in 1974

Project Location



Drivers – Asset Condition

- HPFF on lines 1704 & 1722 are past industry-accepted useful life of 40 years
 - Constructed in 1974 (45 years old)
- Recent inspections of these lines indicate significant deterioration of current vaults/ducts
 - Efflorescence: sign of moisture problems in concrete that causes structural degradation over time
 - Active Water leaks: indication of splice/repair materials breakdown
 - Spalling: break down and crumbling of vault materials
 - Spalling and section loss leads to exposure and rusting of structural rebar, further compromising vault integrity
- Full extent of PTC asset condition is difficult to detect through visual inspections alone
 - Visible asset condition issues allude to additional repairs needed

Asset Condition Photographs



Line 1722 – Vault 5671
Active Water Leak



Line 1704 – Vault 5660B
North Duct Showing Signs of Efflorescence

Asset Condition Photographs



Line 1722 – Vault 5667A
Deep Spall in Wall



Line 1704 – Vault 5660A
Exposed Rebar and Rust in Vault Ceiling

Drivers – Reliability

Several long-term reliability risks affect existing cables:

- Currently only one remaining manufacturer of HPFF cables (Okonite), with long lead times
- Challenges associated with continued operation of existing cables including environmental concerns, maintenance costs, and extended project timelines
 - Increased probability of future failures impacting Hartford-area load-serving capabilities
 - Existing HPFF cables use pressurized dielectric fluid (typically DF-500) as an insulating medium between conductors
 - With age, pipe becomes susceptible to leaks, which require a complex and costly clean-up process
 - Inability to respond quickly if failure rates increase
 - Underground transmission repairs and upgrades take significantly more time and cost substantially more than overhead transmission due to:
 - Lengthy design, siting and routing processes
 - Coordination with local municipalities and constituents
 - Unique construction coordination and safety requirements

Project Alternatives

- Alternative 1:
 - Reconductor existing HPFF on lines 1704 & 1722 with 2500 kcmil copper (CU) conductors
 - 2500 kcmil CU is the largest Eversource standard HPFF conductor
 - Does not address concerns with sole-source supplier availability of HPFF cables
 - Future repairs/maintenance will likely be complicated and costly due to lack of available parts and skilled maintenance workers
 - Risk of potential leaks in the future
 - Ratings would be comparable to existing cable and potentially slightly lower
- Alternative 2 (**Preferred Solution**):
 - Replace existing HPFF with new 5000 kcmil copper (CU) XLPE
 - Eliminates dependence on a sole-source supplier for HPFF cables
 - Increased cable size allows for higher thermal capability
 - Solid dielectric eliminates environmental concerns caused by leaks
- Alternative 2 addresses equipment availability concerns, environmental concerns, better accommodates future system expandability, and provides the most reliable and least risk solution over the long-term

Preliminary Ratings

Underground Cable Technology	Norm Rating (MVA)		LTE Rating (MVA)	
	1704	1722	1704	1722
Existing HPFF Line Summer Rating	245	245	277	277
Alternative 1 - 2500 Kcmil CU HPFF Summer Rating (Reconductoring)	233	232	264	265
Alternative 2 - 5000 Kcmil CU XLPE Summer Rating (Rebuild)	392	407	422	435

Underground Cable Technology	Norm Rating (MVA)		LTE Rating (MVA)	
	1704	1722	1704	1722
Existing HPFF Line Winter Rating	245	245	277	277
Alternative 1 - 2500 Kcmil CU HPFF Winter Rating (Reconductoring)	233	240	286	291
Alternative 2 - 5000 Kcmil CU XLPE Winter Rating (Rebuild)	392	407	474	480

Hartford Area Future Needs

- While selection of Alternative 2 is driven primarily by equipment availability and long-term reliability considerations, anticipated ratings under Alternative 2 will be high enough to address all potential future needs identified in ISO-NE 2050 transmission study

2050 Study Case (Worst N-1-1 Contingency)	Existing HPFF LTE Rating (MVA)	Preliminary Alternative 2 LTE Rating (MVA)		MVA Loading (% Overload)	
		1704	1722	1704	1722
2040 Summer Eve Peak A	277	422	435	251 (90.5%)	263 (95.0%)
2050 Summer Day Peak	277	422	435	248 (89.6%)	277 (100.0%)
2050 Summer Eve Peak A	277	422	435	261 (94.4%)	267 (96.5%)

2050 Study Case (Worst N-1-1 Contingency)	Existing HPFF LTE Rating (MVA)	Preliminary Alternative 2 LTE Rating (MVA)		MVA Loading (% Overload)	
		1704	1722	1704	1722
2040 Winter Peak	277	474	480	305 (110.0%)	332 (119.9%)
2050 51K Winter Peak	277	474	480	356 (128.6%)	383 (138.3%)
2050 57K Winter Peak	277	474	480	418 (150.9%)	466 (168.1%)

Project Scope & Summary

- Alternative 2 (**Preferred Solution**):
 - 1704 Line
 - Install 11 new manholes and 11 telecom hand holes
 - 1 infrastructure crossings utilizing Jack and Bore technology
 - Install approximately 4 miles of XLPE cable between South Meadow and Southwest Hartford 115kV substations
 - 1722 Line
 - Install 8 new manholes and 8 telecom hand holes
 - Install approximately 3 miles of XLPE cable between Northwest Hartford and Southwest Hartford 115kV substations
 - CDEC 51L generation has been retired so 1722 tap to facility will also be retired as part of this project scope
- Replacing HPFF lines with XLPE will:
 - Increase capacity
 - Improve system reliability
 - Mitigate environmental concerns
 - Eliminate dependence on a sole-source supplier for HPFF cables
- Total Estimated Cost: **\$301.6M (-25 / +50%)**
- Project in-service date: **Q4 2026**

Questions

