

Building in the 'Fish Window'

by Jim Markus, King County Department of Transportation

King County, Wash., can disrupt waterways only from June to October, creating challenges that necessitate longer bridge spans and efficient designs

King County, Wash., offers spectacular scenery with many rivers running through a densely populated developed landscape. This creates challenges for maintaining bridges. Most of the bridges span salmon-bearing waterways, which can't be disrupted during spawning season. That "fish window" limits construction of most bridges from June until early October, marking the number-one challenge to keeping roadways open and infrastructure up to date.

The county replaced 33 bridges in the 14 years between 1995 and 2008. Another nine bridges were rebuilt, adding more construction. These nine projects were all uniquely able to make use of the existing structure. Seldom does such rebuilding make sense. Due to our high seismic zone, foundations often must be brought up to code, at which point it's difficult to save the rest of the bridge and achieve any life-cycle cost savings.

In 2008, the county also completed a 14-year, \$20 million, comprehensive Bridge Seismic Retrofit Program, upgrading 115 of the county's 184 bridges, five of which are co-owned with neighboring cities.

The "fish window" restriction requires any work done over the waterway, including girder placement and deck placements, to be completed during that period. The key concern is concrete spills into the water, which can kill fish in an instant. As a result, we no longer build bridges with piers in the water, leading us to continually seek new ways to span the waterways. One approach has been to extend concrete clear-span designs to 200 ft or more. A project to be completed in November 2011 features a 210-ft span with spliced precast concrete Washington State supergirders, our longest simple-span concrete bridge to date.

Replacing longer spans also requires dramatically increased deck area. An example is the new York Bridge, a partnership between the county and the city of Redmond, which replaced a simple-span, narrow 50-year-old bridge vulnerable to earthquake damage. The 220-ft-long, four-span, precast, prestressed concrete replacement features Washington State W42G girders with a shallow cast-in-place concrete arch and inclined columns supporting two center spans.

The project won the Silver Award for Structural Systems from the American Council of Engineering Companies and features artwork



The York Bridge in King County, Wash., features a cast-in-place arch supporting a four-span precast concrete superstructure. The combination allowed the design to be consistent with other bridges in the area while maintaining the required structural integrity. Photos: King County DOT.



The Wynaco Bridge spanning Covington Creek was extensively rehabilitated to upgrade its load capacity, seismically retrofit it, and strengthen its rails. The 195-ft-long bridge reused some precast concrete girders with a more efficient spacing, saving time and money. The project won two awards from the local American Society of Civil Engineers.

by Cliff Garten, paid for by King County and Redmond's public-art programs. In noting the bridge's consistency with other bridges in the area, the judges cited the design's ability to overcome challenges that included soft soil, an unusual arch design, and concern for the environment and neighbors.

The county continues to look for creative approaches to meeting its challenges. Because detours can be significant, we continually look for techniques that will speed construction,

such as geosynthetic reinforced abutments that can replace drilled shafts. Those concepts can minimize user costs and help us to complete work inside the "fish window."

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