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Field Inspection of Experimental Timber Bridges

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In the summer of 1983, a unique inspection study was made of 18 experimental timber bridges in the U.S. National Forests. Constructed in the late 1960's and early 1970's, the various timber bridges contained novel features expected to improve performance. The bridges were built in various national forests in seven states and varied in length from 20 to 168 feet (20 to 73 feet individual spans). The number of spans ranged from one to four. Primarily, they were constructed with transverse glued-laminated (glulam) panel decks and a variety of interpanel connections. Some bridges had nail-laminated (nail-lam) decks for comparative purposes. Also, different types of members, construction and materials were used in the remainder of the superstructure and substructure. Preparation and installation of the experimental features was coordinated with the U. S. Forest Products Laboratory in Madison, Wisconsin. The objective of the study was two-fold: (1) to determine the in-place performance of timber bridges, especially of glued-laminated panel decks, and (2) to determine patterns of moisture content in order to assess the merits of dry-use versus wet-use design stresses. On average, about 100 moisture content readings were taken per bridge.

Overall, the inspected bridges were in excellent structural condition. Glulam decks generally provided a more effective roof over stringers than nail-lam decks but both types had high moisture content. In contrast, the stringers were relatively dry. Stringer readings in excess of 20% were infrequent by the average moisture content in both decking types exceeded 20%. For bottom zones of stringers, it appears likely the moisture content would generally remain well below 20%. Readings above 30% were rare in all components except nail-lam deck. The observations about moisture content strongly suggest modern timber bridges components remain below fiber saturation condition for at least 20 years.

Moisture content data support the use of dry-use stresses for bottom laminations of glulam stringers for at least a 20-year service life. Readings between 13% and 15% were the norm for glulam and although occasional values above 16% were found, the soundness of the material appeared invariant. Except near abutments, dry use stresses for top laminations are similarly justified. Dry use stresses for solid-sawn timber are also supported by the findings in this study. Virtually all readings were at or below 19%, including in the abutment zone. Conversely, the observations do not support the application of dry-use stresses to any decking regardless of treatment method.

Typically, roadway conditions were excellent, providing for smooth passage regardless of surfacing. There was extensive asphalt cracking only where the surface was unusually thin. Evidence of deterioration either due to propagation of cracks or presence of potholes was rare. Dowel-connected deck panels were tightly mated.

*A mistake was done here while photographying the poster:
the photography is in fact unavailable.
We regret for any inconvenience and are very sorry
for the authors of this poster.*