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# WOOD BRIDGES…NEW LIFE FOR AN OLD MATERIAL

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Wood Bridges have existed since the first log fell across a stream and allowed passage from one side to the other. There are certainly no shortage of wood bridges on today's highway network in Ontario. However until recently one would have been hard pressed to find an example of a new wood highway bridge being built in the province.

The Ministry's Bridge Section in Northwestern Ontario changed all that about a decade ago. Faced with a number of challenges wood emerged as a viable alternative to concrete and/or steel as a primary structural material. Canada's first composite steel/wood bridge was constructed at North Pagwachuan River on Highway 11 followed shortly thereafter by similar bridges at Hoiles Creek and Aubinadong River. In all cases the wood was treated with creosote using a reduced retention technique.

The use of wood was very cost competitive and demonstrated that wood could again be a viable alternative to conventional bridge construction materials.

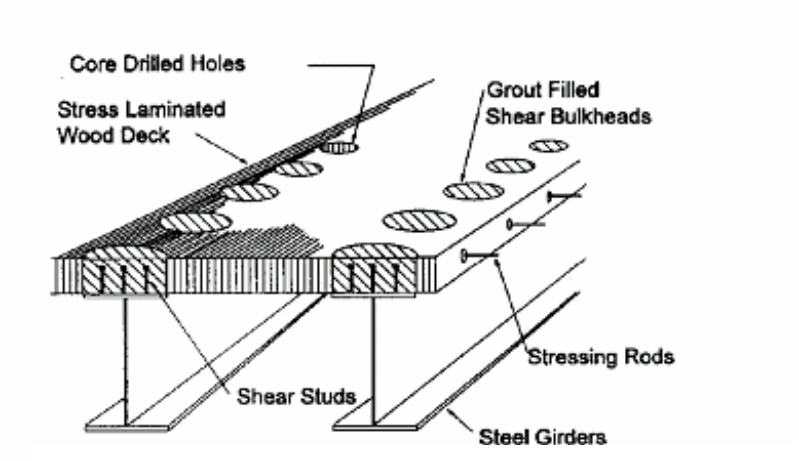


**Figure 1 The concept of Composite Steel/Wood**

One lesson learned was that dimension lumber while of high quality had limitations in term of size and availability and preservative treatment concerns. However new wood technology was emerging which offered additional promise for bridge construction. Specifically structural composite lumber (SCL) made economical use of wood supply, offered high strength elements and was easily treatable.

MTO used this new material to build new Tee Beam Bridges at Rushing River and Wabigoon River. In these instances wood in the form of structural composite lumber comprised the entire superstructure. More importantly wood was the most economical

structural option and allowed for quick staged construction with minimal traffic disruption. These bridges were treated with Pentachlorophenol.

**Figure 2 SCL Tee Beams under construction at Rushing R.**

**Figure 3 SCL Tee Beams under construction at Wabigoon R.**

One very important characteristic of SCL is it's ability to facilitate complete penetration of preservatives throughout the elements. The Canadian Highway Bridge Design Code recognises this fact and allows the use of waterborne treatments for SCL instead of the usual oil borne treatment that is mandatory for dimension and glulam lumber. This offers a number of cost and construction advantages and the ministry decided to take advantage of this in 2002 when replacing the Blind R. Bridge near Sault Ste Marie. A prototype Concrete/SCL bridge was built where the wood was treated using CCA. This was the first known use of a waterborne preservative in a large highway bridge in Canada.


**Figure 4 SCL/Concrete Composite construction at Blind R.**

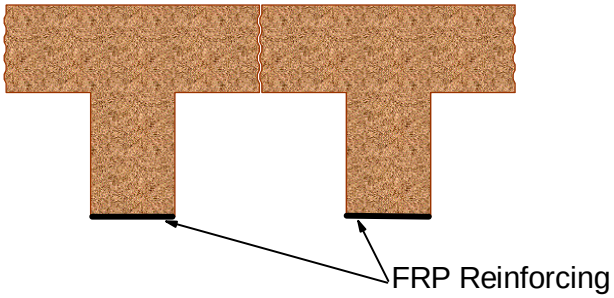


**Figure 5 FRP Reinforced Tee Beams**

Wood holds considerable promise in future bridge construction. The ministry has plans for a number of wood bridge projects and will be testing new technologies. One that is particularly appealing is the use fibre reinforced polymers to strengthen wood elements. Carbon and/or glass fibres are bonded to tension flange of the wood using epoxy and have been shown to dramatically increase strength and stiffness thereby enabling longer and more economical spans.

A discussion of wood bridges in Northwestern Ontario would not be complete with mention of the Sioux Narrows bridge. This well known structure was built in 1936 and was long reputed to be one of the longest single span wood truss bridges in the world. After almost 70 years of continued highway use the bridge finally succumbed to a combination of heavier loads and decay. It was determined to be in a state of failure in 2003 and was subsequently closed to traffic and removed—a temporary detour bridge was installed in the interim until a new replacement could be built.

After much study and public consultation a unique replacement concept was developed which will consist of a new conventional steel and concrete superstructure upon which is built a replica of the original truss bridge. Current plans are to build the new bridge in 2006/2007.