

Eversource 345-kV Structure Replacement Projects

Planning Advisory Committee Meeting

December, 2017

Agenda

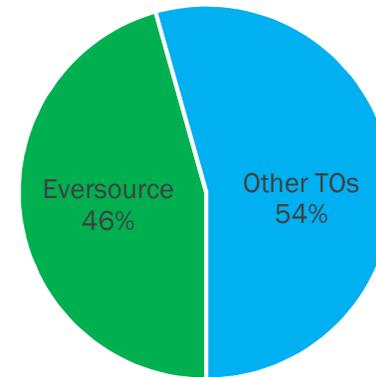
- Project Scope Summary
- Project Background and Drivers
 - Reliability and Safety
- Scope Details
 - Line Characteristics, Asset Condition
- Summary and Conclusions

Project Scope Summary

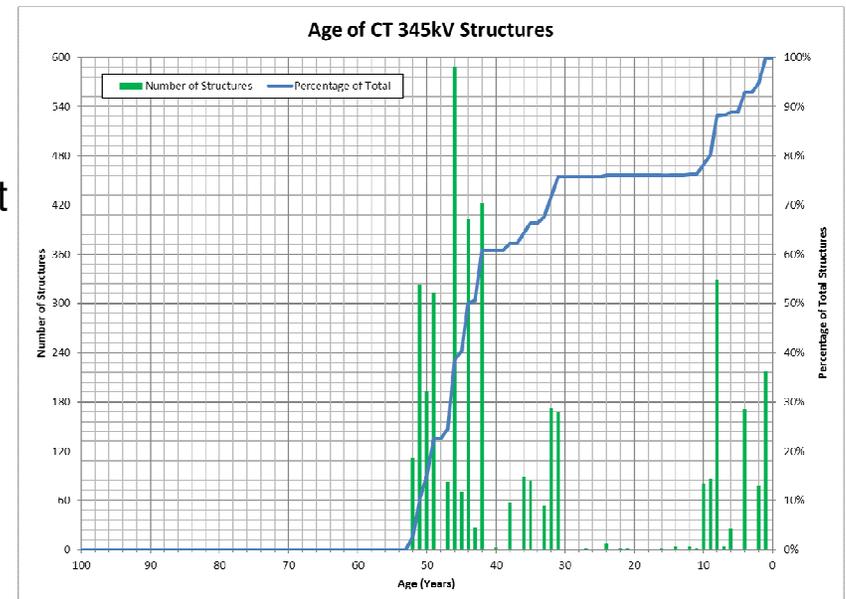
- Eversource Manages ~1,100 Miles of 345-kV OH lines
 - Nearly 50% of all of New England 345-kV PTF
 - Eversource has over 10,000 345-kV structures

- The vast majority of NE 345-kV System was constructed in 1960's and 1970's
 - 345-kV structures targeted by the program are typically wood, single circuit structures in an H-frame configuration.

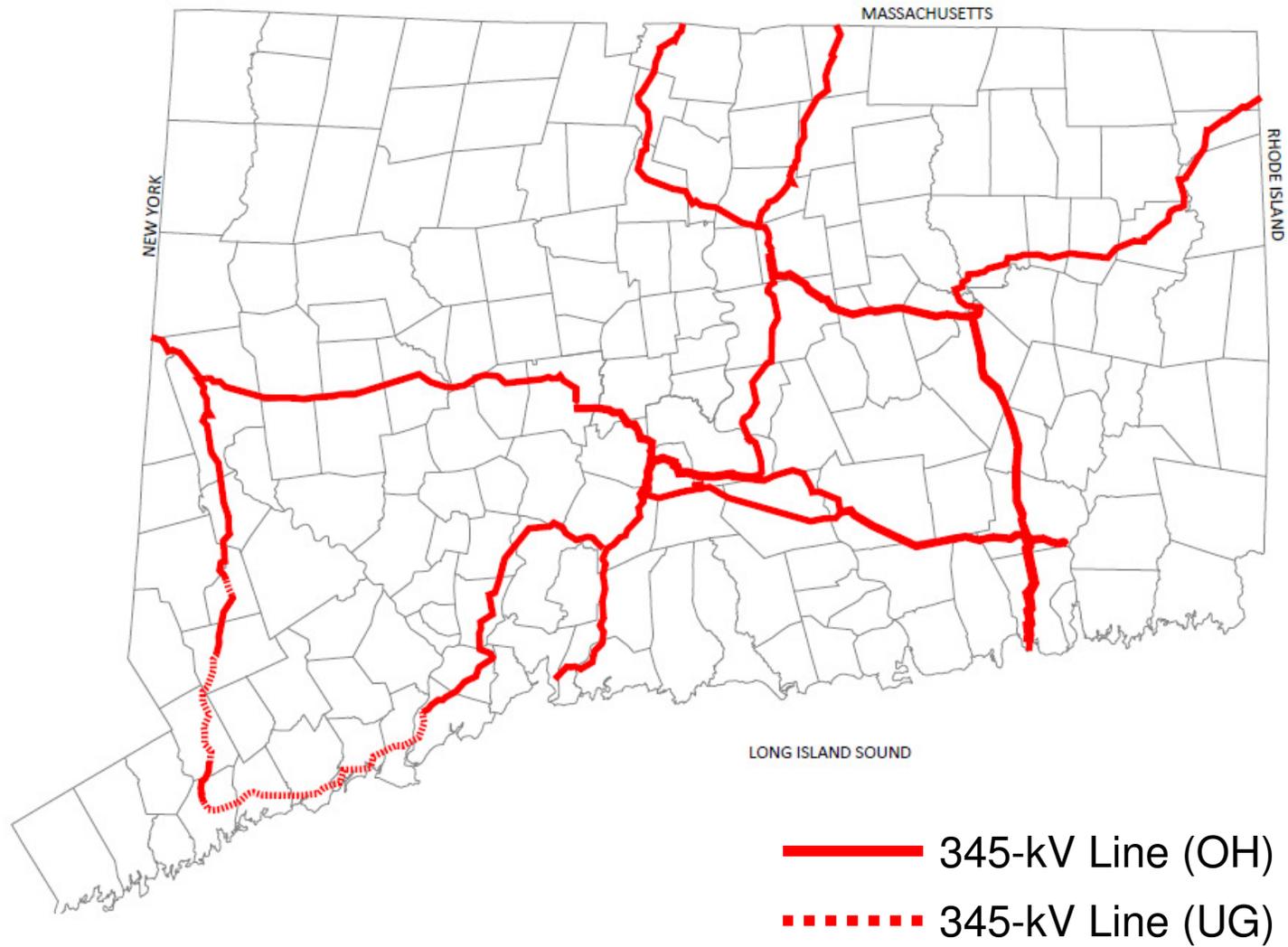
345-kV Circuit Miles



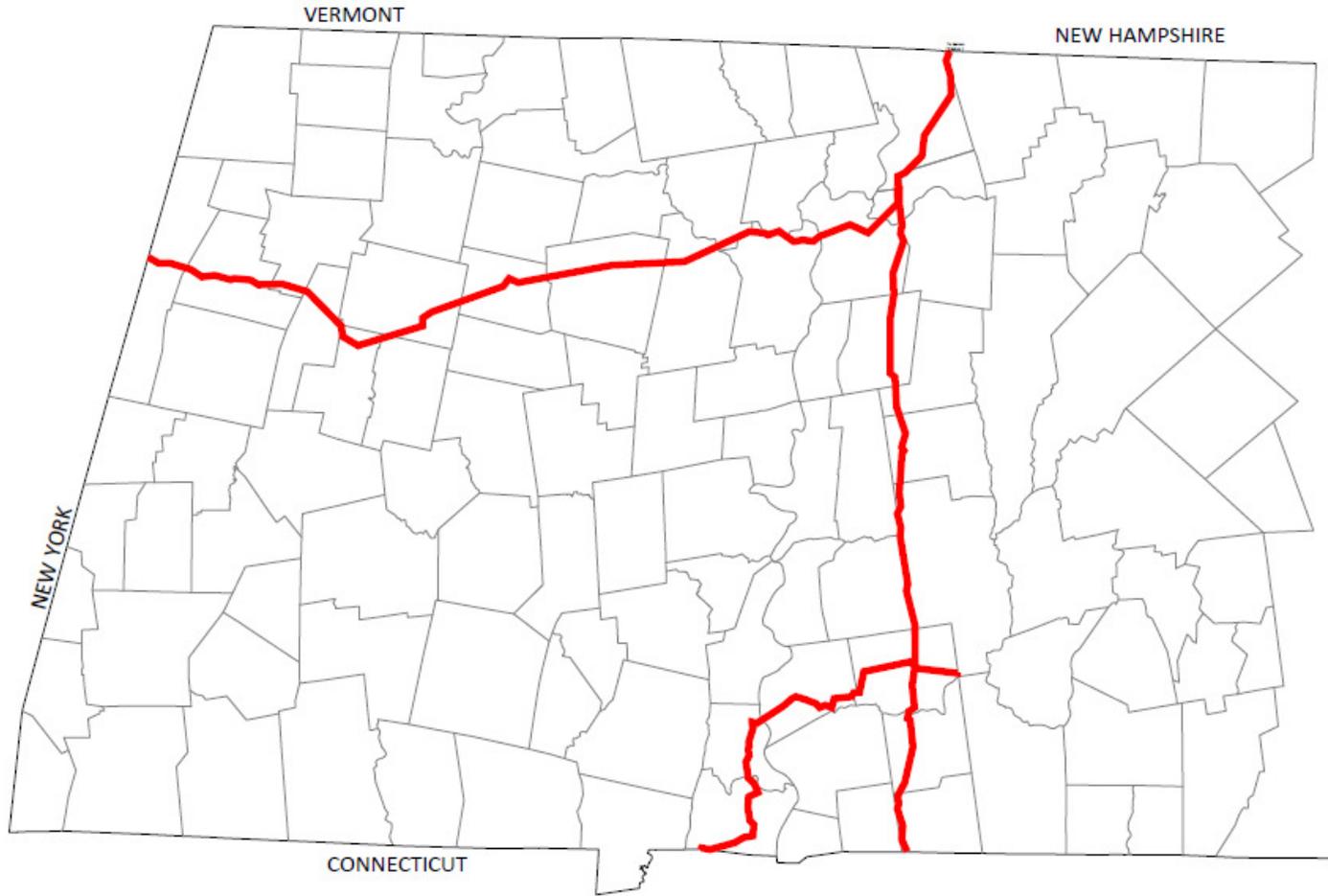
Age of CT 345kV Structures



CT 345-kV Geographic Locations

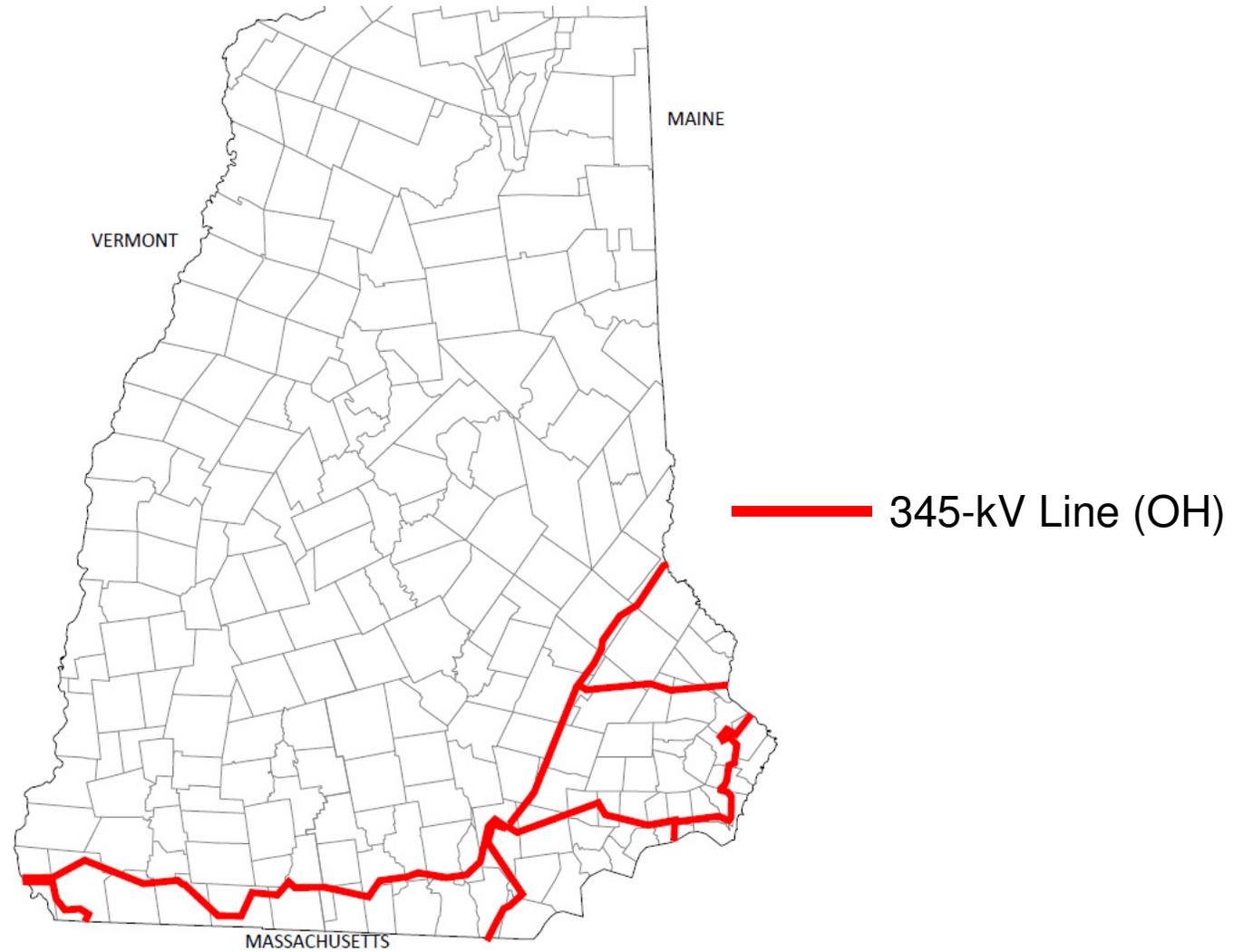


WMA 345-kV Geographic Locations

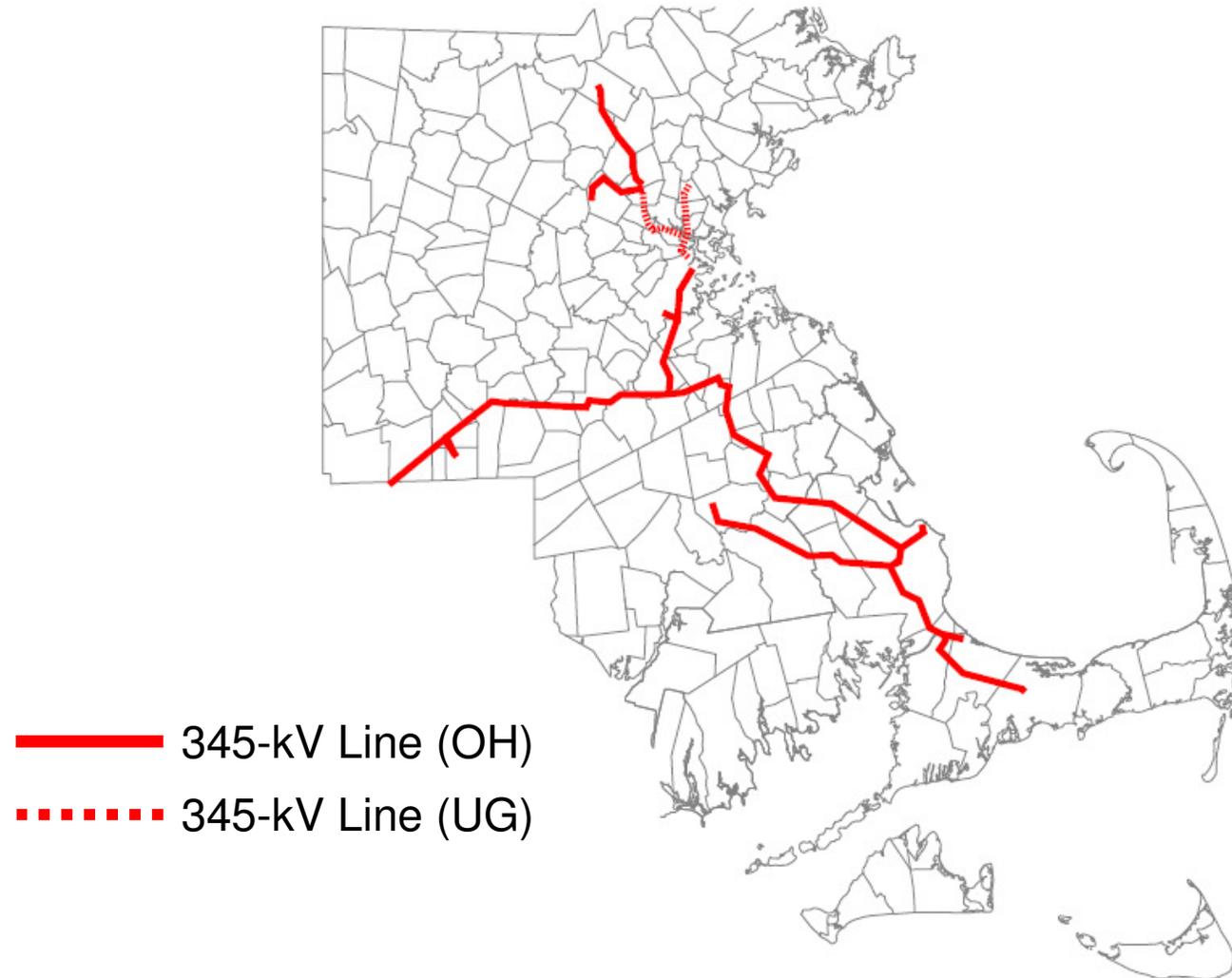


— 345-kV Line (OH)

NH 345-kV Geographic Locations



EMA 345-kV Geographic Locations

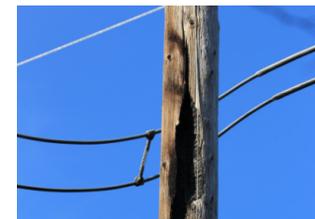
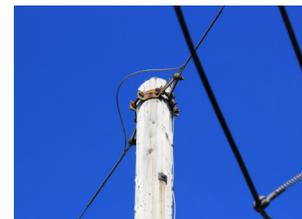


Project Drivers – Reliability/Safety

- Eversource is focused on safe and reliable operation of the transmission system and frequent inspections are performed in accordance with the Eversource Maintenance Program.
 - Foot Patrol
 - Aerial Patrol
 - Ground Line Inspections
 - Climbing Inspections
 - High Resolution Photography
 - Thermography Inspections
- Inspection results are reviewed by Maintenance and Engineering personnel
- Factors such as cost of structure components vs cost of accessing again in the near future, environmental impact, and abutter impact will be assessed.
 - Where there is significant cost associated with access to the structure in need of replacement (matting, etc.), the adjacent structures will be reviewed for consideration of replacement at the same time.
- Structures that are being replaced will be reviewed for storm hardening and compliance with the most recent NESC clearance criteria.
 - New Structures are typically Light-Duty Steel (wood pole equivalent std)/Direct Embed poles

Recent Inspections

- Foot Patrol Inspections – 2015-2017
 - Structures found to be in poor condition and candidates for replacement
 - Inspections cannot always determine extent of subsurface rot
- High Definition Aerial Inspections – 2016
 - Entire 345-kV system flown, similar levels of degradation found throughout lines of similar vintage
- Structure Ground Line Inspection – 2017
 - Focus on 345-kV Transmission Structures
 - Cases of significant pole shell thickness loss found which leads to significant loss in pole strength. Shell thickness loss is not able to be detected visually.



Issues Reviewed During Inspections

- **Wood Structures**
 - Significant Woodpecker Damage
 - Severe Checking and Splits/Cracking
 - Insect Damage
 - Structure with Rot or Decay
 - Wood Pole Top Rot
 - Severe Fracturing
 - Severe Buckling or Leaning
 - Compression Breaks
 - Fire Damage
 - Damage / Vandalism



Pole Top Rot



3041 Line - CT



326 Line - NH

Pole Splits



364 Line - CT



381 Line - CT

Woodpecker Damage



307 Line - NH

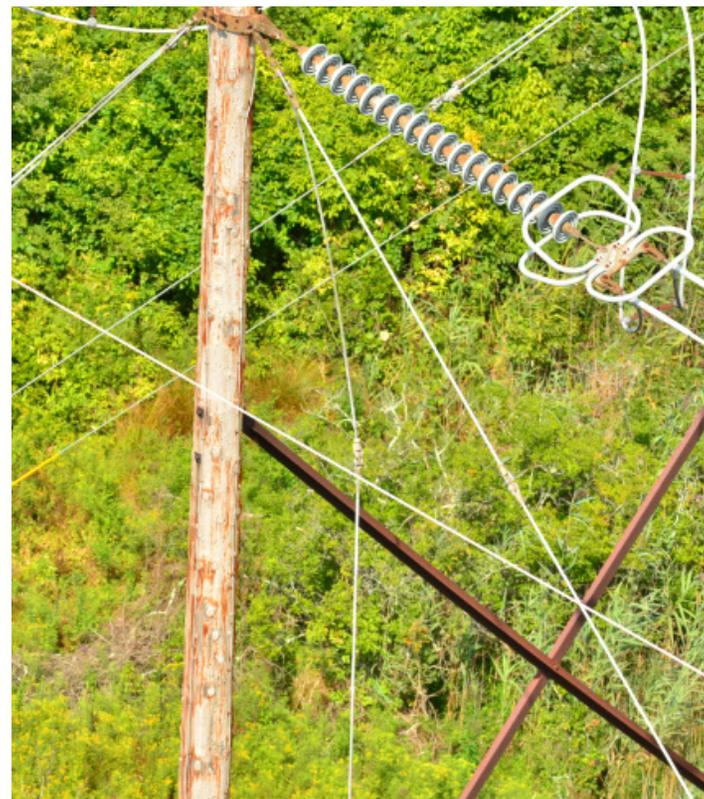


393 Line - MA

Hardware Issues



348 Line – CT
Shield Wire Disconnected



364 Line – CT
Broken Guy Wire

345-kV Lines Summary

CT			
Line	Number of Replacement Structures	Total Number of Structures	Estimated Cost 2017-2018 (\$M)
310	75	410	\$16.5
321	24	64	\$6.0
330	69	264	\$13.5
348	82	363	\$16.0
364	73	199	\$14.3
371	55	111	\$10.6
383	73	277	\$15.5
387	74	230	\$13.1
398	39	44	\$7.8
3041	53	161	\$9.7
3642	46	130	\$9.9

NH			
Line	Number of Replacement Structures	Total Number of Structures	Estimated Cost 2017-2018 (\$M)
307	47	145	\$12.9
326	43	166	\$12.3
367	56	281	\$15.8
379	54	169	\$14.8
381	49	89	\$13.6
391	69	335	\$19.6

WMA			
Line	Number of Replacement Structures	Total Number of Structures	Estimated Cost 2017-2018 (\$M)
393	38	127	\$10.0

Total: \$231.9M

- Structures to be replaced with tubular steel pole structures
- Replacement schedules to be determined – anticipated ISD for completion of all lines is December 2018.
- All estimated costs are (-25%/+50%)

Conclusion

- Inspections have indicated significant degradation and decreased load carrying capacity of wood 345-kV structures. Replacing the structures resolves multiple structural/hardware issues and supports safe and reliable operation.
- Issues can be detected by visual inspection, but there are also many which are not apparent until the structure is replaced or more detailed inspections are performed.
- Replace wood 345-kV structures as inspections present additional deficiencies warranting action.
 - 1019 structures will be replaced with steel pole structures.
 - Hardware, insulators, and guys to be replaced with structures.

The current proposed scope for 345-kV structure replacement is estimated at \$231.9M (-25%, +50%).

Questions

