

First United Methodist Church Structural Repair of Roof Trusses

Paxton, Illinois

Range of Services

- Investigation report of failing roof trusses and deteriorating exterior masonry
- Roof truss repair and upgrade; construction documents; construction administration and observation

Project Overview

The Problem:

The roof form of the First United Methodist Church in Paxton, IL is composed of intersecting gables at a 12 in 12 slope (image 1). Two parallel 45-foot span scissors trusses, spaced approximately 40 feet apart, support the gables. Two parallel chord trusses running in the perpendicular direction and spaced approximately 11 feet apart are suspended from the scissors trusses. All roof rafters bear on these parallel chord trusses. Thus the two scissors trusses support the entire roof. The scissors trusses run parallel with the roof rafters and there is no connection between the roof plane and the trusses. The top chords of the trusses are built up from (5)-2x10 dimension lumber pieces spiked together. The members perpendicular to the top chord are also built-up dimension lumber, while the bottom chord is composed of (2)-1-1/2 inch diameter wrought iron rods. The tension diagonals are also rods. The top chords have buckled under the axial compression force and the pieces have separated, allowing further weak axis bending (image 2). Creep in the wood has increased the weak axis deformation beyond 6 inches. The wood diagonals are twisted to follow the top chord curvature at one truss (image 3). The wood diagonals have shifted out of alignment in trying to follow the top chord curvature at the other truss (image 4).

The Solution

Steel channels were added to each face of the top chords of the scissors trusses, connected by pairs of all-thread rods at 18 inches apart. The bolts are sequentially tightened over a period of time and the bend squeezed out of the wood top chord. Plates attached to the channels at the wood diagonals pushed them back into place. The completed bolt tightening resulted in straight top chords and upgraded strength (image 5).

This technique was also used on the McKinley Foundation Church in Champaign in 1982 and reported on by Engineering News Record Jan. 20, 1983, p.24. See also ASCE Journal of Structural Engineering, Vol. 111, No. 5, May 1985, "Repair technique for Buckled Wood Truss Members", by David Wickersheimer.

integrating
STRUCTURAL
design
focused on
quality

Owner/Client: Board of Directors, First United Methodist Church, Paxton, IL



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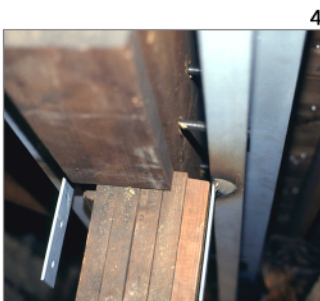
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3



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