QUICK FACTS

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SOUND TRANSIT
RIDE THE WAVE

I-90 load test finds light rail feasible across Lake Washington

Sound Transit's regional system of buses and trains connect communities throughout Central Puget Sound, serving nearly 11 million riders annually and offering alternatives to driving. By the year 2030, the region will be home to another 1.2 million people – that's more than the combined populations of Seattle, Tacoma, Bellevue, Everett, Federal Way, Kirkland, Edmonds and Lynnwood. That kind of growth, combined with the region's already congested roadways, makes the expansion of our regional transit system a critical tool for maintaining and enhancing our quality of life.

In July 2005, when the Sound Transit Board updated its Long Range Plan, it directed additional analyses of the Interstate 90 corridor. This key transportation corridor connects Bellevue and Seattle, two of the region's most important economic and business centers. Corridor-wide land use characteristics and employment densities in the Seattle and Bellevue central business districts support high capacity transit (HCT). In a study by the Puget Sound Regional Council, the cross-lake corridor was identified as being ripe for HCT. In addition, the 1999 Trans-Lake Study indicated I-90 was preferred for the first cross-lake HCT bridge. Together, this work set the stage for Sound Transit to move ahead on providing light rail on I-90 and through East King County.

The load test

An important component of the project was to confirm the feasibility of operating light rail service along the I-90 corridor across the Homer Hadley Floating Bridge spanning Lake Washington. The Washington State Department of Transportation (WSDOT) conducted the test to simulate light rail operation on the I-90 floating bridge. The test, which took place over three days in September 2005, was launched to quantify the bridge's movement during simulated light rail train operation. It also provided additional information affirming computer modeling work and structural analyses prepared by WSDOT's consulting engineers in 2001 that showed that the bridge is capable of carrying light rail.

Traffic was shut down on the center roadway and westbound lanes during the night-time testing. The test involved eight flatbed trucks that were loaded to approximate the weight of light rail vehicles (148,000 pounds each, with two four-truck combinations each simulating a four-car light rail train).

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Static (stationary) load conditions were simulated by placing fully loaded test vehicles at specific locations on the bridge, followed by taking measurements. Dynamic (moving) load conditions then were simulated by driving the fully loaded test vehicles in train formation on the bridge's center roadway, with more measurements. Tests simulated single trains traveling in both directions along the bridge's length, and trains passing one another at mid-span and near the west end.

Sensitive instruments on the bridge captured data as the bridge responded to the trucks' weight and movements, providing information about how the floating bridge would respond to the weight and movement of light rail trains. Measurements were taken at various points on the bridge to monitor movement at its ends and mid-span, as well as on the pontoons, bridge deck and supporting structures.

The test was performed in clear, dry weather with no wind in order to provide a baseline from which to measure the movement from the light rail loads and to enable data collection by satellites passing overhead. Engineers then added data from a one-year storm to the test results to obtain information about how the bridge would perform with light rail movements during storm conditions.

The test results

Results of the load test confirmed previous findings that the bridge can be structurally retrofitted to carry the loads associated with the light rail system under consideration, in addition to general traffic on the roadway. It also verified that models developed by WSDOT's consulting engineers can be used to design the structural retrofit required to accommodate light rail. Further, live load testing was found to correlate very closely to computer simulations, adding more confidence to the previous analysis and confirming that these models can be used for future design work.

What's next?

In December 2006, the Sound Transit Board identified the light rail routes, stations and maintenance facility alternatives for detailed study in the environmental impact statement (EIS). Sound Transit is currently conducting engineering and environmental analysis on the East Link alternatives. The draft EIS will include a detailed analysis of each alternative.

After the Draft EIS is published, it will be made available to the public during a formal comment period, which will include multiple public meetings. After the public comment process for the draft EIS is completed the Sound Transit Board will identify a preferred East Link route for final EIS analysis. During this phase of the project, Sound Transit will begin preliminary engineering on the preferred alternative and the design of light rail on the I-90 floating bridge will be further advanced.