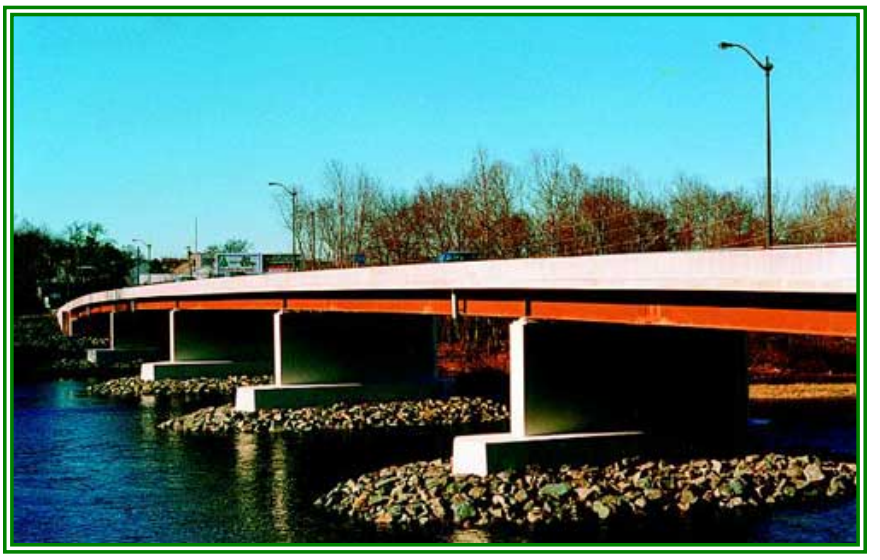
Merit Award: Short Span

S.R. 0029 over the Schuylkill River



The Phoenixville-Mont Clare Bridge project in Pennsylvania was the need to minimize the closure time of State Route 29. To help accomplish this goal, the decision was made to preserve the foundations of the existing bridge and re-use them. This would save both time and money. It required careful demolition of the existing concrete arch structure, repair of a scour hole, pressure grouting of voids, and special design measures to satisfy Seismic Performance Category B requirements. But months of environmental clearance paperwork, engineering labor and complex construction were saved by the elimination of the cofferdams and dewatering that would have been needed to build entirely new substructures in the Schuylkill River.

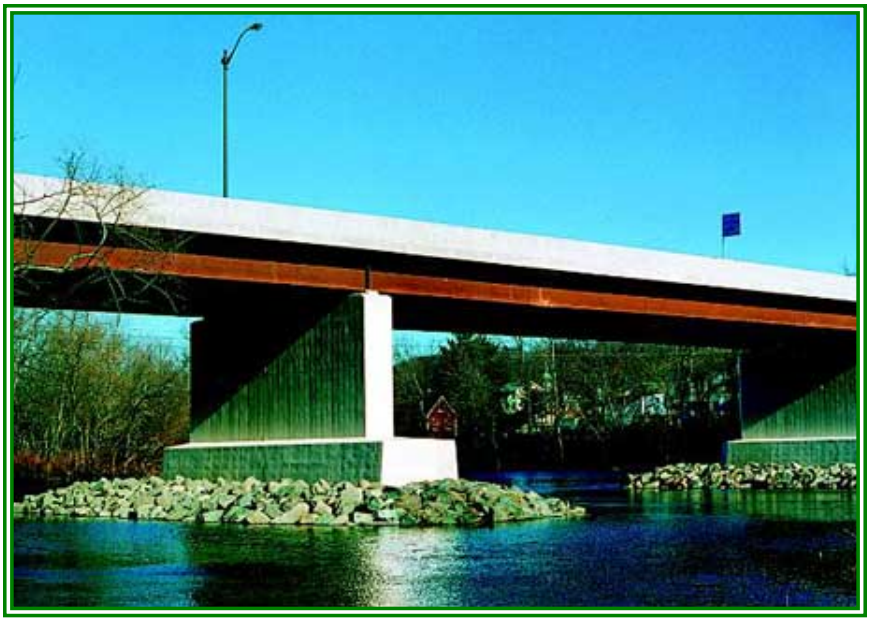
The old bridge was demolished with explosives. To avoid unbalanced arch thrusts and possible damage to the footings that were to be saved, all spans had to be dropped simultaneously. Carefully sized and placed charges were able to accomplish this with minimal and repairable damage to the remaining elements.

New pier shafts and abutment bridge seats were built on the old foundations. Field survey data enabled the new construction to be designed and detailed to fit the existing geometry. With a sidewalk on both sides of the original bridge, but on just one side of the new bridge, the resulting asymmetry required very complex plan presentation and construction to match up the old and new work. A five-span

continuous steel superstructure with four lines of plate girders was chosen to replace the old arches. The girders could be fabricated to fit to the vertical profile of the roadway and would consume the least depth of any alternative, thereby providing maximum waterway opening. Steel also offered speed of erection and the lowest superstructure mass. This would help to control seismic forces that had to be resisted by the old foundations. To limit these forces to acceptable levels, seismic loads were distributed among all piers by means of "shock transmission units." These devices were mounted to all piers that had expansion bearings that would not normally transmit longitudinal forces from superstructure to substructure. The shock transmission units allow normal slow-speed thermal movements to take place, but lock up under the sudden motion that would occur in an earthquake. This is the first application of such an innovation in Pennsylvania.

The Phoenixville-Mont Clare area is heavily served by public utilities. Several utilities occupied the old bridge. These and additional energy and communications companies opted to use the new structure to carry their lines across the river. In all, five companies representing every essential service were accommodated. This placed facilities in every bay of the bridge superstructure. A steel bridge design offered maximum space for these utilities within the girder bays.

The project site and conditions met the Department's criteria for use of weathering steel. Therefore ASTM A709, Grade 50W material was specified to provide premium strength as well as a minimum-maintenance structure. In addition, special fast setting grout mixes were specified for the grouting under and within certain old foundations.S.R. 0029 over the Schuylkill River



The area is scenic and historic. Community input on maintaining this environment had to be received and implemented. Special "period" light poles were substituted for standard light poles to help preserve the quaintness of the old Montgomery and Chester County towns in which the project is situated. The river channel itself was improved by eliminating the excess rip-rap and unsightly debris surrounding the old piers while maintaining the natural contours, shoreline, sandbars and wetlands of the area. The weathering steel superstructure provides a blend with this background.

From the beginning, the public's concern about the effect of the project on their businesses and lives was taken into account. As a direct result of community input, carried even to the level of the State Secretary of Transportation, the decision was made to place an incentive/ disincentive provision in the contract to encourage early completion. A further step towards minimizing the road closure time was to let the contract in the summer of 1996, with the bulk of the construction scheduled for the following year, 1997. This enabled time-consuming utilities work and other tasks that did not require bridge closure, including building of a causeway in the river, to be done up front prior to the major construction.

Remedial operations were performed on the portions of the old substructures that were being re-used. A pier footing that had been undercut by scour and repaired in 1970 was again repaired by pressure grouting into persisting voids under the footing that had been revealed by test borings. Pier damage from the demolition was likewise corrected. As a finishing treatment, a 6 thick, reinforced concrete encasement was applied to all exposed surfaces of the old substructures that were to remain.

The cooperation of all parties led to an opening of the bridges on August 10, 1997, 49 calendar days earlier than the contract date of September 28, 1997. All contract work was completed by October 31, 1997. Steel played a major role in this success story, enabling re-use of the old foundations to support a lightweight, attractive and maintenance free superstructure that was buildable in record time.

S.R. 0029 OVER THE SCHUYLKILL RIVER

Owner:
Pennsylvania Department of Transportation

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

General Contractor:
Allan A. Myers Inc., Worcester, PA

Detailer:
High Steel Structures Inc., Lancaster, PA (NSBA Member)

Fabricator:
High Steel Structures Inc., Lancaster, PA (NSBA Member)

Erector:
High Steel Structures Inc., Lancaster, PA (NSBA Member)