

SR-520 FLOATING BRIDGE ANCHOR TESTING - Seattle, WA



New floating bridge under construction



540-Ton capacity anchor test barge

Replacement of the currently in-service, yet windstorm and seismically-vulnerable 50 year-old SR-520 floating bridge across Lake Washington is being undertaken by WSDOT in a \$4.65B capital works program. The new structure is being constructed adjacent and parallel to the existing bridge and will be the world's longest floating bridge at 7,710-ft (2,350m) long. The new bridge is comprised of 33, 360-ft (110m) long, by 75-ft (56m) wide, by 30 ft (9m) tall reinforced concrete pontoons, and 44 supplemental stability pontoons.

BSCE was retained by the JV of Kiewit-General-Manson (KGM-JV) to provide specialized construction engineering support with a scope focused on designing components and methodology for an in-situ bridge anchor test program that met WSDOT's stringent and extensive requirements. The test program was required to measure anchor movements to a precision of 0.2 inches (5mm) when pulling on a 800-ft long suspended anchor line.

Working with a specialized software engineering firm, eTrac Engineering, BSCE engineers developed the necessary catenary cable formulations that were integrated into the real-time monitoring system which provided the verification data necessary to confirm the 1200-T holding capacity of the trans-

PROJECT INFORMATION

Year of Completion: 2016 (expected)

Construction Cost: \$4.65B (including approaches)

Client: Kiewit-General-Manson JV

Project Sponsor: WSDOT

verse cable anchors.

Although anchored 200-ft (61m) below the surface of Lake Washington and up to 800-ft (250m) away, the real-time measurement system was able to accurately measure anchor movement for crucial load-displacement behavior re-

quirements, taking into consideration influencing factors such as cable take-up, sag, elastic elongation, while compensating for test barge movement using a real-time kinematic Global Positioning System. Transverse anchor testing was successfully completed in 2014.

Additional work performed by BSCE included the design of a unique 1200-T capacity lift barge ("T-Pontoon") that allowed the casting and launch of a pair of supplemental pontoons from Concrete Tech's Tacoma yard where the dry-dock and exit gate were too shallow to allow pontoon launch without supplemental buoyancy of 600-T per pontoon.

SERVICES PERFORMED

- ◆ Specialty structural engineering design and support to develop a real-time anchor testing program
- ◆ Catenary cable behavior analysis, to high precision requirements
- ◆ Design of a testing barge with 540-Ton capacity for the testing of transverse anchors
- ◆ Design of separate test frame fixed to side of bridge pontoon to test longitudinal anchor up to 300-Tons
- ◆ Design of a 1200-Ton capacity T-Lift pontoon for launch of supplemental side pontoons from Tacoma Dry-Dock
- ◆ Construction support and field services



BITTNER-SHEN CONSULTING ENGINEERS, INC.

SPECIALTY ENGINEERING: STRUCTURAL · GEOTECHNICAL · CONSTRUCTION · MARINE

921 SW Washington St., Suite 765, Portland, OR 97205