SOUND TRANSIT

HCT Planning

Sound Transit ST2

Past and Present I-90/East Corridor HCT Alternatives Studies

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1. Introduction

This technical memorandum summarizes the regional and local planning activities and decisions to date involved in the analysis of high capacity transportation (HCT) alternatives for the I-90/East corridor. The I-90/East corridor links Seattle with the Eastside cities of Mercer Island, Bellevue, and Redmond via the I-90 Bridge across Lake Washington.

This memorandum describes the relationship among Sound Transit's HCT planning processes and statewide planning and regional planning processes. It includes an overview of the HCT planning processes and analyses for the I-90/East corridor, and it summarizes the evaluation and selection of HCT modal alternatives to be evaluated further in project-level environmental review.

2. Relationship Among Sound Transit HCT Planning, Statewide Planning, and Regional (PSRC) Transportation Planning Processes

Several state and regional planning processes relate directly to Sound Transit's planning process for the I-90/East corridor.

State High Capacity Transportation Systems Act (RCW 81.104)

Sound Transit's enabling legislation, the State High Capacity Transportation Systems Act (RCW 81.104.100. (2)), provides that HCT system planning is the detailed evaluation of a range of high capacity system options, including: do nothing, low capital, and ranges of higher capital facilities. The Act goes on to state that, "Options to be studied shall be developed to ensure an appropriate range of technologies and service policies can be evaluated. A do-nothing option and a low capital option that maximizes the current system shall be developed. Several higher capital options that consider a range of capital expenditures for several candidate technologies shall be developed."

Sound Transit addressed these requirements in 1996 with adoption of the *Sound Move* plan, and its ongoing ST2 planning work includes the evaluation of "do-nothing", low-capital and high-capital options.

The Act includes direction for the regional, multimodal transportation planning process conducted in the Central Puget Sound region by the Puget Sound Regional Council. The PSRC planning process "provides a comprehensive view of the region's transportation needs but does not select specified modes to serve those needs. The [PSRC] process shall identify a priority corridor or corridors for further study of high capacity transportation facilities if it is deemed feasible by local officials."

Washington State's Growth Management Act (RCW 36.70A; 47.80)

The Washington State Growth Management Act (GMA) was initially adopted in 1990 and has been amended many times since then. The Act established wide-ranging goals and requirements for multi-county, countywide, and local planning. A Regional Transportation Planning

Organization (RTPO) provision (RCW 47.80) in the GMA provides additional direction for regional transportation planning.

A primary goal of the GMA is to "encourage development in urban areas where adequate public facilities and services exist or can be provided in an efficient manner." The GMA supports a regional approach that closely links land use planning with the provision of transportation and other public infrastructure.

The GMA requires RTPOs, such as the Regional Council, to review and certify that the transportation elements of comprehensive plans adopted by the region's counties, cities and towns are consistent with the metropolitan transportation plan, *Destination 2030*. The GMA requires that all comprehensive plans be both internally consistent, and coordinated with one another. Coordination and consistency are required between planning activities at the state, multi-county (or regional) and local levels. The GMA also requires RTPOs, such as the Puget Sound Regional Council, to perform a number of functions that develop growth strategies including:

- Preparation of a regional transportation plan that considers and coordinates policy consistency of state and local transportation plans; and
- Certification that comprehensive plans prepared by local jurisdictions are consistent with the regional transportation plan.

The state RTPO legislation requires a review of regional transportation plans every two years.

VISION 2020

One of the key elements of the GMA is the emphasis on coordinated and consistent planning among jurisdictions. As a regional transportation planning organization (RTPO), the Regional Council is required to adopt and maintain a regional growth management, economic and transportation strategy and a regional transportation plan. Adopted in 1990 and updated in 1995, VISION 2020 outlines the region's strategy for managing growth, the economy and transportation.

The VISION 2020 growth strategy is currently being updated and is scheduled to be completed in early 2007. The process to update VISION 2020 involves a significant public and agency outreach process. Public outreach activities conducted to date include public workshops, interactive polling during the 2004 PSRC General Assembly[1] meeting, and a survey of citizens across the central Puget Sound region. Over one thousand comments were received during the public comment period that ran from October 2003 through March 31, 2004.

Consistent with the GMA, VISION 2020 emphasizes the concentration of regional population and employment growth in designated centers connected by high-quality transportation networks. VISION 2020 includes an emphasis on providing transportation investments that

[1] The PSRC is governed by a General Assembly and Executive Board. The General Assembly is composed of all members, and each has a vote on major regional decisions. The Assembly meets at least annually to review and vote on the annual budget, new officers, as well as plans and updates.

support transit and pedestrian-oriented land use patterns. High capacity transit is an essential part of an integrated transportation system that supports the region's growth objectives.

Destination 2030 (Metropolitan Transportation Plan)

Destination 2030, the metropolitan long-range transportation plan, builds on VISION 2020's transportation policies with a program for addressing transportation improvements. *Destination 2030* was developed in 1995 and updated in 2001. To meet the three-year cycle of updates and review of the plan, PSRC completed progress reports in 1998 and 2004. Public participation for *Destination 2030* activities since 1995 included public workshops, focus group meetings, newsletters, and presentations to community groups. Over 1,300 comments were received from the public during the development of *Destination 2030*. The next major update of the plan is anticipated in 2007-2008, and it will employ a similar level of effort to reach and involve the public and affected agencies.

Destination 2030 calls for continued investment in the region's HCT system, together with expansion in all forms of transportation, to help meet growing demand. The I-90 corridor is a Highway of Statewide Significance that experiences high levels of peak-period congestion in King County. This important corridor connects the regional growth center of downtown Seattle with multiple regional growth and manufacturing/industrial centers east of Lake Washington (Bellevue, Overlake and Redmond).

According to PSRC travel data[2], the region's largest trip destination center is downtown Seattle, which receives 200,000 auto person trips (in 165,000 vehicles) and 80,000 transit person trips each weekday. Combined with the adjacent Denny Regrade and First Hill centers, this metropolitan center attracts 520,000 auto person trips (in 315,000 vehicles) and 100,000 transit person trips each weekday. The next largest center in the region is east of Lake Washington, where the combination of the downtown Bellevue, Overlake, and Redmond attracts 460,000 auto person trips (in 255,000 vehicles) and 10,000 transit person trips each weekday.

The current project list for *Destination 2030* includes a proposed HCT extension across I-90 to connect the downtowns of Seattle, Bellevue, and Redmond. This project is included as a Candidate[3] project. In order for this project to move to Approval status and be eligible for right-of-way acquisition and construction expenditures, a preferred alternative (including technology) needs to be identified. Once the preferred alternative is known, Sound Transit should submit a request for a minor amendment to the PSRC so that the *Destination 2030* project list, regional travel demand forecasting model, and air quality conformity determination can be updated. A minor amendment can be approved by action of the PSRC Executive Board. A formal request for Approval status could be made thereafter.

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[2] PSRC Responses to Federal Certification Review Guide, PSRC, September 2005.

[3] To comply with federal and state requirements that differ in key respects, the PSRC has adopted a two-tiered process for approving projects in *Destination 2030*. Projects included as Candidate system improvement concepts are eligible for federal transportation and environmental planning funds. Once a Candidate project has completed all applicable planning, environmental and financial analyses, the project is eligible for Approval status and implementation funding, including right-of-way acquisition and construction phases. For additional information, see *Guidance for Major Capacity Investments*, Puget Sound Regional Council, 2002.

Other HCT extensions are included in Destination 2030 for other corridors, including the SR 520 corridor. The designation for the I-90 corridor HCT extension indicates that I-90 is the preferred location for the first HCT crossing of Lake Washington.

Regional (PSRC) Transportation Planning Process

The Puget Sound Regional Council (PSRC) performs its regional transportation planning and programming duties under both federal and state regulations. The precursor to the Puget Sound Regional Council was the Puget Sound Council of Governments (PSCOG).

As stated in its Bylaws, the PSRC will utilize "a broad range of public information and participation opportunities, including dissemination of proposals and alternatives, process for written comments, public meetings after effective notice, settings for open discussion, communications programs, information services, and consideration of and response to public comments." The goal of the PSRC Public Participation Plan[4] is to ensure early and continuous public notification about and participation in major actions and decisions by the PSRC. Public outreach efforts for PSRC decisions (e.g., updates to VISION 2020 and *Destination 2030*) are conducted consistent with federal and state laws.

The PSRC involves local, state, and federal jurisdictions and agencies in a continuing, cooperative and comprehensive planning process. Updates and revisions to VISION 2020, *Destination 2030*, and the regional TIP are conducted by the PSRC consistent with federal and state regulations, state environmental requirements, and with the PSRC's Interlocal Agreement and Public Participation Plan. Member agencies of the PSRC operate under the terms of the Interlocal Agreement.

Involvement and comment by federal agencies and Tribal Nations is sought on an ongoing basis. The agencies and Tribal Nations are consulted and invited to comment and participate in development and updates of *Destination 2030* and the regional TIP.

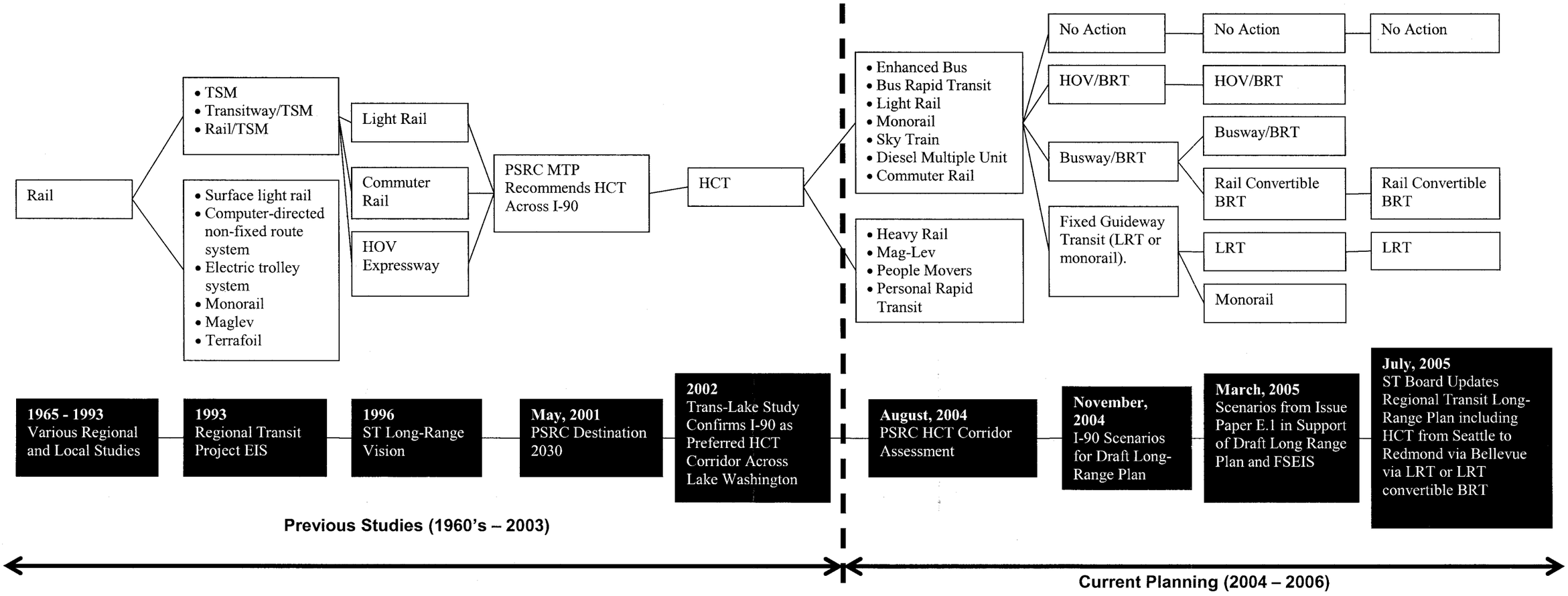
The PSRC has a joint memorandum of understanding (MOU) with all seven of the region's transit agencies, including Sound Transit. The PSRC also has a MOU to coordinate its planning and programming activities with WSDOT. These MOUs outline respective organizational roles and relationships for policy planning, project planning and programming, and broader planning coordination responsibilities. The MOUs also identify involvement of the respective agencies in major corridor studies, the unified planning work program (UPWP), the MTP, and the regional TIP.

WSDOT and the transit agencies, such as Sound Transit, also participate in PSRC planning activities on a regular basis through various policy and technical committees, such as the Executive Board, Transportation Policy Board, the Transportation Operators Committee, Seattle-Tacoma-Everett FTA Caucus, and the Regional Project Evaluation Committee (RPEC).

[4] *Public Participation Plan for the Puget Sound Regional Council*, PSRC, April 2002.

As the designated metropolitan planning organization (MPO) for the four counties of King, Kitsap, Pierce and Snohomish, the transportation planning and programming processes and activities of the PSRC are reviewed on a triennial basis by FHWA and FTA. The most recent federal planning certification review of the PSRC was conducted by FHWA and FTA in late 2005. Pending completion of the final report and documentation, this review resulted in no corrective actions.

Figure 1. Timeline for I-90/East Corridor HCT Alternatives Decisions



3. History of the HCT Planning Process for the I-90/East Corridor

This section describes key elements of the HCT planning processes for the I-90/East corridor since the mid-1960s.

Feasibility of Rapid Transit Operation Within the Seattle Area, Interim Report to the Puget Sound Governmental Conference (1965)

In the early 1960s, the City of Seattle requested a report on the feasibility of rapid transit within the Seattle commuter-shed. Following are some recommendations of this report:

- Construction of a rail rapid transit line between downtown Seattle and North Seattle, and extending to Bellevue. Feeder bus lines would serve outlying rail rapid transit stations for parking of automobiles and delivery of passengers by automobile.
- The first stage construction, to be completed in 1975, included a rail rapid transit section between Seattle and North Seattle. A second stage extension of the line east to Bellevue was to be completed by 1985.
- Rail rapid transit in other corridors was to be reviewed.
- Existing railroad right-of-way in these corridors was recommended for protection for future rapid transit extensions.
- Appointing a project coordinator to provide liaison between all affected agencies, arrange publicity, and attend civic and public meetings.

Some of this analysis led to the Forward Thrust rapid transit proposals of 1967 and 1970.

Forward Thrust Transit Proposals (1968 and 1970)

A bond measure, Forward Thrust, was proposed to voters in early 1968. The rail transit elements included in the proposal were derived from the 1967 report, *Comprehensive Public Transportation Plan for the Seattle Metropolitan Area, 1985 Horizon,* which included the following recommendations:

- Approximately 47 miles of dual-track, grade-separated rail rapid transit routes for the four major travel corridors (east, northeast, northwest, and south). This included rail rapid transit from Seattle to Mercer Island and north to Bellevue, with future rail rapid transit extensions north to Redmond and Bothell, and south to Renton.
- Approximately 32 stations, automobile and bus/rail transfer facilities, and parking.
- Approximately 27 miles of grade-separated right-of-way for future extension of rail rapid transit in the region.
- Approximately 590 miles of local and express bus routes.

Although the measure received a simple majority of "yes" votes, it failed to pass by the required 60 percent supermajority and could therefore not be financed.

In 1970, a similar version of this plan was proposed to voters, which again included a rapid transit route to the east. It did not receive a majority vote.

1976 Memorandum Agreement on Design and Construction of I-90

In 1976, the cities of Seattle, Mercer Island and Bellevue; the Municipality of Metropolitan Seattle; King County; and the Washington State Highway Commission signed a memorandum of agreement on the design and construction of I-90. The memorandum resolved nearly twenty years of disputes that had surrounded the plans to construct an improved I-90 between I-405 and I-5. This 1976 MOA became part of the environmental documentation that allowed I-90 to be built; and was specifically cited in the Record of Decision. The memorandum, which is included in full as Appendix A, included several provisions that provided for the conversion of the center roadway to HCT on I-90 in the future. Following are some of the key passages relating to transit and HCT:

- "The facility shall also contain provision for two lanes designed for and permanently committed to transit use. The eastern and western termini for these lanes shall be designed to facilitate uninterrupted transit and carpool access to downtown Seattle and to downtown Bellevue in accordance with paragraph 3 herein below. The design shall be such as to accommodate the operation of the two transit lanes in either a reversible or in a two-way directional mode.
- To the extent practical, the facility shall provide priority by-pass access for local transit to the general purpose motor-vehicle lanes.
- The parties agree that the transit lanes shall operate initially in a two-way directional mode, at no less than 45 mph average speed, with the first priority to transit, the second to carpools, and the third to Mercer Island traffic.
- The I-90 facility shall be designed and constructed so that conversion of all or part of the transit roadway to fixed guideway is possible.

The agreement represented a significant compromise by all parties. The Commission was to take no action that results in major change in either operation or capacity without consultation of signatories with the intent that concurrence of parties is a prerequisite to Commission action to the greatest extent possible under law.

Light Rail Element: A Feasibility Assessment, Puget Sound Council of Governments (PSCOG) (1981)

In 1981, PSCOG conducted a feasibility assessment of light rail in the Puget Sound region for 1990 and beyond. Following are some of the findings of this assessment:

- When compared to the various bus related options for solving the Seattle CBD issues, a regional light rail element has the potential for major cost savings and will also reduce the required transfer volume in terminals.
- Light rail may be possible at comparable cost to the all-bus option if limited to high volume segments.
- There appears to be a significant potential for reduced energy consumption with the LRT system, and particularly in petroleum fuels.
- The east corridor (from the Seattle CBD to north or northeast of Bellevue) was the 2nd most feasible and cost-effective corridor. This ranking was second only to the north corridor between Seattle CBD and Lynnwood.

PSCOG Regional Transportation Plan Update and Amendment (1982)

PSCOG's Regional Transportation Plan Update, which was adopted in March, 1982, indicated that a major share of the increase in peak-period travel would have to be accommodated by transit. The plan also indicated that because of high peak-period volumes projected in the major regional corridors, a high-capacity line-haul transit system would be required, and that light-rail transit is a feasible alternative to an all bus system in several of the corridors. The regional plan recommended that the region determine the cost-effectiveness of light rail in selected corridors/segments according to priorities established in the regional planning process.

In September, 1982, PSCOG's Executive Board adopted a prioritization of major corridors in the region for the purpose of detailed analyses of transportation alternatives. In this corridor ranking, the eastside corridor from the Seattle CBD to the eastside was ranked second highest, with only the north corridor from Seattle CBD to Snohomish County ranking higher. The Regional Transportation Plan was amended in September, 1982 to include this prioritization.

Multi-Corridor Project, PSCOG and Metro (1986)

PSCOG and Metro prepared a cooperative study in 1986 to examine long-range transit and high occupancy vehicle alternatives for increasing capacity in the region's three highest priority corridors: downtown Seattle to South Snohomish County, east to Bellevue, and south to Federal Way. Some of the recommendations included:

- Implement a rail system by 2020 to meet the region's public transportation needs.
- A transit tunnel in downtown Seattle and transit lanes on I-90 across Lake Washington be reaffirmed as essential components of any future major transit investment in the region.
- Public transportation agencies and the WSDOT design future transportation facilities in potential rail corridors to be convertible to rail.
- Public transportation agencies design their services as appropriate to facilitate the transition to rail.
- Local jurisdictions and the WSDOT preserve rights-of-way in potential rail corridors by giving precedence to the preservation of potential rail corridors over other land uses.
- Major decisions regarding incremental development of the transportation system include analyses of their impact on the cost-effectiveness of the rail system.

This study was prepared under the policy guidance of the Multi-Corridor Steering Committee, an interagency committee of the PSCOG and Metro. Coordination and review of the analysis was facilitated through the Multi-Corridor Technical Committee, with staff representatives from local jurisdictions and state agencies with an interest in the project. Both the PSCOG Executive Board and the Metro Council endorsed these and other recommendations.

PSCOG Transit Amendment to the Regional Transportation Plan (1987)

PSCOG amended the Regional Transportation Plan in 1987 to include recommendations from the Multi-Corridor Project, the North Corridor Extension Project, and the Tacoma-Seattle Transit Connections Project. This action called for a regional rail system by 2020, recognizing the eventual capacity limitations of the downtown Seattle transit tunnel to carry transit demand by bus. Further planning for rail was to be put on hold until the results of the I-90 bridge and

Downtown Seattle Transit Tunnel could be evaluated. Several interim actions to prepare for an eventual rail system were adopted.

PSCOG High Capacity Transit 2000 – An Amendment to the Regional Transportation Plan (1989)

The High Capacity Transit Plan for 2000 established regional policy direction for the next more detailed planning steps toward the implementation of an integrated system. This system would include a regional rail system, an exclusive busway system, additional HOV facilities, and additional passenger-only ferry routes. In this amendment, based upon studies completed between 1982 and 1986, the I-90 corridor was indicated as one of the potential rail corridors, and one of the core set of rail corridors for the year 2000.

PSCOG's VISION 2020 Growth Strategy and Transportation Plan for the Central Puget Sound Region (1990)

PSCOG's VISION 2020 Growth Strategy and Transportation Plan represented a major commitment to both the land use patterns that can achieve a compact urban centers concept, and reordering of transportation investment priorities to emphasize transit, ridesharing, efficiency, demand management, and the maintenance of existing facilities.

Final EIS Regional Transit System Plan, Regional Transit Project (1993)

In 1990, the Washington State Legislature established the State High Capacity Transit (HCT) program, which provided a mechanism and funding for preparation and adoption of a regional HCT plan for the Puget Sound region. In response, Metro, Pierce Transit, and SNO-TRAN began preparing a regional transit plan for the year 2020. In 1993 Metro issued an FEIS, in cooperation with Pierce Transit, SNO-TRAN, Everett Transit, Community Transit, and WSDOT, all under the guidance of the Joint Regional Policy Committee (JRPC). The planning process included public hearings and the EIS responded to 2,000 specific comments from members of the community or public agencies.

The FEIS examined three build and a no build alternative for expanding transit facilities and services: TSM Alternative, Transitway/TSM Alternative, and Rail/TSM Alternative.

For the Eastside, these alternatives consisted of the following:

> **TSM alternative** - converting the I-90 center roadway to a two-way busway.
> **Transitway/TSM alternative** - exclusive busway from Seattle to Bellevue along segments of I-90 and I-405, 114th Ave. SE, and existing railroad right-of-way.
> **Rail/TSM alternative** – a mostly grade separated rapid rail system (that operates similarly to other new rail systems in San Diego, Portland, or Vancouver, B.C.), from Seattle to Bellevue, with spurs extending to Issaquah, Redmond, and Lynnwood. It also included rapid rail in the I-405 / SR 518 corridor from Bellevue to Burien.

The FEIS also considered Rail/TSM variations and supplements, and a surface light rail system that operated on surface streets everywhere except the downtown Seattle transit tunnel. Other alternatives considered but not analyzed included a computer-directed non-fixed route system,

major extension of electric trolley system, and alternative rail technologies (such as monorail, maglev, or terrafoil).

In 1993, the JRPC adopted the Regional Transit Project System Plan, a $13 billion (1991$) investment built around a rail system connecting the region's population and employment centers. The JRPC forwarded its Regional Transit System Plan to the Snohomish, King, and Pierce County Councils for their consideration and recommended formation of a regional transit authority. In response, the Central Puget Sound Regional Transit Authority (RTA or Sound Transit) was created in 1993.

Regional Transit Authority Transit Plans (1995, 1996)

The RTA Board considered the JRPC System Plan too large, so it reduced its scope while trying to retain most of its benefits. The RTA proposed to implement the first phase of a new regional rail and express bus network over 16 years, at an estimated cost of $6.7 billion (1995$). For the eastside, the proposal included a light rail system from Seattle to Mercer Island and Bellevue, and Redmond/Overlake. The plan was placed on the ballot for voter approval in March 1995 and was defeated regionally, although it won approval in Seattle and close-in suburban communities.

In 1996, the RTA placed a scaled-down version of the plan on the ballot for voter financing approval. This $3.9 billion (1995$) program, known as *Sound Move*, consisted of a 25-mile regional rail system, a commuter rail system, and an express bus system. This plan eliminated the I-90 rail project and included two-way bus transit on I-90 between Seattle and Bellevue. The measure passed in King, Snohomish and Pierce Counties, and implementation of the *Sound Move* plan began.

Long Range Vision (1996)

In May 1996, the Sound Transit Board adopted a long-range transportation plan at the same time that it adopted *Sound Move*, Sound Transit's initial phase of regional HCT investments. The long-range plan represented Sound Transit's goals, policies, and strategies to guide the long-term development of the HCT system. It was based on years of intensive planning, environmental analysis, and public outreach, and it was intended to guide how the Sound Transit system could best address the region's mobility needs and support growth management objectives.

Transportation modes for I-90 across Lake Washington included in the Long Range Vision were an HOV Expressway (extension of existing HOV lane system) and potential future rail extensions in future implementation phases beyond *Sound Move*.

Trans-Lake Washington Study (1998 to 2002)

WSDOT and ST's Trans-Lake Washington Study analyzed options for HCT across Lake Washington on I-90, SR-520, or a mid-lake crossing between I-90 and SR 520. This study re-affirmed that I-90 was the preferred cross-lake corridor for future HCT between Seattle and the Eastside, since it would more effectively serve transit ridership and could cost substantially less than one in the SR 520 corridor. In addition, a rail crossing on I-90 was more viable for Eastside connections and Seattle connections for mass transit utilizing the transit tunnel. The Trans-Lake

Washington Project carried the early studies forward and eventually led to the current SR 520 Bridge Replacement and HOV Project.

EIS for I-90 Two-Way Transit and HOV Operations Project (2003/2004)

Sound Move included a project—I-90 Two Way Center Roadway Conversion—that was thought to be a relatively simple implementation of the 1976 MOA--conversion of the center roadway to transit with the construction of several ramps on Mercer Island. The I-90 floating bridge includes eastbound and westbound outer roadways with three general-purpose lanes each as well as a two-lane reversible center roadway between Seattle and Bellevue for buses, carpools, and Mercer Island single-occupant vehicles.[5] The center roadway operates westbound in the mornings and eastbound in the evenings and weekends. However, transit and HOVs that are traveling in the opposite (i.e., reverse-peak) direction must travel in the general-purpose lanes. The purpose of the I-90 Two Way Transit/HOV Operations *Sound Move* project was to provide reliable two-way transit and HOV operations on I-90 between Seattle and Bellevue.

In 1998, recognizing the importance (both legally and politically) of the 1976 MOA, and the requirement that any major change in the I-90 facility is a decision of the Transportation Commission with concurrence of signatories, Sound Transit created the I-90 Steering Committee asking each jurisdiction to appoint representatives. The I-90 Steering Committee (including representatives from the cities of Bellevue, Mercer Island and Seattle; King County; Sound Transit; and the state Department of Transportation) evaluated a number of different roadway configuration alternatives, including the following:

- **Alternative R-1: No Build.** Maintains current operations.
- **Alternative R-2B: Two-way Center Roadway.** Converts the center roadway to a two-way facility for transit and carpools only.
- **Alternative R-5 Restripe: Transit-Only Shoulders on Outer Roadways.** Transit-only use of outer roadway shoulder in peak periods, eastbound in the morning and westbound in the evening.
- **Alternative R-5 Modified: Transit-Only Shoulders on Outer Roadways.** Operates similarly to R-5 Restripe. Includes some widening of the roadway within existing WSDOT property to provide additional shoulder width on Mercer Island.
- **Alternative R-8A: HOV Lanes on Outer Roadways.** Narrows outer roadway lanes and shoulders to add a transit/carpool lane in each direction; maintains current center roadway reversible operation. Includes some widening of the roadway within existing WSDOT property to provide additional shoulder width on Mercer Island.

Although HCT was not considered directly as an element of this EIS, each alternative was analyzed to assess whether it could accommodate future plans to convert the center roadway to HCT, as envisioned in the 1976 Memorandum Agreement for I-90.

The I-90 Steering Committee and the Sound Transit Board identified Alternative R-8A as the preferred alternative in November 2003, following the issuance of a draft EIS. At the November 2003 meeting identifying its preferred alternative, the Sound Transit Board directed staff to

[5] http://www.wsdot.wa.gov/Projects/I90/TwoWayTransit/

negotiate an amendment to the 1976 Memorandum Agreement to address the I-90 Steering Committee's recommendations.

The amendment recognizes the recommendations that the Steering Committee made when they identified Alternative R-8A as the first step towards their ultimate configuration for I-90 with HCT in the center roadway. The amendment commits Sound Transit to the guiding principles for implementing HCT in the I-90 roadway. A final EIS including R-8A as the preferred alternative was issued in May 2004, and the Sound Transit Board then selected Alternative R-8A in August 2004 as the project to be built. In September, 2004, the FHWA issued a Record of Decision concurring with WSDOT and Sound Transit in the selection of Alternative R-8A as the selected alternative.[6]

The R-8A project for I-90 includes modifications to the outer roadways to provide an additional HOV lane in each direction. The project also includes new direct access HOV on and off-ramps on Mercer Island at 77th and 80th Avenues SE, respectively, and modification to the existing ramp at Bellevue Way to provide direct access to the HOV lanes. While portions of the ramp projects are underway, full funding for the bridge improvements has not been identified.

In 2004, an amendment to the 1976 Memorandum Agreement regarding implementing Alternative R-8A and identifying the ultimate configuration for I-90 with high capacity transit (HCT) in the center roadway was signed by all the parties to the 1976 MOA, and Sound Transit. "HCT" was defined in the 2004 amendment as "...a transit system operating in dedicated right-of-way such as light rail, monorail or a substantially equivalent system." The 2004 amendment indicated that construction of the R-8A alignment should commence once the funding is acquired and that construction of HCT in the center lanes should commence as quickly as possible after completion of Alternative R-8A. The original 1976 MA is included in Appendix A of this report, and the 2004 amendment is included in Appendix B.

As of February 2006, WSDOT and ST have nearly completed final design of stage 1 of this project, which consists of improvements on westbound I-90 between Bellevue Way and 80th Avenue SE on Mercer Island. Stage 2 will consist of improvements to eastbound I-90 between 80th Avenue SE on Mercer Island and Bellevue Way, while stage 3 will consist of improvements to eastbound and westbound I-90 between 80th Avenue SE on Mercer Island and Rainier Avenue/I-5 in Seattle. Funding for these latter stages has not been committed.

Recent Studies and Analyses

As the earlier text has indicated, over the years a number of different modal alternatives have been considered to connect Seattle and Bellevue. These alternatives included enhanced bus, several options for bus rapid transit (BRT), two light rail transit (LRT) technologies, monorail, commuter rail, personal rapid transit (PRT), heavy rail, and high speed rail (maglev).

The recent studies include analysis of high capacity transit modes for the region and the I-90 Corridor/Eastside by the Puget Sound Regional Council and analysis by Sound Transit as part of the update to the Long-Range Plan.

[6] http://www.soundtransit.org/pdf/projects/Record_of_Decision_September_2004.pdf

In July 2005, after reviewing the regional long-range transit plan SEIS as well as a series of technical issue papers, the Sound Transit Board updated its Long-Range Plan. This plan designated the I-90/East corridor for LRT or rail-convertible BRT. Figure 1 shows the timeframe for many of the key decisions leading up to the adoption of the updated Sound Transit Long Range Plan in July 2005. The environmental review process and the technical reports and documents supporting the Board's decision-making on the Long-Range Plan are described in more detail below.

PSRC HCT Corridor Assessment (2004)

At the request of Sound Transit, the Puget Sound Regional Council (PSRC) prepared the August 2004 workbook, *Central Puget Sound Region High Capacity Transit Corridor Assessment.* This assessment was part of Sound Transit's planning effort to update its long-range regional transit plan. PSRC assisted Sound Transit in this planning effort by establishing a baseline of fully updated population, employment, and travel demand forecasts. PSRC staff conducted an assessment of the updated existing and future land use and travel data to determine the relative potential of each study corridor to support high capacity transit. PSRC staff then reviewed a range of HCT technologies and analyzed them for future investments in each corridor.

To verify the accuracy and legitimacy of this analysis, the PSRC established an independent Technical Review Committee in March 2004 to review PSRC's data and analysis contained in the draft workbook. The committee, which was comprised of public transit industry professionals from other regions, verified that the land use and travel characteristics associated with supporting high capacity transit were appropriately evaluated and that the range of transit technologies was properly analyzed in each corridor. Specific to the PSRC analysis and conclusions for the I-90/East corridor, this committee indicated, "...consideration should be given to systems capable of capacities beyond what BRT could provide in the cross-lake corridor."

The following transportation modes were considered and deemed appropriate technologies for the cross-lake corridor:

1. Bus Rapid Transit (BRT)
2. Light Rail Transit
3. Monorail

The following sections describe mode analysis results of the *Central Puget Sound Region High Capacity Transit Corridor Assessment.*

Bus Rapid Transit (BRT)

Bus Rapid Transit (BRT) was evaluated in general, without specifically comparing HOV/BRT, Busway/BRT, or Rail-Convertible BRT. PSRC's study indicated that the capacity, speed, and station permanence for BRT would support the long-range land use plans and projected growth in activity centers, but it may not be able to meet long term travel needs between Seattle and Bellevue. The report summarized the analysis for BRT by indicating that existing bus service expansion could provide for near-term needs, and the existing infrastructure could be converted to a higher capacity system in the future. BRT capacities were calculated to reach a maximum of

5,400 persons per hour per day (pphpd), with an average operating speed of 25 to 35 mph, station spacing of .25 to 2.0 miles, and headway of 4 to 15 minutes. In the crosslake corridor, westbound peak hour transit demand is forecast to reach 5,860 passengers per hour per direction (pphpd) in 2030, based on the PSRC travel demand model.

Light Rail Transit

Light rail transit can operate in either street traffic with traffic signal preemption, or exclusive rights-of-way to enable fast and reliable service. Power is provided to the vehicles through an electric overhead catenary system.

The PSRC report indicated that conventional LRT capacity meets and exceeds the needs for the Eastside corridor in the near term and long-term. The report cited light rail capacity of up to 8,880 persons per hour per day (pphpd) assuming 4-car trains at 4 minute frequencies of service. According to this study, the higher capacity, speed, flexibility in frequency, and the permanence of light rail stations fully support the long-range land use plans and projected growth in Bellevue and other activity centers in the corridor.

Monorail

Evaluation of a monorail system was included in the PSRC report. Monorail is grade-separated (typically elevated) with power provided from an electrified third rail. The use of automated vehicles is an option with Monorail.

PSRC's analysis assumed completion of the Seattle Monorail Project (SMP Green Line). The study indicated that direct connections between an Eastside monorail alignment and future SMP monorail investments could pose challenges. For example, even if the same train and guideway beam technology were used, there still might not be the ability to directly interline with the Green Line or other potential monorail extensions in Seattle. The report did indicate, however, that monorail capacity exceeds the needs for the Eastside corridor in the near term and long-term, and that the higher capacity, speed, and the permanence of monorail stations would support the long-range land use plans and projected growth of the activity centers in the corridor. The monorail alternative considered by the PSRC report identified a regional type of monorail system with higher capacity than the Green Line.

The following transportation modes were evaluated more generally in the PSRC study but were not found to be appropriate technologies for the crosslake corridor specifically:

Other Modes

The following other transportation modes were evaluated more generally in the PSRC report, but they were not found to be appropriate technologies for the cross-lake corridor specifically:

4. Enhanced Bus
5. Automated light rail transit (e.g., Vancouver B.C.'s SkyTrain)
6. Diesel Multiple Unit (DMU)
7. Commuter Rail
8. Heavy Rail

9. High Speed Rail and Maglev
10. People Movers
11. Personal Rapid Transit (PRT)

Enhanced Bus/Transportation Systems Management (TSM)

In this study, Enhanced Bus was a system that uses buses operating in mixed traffic but with some priority treatment.

In the crosslake corridor, westbound peak hour transit demand is forecast to reach 5,860 passengers per hour per direction (pphpd) in 2030, based on the PSRC travel demand model. This level of transit demand reflects a 150 percent increase over the current westbound peak hour transit demand in the crosslake corridor (2,175 pphpd). Based on this line-haul capacity need, Enhanced Bus could not meet the long-term levels of transit passenger demand. Enhanced Bus was calculated to reach its maximum capacity potential at approximately 4,800 pphpd under aggressive operating assumptions. In addition, the future travel times and reliability for enhanced bus would suffer due to a lack of exclusive or semi-exclusive right-of-way.

Automated LRT (e.g., SkyTrain)

Automated LRT is similar in design to conventional LRT but uses automated vehicles that must operate with full grade separation. Automated LRT also shares characteristics with Monorail, and its vehicles may be powered by an electrified third rail (also requiring exclusive rights-of-way).

Evaluation of an automated LRT (e.g., SkyTrain) was included in this study. The PSRC report indicated that automated LRT meets the needs for the I-90/East corridor in the long range as it shares many characteristics with Light Rail and Monorail. Unlike the Link LRT system currently under construction, however, automated systems require full grade separation. An additional drawback of automated LRT is that it would involve the addition of an entirely new transit technology to the regional transit system and would require separate stations and guideways that would be likely to pose multiple challenges for integration with existing transit services. No further analysis of an automated LRT alternative for the I-90/East corridor was conducted.

Diesel Multiple Unit (DMU)

Diesel multiple units (DMU) are wheeled train cars that use internal power and transmissions, typically with one undercarriage mounted high-speed diesel engine used for propulsion, and a smaller engine used for auxiliary power. Unlike conventional commuter trains with a locomotive pulling passenger cars, all DMU vehicles carry passengers.

Evaluation of DMUs for some corridors was included in the PSRC report. A DMU system was not considered to be appropriate for the crosslake corridor because of the lack of an existing exclusive railroad right-of-way.

Commuter Rail

Conventional commuter rails systems (e.g., Sounder) typically operate over existing freight rail tracks and are hauled by either an electric or diesel-electric locomotive.

Evaluation of conventional commuter rail (e.g., Sounder) for some corridors was included in this study. Commuter rail was not considered to be appropriate for the crosslake corridor because of the lack of an existing exclusive railroad right-of-way.

Heavy Rail

Heavy rail typically is an exclusive right-of-way, no cross traffic, dual steel rail system capable of moving large volumes of people to serve very high demand routes.

Evaluation of heavy rail was included in the PSRC report. Heavy rail is similar to commuter rail, except that unlike commuter rail (which runs on existing railroad track using diesel engines) heavy rail requires its own track and is powered through an electrified third rail (like New York City's subway or the Bay Area's BART system). It typically serves a dense metropolitan area (e.g., New York City, Chicago) and the infrastructure cost is generally higher than other rail systems. Stations are typically spaced about a mile apart. PSRC's analysis indicated that although a heavy rail system may be applicable in the distant future, the high capacity associated with an intense financial investment in such systems may not be needed for many years to come in the Puget Sound Region. No further analysis of heavy rail for this corridor was conducted.

High Speed Rail and Maglev

High speed rail can operate in a similar manner as conventional commuter rail, on existing freight rail tracks with passenger cars pulled by a locomotive. High speed rail has special considerations, including other rail traffic, station spacing, horizontal and vertical track curvatures, and at-grade crossings.

Maglev technology provides the potential for operations at very fast speeds (in the 300 mph range) through the use of magnetic fields to support, guide and propel the vehicles. Maglev has not yet been proven in routine revenue service.

The PSRC report indicated that high speed rail service in other countries, such as Japan's bullet train and France's high-speed rail from the Mediterranean to Paris, provides competition with airline service. However, in areas such as central Puget Sound the station spacing for an intra-regional system would not allow for high speed vehicles to take advantage of their maximum speed. No further analysis of high speed rail or maglev for this corridor was conducted.

People Movers (e.g., SeaTac Airport Circulator)

People movers generally use automated rubber-tired vehicles with power provided as part of the guideway.

The PSRC report indicated that that the low speeds and limited capacity of people movers make them unsuitable for regional travel but a good fit for local service, such as at airports and in high

activity areas by acting as a feeder to a regional system. No further analysis of people movers for the east corridor was conducted.

Personal Rapid Transit (PRT)

Personal rapid transit (PRT) systems are a fleet of driverless cars each carrying 2-4 passengers between any two off-line stations. The systems require an extensive amount of grade-separated infrastructure and a sophisticated control system.

The PSRC report indicated that the low speeds and limited capacity of PRT make it unsuitable for regional travel but a good fit for local service, such as at airports and in high activity areas by acting as a feeder to a regional system. No further analysis of PRT for the east corridor was conducted.

Updated ST Long Range Plan (2005)

In July 2005 Sound Transit's board approved adoption of its updated Long Range-Plan to make the plan consistent with updated local and regional land use and transportation plans and to identify projects and establish Sound Transit's priorities for the next phase of HCT improvements. *Sound Move* represented Sound Transit's initial phase of regional HCT investments, and it has begun addressing many regional mobility needs. However, *Sound Move* was not intended to be the only phase of regional transit investment; it was meant to be the first. Although *Sound Move* and the region's other investments in transportation are helping provide more competitive alternatives to driving alone, the region's mobility problems will persist and, as the number of people and jobs grows in the coming decades, there will be greater demands for travel.

High capacity transit modes for I-90 across Lake Washington that were considered in this process included all the alternatives previously considered through the SEIS, issue papers, and PSRC's High Capacity Transit study. In July 2005, after reviewing the long-range planning SEIS as well as the issue papers that informed the Board on specific issues or elements of the plan, the Board adopted the updated Long-Range Plan. This plan forwarded two alternatives for further consideration for the I-90/East corridor:

- LRT
- Rail-Convertible BRT

Sound Transit is using the updated Long-Range Plan as the basis for developing the next phase of investments — *Sound Transit 2* (ST2). As with *Sound Move*, ST2 will encompass a specific set of projects and services designed to build upon the first phase and to further expand mobility options for the citizens of the central Puget Sound region.

The updated Sound Transit Long-Range Plan Map is attached as Appendix C.

Supplemental EIS for the Updated Long-Range Plan (2005)

As part of the update to the Long-Range Plan, ST prepared a Supplemental Environmental Impact Statement (SEIS). The SEIS addressed the potential environmental effects of an updated Long-Range Plan and supplemented the 1993 Regional Transit System Plan Final EIS. The

updated plan is consistent with the region's current metropolitan transportation plan, Destination 2030[7], which calls for expansion of the regional transit system to help meet increased transportation demand resulting from population and employment growth in the region. The analysis in the SEIS informs subsequent Board decision-making and project-level planning by Sound Transit, including the second phase of HCT investments (ST2).

For the SEIS, Sound Transit evaluated two primary alternatives:

- No Action Alternative
- Regional Transit Long-Range Plan Alternative (Plan Alternative).

The No Action Alternative involved no change from then-current agency direction and assumed completion of *Sound Move's* plan of light rail, commuter rail and express bus/BRT system. The Plan Alternative was based primarily on the Long-Range Vision, adopted in 1996, and it included actions to expand regional transit facilities and services beyond the current commitments of *Sound Move*. The SEIS also evaluated a set of technology and corridor options that presented a "menu" of other actions that could be implemented, individually or in combination, as part of the Plan Alternative. The options do not stand alone as an alternative, but rather potentially modify or add to the Plan Alternative.

The SEIS evaluated transportation and environmental impacts for the two primary alternatives and options. For the east corridor, the Plan Alternative included light rail from Seattle to Issaquah, and Seattle to Bellevue and Redmond. Regional express bus/BRT was evaluated as an interim technology in all of the potential light rail corridors (including the east corridor), and monorail was evaluated as an option in the east corridor.

The SEIS concludes that, at this programmatic level of review, the transportation and environmental impacts of the various mode choices would generally be similar. Construction impacts tend to vary with the size, duration and intensity of the construction required, and operational impacts vary most with the size of the system developed. Some modes, such as monorail or automated LRT (which require a completely grade-separated system), result in greater impacts due to the need for more dedicated right-of-way and aerial or tunnel structures. But those impacts are not different in kind from, say, a BRT or an LRT system operating in dedicated, grade-separated right-of-way. Regardless of mode, the systems that are more expansive in scope tend to produce higher ridership levels and the benefits that come with it (e.g., air quality improvements, energy savings, transportation availability, consistency with land use plans, etc.).

With future expansion, HCT would be extended over I-90 and along I-405 to activity and employment centers on the Eastside. This alignment could include a mixture of tunnel, at-grade, and elevated structure profiles.

Additional information on the modes analyzed for the Long-Range Plan is included in the sections below.

[7] Puget Sound Regional Council, 2001

Issue Papers and Analysis Supporting Updated ST Long-Range Plan Decisions

In addition to the SEIS, issue papers were prepared to inform the Sound Transit Board in its decision making on the updated Long-Range Plan. Each issue paper provided information about a specific element or area of the Long-Range Plan and potential options. These reports focused on issues such as costs, engineering feasibility, and operations.

Issue papers published to date that are relevant to the east corridor include the following:

- *Technical Report on Future High Capacity Transit Development Along the Seattle CBD to East King via I-90/Bellevue Corridor (April 2004)*
- *White Paper on the Review and Qualitative Assessment of HCT Technologies (June 2004)*
- *East King County Subarea High Capacity Transit (HCT) Analysis: Approach to Assessing System-Level Alternatives (November 2004)*
- *Issue Paper E.1: I-90 Corridor/East King County High Capacity Transit Analysis (March 2005)*
- *Issue Paper N.5: Convertibility of BRT to Light Rail (March 2005)*
- *Issue Paper E.1.S: Hybrid Scenarios Supplement to Issue Paper E.1: I-90/East King County HCT Analysis (May 2005)*
- *Issue Paper E.1.S.2: Rail Convertible Bus Rapid Transit (RC BRT) : Supplement to Issue Paper E.1: I-90/East King County HCT Analysis (November 2005)*

Transportation modes for I-90 across Lake Washington that were considered in this process included the following:

1. HOV/BRT
2. Busway/BRT
3. Light Rail Transit (LRT)
4. Monorail
5. Rail-Convertible BRT

As part of the evaluation of these five modes, the issue papers evaluated a system connecting Seattle with Bellevue along I-90 with three branches from Bellevue, one branch extending to Totem Lake, another extending to Redmond, and another to Issaquah. The initial Eastside issue paper looked at the three-branch system on the Eastside. After review, the Board requested additional information that, in some cases, focused on only the Bellevue to Redmond branch.

Some of the key findings of these issue papers regarding the mode alternatives are summarized below. Where data is based on the three-branch system rather than the one branch to Redmond, it is so noted in the text.

HOV/BRT

The HOV/BRT option operates predominantly along limited access freeways on semi-exclusive HOV lanes and access facilities. The HOV lanes are largely completed in the I-90 corridor with the exception of the Seattle to Bellevue segment where the HOV lanes operate in a reversible configuration, westbound in the AM and eastbound in the PM and weekends. Key to the

operation of the HOV/BRT system is the freeway-to-freeway HOV connections needed at the freeway interchanges of I-90/I-405 and I-405/SR-520 to facilitate access between the freeways.

The goal of the HOV/BRT scenario was to create a bus-based scenario that improves transit performance while avoiding the costs and impacts of building busway or light rail lines. The following are some of the key issues for the HOV/BRT scenario:

Downtown Operations

- Buses operate on-street through downtown Seattle and downtown Bellevue. An additional 25 buses would operate on downtown Seattle streets in the peak hour and an additional 33 buses would operate on downtown Bellevue streets in the peak hour. These bus volumes represent a 4.7% and 26.4% increase in bus volumes in Seattle and Bellevue, respectively, over future baseline conditions anticipated if no other action were taken. Additional bus volumes operating in mixed traffic on downtown streets add further to congestion on those streets and result in a less reliable and predictable travel time for riders.

Reliability

- This option relies on non-exclusive use of HOV lanes and the I-90 center roadway. Lanes would be shared with HOVs, which can add congestion and affect reliability.
- HOV lanes are often not much faster than the adjacent general-purpose lanes due to congestion and due to transit operating and safety procedures. Bus operators using HOV lanes reduce their speeds to respond to traffic conditions in adjacent general purpose lanes and in accordance with defensive driving principles to reduce the risk of accidents due to passenger vehicles moving into and out of the HOV lanes. In some congested areas, bus operators do not use available HOV lanes because of the weaving movements that are required to travel between the HOV lanes and access ramps to other freeways or destinations.
- Lack of reliability for transit leads to unpredictability for riders. Variations in travel time means that riders need to allow additional time to reach their destinations on time.
- Operations in this scenario would likely be highly variable and unpredictable due to operation with other vehicles in HOV lanes and due to operation in mixed traffic in urban centers. Since ridership forecasting assumes a constant, consistent travel time for each mode, ridership for this mode may be overstated.

Risk

- Free-flowing bus operations under this scenario would be dependent on the effective management of the HOV lanes system by another agency (WSDOT) and is not within Sound Transit's direct control.

Ridership

- The daily ridership was approximately 30,000 for the I-90 segment, among the lowest of the options studied despite the fact that the ridership model assumes rapid and reliable travel times for the buses.

Freeway to Freeway HOV Connections and Costs

- Direct HOV connections at I-90/ I-405 and at I- 405/SR 520 require extensive interchange modifications. Essentially the freeway interchange ramps for general purpose traffic need to be demolished and reconstructed in order to fit in any of the HOV connections that allow buses to travel from inside HOV lanes on one freeway to inside HOV lanes on the intersecting freeway. At a minimum, the HOV connections need to be made in the northwest quadrant of the I-90/I-405 interchange and the southeast quadrant of the I-405/SR 520 interchange in order to mimic the transit movements that are achieved by a comparable light rail line.
- The cost to reconstruct the two highway interchanges and to construct the HOV connections in the northwest quadrant of I-90/I-405 and southeast quadrant of I-405/SR 520 and other HOV improvements in this scenario was estimated at $2.5 – 3.5 billion (2005$). Consistent with the intent in designing this alternative, this was the lowest cost option studied among the five options.
- The cost to complete the remaining highway reconstruction and five remaining HOV connections at the two freeway interchanges would add another $0.9 – 1.2 billion (2005$).
- The costs, above, could be reduced if the Legislature were to appropriate funds for WSDOT to reconstruct the highway interchanges. However, the monies provided to date have been earmarked for other improvements in the I-405 corridor, and not identified for the two interchanges.
- Without funding of highway improvements by the Legislature, the ST Board would face a critical policy issue of whether its transit funds should be spent to reconstruct freeways in order to achieve construction of the desired HOV connections that would benefit transit.
- If the Sound Transit Board invested significant financial resources into completion of the HOV system, there would be a risk that the Legislature could enact laws permitting the HOV lanes to be used by general purpose traffic to a greater extent than they are allowed today. Some segments of HOV lanes are currently open to general purpose traffic at some times of the day.

The HOV/BRT alternative was ***not*** one of the two options carried forward for the I-90 corridor in Sound Transit's Long-Range Plan. The primary factors that affected this decision were the lack of reliability, the lack of exclusivity, and the high risks associated with this option, particularly the risks related to the freeway to freeway HOV connections.

Freeway-to-freeway HOV connections are the responsibility of WSDOT, but in order to ensure that they would be built, the full costs of the connections have been included in Sound Transit's estimates for the option. In addition, this alternative results in lower ridership but requires a significant capital investment (HOV to HOV freeway connections and other direct access connections), to improve transit operations. Construction of the freeway connections would be affected by WSDOT's construction schedule and plans for the affected roadways. Funding could be identified for the connections by the State legislature which could potentially reduce Sound Transit's costs. In addition, there is a risk of legislative changes in the use of HOV lanes, that they could be opened to other traffic which would reduce the transit operations benefits of the lanes and freeway connections. These factors make the cost and implementation of this option high risk.

Busway/BRT

Busway/BRT operates predominantly on fully exclusive transitways with priority over other traffic at intersections. The goal of the Busway/BRT scenario was to create a bus-focused scenario that used a completely separate facility (similar to other fixed guideway scenarios) where appropriate, but to also take advantage of the existing roadway and HOV facilities where appropriate (e.g. to keep costs lower, use the HOV lanes instead of a busway east of Eastgate, north of Totem Lake and east of Overlake on SR 520, where traffic congestion is reduced.

The Busway/BRT scenario would add a core exclusive busway network to the BRT system contained in the HOV/BRT scenario. This busway network would utilize three rights-of-way: the I-90 center roadway, the BNSF ROW and new right-of-way that may be developed by the cities of Bellevue and Redmond in the Bel-Red area.

Following were some of the key issues for the Busway/BRT scenario:

Downtown Seattle Operations

Joint operation of buses from an Eastside BRT Busway and LINK light rail in the Downtown Seattle Transit Tunnel is unlikely due to restrictions on the number of buses the tunnel can accommodate.

Upon reopening in 2007, the Downtown Seattle transit tunnel will accommodate 60 bus trips in each direction per hour. As light rail is constructed and extended to the north and south, the number of light rail trains will increase and the number of buses that can operate through the tunnel will decrease. Per an agreement between Sound Transit and King County Metro, when the number of buses operated through the tunnel reaches 30 per direction per hour, King County Metro can decide whether or not to continue operating buses through the tunnel.

Extensions of the light rail system are under consideration to the north and south as part of the development of a Sound Transit 2 plan. With these extensions, light rail train frequencies would increase to the point that joint operation with buses will not be feasible.

Since joint operation of buses from an Eastside BRT busway is not likely, two options were evaluated to provide access for Eastside riders to reach their west-side destinations.

Downtown Seattle Transfer Station

This option requires that a transfer station be built in the International District so that riders transfer to light rail or buses to complete their journey to destinations in downtown Seattle or other destinations on the west side of the lake. This transfer adds travel time which reduces ridership.

Surface Street Operation

A variation that did not require a transfer station was also evaluated. The variation added buses on downtown Seattle streets and had slower travel times. The avoidance of a transfer coupled with slower operations through downtown resulted in no significant overall difference in ridership.

Ridership

- I-90 ridership was 29,000 daily riders.
- Ridership under the variation of this option with surface street operation and no transfer station was 30,000 daily riders across I-90.

Cost

- The total cost of this option was $3.1 – 4.2 billion (2005$).
- The variation with surface street operation did not reduce overall costs. The cost savings associated with not building a transfer station was offset by the added capital cost of purchasing additional buses and higher operating and maintenance costs due to slow bus operations through the Seattle CBD.

Downtown Bus Volumes

- This option reduced bus volumes in downtown Seattle by 73 buses per hour, a 13.7% reduction (because of the transfer station). In downtown Bellevue, it increased bus volumes by 29 buses per hour, a 23.2% increase. The variation in Seattle of through-routing of buses (no transfer station) resulted in an increase of 25 buses per hour, or a 4.7% increase.

I-90 Operation

- Unlike HOV/BRT, this option included exclusive use of the I-90 center roadway.

Traffic Impacts

- The traffic impact of exclusive transit use of the center lanes was estimated between the East Channel Bridge and Rainier Ave on I-90. The drive-alone auto time to travel this distance in the future assuming no action was approximately 9-13 minutes depending on the time of day traveled and direction of travel. With the R-8A Alternative built and exclusive transit in the I-90 center roadway, the travel time remained at approximately 9-13 minutes. (This traffic data was derived from work done by HNTB under contract to WSDOT on the I-90 Two-Way Transit Access Project.)

BNSF Acquisition

- This option built a direct access facility provided from the BNSF right-of-way, across the northbound lanes of I-405, to Bellevue Transit Center (BTC), with an underground bus facility below the BTC.
- This option requires the successful negotiation and acquisition of right-of-way from BNSF; acquisition cost is high, and negotiation entails high risk. The BNSF right-of-way was considered for this alternative because it is an under-utilized transportation corridor BNSF indicated they were considering selling. The BNSF right-of-way is assumed to be acquired in its entirety because it is unlikely that segments could be purchased independently. (King County is currently in negotiations with BNSF, and PSRC is also conducting a study of this corridor's future use.)
- This option would also require the rebuilding of the Wilburton trestle which may have historic or other significance.

The Busway/BRT alternative was ***not*** one of the two options carried forward for the I-90 corridor in Sound Transit's Long-Range Plan. Ridership under this option was among the lowest studied and this option was most reliant on the acquisition of the BNSF right-of-way for implementation.

Light Rail Transit (LRT)

Light rail transit similar to the system being developed for Central Link was evaluated, with electric-powered train cars that carry approximately 200 riders. Trains would be operated with three to four cars, carrying as many as 600 to 800 people in one trip.
The key issues for the LRT scenario included the following:

Downtown Seattle Operations

- An Eastside light rail line would integrate with Central Link LRT. The light rail line from the Eastside, across I-90, would enter the downtown Seattle transit tunnel and be interlined to destinations to the north. Riders would experience one-seat service from the Eastside to destinations in Seattle and north.
- There is no need for the transfer station that would be required under several other mode options (e.g. Busway/BRT and Monorail, and Rail Convertible BRT until it was converted).

Ridership

- The daily ridership was as high as 48,000 (for the I-90 segment)—highest of all the options studied (ridership for the three-branch system).
- This option includes exclusive use of the I-90 center roadway, which provides travel time reliability.

Traffic Impacts

• Traffic impacts of exclusive transit use of the I-90 center roadway on other roadway users were estimated between the East Channel Bridge and Rainier Ave on I-90. The drive-alone auto time to travel this distance in the future assuming no action was approximately 9 to13 minutes depending on the time of day traveled and direction of travel. With the R-8A Alternative built and exclusive transit in the I-90 center roadway, the travel time remained at approximately 9 to 13 minutes. (This traffic data was derived from work done by HNTB under contract to WSDOT on the I-90 Two-Way Transit Access Project.)

Cost

- Both tunnel and aerial routes through Bellevue were studied. The capital cost of a three-branch system with a tunnel alignment in Bellevue was $4.6 – 6.2 billion, while a downtown aerial option was $4.2 – 5.7 billion (2005$), a difference of $400 to $500 million.
- This option is independent of the BNSF right-of-way and does not require the associated acquisition costs or risks.

Downtown Operation

- This option reduced bus volumes on streets in downtown Seattle and downtown Bellevue by 95 and 18 buses per hour, respectively. In percentage terms, this is a reduction of 17.9% and 14.4%, respectively.

Travel Time

- This option had the fastest travel times of all options studied.

After the initial issue paper was published, the Board requested additional information on the light rail alternative, choosing to focus on the connection from Seattle to Bellevue with the branch to Redmond because that branch has the greatest employment and population densities, now and in 2030. Many findings above are the same, but there are some differences, with this one branch from Bellevue, rather than three:

Cost

- A line from Seattle to Redmond with a tunnel in downtown Bellevue, along with other bus capital facilities on the Eastside, was estimated at $3.2 – 4.4 billion, while an aerial configuration was estimated to cost $2.8 – 3.9 billion (2005$).

Downtown Operation

- This variation reduced bus volumes in downtown Seattle and downtown Bellevue by 46 and 14 buses per hour, respectively. In percentage terms, this is a decrease of 8.7% and 11.2%, respectively.

Ridership

- The LRT line from Seattle to Redmond with HOV/BRT in segments from Bellevue to Totem Lake and from South Bellevue to Issaquah had a ridership across I-90 of 44,000 daily riders. The LRT alternative was one of the two options carried forward for the I-90 corridor in Sound Transit's Long-Range Plan. The Sound Transit Board elected to carry the LRT alternative forward for further evaluation because of its ability to integrate with the Central Link System in Sound Move, and the higher ridership due to predictable and reliable travel times tied to its exclusive ROW.

Following the Board's recommendation to evaluate LRT, staff developed a representative alignment for the purpose of developing a cost estimate. In December 2005, the estimated cost of an LRT line from Seattle to Redmond, including vehicles and a maintenance facility, with a tunnel configuration in downtown Bellevue was $3.3 to $3.8 billion in 2005$. The estimated cost for LRT along the same representative alignment with an aerial configuration in downtown Bellevue was $2.9 to $3.4 billion in 2005$.

Monorail

Monorail technology was evaluated for the east corridor. This scenario utilized technology consistent with the Seattle Monorail Project Green Line which was being implemented in Seattle. Work on that project was halted in November 2005. The analysis assumed operation on exclusive right-of-way and automated (driverless) operation. A monorail system would not have

been interlined with the Seattle Monorail's Green Line because that line was not being designed for interlining.

Key issues for the Monorail scenario included the following:

Cost

- This option's capital cost was $5.0 – 6.8 billion (2005$).

Key Issues

- Monorail implementation requires modifications to the Mt. Baker tunnel to accommodate the smaller of the two monorail vehicles available to carry high rider capacity. This smaller vehicle was not the vehicle that the Seattle Monorail Project would have used, and therefore the technologies would be incompatible[8]. The larger of the two vehicles, planned for use by the Seattle Monorail Project would not fit in the Mt Baker tunnel or under some other constrained areas due to height constraints.
- The Green Line was not planned to accommodate interlining with additional monorail routes so a transfer facility in the south downtown Seattle area would need to be built, adding transfer time and reducing ridership.
- Sound Transit's vehicle procurement would not be competitive since only one vehicle manufacturer would be able to produce a vehicle that fits given the I-90 corridor's physical constraints. Procurement would therefore be high risk and could result in high cost.
- Because the type of vehicle that will fit across I-90 would not be the same vehicle as used on the Green Line, the two monorail systems would not be integrated and through-routed in downtown Seattle.

I-90 Operations

- The monorail would have exclusive use of the I-90 center roadway for operations. The monorail beam would need to be placed slightly above the roadway surface; it could not be elevated due to the weight of the beam and support structures. The beam would have to be made of lightweight steel with cut-outs to reduce the weight of the beam, instead of standard concrete monorail beams.

Traffic Impacts

- Traffic impact of exclusive transit use of the center lanes was estimated between the East Channel Bridge and Rainier Ave on I-90. The drive-alone auto time to travel this distance in the future assuming no action was approximately 9-13 minutes depending on the time of day traveled and direction of travel. With the R-8A Alternative built and exclusive monorail operation in the center roadway, the travel time remained at

[8] In order to access the I-90 center roadway on the floating bridge, the monorail vehicles would use the Mt. Baker tunnel, which has a 15-foot 3-inch vertical clearance. After review of monorail vehicles, it was found that the currently available monorail vehicles will not fit within the Mt. Baker tunnel structure and bridge approach. In addition, clearances above the vehicle dynamic envelope are unknown at this time. However, it is assumed that most vehicle manufacturers and operating agencies would require three or more feet above the vehicle dynamic envelope. It appears that one vehicle may fit within the Mt. Baker tunnel if extensive reconstruction of the existing structure was undertaken, i.e., removal of the existing roadway slab and excavation of the soil beneath the slab. However, further engineering study would be required to confirm the feasibility of tunnel modifications.

approximately 9-13 minutes. (This traffic data derived from work done by HNTB under contract to WSDOT on the I-90 Two-Way Transit Access Project.)

Ridership

- The daily ridership was as high as 31,000 (for the I-90 segment).

Downtown Operation

- This option assumed an aerial alignment through downtown Bellevue.
- This option reduced bus volumes on surface streets in downtown Seattle and downtown Bellevue by 92 and 16 buses per hour, respectively. In percentage terms, this is a 17.3% and 12.8% reduction in bus volumes, respectively.

The monorail alternative was ***not*** one of the two options carried forward for the I-90 corridor in Sound Transit's Long-Range Plan. The vehicle requirements (due to physical constraints of the I-90 roadway) which limit competition on vehicle procurement, and the lack of integration with the Green Line, were all factors in the Board's decision. In late 2005 (after the report was published), Seattle voters rejected continuing development of the Seattle Monorail Project Green Line.

Rail-Convertible BRT

Rail-Convertible BRT would operate like Busway/BRT, but on transitway facilities that are constructed in a manner that allows conversion later to light rail. It follows the same route as the light rail scenario. This option features a guideway built to light rail specifications to enable as smooth and rapid conversion as possible to light rail in the future. However, the system is initially operated as a busway. Design to light rail specifications means that the appropriate curves, grades, station platforms, and station configurations are built in from the start. It also means that the alignment chosen is the same as what would be chosen for light rail.

The following issues were highlighted in the analysis:

Downtown Operations

- This option requires a transfer station in downtown Seattle, which results in slower travel times and lower ridership.
- This option reduced bus volumes in downtown Seattle and downtown Bellevue by 94 and 16 buses per hour, respectively. In percentage terms, this is a 17.7% and 12.8% reduction in bus volumes, respectively.

I-90 Operations

- This option includes exclusive use of the I-90 center roadway.

Traffic Impacts

- The traffic impact of exclusive transit use of the I-90 center roadway on other I-90 traffic was estimated between the East Channel Bridge and Rainier Ave on I-90. The drive-alone auto time to travel this distance in the future assuming no action was approximately 9-13 minutes, depending on the time of day traveled and direction of travel. With the R-8A Alternative built and exclusive transit in the center roadway, the travel time remained

at approximately 9-13 minutes. (This traffic data derived from work done by HNTB under contract to WSDOT on the I-90 Two-Way Transit Access Project.)

Cost

- Costs are very similar to LRT; initial costs are lower but subsequent added conversion costs make the cost for this option higher than LRT.
- The three-branch RCBRT system with a tunnel in downtown Bellevue costs $3.7 – 5.0 billion, while the option with an aerial route in downtown Bellevue costs $3.3 – 4.5 billion (2005$ (a difference of $400-500 million). These costs do not include conversion costs which are estimated at $720 to 940 million in 2005$.

Ridership

- Ridership forecasts are lower than for LRT due to the impact of the forced transfer in Seattle.
- The daily ridership was as high as 36,000 (for the I-90 segment).

Vehicles

- Uses special order buses with doors on both sides to serve center and side platforms at stations.

The rail-convertible BRT alternative ***was*** one of the two options carried forward for the I-90 corridor in Sound Transit's Long-Range Plan. The Board's decision was influenced by the exclusivity of right of way, resulting in reliable and predictable travel times for riders which results in the second highest ridership among the five modes that were evaluated. This option also provides a direct comparison of BRT versus LRT since many of the design elements are held constant between the two.

Following the Board's adoption of the Long-Range Plan in July 2005, and narrowing of options to LRT and rail convertible BRT, Sound Transit staff further refined a representative alignment for the light rail and rail convertible BRT systems between Seattle and Redmond. At the Board's request, additional analysis of the LRT and rail-convertible BRT alternatives was conducted in the summer and fall of 2005.

Key Findings

The estimated cost of a RC BRT line from Seattle to Redmond with vehicles and a maintenance facility, with a tunnel configuration in downtown Bellevue was $2.8 to $3.4 billion in 2005$. The same line with an aerial configuration in downtown Bellevue was estimated at $2.5 to $2.9 billion in 2005$. In addition, the estimated cost to convert to LRT at a subsequent date was $740 to $920 million in 2005$.

- Converting the RC BRT facility to LRT would require shutting down all parts of the guideway for a substantial number of years in order to complete the conversion. If additional LRT elements are built in at the beginning, then the conversion period could be shortened, but then the initial capital cost of RCBRT would be higher. There is a direct tradeoff between the initial capital cost and the eventual period of conversion.
- During the conversion period, bus services would use alternative routes. Parallel arterial streets may need to be improved to handle the increase in bus volumes while the guideway was being converted.

- The only direct example that exists for converting a BRT facility to LRT is the downtown Seattle transit tunnel work that is now on-going. Here, $16 million was spent to prepare the surface streets for added bus traffic and to keep traffic moving smoothly. In addition, $2.5 million over two years was committed to compensate King County Metro for the slower speeds (and higher operating expenses) of having its buses operate on surface streets through downtown Seattle. The period of tunnel closure for the little more than 1 mile of tunnel is approximately two years. By comparison, a RCBRT guideway between Seattle and Redmond would be approximately 18 miles long. While it is likely that there will be mitigation costs similar to those of the downtown tunnel closure, ST has made no estimate of what those costs might be.
- There is no known example of a corridor-long conversion from BRT to LRT operations in the country.
- Prior to the time of conversion to light rail operations, the light rail regulations, municipal regulations, transit regulations, technologies, etc., may all change in unknown ways. There is inherent risk in designing facilities now as regulations and technologies may change in the long term that might dictate a different design.

4. Additional Analyses of the I-90 Corridor

In July 2005, when the Sound Transit Board adopted its updated Long-Range Plan, it also directed additional analyses of the I-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). The additional analyses of the corridor included a load test to simulate light rail operation across the I-90 floating bridge, a study of the transition rail joint, and a traffic study of the I-90 corridor.

I-90 Load Test Completed by WSDOT

An important component of the analysis of the I-90 corridor was to confirm the feasibility of operating light rail service along the I-90 center roadway on 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 took place over three days in September 2005. The test quantified the bridge's movement during simulated light rail train operation using heavily loaded trucks. It also provided additional information confirming 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.
For the nighttime testing, traffic was shut down on the center roadway and westbound lanes. 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).

Static (stationary) load conditions were simulated by placing fully loaded test vehicles at specific locations on the bridge, then taking measurements. Dynamic (moving) load conditions 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 from 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 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 I-90. 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, if needed.

I-90 Rail Joint Study (ST)

Because I-90 would be the first known example of rail operation on a floating bridge, Sound Transit compared the anticipated movements on the I-90 bridge with the movements of modern passenger rail suspension bridges. This comparison demonstrates that it is feasible to design a light rail track system to accommodate the movements of the I-90 floating bridge.

Since 1985, many studies have assessed the feasibility of operating light rail on the I-90 floating bridge. These include an assessment of alternate loading scenarios, anticipated movement of the roadway structures, and consideration of the rail joint at the floating bridge and transition structure spans.

To assess how rail joints would operate on I-90 between the fixed and floating bridge spans, Sound Transit reviewed assumptions and assessments from prior rail joint studies. Additional review included rail joint design and operations, operational assumptions for light rail vehicle type, track configurations, associated transitional bridge movements, and potential mitigation measures.

The I-90 floating bridge includes land-based fixed spans attached to the floating mid-section of the bridge. Transition joints between the fixed and floating portions of the bridge allow for the bridge's movement. The light rail track system across the transition joint will need to be designed to accommodate the bridge's movement.

Sound Transit has identified examples of modern rail bridges that have rail joints designed to accommodate similar movements to those expected for the I-90 floating

bridge. Structural details follow for two of these bridges – the Tagus River Suspension Bridge in Lisbon, Portugal, and the SkyTrain Cable Stayed Bridge (SkyBridge) in Vancouver, B.C., Canada -- both of which have a successful history of passenger rail operation.

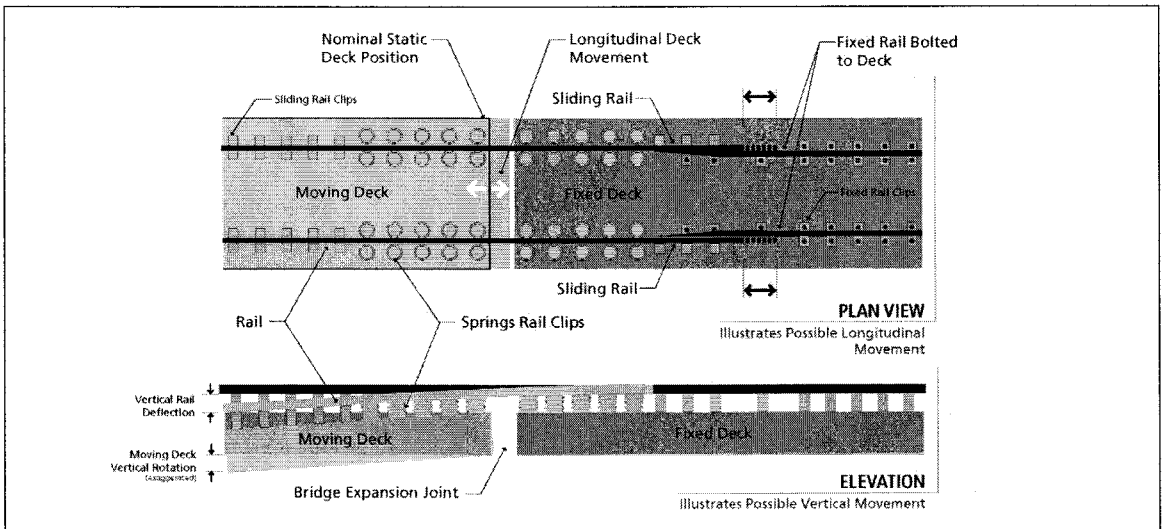
The following table compares these bridges with the I-90 floating bridge by two major movement types, longitudinal (along the length of the bridge) and vertical (up and down). Movements on the Tagus River Suspension Bridge exceed those expected on the I-90 floating bridge. Movements on the SkyBridge are slightly less than those expected on the I-90 floating bridge.

Summary of Bridge Movements

Movement	I-90 Bridge (modeled)	Tagus River Bridge Lisbon, Portugal	SkyBridge Vancouver, BC
Longitudinal Movement	+/-2'-0.5"	+/-5'-0	+/-1'-1.1"
Vertical Rotation*	2.2 degrees (downward)	+/-3.43 degrees	+/-0.75 degrees

**Rotation of transition span due to its vertical placement at floating bridge*

The I-90 floating bridge also experiences a horizontal rotation (side to side) of +/- 1.1 degrees as it shifts in the water. On the Tagus River Bridge and SkyBridge, similar horizontal rotation occurs due to changes in temperature and the effects of trains crossing the bridge. These horizontal rotations cause additional longitudinal movement and slight horizontal rotation across the transition rails. Engineering reviews conclude that the designs of the rail joints across the Tagus River Bridge and SkyTrain Bridge also could accommodate the I-90 floating bridge movement.



SkyTrain SkyBridge Rail Extension Joint
Vancouver, B.C. *Not to scale*

The SkyBridge joint allows movement due to temperature, wind and movement of the SkyTrain vehicles. The rail joint undergoes vertical and horizontal angular changes and longitudinal movement. The rail joint consists of two parts: a pair of sliding sections that allow for longitudal movement (top), and another section with spring devices that allow for vertical angular change (bottom).

I-90 Traffic Study (WSDOT)

To be provided by WSDOT. Information about study purpose and alternatives being evaluated will be included for the 4/27/06 update to the Board. Information about findings will be added at a later date.

5. Conclusions

High capacity transit in the I-90 corridor and the Eastside has been evaluated many times over the last fifty years. The advantages and disadvantages of different high capacity modes have been identified. Information about all the modes is summarized in this report for decision makers to review and refer to in their decision-making process. After a preferred high capacity transit mode is identified for the I-90 corridor/Eastside, more detailed environmental and project-level analysis will be initiated prior to construction and implementation.

Appendix A.

1976 Memorandum Agreement for I-90

MEMORANDUM AGREEMENT

City of Seattle
City of Mercer Island
City of Bellevue
King County
Metro
Washington State Highway Commission

December, 1976

MEMORANDUM AGREEMENT

WHEREAS, the cities of Seattle, Mercer Island and Bellevue; the Municipality of Metropolitan Seattle (hereinafter "Metro"); and King County by and through their respective councils and the Washington State Highway Commission (hereinafter "the Commission") desire to resolve the disputes which have surrounded the plans to construct an improved Interstate 90 (I-90) facility between Interstate 405 (I-405) and Interstate 5 (I-5); and

WHEREAS, there is a desire to create an environment of cooperation in which agreement is reached among all parties concerned relative to the design of the I-90 facility and related transportation projects; and

WHEREAS, the decisions of the Ninth Circuit Court of Appeals of the United States District Court for the Western District of Washington have required that all alternatives to the proposed highway be studied; and

WHEREAS, all parties hereto state that they have reviewed the proposed highway development and all currently available alternatives to it, including the option of withdrawal and substitution; and

WHEREAS, the I-90 facility from I-405 to I-5, when constructed, must contain all of the social and environmental amenities included in the Commission's previously adopted plans and modifications thereof contained in the Findings and Order of the Board of Review in order to be acceptable to all jurisdictions; and

WHEREAS, the parties believe that construction of the agreed upon I-90 facility will be of definite advantage to all four local jurisdictions because it will provide an excellent transit way between Seattle, Mercer Island and Bellevue; it will eliminate the dangerous three-one reversible lane operation presently employed in that corridor; it will provide improved truck access from the east to Seattle's south industrial/commercial area and port; it will provide improved capacity in the off-peak direction; it will probably provide an improved facility sooner than other approaches; it will provide access to and from I-90 and I-5 south of downtown Seattle eliminating traffic presently going through Beacon Hill residential areas; it will provide many jobs for our citizens during the period of construction; and it will repair the corridor and help knit together the communities now split by U.S. 10 west of the Mount Baker ridge and across Mercer Island; and

WHEREAS, the parties have concluded that withdrawal and substitution is not a desirable option because it would double the local matching monies required and because Mercer Island and Seattle find unacceptable a major highway/transit I-90 facility without extensive environmental amenities which amenities might not be funded under the withdrawal and substitution alternative; and

WHEREAS, it is in the best interest of the citizens of the Puget Sound area and the State of Washington that this segment of I-90 be completed in an expeditious manner; and

WHEREAS, all jurisdictions believe that sufficient public hearings have been held on the project and that no further hearings should be held unless legally required; and

WHEREAS, the parties desire to identify and establish a reasonable assurance of construction of certain priority public transportation facilities which are contained in the 1990 Transportation System Plan for the Central Puget Sound Region and which serve to ensure that I-90 functions as an integral part of the region's transportation system; and

WHEREAS, the parties desire to ensure that these future improvements are consistent with the goals and policies for regional development presently under consideration by the Puget Sound Council of Governments (hereinafter "PSCOG") and the subsequent subregional land use element of the Regional Development Plan for the Central Puget Sound Region;

NOW THEREFORE, in consideration of the mutual and reciprocal benefits accruing to each of the parties hereto, it is hereby agreed as follows:

1. The Cities of Seattle, Mercer Island and Bellevue; King County; Metro and the Commission support the construction of a facility which will accommodate no more than eight motor vehicle lanes which are arranged in the following general manner:

   (a) Three general-purpose motor-vehicle lanes in each direction shall be constructed between the South Bellevue Interchange and I-5. In addition, there will be provision for necessary weaving lanes and possible local access across the East Channel, to be determined in accordance with paragraph 1(e) below.

(b) The facility shall also contain provision for two lanes designed for and permanently committed to transit use. The eastern and western termini for these lanes shall be designed to facilitate uninterrupted transit and carpool access to downtown Seattle and to downtown Bellevue in accordance with paragraph 3 hereinbelow. The design shall be such as to accommodate the operation of the two transit lanes in either a reversible or in a two-way directional mode.

(c) The facility shall be designed in a manner which, as much as practicable, minimizes the width of the roadway and the taking of land.

(d) To the extent practical, the facility shall provide priority by-pass access for local transit to the general purpose motor-vehicle lanes.

(e) The parties agree that the transit lanes shall operate initially in a two-way directional mode, at no less than 45 mph average speed, with the first priority to transit, the second to carpools, and the third to Mercer Island traffic. In the direction of minor flow, the transit lane shall be restricted to busses. The parties further agree that the initial operation of the East Channel bridge shall consist of only three general purpose auto

lanes in each direction in addition to the transit lanes. In addition, there will be an acceleration lane from the South Bellevue Interchange which will terminate prior to the exit ramp at the East Mercer Interchange. The subsequent mode of operation of the facility shall be based upon existing needs as determined by the Commission in consultation with the affected jurisdictions, pursuant to paragraph 14 of this agreement. That determination will consider efficient transit flow, equitable access for Mercer Island and Bellevue traffic, and traffic-related impacts on Seattle.

2. The I-90 facility shall be designed and constructed so that conversion of all or part of the transit roadway to fixed guideway is possible.

3. The parties recognize that the planning, design and construction of efficient access at the eastern terminus and western terminus of this facility will enhance the operation of I-90 as a regional transportation facility. Therefore, the Commission, jointly with Seattle, Mercer Island, Bellevue, King County, and Metro, as their respective interests and responsibilities may dictate, shall immediately upon execution of this agreement undertake the development of the necessary plans and designs for, and shall further proceed, with

the required public hearings and the preparation of the necessary environmental impact statements in order to obtain maximum eligibility for Federal Interstate funding for the construction of the following projects:

(a) Transit access from I-90 to downtown Seattle:

(b) Transit access from I-90 to I-405 and to the Bellevue central business district;

(c) Transit and general-purpose access from I-90 to the King County Stadium area; and

(d) Transit and general-purpose access from I-90 to arterials serving the north Duwamish industrial/commercial area and the Seattle waterfront;

(e) Transit access from I-90 transit lanes to I-5;

For any of the above projects or portions thereof which are not eligible for Federal Interstate funding, the Cities, the County and Metro with full support of the Commission, shall seek any available funding for such projects and shall make reasonable effort to complete the construction thereof prior to the completion of I-90.

4. The parties further agree, except as otherwise provided in this agreement, that the modified design of the facility will preserve and incorporate all of the provisions for community amenities and for reducing adverse environmental impacts as contained in limited access plans adopted by the State Highway Commission for

(a) the segment of I-90 from the West Shore of Mercer Island to the East Channel Bridge and for

(b) the segment from I-5 to the West Shore of Mercer Island (modified by the Findings and Order of the Board of Review dated March 26, 1973, and the Stipulation to Resolve Certain Issues incorporated therein, including but not limited to the provisions for a full lid tying affected Seattle neighborhoods together. The lid shall be constructed to permit park and/or two-story residential or business construction (not industrial uses) to take place on top of the highway between the Mt. Baker tunnel and 23rd Avenue South. Additional loads may be acceptable following specific agreement between the Commission and the City of Seattle. The Commission agrees to fund the landscaping of the lid and the maintenance thereof except as may be agreed to by other parties.

5. The parties agree that the design of the entire facility shall include the following additional features:

(a) a transit station permitting transfer of transit passengers at Empire Way South or 23rd Avenue South as more particularly set forth in the Findings and Order of the Board of Review.

(b) a direct Highway connection for Rainier Valley to and from the east.

(c) the Commission's plan for preserving access between Seattle communities over adjacent local city streets shall include improvements of South Norman Street between 20th Avenue South and 23rd Avenue South to provide access to the Judkins neighborhood,

this being done in lieu of the development of South Judkins Street as provided in the Commission's adopted plan as modified by the Findings and Order of the Board of Review.

(d) a continuous park/pedestrian link between Judkins Park and the lid over I-90 west of the Mt. Baker Ridge Tunnel.

6. The Commission agrees to participate jointly with the City of Seattle in an I-90 corridor area planning study for the purpose of designing alternative means of redeveloping areas adjacent to the I-90 project in Seattle. The extent of such study shall be defined and agreed to by Seattle and the Commission, and to the extent that the study relates to the effects of the I-90 facility in the corridor, it shall be funded by the Commission.

7. At the option of the local jurisdictions to be exercised within a reasonable time, the Commission shall transfer to the appropriate jurisdiction fee title of all state-purchased lands acquired for the I-90 project but which are outside the finally determined right-of-way lines of I-90 to the fullest extent and at the lowest cost legally possible.

8. The parties hereto agree that they will proceed under established legal processes, including regional transportation planning procedures of PSCOG and consistent with the approved Regional Development Plan of PSCOG, to determine those projects which are of highest priority in the Transportation System Plan and the Transportation

Improvement Program as the Plan and Program apply to the King County subregion. The parties hereby agree that projects (a) through (g) listed below are of highest priority and shall so indicate in the process of establishing the King County Subregional Transportation Improvement Program, the Regional 1990 Transportation System Plan, and Metro's Comprehensive Public Transportation Plan. The Commission and Metro shall work with the local jurisdictions in undertaking location and design studies for these projects at the earliest possible date commensurate with state, regional, metropolitan and local planning and priority programming practices. Projects to be considered through these processes shall include, but not be limited to, the following regional components of PSCOG 1990 Transportation Plan:

(a) Transit/carpool lanes and/or Surveilance Control and Driver Information Systems (SC&DI) on I-5 from I-405 at Tukwila to the King County Snohomish County line:

(b) The park-and-ride lots and flyer stops contained in the approved 1980 Plan as may be modified by Metro:

(c) Provision for a busway or exclusive transit/carpool lane(s) as a part of the SR 99 and SR 509 corridor including a crossing of the First Avenue South Bridge, consistent with Metro's transition planning for this corridor;

(d) Provision for a busway or exclusive transit/carpool lane(s) and/or SC&DI as a part of SR 520 from I-5 to I-405;

(e) Redesign, in a manner acceptable to the City of Seattle, of the lanes where SR 520 meets I-5 and at the Mercer Street egress from I-5 in order to improve transit flow and reduce the congestion on I-5 between Mercer Street and Roanoke Street;

(f) Provision for a busway or exclusive transit/carpool lane(s) and/or SC&DI as a part of I-405 from Bothell to Renton

(g) Provision for exclusive transit lane(s) on I-405 through Bellevue which shall also include provision for a freeway flyer stop and a park-and-ride facility on I-405 between Main Street and N.E. 8th in Bellevue and provision for I-405 access improvements to the Bellevue central business district as determined by the Joint State Legislative/Highway Commission and City of Bellevue I-405 Access Study.

9. The parties agree that the I-90 facility should be operated in such a manner as to encourage growth and development in the presently urbanized areas of King County rather than in undeveloped areas. Therefore, the Commission shall conduct a study in coordination with the parties to this agreement to determine the feasibility and means of metering and controlling local access to I-90 east of Bellevue during peak hours.

10. Seattle, Bellevue, Mercer Island, King County and Metro agree that dedicated public transit rights-of-way through downtown Seattle and through downtown Bellevue are compatible with the public transportation plans of this area and are desirable to be implemented in conjunction with the completion of the I-90 facility.

11. Immediately upon the issuance of the environmental impact statement, another review team comprised of representatives chosen by each of the parties to this agreement shall be established to further monitor and advise the Commission on the development of the design and the implementation of the entire I-90 facility and the I-90 transit access provisions listed in paragraph 3 above. In addition, review teams including elected officials and citizens from Seattle, Bellevue, Mercer Island and King County may be established to further monitor and advise the Commission upon the implementation and design of the I-90 facility.

12. Upon execution of this agreement, the Commission becomes responsible for the design and construction of the facilities described in this agreement that can be funded with federal interstate funds as well as any other facilities referred to in this agreement for which the Commission, by law, has the sole responsibility; and the several parties to this agreement become responsible for the design and construction of the remaining facilities referred to in this agreement; provided that all such undertakings are subject to available funding and legal and procedural requirements. Seattle,

Bellevue, Mercer Island, King County and the Commission agree to process any permits required for construction of the agreed upon facilities in a timely and expeditious manner, as provided by law.

13. It is expressly understood that agreement to the above by the Commission is tentative pending review of (1) the final environmental impact statement to be filed in connection with the project and (2) the hearing record being prepared in connection with the corridor-design hearing held in January and February 1976. It is also understood that the parties have reached this agreement under the assumption and on the condition that the funding for the project, in accordance with the modified design of said project as referred to in paragraphs 1, 2 and 4 and those eligible portions under paragraph 3 which will qualify for Federal Aid Interstate monies, is approved prior to the initiation of construction and shall be funded from federal and state funds, except as agreed to by the affected jurisdiction(s).

14. This agreement represents substantial accommodations by the parties of positions held heretofore. Such accommodations were made in order to achieve a unanimous agreement upon which to proceed with the design and construction of I-90 and related projects. This agreement, therefore, sets forth the express intent of the existing governing bodies that the parties to this agreement understand that their respective governing bodies are limited in the degree to which they can bind their successors with respect to the exercise of govern-

mental powers vested in those governing bodies by law. Accordingly, the Commission will take no action which would result in a major change in either the operation or the capacity of the I-90 facility without prior consultation with and involvement of the other parties to this agreement, with the intent that concurrence of the parties be a prerequisite to Commission action to the greatest extent possible under law.

Dated this 21st day of December, 1976

COUNTY OF KING

By: _____

CITY OF SEATTLE

By: _____

MUNICIPALITY OF METROPOLITAN SEATTLE

By: _____

CITY OF MERCER ISLAND

By: _____

WASHINGTON STATE HIGHWAY COMMISSION

By: _____

CITY OF BELLEVUE

By: _____

Appendix B.

Amendment to the 1976 Memorandum Agreement

AMENDMENT To The I-90
MEMORANDUM AGREEMENT

AUGUST, 2004

Central Puget Sound Regional Transit Authority
City of Bellevue
City of Mercer Island
City of Seattle
King County
Washington State Transportation Commission

August 2004
Amendment to 1976 Memorandum Agreement

WHEREAS, the Cities of Seattle, Mercer Island, and Bellevue; King County; by and through their respective governing bodies and the Washington State Transportation Commission (hereinafter "the Commission") desire to amend the existing Memorandum Agreement (the Agreement) signed by all parties in 1976 to reflect current and future conditions and demands along the Interstate 90 (I-90) corridor between Bellevue and Seattle crossing Lake Washington via Mercer Island (the "I-90 Corridor"), including increased travel growth, changes in travel patterns, and a reduction in transit reliability; and

WHEREAS, there is a desire among the parties and Sound Transit to add Sound Transit as the Regional Transit Authority with responsibility for High Capacity Transit as a signatory to this 2004 Amendment, but not to the underlying 1976 Agreement, given its role in the region generally and the I-90 Corridor specifically; and

WHEREAS, all parties recognize the I-90 facility as a key interstate corridor connecting the East and West Coasts, Eastern and Western Washington, and recognize its importance as a critical link between major urban centers in King County, and the only means of mobility to and from Mercer Island; and

WHEREAS, all parties acknowledge I-90 as a critical transportation link vital to the economy of the region and the state by providing for the movement of people and goods within the region; and

WHEREAS, all parties agree that the current configuration and operation of I-90 between Bellevue, Mercer Island, and Seattle does not address today's demands and expected growth in the region; and a new configuration that helps move more people and goods is imperative to manage congestion on what is the busiest east-west corridor in the region; and

WHEREAS, all parties recognize the importance of the environment and thereby seek to preserve and enhance its quality; and

WHEREAS, all parties agree that the ultimate configuration for I-90 between Bellevue, Mercer Island, and Seattle should be defined as High Capacity Transit in the center roadway and HOV lanes in the outer roadways; and further agree that High Capacity Transit for this purpose is defined as a transit system operating in dedicated right-of-way such as light rail, monorail, or a substantially equivalent system; and

WHEREAS, all parties agree to work cooperatively to secure funding at local, regional, state, and federal levels to fully fund both parts of the ultimate configuration of the "I-90 Corridor" (HOV lanes on the outer roadway and High Capacity Transit in the center roadway); and

WHEREAS, all parties have studied many alternatives as participants on the Steering Committee for Sound Transit and the Washington State Department of Transportation's (WSDOT) I-90 Two-Way Transit and HOV Operations Project (Project), and all parties agree that building HOV lanes on the outer roadways as identified as Alternative R-8A as set forth in the April 25, 2003 Draft Environmental Impact Statement (DEIS) prepared for the project, is an essential first step toward achieving the ultimate configuration; and

WHEREAS, all parties acknowledge that the ultimate configuration is consistent with the region's transportation action plan, Destination 2030, which focuses on integrated multi-modal transportation systems; describing facilities that weave parts of the region together by crossing county or city boundaries or access major regional activity centers as critical to the region's transportation system; and specifically calls for safety, maintenance, and capacity investments on I-90 between I-5 and I-405; and high capacity transit in the "I-90 Corridor" between Seattle and Bellevue; and

WHEREAS, all parties agree that I-90 is an integral piece of the regional bike network, providing the only bicycle-pedestrian path across Lake Washington; that the preferred alternative maintains a ten foot bicycle lane as part of providing optimal multi-modal travel in the I-90 corridor for cyclists and pedestrians; and

WHEREAS, the Cities of Bellevue, Mercer Island, and Seattle; King County; Sound Transit, and the Washington State Transportation Commission, as participants of the I-90 Steering Committee, having conducted a thorough evaluation of the performance and benefits of the alternatives, agree that Alternative R-8A has been shown to improve regional mobility by providing reliable and safe two-way transit and high occupancy vehicle operations on I-90 between Bellevue, Mercer Island, and Seattle, and mobility for Mercer Island, while minimizing impacts to the environment, to other users, and to other transportation modes; and is an essential first step toward implementing High Capacity Transit in the I-90 corridor;

NOW THEREFORE BE IT RESOLVED, the parties to this 2004 Amendment agree to the following principles regarding future development of the I-90 Corridor between Seattle and Bellevue:

1. Alternative R-8A with High Capacity Transit deployed in the center lanes is the ultimate configuration for I-90 in this segment;
2. Construction of R-8A should occur as soon as possible as a first step to the ultimate configuration;
3. Upon completion of R-8A, move as quickly as possible to construct High Capacity Transit in the center lanes;
4. Commit to the earliest possible conversion of center roadway to two-way High Capacity Transit operation based on outcome of studies and funding approvals.
5. Minimize construction impacts to the existing bicycle/pedestrian path, and maintain safe access to the path during construction;

6. Maintain the existing width of the bicycle/pedestrian path and to install screen treatments to create a safe barrier between the path users and vehicular traffic; and
7. To the extent of any loss of mobility to and from Mercer Island based on the outcome of studies, additional transit facilities and services such as additional bus service, parking available for Mercer Island residents, and other measures shall be identified and satisfactorily addressed by the Commission, in consultation with the affected jurisdictions pursuant to paragraph 14 of the Agreement, prior to the time the center roadway converts to High Capacity Transit.

King County

By: _____

Its: King County Executive

City of Bellevue

By: Connie Marshall

Its: Mayor

City of Mercer Island

By: _____

Its: Mayor

Washington State
Transportation Commission

By: _____

Its: Chairman

City of Seattle

By: _____

Its: Mayor

Central Puget Sound
Regional Transit Authority

By: Joan M Earl

Its: Chief Executive Officer

Appendix C.

Updated Sound Transit Long-Range Plan Map (2005)

2005 LONG-RANGE PLAN

SOUNDTRANSIT

On July 7, 2005, the Sound Transit Board adopted the following changes to Sound Transit's Long-Range Plan, which was originally adopted in 1996:

1. Identified SR-99 from Seattle to Everett as a BRT corridor.
2. Changed I-5, I-405, I-90 and SR-167 corridors from HOV Expressway to BRT corridors.
3. Designated Northgate-to-Bothell and University District-to-Redmond as HCT corridors.
4. Added an extension to Burien as both a part of the I-405 BRT corridor and as a potential rail extension.
5. Added an extension of Tacoma Link from downtown Tacoma to Tacoma Community College (TCC).
6. Designated Seattle-to-Redmond via Bellevue as Light Rail Transit or Rail Convertible BRT.