

HSS: DESIGNS FOR THE 21st CENTURY



Green River Trailway Bridge, Kent, Washington

FROM HAUL TRUCKS TO HIKERS

HSS 'BRIDGES' GAP BETWEEN STRENGTH AND APPEARANCE

The excellent strength-to-weight ratio of steel Hollow Structural Sections (HSS) is paying immediate benefits to the city of Kent, Washington, but it's the material's aesthetic appeal that will make a difference in the long run.

Kent, a community about 20 miles southeast of Seattle, had a double need for a new bridge over the Green River, which flows north through the city enroute to Lake Washington. Kent's permanent need was a pedestrian bridge for the Interurban



Trail, a hiking and biking route. But first, the city needed a short-cut for haul trucks removing earth excavated for a nearby highway project to keep them out of the city's downtown area. It preferred a truss design that would harmonize with existing Interurban Trail bridges.

The Seattle design engineering firm of Andersen Bjornstad Kane Jacobs, Inc. met all of the city's needs with a 172-foot-long truss bridge that uses HSS for its chords and bracing.

James J. Morris, Senior Project Engineer for ABKJ, said the firm was familiar with

the benefits of HSS, having used round steel hollow structural sections for two earlier trail bridges in Kent. But this time, he said, ABKJ elected to use square HSS and was more than satisfied with the results.

Variety of Wall Sizes Helped Tailor Members

"We liked using HSS because it was easier to make connections, and because there was such a wide variety of sizes and wall thicknesses to choose from," he says. The latter consideration helped ABKJ tailor the amount of steel in the truss closely to the

load-bearing requirements.

"Another plus was the clean, simple lines of the HSS, which added to the bridge's visual appeal," he adds.

ABKJ selected 10" square HSS for the top and bottom chords of the truss, and 10" x 8" rectangular HSS for the visible lateral bracing. A variety of wall thicknesses were used, depending on the specific load requirements for each member.

All of the HSS was fabricated from ASTM A500 grade B steel. The main tension members of the truss had to meet the charpy impact requirements for non-redundant fracture critical members for Temperature Zone 1 as specified in ASTM A709.



Field Bolting Used for Most Connections

Almost all connections were field bolted; the only welding required was for some bracing connections. To field bolt the HSS sections, hand-hole openings were cut into the structurals near each connection. After the bolts were tightened, the hand-holes were covered and sealed.

The ends of the HSS were sealed to prevent water from leaking into the joints. The steel was painted with a three-coat system consisting of a zinc-rich class B primer for slip-critical connections and two final coats. The insides of the HSS were unpainted except for a primer coat at the connections.

The truss, weighing about 160,000 pounds, was completely assembled at a riverbank site in about ten days. It was then picked up by a 250-ton crane and swung halfway across the river, and a second crane then picked up an end to complete the bridge's erection.

Savings Offset Cost of Changing Truss Loading

Kent determined that the money saved in the earthwork bid price from the highway



contractor, coupled with the savings from repairing damage to roads had a longer route through the city been needed, more than paid for the cost of changing the bridge capacity from a pedestrian loading to a truck loading.

For the haul phase of use, a temporary curb and guide rail were provided for the single lane of haul truck traffic. Modifications for trail use include the installation of a permanent concrete curb and steel pedestrian railing identical to that used on

the city's other pedestrian bridges.

The bridge provides a 10-foot-wide corridor over the river for hikers and bikers. It also carries two large pipelines for water and sewage.

Other principal participants in the \$500,000 project included Donald B. Murphy Contractors, Inc. and Kaiser Steel Fabricators, Inc.

