Extending the Useful Service Life of Utility Poles through Pole Restoration

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PRESENTATION ABSTRACT

There are an estimated 12 to 15 million wood poles in Canada that carry vital distribution, transmission and telecommunication cables across the country. Wood poles are a great structural material for this purpose for a variety of reasons. With over 100 years of proven performance for electric utilities, wood is a renewable material with advantageous physical properties – it's economical, easily climbed, long lasting, readily available, and renewable. Just like any structural material, however, wood can degrade over time. The primary cause of structural strength deterioration in a wood utility pole is decay. When structural strength is compromised, it increases the risk of outages and structural failure.

The original preservative treatment applied to the pole resists the decay for a significant period, but eventually it will lose its effectiveness. Once decay has reduced the structure strength to 60% of that required when installed, the CSA Overhead Systems Standard (C22.3) requires the pole be replaced or restored.

Restoring an in-service wood pole is sustainable, less costly and provides bending strength in excess of CSA code requirements. It can be done with contract labor or in-house labor, and can be installed significantly faster than a complete pole replacement. Installations do not require work in the supply space, so outages are not needed and safety is improved. When paired with cyclical application of remedial treatments in the groundline zone, restored poles with steel trusses can extend the useful life of wood poles by decades.

Steel truss systems used to restore wood poles should be engineered to exacting standards that include rated bending strength capacities matched to different lengths and classes of poles so each system can ensure that minimum required restoration strength is exceeded. When matching truss system strength to poles, it should be assumed the wood pole has zero remaining bending strength at groundline. Specifications for restoration systems should include minimum yield strength of the steel truss used (e.g. 60,000 psi, 80,000 psi, 100,000 psi, etc.), galvanization to the ASTM A-123 Standard, and clear installation requirements that ensure the rated bending capacities of each system can be realized. These installation requirements should include minimum allowed wood pole conditions in the restored zone, driving depths, above ground installed length, banding amount and locations, and installation orientation in relation to the line of lead.

CSA 22.3 also establishes standards for grades of construction, safety factors, and loading zones. These criteria establish minimum design requirements, including structure strength requirements. The result is a minimum expected structural resiliency against the weather loading (wind and ice) established in CSA 22.3. Restoring poles weakened by decay re-establishes the initial structural resiliency the pole had against these weather conditions when first installed.

To improve the current structural resiliency, a utility may elect to design their system, or parts of their system, to extreme weather conditions more than the minimum required by CSA. This means installing new, stronger structures (wood or other materials), or installing pole capacity upgrade

steel trusses to in-service wood poles. Increasing in-service poles with capacity upgrading trusses is faster, safer, and lower cost than a complete structure replacement.

Wood poles are the most prevalent material used for utility overhead structures due to their superior strength to value ratio, cost to manufacture and install, and availability. As these structures age, effective maintenance and utilization of steel truss restoration, when needed, can get the most life out of these valuable assets. Wood pole restoration and capacity upgrading are effective tools to maintain or even improve grid resilience because fewer weakened poles leads to fewer pole failures which reduces overall time and cost to restore services after a major weather event. The fact that wood allows for these simple, cost effective improvements in the field is just another benefit over other structural materials being considered by utilities today.