

Eversource NH 115-kV Laminated Wood Structure Replacement Program Phase I

Reliability Committee Meeting
February 15th, 2022

Agenda

- Background
- Project Drivers
- Inspection Photos
- NH Project Geographic Locations
- Project Summary

Background

- Laminated wood structures are made with untreated southern yellow pine and then placed into a pressurized tube to force chemical treatments into the wood pores
 - This treatment only penetrates about ¾” into the pole’s surfaces
- In 2017, Eversource replaced deteriorating laminated wood structures that were installed in the 1970s
- Recent structure replacements have revealed additional concerns about the integrity of laminated wood structures installed between 2000 and 2014
 - The softened wood is prone to woodpecker damage as well as damage from ants and other pests
 - Poles are susceptible to cracking along their length, creating points of entry for water
 - Water seepage causes the structures to rot
 - Cracks provide a route for pests to enter the pole and further deteriorate the weakened wood
 - Combination of water seepage and pests results in splits, bending, and warping of poles

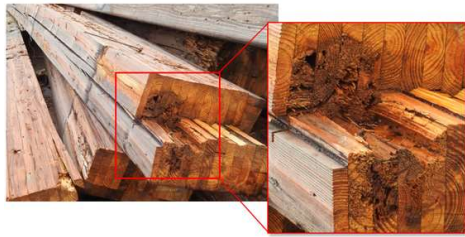
Project Drivers – Recent Structure Replacements

- Eversource periodically replaces structures as part of regular maintenance projects and system upgrades
- Cross-sectional inspections of recently-removed laminate structures have uncovered significant structural damage that was not detected in previous visual inspections
 - Rot present through the length of the structure and follows the voids between joints
 - Open joints at the top of the structure allow free entry of water
 - Damp wood at the center of the structure became soft with rot
 - Voids between layers are not consistent in size or location throughout the structure but were present on each cross-sectional cut
 - Additional splitting behind surface cracks for most of the length of the structure (2-4 layers into structure)
- Similar issues have been identified on several lines based on recent structure replacements

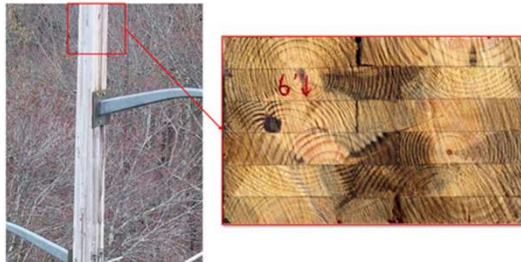
Project Drivers – Inspection Results

- Structures are graded in accordance with Electric Power Research Institute (EPRI) Guidelines
 - *A: Nominal Defect – No Action Required*
 - *B: Minimal Defect – Monitor Degradation*
 - *C: Moderate Defect – Repair or Replace under next maintenance*
 - *D: Severe Defect – Repair, Reinforce, or Replace immediately*
- Many of the recently-removed structures were rated A or B during previous inspections
- Extent of internal damage did not become visible until structures cross sections were examined after removal
 - Internal damage not visible during aerial inspections
 - EPRI does not have specific guidelines to assess internal damage or rot during ground inspection
 - Woodpecker damage and pole-top cracks accelerate internal deterioration
- Conclusion:
 - Integrity of the laminated wood structures cannot be measured by conventional visual inspection
 - Remaining strength cannot be reliably estimated because wood is rotting from within or under mounting brackets

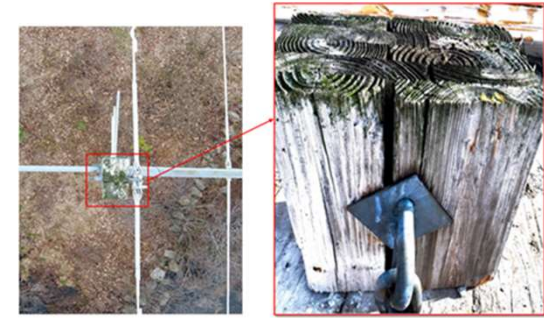
Inspection Photos



Sample Laminated Structure Base –
Sawdust from Insect Damage –
G128 Line



Comparison of 2019 Visual Inspection (Left)
and 2020 Cross-Section Photos Showing
Internal Splitting (Right)
G128 Line, Structure #75



Comparison of 2019 Visual Inspection (Left)
and 2020 Cross-Section Photos (Right) –
G128 Line, Structure #76



Woodpecker Damage –
G128 Line, Structure #57



Woodpecker Damage –
G128 Line, Structure #63



Rot and Splitting at Joints –
K105 Line, Structure #32

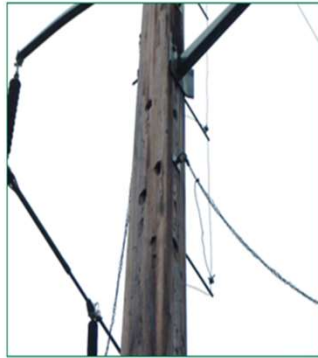


Extensive Rot –
K105 Line, Structure #67

Inspection Photos



Rotten Pole Top –
K105 Line, Structure #20



Woodpecker Damage –
K105 Line, Structure #54



Side Crack –
L175 Line, Structure #122



Crack Through Woodpecker Hole –
L175 Line, Structure #139



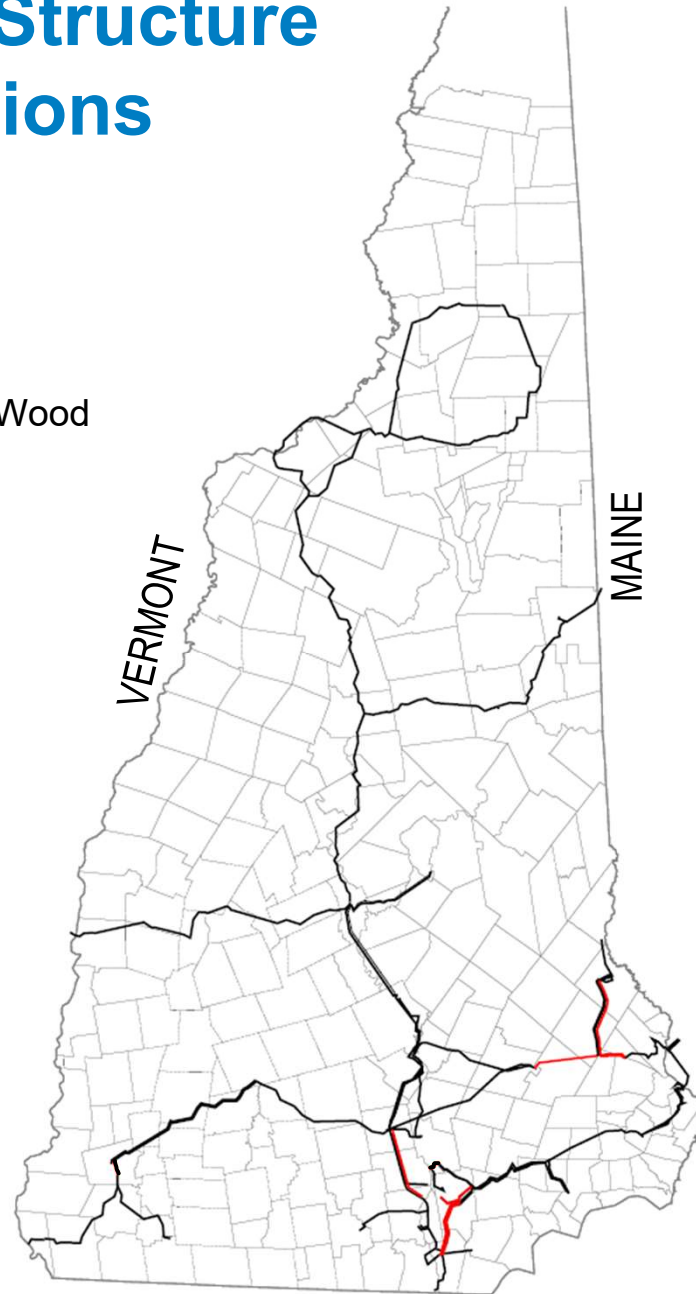
Large Crack –
X116 Line, Structure #133



Extensive Rot –
Z119 Line, Structure #137

Laminated Wood Structure Geographic Locations

- 115-kV Lines Not in Scope
- 115-kV Lines with Laminated Wood Structure Replacements



NH 115-kV Laminated Wood Structure Replacements Summary - Costs

Line	TCA #	Description	TCA Submitted Cost (\$Ms)
L175	ES-21-TCA-20	Deerfield substation – Madbury substation	\$19.300
G128	ES-21-TCA-22	Madbury substation – Eastport substation	\$12.632
K105	ES-21-TCA-53	North Merrimack substation – Greggs substation	\$16.503
X116	ES-21-TCA-55	Scobie Pond substation – Power Street substation	\$24.646
Z119	ES-21-TCA-58	Scobie Pond substation – Power Street substation	\$23.443
Total			\$96.524

Project Scope Summary

- Replacement of all laminated wood structures across five New Hampshire 115-kV transmission lines with weathering steel monopoles, installation of lightning arrestors and counterpoise
- Benefits of weathering steel monopoles
 - Compliance with current clearance and strength code requirements
 - Improved reliability and storm resilience for all regions
 - Increased strength can support larger conductor sizes if needed in future
- Replacement schedules to be coordinated with ongoing projects to take advantage of mobilization, permitting, and outreach efforts, and access to shared ROWs
- Projects in this presentation will address priority lines
 - Additional structures removed during these projects will continue to be assessed for internal damage
 - Remaining lines with laminated wood structures continue to be assessed
 - Additional structure replacement projects will be presented to PAC as necessary
 - There is potential for all laminated wood structures to require replacement

Questions

