

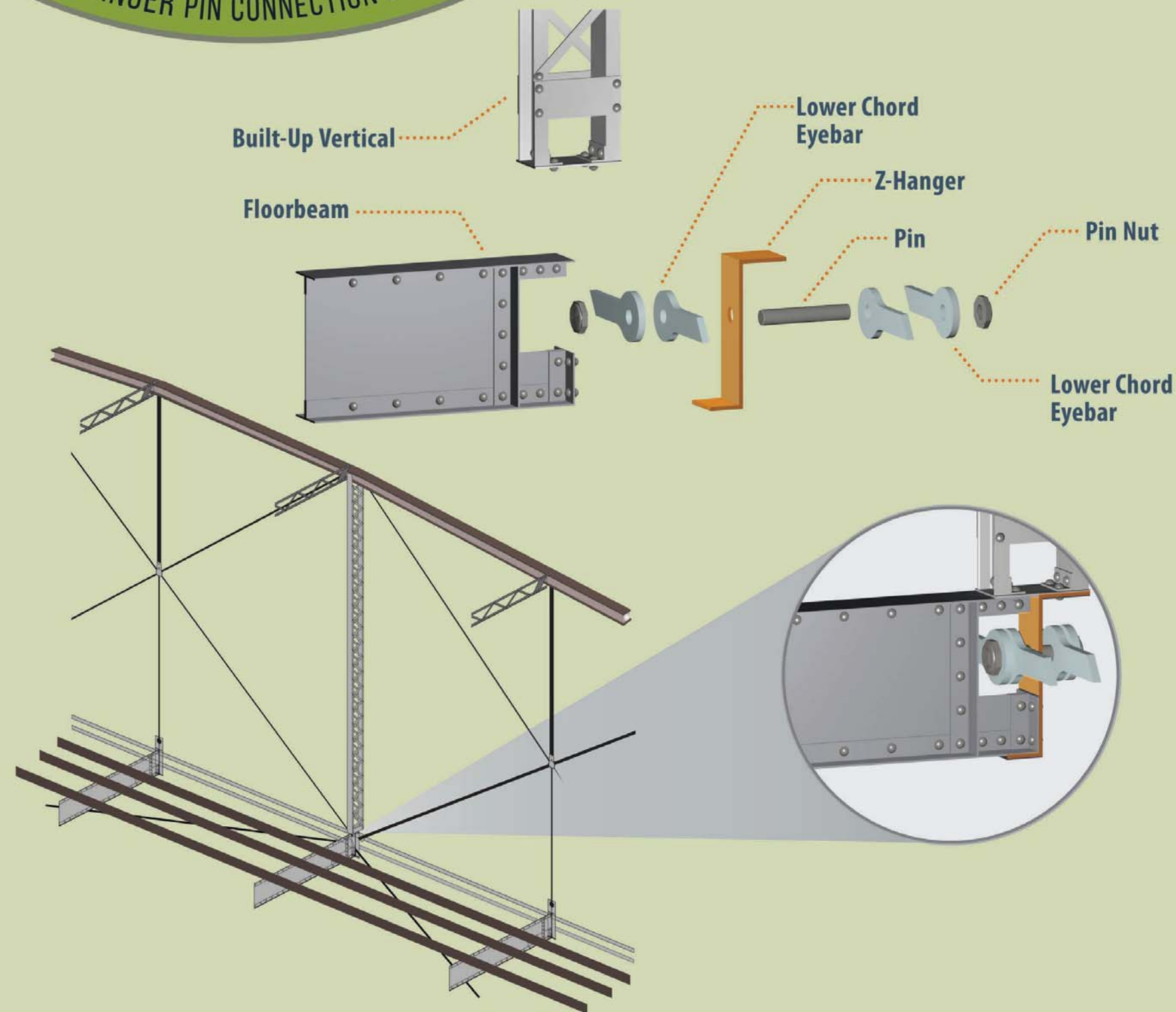
INWOOD IRON BRIDGE

AT SWATARA GAP

Z-HANGER PIN CONNECTION DETAIL

INWOOD IRON BRIDGE

A Pennsylvania (Petit) Thru Truss, Inwood bridge was fabricated by the Pittsburgh Bridge Company and was erected by their agents Nelson & Buchanan in 1899. The 160-foot-long, single-span, pin-connected steel bridge was determined eligible for listing in the National Register of Historic Places in 2007. A distinctive feature is its Z-shaped plate floor beam hangers.



HOW A PENNSYLVANIA (PETIT) THRU TRUSS BRIDGE WORKS

The individual components of metal truss bridges are connected in a series of triangles or combinations thereof. Their basic structural members are the top and bottom chords. The top chord acts in compression while the bottom chord acts in tension to carry the major loads exerted on the bridge. Connected to the top and bottom chords, a truss's web members are categorized as built-up verticals and braced diagonals. The Pennsylvania (Petit) truss provided greater strength over the earlier Pratt truss design by inclining the top chord and adding sub-struts (additional diagonal or vertical components) to the design. These truss members act both to resist and transmit forces as a load travels across the structure. In order to maintain a bridge's equilibrium, the forces caused by a live load need to be transferred from the floor beams to the lower chords and up the verticals and diagonals to the upper chords.

THE ROLE OF THE Z-HANGER

A bridge's floor beams support the stringers and deck carrying any live loads across the bridge. The Z-shaped plate floor hangers of the Inwood Iron Bridge are key components in the transfer of live load forces. Although quite simple in form, the Z-hanger through its pin connection with the lower chord's eyebars, links every other floor beam with the built-up vertical immediately above it, thereby transferring the force from the lower chord to the upper chord. The use of the Z-hanger allows both tension and compression forces to be transferred to the truss, instead of tension only as was the case for the previously used U-shaped hangers.