EVERSOURCE

New Hampshire Asset Condition Structure Replacements – Lines 367, A126, A152, B143, K174, and M127

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Introduction

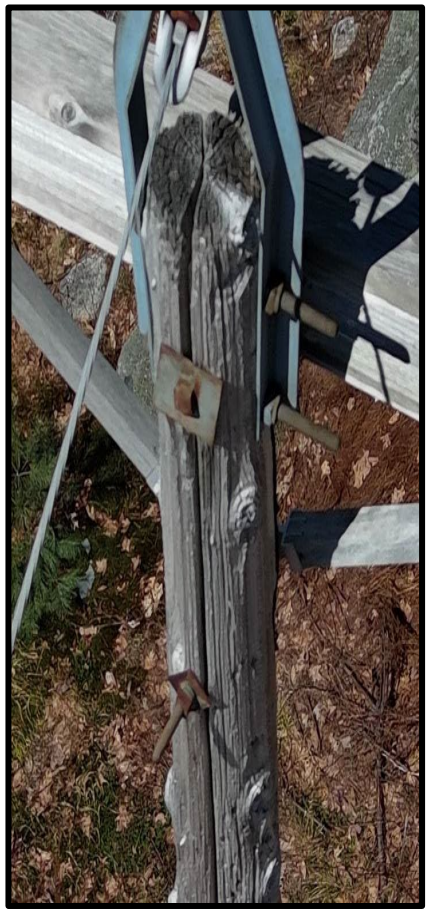
- The following presentation includes six asset condition structure replacement projects on Lines 367, A126, A152, B143, K174, and M127
- The projects are being presented together using a modified presentation template in an effort to efficiently inform stakeholders of similar, planned asset condition projects spread throughout Southern New Hampshire
  - Information common to multiple projects is provided in the introductory slides, followed by additional sections with project-specific details
- Structures planned for replacement via these projects consist mainly of wood H-frame structures
  - Existing lines consist mainly of wood and steel H-frame structures
  - Line were originally constructed between 1953 and 1970

Structure Inspections and Ratings

- All projects were initiated due to recent line inspections
- Visual inspections identified issues such as pole splitting, checking, cracking, pole top/base rot, pole bending, woodpecker damage, and other forms of decay
  - Structures receiving visual inspection ratings based on 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
- Overall structure ratings and replacement plans were developed based on visual inspections, engineering analysis, field testing, and ROW access considerations
  - Details are provided for each project based on Appendix C to the New England Transmission Owner Asset Condition Process Guide

Line 367 Structure 406
Pole top rot, splitting at attachment points, and checking along pole

Line B143 Structure 24
Pole top rot and splits, bending



Line M127 Structure 187
Major splitting, rusting hardware

Structures with Engineering Concerns

- Eversource analyzes the loading of existing and new structures during the design phase of a project
- **Overstressed structures**
  - Baseline loading analysis is performed using existing conditions and the National Electric Safety Code (NESC) in place at the time of construction
  - In some cases, existing structures were found to be overstressed based on this analysis
  - Overstressed structures must be reinforced or replaced as appropriate
- **Swing violations**
  - Analysis also identified some structures with swing violations, which are instances when required clearances between conductor and its supporting structure are not met
  - Swing violations are typically addressed with the addition of insulator struts and do not require full structure replacements
- **Uplift violations**
  - In some cases, replacement of original wood structures with taller steel structures can reduce insulator tension on adjacent structures and create “uplift” conditions
  - Uplift conditions may require the replacement of adjacent structures
- Structure replacements or modifications to address these issues are described in more detail for each project

Figure A

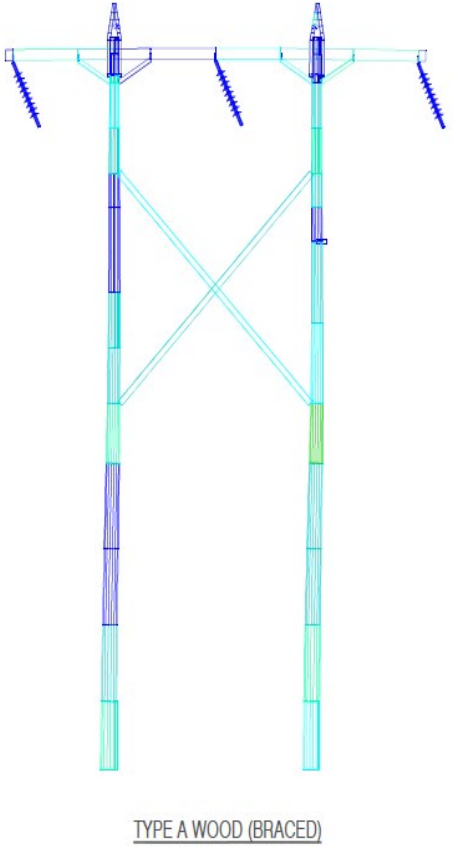


Figure B

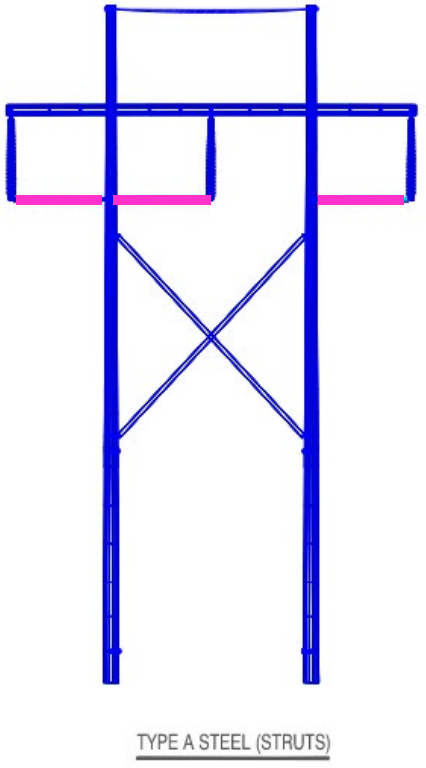


Figure C

Figure A & B - Example of overstressed wood structure reinforced with cross bracing
Figure C – Example of insulator struts (Pink) to mitigate swing violations

Proximity Structures and Last Remaining Wood

Proximity Structures (i.e. access efficiency replacements)

- As ROW access plans are developed for a project, Eversource evaluates whether additional Category B wood structures can be efficiently replaced using access roads and/or matting installed to reach Category C structures
    - Replacing these structures alongside Category C structures can take advantage of existing access, matting, wetland impacts, mobilization costs, and permitting, as opposed to incurring the costs and re-permitting of a future project to do similar work
- Category B structures replaced due to access efficiencies are typically original wood structures that have reached or exceeded their expected useful life
    - Newer Category B structures are not typically replaced due to access efficiencies

Last remaining wood structures

- If a line will have less than 10% of its original wood structures remaining after accounting for structure replacements needed for other reasons, Eversource evaluates whether the remaining wood structures should also be replaced
- When the number of original wood structures remaining is small, it is more efficient to replace these structures using crews already mobilized to replace other structures rather than remobilizing in the near future to perform additional replacements

Example of Proximity Structure Evaluation – Line K174

- Access to Category C structure (red data point) requires $1.29 M in access costs due to:
  - Improvements to unmaintained public road (NH Class VI road, Cat Hole Road)
  - Matting and temporary access roads within ROW
- Replacing adjacent Category B wood structures (blue data points) avoids potentially-duplicative access costs for future projects

Previous Asset Management and Maintenance Strategies

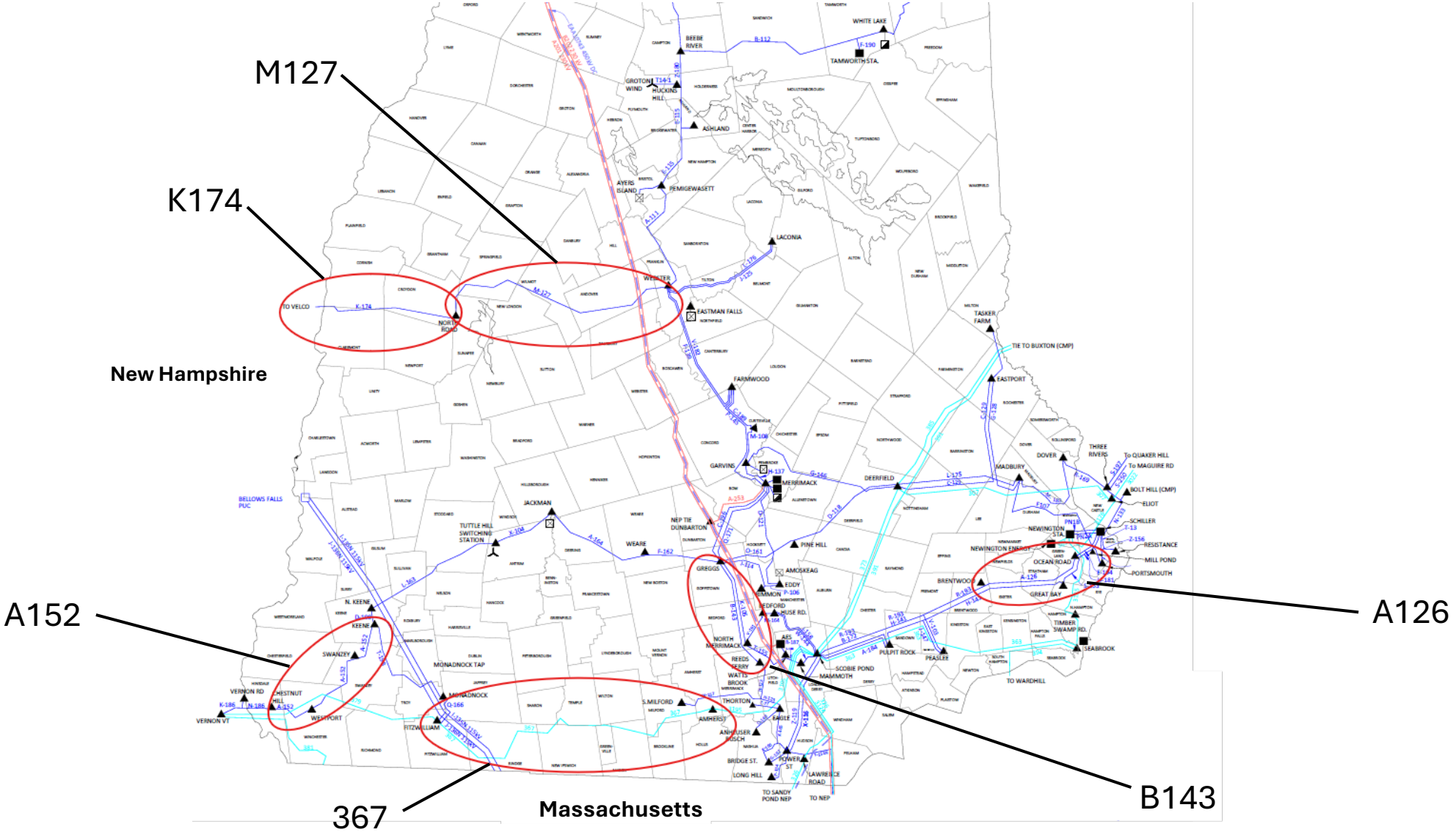
Preventative Maintenance and Other Practices	
Issue	**Status**
Structures	Life-extending wood structure treatments are applied approximately every 8 years during groundline inspections

Project Needs and Drivers

Other Concerns

Other Concerns	
Conductors	• No needs identified at this time
Insulators	• No needs identified at this time
Shield Wire	• No needs identified at this time
Planning	• No needs identified at this time
Operational	• No needs identified at this time
Telecommunication	• Lines were evaluated for potential installation of Optical Ground Wire (OPGW) to improve telecommunications capabilities • However, no need for OPGW on any of the lines included in this presentation was identified

Project Locations: New Hampshire



Line 367

Background Information

Line 367

Line 367

Key Details	
Location	**From:** Amherst Substation *Amherst, NH* **To:** Fitzwilliam Substation *Fitzwilliam, NH*
Line Length	31.83 miles
Operating Voltage	345 kV
Age and Upgrade History	• Originally constructed in 1970 • There were 150 wood structure replacements with steel structures between 2017-2020 on this line
Prior PAC Presentations	• ACL# 187: 2019 Presentation • ACL# 57: 2017 Presentation

Existing Structures

Material	Configuration	Number	Avg. age
Wood	Single-circuit H-frame	97	55 years
Steel	Single-circuit H-frame	184	7 years

Existing Conductor

Type	Length	Avg. age
2-850.8 ACSR	31.83 miles	55 years

Existing Shield Wire

Type	Length	Avg. age
0.646 Fiber OPGW	31.83 miles	14 years
7#8 Alumoweld	31.83 miles	55 years

Project Needs and Drivers

Structure Concerns

Line 367

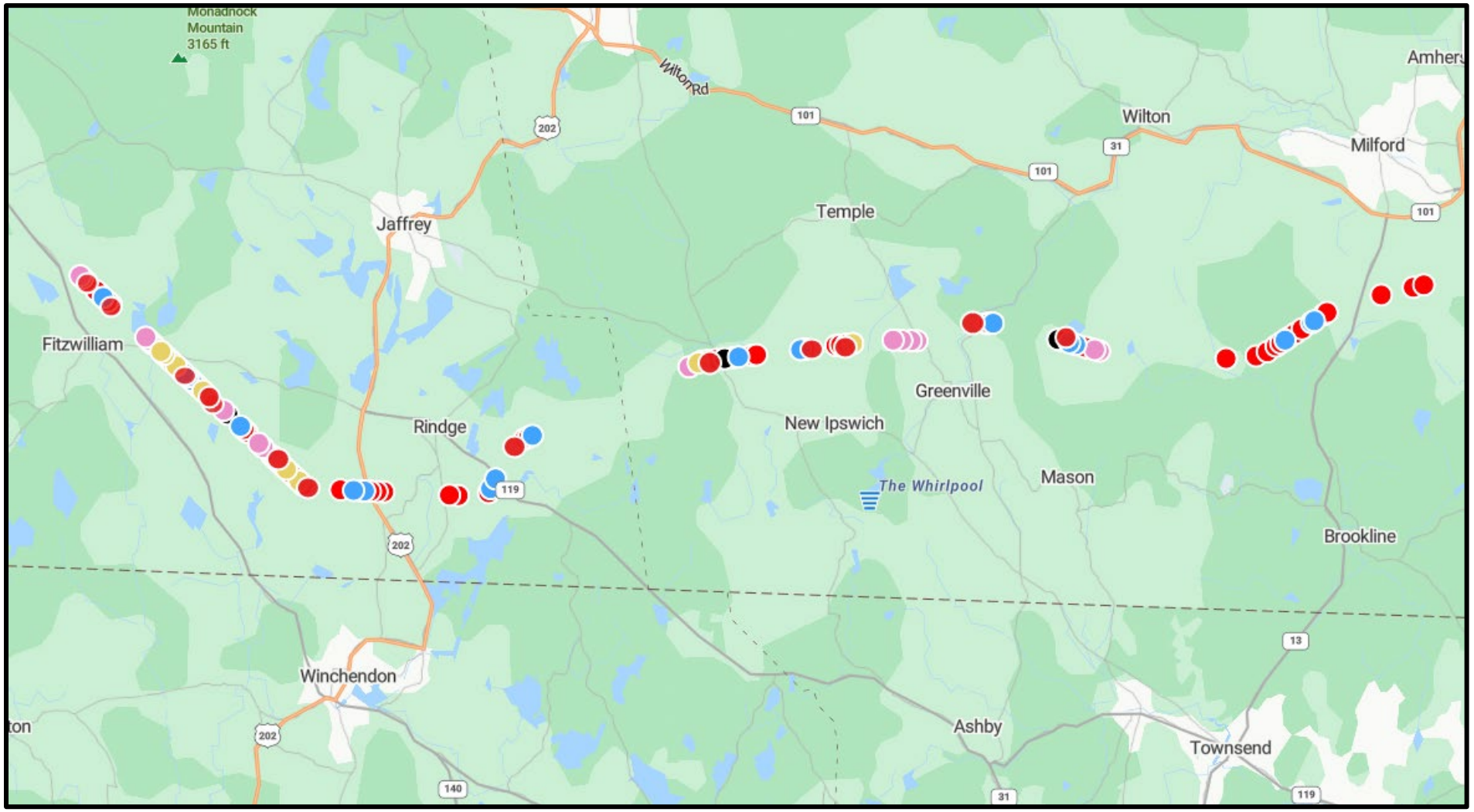
Structure Concerns	
Primary Concerns	
Structure deterioration	• Recent inspections identified 51 Category C wood structures • Affected structures are approximately 55 years old and have reached the end of the typical useful life for 345 kV natural wood structures (40 – 60 years) • Additionally, vandalism (bullet holes) were found on one steel structure, this is a Category C steel structure
Engineering Concerns	• Additional Category B structures were identified for either replacement or the addition of struts to mitigate swing violations
Secondary Concerns	
Category B structures	• Category B structures are in close proximity to the work sites that will be required to replace the Category C structures • All Category B remaining wood structures are original to the line installation and are approximately 55 years old

Summary of Current Structure Grades		
Category	**Recommended Action**	**Number of Structures**
A	No replacement required due to deterioration	90
B	Consider replacement in conjunction with other structure replacements	139 • 8 swing violations • 21 proximity • 17 last remaining wood
C	Initiate planned structure replacement project **or** Replace as part of upcoming structure replacement project	52
D	Replace immediately (emergency replacement)	0
Total		**281**

Project Needs and Drivers

Structure Concerns – Map (Line 367)

Line 367



- Category C Structures
- Engineering Concern
- Strut Installations
- Proximity Structures
- Last Remaining Wood

Evaluated Solution Alternatives

Line 367

Alternative 1

Base Alternative, Replace Structures Requiring Immediate Replacement	

Description	• **57 total structure replacements**
	  • Replace 51 Category C wood structures
	  • Replace 1 Category C steel structure
	  • Replace 5 Category B wood structures with swing violations
	  • Install struts on 2 existing structures

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• No
Advanced transmission technologies to be considered	• None. No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	• **$20.717 M (-25%, +50%)**
Longer-term transmission needs addressed	• N/A
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame and designed in accordance with the current NESC requirements

Evaluated Solution Alternatives

Alternative 2

Line 367

Base Alternative, Plus Proximity Structures	

Description	• **81 total structure replacements**
	  • Replace 51 Category C wood structures
	  • Replace 1 Category C steel structure
	  • Replace 8 Category B wood structures with swing violations
	  • Replace 21 Category B proximity structures
	  • Install struts on 2 existing structures

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• Yes, Category B proximity structure concerns are addressed
Advanced transmission technologies to be considered	• None • No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	• **$26.842 M (-25%, +50%)**
Longer-term transmission needs addressed	• N/A
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame and in accordance with the current NESC requirements

Evaluated Solution Alternatives

Alternative 3

Line 367

Alternative 2, Plus Last Remaining Wood Structures	

Description	• **98 total structure replacements**:
	  • Replace 51 Category C wood structures
	  • Replace 1 Category C steel structure
	  • Replace 8 Category B wood structures with swing violations
	  • Replace 21 Category B proximity structures
	  • Replace 17 Category B last remaining wood structures
	  • Install struts on 4 existing structures

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• Yes, Category B proximity structure concerns are addressed
Advanced transmission technologies to be considered	• None • No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	• **$32.362 M (-25%, +50%)**
Longer-term transmission needs addressed	• N/A
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame and in accordance with the current NESC requirements

Comparative Analysis of Alternatives

Line 367

Comparison

Key Criteria	Alternative 1	Alternative 2	Alternative 3 (Preferred)
Addresses primary need	Yes	Yes	Yes
Addresses secondary need	No	Yes	Yes
Cost	**$20.717 M (-25%, +50%)** • $364 k/structure	**$26.842 M (-25%, +50%)** • $331 k/structure	**$32.362 M (-25%, +50%)** • $330 k/structure
Constructability concerns or advantages	Good – no unusual problems anticipated	Good – no unusual problems anticipated	Good – no unusual problems anticipated
Siting, environmental and regulatory issues	• Resolves immediate structure issues but does not minimize repeated future disturbances within the same section of the ROW by leaving Category B structures located in close-proximity to the work sites	• Minimizes repeated near-future disturbances within the same section of the ROW by replacing the Category B structures located in close-proximity to the work sites	• Minimizes repeated near-future disturbances within the same section of the ROW by replacing all Category B last remaining wood structures located in close-proximity to the work sites

Conclusion

- Alternatives 1 and 2 both address the immediate needs but leave original wood structures in place
  - Original wood structures are likely to deteriorate further and need to be replaced in the near future
- Alternative 3:
  - Addresses immediate and near-future asset condition concerns
  - Eliminates repeated disturbances to this ROW
  - Avoids additional future project cost to replace original wood structures
- **Alternative 3 is the preferred solution**

Line A126

Background Information

Line A126

Line A126

Key Details	
Location	**From:** Brentwood Substation *Brentwood, NH* **To:** Ocean Road Substation *Portsmouth, NH*
Line Length	15.3 miles
Operating Voltage	115 kV
Age and Upgrade History	• Originally constructed in 1953 • Several structure replacements since 2018
Prior PAC Presentations	• ACL 393: 2023 Presentation • ACL 100: 2018 Presentation

Existing Structures			
Material	**Configuration**	**Number**	**Avg. age**
Wood	Single-circuit H-frame	71	72 years
Steel	Single-circuit H-frame	107	5 years
Steel	Single-circuit H-frame	2	50 years

Existing Conductor		
Type	**Length**	**Avg. age**
477 kcmil 26/7 ACSR	15.3 miles	72 years

Existing Shield Wire		
Type	**Length**	**Avg. age**
7#8 Alumoweld	15.3 miles	72 years

Project Needs and Drivers

Structure Concerns

Line A126

Structure Concerns	
Primary Concerns	
Wood structure deterioration	• Recent inspections have identified 8 Category C structures • Affected structures are 72 years old and have reached the end of the typical useful life for 115 kV natural wood structures (40 – 60 years)
Engineering Concerns	• Additional Category B structures were identified for replacement to mitigate uplift
Secondary Concerns	
Category B structures	• Two Category B structures are in close proximity to the work sites that will be required to replace the Category C structures • All Category B wood structures are original to the line and are approximately 72 years old

Project Needs and Drivers

Structure Concerns

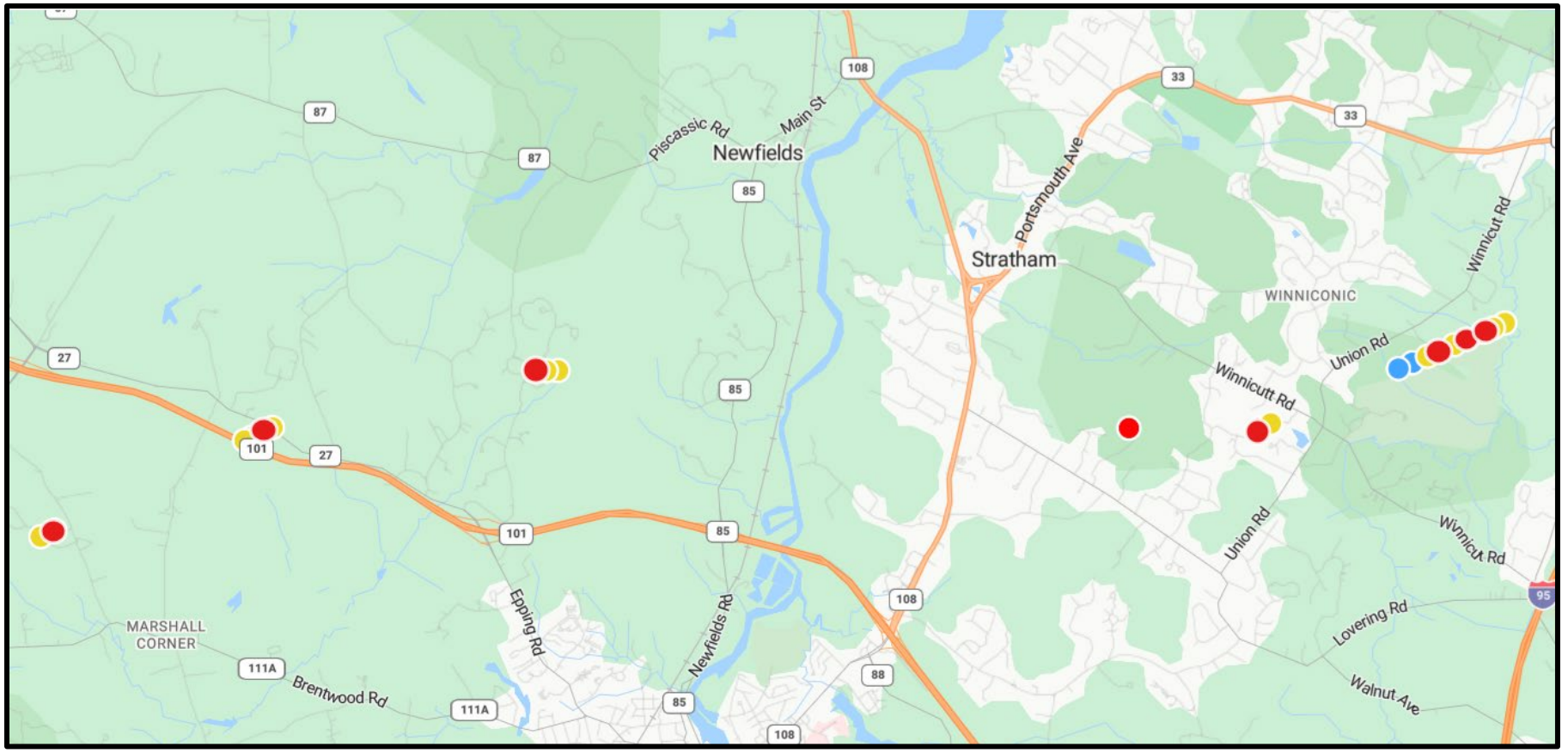
Line A126

Summary of Current Structure Grades		
Category	**Recommended Action**	**Number of Structures**
A	No replacement required due to deterioration	103
B	Consider replacement in conjunction with other structure replacements	69 • 11 uplift
C	Initiate planned structure replacement project **or** Replace as part of upcoming structure replacement project	8
D	Replace immediately (emergency replacement)	0
Total		**180**

Project Needs and Drivers

Structure Concerns – Map (Line A126)

Line A126



- **Category C Structures**
- **Engineering Concern**
- **Proximity Structures**

Evaluated Solution Alternatives

Line A126

Alternative 1

Base Alternative	

Description	• **18 total structure replacements**
	  • Replace 8 Category C wood structures
	  • Replace 10 Category B structures wood structures due to uplift concerns
	• Remove 1 Category B wood structure due to uplift concerns

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• No, Category B structure concerns are not addressed
Advanced transmission technologies to be considered	• None. No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	**$6.702 M (-25%, +50%)**
Longer-term transmission needs addressed	• N/A
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame and three-pole structures designed in accordance with the current NESC requirements

Evaluated Solution Alternatives

Line A126

Alternative 2

Base Alternative, Plus Proximity Structures	

Description	• **20 total structure replacements**
	  • Replace 8 Category C wood structures
	  • Replace 10 Category B structures wood structures due to uplift concerns
	  • Replace 2 Category B structures proximity wood structures
	• Remove 1 Category B wood structure due to uplift concerns

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• Yes, all Category B structure concerns are addressed
Advanced transmission technologies to be considered	• None. No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	**$7.406 M (-25%, +50%)**
Longer-term transmission needs addressed	• Yes
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame and three-pole structures designed in accordance with the current NESC requirements

Comparative Analysis of Alternatives

Line A126

Comparison		
Key Criteria	**Alternative 1**	**Alternative 2 (Preferred)**
Addresses primary need	Yes	Yes
Addresses secondary need	No	Yes
Cost	**$6.702 M (-25%, +50%)** • $372 k/structure	**$7.406 M (-25%, +50%)** • $370 k/structure
Constructability concerns or advantages	Good – no unusual problems anticipated	Good – no unusual problems anticipated
Siting, environmental and regulatory issues	• Resolves immediate structure issues but does not minimize repeated future disturbances within the same section of the ROW by leaving Category B structures located in close-proximity to the work sites	• Eliminates repeated future disturbances within the same ROW while taking advantage of the significant access effort, engineering permitting, outreach, etc. by replacing Category B proximity and last remaining wood structures

Conclusion

- Total access costs to support this project is estimated to be $1.87 M for the preferred scope
  - The 8 C-rated structures are dispersed across the full length of the 15.3-mile A126 line challenging access routes, including remote or environmentally sensitive areas requiring significant matting/ROW improvements
  - Taking advantage of a single mobilization effort creates cost efficiencies in access as well as engineering, siting, permitting, and project management efforts
- Under Alternative 1, the average cost per structure replacement is $372 k
- Under Alternative 2, the incremental cost to replace proximity structures is approx. $352 k per structure
- Although under Alternative 2, the average cost per structure is only slightly lower, the incremental cost of adding the proximity structures is $352k per structure, and including the proximity structures avoids the need to re-access challenging terrain in the near future
- **Alternative 2 is the preferred solution**

Line A152

Background Information

Line A152

Line A152

Key Details	
Location	**From:** Emerald Street Substation *Keene, NH* **Via:** Westport Substation *Westport, NH* **To:** Chestnut Hill Substation *Hinsdale, NH* **The line includes a radial tap to Swanzey Substation in Swanzey, NH*
Line Length	16.9 miles
Operating Voltage	115 kV
Age and Upgrade History	• Originally constructed in 1968 • Several structure replacements since 2017
Prior PAC Presentations	• ACL 105: 2018 PAC Presentation • ACL 321: 2021 PAC Presentation • ACL 424: 2023 PAC Presentation

Existing Structures

Material	Configuration	Number	Avg. age
Wood	Single-circuit H-frame	88	57 years
Wood	3-pole	7	57 years
Steel	H-frame and monopole	145	1 – 17 years

Existing Conductor

Type	Length	Avg. age
1590 ACSR (A152-1)	4.76 miles	17 years
795 36/1 “COOT” ACSR (A152-2)	12.11 miles	57 years
1590 ACSR (A152-3)	0.03 miles	17 years

Existing Shield Wire

Type	Length	Avg. age
3#6 Copperweld	0.12 miles	57 years
7#8 Alumoweld	12.02 miles	57 years
84 Fiber OPGW	4.76 miles	17 years

Project Needs and Drivers

Line A152

Structure Concerns

Structure Concerns	
Primary Concerns	
Wood structure deterioration	• Recent inspections identified 28 Category C structures • Affected structures are 57 years old original wood structures and are reaching the end of the typical useful life for 115 kV natural wood structures
Engineering concern	• Line A152 has 35 overstressed wood structures, 6 uplift wood structures, and 1 uplift steel structure which will require either structure replacement or the addition of cross-bracing
Copperweld shield wire	• Line A152 has 0.161 miles of Copperweld shield wire on structures 73 through 76 • The existing 57-year-old Copperweld shield wire is obsolete and susceptible to failure • For additional details, please see the Eversource Copperweld Shield Wire Asset Management Strategy presentation to the Planning Advisory Committee on October 23, 2025
Secondary Concerns	
Category B structures	• 19 Category B structures are in close proximity to the required work sites to replace the Category C structures • If all Category C, overstressed, and proximity structures are replaced, only 7 Category B wood structures will remain on the line • All Category B wood structures are original to the line and are approximately 57 years old

Project Needs and Drivers

Structure Concerns

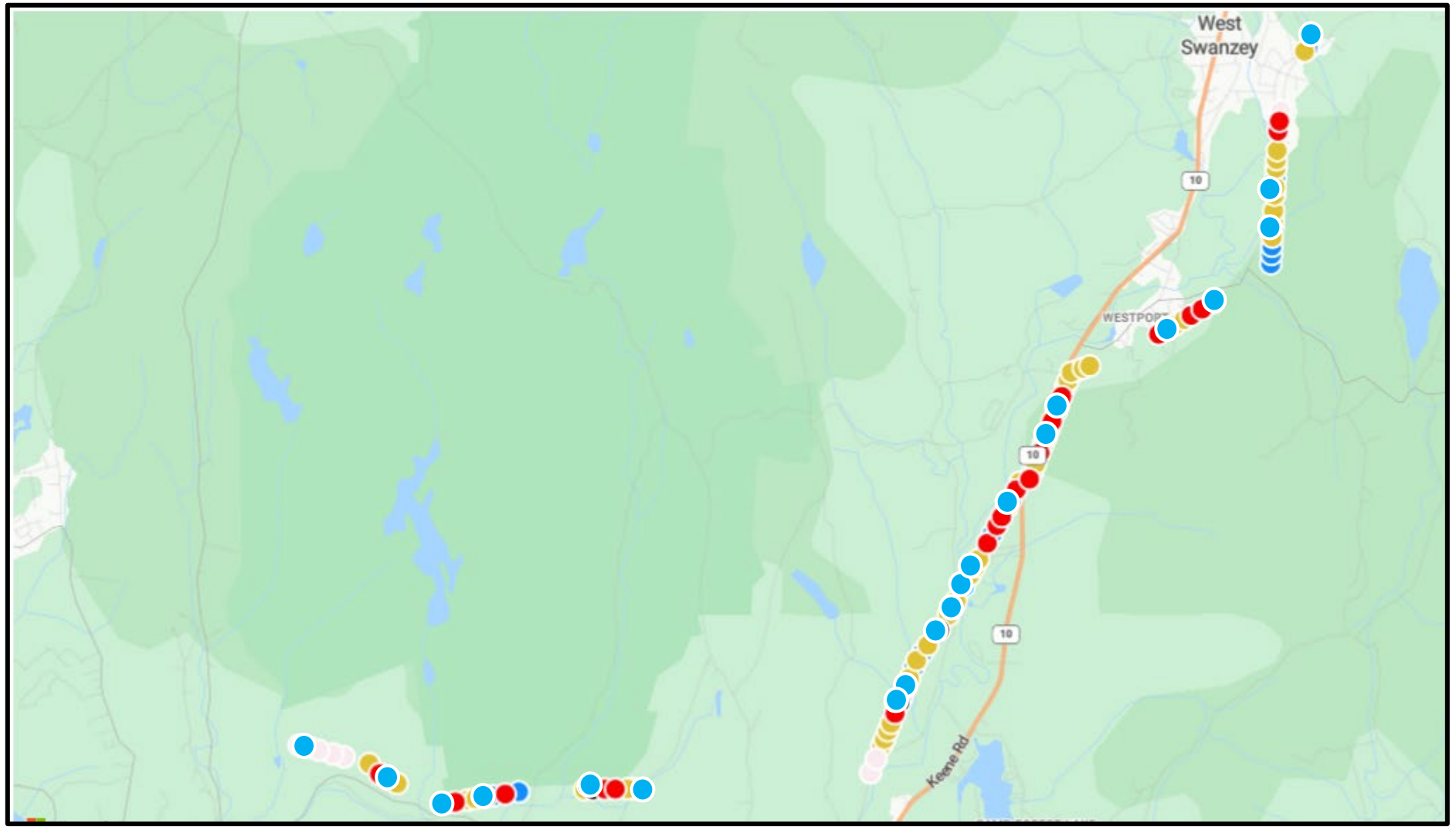
Line A152

Summary of Current Structure Grades		
Category	**Recommended Action**	**Number of Structures**
A	No replacement required due to deterioration	31 • 1 uplift • 1 overstressed
B	Consider replacement in conjunction with other structure replacements	181 • 34 overstressed • 6 uplift • 19 proximity
C	Initiate planned structure replacement project **or** Replace as part of upcoming structure replacement project	28
D	Replace immediately (emergency replacement)	0
Total		**240**

Project Needs and Drivers

Structure Concerns – Map (Line A152)

Line A152



- Category C Structures
- Engineering Concern
- Proximity Structures
- Last Remaining Wood

Evaluated Solution Alternatives

Line A152

Alternative 1

Base Alternative, Targeted Replacements and X-bracing	

Description	• **32 total structure replacements**
	  • Replace 28 Category C wood structures
	  • Replace 4 Category B wood structures that are overstressed
	• Add X-bracing to 35 overstressed original wood structures and guy wires to 1 original wood structure (Vintage 1957)
	• Replace 3#6 Copperweld with 19#10 Alumoweld

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• No, Category B structure concerns are not addressed
Advanced transmission technologies to be considered	• None. No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	**$17.322 M (-25%, +50%)**
Longer-term transmission needs addressed	• No
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame structures designed in accordance with the current NESC requirements

Evaluated Solution Alternatives

Alternative 2

Line A152

Replace all Category C Structures, Overstressed Structures, Proximity Structures, and Last Remaining Wood Structures	

Description	• **96 total structure replacements**
	  • Replace 28 Category C wood structures
	  • Replace 41 wood structures that with engineering concerns (35 overstressed and 6 uplift)
	  • Replace 1 uplift steel running angle pole structure
	  • Replace 19 Category B wood proximity structures due to permitting and its location along the access route and work area
	  • Replace the 7 Category B last remaining wood structures
	• Replace 3#6 Copperweld with 19#10 Alumoweld

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• Yes, all Category B structure concerns are addressed
Advanced transmission technologies to be considered	• None. No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	**$38.131 M (-25%, +50%)**
Longer-term transmission needs addressed	• No
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame structures designed in accordance with the current NESC requirements

Evaluated Solution Alternatives

Alternative 3

Line A152

Partial Rebuild, Replace all Original Wood Structures on the Line and on A152 Segment 2, Replace 795 ACSR Conductor with 1272 ACSS Conductor, and Replace Existing Shield Wires with OPGW	

Description	• **91 total structure replacements**
	  • Replace 28 Category C wood structures
	  • Replace 41 wood structures that with engineering concerns (35 overstressed and 6 uplift)
	  • Replace 1 uplift steel running angle pole structure
	  • Replace 19 Category B wood proximity structures due to permitting and its location along the access route and work area
	  • Replace the 7 Category B last remaining wood structures
	  • *Reconductoring design would facilitate the removal of 5 existing wood structures*
	• **On A152 Segment 2 replace 795 ACSR conductor with 1272 ACSS conductor and replace existing shield wire with OPGW**

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• Yes, all Category B structure concerns are addressed
Advanced transmission technologies to be considered	• None • No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	**$69.279 M (-50%, +200%)**
Longer-term transmission needs addressed	• Yes
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame structures designed in accordance with the current NESC requirements

Comparative Analysis of Alternatives

Line A152

Comparison

Key Criteria	Alternative 1	Alternative 2 (Preferred)	Alternative 3
Addresses primary need	Yes	Yes	Yes
Addresses secondary need	No	Yes	Yes
Cost	**$17.322 M (-25%, +50%)** • $541 k/structure	**$38.131 M (-25%, +50%)** • $397 k/structure	**$69.279 M (-50%, +200%)** • $397 k/structure • Additional $31.1M for reconductoring/OPGW on A152-2
Constructability concerns or advantages	Good – no unusual problems anticipated	Good – no unusual problems anticipated	Good – no unusual problems anticipated
Siting, environmental and regulatory issues	• Resolves immediate structure issues but does not minimize repeated future disturbances within the same section of the ROW by leaving Category B structures located in close-proximity to the work sites	• Eliminates repeated future disturbances within the same ROW while taking advantage of the significant access effort, engineering, permitting, outreach, etc. by replacing Category B proximity and last remaining wood structures	• Eliminates repeated future disturbances within the same ROW while taking advantage of the significant access effort, engineering, permitting, outreach, etc. by replacing Category B proximity, last remaining wood structures, and aging conductor/shield wire

Conclusion

- Alternative 1 addresses the immediate needs but invests in reinforcements (cross-bracing) on 57-year-old original wood structures that will continue to deteriorate further and need to be replaced in the near future
- Alternative 2 addresses immediate and near future asset condition concerns, eliminates repeated disturbances to this ROW and avoids additional future project cost to replace last remaining wood structures as they continue to decline in the near future
- Alternative 3 is unnecessary at this time, as there is no known immediate need to replace the conductor or install OPGW
- **Alternative 2 is the preferred solution**

Line B143

Background Information

Line B143

Line B143

Key Details	
Location	**From:** Greggs Falls Substation *Goffstown, NH* **To:** Reeds Ferry Substation *Merrrimack, NH*
Line Length	11.1 miles
Operating Voltage	115 kV
Age and Upgrade History	• Originally constructed in 1966 • Projects between 2018 and 2024 replaced 87 of the original wood structures on the line
Prior PAC Presentations	• ACL# 198: 2019 Presentation • ACL# 398: 2023 Presentation

Existing Structures

Material	Configuration	Number	Avg. age
Wood	Single-circuit H-frame	18	59 years
Wood	Single-circuit H-frame	34	48 years
Wood	Single-circuit H-frame	4	10 years
Steel	Single-circuit H-frame	94	6 years

Existing Conductor

Type	Length	Avg. age
795 36/1 ACSR	11.1 miles	59 years

Existing Shield Wire

Type	Length	Avg. age
0.646" 144F OPGW	11.1 miles	2 years
0.646" 48F OPGW	11.1 miles	2 years

Project Needs and Drivers

Structure Concerns

Line B143

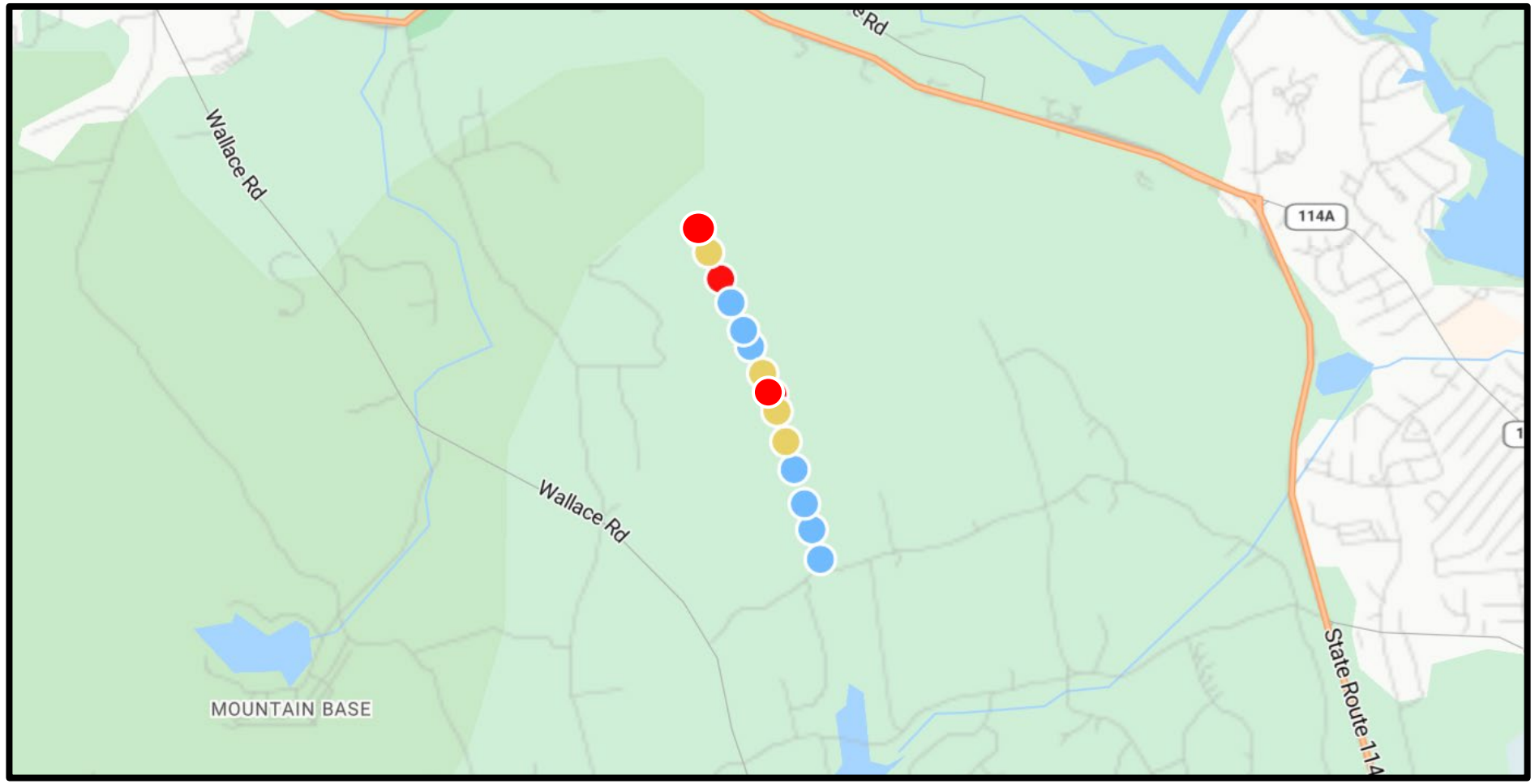
Structure Concerns	
Primary Concerns	
Wood structure deterioration	• Recent inspections have identified 4 Category C wood structures • Affected structures are on average 59 years old and have reached the end of the typical useful life for 115 kV natural wood structures (40 – 60 years)
Engineering structures	• Four additional Category B structures were identified for replacement to mitigate uplift
Secondary Concerns	
Category B structures	• Eight Category B structures are in close proximity to the work sites that will be required to replace the Category C structures • All Category B remaining wood structures were installed in 1966 and 1977, and are approximately 59 and 48 years old

Summary of Current Structure Grades		
Category	**Recommended Action**	**Number of Structures**
A	No replacement required due to deterioration	47
B	Consider replacement in conjunction with other structure replacements	99 • 4 uplift
C	Initiate planned structure replacement project **or** Replace as part of upcoming structure replacement project	4
D	Replace immediately (emergency replacement)	0
Total		**150**

Project Needs and Drivers

Structure Concerns – Map (Line B143)

Line B143



- **Category C structures**
- **Engineering structures**
- **Proximity structures**

Evaluated Solution Alternatives

Line B143

Alternative 1

Base Alternative	

Description	• **8 total wood structure replacements**
	  • Replace 4 Category C structures
	  • Replace 4 Category B structures that are overstressed from uplift

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• No, Category B proximity structure concerns are addressed
Advanced transmission technologies to be considered	• None • No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	• **$3.217 M (-25%, +50%)**
Longer-term transmission needs addressed	• N/A
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame and in accordance with the current NESC requirements

Evaluated Solution Alternatives

Line B143

Alternative 2

Base Alternative, Plus Proximity Structures	

Description	• **16 total wood structure replacements**
	  • Replace 4 Category C structures
	  • Replace 4 Category B structures that are overstressed from uplift
	  • Replace 8 Category B proximity structures

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• Yes
Advanced transmission technologies to be considered	• None • No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	• **$5.617 M (-25%, +50%)**
Longer-term transmission needs addressed	• N/A
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame and designed in accordance with the current NESC requirements

Comparative Analysis of Alternatives

Line B143

Comparison

Key Criteria	Alternative 1	Alternative 2 (Preferred)
Addresses primary need	Yes	Yes
Addresses secondary need	No	Yes
Cost	**$3.217 M (-25%, +50%)** • $402 k/structure	**$5.617 M (-25%, +50%)** • $351 k/structure
Constructability concerns or advantages	Good – no unusual problems anticipated	Good – no unusual problems anticipated
Siting, environmental and regulatory issues	• Resolves immediate structure issues but does not minimize repeated future disturbances within the same section of the ROW by leaving Category B structures located in close-proximity to the work sites	• Minimizes repeated near-future disturbances within the same section of the ROW by replacing the Category B structures located in close-proximity to the work sites

Conclusion

- Alternative 1 addresses the immediate needs but leaves original wood structures that will continue to deteriorate further and need to be replaced in the near future
- Alternative 2:
  - Addresses immediate and near future asset condition concerns, eliminates repeated disturbances to this ROW location and avoids additional future project cost to replace wood structures in proximity to the current work site as they continue to decline in the near future
- Under Alternative 1, the average cost per structure replacement is $402 k
- Under Alternative 2, the incremental cost to replace the proximity structures is approx. $300 k per structure when added to the overall project scope
- **Alternative 2 is the preferred solution**

Line K174

Background Information

Line K174

Line K174

Key Details	
Location	**From:** North Road Substation *Sunapee, NH* **To:** Ascutney Substation (VELCO) *Weathersfield, VT*
Line Length	16.27 miles • *Eversource portion of line to VT border*
Operating Voltage	115 kV
Age and Upgrade History	• Originally constructed in 1967 • Several structure replacements since 2016
Prior PAC Presentations	• ACL# 103: 2018 Presentation • ACL# 203: 2019 Presentation

Existing Structures

Material	Configuration	Number	Avg. age
Wood	Single circuit H-Frame	59	58 years
Steel	Single circuit H-Frame	145	7 years

Existing Conductor

Type	Length	Avg. age
795 36/1	16.27 miles	58 years

Existing Shield Wire

Type	Length	Avg. age
48 Fiber OPGW	16.27 miles	5 years
7#8 Alumoweld	16.27 miles	58 years

Project Needs and Drivers

Structure Concerns

Line K174

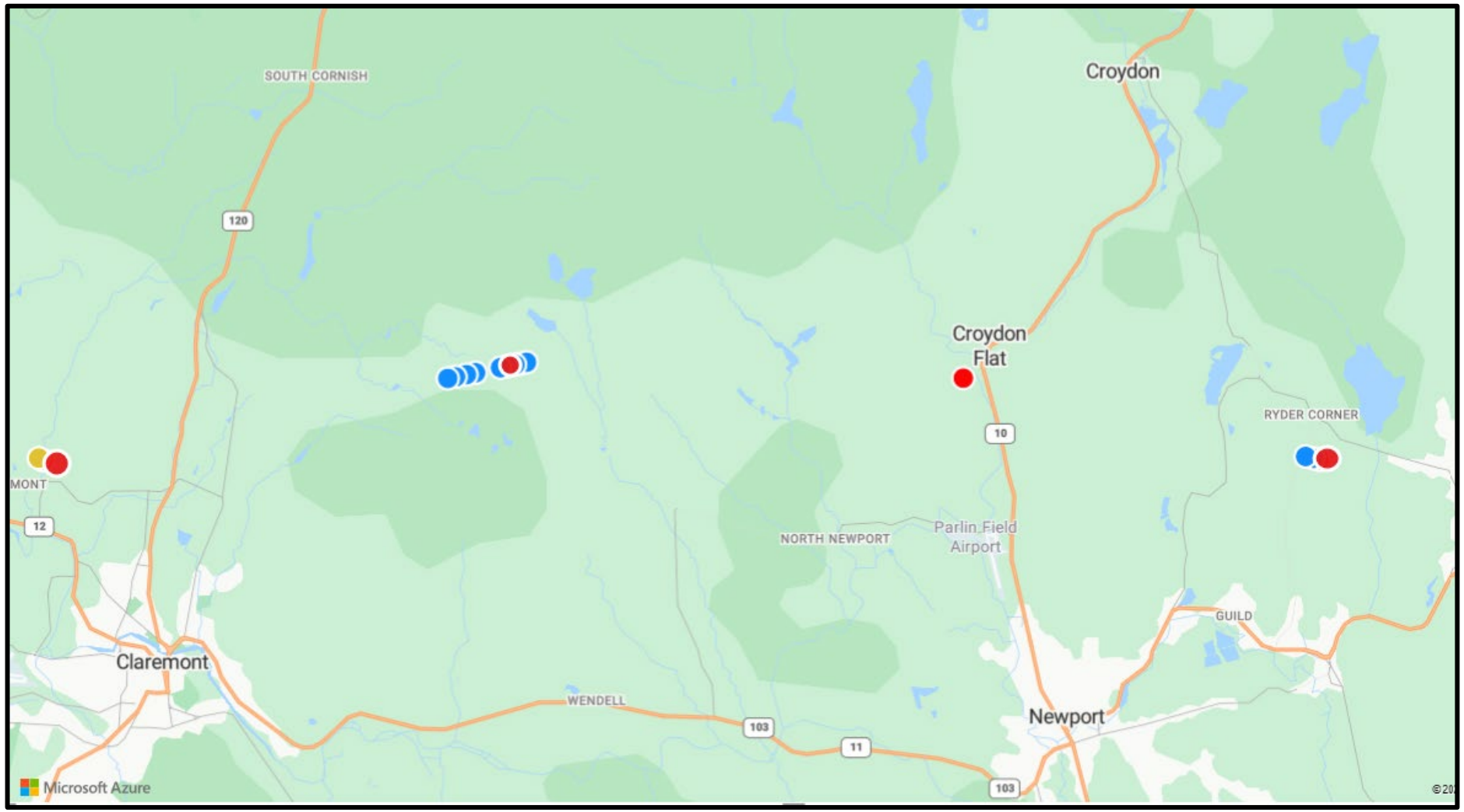
Structure Concerns	
Primary Concerns	
Wood structure deterioration	• Recent inspections have identified 4 Category C wood structures • Affected structures are on average 58 years old and are reaching the end of the typical useful life for 115 kV natural wood structures (40 – 60 years)
Engineering concern	• An additional Category B structure was identified for replacement to mitigate uplift violations
Secondary Concerns	
Category B structures	• Category B structures are in close proximity to the required work sites to replace the Category C structures

Summary of Current Structure Grades		
Category	**Recommended Action**	**Number of Structures**
A	No replacement required due to deterioration	73
B	Consider replacement in conjunction with other structure replacements	127 • 10 proximity • 1 uplift
C	Initiate planned structure replacement project **or** Replace as part of upcoming structure replacement project	4
D	Replace immediately (emergency replacement)	0
Total		**204**

Project Needs and Drivers

Structure Concerns – Map (Line K174)

Line K174



- Category C Structures
- Engineering Concern
- Proximity Structures

Evaluated Solution Alternatives

Alternative 1

Line K174

Base Alternative	

Description	• **Replace 5 total wood structures**
	  • Replace 4 Category C structures
	  • Replace 1 uplift Category B wood structures

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• No
Advanced transmission technologies to be considered	• None • No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	**$2.228 M (-25%, +50%)**
Longer-term transmission needs addressed	• No
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame structures designed in accordance with the current NESC requirements

Evaluated Solution Alternatives

Alternative 2

Line K174

Base Alternative, Plus Proximity Structures	

Description	• **Replace 15 total wood structures**
	  • Replace 4 Category C structures
	  • Replace 1 uplift Category B wood structures
	  • Replace 10 Category B proximity structures

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• Yes, Category B proximity structure concerns are addressed
Advanced transmission technologies to be considered	• None • No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	• **$5.542 M (-25%, +50%)**
Longer-term transmission needs addressed	• No
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame structures designed in accordance with the current NESC requirements

Evaluated Solution Alternatives

Alternative 3

Line K174

Alternative 2, Plus Replace Proximity Structures West of Cat Hole Road Access Point *(See slide 6 for reference)*	

Description	• **Replace 21 total wood structures**
	  • Replace 4 Category C structures
	  • Replace 1 uplift Category B wood structures
	  • Replace 16 Category B proximity structures

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• Yes, Category B proximity structure concerns are addressed
Advanced transmission technologies to be considered	• None • No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	• **$7.839 M (-50%, +200%)**
Longer-term transmission needs addressed	• No
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame structures designed in accordance with the current NESC requirements

Comparative Analysis of Alternatives

Line K174

Comparison			
Key Criteria	**Alternative 1**	**Alternative 2 (Preferred)**	**Alternative 3**
Addresses primary need	Yes	Yes	Yes
Addresses secondary need	No	Yes (Proximity structures)	Yes
Cost	**$2.228 M (-25%, +50%)** • $446 k/structure	**$5.542 M (-25%, +50%)** • $370 k/structure	**$7.839 M (-50%, +200%)** • $373 k/structure
Constructability concerns or advantages	Good – no unusual problems anticipated	Good – no unusual problems anticipated	Good – no unusual problems anticipated
Siting, environmental and regulatory issues	• Resolves immediate structure issues but does not minimize repeated future disturbances within the same section of the ROW by leaving Category B structures located in close-proximity to the work sites	• Minimizes repeated near-future disturbances within the same section of the ROW by replacing the Category B structures located in close-proximity to the work sites. Access through Cat Hole Road in Claremont, NH, which is classified as a Class VI road due to degradation. Eight of the ten proximity structures are located on Cat Hole Road. Eversource seeks to take advantage before the road incurs further degradation, and of the temporary access permission to this remote location	• Minimizes repeated near-future disturbances within the same section of the ROW by replacing the Category B structures located in close-proximity to the work sites. Replaces all proximity structures on Cat Hole Road (6 west of access point). Eversource would take advantage before the road incurs further degradation, and of the temporary access permission to this remote location. However, this cost may be unnecessary at this time

Conclusion

- Total access costs to support this project is estimated to be $1.294 M (23% of total cost of the preferred Alt.)
  - Of this, $444k is related to the Cat Hole Road access point *(See Slide 6 for visual of access point)*
  - Due to the significant cost and difficulty of access to Cat Hole Road, Eversource has also calculated the additional cost of replacing all original wood proximity structures west of the entry point for the scope of work in Alternative 2
- The entire right of way contains challenges impacting the access cost, such as challenging terrain (ridge line locations and navigating around steep cliffs), and the Cat Hole Road access point, which requires substantial road improvements.
  - Taking advantage of a single mobilization effort creates cost efficiencies in access as well as engineering, siting, permitting, and project management efforts
- Under Alternative 1, the average cost per structure replacement is $446 k
- Under Alternative 2, the average cost to replace proximity structures is approx. $370 k per structure
- Alternative 3 is an opportunity to minimize future costs and disturbances associated with this area, and may be unnecessary at this time
- **Alternative 2 is the preferred solution**

Line M127

Background Information

Line M127

Line M127

Key Details	
Location	**From:** Webster Substation *Franklin, NH* **To:** North Road Substation *Sunapee, NH*
Line Length	25.8 miles
Operating Voltage	115 kV
Age and Upgrade History	• Originally constructed in 1967 • Several structure replacements in recent years
Prior PAC Presentations	• ACL 425: 2023 Presentation • ACL 205: 2019 Presentation

Existing Structures

Material	Configuration	Number	Avg. age
Wood	Single circuit H-Frame	167	58 years
Wood	3-Pole H-Frame	8	58 years
Steel	Single circuit H-Frame	140	3 years
Steel	3-Pole H-Frame	23	3 years

Existing Conductor

Type	Length	Avg. age
795 ACSR 36/1	25.8 miles	58 years

Existing Shield Wire

Type	Length	Avg. age
0.457 Fiber OPGW	25.8 miles	5 years
7#8 Alumoweld	25.8 miles	58 years

Project Needs and Drivers

Structure Concerns

Line M127

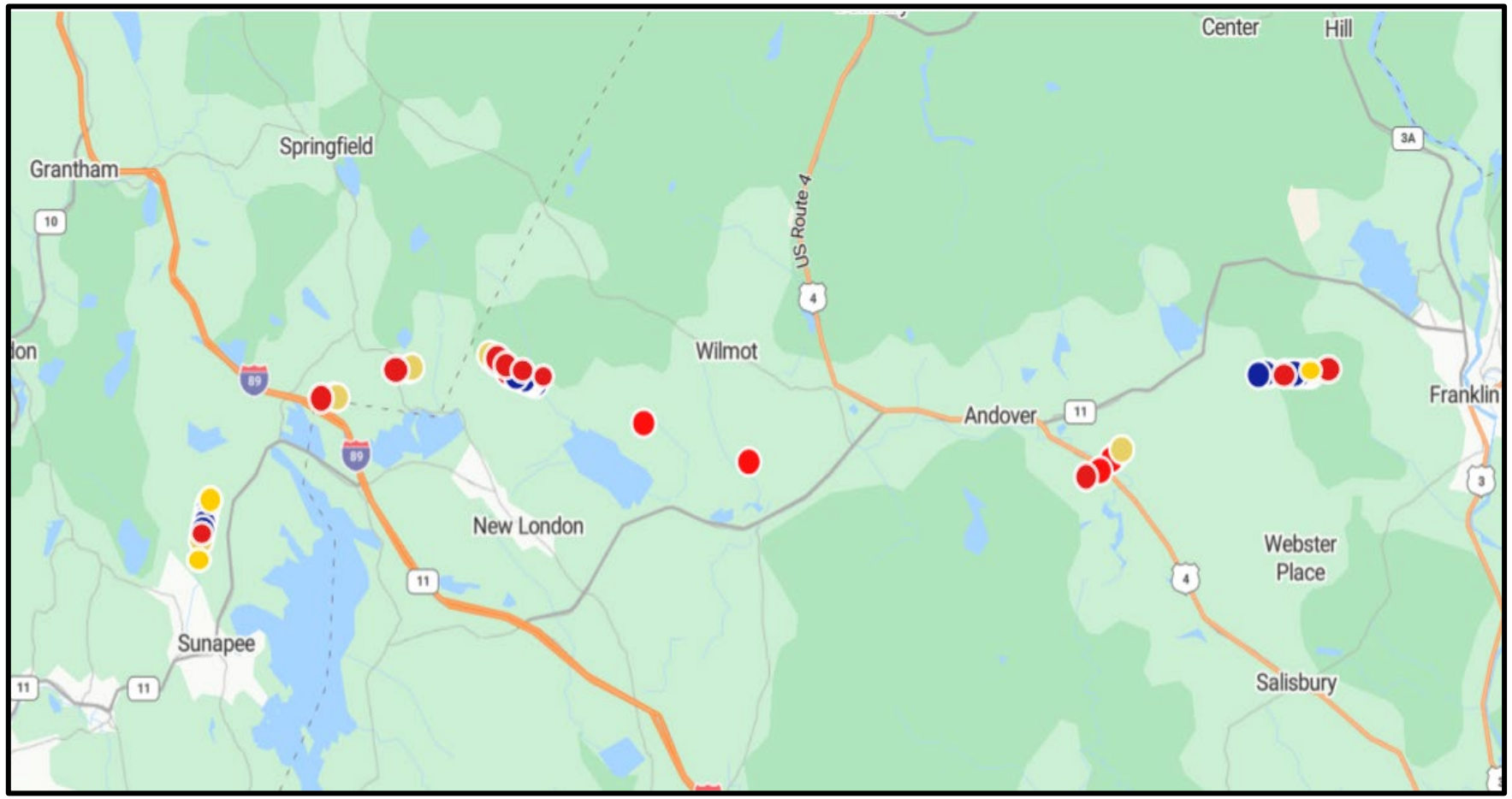
Structure Concerns	
Primary Concerns	
Wood structure deterioration	• Recent inspections have identified Category C 14 wood structures • Affected structures are on average 58 years old and are reaching the end of the typical useful life for 115 kV natural wood structures (40 – 60 years)
Engineering Concerns	• Additional Category B structures were identified for replacement to mitigate uplift
Secondary Concerns	
Category B structures	• Category B structures are in close proximity to the work sites that will be required to replace the Category C structures

Summary of Current Structure Grades		
Category	**Recommended Action**	**Number of Structures**
A	No replacement required due to deterioration	**161**
B	Consider replacement in conjunction with other structure replacements	**163** • 7 uplift • 18 proximity
C	Initiate planned structure replacement project **or** Replace as part of upcoming structure replacement project	**14**
D	Replace immediately (emergency replacement)	0
Total		**338**

Project Needs and Drivers

Structure Concerns – Map (Line M127)

Line M127



- Category C Structures
- Engineering Concern
- Proximity Structures

Evaluated Solution Alternatives

Line M127

Alternative 1

Base Alternative	

Description	• **21 total structure replacements**
	  • Replace the 14 Category C structures
	  • Replace 7 uplift Category B wood structures

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• No
Advanced transmission technologies to be considered	• None • No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	**$8.166 M (-50%, +200%)**
Longer-term transmission needs addressed	• N/A
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame structures designed in accordance with the current NESC requirements

Evaluated Solution Alternatives

Line M127

Alternative 2

Base Alternative, Plus Proximity Structures	

Description	• **39 total structure replacements**
	  • Replace the 14 Category C structures
	  • Replace 7 uplift Category B wood structures
	  • Replace 18 Category B proximity original wood structures due to permitting and its location along the access route and work area

Primary needs addressed	• Yes, Category C structure concerns are addressed
Secondary needs addressed	• Yes, Category B proximity structure concerns are addressed
Advanced transmission technologies to be considered	• None • No advanced transmission technologies are applicable to degraded structures
Cost estimate and accuracy	• **$12.535 M (-25%, +50%)**
Longer-term transmission needs addressed	• N/A
Key standards or criteria affecting design if different than current design	• New structures will be steel H-frame structures designed in accordance with the current NESC requirements

Comparative Analysis of Alternatives

Line M127

Comparison

Key Criteria	Alternative 1	Alternative 2 (Preferred)
Addresses primary need	Yes	Yes
Addresses secondary need	No	Yes (Proximity structures)
Cost	**$8.166 M (-50%, +200%)** • $389 k/structure	**$12.535 M (-25%, +50%)** • $321 k/structure
Constructability concerns or advantages	Good – no unusual problems anticipated	Good – no unusual problems anticipated
Siting, environmental and regulatory issues	• Resolves immediate structure issues but does not minimize repeated future disturbances within the same section of the ROW by leaving Category B structures located in close-proximity to the work sites	• Minimizes repeated near-future disturbances within the same section of the ROW by replacing the Category B structures located in close-proximity to the work sites

Conclusion

- Total access costs to support this project is estimated to be $2.498 M
  - The right of way contains challenges impacting the access cost, such as significant presence of wetlands
  - Taking advantage of a single mobilization effort creates cost efficiencies in access as well as engineering, siting, permitting, and project management efforts
- Under Alternative 1, the average cost per structure replacement is $389 k
- Under Alternative 2, the incremental cost to replace the proximity structures is approx. $242 k per structure when added to the overall project scope
- Alternative 2 is the preferred solution

Conclusion

Review of Relevant Transmission Studies

EVERSOURCE

Transmission Study Status

Were these lines overloaded in recent Attachment K studies (Reliability Needs Assessments, Longer-Term Transmission Studies, etc.) or other recent studies?

Lines 367, A126, B143, and M127:

- In the most recent ISO-NE 2050 study, no overloads were identified outside of the Winter Peaking 57 GW scenario

Line A152:

- Yes, the A152 line experienced overloads in the most recent ISO-NE 2050 study. The most severe overloads documented outside of Winter Peaking 57 GW scenario were in a 2050 Summer Evening Peaking scenario
  - Line A152: 110.8% at 260 MVA of flow compared to an existing summer LTE Rating of 234 MVA

Line K174:

- Yes, this line experienced overloads in the most recent ISO-NE 2050 study. The most severe overloads documented outside of Winter Peaking 57 GW scenario were in a 2050 Winter Peaking 51 GW scenario
  - Line K174: 115.0% at 315 MVA of flow compared to an existing winter LTE Rating of 274 MVA

Have modifications or upgrades to this line been identified as potential solutions in any of those studies?

No

Summary: Total Cost by Preferred Alternative

Line	Planned Removal/Replacement Structures	Estimated Cost (-25%,+50%) ($M)
367	98	$32.362
A126	20	$7.406
A152	96	$38.131
B143	16	$5.617
K174	15	$5.542
M127	39	$12.535
Total	**284**	**$101.593**

Schedule

Planned Schedule		
Line	**Start of Major Construction**	**Project In-Service Date**
367	Q2 2026	Q2 2027
A126	Q4 2026	Q4 2026
A152	Q4 2026	Q3 2027
B143	Q3 2026	Q4 2026
K174	Q3 2026	Q4 2026
M127	Q3 2026	Q4 2026

Comment Submission	
Comment Deadline	February 11, 2026
ISO-NE Contact Email Address	pacmatters@iso-ne.com
Transmission Owner Contact Name	Dave Burnham
Transmission Owner Contact Email Address	PAC.Responses@eversource.com

Questions

Appendix

Scope Summary for Preferred Solution – 367

Structure Characteristics		
		Per Unit
Primary structure configuration	H-Frame	N/A
Material	Steel	N/A
Number of Structure Replacements (est)	98	3.34 per mile

Additional Scope Details	
	Total
Miles of ROW Affected	29.3 miles
Miles of shield wire replacement	N/A
Miles of conductor replacement	N/A
ADSS Substation Connections	N/A

Cost Breakdown Details		
	Cost ($M)	Per Unit Cost ($M)
Structure Replacements	$32.362	$0.330/structure
Reconductoring / Shield Wire	N/A	N/A
Access costs	$6.8	$0.231/mile
Other costs (risk and contingency)	$2.985	
Total Cost	$32.362	

**Structure replacement costs include access and other costs*

Scope Summary for Preferred Solution – A126

Structure Characteristics			
			Per Unit
Primary structure configuration	H-Frame	Three-pole dead-end	N/A
Material	Steel	Steel	N/A
Number of Structure Replacements (est)	19	1	12.58 per mile

Additional Scope Details	
	Total
Miles of ROW Affected	1.6 miles
Miles of shield wire replacement	None
Miles of conductor replacement	None
ADSS Substation Connections	None

Cost Breakdown Details		
	Cost ($M)	Per Unit Cost ($M)
Structure Replacements	$7.406	$0.370/structure
Reconductoring / Shield Wire	N/A	N/A
Access costs	$1.87	$1.168/mile
Other costs (risk and contingency)	$0.707	
Total Cost	$7.406	

**Structure replacement costs include access and other costs*

Scope Summary for Preferred Solution – A152

Structure Characteristics		
		Per Unit
Primary structure configuration	H-Frame	N/A
Material	Steel	N/A
Number of Structure Replacements (est)	96	8.47 per mile

Additional Scope Details	
	Total
Miles of ROW Affected	11.34 miles
Miles of shield wire replacement	0.161 miles
Miles of conductor replacement	N/A
ADSS Substation Connections	N/A

Cost Breakdown Details		
	Cost ($M)	Per Unit Cost ($M)
Structure Replacements	$37.931	$0.397/structure
Reconductoring / Shield Wire	$0.200	$1.24/mile
Access costs	$10.7	$0.943/mile
Other costs (risk and contingency)	$3.85	
Total Cost	$38.131	

**Structure replacement costs include access and other costs*

Scope Summary for Preferred Solution – B143

Structure Characteristics		
		Per Unit
Primary structure configuration	H-Frame	N/A
Material	Steel	N/A
Number of Structure Replacements (est)	16	14.04 per mile

Additional Scope Details	
	Total
Miles of ROW Affected	1.14 miles
Miles of shield wire replacement	N/A
Miles of conductor replacement	N/A
ADSS Substation Connections	N/A

Cost Breakdown Details		
	Cost ($M)	Per Unit Cost ($M)
Structure Replacements	$5.617	$0.351/structure
Reconductoring / Shield Wire	N/A	N/A
Access costs	$0.644	$0.764/mile
Other costs (risk and contingency)	$0.515	
Total Cost	$5.617	

**Structure replacement costs include access and other costs*

Scope Summary for Preferred Solution – K174

Structure Characteristics		
		Per Unit
Primary structure configuration	H-Frame	N/A
Material	Steel	N/A
Number of Structure Replacements (est)	15	13.56 per mile

Additional Scope Details	
	Total
Miles of ROW Affected	1.106 miles
Miles of shield wire replacement	N/A
Miles of conductor replacement	N/A
ADSS Substation Connections	N/A

Cost Breakdown Details		
	Cost ($M)	Per Unit Cost ($M)
Structure Replacements	$5.542	$0.370/structure
Reconductoring / Shield Wire	N/A	N/A
Access costs	$1.294	$1.116/mile
Other costs (risk and contingency)	$0.605	
Total Cost	$5.542	

**Structure replacement costs include access and other costs*

Scope Summary for Preferred Solution – M127

Structure Characteristics				
				Per Unit
Primary structure configuration	H-Frame	Steel Running angle	Steel tangent dead-end	N/A
Material	Steel	Steel	Steel	N/A
Number of Structure Replacements (est)	37	1	1	13.68 per mile

Additional Scope Details	
	Total
Miles of ROW Affected	2.85 miles
Miles of shield wire replacement	N/A
Miles of conductor replacement	N/A
ADSS Substation Connections	N/A

Cost Breakdown Details		
	Cost ($M)	Per Unit Cost ($M)
Structure Replacements	$12.535	$0.321/structure
Reconductoring / Shield Wire	N/A	N/A
Access costs	$2.498	$0.876/mile
Other costs (risk and contingency)	$1.165	
Total Cost	$12.535	

**Structure replacement costs include access and other costs*

Additional Cost Detail ($M)

Project Cost Summary						
Line	**367**	**A126**	**A152**	**B143**	**K174**	**M127**
Material	$4.546	$0.670	$3.263	$0.554	$0.565	$1.572
Labor and Equipment	$19.598	$4.948	$23.532	$3.133	$3.325	$7.556
Right of Way	$0.078	-	-	-	$0.113	-
Engineering, Permit, Indirect	$2.939	$0.641	$4.136	$1.063	$0.703	$1.095
Escalation	1.333	$0.191	$1.409	$0.131	$0.129	$0.599
AFUDC	$0.923	$0.266	$1.941	$0.218	$0.192	$0.547
Contingency	$2.945	$0.708	$3.850	$0.518	$0.515	$1.166
Total PTF Project Cost	**$32.362**	**$7.406**	**$38.131**	**$5.617**	**$5.542**	**$12.535**