New Suspension Bridge spans McKenzie River

Reference Details:

Owner Wildish Land Company, Eugene, Oregon, USA +++ **Engineer** OBEC Consulting Engineers, Eugene, Oregon, USA; Dr.Jiri Strasky, Greenbrae, California, USA; Brno, Czech Republic +++ **Precaster** Wildish Paving Company, Eugene, Oregon, USA

DSI Units DSI USA, Western Division, Long Beach, CA, USA
DSI Services Supply of DYWIDAG Post-Tensioning Systems, DYNA Bond ® anchorages, rental of equipment and technical assistance

New 205m bridge near Eugene, Oregon, USA

The McKenzie River suspension bridge spans the McKenzie River north of Eugene, Oregon. The suspension bridge has a total length of 205m and consists of three spans of 37m, 131m and 37m. The design had to be synchronized with the partly extreme water current and possible environmental concerns. For these reasons a classical suspension bridge shape was selected - without piers in the river bed. The design team consisting of OBEC Consulting Engineers and Dr.Jiri Strasky provided the design and detailing for the installation work.

The McKenzie River Bridge utilizes a number of design innovations. The main cables consist of PE sheathed and greased prestressing steel strands sealed and grouted inside steel carrier pipes. The suspenders consist of solid round ASTM Specification A449 rods with threaded ends for clevis connections cast in the precast deck panels and attached to the steel carrier pipes. The clevises used were standard AISC size #5 forged type. Main cable carrier pipes, suspender rods, clevises, and pins were hot dip galvanized after fabrication.

The standard method includes clamping the suspenders to the bridge wire ropes and then sealing them with a wire wrapping and paint system. The McKenzie Bridge main cables are similar to the stays used in the construction of cable-stayed bridges. The Post-Tensioning Institute (PTI) Recommendations for Stay Cable Design, Testing and Installation and FHWA stay cable design advisories were utilized for the design of the main cables. This is the second use of the steel carrier pipe main cable method for a suspension bridge in the United States, the first being the Willamette River (DeFazio) Pedestrian Bridge also developed by this design team and supplied by DSI.

The design team developed the design of the bridge to meet various criteria. These criteria included minimizing environmental impacts during construction and in service, avoiding the construction of piers in the river, and providing an architecturally elegant economical design. In order to meet these requirements, the engineer’s design for the suspension bridge utilized precast elements for the suspended spans. Each precast element is 3m long and installed symmetrically from the center of the bridge, suspended from the main cables. The main cable carrier pipes were suspended across the river on auxiliary strand lines. The strands of the cables were then pulled through the carrier pipes and adjusted as required during erection to meet the design deflected shape.

There are no deck joints located within the precast elements. After erection of all elements the entire deck section was post-tensioned together with 27-15.2 (0.6-inch) DYWIDAG Multistrand Tendons through a continuous duct in each of the curb sections of the precast elements to form a laterally stiff deck diaphragm. The main cables are anchored to the top of the "A" shaped tower pylons and to the abutments with 48-0.6" DYNA Bond ® anchorages. The main cables consist of 0.6" strands,greased and individually PE sheathed, with the low relaxation 7-wire strand grade 270 / St1620/1860 conforming to ASTM Specification A416. After erection of the bridge, the main cables are grouted inside of the steel carrier piles with DSI DYNA Grout ® in accordance with Post Tensioning Institute (PTI) "Recommendations for Stay cable Design, Testing, and Installation, 1993".

The end anchorages are located at the abutments and consist of reinforced concrete blocks supported by rows of inclined piles in both directions longitudinally. To stabilize the bridge in the longitudinal direction and to reduce the horizontal force on the abutments, large bearing bolts are engaged on each end of the deck section.This places the deck in additional compression and allows the bridge to take advantage of this "self stiffening" behaviour. In addition,the bearing bolts reduce force in the main cables and provide an additional load reduction mechanism in terms of the "arching action" of the deck.

Job started in 2002 and was completed in 2003.

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