SOUND TRANSIT

MOTION NO. M2005-102

A motion of the Board of the Central Puget Sound Regional Transit Authority directing the Chief Executive Officer to complete the "North Link First Hill Work Plan," dated August 3, 2005 as reviewed by the Executive and Finance Committees on August 4, 2005 and the "North Link First Hill Rail Spur Work Plan," and report back to the Board in writing at least four weeks prior to the Board's final decision selecting the preferred route, profiles, and station locations for the North Link Light Rail Project.

Background:

At the July 28, 2005 meeting, the Sound Transit Board adopted Resolution No. R2005-20, modifying the preferred route, profiles, and station locations for the North Link Light Rail Project and identifying University Link as the preferred segment of North Link for purposes of the final supplemental EIS and for obtaining a New Starts rating from the Federal Transit Administration. The decision to modify the preferred route, profiles, and station locations for the North Link Light Rail Project, eliminated the First Hill Station.

The Board continues to recognize the importance of serving First Hill and this motion directs staff to complete a work plan for other options. The motion also directs staff to present the findings in writing to the Board at least four weeks prior to the Board's final decision on the selection of the North Link route.

Motion:

It is hereby moved by the Board of the Central Puget Sound Regional Transit Authority that the Chief Executive Officer is directed to complete the "North Link First Hill Work Plan," dated August 3, 2005 as reviewed by the Executive and Finance Committees on August 4, 2005, and the "North Link First Hill Rail Spur Work Plan," and report back to the Board in writing at least four weeks prior to the Board's final decision selecting the preferred route, profiles, and station locations for the North Link Light Rail Project.

APPROVED by the Board of the Central Puget Sound Regional Transit Authority at a regular meeting thereof held on August 25, 2005.

Greg Nickels
Board Vice Chair

ATTEST:

Marcia Walker
Board Administrator

Sound Transit

North Link
First Hill Rail Spur Work Plan
August 9, 2005

Analyze the potential feasibility, benefits, and costs associated with a potential future rail spur connection from the Capitol Hill Station to First Hill, for which funding would be considered later.

The above task to analyze the feasibility of a potential future rail spur was presented to the Board, although staff did not receive direction to develop a work plan for this task. Should the Board direct staff to pursue this analysis within the First Hill work plan, then staff would complete a number of tasks to assess the feasibility of this alternative.

The information will be provided in two phases. Phase I will define the technology and operations concept for a potential rail spur between Capitol Hill and First Hill. Phase II would be initiated at the discretion of the Board after review of Phase I and would develop conceptual engineering designs and cost estimates.

Phase I task will include:

- *Vehicle Technology:* this task includes a comparative assessment of the various rail transit technologies to provide safe, efficient and reliable service between Capitol Hill and First Hill and a matrix that summarizes the findings from this assessment;

- *Operations & Maintenance Concepts:* this task includes a review and reporting on system requirements (including constraints) that influence both operations and maintenance for various transit vehicles;

- *Potential routes:* this involves definition of potential route and station locations for a rail spur

If directed by the Board to proceed with Phase II, some of the major conceptual engineering tasks will include:

- *Alignment/Civil*: this task includes developing the alignment and profile that is compatible with the vehicle operations recommended for this alternative;

- *Geotechnical Investigations:* this task is to conduct a limited exploration program (including field and laboratory testing) to evaluate subsurface soil and groundwater conditions at selected locations along the alignment;

- *Structures Design*: this task is to determine the structural configurations which may include a bored or mined tunnel, cut-and-cover tunnel, a cut-and-cover station at First Hill, connection into the Capitol Hill station, and other miscellaneous structures to address emergency access/egress, ventilation requirements, maintenance requirements, and system-wide elements such as power, signals and communications;

- *Utility Impact Analysis:* this task is to identify the major utilities that exist within or adjacent to the alignment and develop a matrix assessing the impacts on these utilities and the preferred mitigation to address the impacts;

- *Right of Way Identification:* this task is to identify properties directly affected by the alignment and support facilities;

- *Support for Ridership and Traffic Forecasts:* this task is to provide support and coordination for the development of initial information addressing transit ridership, mode of access, pedestrian and traffic forecasts; and

- *EIS Support:* this task is to provide initial technical environmental analysis on various impacts related to construction and operations of this alternative.

Deliverables:

- *Phase 1: Definition of a potential rail spur from Capitol Hill to First Hill, including technology, operation and maintenance, and route concepts.*
- *Phase 2: Conceptual engineering design and cost estimates.*

North Link
First Hill Work Plan
August 3, 2005

Introduction

This work plan provides detailed descriptions of the tasks to be performed by Sound Transit in response to the Sound Transit Board direction under Board Motion M2005-102. Unless specifically stated otherwise, work plan activities will be performed by agency staff using existing resources and relying on available information. Work plan deliverables will be reported back to the Board at least four week's prior to the Board's final decision selecting the alignment and stations for the North Link project.

Work Plan Tasks:

Further evaluate ways to reduce the potential construction risks and costs of the First Hill light rail station including:

(1) The cost and benefits of securing additional construction staging areas to support the construction of the First Hill station.

Sound Transit staff will identify additional potential construction staging areas in the vicinity of the First Hill station, develop preliminary real estate acquisition cost estimates, identify relocation issues, and prepare preliminary relocation cost estimates by considering the type of existing property occupants (e.g., residential, retail, etc.). Staff will evaluate the range of construction staging and support functions that could reasonably be located at each of the identified properties, considering site constraints, environmental issues, and the distance of properties to each of the two station surface work sites. This evaluation will inform a qualitative assessment of how the availability of the identified additional construction staging areas could facilitate the construction of the First Hill station.

Deliverables:

- *Preliminary property acquisition and relocation cost estimates for potential construction staging areas in the vicinity of the First Hill station.*
- *Narrative description of potential construction activities that could be sited on each of the identified sites.*
- *Qualitative assessment of cost, risk reduction, and schedule benefits that could potentially be expected for the First Hill station construction as a result of the availability of one or more additional construction staging sites.*

(2) Alternate methods for stabilizing soils in support of the First Hill station excavations, including consideration of ground freezing.

Sound Transit staff will assess alternate methods to provide primary support of the excavations of the First Hill station shafts and caverns. This assessment will be based on available geotechnical and hydro-geologic information that the Sound Transit team has assembled to date. In addition, Sound Transit staff will review case histories (local and otherwise) to assess the merits and limitations of alternate ground support methods in similar soils. Our assessment will include:

- Further review of Sound Transit records from the previous design/build contract (Contract LB235) for the North Corridor of Central Link, especially the Contractor's consideration of ground freezing;
- Review of case histories outside the Puget Sound Region in similar soils and documentation of findings on ground pre-treatment and other support techniques (ex. horizontal grouting, jet grouting, compaction grouting, chemical grouting, dewatering, horizontal ground freezing); and
- Review of local case histories including recent work by King County Metro on the Brightwater Project and their design considerations using ground freezing for primary support of a deep shaft excavation in similar glacial soils.

As part of this assessment, Sound Transit staff will evaluate the requirements for construction staging associated with each of the alternate excavation support methods. Construction staging considerations will complement the findings for item (1) of this work program.

Deliverables:

- *Assessment of applicability of alternative methods for stabilizing soils for primary support for main shafts, concourse tunnels and platform tunnels, including ground freezing.*
- *Assessment of required areas for construction staging for the alternative methods for stabilizing soils for primary support.*
- *Qualitative assessment of construction cost and risk reduction and schedule benefits resulting from alternate methods of stabilizing soils.*

(3) The cost, risks, and benefits of raising the profile and/or shifting the station platforms or making other design changes at the First Hill station location in order to place platform caverns in more favorable soils.

Sound Transit staff will evaluate the risks and benefits of raising the profile and/or shifting the location of underground caverns of the First Hill station. This evaluation will be based on available geotechnical and hydro-geologic information that the Sound Transit team has assembled to date. Sound Transit staff will review studies completed to date, including the work done with the design/build contractor (Modern Transit Constructors) prior to the termination of that contract. This evaluation will assess the risks and benefits for both construction and operations of a subway station at First Hill. This evaluation will provide a qualitative comparison between any potential design modifications and the current design of the First Hill station.

Deliverables:

- *Assessment of the construction risks and benefits of raising the profile and/or shifting the location of underground caverns.*
- *Assessment of the operations risks and benefits of raising the profile and/or shifting the location of underground caverns.*
- *Qualitative comparison between potential design modifications and the current preliminary engineering design.*

(4) Construction sequence review with the objective of mitigating schedule delay risks.

The preliminary engineering (PE) project schedule and construction sequencing plan developed for the construction between the DSTT and the University of Washington Stadium station were developed specifically to mitigate construction risks. Construction sequences are based on the construction packaging plan developed as part of a peer review that included senior managers from other transit agencies and tunnel industry experts.

Due to the specialized nature of the sequential excavation mining (SEM) and the limited industry capacity for this type of construction, the SEM and related construction, including the First Hill station, are packaged as a separate contract that would be let among the first major construction contracts for any North Link extension. Packaging the First Hill station work in a separate contract isolates the procurement risk (e.g., limited competition) posed by this work. Combining the First Hill station in a contract that also includes the bored tunnels would significantly broaden procurement risk cost exposures. Given the complexity of the First Hill station construction, the project schedule is built on the assumption that this work would start as early as possible, immediately upon acquisition of the required property.

The schedule risk posed by the First Hill station construction is in largest part due to the unavoidable fact that, absent methods for stabilizing soils 215 feet below grade from the surface, ground improvements required to support the excavation of platform-level caverns can only be performed from the bottom of the excavated vertical shafts. This places this complex work (i.e., horizontal jet grouting) necessarily on the critical path of the overall station construction.

Since the construction packaging plan and project schedule specifically mitigate cost and schedule risks associated with the First Hill station construction and given that the station construction sequence is a function of physical constraints and the required depth of the excavation, it is recommended that no review of First Hill station construction sequences be conducted as part of this work plan.

Deliverables: No further work to be performed.

(5) Determine whether there are other First Hill light rail station locations that would reduce construction costs and risks while retaining significant ridership.

Staff will examine alternate First Hill station locations and assess:

- Available construction areas and impacts;
- Station depth and tunnel length; and
- Ridership potential

This will be a planning level analysis and will not involve collection of new survey, geotechnical, environmental, or utility information. Emphasis will be placed on locations north of Madison Street to minimize out-of-direction travel and tunnel length. Alternate locations examined during the North Link environmental screening process will also be summarized. Relocating the First Hill station may also change the location of the Capitol Hill station.

Deliverables:

- *Alignment maps and station locations with a planning level comparison of order of magnitude comparative construction costs, environmental impacts, and ridership projections to the baseline First Hill station location.*

(6) Analyze the potential feasibility, benefits, and costs associated with providing alternative transit connections to the First Hill neighborhood in the absence of a First Hill light rail station, including consideration of improved bus service, shuttle bus, and streetcar, all in cooperation with King County Metro and City of Seattle staff.

Staff will establish a work program that includes a multi-agency work team made up of staff from Sound Transit, King County Metro and the City of Seattle to explore potential options for improving transit service to First Hill. The information will be provided in two phases. Phase 1 will be a feasibility study that the Board can use to narrow to the most promising options. Phase 2 will be a more detailed report on the narrowed list of options. Phase 2 work may require consultant resources. Scope elements include:

- Identify the various markets, institutions and other destinations on First Hill;
- Review past studies conducted by the City of Seattle and King County Metro that looked at ways to improve transit speed and reliability. Options to consider should include but not be limited to bus lanes, parking removal, signal priority, queue jumps and bus bulbs. Develop cost estimates for the most promising improvements;
- Consider options for service increases on existing routes that serve First Hill and identify other options for serving First Hill with new transit routes or shuttles. Service from the Capitol Hill station, downtown and the International District station should be considered when evaluating these service changes. Estimate the operating costs associated with these options; and
- Study the potential for constructing and operating streetcar service between the Capitol Hill station and First Hill. The identification of possible routes should consider traffic and other environmental impacts, the need for parking removal, signal changes, vehicle

requirements and civil design issues like utilities, grades and curves. The system will need to connect to the existing Waterfront Streetcar line in the International District to provide access to a maintenance facility. Travel times will be estimated and compared to the transit service options identified above. Order of magnitude cost estimates will be developed based on the proposed South Lake Union streetcar line.

Deliverables:

- *Multi-agency work program and schedule.*
- *Phase 1: Feasibility study covering the individual study options. A planning level, order of magnitude comparison of costs, environmental impacts and ridership projections will be provided for the study options. The findings will be presented to the Sound Transit Board to narrow the options for further study.*
- *Phase 2: Document the findings from phase 2 analysis. Depending on the options that are carried forward for further study, consultant resources may be required. Phase 2 will be conducted after the final adoption of the North Link project.*

(7) Consistent with Federal Transit Administration guidelines, analyze enhancements to the ridership model to more accurately reflect the impact of rail, including factors such as bus reliability, using the recent Sound Transit case study of transit reliability in the North Link Corridor.

FTA policy requires that bus and light rail modes be treated equally in areas where light rail is a new mode. FTA is aware that there are additional improvements to transit service quality beyond the time and cost measures already accounted for in travel models and is considering changes to their policy, which would allow these qualities to be captured. However, FTA stated as recently as April 29, 2005 that additional research, analysis, industry consultation, and testing is necessary before adjusting its current policy.

Sound Transit is in the midst of on-going work to determine whether transit reliability could be incorporated into ridership forecasts. The case study of transit reliability in the North Corridor compares current bus reliability to probable rail reliability. However, the case study does not determine how travel time uncertainty affects mode choice. Staff is now beginning work on the effects of reliability on mode choice but this is a new area of research and the outcomes are uncertain.

Prior to the Board's final decision selecting the alignment and station locations, staff will report on the status of the on-going work and also any new information on FTA policy. Boardmembers should also be aware that any local progress in this area would be evaluated by FTA against their efforts to maintain a level playing field in forecasting procedures nationally.

Deliverables:

- *Progress report to the Board on on-going efforts to advance industry practice so as to incorporate reliability into ridership forecasts and any changes in FTA ridership forecasting policy.*

(8) Analyze alternative options for a competitive alignment in the federal funding process, including ridership estimates that use local funding to pay for Downtown to First Hill with an application for federal funding from Capitol Hill to Brooklyn.

The challenge with alternative option(s) or alternative "minimum operable segment(s)" (MOS) for a competitive federalized segment is that the applied segment needs to be either 1) an extension of an existing or planned operating system or 2) be a stand alone MOS like the Initial Segment with all the associated facilities such as O & M facility.

Option 2, the stand alone MOS with no connection to the Initial Segment, does not make sense. To pursue option 1, we must demonstrate that the gap between Initial Segment and the federally pursued segment can be afforded, built separately and operated prior to opening of the federalized segment. To do so we need to use local money and extend the Initial Segment through First Hill to at least Capitol Hill. An interim terminus at First Hill is not an option because the tunnel boring machine can not be launched from a deep mined station at First Hill. Pine Street and I-5 are too constrained to be practical tunneling launching sites. This leaves Capitol Hill as the first available tunneling site. Therefore, Capitol Hill to downtown is the shortest North Link segment that can be constructed but is not affordable with 100% local funds.

Because Sound Transit would be unable to show either a financing plan or a construction schedule for the downtown to Capitol Hill segment, the Federal Transit Administration would reject an application for federal funding from Capitol Hill to Brooklyn, regardless of the project merits.

Deliverables: No further work to be performed.