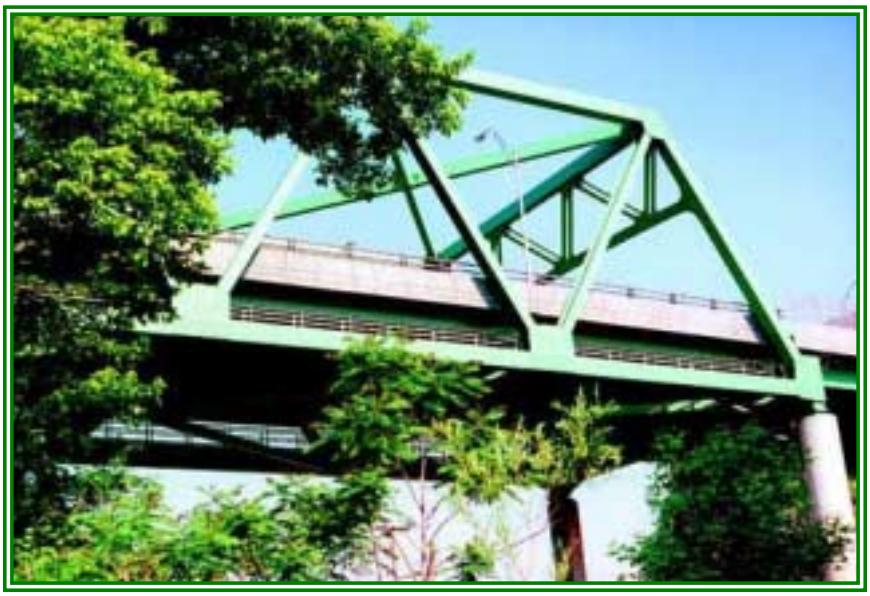
Merit Award: Long Span

ADMIRAL T.J.LOPEZ BRIDGE



The new Admiral T. J. Lopez Bridge in Chelyan, WV is a modern four-lane bridge over the Kanawha River that replaced the existing deteriorated Chelyan Bridge. The new bridge is a three-span continuous, constant depth, through Warren truss with no verticals and spans of 247.5'-594'-247.5' (1,089' total). The poor span balance was dictated by physical constraints at either end of the truss.

The Strength Design Method and use of Grade 70W steel provided significant design economy. Modified load factors reduced design loads in many truss members. Grade 70W steel was used for highly stressed truss members and gusset plates to minimize weight. Both two- and three-dimensional analyses were used to assess load distribution through the truss. Sway bracing was used at support locations only. Moment connections were provided at the floorbeam ends to maintain alignment between trusses. Shear plates incorporated into the joints transfer lateral shears between the joints and the diagonals. The approach girders at the each end of the truss rest on the truss end floorbeams. These reactions provided additional vertical load at the end joint to eliminate the need for tie-downs to resist uplift. This detail also ensures compatible deflections across the deck expansion joints.

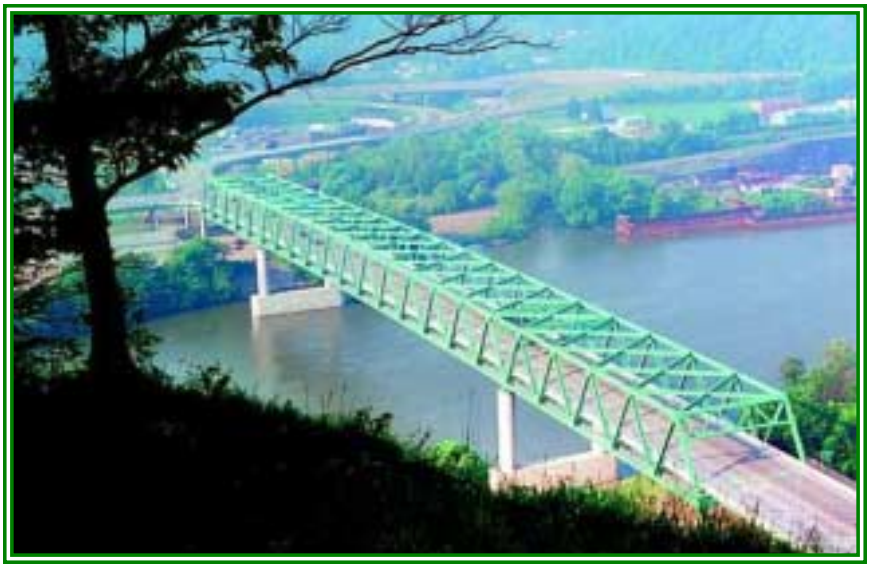
Several major steel fabricators were consulted during design to ensure that details developed were cost-effective. This was particularly important since a concrete alternate design was prepared. The continuous

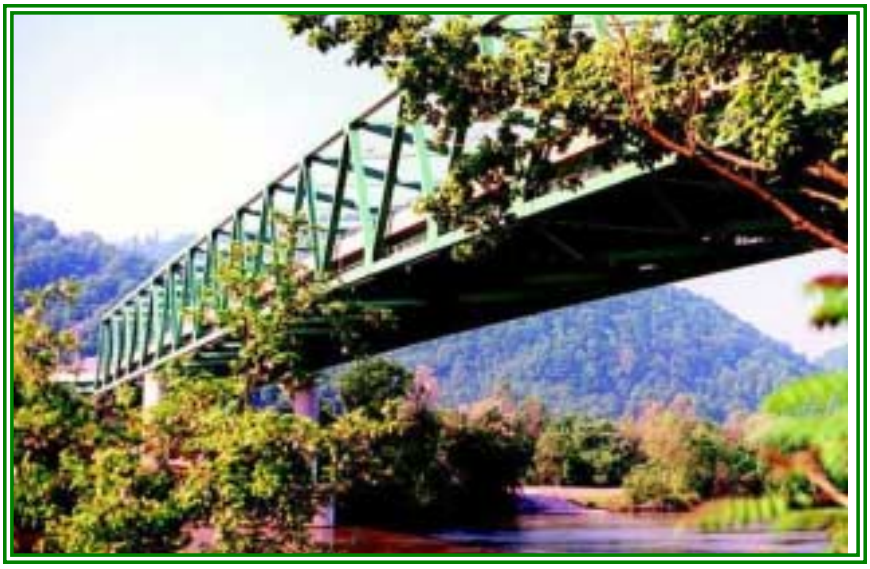
truss permitted erection with economical falsework towers under Panel Point 3 in the end spans, limiting navigation restrictions in the river during construction. HDR had analyzed an assumed erection scheme during design to check potential overstresses during erection. The deck was designed as continuous from end to end of the truss, eliminating the initial cost of stress relief joints and future deterioration of the floor system under such joints due to leakage. Participatory stresses were minimized by tightening bolts on bottom lateral bracing at the center of the bridge and at the stringer bearings after the deck was placed. Dual inspection walkways (one adjacent to each bottom chord) will reduce future inspection costs.

Several items were combined to produce an aesthetically pleasing structure. Those included a contemporary appearance created by the constant depth truss with no verticals or intermediate sway frames and a very slender profile resulting from the continuity of the truss. Also, consistent size and shape of the truss joints achieved through the use of moment connections at the floorbeam ends, high-strength steels, and Class B faying surfaces for truss joints helped with the final result.

The project contained approximately 1700 of plate girder approach spans, containing four continuous units, one of them on a 500 radius. These units were designed utilizing a three-dimensional finite element analysis for maximum economy through improved live load distribution. A simple span at the south end of the truss, which supports a T-intersection, is supported on three piers. A grid analysis was used for the complex framing.

The bridge contract was competitively bid against a concrete alternate design and was chosen by the low bid. The three lowest bids were on the steel alternate, with only $1,571.00 separating first and second on the $25.9





ADMIRAL T.J. LOPEZ BRIDGE

Owner:
West Virginia Department of Transportation

Designer:
HDR Engineering Inc., Pittsburgh (NSBA Affiliate Member)

General Contractor:
C. J. Mahan Construction Co., Grove City, OH

Detailer:
Tensor Engineering Inc., Indian Harbour Beach, FL (NSBA Affiliate Member)

Fabricator:
PDM Bridge, Eau Claire, WI (NSBA Member)

Erector:
Armstrong Steel Erectors, Newark, OH

million contract (including approaches). The low concrete bid was approximately $26.9 million. The project construction duration was approximately 26 months. The bridge was opened to traffic on June 30, 1997.