



Transportation

Client

Washington State Department of Transportation

Location

Renton, Washington

I-405 Renton Stage 2 Design-Build

CH2M HILL provided design and construction services to WSDOT through the two-party joint venture, I-405 Corridor Design Builders (CDB), for the Renton Stage 2 design-build project. The project consists of a new half-diamond interchange on I-405 at SR 515 (Talbot Road), improved access ramps to the I-405 interchanges at SR 167 and SR 169, construction of one additional auxiliary lane on I-405 in each direction between SR 167 and SR 169, and reconstruction of the Benson Road Bridge over I-405.

The CH2M HILL team designed two new bridges on a fast-track schedule that included the Benson Road Bridge Replacement. This 520-foot-long bridge features a three-span, spliced, post-tensioned, pre-cast girder bridge with a maximum span length of 207 feet. The bridge was designed using a spliced post-tensioned design and features 45 degree pier skews. The project also included the new Southbound Off-Ramp Bridge, a two-span, pre-stressed girder bridge, which was designed for a curved alignment and included design of an integral straddle bent at the interior pier. The bridges also feature aesthetic treatments in accordance with I-405 corridor guidelines. Both bridges were designed to WSDOT displacement-based seismic design criteria, and were designed on a 4-month, fast-track schedule.

The Renton Stage 2 project is developed in accordance with the Urban Design Criteria established for the I-405 Corridor. This includes aesthetic geometric criteria for size and scale and patterns on all retaining walls, bridge elements, railings, and a specified pallet of landscape materials. This is the first major project in the corridor designed with the distinctive horizontal tops and vertical steps on all retaining and noise walls. American Disability Act criteria were employed in this urban environment where excessive grades on sidewalks were a challenge.

The Renton Stage 2 work site contained four differing site conditions: 1) contaminated soils in a civic dump; 2) an abandoned coal mine under the freeway with a dilapidated culvert; 3) a shifted approach slab and barrier rail on the I-405 structure over Talbot Road; and 4) loose unconfined fills with liquefiable potential. All four site conditions were within the core areas of construction and posed significant risk of delaying the entire project if not addressed in a timely and collaborative approach. The integrated management team of designers and builders met with WSDOT teams to brainstorm options, reach consensus, adjust schedules, and develop phased work plans to manage risks and keep the construction on track.

In addition, the project is located in the urban environment at the south end of the Renton “S-Curves” on I-405. With terrain varying more than 200 feet in elevation across the site, project earthwork areas are visible from 3 miles across the valley. The joint venture team moved more than 200,000 cubic yards of dirt to complete a critical path element of excavating the northbound Talbot Road to I-405 onramp and expose Pier 2 of the Benson Road bridge, all prior to the winter rainy season. The CH2M HILL team minimized the project disturbance area by 25 percent through innovative earthwork concepts. Further enhancements were developed to optimize water quality features. The team eliminated all high-cost detention vaults and found space for modified media filter drains to be situated for forward compatibility.

The lower elevations of the project coincided with tight right-of-way, leaving no space for temporary water quality features outside the work zones. To manage stormwater during wet season earthwork, the team developed an “environmental bathtub,” a quarry spalls filtration system below grade with 120,000 gallons storage and treatment capacity. The team installed roadside restoration plantings, integral to permanent slope stabilization on the north-bound on-ramp cut, within one planting season following Notice to Proceed.

The project also involved elements of context sensitive solutions. In addressing a discovered field condition of liquefiable soils, the CH2M HILL team worked with WSDOT and City of Renton to develop an efficient solution for all parties. The context sensitive solution was a reinforced soil slope with a green grass face. Though the feature being built supported the WSDOT I-405 to Talbot Road off-ramp, the City of Renton was a key decision maker as the 1,080-foot-long wall is highly visible from Renton City Hall. City staff desired a “green wall” look as opposed to a “caged rock” or concrete faced structure. The solution incorporated grass turf into the vertical face of the stepped wall. The result is an instant green wall.

Public involvement was planned in conjunction with WSDOT and City of Renton staff to be inclusive of all affected communities. Team members attended many community picnics, public meetings, and sidewalk neighborhood meetings to explain the project improvements and effects during construction. In addition, weekly updates to noise and traffic impacts were communicated through various forms of door-to-door flyers, newsletters, and always posted on the WSDOT website.

The biggest event of the project was the full closure of I-405 (both north-bound and south-bound traffic) to remove the Old Benson Road Bridge. This was done only one other time in WSDOT history. At first, the idea was discounted, but then became the preferred WSDOT alternative for the demolition of the old bridge. WSDOT and the team partnered together to develop hour-by-hour and sometimes minute-by-minute plans to demolish the bridge, and to perform other work made possible with the complete closure, including concrete panel replacements, sign bridge erection, storm drain crossings, boring fiber optic lines under the freeway, setting vaults for the Intelligent Transportation System, and to locate a City of Renton Sanitary sewer manhole that was covered when I-405 was constructed in the 1960s. This was an enormous public information undertaking that WSDOT and the CH2M HILL team partnered for success, winning the both the Markum and Totem Awards recognizing excellence in public information.

About CH2M HILL

Headquartered near Denver, Colorado, USA, employee-owned CH2M HILL is a global leader in consulting, design, design-build, operations, and program management for government, civil, industrial and energy clients. The firm's work is concentrated in the areas of water, transportation, environmental, energy, facilities and resources. With US\$6.3 billion in revenue and 23,000 employees, CH2M HILL is an industry-leading program management, construction management and design firm, as ranked by Engineering News-Record and named a leader in sustainable engineering by Verdantix. The firm has been named a FORTUNE 100 Best Companies to Work for five times. Visit us at www.ch2mhill.com, twitter.com/ch2mhill and facebook.com/ch2mhill.