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

Planning Advisory Committee Meeting

March 17th, 2021

Agenda

- Background
- Project Drivers
- Inspection Photos
- Laminated Wood Structure Geographic Locations
- Project Scope
- Summary of Work

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

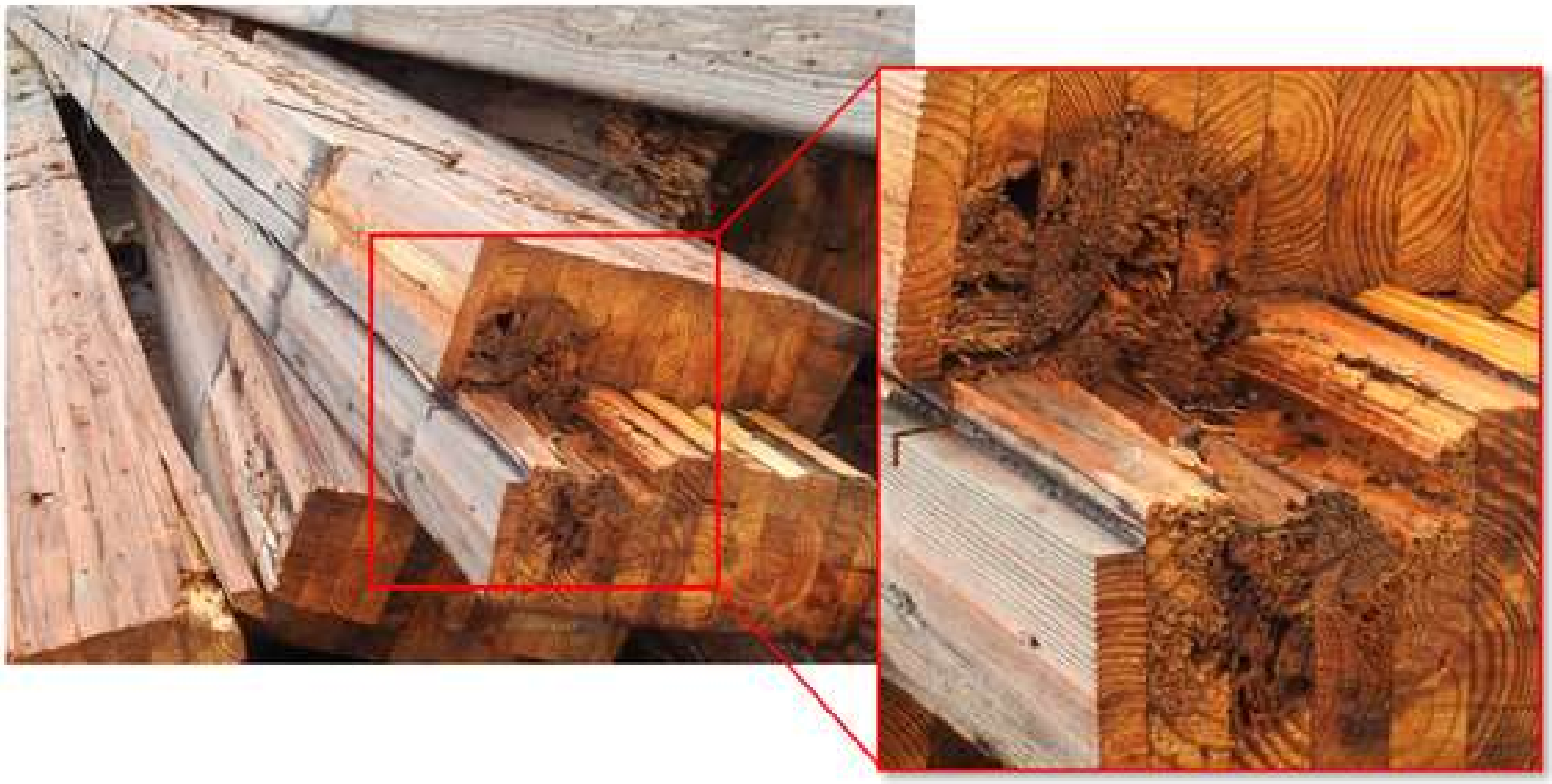
Project Drivers – Recent Structure Replacements

- 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

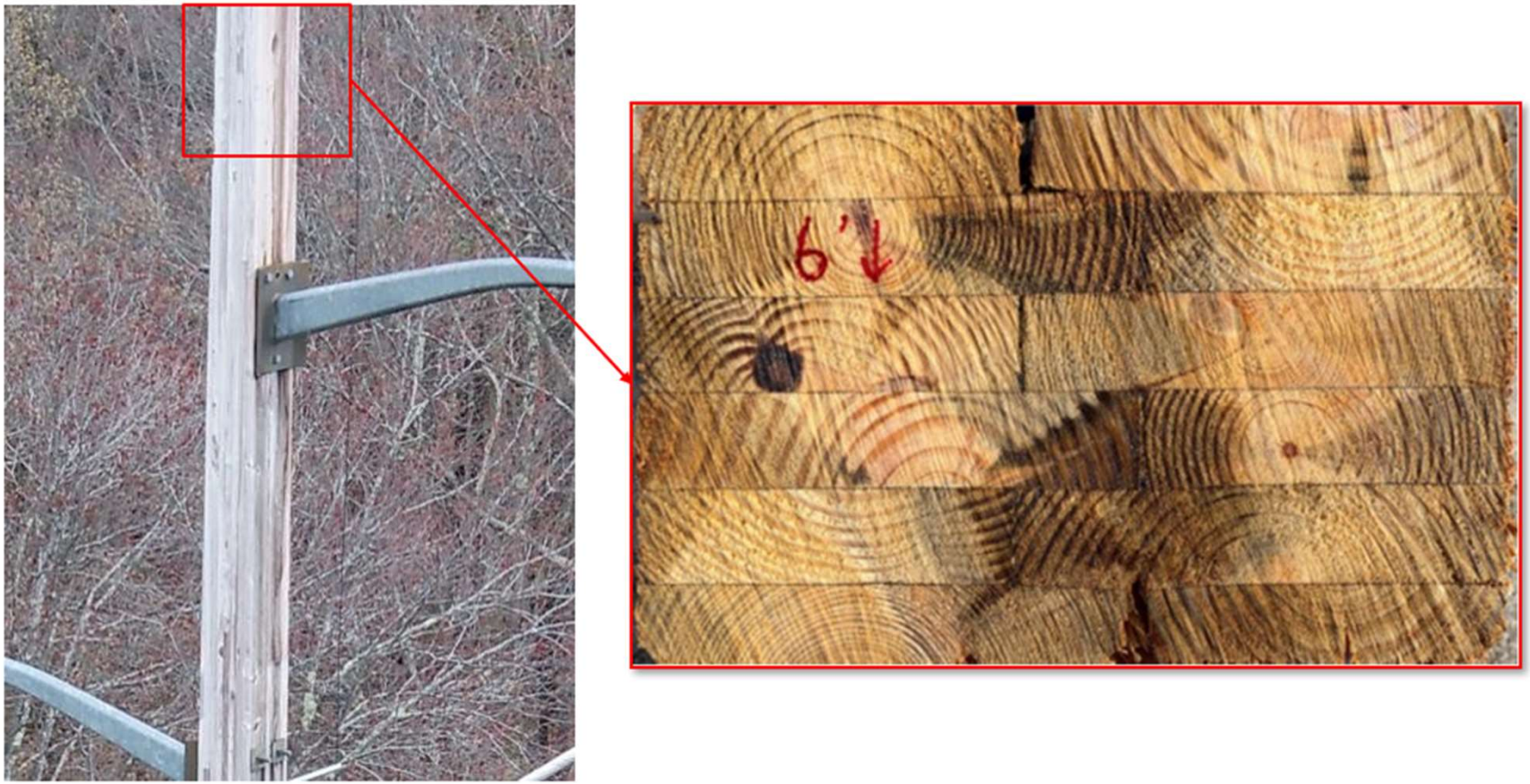
- Structures are graded in accordance with Electric Power Research Institute (EPRI) Guidelines
  - *A: Nominal Defect – No Action Required*
  - *B: Minimal Defect – Monitor Degradation*
  - *C: Moderate Defect – Repair or Replace under next maintenance*
  - *D: Severe Defect – Repair, Reinforce, or Replace 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



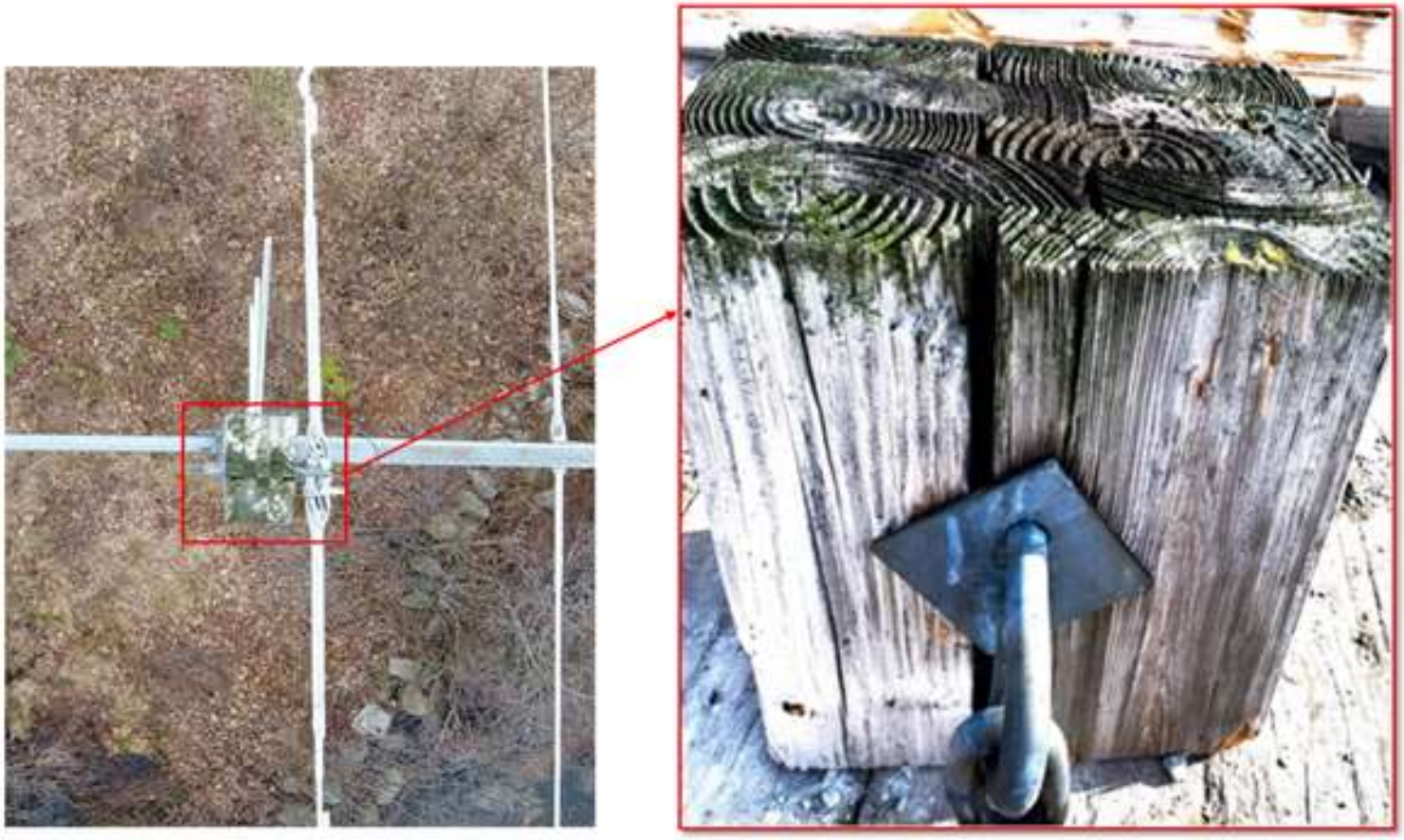
Sample Laminated Structure Base –
Sawdust from Insect Damage –
G128 Line

Inspection Photos



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

Inspection Photos



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

Inspection Photos

Woodpecker Damage –
G128 Line, Structure #57

Woodpecker Damage –
G128 Line, Structure #63

Inspection Photos

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

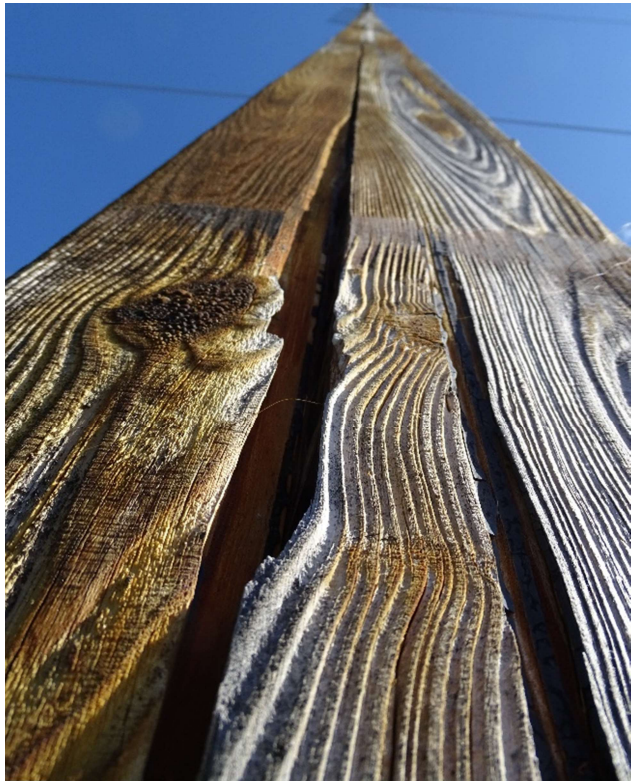
Extensive Rot –
K105 Line, Structure #67

Inspection Photos

Rotten Pole Top –
K105 Line, Structure #20

Woodpecker Damage –
K105 Line, Structure #54

Inspection Photos



Side Crack –
L175 Line, Structure #122

Crack Through Woodpecker Hole –
L175 Line, Structure #139

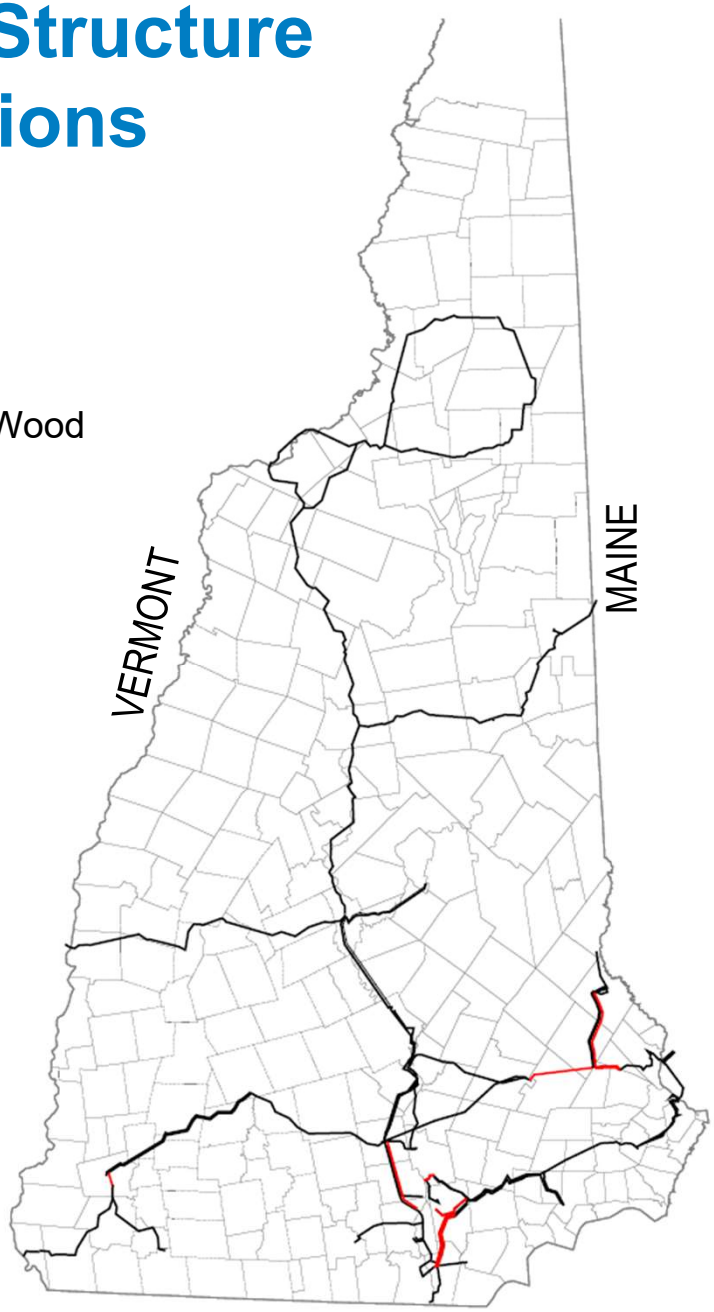
Inspection Photos

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



Project Scope

- Replacement of all laminated wood structures (546) across eight 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 will be assessed in the coming months
  - Additional structure replacement projects will be presented to PAC if necessary
  - There is potential for all laminated wood structures to require replacement

Summary of Work

Line*	Total Length (Miles)	Replacement LWS Structures	Total Structures**	Estimated Cost (-25% / +50%)	In-Service Date
G128	15.0	77	165	$12.6 M	December 2021
L175	13.0	115	145	$19.3 M	December 2021
K105	10.8	79	112	$14.7 M	December 2022
X116	11.2	139	141	$26.0 M	December 2022
Z119	11.1	136	140	$25.4 M	December 2022
Total	61.1	546	703	$98.0 M	-

* All lines are 115-kV
** Remaining structures include steel and round wood

Questions