

## REVIEW OF TRESTLEWOOD STRENGTH AND STIFFNESS TESTS

### Summary

The long exposure to the saline waters of the Great Salt Lake has not reduced the strength and stiffness of the Trestlewood piling. The design properties of these piling, or of lumber cut from these piling, may be considered equal to common Douglas fir piling and lumber from freshly cut logs.

Wood from the main stringers of the trestle is reduced in strength by about 15% and in elastic modulus by about 25%. This difference in the residual properties of the piling and the stringers is probably due to the higher levels of stress in service of the stringers.

### Tests by Engineering Data Management

The destructive tests of four pilings from the trestle show no impairment of the elastic modulus (MOE) or bending strength (MOR) by the history of prior use in the Southern Pacific Railroad trestle over the Great Salt Lake.

Destructive tests of thirty-three small size clear wood compression specimens from these same pilings show an average strength and variability that supports the design values of Pacific Coast Douglas Fir as set forth in the National Design Specifications for Wood Construction-1991.

Destructive tests of four stringers from the trestle showed an elastic modulus of 67% of that expected from common Douglas fir and a bending strength of 81%. Two tested beams had values equal to those to be expected from previously unused Douglas fir of equal grade (No.1 B&S).

Destructive bending tests of fifty small specimens from the stringers showed an elastic modulus of 75% and a bending strength of 87% of the values normally accorded similar Douglas fir with no history of prior use.

There is a reason for this difference between the results for stringers and for piling. Piles supporting fully loaded stringers do not experience very high pile loads. The maximum useful pile loads may be limited by the

pile buckling or stability criteria rather than their compression strengths. The stringers experience high bending stress while the piles do not receive equally high compressive loadings. Exposure to this repetitive loading therefore leads to some fatigue of the stringers.

#### Tests by the Western Wood Products Association

The WWPA tested sixty-four pieces of 2x6 lumber, believed to be of No.2 grade, and cut from the trestle piling. The elastic modulus and the bending strength of this material was fully equal to that required of the grade.

The tests showed that the piling had undergone no loss of either strength or stiffness due to the aging and exposure to salt water. This confirms the findings of the piling tests by Engineering Data Management.

#### Tests at Brigham Young University

Destructive tests made at the Civil Engineering Department of BYU of 2x4 lumber made from material taken from the trestle provided eleven specimens which showed both bending strength and stiffness exceeding that to be expected from high grade Douglas fir lumber. (The BYU laboratory did not grade the specimens.) Twelve compression specimens also showed parallel-to-grain strength adequate for No.1 grade Douglas fir lumber.

  
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#### References

1. Material Tests of Stringers and Pilings from the Southern Pacific Great Salt Lake Trestle. October 1983. Engineering Data Management, Inc. Fort Collins, CO.
2. WWPA Letter Report on Testing of 64 pieces of 2x6 Lumber Cut From Old Douglas Fir Pilings. January 20 1994. Kevin C.K.Cheung, Western Wood Products Association.
3. Report on Testing of Timber Structural Size Members. September 1993. Letter report by Reece J. Goodwin, Civil Engineering Department, Brigham Young University.