

# I-90 Corridor Design

## Mercer Island, Washington

**Owner:** Washington State Department of Transportation

**Description:** INCA Engineers, Inc., A Tetra Tech Company (INCA) was a significant contributor as a designer of the Puget Sound's premier transportation program of the 1980s, the improvements to the I-90 Corridor across Mercer Island. This \$23 million construction effort was a major undertaking of WSDOT, resulting in several new approaches for integrating of landscape, transit, and community access. INCA provided preliminary design of the eight-lane depressed freeway, including landscaped cut and cover overpasses, aerial ramps, and transit access. INCA provided value engineering services and final design for numerous retaining walls with several construction techniques. Specific assignments are summarized below:

- ▶ **I-90: 80th Avenue to Island Crest Way:** Preliminary and final design, contract plans, specifications, and cost estimates for the 258-foot long, 131-foot wide bridge. Slurry wall abutments were used as substructure to eliminate shoring. Designed as a lid over I-90, the bridge sustains six feet of soil for landscaping -- equivalent in weight to a seven-story high-rise building. It was also designed to take lateral loads due to winds because of the 40-foot trees to be placed on the structure. The seismic design of this bridge takes into consideration the weight of the structure and six feet of soil.
- ▶ **I-90: Luther Burbank to East Mercer Connection:** As part of value engineering, replaced nearly 100,000 square feet of slurry wall with newly developed drilled shaft spaced pile design to save construction time and cost for the owner and drilling contractor.
- ▶ **I-90: Shorewood Apartment Emergency Slurry Walls:** Permanent cantilever and tieback diaphragm slurry walls, fast-tracked in 60 days due to mud slide below the Shorewood Apartments. Design included a combination rectangular slurry wall with tiebacks and tee section slurry wall without tiebacks.
- ▶ **I-90: Luther Burbank Emergency Soldier Pile Wall:** During construction, INCA was called to respond to an emergency closure of the westbound lane of I-90 when heavy rainfall caused the hillside to slide on to the outside lane, completely stopping the flow of traffic. INCA was on site within the hour. One lane of traffic flow was reopened the same day. All lanes were operational within two days.
- ▶ **I-90: Shorewood Undercrossing:** Complete analysis of stage two construction and design of Pier 1 using space pile with precast fascia wall for two contractors. Design met structural requirements, and saved construction time and money.
- ▶ **I-90: Soldier Pile and Cantilevered Retaining Walls:** Temporary soldier pile walls and permanent cantilevered retaining walls for the Luther Burbank LID to East Mercer Island interchange.
- ▶ **I-90: Spaced Pile Diaphragm Wall:** Replaced over 150,000 square feet of slurry wall with newly developed drilled shaft spaced pile wall to save construction time and cost for owner and DBM/foundations contractor.
- ▶ **I-90: East Mercer Interchange Redesign/Build:** Value engineering and redesign of T-1 soldier pile lagging walls for contractor included design calculations and sketches for design. To eliminate open trench excavation on the roadway for the construction of a deadman anchor, INCA used additional shafts as deadman anchors and drilled under the roadway to connect the deadman shaft. This allowed traffic corridors to remain open.
- ▶ **I-90: East Mercer Interchange Redesign/Build:** Value engineering and redesign of slurry wall. Included design calculations and sketches to reinforce concrete cantilevered drill shaft. Cast-in-place, 4-foot diameter drilled shafts were used for quick construction and cost savings. Portions of the wall were cast-in-place concrete and were used above the shaft.
- ▶ **I-90: Abbott Road Bridges:** Directed the widening of both sides of these two bridges. Prepared contract documents for superstructure and substructure. Project included stage construction to keep I-90 open to traffic during widening.

