

ISO-NE PAC MEETING

05/15/2024

W-149 115kV Line Asset Condition Refurbishment

This document has been reviewed and does not contain Critical Energy/Electric Infrastructure Information (CEII).

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Outline

- Purpose
 - Discuss the asset condition needs driving the refurbishment of the 115kV W-149 line and alternatives to address the identified issues
- Background
- Geographic Location
- Project Needs
- Solution Alternatives
- Questions

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Background

- The 115kV W-149S/W-149/W-149N Line originates at the Bellows Falls No. 14 Switchyard in Bellows Falls, VT and terminates at the Wilder No. 16 Switchyard in Hartford, VT. This line has loops into the Mt. Support No. 16 Substation in Lebanon, NH as well as the Slayton Hill No. 39 Substation in Lebanon, NH. The W-149S line also connects to VELCo's Ascutney substation via the K-149 line at the Ascutney tap in Claremont, NH.
- The W-149S/W-149/W-149N is designated as follows:
 - W-149S: Bellows Falls – Slayton Hill (37 mi.)
 - W-149: Slayton Hill – Mt. Support (5.0 mi.)
 - W-149N: Mt. Support – Wilder (2.2 mi.)
- The line was originally built in 1948 and was refurbished in 2008. The line is 44.2 miles long including taps. The original 336 ACSR conductor remains in service from Bellows Falls to the Ascutney Tap. The Ascutney Tap to Slayton Hill (17.6 miles) was replaced with 954 ACSR in 2008.
- Contains 570 structures
 - 5 Lattice Tower, 58 Steel Pole, 507 Wood Pole
- The driver for this project is asset condition
- W-149S/W-149/W-149N (44.2 miles): 100% PTF

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Geographic Location



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Project Needs

Asset Condition

The asset condition information is derived from the following sources:

- Engineering Ground Line Inspection – 2020
- Aerial Comprehensive Inspection – 2018
- Internal and External Inspections – Multiple Years

Asset issues found include:

- 38 interruption events since 2013 (10 events associated with tree falls, 12 events associated with lightning strikes, 4 events associated with substation issues, 12 events associated with unknown or external issues)
- Wood pole and wood pole top deterioration (443 structures)
- Woodpecker Damage (64 Structures)
- Flashed and Damaged Insulators

Structures Replaced for Deteriorated Condition			
Pole Type	Rating	Description	Quantity
Wood	2	Priority Reject	507
Structures Replaced for Structural Capacity to Support the Installation of Conductor and OPGW			
Single Circuit Lattice	4	Light Pitting	4
Total Replacements			511

Wood Ratings: 2: Priority Reject, 3: Reject, 4: Serviceable

Steel Ratings: 1: Serviceable, 2: Intact, 3: Light Corrosion, 4: Light Pitting, 5: Significant Pitting, 6: Very Severe Deterioration

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Project Needs (continued)

Reliability Issues

- 38 interruption events since 2013
 - Ten (10) events were associated with tree falls resulting in either lockouts or trip-reclose operations
 - Twelve (12) events were associated with lightning strikes that resulted in trip/reclose operations
- The Line is primarily comprised of chair frame construction which is characterized by poor lightning performance due to shallow shielding angles and numerous tree contacts due to its short profile and the line's location in a well-wooded region of our system
- The ROW is 250 ft wide and the outboard phase distance to the edge of ROW is 50.5 ft for most of the line. Many of the line's performance issues are due to tree contacts. Forestry has calculated that the risk of tree contact may be substantially decreased by maintaining a 75 ft width from conductor to edge of ROW in conjunction with raising the conductor elevations by 10 ft. This increased distance to edge of ROW could be accomplished by relocating the line's centerline.

Improved Communication Channels

- The private telecommunications network operated by National Grid requires expansion and modernization to provide a level of service that eliminates single points of failure for communication pathways for a single station and implementation of redundant communication pathways to eliminate cascading data loss from multiple stations
- Expanding OPGW deployment directly augments the scale and reach of the National Grid private telecommunications network and supports our mandate of providing low cost, secure and reliable solution
- National Grid's private telecommunications network strategy is built predominantly on the physical foundation of OPGW reducing the reliance on leased services for protection, critical monitoring, and controls systems
- Being a secure private network, it is isolated from security threats that are possible when connecting to external network elements thus maximizing the reliability and security of the network supporting BES and CEII Cyber Systems

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Project Needs – Points of Concern: Pole Top Deterioration



Str 94



Str 441



Str 467



Str 3

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Project Needs – Points of Concern: Woodpecker



Str 14



Str 90



Str 95



Str 95



Str 93



Str 138



Str 205



Str 265



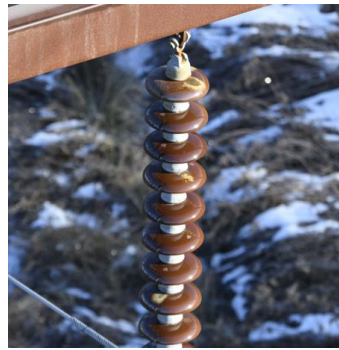
Str 3

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Project Needs– Points of Concern: Insulators



Str 34



Str 74



Str 84



Str 99



Str 118



Str 160



Str 196



Str 211



Str 243

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Solution Alternatives

Option 1: Full Rebuild on New Centerline with OPGW and Reconductoring (Preferred Solution)

- Replace all W-149S, W-149, and W-149N wood pole structures with light duty steel pole davit arm structures for tangents and engineered steel pole davit arm structures on concrete foundations for angles and deadends with an additional vertical clearance buffer for tree mitigation and with two (2) shield wire positions
- Relocate line W-149S centerline such that the conductors are 75 ft from the edge of the ROW at a minimum where achievable;
- Install two (2) OPGW on the W-149S, W-149, and W-149N from Bellows Falls to Slayton Hill to Mt. Support Loop, to Wilder Station and replace any resulting overloaded structures
- Replace 36.9 miles of existing conductor with 795 ACSS “DRAKE” conductor.
- Restore approximately 37 miles of access and create approximately 7 miles of new access

Project Costs: \$491.15M (+50/-25%), 100% PTF

Estimated construction start date: Q1 2027

Estimated in-service date: Q2 2030

Option 2: Full Rebuild on Existing Centerline with OPGW

- Replace all W-149S, W-149, and W-149N wood pole structures with light duty steel pole H-Frame structures for tangents and engineered steel pole H-Frame structures on concrete foundations for angles and deadends with an additional vertical clearance buffer for tree mitigation
- Install two (2) OPGW on W-149S, W-149, and W-149N from Bellows Falls to Slayton Hill to the Mt. Support Loop to Wilder Station.
- Restore approximately 37 miles of access

Project Costs: \$470.11M (+200/-50%), 100% PTF

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Questions

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Please submit any written comments or feedback by June 02, 2024

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