Francis Avenue Bridge U.S. 395 North Spokane Corridor

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Aerial view of the Francis Avenue Bridge located in the north Spokane corridor in Washington state. All Photos: Washington State Department of Transportation Visual Engineering Resource Group (VERG).

When fully complete, the north Spokane corridor in Washington state will be a 10.5-mile-long, north/south, limited-access facility. The new alignment will connect I-90 at the south to U.S. 395 at the north. Planning for the mega project started prior to the World War II era and has resulted in 5.7 miles of new roadway to date. Construction has required dozens of new bridges, the majority of these using precast, prestressed concrete girders. All bridges include ambitious architectural designs.

Francis Avenue Bridge is 455 ft in length and 101 ft wide (curb to curb) with four spans of varying length. The bridge carries five lanes of traffic with bike lanes and sidewalks on each side. The main challenge during the initial design was taking an at-grade railroad crossing and elevating the road over the tracks and future U.S. 395 alignment. Due to existing intersections near each end of the bridge, significant grade changes (+7.38% to –2.98%) were required to maintain minimum vertical clearances over the existing railroad and the future relocated railroad.

To help minimize the vertical profile, Washington State Department of Transportation (WSDOT) deck bulb-tee series girders (W41DG and W53DG) were utilized with a 5-in.-thick, cast-in-place concrete topping. Twenty-four girder lines placed flange to flange were used, requiring 96 total girders. This girder type also reduced the amount of temporary falsework over the active railroad tracks by eliminating the need for deck forms. Spread footings were used at piers 1 and 5, while piers 2, 3, and 4 were founded on drilled shafts primarily to reduce the impact on the adjacent railroad tracks. The girders were designed to envelope the worst-case scenario with and without sidewalks and changing the number of design lanes from six to eight.

Additionally, the geometry and architectural requirements of the bridge required special attention and detailing. Coordinating the locations of the gateway columns, fence posts, barrier joints, luminaire mounts, junction boxes, and future sidewalk lighting conduit stubs were critical. Notably, the outside girder top flange is purposefully exposed to view, creating strong horizontal lines visible as part of the traffic barrier elevation view.

The columns are designed to extend outside the bridge deck. They rise above the sidewalk to become "people places." They also obscure differences in superstructure depth while providing stylized abstractions of diesel engines.

This photo shows how the different girder depths are obscured by the vivid railroad motif columns. Inset: Column design.

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