Maple Avenue Bridge
Redmond, OR

Team

Owner:
City of Redmond

Designer:
OBE Consulting Engineers
(in conjunction with Jiri Strasky, Consulting Engineer, Eugene, OR)

General Contractor:
Cascade Bridge LLC, Vancouver, WA

Reinforcing Bar Fabricator:
Farwest Steel, Eugene, OR and R2M2 Rebar & Stressing, Portland, OR

Total Project Cost:
$8.3 million

Total Project Size:
780 ft (overall span);
(three) 210 ft (arch spans);
(two) 75 ft (approach spans)

Photography:
OBE Consulting Engineers.

STRUCTURAL FRAMING SYSTEM

The NW Maple Avenue Bridge provides a link for the City of Redmond across Dry Canyon, a scenic natural feature providing recreational space for citizens. City officials wanted to create a structure that presented minimal interference with this open space while also providing a pleasing appearance suited for its surroundings.

The 780-foot-long, cast-in-place (CIP) concrete design consists of three continuous 210-foot deck arch spans and two 75-foot post-tensioned approach spans. The arches support a double-tee stemmed deck section, with the two stems matching the transverse spacing of the arch ribs below. The superstructure section for the arch spans continues across the approach spans, where the longer spans of the shallow beams required post-tensioning. All other elements, including substructure, arches, columns, and decks, were conventionally reinforced.

Double columns were placed at each arch rib end, with spandrel columns placed midway between rib ends and composite crown segments. The columns are monolithic, with T-beams above and arch ribs or footings below. They were designed as structurally slender members along the bridge and wide members transverse to the bridge. This created unbraced transverse rigid frames. The arch ribs are composite T-beams with 50 foot mid-spans.

Each arch span has a different profile to provide a uniform length with variable rise relative to each arch support, conforming to the canyon's topography. The two arch ribs are fixed to the footings at the ends of the three-span series, and are pinned to and continuous across the end footings at the intermediate bents. This arrangement allows the ribs to appear to lightly touch the canyon floor at the interior bents.

Intermediate deck diaphragms, transverse beams, and transverse arch braces were made unnecessary by the design approach, contributing to the openness of the structure. Spandrel and bent columns were designed to be architecturally similar, with their slender dimensions relative to height nearly constant. At the bents, the column pair is one column architecturally but two columns functionally, with one of the pair on each side of a transverse deck expansion joint.

Cast-in-place reinforced concrete easily accommodated the variability required in the arch shapes, with special formwork needed only to create the arch curvature that provided the unique and aesthetically pleasing final shape.

Concrete reinforced steel arches add to the beauty and functionality of the bridge by conforming to the canyon.