



File Code: 4700

Date: January 25, 2016

Randy C. Douglas, P.E.
Natural Resources Engineer – Lands/LF
Wisconsin Department of Natural Resources
427 E Tower Drive, Suite 100
Wautoma, WI 54982-6927

Dear Randy:

Thank you for the opportunity to work with the Wisconsin Department of Natural Resources (DNR) on assessing the structural integrity of the observation tower located in Peninsula State Park, Door County, WI. Based on a review of the condition assessment reports that you provided (which were prepared by two engineering firms that conducted independent assessments), discussions with you and your colleagues within the DNR, and observations from my recent visit and visual inspection of the tower, I submit the following:

1. There is considerable deterioration of the structural and non-structural wood members in the tower. I observed numerous deep splits and cracks within many of the members, and several deep splits on the main load bearing support columns. Numerous holes, probably resulting from nesting activities of birds, were observed. Of significant concern were splits and deterioration in the vicinity of connections. I also observed evidence of lateral movement of the upper sections of the tower.
2. A major concern is the deterioration of the main columns supporting the tower. It was noted that, based on sounding tests and subsequent coring tests performed by DNR engineers, there is significant deterioration of the columns where they are in contact with concrete support pads. This type of deterioration is observed in many older wood structures, and is the consequence of placing wood that has not been preservative treated in contact with or near the ground. This results in the wicking of water into the end grain of the timber, and subsequent deterioration from decay fungi and carpenter ants. Please note that, in my experience with inspection of wood structures, the deterioration always extends significantly up into the member, greatly reducing its load carrying capacity.
3. There appears to have been several attempts to repair, and consequently modify the tower.
4. Given the current state-of-the-art in timber inspection, it would be difficult to accurately determine, in-place, the extent of deterioration and assess the tower's load carrying capacity.



5. Based on the assessments to-date, it is difficult to estimate the quantity or quality of recoverable material from the timbers.
6. Various repair techniques have been discussed. Based on my observations on the extent of deterioration, I do not recommend repair.
7. I suggest the tower be dismantled, and each member extensively evaluated using advanced nondestructive assessment procedures. A wide range of technologies, including those that utilize ultrasound and advanced probing techniques, are available and in use worldwide. The Forest Products Laboratory (FPL) has been actively involved in the development of these techniques, and would look forward to working the DNR in testing and assessment of the timbers from the dismantled tower. This would result in an accurate determination of the condition of the members, and enable the DNR to utilize the timbers in appropriate applications.

Thank you, again, for asking for our input. I am available for further comment or discussions with you or your colleagues.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert J. Ross". The signature is fluid and cursive, written in a professional style.

ROBERT J. ROSS, Ph.D.
Project Leader, Engineering Properties of Wood, Wood Products and Structures