

# I-90 HOMER HADLEY FLOATING BRIDGE

Independent Review Team

Light Rail Train Impacts

Final Report



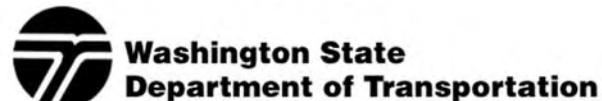
Prepared by

**SC SOLUTIONS**

In Association with



For



**15 September 2008**

# Issue Resolution Report

**Title:**

Washington State Legislature, Joint Transportation Committee  
Independent Review Team  
Feasibility of Placing LRT on the Homer M. Hadley Floating Bridge

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<b>Issue A Track Bridge/Expansion Joint Design and Performance Criteria</b>		
<b>Independent Review Team Member Responsible for Resolution of Issue</b>	<b>Importance of Issue</b>	<b>Agency Responsible for Providing Resolution</b>
Chuck Ruth	High	Sound Transit
<b>General Description and Background of Issue</b>		
<p>The feasibility of connecting the East Link light rail line to the Central Link requires that the track bridge, at each end of the transition spans, be functional at all times during operation. The Independent Review Team acquired the design/performance criteria used by Washington State DOT for the new expansion joints that they are placing in the Homer M. Hadley Floating Bridge. These criteria should be a good basis for outlining the performance specification for the track bridge at the expansion joints. Early prototype testing is recommended because the track bridge is unique.</p> <p>The Independent Review Team is not aware of any current manufactured track bridge concept that could be adopted for the use on the floating bridge. Sound Transit has developed and provided the Independent Review Team with conceptual details for the proposed track bridge. Since the successful installation and operation of the track bridge is a critical element for East Link and a unique design, the track bridge concept needs to be developed and prototype testing performed before final design begins. Track bridge noise should also be evaluated as part of the prototype testing. The track bridge attachments and effects on the supporting structure require testing as well.</p>		
<b>Required Information for Independent Review Team's Review</b>		
<ul style="list-style-type: none"><li>• Design and performance criteria for new expansion joint from Washington State DOT.</li><li>• Prototype development and test plan for track bridge.</li><li>• Method for production track bridge testing.</li><li>• Proposed approach for incorporation of track bridge into final contract (agency-furnished contract element or contractor-fabricated element).</li></ul>		
<b>Data Sources and Documents Provided by Responsible Agency</b>		
<ol style="list-style-type: none"><li>1. INCA Engineers, Inc., "Eastside HCT Corridor, I-90 floating Bridge (Homer Hadley), Expansion Joint Final Conceptual Report, January 2008.</li><li>2. May 30th, 2008 letter from Sound Transit in response to the Independent Review Team's April 24, 2008 letter.</li></ol>		

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## Resolution of Issue

Prototype testing and vetting of the track bridge concept design needs to be performed as soon as possible. This type of track bridge has never been utilized before and there is no historical data available for Independent Review Team to judge the feasibility of this concept. Therefore, the Independent Review Team recommends the following action plan for track bridge:

- Perform preliminary design of the track bridge system based on Washington State DOT-accepted design criteria for the following two load conditions: (1) LRT max load in combination with "normal operating conditions" (to be established based on nominal bridge storm movement and maximum lake level drop or rise, with appropriate load factors), and (2) extreme (maximum operational level storm movement) in combination with max LRT load (up to yield material stress allowed with no load factors). Preliminary and final design of the track bridge system should be completed prior to prototype testing.
- Based on member sizes, connections, bridge rail elements, and fasteners determined from preliminary design, fabricate a "prototype" track bridge and test in accordance with Washington State DOT fatigue testing requirements for major bridge expansion joints. Prototype testing should include provisions maintenance, removal, and replacement of the track bridges. The sound emitted by the track bridge under LRT loading should be monitored throughout testing to assure that acceptable sound levels are not exceeded. Prototype fabrication and testing should be completed prior to the start of final design of the LRT installation.
- Modify track bridge design based on results of prototype testing and perform additional testing until it is determined that the final prototype will function with tolerable maintenance for the anticipated remaining life of the bridge or until scheduled replacement milestones. This stage should be completed at least two years before the anticipated final LTR installation contract on the Homer Hadley Floating Bridge, and before any construction begins on the East/West LRT Link.
- Consider fabricating track bridges prior to final contract for placing LRT on Homer Hadley Floating Bridge. Fabrication would include development of a "track bridge maintenance manual" and at least one extra replacement track bridge.
- Consider installing track bridges in final LRT contract as "agency-furnished materials"

Preliminary analysis by the Independent Review Team indicates that the Sound Transit conceptual design track bridge member stresses are within reasonable limits under the application of LRT loads (see Appendix B, Technical Memorandum TM-03 Expansion Joint Model).