

NATIONAL STEEL BRIDGE ALLIANCE

2001 Prize Bridge Award

merit award: **MEDIUM SPAN**

Avery-Muirfield Drive Bridge

Over US33/SR 161, City of Dublin, OH

The existing 36' wide, four-span structure was a conventional highway steel beam bridge with capped column piers and stub type abutments. All three existing piers were situated less than 30' from edge of pavement and were shielded by guardrail to mitigate their hazard. The vertical clearance provided by the existing bridge over US33/SR161 (designated on the National Highway System) was substandard at less than 15'.

The new bridge needed to meet current design standards for minimum horizontal clearance zone to eliminate guardrail and increase the vertical clearance to a preferred 17' minimum, while minimizing any





raise in profile grade on Avery-Muirfield Drive so as to avoid re-grading of interchange ramps that flank the bridge. It also needed to be easily constructed while safely maintaining all lanes of traffic both on and under the bridge throughout construction.

Anchored End Span Design

An anchored end span type bridge met all of the above design requirements the best and provided an elegant bridge form from which to develop other architectural features. Furthermore, it allowed the City of Dublin the distinction of having the first bridge of its type in the State of Ohio.

The three-span, continuous, steel girder bridge appears to motorists as a single clear span of 191' over the six-lane highway with no center support. Limestone faced solid wall piers support the main span and hide the 33' end spans and abutment anchorage. The deck is 105' 6" wide and carries six lanes of traffic and two combination bikeway/walkways. The superstructure framing is comprised of twelve girders having 72" webs in the end spans and parabolic haunches with 48" minimum web depth in the

center span. The ends of the girders are anchored to the abutments using four post-tensioned galvanized threaded anchor rods extending from a top flange mounted load plate down into grease-packed ducts in the abutment breastwalls. The abutments, designed to preclude pile uplift, have massive footings that serve as counterweights to offset uplift from the unbalanced end spans. Buried pile struts braced off the rigid pier foundations serve to increase the lateral stability of the abutments. Moveable deck joints are avoided by utilizing a semi-integral abutment design that includes a moveable backwall, elastomeric expansion bearings and 12' long flexible anchor rods to accommodate superstructure thermal movements. Recesses are provided in the abutment for future inspection of the anchor rods. Access to the enclosed spans for inspection and future maintenance is provided via removable fence panels between the girders atop the piers.

The continuity provided by the enclosed short end spans enables the use of gracefully-thin haunched girders in the center span that facilitate obtaining the increased vertical clearance with minimal raise in the overpass

profile. It allows the structure to dramatically vault over the entire divided highway without a center pier or any other support within a 30' clear zone from the edge of traveled lanes. This not only significantly improves the safety of the site by removing hazards within the clear zone; it also greatly increases the aesthetic value of the structure.

Owner

City of Dublin, Dublin, OH

Structural Engineer

Burgess & Niple, Limited, Columbus, OH

Steel Fabricator

Vincennes Steel, Vincennes, IN
(AISC member)

Steel Detailer

Tensor Engineering Company, Indian Harbor Beach, FL (AISC & NISD member)

General Contractor

Complete General Construction Company, Columbus, OH

Consultant

Lisle Architecture & Design, Inc.,
Wilmington, NC

Software

MDX Software (Curved and Straight Steel Bridge Design and Rating), Bridgesoft, Inc. (STLBRIGE)