SR 520 Bridge Replacement

US SPEC Products: NA Grout
Contractor: Kiewit
Date of Completion: 2016
Location: Seattle, Washington

Seattle, Washington has experienced tremendous growth in the last 15 years; it is home to Boeing and Microsoft, two of the world’s largest companies. Before the population boom, Seattle’s roads and highways were extremely constrained due to geography.

The State Route (SR) 520 bridge connects the Montlake/Union Bay district of Seattle to Medina, Washington. Since opening in 1963, the bridge settled one foot lower than originally constructed. It had limited shoulder space and could create major traffic jams with the slightest car accident or stall. Construction of the new, floating SR 520 began in 2011. The replacement supports a wider, six-lane roadway with dedicated transit/HOV lanes, wider shoulders and a 14-foot-wide bicycle/pedestrian path. During construction, the original bridge remained in place and open to traffic. It was converted to a toll road to help pay for the $4.65 billion SR 520 replacement. SR 520 will be the largest floating bridge in the world and the largest post-tensioning grout project US SPEC has had to date.

Construction of SR 520 required a pumpable, non-bleed grout that met or exceeded Post-Tensioning Institute (PTI) specifications. The grout also needed to meet the Washington State Department of Transportation (WSDOT) requirements for a post-tensioning grout. Kiewit, the general contractor, chose US SPEC NA Grout. NA Grout met all requirements and was the only USA made product on the WSDOT Qualified Products List (QPL).

The massive base of SR 520 was constructed using 77 concrete pontoons, each the size of a football field. Of these, 33 were built at a dry dock in Aberdeen, Washington, off the coast of Washington state; the other 44 were built in Tacoma, Washington. NA Grout was used in post-tensioned ducts that encapsulate post-tensioned strands that gave the pontoons their structure. When complete, the pontoons were towed by tugboat from Aberdeen, through the Pacific Ocean to their final destination in Lake Washington near Seattle. The final three arrived early April 2015.

NA Grout was mixed in batches of 4-8 bags in a colloidal mixer and pumped up to 360 feet. The colloidal mixer had a mixing tank and a holding tank to keep the grout agitated to maintain a fluid consistency. Before grouting could start, all batch numbers were required to be documented. Also, the ducts had to be pressure checked prior to grouting and the tendons needed to be clear of water and debris. Pumping grout into ducts is a synchronized process. Workers were stationed at multiple areas of the ducts, including the inlet and outlet, monitoring and communicating the grouting process. When grouting of a duct was complete, the inlet needed to be closed before the outlet. The closings happened nearly simultaneously by workers communicating over radio. If the outlet closed first, the grout backs up and there will often be a break or blow out in the duct. Schwager Davis, the sub-contractor specializing in post-tensioning systems, performed the grouting.

The durable bridge was designed to withstand windstorms up to 89 mph and be compatible with the future addition of light rail. It is on schedule to open spring of 2016. To learn more about this project and watch the construction progress, follow @wsdot_520 on Twitter.

US SPEC has supplied grout on many WSDOT jobs including the Manette Bridge, Nalley Valley Overpass and SEATAC (Seattle-Tacoma International Airport) light rail expansion.