KING COUNTY METRO DOWNTOWN SOUTHEND TRANSIT STUDY

King County METRO

We'll Get You There

August 2012

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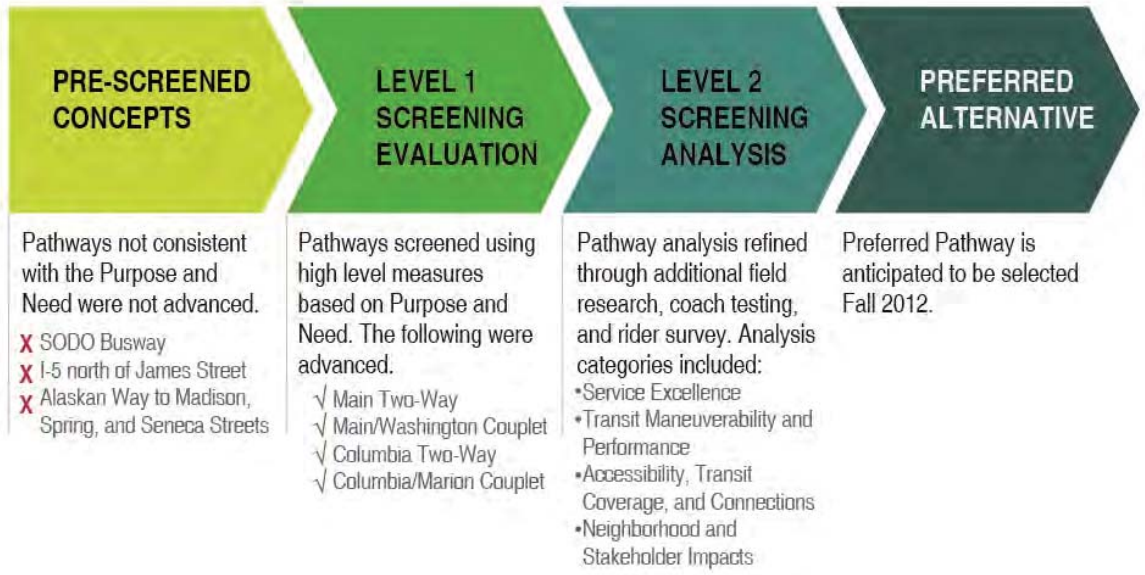
Executive Summary

King County Metro (Metro) led the development of the Downtown Southend Transit Study. The purpose of this study was to evaluate and select a dedicated transit pathway between the Third Avenue transit spine in downtown Seattle and West Seattle, Ballard, the RapidRide D Line, and other parts of southwest King County. This pathway will replace the existing pathway using the Columbia and Seneca Street ramps that connect Seattle's downtown street grid to the viaduct.

The study process obtained input from King County Staff, the Central Waterfront Project Team, the Seattle Department of Transportation staff from Major Projects and Policy and Planning groups, and the public. This report includes an alternatives evaluation process (summarized in Exhibit E-1) to select the replacement transit pathway(s) in compliance with the National Environmental Policy Act (NEPA) as stipulated for this Federal Transit Administration funded project. The pre-screening process eliminated routes with apparent critical flaws.

Exhibit E-1. Planning Process Diagram



The Level 1 Screening Evaluation reduced the number of pathways considered from 13 to 2, with a couplet or two-way transit option for each pathway.

The Level 2 Screening Analysis provides a closer look at performance metrics grouped into four major categories for each of the preferred pathways. These performance metrics were selected by Metro and City of Seattle staff and provide a balance of service quality and usability.

The findings for the four proposed pathways will be used in discussions between King County and City of Seattle officials and staff and in Public Forums in determining a preferred pathway. The following timeline is anticipated for this project:

- 2012: Interim construction pathway and preferred pathway identified
- 2013: Conceptual design and draft environmental review and assessment completed
- 2014: Preliminary engineering and completion of environmental documentation
- 2015: Completion of PS&E and bid document, and permitting
- 2016-2017: Construction
- 2016-2018: Metro operates on interim pathway
- 2018: Pathway completed and opens for Metro service

Next Steps

- Begin conceptual design and draft environmental review and assessment work associated with pathways
- Continue to work with the City of Seattle to refine transit concepts related to the Southend Pathways project including:
- Identifying an interim construction pathway for 2016-2019
- Identifying necessary improvements once a preferred pathway is chosen, including transit priority treatments and intersection enhancements.
- Identifying and evaluating potential bus stop locations once a preferred pathway is chosen
- Communicate with neighborhoods including Pioneer Square, Ballard, and West Seattle on the decision-making timeline and process.
- Outreach to Washington State Ferries, WSDOT and other agencies on the decision-making timeline and process.

1 Introduction and Project Description

This project is a joint effort between King County Metro, King County Roads, and the City of Seattle in south Seattle.

1.1 Who is leading the proposed project and who were the project partners?

King County Metro (Metro) led the Downtown Southend Transit Study. In leading this project, they sought input from the Alaskan Way Central Waterfront Project Team, the Seattle Department of Transportation staff from Major Projects and Policy and Planning groups, and the public.

1.2 What is the purpose of this project?

The purpose of this project is to evaluate and select a dedicated transit pathway between the Third Avenue transit spine in downtown Seattle and West Seattle, Ballard, and other parts of southwest King County. This pathway is necessary to replace the existing Columbia and Seneca Street ramps that connect Seattle's downtown street grid to the viaduct. The selection process will include working with the public to determine a pathway that addresses neighborhood needs consistent with the design and vision of the Alaskan Way Central Waterfront. In addition, the pathway needs to provide transit connections that accommodate a comparable level of transit speed, reliability, and capacity to the existing SR 99 pathway via the Seneca and Columbia Streets ramps. This report includes an alternatives evaluation to select and design the replacement transit pathway(s) in compliance with the National Environmental Policy Act (NEPA) as stipulated for this Federal Transit Administration funded project. The alternatives evaluation considers transit speed and reliability as well as impacts to the environment.

1.3 What other planned projects in the southend of Downtown Seattle could affect the transit pathways?

This section summarizes projects in the southend of Downtown Seattle that could affect the pathways considered in this study. Transit pathways are illustrated in Chapter 3, Exhibits 3-1 through 3-13. Additional information in the form of an annotated bibliography describes other planned projects in that could affect the transit pathways and is included in Appendix A.

*The **Alaskan Way Viaduct** and **Seattle Waterfront Project** will change the way transit can access downtown. The purpose of this study is to find a comparable, fast, and efficient transit travel pathway into downtown.*

1.3.1 WATERFRONT SEATTLE PROJECT

The Waterfront Seattle Project is currently in the early stages of planning and will ultimately redesign a portion of Alaskan Way from King Street to Pine Street to create a new urban street that will accommodate all modes of travel and reclaim the waterfront area for the public.

- *Potentially Affected Pathways:* 1A, 2A, 2B, 3A, and 5A.

1.3.2 SR 99: ALASKAN WAY VIADUCT REPLACEMENT PROJECT – BORED TUNNEL

The Bored Tunnel Alternative would replace SR 99 between Royal Brougham Way and Roy Street. The Seneca Street and Columbia Street ramps would be demolished when the tunnel is completed, which is scheduled to occur in 2016. Full northbound and southbound access to and from SR 99 would be provided at Dearborn Street. The northbound on-ramp to and southbound off-ramp from SR 99 would be reached from Royal Brougham Way at its intersection with the East Frontage Road.

- *Potentially Affected Pathways:* 1A, 1B, 2A, 2B, 3A, 5A, 5B, 6B.

1.3.3 SR 99: S. HOLGATE TO S. KING STREET VIADUCT REPLACEMENT PROJECT

This project involves replacing about one mile of SR 99 located between Holgate Street and King Street. Near Holgate Street, SR 99 would transition from an at-grade roadway to a side-by-side aerial roadway crossing over Atlantic Street and the BNSF tail track. SR 99 would return to grade for a short distance north of Royal Brougham Way. SR 99 would then transition to match the Bored Tunnel Alternative for the Alaskan Way Viaduct Replacement Project.

- *Potentially Affected Pathways:* 1A, 1B, 2A, 2B, 3A, 5A, 5B, 6B.

1.3.4 FIRST HILL STREETCAR

The First Hill Streetcar links First Hill employment centers to the regional transit system via connections on Capitol Hill and in the International District. The First Hill Streetcar will also connect diverse and vibrant neighborhoods on Capitol Hill, First Hill, and in the Chinatown/International District, while serving medical centers (Harborview, Swedish, and Virginia Mason) and higher education (Seattle Central Community College and Seattle University). A terminal will be constructed at Jackson Street and Occidental Avenue. On-going construction could temporarily impact some of the proposed pathways.

- *Potentially Affected Pathways:* 2A, 2B, and 3A.

1.3.5 SPOKANE STREET VIADUCT PROJECT

The South Spokane Street Viaduct is a 60-year old elevated roadway that serves 65,000 to 70,000 vehicles per day between I-5 and the West Seattle Bridge. The Seattle Department of Transportation (SDOT) is widening and improving the South Spokane Street Viaduct. This project provides a westbound on-ramp and off-ramp to First Avenue.

- *Potentially Affected Pathways:* 6A and 7A.

1.3.6 LIVABLE SOUTH DOWNTOWN PLANNING STUDY

The Livable South Downtown project was a planning process that analyzed a variety of land use changes in the Pioneer Square, Chinatown/International District, and the Greater Duwamish Manufacturing and Industrial Center areas. The Preferred Alternative changes zoning, densities, and height limits in the western, central, and eastern portions of the study area.

- *Potentially Affected Pathways:* All pathways could be affected by increased congestion. Pathways along First Avenue (1B, 5B, and 6B) could experience decreases in transit operating speeds.

1.3.7 KING STREET STATION MULTIMODAL TRANSPORTATION HUB STRATEGY

King Street Station is one of three Center City Multimodal Transportation Hubs that serves inter- and intra-city bus, commuter rail, light rail, and freight. The hub study area covers roughly eight blocks of the Pioneer Square and Chinatown/International District neighborhoods. Within these neighborhoods, draft recommendations have identified several short-, mid-, and long-term projects.

- *Potentially Affected Pathways:* Various projects could affect pathways 2A, 2B, 3A 4A, 4B, 6A, 6B, and 7A. This project would generally improve transit operations,

1.3.8 SEATTLE MULTIMODAL TERMINAL AT COLMAN DOCK PROJECT

The Seattle Ferry Terminal (also known as Colman Dock) is Washington State Ferries (WSF) largest ferry terminal and is a transportation nexus for the Puget Sound area. The purpose of the project is to preserve the transportation function of an aging, deteriorating, and seismically-deficient facility to continue providing safe and reliable service. It will also address existing safety concerns related to pedestrian/vehicular conflicts and operational inefficiencies of the current terminal layout. Pier 50 also provides access to the King County Water Taxi serving West Seattle and Vashon Island.

- *Potentially Affected Pathways:* 1A and 5A.

1.3.9 KING STREET STATION RESTORATION PHASE II

Under Phase II, key improvements will be made in King Street Station to meet the intent of the urban vision. These improvements include full restoration of the building's public spaces and circulation; cost-effective and low-impact seismic, code and accessibility upgrades; energy-efficient mechanical and electrical systems upgrades; and enhanced vehicular and pedestrian connections.

- *Potentially Affected Pathways:* None

1.3.10 SEATTLE PUBLIC SPACES AND PUBLIC LIFE

The vision for the King Street Station is to create an attractive gateway to the City, develop public spaces with strong character and identity, efficiently connect various modes of transportation, transform the front parking area into a forecourt, cover or screen some of the visible train rails, and build up the urban fabric.

- *Potentially Affected Pathways:* None

1.3.11 SEATTLE TRANSIT MASTER PLAN

The City of Seattle has adopted the Seattle Transit Master Plan (TMP). The TMP is a comprehensive and 20-year look ahead to the type of transit system that will be required to meet Seattle's transit needs through 2030.

- *Potentially Affected Pathways:* All

1.4 What is this project's timeline?

The WSDOT Alaskan Way Viaduct Replacement Project is scheduled to complete the bored tunnel in the year 2015. Metro would prefer to continue transit service along the existing SR 99 Viaduct roadway via Seneca/Columbia ramps as near to demolition of the SR 99 as possible. The proposed Southend Pathways Project Timeline is as follows:

- 2012: Interim construction pathway and preferred pathway identified
- 2013: Conceptual design and draft environmental review and assessment completed
- 2014: Preliminary engineering and completion of environmental documentation
- 2015: Completion of PS&E and bid document, and permitting
- 2016-2017: Construction
- 2016-2018: Metro operates on interim pathway
- 2018: Pathway completed and opens for Metro service

1.5 Why is the proposed project being considered?

The southend downtown pathways are the east-west corridors connecting the new SR 99 off-ramp in the South of Downtown (SODO) neighborhood to the Third Avenue transit spine in downtown Seattle. The preferred pathway will use the existing street network, which will be improved to enhance and promote future RapidRide C and D lines and other transit service currently using the Alaskan Way Viaduct. The preferred pathway will need to be ready for use prior to the removal of the existing Seneca and Columbia ramps in the year 2016.

As of 2011, the SR 99 pathway via the Columbia Street and Seneca Street ramps serve between 520 and 530 (252 northbound and 264 southbound) daily bus trips on 12 bus routes, These routes carry approximately 20,000 weekday transit riders on the Alaskan Way Viaduct. Both of the SR 99 ramps will be eliminated with the Washington Department of Transportation (WSDOT) Alaskan Way Viaduct Replacement Project. Also, the City of Seattle Waterfront Project will reconfigure street connectivity in the study area and will change the travel pattern in the southend of Downtown Seattle.

If the preferred pathway is located on portions of the new Alaskan Way surface street, an interim pathway would need to be identified and in place from approximately 2016 to 2019. The development of an interim pathway would be coordinated with the Waterfront Seattle and Elliott Bay Seawall projects.

1.6 What is the project study area?

The project study area is in the southend of Downtown Seattle. The study area extends to the north from Spokane Street/West Seattle Bridge to Seneca Street and to the east from Alaskan Way/State Route 99 to Interstate-5.

1.7 How were the transit pathway alternatives developed?

Metro assembled a wide-range of staff from their Service Development, and Design and Construction groups to participate in the development of pathway alternatives and the evaluation process.

The project team, with input from project partners, developed the pathways using logical street connections between the West Seattle Bridge/ Spokane Street interchange and the Third Avenue transit spine. These pathways replace the existing connection for bus routes using the Seneca and Columbia streets ramps from the Alaskan Way Viaduct. Rail operations and existing land uses limit the number of east-west connecting streets through the study area. This directs most of the pathways to use Alaskan Way, First Avenue and Forth Avenue, while some use

Airport Way and I-5. Also, some variation in how the pathways connect to the Third Avenue transit spine at the north end of the study area was included.

The city of Seattle was engaged in the *Level 1 Screening Process*, which reduced the number of pathways being considered. The city of Seattle was included in the *Level 2 Alternatives Definition and Evaluation* process. Metro met with the Waterfront Seattle Committee, neighborhoods, local businesses and others, and conducted an online ridership survey in June 2012 with more than 1,500 respondents, to collect comments and feedback for this project's pathway alternatives.

1.7.1 WHAT OPERATIONAL AND CAPITAL IMPROVEMENTS ARE BEING CONSIDERED?

***Capital Improvements** will be necessary to improve bus travel time and flow along a new route because the existing Alaskan Way Viaduct route is the fastest route into downtown Seattle from the south.*

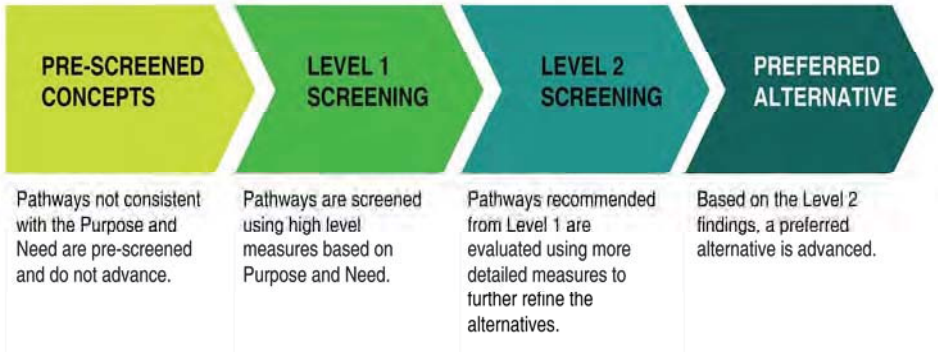
Operational and Capital improvements considered for improving transit service include the following:

- Roadway rechannelization to allow for Bus Lanes including right-turn only lanes except for transit and changes to on-street parking
- Transit signal queue jump and queue jump lane, with modification to the existing signal phasing and timing
- Roadway repair and reconstruction as necessary to handle the additional weight of buses
- Transit passenger amenities such as new bus stops and shelters and/or RapidRide Stations

1.8 What is the project evaluation process?

The project will use a four-step approach to narrow and refine the results for proposed pathways as shown in Exhibit 1-1.

Exhibit 1.1. Planning Process Diagram



PRE-SCREENED CONCEPTS

The Pre-Screening Evaluation (Chapter Two) identifies and eliminates pathways with inherent critical flaws, narrowing the number of pathways considered in the Level 1 Screening Evaluation.

LEVEL 1 SCREENING

The Level 1 Screening Evaluation (Chapter Three) identifies and evaluates practicable transit pathway connections through the study area. The analysis focused on mostly qualitative assessments of the pathways supported by readily available quantitative data and the professional judgment of project team members. This screening eliminated some of the proposed pathways from further consideration.

LEVEL 2 SCREENING

The Level 2 Screening Analysis (Chapter Four) provides further definition of the project alternatives and additional analysis of the pathways recommended for further consideration from Level 1. This evaluation proposes a preferred pathway for transit service from West Seattle and areas south on SR 99 through the southend of Seattle.

*The **Evaluation Process** had 2 levels of screening evaluation:*

- *Level 1 narrowed the 11 proposed pathways down to 4 alternatives*
- *Level 2 provided a more detailed review to select a preferred alternative to carry forward into preliminary engineering*

2 Pre-Screening Evaluation

Pathways that were considered but found to have fatal flaws early in planning process and removed from further evaluation included:

- The SODO busway was not evaluated because the number of routes included in this project would greatly increase congestion in the busway. Also, the current busway has one lane in each direction and RapidRide coaches would be required to stop behind local service serving these stops, which is not preferred.
- Accessing downtown via I-5 north of James Street (variation of 6A) was not evaluated because the pathway would not serve the stadium district and would not serve part of the Third Avenue transit spine.
- Pathways to downtown via Alaskan Way to Madison, Spring, and Seneca streets (variations of Pathway 5) were not evaluated because they would fail to serve major employment and residential areas along the Downtown transit spine. Also, Seneca Street would not connect from Western Avenue to First Avenue.

Some Pathways were eliminated because of fatal flaws such as greatly impacting existing transit service or the inability to serve the Stadium District and Pioneer Square.

3 Level 1 Screening Evaluation

3.1 What measures were used to evaluate the proposed pathways in the Level 1 Screening Evaluation?

3.1.1 SPEED AND RELIABILITY

These measures describe how quickly buses could travel on proposed pathways and how much congestion buses could experience. The preferred pathway would provide a fast and consistent (reliable) travel time through the study area. It would also provide the most feasible opportunities to implement transit priority treatments.

- **Number of signalized intersections:** This is the total number of signalized intersections the pathway encounters from the West Seattle Bridge to the Third Avenue/Seneca Street intersection. This is a qualitative assessment of the number of locations where buses could experience increased delay and worse reliability. Pathways with less signalized intersections are preferred.
- **Bus lane or priority lane**: This is a measure of the percent of the route that could provide a priority travel lanes for buses; priority travel lane includes an all-day bus lane, peak-hour parking restrictions, or transit preferred roads with traffic re-routing (such as the Third Avenue transit spine). This measure is based on the number of travel lanes, on-street parking, freight traffic, and/or bike lanes along the existing corridor. This is a qualitative assessment of the improvements that could offer the highest transit travel time benefit and would be consistent with City of Seattle's vision for the Alaskan Way Central Waterfront project.
- **Transit route congestion:** This is a qualitative assessment of how congested the pathway is with general purpose traffic, train crossings, special events, future streetcar, and other roadway uses. This is a qualitative assessment and less congested roads are preferred.
- **Directness of route:** This is the total number of right- and left-turns buses would be required to make; the more turns buses are required to make typically indicate a higher travel time and greater delay to passengers. Direct connections are preferred.
- **Railroad crossings:** This is the total number of railroad crossings each pathway would cross. Pathways crossing less railroad crossings are preferred.
- **Travel distance:** This is the length of the pathway between the West Seattle Bridge/Alaskan Way interchange and the Third Avenue/ Seneca Street intersection. This distance will be measured using geographic

Pathway comparison bookends: *Each pathway was evaluated from the West Seattle Bridge/ Alaskan Way interchange to the Third Avenue/Seneca Street intersection.*

information system mapping; shorter pathways are preferred because they typically indicate less travel time.

__Areaways__ are usable areas below the sidewalk and between the building foundation the street wall. Most areaways in the Pioneers Square Historical District were created when City engineers raised Pioneer Square's streets a full story following the Great Seattle Fire of 1889.

3.1.2 CONSTRUCTABILITY / EASE OF IMPLEMENTATION

These measures evaluate the type of investments a pathway could require to improve roadways for transit use and identify expensive conflicts with utilities and the areaways which would be considered a fatal flaw because of the increased costs based on Metro experience as well as the availability of funds for this project. The preferred pathway would require little to no capital improvement cost and construction would be simple.

- **Pavement type:** Assessment of pavement areas that could need to be replaced based on engineer field review (no borings or structure testing was conducted) and information from the Seattle Department of Transportation's (SDOT) paving plan. This is a qualitative assessment of the percent of the pathway that could need repaving.
- **Improved travel surface:** Distance (percent of pathway distance) the pathway does not have an improved travel lane buses could use; pathways with longer areas of improvements are preferred.
- **Areaways:** Evaluate the distance (number of blocks) a pathway would travel through the areaways because any improvements that would be required to areaways could indicate the potential for a project cost overrun.
- **RapidRide stations:** Number of RapidRide stations along the pathway.
- **Utility conflict:** Potential to impact high voltage transmission lines along the pathway and locations likely requiring curb widening. This is a qualitative assessment based on the field-review and pathways without utility conflicts are preferred.
- **Roadway widening:** Locations where the roadway may need to be widened outside of the roadway right-of-way to provide for service along the pathway.

3.1.3 NON-MOTORIZED FACILITIES AND REGIONAL CONNECTIVITY

This measure describes how the proposed pathways connect to existing and proposed non-motorized facilities, such as regional trails and bike lanes.

- **Bike lane:** Evaluate the proportion of the pathway that has an existing bike lane, which could compete for roadway improvements for transit.
- **Sharrows:** Evaluate the proportion of the pathway that has a sharrow, which could indicate high bicycle use.
- **Connections to bike facilities:** Identify existing and proposed bike trails adjacent to and crossing the proposed transit pathway. The preferred pathway would not conflict with bicycle trails.

3.1.4 TRANSIT FACILITIES, ACCESSIBILITY, AND SERVICE COVERAGE

King County Council ordinance requires that Metro RapidRide service provide a bus stop in the stadium area. These measures describe whether a bus stop could be located along the pathway and the type of land uses it could serve, the proximity of a potential RapidRide station to the stadium area, and if all of the existing bus routes could use the proposed pathway.

- **Service coverage and new bus stops:** Potential for bus stops to serve residential, employment, and special activity centers along the pathway. GIS data showing population and employment density will be used to make a qualitative assessment of where a bus stop could be located. Pathways serving new riders or making new connections are preferred.
- **Access to stadium:** Evaluate the distance from the nearest local and RapidRide bus stop in the stadium area.
- **Split service:** Evaluate if service is split for more than 1 to 2 blocks along the pathway.
- **Accommodates all study routes:** Assessment of whether all routes currently using the Alaskan Way Viaduct Columbia Street and Seneca Street ramps could use the pathway.

Each pathway was evaluated from the West Seattle Bridge / Alaskan Way interchange to the Third Avenue / Seneca Street intersection.

3.1.5 NEIGHBORHOOD IMPACTS

These measures provide a comparison of whether pathways travel through study area neighborhoods and if these routes would now serve neighborhoods that they didn't serve previously. Pathways that travel the least distance on roads with areaway concerns and/or neighborhood concerns are preferred. Also, this measure identifies the number of blocks through residential areas the pathways travel for noise sensitivity.

- **Transit coverage:** Evaluate which neighborhoods or areas the proposed pathway would travel through and the potential to serve neighborhoods and areas (this is based on probable bus stop locations).
- **Noise:** Summarize the number of blocks the pathway travels through the Pioneer Square neighborhood. Pathways with little to no noise impacts are preferred.

3.1.6 RIGHT-OF-WAY / PROPERTY ACQUISITION

These measures identify the potential for additional project costs associated with property acquisition and impacts to utilities. Any pathway requiring private property acquisition or impacting park land is deemed to be fatally flawed. Roadways along the proposed pathways could require increasing the space for buses to be able to turn, which would increase project costs.

- **Impacts to right-of-way:** Qualitative assessment whether widening is required to improve turning radii; pathways requiring little to no right of way improvements or property acquisition are preferred.

3.1.7 ENVIRONMENTAL JUSTICE

This measure provides a comparison of the distance the pathways would travel through vulnerable, minority, and low income areas in the study area and is related to the *Transit Accessibility* measure because the potential locations of bus stops are needed to evaluate this measure.

- **Minority populations:** Qualitative assessment for locating new bus stops in areas of minority populations and summarizes the areas served. Pathways providing new connections and service to these areas are preferred.
- **Low income populations:** Qualitative assessment for locating new bus stops in areas of low income populations and summarizes the areas served. Pathways providing new connections and service to these areas are preferred.
- **Transit dependent populations:** Qualitative assessment for locating new bus stops in areas with transit dependent populations, such as those without private transportation, elderly (over age 65), youths (under age 18), and persons below poverty or median income levels (see above). Pathways providing new connections and service to these areas are preferred.

3.1.8 MULTIMODAL CONNECTIONS

This measure describes the potential for the proposed pathways to connect to other modes of travel, which could enhance the mobility of transit users and others through the study area.

- **Connectivity to other major travel modes**: Quantitative assessment of proposed bus stops (both inbound and outbound) that would be located within one-quarter mile of major travel modes, which include the ferry at Coleman Dock, Amtrak, light rail stops at International District and Pioneer Square, and the proposed First Hill Streetcar stop.

3.1.9 TRANSIT CLASSIFICATION

This measure summarizes the existing City of Seattle transit classifications for roads along the proposed pathways. Pathways requiring a change in the street classification are not considered fatally flawed.

- **Roadway transit classification:** Percent of the pathway (inbound and outbound) on roads classified for transit use. The preferred classification for pathways is from transit way, principal transit street, and major transit street.

3.2 How were the pathways evaluated?

Analysts relied on knowledge of the study area and transit operations through the study area, available geographic information systems (GIS) data, input from King County and City of Seattle staff, findings and data from existing studies, and professional judgment. A field visit was conducted to supplement available information for the Level 1 screening measures. GIS data was obtained from King County, City of Seattle, WSDOT, and other on-line sources. Each pathway was evaluated using the qualitative and quantitative methods described above from the West Seattle Bridge/Alaskan Way interchange to the Third Avenue/Seneca Street intersection. The pathways were then compared to existing conditions and against one another. Those pathways believed to provide the highest quality transit service were recommended for further consideration in the Level 2 Screening Analysis.

A detailed summary of the information used in conducting the Level 1 screening is provided in Appendix B.

3.3 What are the pathways for the Level 1 Screening Evaluation?

Thirteen transit pathways are proposed for the Level 1 Screening Evaluation. These routes would provide a connection between West Seattle and to the south on State Route 99 (SR 99), and the Third Avenue transit corridor in Downtown Seattle

The proposed pathways are illustrated in Exhibits 3-1 through 3-13.

DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500
Feet

Inbound Route
Outbound Route
Pathway Connector

Exhibit 3-1
Pathway 1A

DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500
Feet

Inbound Route
Outbound Route
Pathway Connector

Exhibit 3-2
Pathway 1B

DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500
Feet

Inbound Route
Outbound Route
Pathway Connector

Exhibit 3-3
Pathway 2A

DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500
Feet

Inbound Route
Outbound Route
Pathway Connector

Exhibit 3-4
Pathway 2B

DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500
Feet

Inbound Route
Outbound Route
Pathway Connector

Exhibit 3-5
Pathway 3A

DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500
Feet

Inbound Route
Outbound Route
Pathway Connector

Exhibit 3-6
Pathway 3B

ELLIOTT BAY

Jack Perry Park

E Marginal Way S

Alaskan Way Viaduct

99

S Horton St

S Spokane St

Utah Ave S

1st Ave S

Occidental Ave S

S Lander St

John Stanford Center

Industrial

S Holgate St

3rd Ave S

4th Ave S

Seattle Fire Station 14

District

SODO Busway

6th Ave S

S Hanford St

S Forest St

Airport/Spokane P&R

8th Ave S

Airport Way S

5

Viewpoint Park in Seattle

S Hanford St

S Lander St

S Walker St

Beacon Hill School

S Holgate St

S Massachusetts St

S Atlantic St

Edgar Martinez Dr S

S Atlantic St

Safeco Field

S Royal Brougham Way

Alaskan Way Viaduct

1st Ave S

Occidental Ave S

Future Streetcar Station

Qwest Field

519

Amtrak

Dr. Rizal Park

90

Seattle Ferry Terminal

Coleman Dock

Alaskan Way

Pioneer Square

S King St

S Jackson St

S Main St

S Washington St

1st Ave S

2nd Ave S

SC

Pioneer Square Transit Station

TS

3rd Ave Transit Spine

Downtown

Western Ave

HUD

Post Ave

1st Ave

IRS

2nd Ave

Spring St

Seneca St

University St

SAM

3rd Ave

4th Ave

5th Ave

Marion St

Columbia St

Cherry St

James St

City Hall

Federal Courthouse

Seattle Police H.Q.

King Street Station

International District Transit Station

TS

3rd Ave S

4th Ave S

5th Ave S

Yesler Way

International District

Airport Way S

S Dearborn St

S Lane St

S Weller St

S King St

S Charles St

S Plummer St

Maynard Ave S

7th Ave S

8th Ave S

Int. District Community Center

S Jackson St

S Weller St

Horiuchi Park

Bailey Gatzert School

DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500

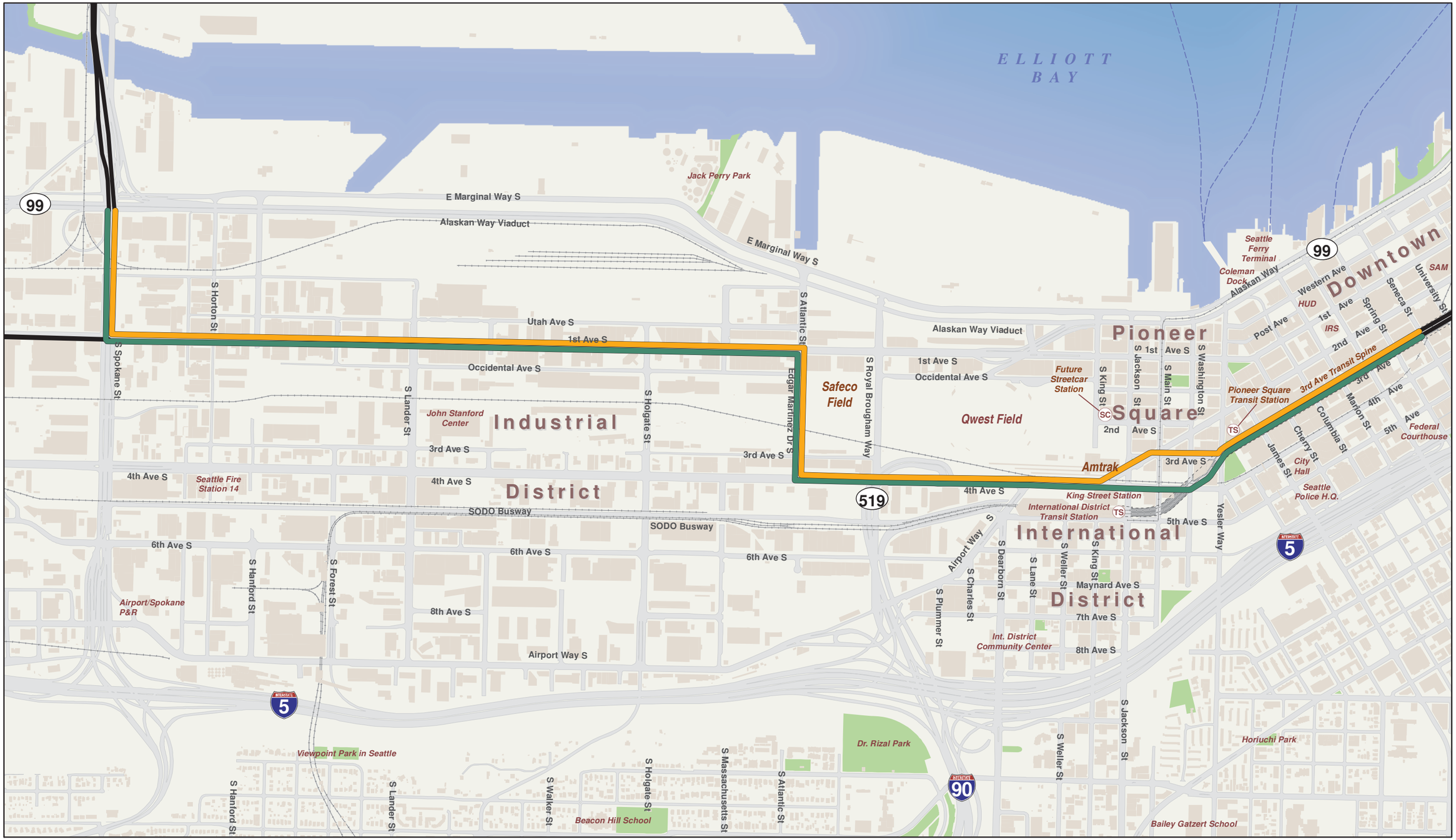
Feet

Inbound Route

Outbound Route

Pathway Connector

Exhibit 3-7
Pathway 4A



DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500
Feet

Inbound Route
Outbound Route
Pathway Connector

Exhibit 3-8
Pathway 4B

DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500
Feet

Inbound Route
Outbound Route
Pathway Connector

Exhibit 3-9
Pathway 5A

DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500
Feet

Inbound Route
Outbound Route
Pathway Connector

Exhibit 3-10
Pathway 5B

DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500
Feet

Inbound Route
Outbound Route
Pathway Connector

Exhibit 3-11
Pathway 6A

ELLIOTT BAY

Jack Perry Park

E Marginal Way S

Alaskan Way Viaduct

99

S Horton St

S Spokane St

Utah Ave S

1st Ave S

Occidental Ave S

S Atlantic St

Edgar Martinez Dr S

S Holgate St

S Lander St

John Stanford Center

Industrial

3rd Ave S

4th Ave S

Seattle Fire Station 14

District

SODO Busway

6th Ave S

S Hanford St

S Forest St

Airport/Spokane P&R

8th Ave S

Airport Way S

5

Viewpoint Park in Seattle

S Hanford St

S Lander St

S Walker St

Beacon Hill School

S Holgate St

S Massachusetts St

S Atlantic St

Safeco Field

S Royal Brougham Way

Alaskan Way Viaduct

1st Ave S

Occidental Ave S

Qwest Field

Future Streetcar Station

519

Amtrak

King Street Station

International District Transit Station

TS

Pioneer Square

S King St

S Jackson St

S Main St

S Washington St

S 1st Ave S

2nd Ave S

SC

Pioneer Square Transit Station

3rd Ave Transit Spine

Seattle Ferry Terminal

Coleman Dock

Alaskan Way

Downtown

Western Ave

HUD

Post Ave

1st Ave

IRS

2nd Ave

Spring St

Seneca St

University St

SAM

3rd Ave

4th Ave

5th Ave

Marion St

Columbia St

Cherry St

James St

City Hall

Seattle Police H.Q.

Federal Courthouse

3rd Ave S

5th Ave S

Yesler Way

International District

Airport Way S

S Dearborn St

S Lane St

S Weller St

S King St

S Charles St

S Plummer St

Maynard Ave S

7th Ave S

8th Ave S

Int. District Community Center

S Jackson St

S Weller St

Dr. Rizal Park

90

Horiuchi Park

Bailey Gatzert School

DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500

Feet

Inbound Route

Outbound Route

Pathway Connector

Exhibit 3-12
Pathway 6B

DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500
Feet

Inbound Route
Outbound Route
Pathway Connector

Exhibit 3-13
Pathway 7A

3.4 What pathways are recommended for further consideration?

Exhibit 3-15 summarizes the results for the Level 1 Screening Evaluation for each of the thirteen pathways. As shown, pathways 3A, 3B, 4B, and 5A scored the highest and were recommended for further consideration in the Level 2 Screening Analysis.

The City of Seattle transit ordinance requires that Metro RapidRide service provide a bus stop in the stadium area. All of the pathways recommended for further consideration meet this ordinance.

3.4.1 MAIN STREET AND WASHINGTON STREET PATHWAYS

Pathways 3A and 3B

These pathways travel Alaskan Way and enter the southend of Downtown Seattle via Washington and Main Streets (3A, see Exhibit 3-10) or Main Street (3B, see Exhibit 3-11) to Third Avenue. For each criterion, the overall ranking was the same for these two pathways, which is why both are being recommended for further consideration. These pathways would require modification to their Seattle Transit Classification from minor to principal transit street. Benefits of these pathways include:

Pathways 3A, 3B, 4B, and 5A are recommended for the Level 2 Screening Analysis.

- Low congestion, direct route, and the potential to add bus priority treatments
- No foreseen utility conflict or impacts to right-of-way, and limited resurfacing
- Accommodates all routes and does not split service beyond a practical walking distance
- Serves stadium district and Pioneer Square
- Connects to other major multimodal services such as Washington State Ferries, Amtrak, light rail station, and the proposed First Hill Streetcar on Jackson Street

3.4.2 COLUMBIA STREET AND MARION STREET PATHWAYS

Pathway 5A

This pathway (see Exhibit 3-15) travels Alaskan Way connecting to Third Avenue in Downtown Seattle via Columbia Street (outbound) and Marion Street (inbound). This pathway would require modification to its Seattle Transit Classification from minor to principal transit street. Pathway 5B was not selected because of its greater exposure to congestion and less direct connections to other multimodal services, compared to Pathway 5A.

Benefits of Pathway 5A include:

- Direct route, no railroad crossings, bus lanes, and least amount of signalized intersections to travel through

- No foreseen utility conflict, impacts to right-of-way and areaways, and potentially limited resurfacing needed
- Accommodates all routes and does not split service beyond a practical walking distance
- Serves stadium district and Pioneer Square
- Connects to other major multimodal services such as Washington State Ferries and the Pioneer Square light rail station

3.5 What pathways were removed from further consideration?

Exhibit 3-14 summarizes why pathways were removed from further consideration due to various challenges that could prevent high quality transit service, similar to current service on the Alaskan Way Viaduct, from being delivered.

Exhibit 3-14. Summary of Pathways Removed from Further Consideration

Pathway	Reasons for being removed from further consideration:	
Yesler Way and James Street Pathways (1A and 1B)	See one-page summaries for additional information.	▫ Conflicts with ferry operations at Yesler Way and surface Alaskan Way. ▫ Added delay of accommodating a new westbound left turn movement at the Yesler Way/Alaskan Way intersection. ▫ Difficult right and left turns for coaches between 3rd Avenue and Yesler Way. The right turn could impact Prefontaine Place Park.
Jackson Street Pathways (2A and 2B)		▫ Higher traffic volumes expected on Jackson Street with surface Alaskan Way. ▫ Potential for right-of-way constraints with the city of Seattle First Hill Streetcar and proposed expansion of Union Station Square at Jackson Street between 3rd Avenue South and 2nd Avenue Extension. ▫ Increased turn movements and pedestrian conflicts. ▫ Difficult turn for outbound coaches at the 3rd Avenue South to Jackson Street.
1st Avenue S, 4th Avenue S, and E3 Busway (4A, 4B, 5B, and 6B)		▫ Poor transit reliability (railroad crossings and not serving all routes). ▫ Increased travel time (adds approximately 1,000 hours of person delay per day) compared to the existing Alaskan Way Viaduct pathway – bus travel time would increase by approximately 4.5 minutes northbound and 7.5 minutes southbound during the PM peak. This extra travel time also increases transit operating costs by approximately $2,300 per day.
Interstate-5 (6A)		▫ High traffic volumes on I-5 and poor transit reliability depending on time of day. ▫ Greatest travel distance between West Seattle Bridge and Downtown Seattle compared to other pathways. ▫ Poor transit reliability (greatest number of railroad crossings not serving all routes).
Airport Way (7)		▫ Poor transit reliability (does not serve all routes). ▫ Would not serve the Industrial area of south downtown.

For some of the pathways it was not clear whether they should be removed from further consideration. A closer examination of three of the pathways was completed and is summarized on the following pages.

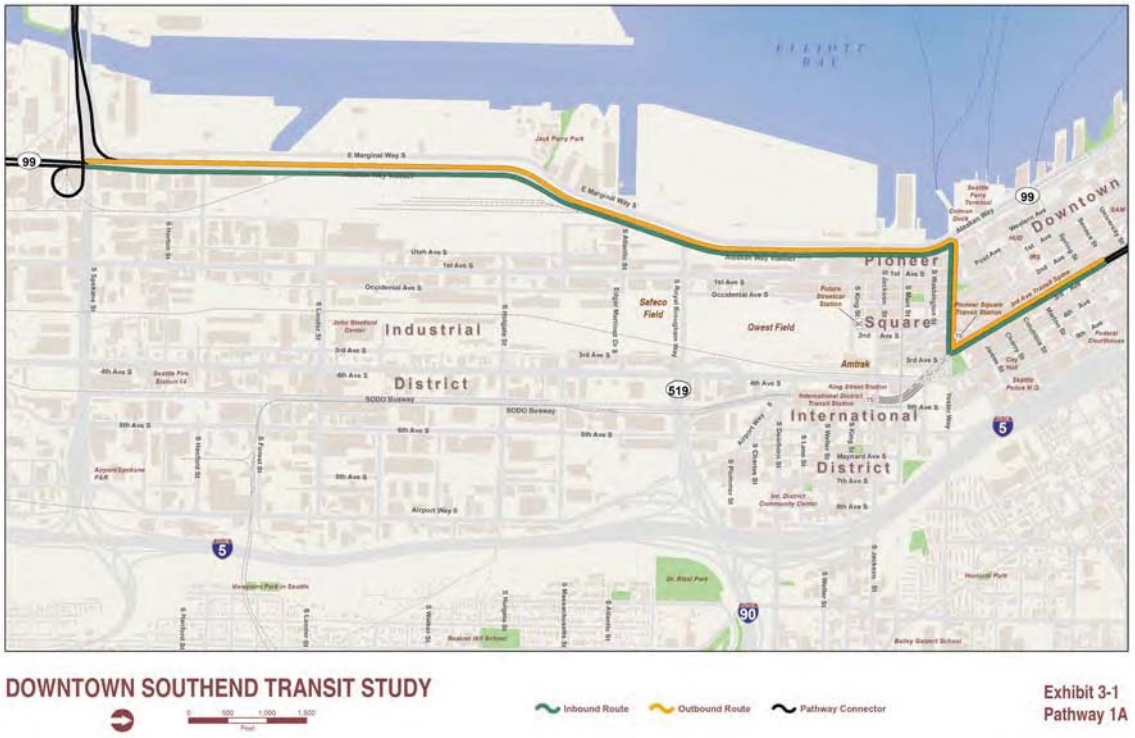
Exhibit 3-14. Level 1 Matrix Evaluation Results

Level 1 Matrix Evaluation	Alaskan & Yesler	Alaskan, First & Yesler	Alaskan, Jackson & Main	Alaskan, King & Jackson	Alaskan, Main & Washington	Alaskan & Main	Split 1st & 4th, & Edgar	1st, Edgar & 4th	Alaskan, Columbia & Marion	Alaskan, 1st, Columbia & Marion	I-5 to 4th	Alaskan, Royal & 4th	Airport Way
Proposed Criteria	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B	7
2.2.1 Speed and Reliability	●●●○○	●●●○○	●●●○○	●●●○○	●●●●○	●●●●○	●●○○○	●●○○○	●●●●○	●●○○○	●○○○○	●●○○○	●○○○○
2.2.2 Constructability / Ease of Implementation	●●●○○	●●○○○	●●●○○	●●●○○	●●●○○	●●●○○	●●●○○	●●●●○	●●●○○	●●○○○	●●●●○	●●●○○	●●○○○
2.2.3 Non-motorized Facilities (Regional connectivity)	●●●○○	●●●○○	●●○○○	●●●●○	●●●●●	●●●●●	●●○○○	●●●○○	●●●●●	●●●○○	●●●○○	●○○○○	●○○○○
2.2.4 Transit Facilities and Accessibility	●●●○○	●●●●○	●●●○○	●●●○○	●●●○○	●●●○○	●●○○○	●●●●○	●●●○○	●●●●○	●○○○○	●●●●○	●○○○○
2.2.5 Neighborhood Impact	●●●○○	●●●○○	●●○○○	●●○○○	●●○○○	●●○○○	●●●○○	●●●○○	●●●●○	●●●●○	●●●○○	●●●○○	●●●○○
2.2.6 Right-of-Way / Property Acquisition	●●○○○	●●○○○	●●●●○	●●●●○	●●●●○	●●●●○	●●●●○	●●●●○	●●●●○	●●●●○	●●●●○	●●●●○	●●●●○
2.2.7 Environmental Justice	●●○○○	●●●○○	●●●○○	●●●○○	●●●○○	●●●○○	●●●●●	●●●●●	●●○○○	●●●○○	●●○○○	●●○○○	●●●●○
2.2.8 Multimodal Connections	●●●○○	●●●○○	●●●●●	●●●●●	●●●●○	●●●●○	●●●●●	●●●●●	●●○○○	●●●●●	●●●●●	●●●●●	●●●●●
2.2.9 Transit Classification	●●○○○	●●●○○	●●○○○	●○○○○	●●○○○	●●○○○	●●●●●	●●●○○	●●●○○	●●●●○	●●●●●	●●○○○	●●●●●

Pathways 5A, 3A, 3B, and 4B are recommended for further evaluation in the Level 2 Screening.

DRAFT: King County Metro Downtown Southend Transit Study
Summary of Yesler Way and James Street as a Potential Transit Pathway

Using a combination of Yesler Way and James Street to connect between Alaskan Way and Downtown Seattle was evaluated as part of the Downtown Southend Transit Study. These pathways were excluded from further consideration because of conflicts with signal operations at Alaskan Way and Yesler Way that will affect transit reliability, potential impacts to Prefontaine Place (a city park), and difficult eastbound left turns (no separate left turn phase for this movement) for transit vehicles at the Yesler Way/3rd Avenue intersection when compared to the existing Alaskan Way Viaduct pathway.



Characteristics of this Pathway

- ***Travel Time comparison to the existing condition (without special events):***
  - ***West Seattle and SODO:*** Bus travel time would increase slightly northbound and southbound because of the additional four to eight signalized intersections along the routes, traffic congestion, and increased travel distance.
- ***Transit Priority:*** Business access and transit (BAT) lanes on Yesler Way or James Street (east of 1st Avenue) were not considered because the approximately 42-foot roadway width is insufficient to accommodate two BAT lanes and two general purpose lanes, and high traffic volumes on these streets.
- **Intersection Impacts:** The left-turn from westbound Yesler Way to southbound Alaskan Way is prohibited today and would not likely be permitted in the future. Adding this movement would greatly increase congestion and delay for all people travelling in the Alaskan Way corridor. The Yesler Way/3rd Avenue intersection accommodates multiple movements (from Prefontaine, to 3rd Avenue S, to and from 3rd Avenue, and to and from Yesler Way). Therefore, increasing the number of buses turning at the Yesler Way/3rd Avenue intersection would add delay to other bus routes, reducing green time for 3rd Avenue through movements. This would have an impact on transit reliability for all routes travelling through the area.
- ***Transit Reliability:*** Slightly worse than existing because of added signalized intersections and longer travel distance compared to using the Alaskan Way Viaduct ramps to and from Columbia and Seneca Streets.
- ***Right of Way Impacts:*** This pathway could impact Prefontaine Place (a city park) because buses turning from southbound 3rd Avenue to westbound Yesler Way may need additional space, which would require roadway widening.
- ***Southwest King County routes:*** All routes can access Yesler Way and James Street directly from SR-99.

DRAFT: King County Metro Downtown Southend Transit Study
Summary of King Street or Jackson Street as Potential Transit Pathways

Using King Street or Jackson Street to connect between Alaskan Way and Downtown Seattle was evaluated as part of the Downtown Southend Transit Study. These pathways were excluded from further consideration because of poor transit reliability (up to 160 stadium events a year) and implementation challenges relating to existing and proposed projects (First Hill Streetcar on Jackson Street and SR 99 Tunnel Project) when compared to the existing Alaskan Way Viaduct pathway.

Characteristics of these Pathways

- ***Travel Time comparison to the existing condition (without special events):***
  - ***West Seattle and SODO:*** Bus travel time would increase slightly northbound and southbound because of the additional intersections, traffic congestion, increased turning movements such as the eastbound left turn from Jackson Street to 2nd Avenue, and travel distance.
- ***Seattle Capital Projects:***
  - ***SR 99 Tunnel Project:*** With the completion of the SR 99 tunnel and removal of the Viaduct, Jackson Street will become a primary east-west vehicle connection to the waterfront, which is anticipated to increase congestion and reduce transit travel time and reliability.
  - ***First Hill Streetcar Project:*** Streetcar operations on Jackson Street would limit transit reliability improvement opportunities. The First Hill Streetcar terminal will be at Occidental Street and Jackson Street, reducing lane capacity on Jackson Street.
- ***Transit Priority:*** Business access and transit (BAT) lanes on King Street were not considered because they require the conversion of a parking and/or a general purpose lane. It is anticipated there will be high traffic volumes on King Street and Jackson Street with the SR 99 Tunnel project completion. BAT lanes were not considered on Jackson Street due to narrow roadway width, which cannot accommodate two BAT lanes and two general purpose traffic lanes.
- **Stadium Impacts:** Jackson Street, and to a greater extent King Street, are impacted by up to 160 special events year. These events currently require rerouting of transit service to alternative alignments. For more than 1/3 of the year, it would be necessary for transit to operate on pathways other than Jackson Street.
- ***Transit Reliability:*** Slightly worse than existing due to additional signalized intersections, longer travel distance compared to existing routing, and special event impacts at the stadiums.

- ***Right of Way Impacts:*** The turns at Jackson Street and King Street at 2nd Avenue South may require widening to accommodate larger transit coaches.
- ***Southwest King County routes:*** All routes can access King Street and Jackson Street directly from SR-99

DRAFT: King County Metro Downtown Southend Transit Study
Summary of 1st Avenue and 4th Avenue as a Potential Transit Pathway

The 1st Avenue S /4th Avenue pathway was evaluated as part of the Downtown Southend Transit Study. This pathway was excluded from further consideration because of poor transit reliability (railroad crossings and not serving all routes) and increased travel time (adds approximately 1,000 hours of person delay per day) compared to the existing Alaskan Way Viaduct pathway.

Characteristics of this Pathway

- ***Transit priority:*** Business access and transit (BAT) lanes opportunity could be added on 4th Avenue south of Edgar Martinez Drive on 4th Avenue. BAT lanes on 1st Avenue S were not considered because it would require the conversion of the parking, general purpose, and removal of the two-way left-turn lane.
- ***Travel Time comparison to the existing condition (without special events):***
    - ***West Seattle:*** Bus travel time would increase by approximately 4.5 minutes northbound and 7.5 minutes southbound during the PM peak because of the additional 9 to 13 intersections along the routes and traffic congestion.
    - ***SODO busway:*** Buses were assumed to use Edgar Martinez Drive instead of Lander Street because of the at-grade railroad crossing on Lander Street. Travel time saving using the SODO busway is not enough to offset the extra time and delays to reenter 4th Avenue from Royal Brougham. This route would add approximately 3 minutes to the 4th Avenue pathway each way during average peak conditions without a train.
- ***Reliability:*** SODO and stadium area travel time and reliability are impacted by special events (at least 130 to 160 days per year).
- ***Railroad Crossing Impacts:*** The Holgate Street and Lander Street at-grade railroad crossings would cause significant schedule variation, which reduces reliability. A train crossing can delay buses by as much as 7 minutes. Grade separating these rail crossings was estimated at over $100 million.
- ***Pedestrian Impact:*** Split transit service between 1st Avenue and 4th Avenue creates a long walking distance between inbound and outbound service. South of Edgar Martinez Drive the walking environment is not too friendly for pedestrians especially when crossing the train tracks.
- ***Southwest King County routes:*** These routes cannot access 4th Avenue or 1st Avenue S directly from SR-99 and cannot use this routing to and from downtown.

4 Level 2 Screening Analysis

4.1 How were the pathways further defined for the Level 2 Screening Analysis

*The recommended **pathways were further defined by the project team** to include specific transit travel time and service quality enhancements.*

After completion of the Level 1 Screen Evaluation process, transit pathways through Pioneer Square (Washington Street and/or Main Street) and another through the downtown core (Marion Street and/or Columbia Street) were recommended for further consideration. The Level 1 definitions provided a general alignment that was used to refine each of these pathways.

The Level 2 pathways follow the same general alignment on Alaskan Way and 3rd Avenue Transit Spine and deviate between the Alaskan Way/ Main Street intersection and the 3rd Avenue/Marion Street intersection. Because these proposed pathways shared similar partial alignments, they would benefit from transit priority treatments on Alaskan Way, such as exclusive transit lanes. Transit lanes have been requested by Metro as part of the City's Waterfront Seattle planning process; these transit lanes would be provided between 3rd Avenue and Alaskan Way. The current plan for Alaskan Way includes peak period transit priority lanes between Dearborn Street and Columbia Street (AM and PM Southbound, and AM only Northbound).

*The **Level 2 Screening Analysis** provided additional analysis of the pathways, supplemented with Level 1 data for the recommended pathways.*

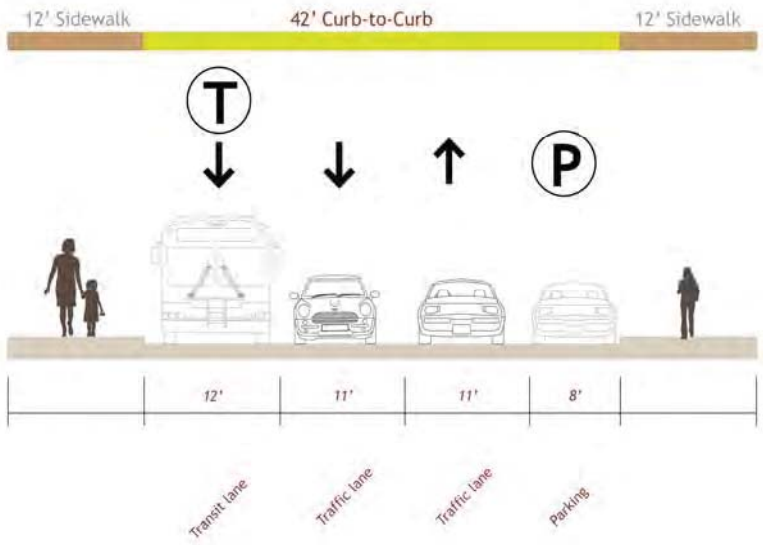
In focusing on the varying segments for the pathways, Metro developed four alternatives for providing high quality transit service. A summary of the Level 2 findings can be found in Exhibit 4-11 at the end of this chapter. Although these alternatives provide the option to split inbound and outbound transit service, it is not preferred. Splitting transit service to different roadways reduces the number of buses on each roadway; thereby reducing the need for transit priority improvements. Also, splitting transit service may provide riders with fewer connections, and adds to rider confusion because inbound/outbound bus stops are not located along the same roadway.

Main Street and Washington Street Transit Couplet

This pathway would provide a transit lane on Main Street and Washington Street between Alaskan Way and 3rd Avenue. Both streets are approximately 42 feet wide (measured from curb to curb) with 12-foot wide sidewalks on both sides of the street (see Exhibit 4-1). General vehicle traffic could make right-turns at intersections and access businesses from the proposed bus lane. On-street parking would be eliminated on one side of the street.

Inbound buses would use Main Street, 4th Avenue, and Prefontaine Place to make the connection between Alaskan Way and 3rd Avenue. Outbound buses would use Washington Street to connect between 3rd Avenue and Alaskan Way (see Exhibit 4-3). Inbound and outbound service would be split for this pathway alternative because providing two-way transit lanes on either street would likely have eliminated one of the directions of general purpose traffic.

Exhibit 4-1. Proposed Cross Section for Main Street and Washington Street Transit Couplet



Main Street Two-Way Transit Priority

This pathway would provide one transit lane in each direction on Main Street between Alaskan Way and 3rd Avenue. Main Street is approximately 42 feet wide (measured from curb to curb) with 12-foot wide sidewalks on both sides of the street (see Exhibit 4-2). This pathway would expand the sidewalks on both sides of the road by approximately 7 feet and retain 28 feet for two bus lanes. On-street parking would be eliminated on both sides of the street. General purpose traffic would be permitted to use the transit lanes for one block only, except for the block between 1st Avenue S. and 2nd Avenue S., which would be limited to transit and local delivery vehicles only. Transit facilities on Main Street could be constructed to reflect and preserve the historic nature of the Pioneer Square district.

Exhibit 4-2. Proposed Cross-Section for Main Street Two-Way Transit Priority

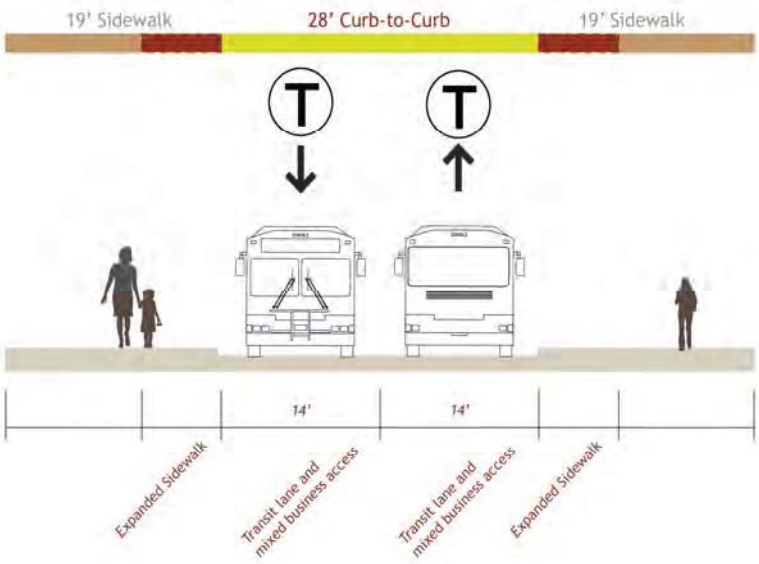
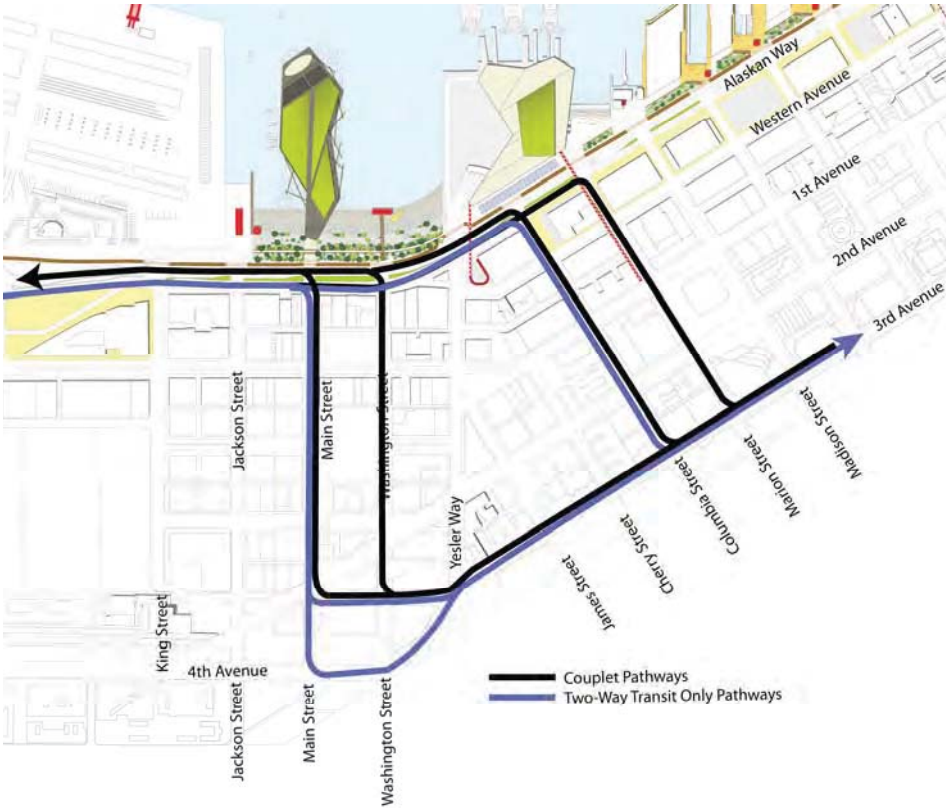


Figure 4-3. Proposed Level 2 Transit Pathways

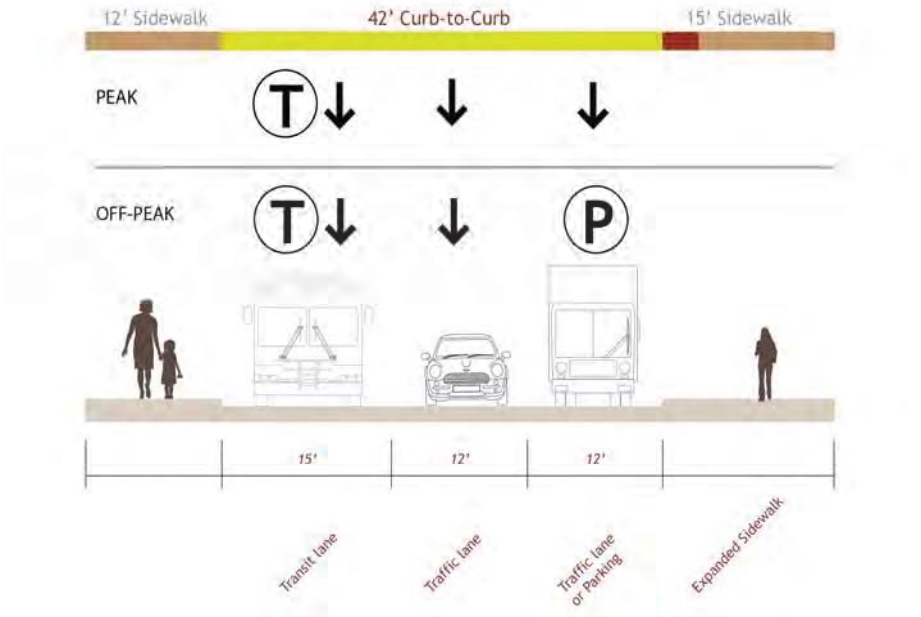


Inbound buses would use Main Street, 4th Avenue, and Prefontaine Place to make the connection between Alaskan Way and 3rd Avenue. Outbound buses would use Main Street to connect between 3rd Avenue and Alaskan Way (see Exhibit 4-3).

Columbia Street and Marion Street Transit Couplet

This pathway would provide a transit lane on Columbia Street and Marion Street between Alaskan Way and 3rd Avenue. Both streets are approximately 42 feet wide (measured from curb to curb) with 12-foot wide sidewalks on both sides of the street (see Exhibit 4-4); except for Marion Street which narrows to approximately 34 feet between Alaskan Way and 1st Avenue. This narrower section of Marion Street is constrained by the pedestrian bridge connecting 1st Avenue to the Washington State Ferries Colman Dock facility. General vehicle traffic could make right-turns and access businesses from the proposed transit lane.

Exhibit 4-4. Proposed Cross Section for Columbia Street and Marion Street Transit Couplet



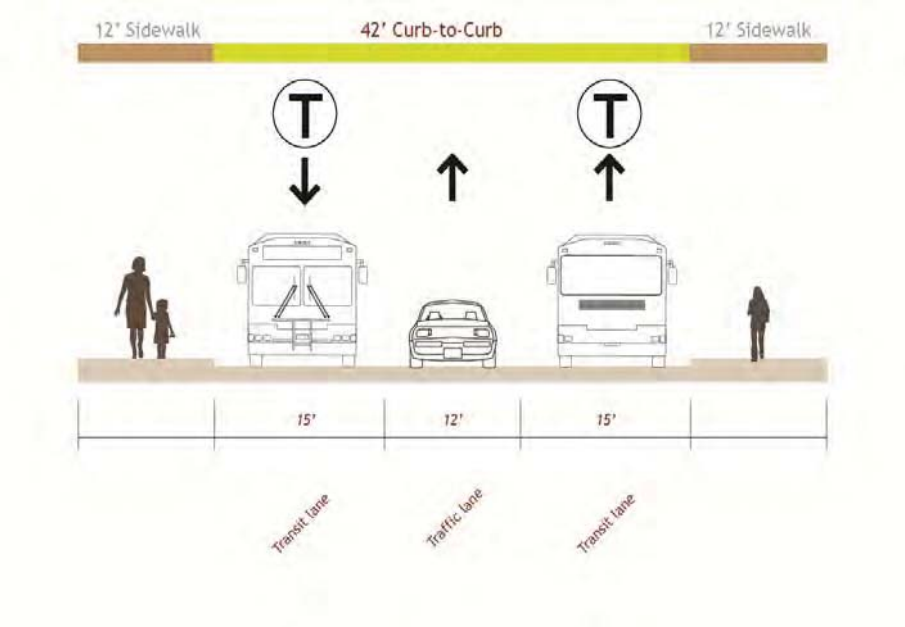
Inbound buses would use Marion Street to make the connection between Alaskan Way and 3rd Avenue. Outbound buses would use Columbia Street to connect between 3rd Avenue and Alaskan Way (see Exhibit 4-3).

Columbia Street Two-Way Transit Priority

This pathway would provide two transit lanes on Columbia Street between Alaskan Way and 3rd Avenue. Columbia Street is approximately 42 feet wide (measured from curb to curb) with 12-foot wide sidewalks on both sides of the street (see Exhibit 4-5).

Inbound and outbound buses would use Columbia Street to make the connection between Alaskan Way and 3rd Avenue; inbound buses would use a contraflow transit lane on the south curb (see Exhibit 4-3).

Exhibit 4-5. Proposed Cross-Section for Columbia Street Transit Priority



4.2 What measures were used to evaluate the proposed pathways in the Level 2 Screening Analysis?

4.2.1 SERVICE EXCELLENCE

These measures describe how quickly buses could travel on the proposed pathways and how much congestion buses could experience. The Level 2 analysis builds upon the Level 1 measure of *3.1.1 Speed and Reliability*. A fast and consistent (reliable) travel time through the study area is important for the preferred pathway because it improves the attractiveness of using transit. Feasible opportunities to implement transit priority treatments, such as bus lanes, were included in the proposed alternatives where feasible.

Estimated 2030 Travel Time

Exhibit 4-6 summarizes the estimated 2030 travel times for the proposed pathways. These travel times were calculated using Synchro macrosimulation software to provide an average traffic signal delay for each movement and an estimate of bus speed along study area roadways was derived using existing bus travel time data collected by Metro. The travel time estimates are between the West Seattle Bridge, just east of Harbor Island, and the 3rd Avenue/Seneca Street intersection in

Downtown Seattle. The Alaskan Way Viaduct Replacement Project's Synchro *Final 2030 Program PM-FEIS-Toll Free* model was combined with the Waterfront Seattle

2030 PM Concept Toll Free model for this analysis. It was important to incorporate these models to provide a method of comparing alternatives traveling on similar street that would have likely impacts to signal timing.

As shown in Figure 4-6, the two proposed pathways traveling along Surface Alaskan Way using either Columbia Street or Marion Street have lower anticipated travel times compared to Pioneer Square pathways—buses on Columbia Street or Marion Street are faster by approximately 1 minute inbound and 2 to 3 minutes outbound. This is because the pathways through Pioneer Square have slightly longer distances to travel and experience additional congestion along 4th Avenue and/or 3rd Avenue. Also, approximately 30 seconds of additional travel time was added to the pathways on Main Street because these pathways have one additional bus stop. Removing the time it takes to serve the extra bus stop still results in a faster travel time for the pathways using Marion Street and/or Columbia Street.

Exhibit 4-6. Estimated 2030 Transit Travels Times

Proposed Pathway	Inbound Travel Time (minutes)	Outbound Travel Time (minutes)
Main Street Two-Way Transit Priority	14.3	13.5
Main Street and Washington Street Transit Couplet	14.5	12.5
Columbia Street Two-Way Transit Priority	13.2	10.4
Columbia Street and Marion Street Transit Couplet	13.4	11.2

Reliability

This is a quantitative measure of the ability for transit service to be maintained due to planned or unplanned events, and the ability to avoid potential roadway congestion. Reliability accounts for unexpected situations resulting in increased travel time for individual buses.

Common to all Pathways

All of the proposed pathways would be impacted by congestion on the West Seattle Bridge and on Alaskan Way near the stadiums. Because the level of congestion on these facilities varies by time of day and stadium events are not held daily, they impact the ability of buses to make consistent travel time (reliable) through the study area. In addition, the Waterfront Seattle Project is proposing northbound AM peak period bus lanes to Columbia Street and southbound AM and PM peak period bus lanes south from Columbia Street to the south. These bus lanes would improve the travel time reliability of buses traveling on Alaskan Way in the peak direction.

Main Street and Washington Street Transit Couplet

Transit lanes on both roadways would improve speed and reliability for transit. Low projected vehicle volumes on Main Street would reduce the risk of added to delay to buses because there would be fewer vehicles making right-turns in front of buses at driveways and intersections. Main Street and Washington Street are generally used for local access and could provide a fairly consistent travel time because they are less likely to be impacted by regional impacts to traffic patterns such as traffic incidents. Lower vehicle volumes on Main Street and Washington Street generally mean less risk of incidents that would impact the reliability of transit service. Also, the impact of Colman Dock ferry traffic on this pathway is lessened because of the shorter distance buses would travel on Alaskan Way.

Main Street Two-Way Transit Priority

Currently, the Occidental Avenue pedestrian crossing of Main Street is unsignalized and pedestrians cross at their pleasure. With this pathway alternative, the number of people crossing at this intersection would increase, which would increase the delay buses could experience as they wait for people to cross. Some of this crossing delay could be mitigated by installing a pedestrian-actuated signal. This signal would function similar to the pedestrian signal on Pine Street between Westlake Park and Westlake Center. It would help to direct pedestrians to cross at a designated location and control when people could cross Main Street—this would provide a more predictable amount of delay from this pedestrian crossing, which would improve the reliability of the pathway.

Transit only lanes and projected low traffic volumes on Main Street are also indicators of likely improved reliability for transit. Main Street and 3rd Avenue are generally used for local access and could provide a fairly consistent travel time because they are less likely to be impacted by regional impacts to traffic patterns such as traffic incidents. Lower vehicle volumes on Main Street would generally indicate there is less risk of incidents that would impact transit service reliability.

Columbia Street and Marion Street Transit Couplet

Inbound buses traveling Marion Street would experience congestion near the Colman Dock ferry terminal where a high number of vehicles are unloading from ferries and either traveling east on Marion Street or south on Alaskan Way south of Yesler Way. During ferry unloading, the risk of buses being delayed by vehicles making a right-turn onto 1st Avenue, 2nd Avenue, or 3rd Avenue from Marion Street is increased. These turning movements would delay buses on Marion Street and because ferry-related vehicles are not always present, it results in greater variability of bus travel times for this segment of the transit pathway.

Today, high pedestrian volumes crossing 3rd Avenue during the peak periods result in increased delay for outbound buses turning from 3rd Avenue to Columbia Street—pedestrians entering the crosswalk during the 'flashing, don't walk' phase results in buses having to turn at the last second. Making right-turns on red is also difficult for buses because of the high volume of general purpose traffic traveling west on Columbia Street and pedestrians crossing 3rd Avenue. In the future, Columbia Street would not be the primary access out of downtown with the removal of the Alaskan Way Viaduct on-ramp and improved access to Alaskan Way proposed in the Waterfront Seattle project. This would result in lower projected traffic volumes and lower delay for buses making right-turns.

This pathway travels further on Alaskan Way compared to the Washington Street and/or Main Street pathways. In the future, Alaskan Way would be a relatively high-volume regional corridor impacted by regional events such as accidents on I-5 and Spokane Street viaduct. The regional nature of Alaskan Way could increase the risk of travel time variation, which decreases the reliability of transit service.

COLUMBIA STREET TWO-WAY TRANSIT PRIORITY

This proposed pathway would encounter similar pedestrian congestion at the Columbia Street/3rd Avenue intersection as the *Marion Street and Columbia Street Transit Couplet* alternative—high volumes of pedestrians crossing the street during peak periods could delay buses and impact both travel time and travel time reliability. In addition, this pathway would be impacted by regional traffic incidents, which increases the risk of travel time variation.

To accommodate buses turning from Columbia Street onto 3rd Avenue from the proposed contraflow transit lane, a new signal phase at the intersection would be required. This signal would function similar to the existing Seneca Street/3rd Avenue signal, but without the transit notification to proceed from the bus stop prior to the light turning green. To reduce some of the impact of a new signal phase (which takes additional time from other movements), a right-turn overlap phase could be provided for the southbound right-turn onto Columbia Street. A preliminary analysis using AutoTurn engineering software illustrated this movement was possible. Also, providing additional signal time to the southbound right-turn (as an overlap phase) would provide some improvement to the bus travel time reliability.

4.2.2 TRANSIT MANEUVERABILITY AND PERFORMANCE

These measures describe the ease in which buses would be able to travel the pathway based on the character of the roadway. The Level 2 analysis builds upon the Level 1 measure of *3.1.2 Constructability / Ease of Implementation*. These Level 2 measures are one way of determining if any capital improvements would likely be

necessary at intersections for turning buses and if there are critical flaws prohibiting buses from traveling on a roadway.

Bus Turning Radius

Bus routes currently traveling on the Columbia Street and Seneca Street Alaskan Way Viaduct ramps will need to be temporarily relocated during construction of the new Alaskan Way. If bus routes are relocated temporarily to 1st Avenue, the proposed pathways may require improvements on 1st Avenue to accommodate bus turning movements.

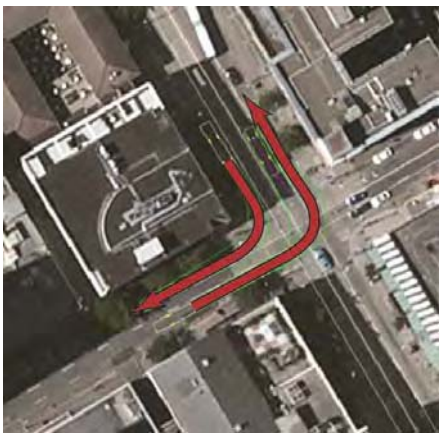
A preliminary assessment of the permanent pathway alternatives using AutoTurn, software capable of assessing the space vehicles use when navigating turns, was conducted at three locations with likely turning challenges. A 40-foot bus was selected as the design vehicle because it requires more space than a 60-foot articulated bus or the new RapidRide coaches. The following intersections were analyzed:

Columbia Street and 3rd Avenue

Applicable alternatives:

- *Columbia Street and Marion Street Transit Couplet*
- *Columbia Street Two-Way Transit Priority*

Buses making the southbound right-turn and eastbound left-turn between 3rd Avenue and Columbia Street would require modifications to this intersection. Metro conducted a coach field test which demonstrated the need for a curb bulb cutback and a 10-foot stop bar setback at this intersection (See Appendix C). Also, buses must navigate the southbound right-turn carefully because of the high pedestrian volumes on 3rd Avenue. The south side curb lane of Columbia Street would be a contraflow bus lane in the *Columbia Street Two-Way Transit Priority* pathway alternative.

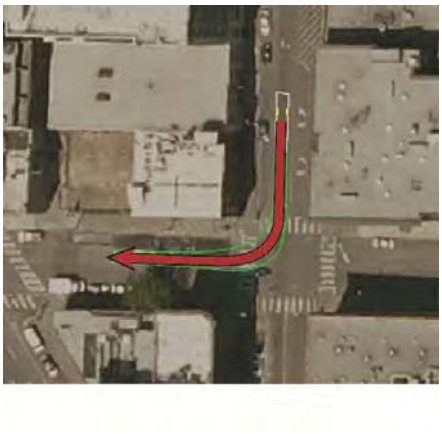


3rd Avenue and Washington Street

Applicable alternative:

- *Main Street and Washington Street Transit Couplet*

Buses making the southbound right-turn from 3rd Avenue to Washington Street appear to be able to navigate this turn without running over the curb or encroaching into the eastbound travel lanes on Washington Street.



3rd Avenue, Main Street, and 2nd Avenue Extension

Applicable alternative:

- *Main Street Two-Way Transit Priority*

Buses making the southbound right-turn from 3rd Avenue to Main Street would likely run over the curbed area south of the pedestrian refuge between 2nd Avenue Extension and 3rd Avenue. This would likely require a slight curb modification to accommodate turning buses.

Grades

Most east-west roadways in downtown Seattle have a significant change in elevation from the Waterfront to the east. This change in elevation, or how steep a hill is, is referred to as the grade. Grade is expressed as a percentage where 0 percent is flat and 100 percent is a vertical cliff. A positive grade is uphill and a negative grade is downhill. Diesel buses are generally limited to uphill (positive) grades of less than 10 percent for short distances without special modifications to their transmission. Roadway grades for the pathway alternatives were measured with a degree-level, not surveyed, at multiple locations to identify the maximum potential grade.

Main Street

Applicable alternatives:

- *Main Street and Washington Street Transit Couplet*
- *Main Street Two-Way Transit Priority*

Slight grades of approximately 4 percent approaching 4th Avenue and generally flat near Alaskan Way. Metro buses can travel these moderate grades with minimal difficulty.

Washington Street

Applicable alternative:

- *Main Street and Washington Street Transit Couplet*

Grades on Washington Street are slight and because buses are travelling downhill on Washington Street, grades are of less concern.

Columbia Street

Applicable alternatives:

- *Columbia Street and Marion Street Transit Couplet*
- *Columbia Street Two-Way Transit Priority*

Columbia Street has moderate to steep grades of approximately 8 percent approaching 3rd Avenue. Although an 8 percent grade is challenging for buses and increases wear and tear on propulsion components, it does not restrict Metro's diesel-hybrid buses from using the roadway. The transition between 3rd Avenue and Columbia Street does not appear to cause buses to get high-centered (buses would not likely scrape their under carriage because of the grade change); however, the transition at 2nd Avenue may warrant a bus 'slow' order, which instructs drivers to slow down and ease through grade transitions.

Marion Street

Applicable alternative:

- *Columbia Street and Marion Street Transit Couplet*

Marion Street has moderate to steep grades of approximately 11 percent between 1st Avenue and 2nd Avenue. Although Marion Street's grade is challenging for buses and increases wear and tear on propulsion components, it would not likely restrict Metro buses from using the roadway.

Bus Stops

The sizing, location, and placement of bus stops can impact the ability of buses to serve a bus stop and the reliability of a bus route. This measure evaluates the roadway space used by buses to access proposed bus stops along the pathways. It does not evaluate physical amenities such as a shelter, bench, or lighting. Ideally, bus stops on high bus volume streets in downtown Seattle would provide the following:

- Approximately 200 feet of curb space to accommodate 3 buses.
- Be located on the far-side of a signalized intersection to reduce the risk of buses missing a green light because they must stop to serve a bus stop.
- Allow buses to stop in-lane instead of pulling out of the travel lane to serve the bus stop; stopping in-lane avoids the added travel time buses have when merging into the travel lane.

The existing bus stops along 3rd Avenue at Prefontaine Place and Yesler Way were not included in this analysis because they have sufficient space for buses and are in-lane bus stops. The proposed bus stops for the pathway alternatives are as follows:

Main Street and Occidental Avenue Bus Stops

Inbound: This would be a new bus stop location. There is approximately 120 feet of curb space between Occidental Avenue and the Fire Department access to the east (see Exhibit 4-7). The length of this bus stop could be extended to approximately 180 feet. This would require narrowing the pedestrian crossing area of Main Street at Occidental Avenue, spanning a small alleyway, and extending the bus lane up to the first access door at the Fire Department. The proposed bus stop would be far-side and in-lane, which could reduce the travel time delay associated with the high volume of pedestrians crossing Main Street at Occidental Avenue. Alternatively, the bus zone could be expanded across Occidental Avenue to provide up to 250 feet in both near-side and far-side zones.

Outbound: This would be a new bus stop location. There is approximately 120 feet of curb space between Occidental Avenue and a marked pedestrian crossing area to the west. By spanning this crosswalk, the bus stop could be extended west towards 1st Avenue, providing approximately 250 feet. This would be a far-side in-lane bus stop to reduce delay that could be associated with the high volume of pedestrians crossing Main Street along Occidental Avenue.

Washington Street and Occidental Avenue Bus Stop

Outbound Only: This would be a new bus stop location. To the west of Occidental Avenue, there is curb space for a bus stop that is approximately 120 feet in length. Expanding this bus stop to cross an alleyway provides approximately 250 feet for a bus stop. Because the Washington Street/Occidental Avenue intersection is stop-control, there is little speed and reliability benefit from providing a far-side bus stop compared to a near-side bus stop. However, east of Occidental Avenue a bus stop would need to span an alleyway, which provides access to a parking lot, to provide a bus stop longer than 120 feet.

Exhibit 4-7. Summary of Bus Stop Locations

Location	Direction	Approximate Length	Far-Side	In-Lane
Main Street @ Occidental Avenue	Inbound	120/250 feet	✓	✓
	Outbound	120/250 feet	✓	✓
Washington Street @ Occidental Avenue	Outbound	120/250 feet	✓	✓
Columbia Street @ Western Avenue	Inbound	110/240 feet	✓	✓
	Outbound	110/240 feet	✓	✓
Marion Street @ Western Avenue	Inbound	110/230 feet	✓	✓

X / X: X is the uninterrupted curb space / X is the total curb space with spanning a driveway or alleyway.

COLUMBIA STREET AND WESTERN AVENUE BUS STOPS

Inbound: This would be a new bus stop location that could be provided on the far-side (east of) Western Avenue. There is approximately 110 feet of curb space between Post Avenue and 1st Avenue, which may warrant separate bus stop locations for RapidRide and local transit. By spanning Post Avenue towards Western Avenue, this bus stop could be expanded to provide approximately 240 feet of curb space. Because the Western Avenue/Columbia Street intersection is proposed to be signalized with the Waterfront Seattle Project, bus travel time would be improved with a far-side/in-lane stop.

Outbound: This would be a new bus stop location that could be provided once the Columbia Street on-ramp to the Alaskan Way Viaduct is removed. It is likely the bus stop would be located between Western Avenue and 1st Avenue because buses would need to change lanes to position for the left-turn onto Alaskan Way. If the bus stop stretched across Post Avenue, there would be approximately 240 feet of curb space for a bus stop. There is approximately 110 feet of curb space between 1st Avenue and Post Avenue, which may warrant separate bus stop locations for RapidRide and local transit. This would be a far-side in-lane bus stop to reduce delay that could be associated with the Columbia Street/1st Avenue signalized intersection.

MARION STREET AND WESTERN AVENUE BUS STOP

Inbound Only: This would be a new bus stop that could be provided between Western Avenue and 1st Avenue on Marion Street. There is approximately 110 feet of curb space between Post Avenue and 1st Avenue; by spanning Post Avenue towards Western Avenue, this bus stop could be expanded to provide approximately 230 feet of curb space. Because the Western Avenue/Marion Street intersection is proposed to be signalized with the Waterfront Seattle Project, bus travel time would benefit from a far-side/in-lane stop.

4.2.3 ACCESSIBILITY, TRANSIT COVERAGE, AND MULTIMODAL CONNECTIONS

These measures evaluate the proximity of other major transit connections to proposed pathway bus stop locations, how easy the new route structure would be for patrons to understand, and how many people live within one-quarter mile of the proposed bus stops.

The Level 2 analysis builds upon the following Level 1 measures; *3.1.3 Non-motorized Facilities and Regional Connectivity, 3.1.4 Transit Facilities, Accessibility, and Service Coverage, 3.1.5 Neighborhood Impact, 3.1.7 Environmental Justice,* and *3.1.8 Multimodal Connections.*

Multimodal and Neighborhood Connectivity

This measure describes how easily patrons could make connections from bus stops along the proposed pathways to other major destinations such as the Downtown Seattle Transit Tunnel, Pioneer Square, stadium district, King Street Station, International District Station, and Colman dock for King County passenger ferry and Washington State Ferries connections. Exhibit 4-8 illustrates the different bus stops for the proposed alternatives, the next in-line common bus stops, and major destinations. Exhibit 4-9 summarizes the distances between major destinations and the nearest bus stop along the proposed pathway.

Information on rider preference was obtained by Metro through a ridership survey targeting routes using the existing Alaskan Way Viaduct pathway (see Appendix D). This survey found that 64 percent of respondents preferred a Columbia Street pathway compared to a Main Street pathway. In terms of accessible patrons, 60 percent of the 74 respondents indicating mobility issues preferred a Columbia Street pathway.

Common to all alternatives

All of the proposed pathways would provide a bus stop near the stadiums at the Alaskan Way and Dearborn Street intersection. Also, all of the alternatives provide a bus stop along 3rd Avenue, which would be used to access the Downtown Seattle Transit Tunnel at Pioneer Square or University stations.

Main Street and Washington Street Transit Couplet and Main Street Two-Way Transit Priority

These pathways would provide a bus stop approximately 1 block away from the planned First Hill Streetcar stop and terminal at Jackson Street and Occidental Avenue. This stop would also be approximately 4 blocks from King Street Station. Access to Colman dock and the Washington State Ferries routes and King County Passenger ferry is approximately 3 to 4 blocks, which is farther than the pathways on Marion Street and/or Columbia Street. These pathways also provide additional access to the Stadium district and International District Station and neighborhood.

Columbia Street and Marion Street Transit Couplet and Columbia Street Two-Way Transit Priority

These pathways would provide a bus stop across the street from Colman Dock, which provides excellent access to Washington State Ferries service and King County Passenger ferry service. Connections to King Street Station and the First Hill Streetcar are approximately 6 blocks and 4 blocks away, respectively, from the Alaskan Way and Dearborn Street bus stop.

DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500
Feet

Exhibit 4-8
Population
Within Quarter-Mile of
Proposed Transit Stops

Exhibit 4-9. Distance Between Major Destinations and Nearest Transit Stop

Pathway	King Street Station (Amtrak)	Stadium District (CenturyLink Field)	International District Station	Downtown Seattle Transit Tunnel	WSF Colman Dock
	Distance shown in miles				
Main Street and Washington Street Transit Couplet	0.30	0.15	0.30	0.05	0.30
Main Street Two-Way Transit Priority	0.30	0.15	0.30	0.05	0.30
Columbia Street and Marion Street Transit Couplet	0.40	0.15	0.50	0.10	0.10
Columbia Street Two-Way Transit Priority	0.40	0.15	0.50	0.10	0.10

Accessibility

This measure evaluated the ability of new and infrequent riders to understand the proposed change to service and their ability to find bus stops.

COMMON TO ALL ALTERNATIVES

All pathways would be designed to the same engineering and architectural standards all Metro transit routes adhere too. This ensures that Metro has the same look and feel throughout their system, which increases the recognizability of bus stop locations. It also ensures there is ADA access to bus stops.

MAIN STREET AND WASHINGTON STREET TRANSIT COUPLET

This pathway would split transit service between Main Street (inbound) and Washington Street (outbound). Although this configuration is common in downtown Seattle and other areas, it is slightly more complicated than service operating on the same street for new and infrequent riders who are making a round-trip. Inbound and outbound service was split for this pathway alternative because providing two-way transit lanes would have eliminated one of the directions of general purpose traffic.

This proposed pathway would provide two bus stops in Pioneer Square; near Washington Street and Main Street at Occidental Avenue, and at 3rd Avenue and Prefontaine Place and Yesler Way. As illustrated in Exhibit 4-8, these stops provide a shorter walking distance to this bus service for people living and/or working in Pioneer Square and the International District.

MAIN STREET TWO-WAY TRANSIT PRIORITY

This pathway would provide service operating on the same roadway through Pioneer Square. Two-way transit lanes with limited general purpose vehicle access would increase the visibility as a transit corridor. Also, the two-way configuration

provides approximately 14 feet of additional sidewalk space, which could be divided evenly on the north and south sides of the road. This improves the quality of the walking environment by allowing extra separation from vehicular traffic.

This proposed pathway would provide a bus stop in Pioneer Square near Main Street and Occidental Avenue. An additional stop would be provided at 3rd Avenue and Prefontaine Place and Yesler Way, which is an existing bus stop. As illustrated in Exhibit 4-8, these stops provide a shorter walking distance to the new bus service for people living and/or working in Pioneer Square and the International District.

Columbia Street and Marion Street Transit Couplet

This pathway would split transit service between Marion Street (inbound) and Columbia Street (outbound). Although this configuration is common in downtown Seattle and other areas, it is slightly more complicated than service operating on the same street for new and infrequent riders who are making a round-trip. Inbound and outbound service was split for this pathway alternative because these two roadways are presently one-way couplets.

This proposed pathway would provide bus stops approximately 2 blocks from Pioneer Square near Marion Street and Columbia Street at Western Avenue. As illustrated in Exhibit 4-8, this stop is located outside a ¼ mile walking distance from the International District and only captures about half of the Pioneer Square neighborhood.

The proposed Columbia Street bus stop would have a slight uphill grade from Post Avenue to 1st Avenue of approximately 4 percent. Similarly, the proposed Marion Street bus stop west of 1st Avenue would have slight downhill grade of approximately 4 percent. These grades could present a challenge to patrons with mobility impairments.

Columbia Street Two-Way Transit Priority

This pathway would provide service operating on the same roadway in Downtown between Alaskan Way and 3rd Avenue. Two-way transit lanes would increase the visibility of this corridor as a transit corridor. Because a westbound general purpose travel lane was retained, sidewalks could not be widened along Columbia Street similar to the Main Street pathway alternative.

This proposed pathway would provide bus stops approximately 2 blocks from Pioneer Square near Marion Street and Columbia Street at Western Avenue. As illustrated in Exhibit 4-8, this stop is located outside a ¼ mile walking distance from the International District and only captures about half of the Pioneer Square neighborhood.

The proposed Columbia Street bus stops would have slight grades from Post Avenue to 1st Avenue of approximately 4 percent. These grades could present a challenge to patrons with mobility impairments. Because this area would need to be rebuilt when the existing Alaskan Way Viaduct ramp is demolished, transit maneuverability should be considered during design and reconstruction if this pathway is selected.

Population

Geographic Information Systems (GIS) software was used to calculate the approximate number of people living within one-quarter mile of proposed stops (see Exhibits 4-8 and 4-10). Year 2010 census data at the block group level was used for this analysis.

Exhibit 4-10. Number of People Living within One-Quarter Mile of Proposed Bus Stops

Bus Stop Location	Population	Pathway
3rd Avenue / Prefontaine Place / Yesler Way	5,800	Main Street
Main Street / Occidental Avenue	3,000	Main Street
Columbia Street / Western Avenue	2,100	Columbia Street

Main Street and Washington Street Transit Couplet and Main Street Two-Way Transit Priority

Population within a one-quarter mile of the Main Street/ Occidental Avenue and 3rd Avenue/ Prefontaine Place / Yesler Way bus stops is approximately 8,800 people. This stop serves residences and employment centers in the Industrial, International, Pioneer Square, and Downtown districts (see Exhibit 4-8). The number of people residing near these bus stops is likely to increase in the future with new projects such as the Stadium Place under construction in the north Century Link Field parking lot.

Columbia Street and Marion Street Transit Couplet and Columbia Street Two-Way Transit Priority

Population within one-quarter mile of the Columbia Street / Western Avenue bus stops is approximately 2,100 people. This stop serves residences and employment centers in the Pioneer Square and Downtown districts (see Exhibit 4-8). Although the International District is served by the common Alaskan Way and Dearborn Street bus stop, this pathway does not provide close access to bus stops for business and residences in the International district.

4.2.4 NEIGHBORHOOD AND STAKEHOLDER IMPACTS

These measures describe the effect of the proposed pathways on pedestrian activity along the corridors, impacts to on-street parking and business deliveries, and addresses noise impacts associated with higher bus volumes. The Level 2 analysis

builds upon the following Level 1 measures: *3.1.5 Neighborhood Impacts* and *3.1.7 Environmental Justice.*

Urban Form

Providing a high-quality and highly visible transit service typically results in varying opinions for local residents and bus riders using the service. This measure was refined to describe the likelihood of increased pedestrian activity and any benefit the proposed improvement would have to the surrounding non-motorized travel environment from a design perspective. For all alternatives, pedestrian activity would increase with higher volumes of buses traveling through the area. This is because some of these stops would be more convenient for people residing or working in the area compared to the other bus stops currently provided in this area. Perhaps the only notable *urban form* differences between the pathway alternatives is the provision of wider sidewalks on both sides of Main Street proposed with the *Main Street Two-Way Transit Priority* pathway alternative (a photo rendering of the proposed improvements on Main Street is shown in Exhibit 4-11) and the consideration by the City of Seattle of a transit plaza on Columbia Street near the waterfront.

Business and Residential Access

The proposed pathways all propose all-day transit lanes on their respective roadways connecting from Alaskan Way to 3rd Avenue. This type of transit reliability improvement typically displaces parking spaces, loading zones, and/or a traffic lane.

COMMON TO ALL ALTERNATIVES

Metro permits general purpose vehicles and deliveries to enter the bus lane and make turns at an intersection, driveways, and alleys. The bus lanes do not allow stopping or loading within them and would change where delivery vehicles temporarily park to access residences and businesses. All proposed pathways would result in some loss of on-street parking.

DOWNTOWN SOUTHEND TRANSIT STUDY
Preliminary Concept

Exhibit 4-11
Main Street Two-Way
Transit Priority Pathway

MAIN STREET AND WASHINGTON STREET TRANSIT COUPLET

Parking would be removed from the south curb lane on Main Street and the north curb lane of Washington Street between Alaskan Way and 3rd Avenue to accommodate the proposed bus lanes. This would result in a net loss of approximately 35 on-street parking spaces (8 parking spaces from Main Street and 23 parking spaces from Washington Street). The following loading zones would be impacted:

- Inbound on Main Street
  - 30 minute commercial loading east of Alaskan Way
  - 15 minute charter bus loading west of Second Avenue
- Outbound on Washington Street
  - 30 minute commercial loading just east of First Avenue
  - 30 minute commercial loading between Alaskan Way and First Avenue

MAIN STREET TWO-WAY TRANSIT PRIORITY

Parking would be removed from both sides of Main Street between Alaskan Way and 1st Avenue and the south side of Main Street between 1st Avenue and Occidental Avenue. This would result in a net loss of approximately 20 on-street parking spaces on Main Street. The special use parking spaces on Main Street for the fire department on Main Street east of 2nd Avenue and the charter bus loading zone east of Occidental Avenue would need to be relocated to 2nd Avenue or Washington Street to provide for continuous bus lanes along Main Street. On-street parking on Main Street east of 3rd Avenue would be retained because buses would be merging to the left to make the left-turn onto 4th Avenue. The following loading zones would be impacted:

- Inbound on Main Street
  - 30 minute commercial loading east of Alaskan Way
  - 15 minute charter bus loading west of Second Avenue
- Outbound on Main Street
  - 15 minute loading just east of Alaskan Way
  - 30 minute commercial loading between Alaskan Way and First Avenue

An alternative to the proposed configuration could limit the sidewalk expansion to one side of Main Street only and adding an on-street parking and either pull-outs or an offset bus lane on the other side. An offset bus lane is placed one lane away from the curb, which allows the curb lane to be used for parking or loading. Although double-parking or stopping of any kind is not typically permitted in an offset bus lane, there is a risk of increased travel time delay by drivers who disobey such rules.

COLUMBIA STREET AND MARION STREET TRANSIT COUPLET

With this proposed pathway, a total of 23 on-street parking spaces would be removed from the curb lane on the north side of Marion Street. Some of the on-street parking loss would occur from converting the diagonal parking on Marion Street between 2nd Avenue and 3rd Avenue to parallel parking spaces. This is necessary to accommodate the proposed cross-section. Most of the parking loss occurs because Marion Street narrows between Alaskan Way and 1st Avenue for the south side pedestrian bridge that connects to the Colman Dock ferry terminal. To maintain the preferred cross-section of two traffic lanes and one all-day transit lane requires all of the available curb-to-curb space of approximately 34 feet through this narrow section. No loading zones would be impacted.

COLUMBIA STREET TWO-WAY TRANSIT PRIORITY

Providing all-day two-way transit lanes on Columbia Street would remove approximately 28 on-street parking spaces and 2 loading zones between Alaskan Way and 3rd Avenue. Currently, there are on-street parking restrictions on Columbia Street. The following loading zones would be impacted:

- Inbound on Columbia Street
  - 3 minute passenger loading just east of Alaskan Way
  - 30 minute commercial loading just east of Western Avenue
  - 30 minute commercial loading just west of Third Avenue

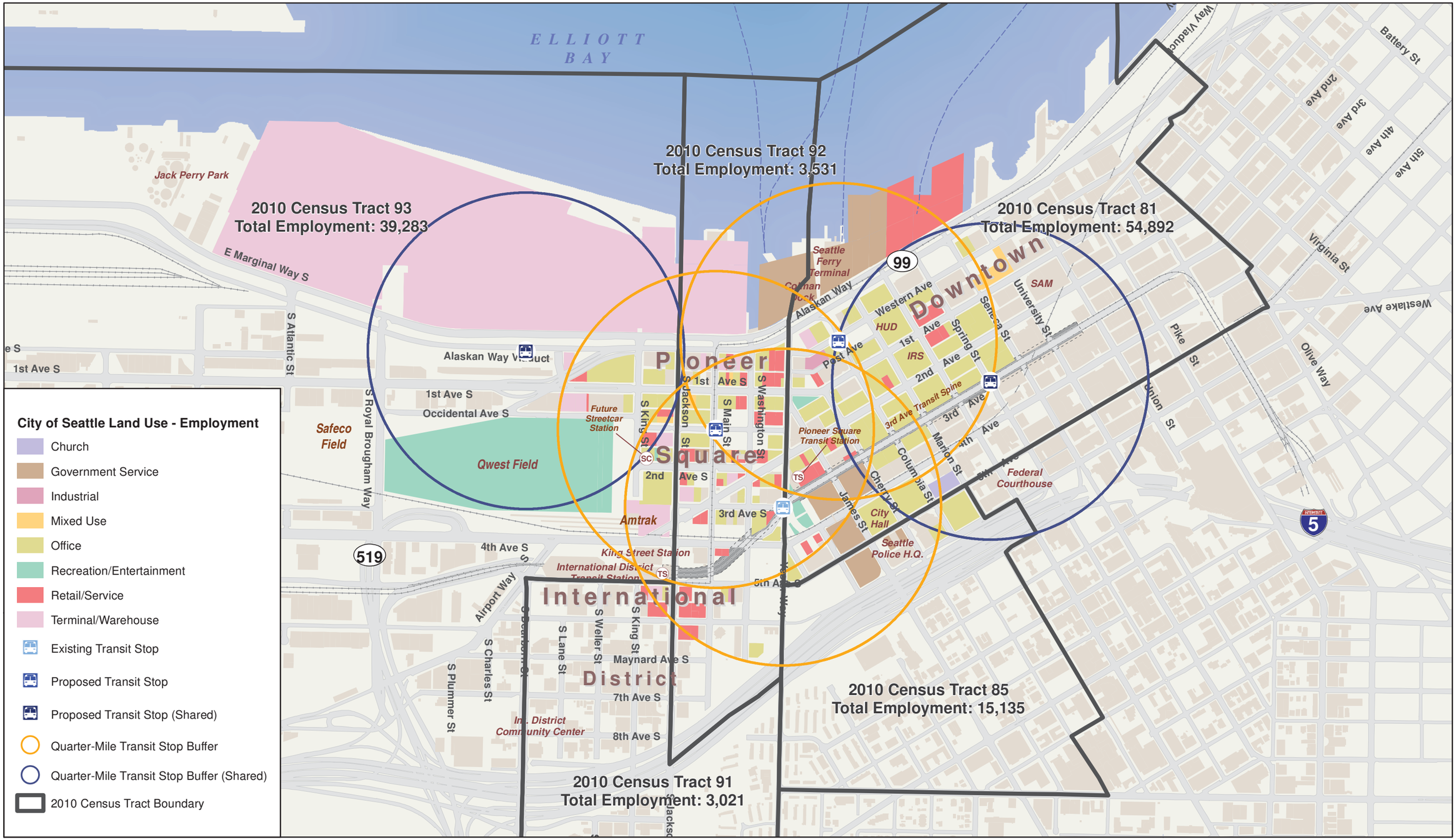
Noise

This measure is a qualitative assessment of noise levels on adjacent land uses along the proposed pathways. Exhibit 4-12 summarizes sample noise test and the decibel (dBA) rating for vehicles as they accelerate or drive by. Generally, the hybrid buses are quieter than diesel-only buses—a person would hear the same level of noise from a Metro bus driving by as they would a pick-up truck. A Metro bus would be quieter than a large truck driving by. Also, an accelerating Metro bus is quieter than a garbage truck and produces about the same noise as a utility truck.

Exhibit 4-12. Sample Noise Tests on Vehicles (dBA)

Vehicle	Accelerating	Driving By
Bus (diesel)	76–81	74–80
Bus (hybrid)	76–78	73–79
Trolley Bus	72–75	69–70
Large Truck		82-86
Pickup Truck		75-81
Garbage truck	80-84	
Utility truck	76-80	
Passenger car	66-70	

As illustrated in Exhibit 4-13, the land use along Columbia Street is predominately a mix of retail, office, parking garage, and residential buildings. As summarized in Exhibit 4- 9 there is approximately one-quarter of the people (2,100) residing within one-quarter of a mile of the proposed Columbia Street and/or Marion Street bus stops. This lower population compared to the Main Street and/or Washington Street alternative (with approximately 8,800 people) gives an indication that the impact of noise on the Columbia Street and/or Marion Street bus route could be less because it could impact less people.



City of Seattle Land Use - Employment

- Church
- Government Service
- Industrial
- Mixed Use
- Office
- Recreation/Entertainment
- Retail/Service
- Terminal/Warehouse
- Existing Transit Stop
- Proposed Transit Stop
- Proposed Transit Stop (Shared)
- Quarter-Mile Transit Stop Buffer
- Quarter-Mile Transit Stop Buffer (Shared)
- 2010 Census Tract Boundary

DOWNTOWN SOUTHEND TRANSIT STUDY

0 500 1,000 1,500
Feet

Exhibit 4-13

Employment Locations Within Quarter-Mile of Proposed Transit Stops

Metric	Measure of Effectiveness	Common to All Pathways	Level 2 Pathways							
			Main Street/ Washington Street Transit Couplet		Main Street Two-Way Transit Priority		Columbia Street/ Marion Street Transit Couplet		Columbia Street Two-Way Transit Priority	
			Justification / Findings / Results	Rating	Findings	Rating	Findings	Rating	Findings	Rating
SERVICE EXCELLENCE	**Estimated 2030 Travel Time:** Estimated travel times account for the length of the pathway, anticipated congestion, and approximate delay at bus stops.	Existing travel time information was used to estimate future p.m. peak travel times for the pathway alternatives	**Inbound: 14.5 minutes**, slightly longer than other routes because two bus stops and congestion through the Main Street/3rd Avenue intersection. Inbound buses would experience congestion at the Main Street/3rd Avenue/ 2nd Avenue intersection. **Outbound: 12.5 minutes.** Outbound buses would serve two bus stops and experience congestion at the 2nd Avenue/ Washington Street intersection.		**Inbound: 14.3 minutes** **Outbound: 13.5 minutes**, slightly longer than other routes because this pathway serves two bus stops and experiences congestion through the Main Street/3rd Avenue intersection. Outbound buses would experience congestion through the Main Street/ 3rd Avenue/2nd Avenue Extension intersection.		**Inbound: 13.4 minutes** **Outbound: 11.2 minutes**, slightly faster than some routes because of short travel distance and a southbound PM peak transit lane on Alaskan Way.		**Inbound: 13.2 minutes** **Outbound: 10.4 minutes**, slightly faster than other routes because of shorter route and a southbound PM peak transit lane on Alaskan Way.	
	Reliability: Ability for transit service to be maintained due to planned or unplanned stadium events, and the ability to avoid potential roadway congestion.	All pathways would be impacted by congestion on the West Seattle Bridge, and on Alaskan Way near the stadiums. Low risk of being re-routed for stadium events.	**Less impacted by ferry related congestion** because pathway does not travel through the Alaskan Way/Yesler Way intersection. More consistent travel times throughout the day because Main Street and Washington Street are for local access.		Transit only lanes and low volume on Main Street would increase bus speeds and reliability. **Less impacted by ferry related congestion** because pathway does not travel through the Alaskan Way/Yesler Way intersection. More consistent travel time throughout the day because Main Street is for local access.		Inbound buses traveling Marion Street during ferry unloading would be **impacted by ferry related congestion.** Congestion variations on Alaskan Way during peak hours could result in greater variability in travel time because it is a regional roadway with high traffic volumes.		Transit only lanes and **low traffic volumes** on Columbia Street would **increase bus speeds and reliability**. Congestion and higher pedestrian volumes on 3rd Avenue could delay buses as they make a southbound right-turn onto Columbia Street. Congestion variations on Alaskan Way during peak hours could result in greater variability in travel time because it is a regional roadway with high traffic volumes. Bus lanes on Columbia Street and Alaskan Way would increase transit reliability.	
TRANSIT MANEUVERABILITY AND PERFORMANCE	**Bus Turning Radius**: Ability for buses to navigate turns along the pathway.	Coordinate with Waterfront Seattle project to ensure adequate right-turn radius from surface Alaskan Way. All options may require improvements during interim period if transit uses 1st Avenue.	No likely turning challenges		Outbound right-turn from 3rd Avenue to Main Street **could require slight curb modifications**.		No likely turning challenges		Coach field test report indicates a curb bulb cutback and a 10-foot stop bar setback are needed for right-turning buses from 3rd Avenue to Columbia Street.	

Metric	Measure of Effectiveness	Common to All Pathways	Level 2 Pathways							
			Main Street/ Washington Street Transit Couplet		Main Street Two-Way Transit Priority		Columbia Street/ Marion Street Transit Couplet		Columbia Street Two-Way Transit Priority	
			Justification / Findings / Results	Rating	Findings	Rating	Findings	Rating	Findings	Rating
ACCESSIBILITY, TRANSIT COVERAGE, AND MULTIMODAL CONNECTIONS	**Grades:** Summary of roadway grades.		**Slight grades of up to 4%** on Main Street approaching 3rd Avenue.		**Slight grades of up to 4%** on Main Street approaching 3rd Avenue.		**Moderate to steep grades of approximately 11%** on Marion Street (uphill). Steep grade turns to and from 3rd Avenue. Buses on Columbia Street may need to reduce speed crossing 2nd Avenue to avoid bottoming out.		**Moderate to steep grades of approximately 8%** on Columbia Street. Steep grade turns to and from 3rd Avenue, but buses could pass each other while turning. Buses on Columbia Street may need to reduce speed crossing 2nd Avenue to avoid bottoming out.	
	Bus Stops: Evaluation of sizing, location, and accessibility for buses. (Number separated by a '/' indicate the bus stop could be longer if permitted to span an alleyway or driveway	All pathways would provide bus stops on surface Alaskan Way near Dearborn Street, and on 3rd Avenue north of Marion Street. All bus stops are in-lane, far-side of intersections, and provide adequate spacing for multiple buses.	Main Street @ Occidental provides approximately: **120/250 foot Inbound bus stop** Washington Street @ Occidental provides approximately: **120/250 foot Outbound bus stop**		Main Street @ Occidental provides approximately: **120/250 foot Inbound bus stop** **120/250 foot Outbound bus stop**		Marion Street @ Western Avenue provides approximately: **110/230 foot Inbound bus stop** Columbia Street @ Western Avenue provides approximately: **110/240 foot Outbound bus stop**		Columbia Street @ Western Avenue provides approximately: **110/240 foot Inbound and Outbound bus stops** Proximity of Post Alley may warrant separate bus stops for RapidRide and local transit on Columbia Street.	
	Multimodal and Neighborhood Connectivity: Proximity to other major destinations.	All pathways would provide a bus stop near the stadiums at Alaskan Way and Dearborn Street, and to the Downtown Seattle Transit Tunnel on 3rd Avenue.	Provides a bus stop close to the proposed First Hill Streetcar. **Connections to both Pioneer Square and International District neighborhoods** 0.30 miles to King Street Station 0.15 miles to Stadium District (Quest Field) 0.30 miles to International District Station 0.05 miles to DSTT 0.30 miles to WSF Colman Dock		Provides a bus stop close to the proposed First Hill Streetcar. **Connections to both Pioneer Square and International District neighborhoods** 0.30 miles to King Street Station 0.15 miles to Stadium District (Quest Field) 0.30 miles to International District Station 0.05 miles to DSTT 0.30 miles to WSF Colman Dock		Provides a bus stop approximately 4 blocks from the First Hill Streetcar **Provides bus stop across the street from Colman Dock** 0.40 miles to King Street Station 0.15 miles to Stadium District (Quest Field) 0.50 miles to International District Station 0.10 miles to DSTT 0.10 miles to WSF Colman Dock		Provides a bus stop approximately 4 blocks from the First Hill Streetcar **Provides bus stop across the street from Colman Dock** 0.40 miles to King Street Station 0.15 miles to Stadium District (Quest Field) 0.50 miles to International District Station 0.10 miles to DSTT 0.10 miles to WSF Colman Dock	
	Accessibility: Ability of new and infrequent riders to understand the service and find stops and accessibility for all patrons.	All pathways would be designed to the same standards, having the same look and feel Metro is known for.	Split service between Main Street and Washington Street is slightly more complicated than service operating on the same street for new and infrequent riders to make a round-trip. Two bus stops in Pioneer Square district to access service.		Inbound and outbound service operates on the same roadway. Two bus stops in Pioneer Square district to access service **Two-way transit lanes** with limited access would increase the visibility of this corridor as a transit corridor. **Provides wider sidewalks on both sides of Main Street.**		Split service is slightly more complicated than service operating on the same street for new and infrequent riders to make a round-trip. One bus stop before 3rd Avenue for connections to center city		Two-way transit lanes with limited access would increase the visibility of this corridor as a transit corridor. One bus stop before 3rd Avenue for connections to center city	

Metric	Measure of Effectiveness	Common to All Pathways	Level 2 Pathways							
			Main Street/ Washington Street Transit Couplet		Main Street Two-Way Transit Priority		Columbia Street/ Marion Street Transit Couplet		Columbia Street Two-Way Transit Priority	
			Justification / Findings / Results	Rating	Findings	Rating	Findings	Rating	Findings	Rating
	Population: Number of people living within ¼ mile of bus stop.		**Approximately 8,800 people have access to transit** within one quarter-mile of proposed bus stops. The number of people would increase with the planned Stadium Place development		**Approximately 8,800 people have access to transit** within one-quarter mile of proposed bus stops. This would increase with the planned Stadium Place development		**Approximately 2,100 people have access to transit** within one-quarter mile of proposed bus stop.		**Approximately 2,100 people have access to transit** within one-quarter mile of proposed bus stop.	
NEIGHBORHOOD AND STAKEHOLDER IMPACTS	**Urban form:** Neighborhood concerns and increased pedestrian activity.	Pedestrian activity would increase with higher volumes of buses traveling through the area.			**Provides wider sidewalks on both sides of Main Street.**					
	Business and Residential Access: Estimated on-street parking removal or restriction or limitation on deliveries.	Deliveries would not be restricted.	**Net loss of approximately 35 on-street parking spaces:** 8 on Main Street and 23 on Washington Street to accommodate transit lanes.		**Loss of approximately 20 on-street parking spaces** on Main Street to accommodate transit lanes. Special use parking spaces for fire department and charter bus could be relocated to 2nd Avenue or Washington Street. Parking east of 3rd Avenue would be retained on Main Street.		**Loss of approximately 23 on-street parking spaces** on Marion Street to accommodate transit lanes.		**Loss of approximately 22 on-street parking spaces** on Columbia Street to accommodate transit lanes.	
	Noise: Qualitative assessment of noise levels on adjacent residential land use.	The 60-foot diesel-hybrid buses are noisier than passenger cars, but not as noisy as garbage trucks.	Land use is a mix of retail, office, and residential.		Land use is a mix of retail, office, and residential.		Land use is predominantly office buildings and parking garages.		Land use is predominantly office buildings and parking garages.	

Appendix A

Annotated Bibliography of Southend Projects

City of Seattle. Seattle Department of Transportation, *First Hill Streetcar, Transportation Technical Report*. August 27, 2010. Accessed at: http://www.seattlestreetcar.org/about/docs/sepa/Appendix%20F%20-%20Transportation%20Technical%20Report.pdf

The proposed First Hill Streetcar links First Hill employment centers to the regional transit system via connections on Capitol Hill and in the International District. The First Hill Streetcar will also connect diverse and vibrant neighborhoods on Capitol Hill, First Hill, and in the Chinatown/International District, while serving medical centers (Harborview, Swedish, and Virginia Mason) and higher education (Seattle Central Community College and Seattle University). The route, which is approximately 2.5 miles, will operate primarily on Broadway, E Yesler Way, and S Jackson Street, with ten proposed stop locations in the vicinity of Broadway at E Denny Way; Broadway at E Union Street; Broadway at E Marion Street; Broadway at E Terrace Street; E Yesler Way at Broadway; 14th Avenue S at E Yesler Way; S Jackson Street at 12th Avenue S; S Jackson Street at 7th Avenue S; S Jackson Street at 5th Avenue S; and 2nd Avenue S at S Jackson Street.

- **Potentially Affected Pathways:** 2A, 2B, and 3A.
- **Conclusions:** Along S Jackson Street, between Rainier Avenue S and 2nd Avenue S, the proposed track and roadway configuration would provide for independent streetcar and bus operations in different travel lanes, and with independent stops, westbound from Rainier to 5th Avenue S and eastbound east of 8th Avenue S. The streetcar and buses would share a travel lane eastbound between 6th Avenue S and 8th Avenue S. Cross-platform transfers would be available from the center streetcar platforms at 8th Avenue S and 5th Avenue S to the sidewalk bus stops in these locations. The City and Metro are currently converting several of the bus stops in this segment to in-lane bus stops with side stop platforms, as part of the Rainier Transit Priority Corridor project. Westbound deadheading buses would share a travel lane with the streetcar when making their return to base via S Jackson Street and 5th Avenue S.

City of Seattle. Zimmer, Gunsul, Frasca Architects LLP, *King Street Station Restoration Phase II*. February 17, 2009. Accessed at: http://www.seattle.gov/transportation/docs/ks/KSShubreferencetotal.pdf

Under Phase II, key improvements will be made in King Street Station to meet the intent of the urban vision. These improvements include full restoration of the building's public spaces and circulation; cost-effective and low-impact seismic, code and accessibility upgrades; energy-efficient mechanical and electrical systems upgrades; and enhanced vehicular and pedestrian connections.

- **Potentially Affected Pathways:** None.
- **Conclusions:** Phase II improvements largely improve and maintain the historic quality of the station, improve multimodal connections, and set the groundwork for future land and economic development and would not substantially affect the Southend Transit Study pathways.

City of Seattle. Department of Planning and Development, *Livable South Downtown Planning Study*. December 2009. Accessed at: http://www.seattle.gov/DPD/cms/groups/pan/@pan/@plan/@proj/documents/web_informational/dpdp018365.pdf

The Livable South Downtown project was a planning process that analyzed a variety of land use changes in the Pioneer Square, Chinatown/International District, and the Greater Duwamish Manufacturing and Industrial Center areas. The Preferred Alternative changes zoning, densities, and height limits in the western, central, and eastern portions of the study area.

- **Potentially Affected Pathways:** All pathways would generally be affected by increased congestion. Pathways along 1st Avenue S (1B, 5B, and 6B) would experience more noticeable decreases in transit operating speeds.
- **Conclusions:** Future infill would contribute to increased congestion throughout most of South Downtown, which, in turn, would also reduce overall bus transit performance unless other bus-related street network improvements are made. Average operating speeds are expected to decrease along major corridors, most notably along Rainier Avenue S, S Jackson Street, and 1st Avenue S. Approximately 850 to 1,300 park spaces could also be removed as a result of infill, which could increase the demand for transit service. Green Streets are also proposed for Occidental Avenue S, S Washington Street, S Main Street, Maynard Avenue S, S Lane Street, S King Street, and S Weller Street, but would largely not affect the Southend Transit Study pathways.

Proposed and Existing Green Streets for South Downtown

City of Seattle. Department of Planning and Development and Seattle Department of Transportation, *Downtown Seattle, Seattle Public Spaces & Public Life*. 2009. Accessed at: http://www.seattle.gov/DPD/cms/groups/pan/@pan/@plan/@proj/documents/web_informational/dpdp020164.pdf

The vision for the King Street Station is to create an attractive gateway to the City, develop public spaces with strong character and identity, efficiently connect various modes of transportation, transform the front parking area into a forecourt, cover or screen some of the visible train rails, and build up the urban fabric.

- **Potentially Affected Pathways:** None.
- **Conclusions:** This project established the vision, feel, and functionality of King Street Station, which would improve the user experience, but would ultimately not have operational impacts to the Southend Transit Study pathways.

City of Seattle. Seattle Department of Transportation, *Center City Circulation Report*. December 2003. Accessed at: http://www.seattle.gov/transportation/ppmpcentercity.htm

The goal of the Center City Circulation Report is to present a clear and coherent conceptual approach for maximizing access to downtown by improving and integrating downtown's public transit, bicycle and pedestrian networks. The project is a macro-scale effort to integrate several independent transportation projects that will affect the Center City, including light rail, bus, monorail,

streetcar, ferry terminal, Alaskan Way Viaduct and Seawall (AWVS), and bicycle and pedestrian projects.

- **Potentially Affected Pathways:** None.
- **Conclusions:** Due to the macro-scale nature of the project, the recommendations focus on improving the quality of service around transit hub areas, identifying gaps where additional corridor master plans are needed, and emphasize coordination with other major transportation projects in the area. This report specifically identifies upgrading the pedestrian realm of 4th Avenue S to include lighting, sidewalk plantings, and more and wider sidewalks.

City of Seattle. *Waterfront Seattle*. Accessed at: http://waterfrontseattle.org/home/

The Waterfront Seattle project is currently in the early stages of planning and will ultimately redesign a portion of Alaskan Way from King Street to Pine Street to create a new urban street that will accommodate all modes of travel and reclaim the waterfront area for the public.

- **Potentially Affected Pathways:** 1A, 2A, 2B, 3A, and 5A.
- **Conclusions:** Pathways 1A, 2A, 2B, 3A, and 5A are expected to be affected as a result of shared alignments with the project. While the exact improvements associated with the Waterfront Seattle project are unknown, it is unlikely that any improvements would preclude the Southend Transit Study pathways or require substantial route diversions.

City of Seattle. Seattle Department of Transportation, *King Street Station Multimodal Transportation Hub Strategy*. Accessed at: http://www.seattle.gov/transportation/kingstreethub.htm

King Street Station is one of three Center City Multimodal Transportation Hubs that serves inter- and intra-city bus, commuter rail, light rail, and freight. The Hub study area covers roughly eight blocks of the Pioneer Square and Chinatown/International District neighborhoods. Within these neighborhoods, draft recommendations have identified several short-, mid-, and long-term projects.

Hub projects that could most substantially affect the Southend Transit Study pathways include: S4 (signal timing revisions along S Jackson Street at 4th and 5th Avenue S), S5 (potential removal of existing signal at 2nd Avenue S Extension/S Jackson Street), M1 (re-route 2nd Avenue S Extension traffic to S Main Street and 4th Avenue S), M4 (create green streets along S Main Street, 3rd Avenue S, 2nd Avenue S, and Occidental Avenue S), and M15 (evaluate transit priority improvements along 4th Avenue S).

- **Potentially Affected Pathways:** Project S4 could affect pathways 4A, 4B, 6A, 6B, and 7A. Project S5 could affect pathways 2A and 2B. Project

M1 could affect pathways 4A, 4B, 6A, 6B, 7A. Project M4 could affect pathways 2A, 2B, and 3A. Project M15 could affect pathways 2A, 2B, 3A, 4A, 4B, 6A, 6B, and 7A.

- **Conclusions:** The King Street Station Multimodal Transportation Hub Strategy projects would generally improve transit operations, even with minor route revisions. It is unlikely that any of the Hub projects would preclude or adversely affect the Southend Transit Study pathways.

City of Seattle. Seattle Department of Transportation, *South Spokane Street Project*. Accessed at: http://www.seattle.gov/transportation/spokanestreet.htm

The South Spokane Street Viaduct is a 60-year old elevated roadway that serves 65,000-70,000 vehicles per day between I-5 and the West Seattle Bridge. SDOT is widening and improving the South Spokane Street Viaduct, which creates a new two-lane eastbound off-ramp leading to Fourth Avenue South; relocates the westbound on- and off- ramps to a new First Avenue South ramp; widens the upper roadway to the north by 41 feet between Sixth Avenue South and East Marginal Way; and rebuilds the lower roadway in concrete, with new curbs, sidewalks and improved pedestrian and bicycle access. Work on this long-awaited project began in 2008 and is set to wrap up in 2012.

- **Potentially Affected Pathways:** 6A, and 7A.
- **Conclusions:** Pathway 6A would access the West Seattle Bridge via I-5 and continue through the study area to West Seattle. Given that the route for Pathway 6A would not be affected, the effects of this project on Pathway 6A would likely be limited to the operational benefits of the project. The outbound route for Pathway 7A would access the West Seattle Bridge from the new 1st Avenue S ramps that are associated with the South Spokane Street Project. As a result, if the new 1st Avenue S ramps are not completed, this pathway would need to be altered. However, this project is expected to be completed in the Spring of 2012.

Juel, Jeff and Wang, Ming. Inca Engineers Inc., *Investigation of the Main and Washington Couplet Analysis, Main & Washington Transit Couplet Analysis*. March 24, 2008.

The purpose of this project was to develop conceptual improvements that would allow transit to operate efficiently between 1st Avenue S and 3rd Avenue. Two east-west routes were evaluated:

Route 1 - Southeast-bound (SEB) on 3rd Avenue, then SB on 3rd Avenue to westbound (WB) on S Main Street to SB on 1st Avenue / NB on 1st Avenue to eastbound (EB) on S Main Street to NB on 4th Avenue to NWB on Prefontaine Place S to NWB on 3rd Avenue.

Route 2 - SEB on 3rd Avenue then SB on 3rd Avenue to WB on S Washington Street to SB on 1st Avenue / NB on 1st Avenue to EB on S Main Street to NB on 4th Avenue to NWB on Prefontaine Place S to NWB on 3rd Ave.

The analysis consisted of whether existing curb locations would be sufficient in accommodating the design vehicle and whether or not the design vehicle would encroach on traffic in the side street while turning. Existing parking spaces, stop bar locations, and existing street car tracks on Main Street were also taken into consideration.

- **Potentially Affected Pathways:** All pathways.
- **Conclusions:** All pathways could potentially be affected given that many of the Southend Transit Study pathways share portions of the same alignments studied in the Main & Washington Couplet Analysis. However, the effects of the Main & Washington Couplet Analysis would generally be beneficial to the Southend Transit Study given that the project largely consists of improving turning radii for transit vehicles.

Washington State Department of Transportation. *SR 99 – S Holgate Street to S King Street Viaduct Replacement*. Accessed at: http://www.wsdot.wa.gov/Projects/SR99/HolgateToKing

This project involves replacing about one mile of SR 99 located between S Holgate Street and S King Street. Near S Holgate Street, SR 99 would transition from an at-grade roadway to a side-by-side aerial roadway crossing over S Atlantic Street and the BNSF tail track. SR 99 would return to grade for a short distance north of S Royal Brougham Way. SR 99 would then transition to match the Bored Tunnel Alternative for the Alaskan Way Viaduct Replacement Project. In addition to replacing the existing viaduct the project would: add a new SR 99 southbound on-ramp and northbound off-ramp near S King Street; provide a new grade-separated access for freight and general purpose traffic north of S Atlantic Street; improve Colorado Avenue S between S Massachusetts Street and S Atlantic Street; provide northbound and southbound frontage roads that would provide access between Alaskan Way S and E Marginal Way S; reconfigure the intersections on S Atlantic Street that are west of First Avenue S; and relocate the BNSF tail track.

- **Potentially Affected Pathways:** 1A, 1B, 2A, 2B, 3A, 5A, 5B, and 6B.
- **Conclusions:** Southend Transit Study pathways 1A, 2A, 3A, and 5A would likely not be substantially affected because these routes connect to SR 99 to the north and south of the project and would continue through the project area as through trips. Pathways 1B, 2B, 5B, 6B connect to SR 99 at various locations between S Holgate Street and S King Street and would be affected to a greater degree if connections to SR 99 are modified as a result of the new ramps, bored tunnel, or other project elements. However, local street connectivity should be able to accommodate all pathways.

Washington State Department of Transportation. *SR 99 – Alaskan Way Viaduct Replacement*. Accessed at: http://www.wsdot.wa.gov/projects/Viaduct/

The Bored Tunnel Alternative would replace SR 99 between S Royal Brougham Way and Roy Street. Full northbound and southbound access to and from SR 99 would be provided in the south portal area between S Royal Brougham Way and S King Street. The northbound on-ramp to and southbound off-ramp from SR 99 would be reached from S Royal Brougham Way at its intersection with the East Frontage Road. The southbound on ramp to and northbound off-ramp from SR 99 would feed directly into a reconfigured Alaskan Way S. The northbound off-ramp would have a general-purpose lane and a peak hour transit-only lane to accommodate transit coming from the south and West Seattle.

The reconfigured Alaskan Way S would have three lanes in each direction up to S King Street. A new street, S Dearborn Street, would be constructed from Railroad Way S to Alaskan Way S, and would include a new signalized intersection at Alaskan Way S. This intersection would provide access to and from East Marginal Way S, which would run along the west side of SR 99.

- **Potentially Affected Pathways:** 1A, 1B, 2A, 2B, 3A, 5A, 5B, and 6B.
- **Conclusions:** The primary effects of this project relate to the access restrictions to the bored tunnel and closers of the Columbia Street and Seneca Street ramps to SR 99. All pathways could be accommodated using local street connectivity and access to the Alaskan Way surface street north of the bored tunnel.

Washington State Department of Transportation. Washington State Ferries, *Seattle Multimodal Terminal at Colman Dock Project*. Accessed at: http://www.wsdot.wa.gov/projects/ferries/colmanmultimodalterminal/

The Seattle Ferry Terminal (also known as Colman Dock) is Washington State Ferries (WSF) largest ferry terminal and is a transportation nexus for the Puget Sound area. Colman Dock is a true multimodal hub, serving general and commercial purpose traffic, high occupancy vehicles, transit, bicyclists and pedestrians.

The purpose of the project is to preserve the transportation function of an aging, deteriorating, and seismically-deficient facility to continue providing safe and reliable service. It will also address existing safety concerns related to pedestrian/vehicular conflicts and operational inefficiencies of the current terminal layout.

- **Potentially Affected Pathways:** 1A and 5A.
- **Conclusions:** Previous planning efforts included substantial expansion of the Seattle Ferry Terminal operations and also explored possibilities for redevelopment in the area. Those ideas are no longer being

evaluated because of lower ridership projections and limited available resources. The scope of the current project largely consists of replacing and re-configuring the facility within the existing site footprint. As a result, only pathways 1A and 5A, which run along SR 99 in front of Colman Dock, could potentially be affected.

Appendix B

Level 1 Screening Data Summary

Level 1 Matrix Evaluation

Proposed Criteria	Measurement	How calculated	Data Source	Direction	Alaskan & Yesler 1A	Alaskan, First & Yesler 1B	Alaskan, Jackson & Main 2A	Alaskan, King & Jackson 2B	Alaskan, Main & Washington 3A	Alaskan & Main 3B
3.1.1 Speed and Reliability					●●●○○	●●●○○	●●●○○	●●●○○	●●●●○	●●●●○
Number of signalized intersections	(# of signalized intersections for each pathway)	1) count of the # of signals along the pathways	Field / GIS	Inbound	12	17	16	15	14	14
				Outbound	12	17	15	16	12	11
Bus lane or priority lane	(approximate percent distance of pathway with bus lanes or peak period parking restrictions)	1) based on field trip then measured in GIS	Field / GIS	Inbound	28%	16%	24%	22%	26%	26%
				Outbound	28%	16%	22%	22%	26%	24%
Transit route congestion	(qualitative assessment for low, moderate, or high congestion)	1) based on knowledge of corridor and where there is congestion in the morning or evening	Field	Inbound	Moderate	Moderate	Low	Low	Low	Low
				Outbound	Moderate	Moderate	Low	Low	Low	Low
Directness of route	(# of right- and left-turns)	1) count of the # of right- and left-turns the route makes	Field	Inbound	R=1 ; L=1	R=2 ; L=2	R=2 ; L=2	R=2 ; L=2	R=1 ; L=1	R=1 ; L=1
				Outbound	R=1 ; L=1	R=2 ; L=2	R=2 ; L=1	R=2 ; L=1	R=1 ; L=1	R=1 ; L=1
Railroad crossings	(# of rail road crossings)	1) count of the number of active railroad crossings	Field / GIS	Inbound	0	0	0	0	0	0
				Outbound	0	0	0	0	0	0
Travel distance	(distance in miles of pathway)	1) measure the distance for each path in GIS from West Seattle Bridge and Spokane Street interchange to the Seneca Street / Third Avenue intersection. Write brief discussion of how routes to the south would be different (if applicable)	GIS	Inbound	2.82	2.78	2.89	2.88	2.89	2.89
				Outbound	2.82	2.78	2.80	2.80	2.81	2.81
3.1.2 Constructability / Ease of Implementation					●●●○○	●●○○○	●●●○○	●●●○○	●●●○○	●●●○○
Pavement type	(distance in miles of pavement needing to be repaved with respect to total distance)	1) based on field trip then measure in GIS	Field / GIS	Inbound	9.4%	6.1%	10.5%	10.5%	10.5%	10.5%
				Outbound	9.4%	6.1%	8.8%	8.8%	8.8%	8.8%
Improved travel surface	(distance in miles of non-concrete curb lane with respect to total distance)	1) based on field trip then measure in GIS	Field / GIS	Inbound	11%	12%	15%	17%	16%	16%
				Outbound	11%	12%	17%	17%	12%	12%
Areaways	(# of blocks within areaways)	1) based on areaway map from City of Seattle	Engineer	Inbound	4	7	7	6	6	6
				Outbound	3	7	7	7	5	5
RapidRide stations	(# of RapidRide stations and summary of sidewalk width, placement of amenities)	1) based on logical stop locations for transit service	KC Metro	Inbound	3	3	4	4	4	4
				Outbound	3	3	3	3	3	3
Utility conflict	(List of locations with potential for utility conflict or right-of-way improvements)	1) based on field and count the # of locations	Field	Both	None	None	None	None	None	None
Roadway widening	(List of locations with potential for roadway widening to accommodate bus turning movements)	1) based on field and count the # of locations	Field	Inbound	None	None	None	None	None	None
				Outbound	3rd & Yesler	3rd & Yesler	None	None	None	None
3.1.3 Non-motorized Facilities (Regional connectivity)					●●●○○	●●●○○	●●○○○	●●●●○	●●●●●	●●●●●
Bike lane	(proportion of bike lane along pathway)	1) layout bike plan on GIS 2) Mark locations where lane would cross the bike facilities and count them	GIS / Aerial	Inbound	0%	0%	0%	0%	0%	0%
				Outbound	0%	0%	2%	2%	0%	0%
Sharrows	(proportion of sharrows along pathway)	1) layout bike plan on GIS 2) Mark locations where lane would cross the bike facilities and count them	GIS / Aerial	Inbound	9%	9%	8%	2%	2%	2%
				Outbound	9%	9%	0%	0%	0%	0%
Connection to bike facilities	(# of crossings of bike facilities)	1) layout bike plan on GIS 2) Mark locations where lane would cross the bike facilities and count them	GIS / Aerial	Inbound	0	0	0	0	0	0
				Outbound	0	0	0	0	0	0

Level 1 Matrix Evaluation

Proposed Criteria	Measurement	How calculated	Data Source	Direction	Alaskan & Yesler 1A	Alaskan, First & Yesler 1B	Alaskan, Jackson & Main 2A	Alaskan, King & Jackson 2B	Alaskan, Main & Washington 3A	Alaskan & Main 3B
3.1.4 Transit Facilities, Accessibility, and Service Coverage					●●●○○	●●●●○	●●●○○	●●●○○	●●●○○	●●●○○
Service Coverage and new bus stops	(# of local and RapidRide stop proposed along pathway)	1) based on field trip and input from King County staff	Field / KC Metro	Inbound	L 5 / RR 3	L 5 / RR 3	L 6 / RR 4	L 6 / RR 4	L 6 / RR 4	L 5 / RR 4
				Outbound	L 5 / RR 3	L 5 / RR 3	L 5 / RR 3	L 5 / RR 3	L 5 / RR 3	L 5 / RR 3
Access to stadium	(distance from nearest bus stop to the stadium)	1) calculate from GIS map 2) Note for both RapidRide and local service	GIS / KC Metro	Inbound	L 0.6 / RR 0.6	L 0.5 / RR 0.5	L 0.5 / RR 0.7	L 0.4 / RR 0.7	L 0.6 / RR 0.6	L 0.6 / RR 0.6
				Outbound	L 0.7 / RR 0.7	L 0.5 / RR 0.5	L 0.5 / RR 0.5	L 0.5 / RR 0.5	L 0.6 / RR 0.6	L 0.6 / RR 0.6
Split service	(note if pathway splits service more than 1-2 blocks)	1) based on pathway alignment	KC Metro	Both	No	No	No	No	No	No
Accommodates all study routes	(note if South King County routes can't be accommodated)	1) description of whether routes would cause any out of direction travel for some routes	KC Metro	Both	Yes	Yes	Yes	Yes	Yes	Yes
3.1.5 Neighborhood Impact					●●●○○	●●●○○	●●○○○	●●○○○	●●○○○	●●○○○
Transit coverage	(potential for new stop in a neighborhood)	1) assessment of stop location based on data from by KC Metro	KC Metro	Inbound	All	All	All	All	All	All
				Outbound	All	All	All	All	All	All
Noise	(# of blocks pathway travels through Pioneer Square / brief summary of positive feedback, concerns, opposition, or not available)	1) based on pathway alignment	KC Metro	Both	7 blocks thru PS	6 blocks thru PS	11 blocks thru PS	11 blocks thru PS	14 blocks thru PS	9 blocks thru PS
3.1.6 Right-of-Way / Property Acquisition					●●○○○	●●○○○	●●●●○	●●●●○	●●●●○	●●●●○
Impacts to right-of-way	(number of intersections/locations requiring widening to adjacent property)	1) based on field trip and count the # of locations	Field		Some	Some	None	None	None	None
3.1.7 Environmental Justice					●●○○○	●●●○○	●●●○○	●●●○○	●●●○○	●●●○○
Minority populations	(provides new bus stop in minority population areas)	1) Map in GIS 2) Evaluate bus stop locations based on KC Metro	Field / GIS		Less stops b/c Alaskan	Less stops b/c Alaskan, but thru more PS	Less stops b/c Alaskan	Less stops b/c Alaskan	Less stops b/c Alaskan	Less stops b/c Alaskan
Low income populations	(provides new bus stop in low income population areas)	1) Map in GIS 2) Evaluate bus stop locations based on KC Metro	Field / GIS		Less stops b/c Alaskan	Less stops b/c Alaskan, but thru more PS	Less stops b/c Alaskan	Less stops b/c Alaskan	Less stops b/c Alaskan	Less stops b/c Alaskan
Transit dependent populations	(provides new bus stop in low income population areas)	1) Map in GIS 2) Evaluate bus stop locations based on KC Metro	Field / GIS		Less stops b/c Alaskan	Less stops b/c Alaskan, but thru more PS	Less stops b/c Alaskan	Less stops b/c Alaskan	Less stops b/c Alaskan	Less stops b/c Alaskan
3.1.8 Multimodal Connections					●●●○○	●●●○○	●●●●●	●●●●●	●●●●○	●●●●○
Connectivity to other major travel modes	(sum for each direction of the # of the 5 multimodal connections within 1/4 mile of proposed bus stops)	1) mark major connections on GIS 2) use KCM provided bus stop locations 3) use maps to calculate locations within 1/4 mile of stop	KC Metro / GIS		6	6	8	8	7	7
3.1.9 Transit Classification					●●○○○	●●●○○	●●○○○	●○○○○	●●○○○	●●○○○
Roadway transit classification	(percent of pathway on roads classified for transit use)	1) calculate percent of pathway on transit classified roadways	GIS / City of Seattle	Inbound	91%	92%	89%	85%	90%	90%
				Outbound	91%	92%	91%	91%	91%	91%

Level 1 Matrix Evaluation

Proposed Criteria	Measurement	How calculated	Data Source	Direction	Split 1st & 4th, & Edgar 4A	1st, Edgar & 4th 4B	Alaskan, Columbia & Marion 5A	Alaskan, 1st, Columbia & Marion 5B	I-5 to 4th 6A	Alaskan, Royal & 4th 6B	Airport Way 7
3.1.1 Speed and Reliability					●●○○○	●●○○○	●●●●○	●●○○○	●○○○○	●●○○○	●○○○○
Number of signalized intersections	(# of signalized intersections for each pathway)	1) count of the # of signals along the pathways	Field / GIS	Inbound	23	25	9	15	20	20	26
				Outbound	24	24	9	15	16	19	27
Bus lane or priority lane	(approximate percent distance of pathway with bus lanes or peak period parking restrictions)	1) based on field trip then measured in GIS	Field / GIS	Inbound	15%	17%	21%	7%	12%	15%	15%
				Outbound	14%	14%	23%	9%	11%	13%	12%
Transit route congestion	(qualitative assessment for low, moderate, or high congestion)	1) based on knowledge of corridor and where there is congestion in the morning or evening	Field	Inbound	Moderate	Moderate	Moderate	Moderate	High	Moderate	Moderate
				Outbound	Moderate	Moderate	Moderate	Moderate	High	Moderate	Moderate
Directness of route	(# of right- and left-turns)	1) count of the # of right- and left-turns the route makes	Field	Inbound	R=1 ; L=0	R=1 ; L=2	R=1 ; L=1	R=2 ; L=2	R=3 ; L=1	R=2 ; L=2	R=1 ; L=1
				Outbound	R=2 ; L=1	R=2 ; L=1	R=1 ; L=1	R=2 ; L=2	R=0 ; L=1	R=2 ; L=2	R=2 ; L=2
Railroad crossings	(# of rail road crossings)	1) count of the number of active railroad crossings	Field / GIS	Inbound	0	1	0	0	1	1	2
				Outbound	1	1	0	0	1	1	3
Travel distance	(distance in miles of pathway)	1) measure the distance for each path in GIS from West Seattle Bridge and Spokane Street interchange to the Seneca Street / Third Avenue intersection. Write brief discussion of how routes to the south would be different (if applicable)	GIS	Inbound	3.34	3.03	2.64	2.64	4.54	3.54	3.49
				Outbound	3.01	3.01	2.63	2.65	3.94	3.56	3.50
3.1.2 Constructability / Ease of Implementation					●●●○○	●●●●○	●●●○○	●●○○○	●●●●○	●●●○○	●●○○○
Pavement type	(distance in miles of pavement needing to be repaved with respect to total distance)	1) based on field trip then measure in GIS	Field / GIS	Inbound	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
				Outbound	0.0%	0.0%	7.9%	4.3%	0.0%	0.0%	16.8%
Improved travel surface	(distance in miles of non-concrete curb lane with respect to total distance)	1) based on field trip then measure in GIS	Field / GIS	Inbound	0%	0%	2%	24%	10%	19%	61%
				Outbound	0%	0%	10%	27%	11%	26%	77%
Areaways	(# of blocks within areaways)	1) based on areaway map from City of Seattle	Engineer	Inbound	2	2	0	5	1	1	1
				Outbound	1	1	0	6	2	2	2
RapidRide stations	(# of RapidRide stations and summary of sidewalk width, placement of amenities)	1) based on logical stop locations for transit service	KC Metro	Inbound	4	4	4	4	3	3	3
				Outbound	4	4	4	4	2	3	3
Utility conflict	(List of locations with potential for utility conflict or right-of-way improvements)	1) based on field and count the # of locations	Field	Both	None	None	None	None	None	None	None
Roadway widening	(List of locations with potential for roadway widening to accommodate bus turning movements)	1) based on field and count the # of locations	Field	Inbound	None	None	None	None	None	None	None
				Outbound	None	None	None	None	None	None	None
3.1.3 Non-motorized Facilities (Regional connectivity)					●●○○○	●●●○○	●●●●●	●●●○○	●●●○○	●○○○○	●○○○○
Bike lane	(proportion of bike lane along pathway)	1) layout bike plan on GIS 2) Mark locations where lane would cross the bike facilities and count them	GIS / Aerial	Inbound	0%	0%	0%	0%	5%	7%	0%
				Outbound	0%	0%	0%	0%	0%	7%	0%
Sharrows	(proportion of sharrows along pathway)	1) layout bike plan on GIS 2) Mark locations where lane would cross the bike facilities and count them	GIS / Aerial	Inbound	3%	10%	0%	5%	6%	11%	3%
				Outbound	6%	6%	0%	5%	0%	8%	29%
Connection to bike facilities	(# of crossings of bike facilities)	1) layout bike plan on GIS 2) Mark locations where lane would cross the bike facilities and count them	GIS / Aerial	Inbound	0	0	0	0	0	0	0
				Outbound	0	0	0	0	0	0	1

Level 1 Matrix Evaluation

Proposed Criteria	Measurement	How calculated	Data Source	Direction	Split 1st & 4th, & Edgar 4A	1st, Edgar & 4th 4B	Alaskan, Columbia & Marion 5A	Alaskan, 1st, Columbia & Marion 5B	I-5 to 4th 6A	Alaskan, Royal & 4th 6B	Airport Way 7
3.1.4 Transit Facilities, Accessibility, and Service Coverage					●●○○○	●●●●○	●●●○○	●●●●○	●○○○○	●●●●○	●○○○○
Service Coverage and new bus stops	(# of local and RapidRide stop proposed along pathway)	1) based on field trip and input from King County staff	Field / KC Metro	Inbound	L 11 / RR 4	L 8 / RR 4	L 5 / RR 4	L 6 / RR 4	L 6 / RR 3	L 6 / RR 3	L 12 / RR 3
				Outbound	L 7 / RR 4	L 7 / RR 4	L 5 / RR 4	L 6 / RR 4	L 3 / RR 2	L 4 / RR 3	L 9 / RR 3
Access to stadium	(distance from nearest bus stop to the stadium)	1) calculate from GIS map 2) Note for both RapidRide and local service	GIS / KC Metro	Inbound	L 0.3 / RR 0.3	L 0.3 / RR 0.3	L 0.6 / RR 0.6	L 0.5 / RR 0.5	L 0.3 / RR 0.3	L 0.3 / RR 0.3	L 0.7 / RR 0.8
				Outbound	L 0.3 / RR 0.3	L 0.3 / RR 0.3	L 0.7 / RR 0.7	L 0.5 / RR 0.5	L 0.7 / RR 0.7	L 0.3 / RR 0.3	L 0.7 / RR 0.7
Split service	(note if pathway splits service more than 1-2 blocks)	1) based on pathway alignment	KC Metro	Both	Yes	No	No	No	No	No	No
Accommodates all study routes	(note if South King County routes can't be accommodated)	1) description of whether routes would cause any out of direction travel for some routes	KC Metro	Both	Does not serve Burien routes	Yes	Yes	Yes	Does not serve Burien routes	Yes	Does not serve Burien routes
3.1.5 Neighborhood Impact					●●●○○	●●●○○	●●●●○	●●●●○	●●●○○	●●●○○	●●●○○
Transit coverage	(potential for new stop in a neighborhood)	1) assessment of stop location based on data from by KC Metro	KC Metro	Inbound	All	All	All	All	All	All	All
				Outbound	All	All	All	All	IND	All	All
Noise	(# of blocks pathway travels through Pioneer Square / brief summary of positive feedback, concerns, opposition, or not available)	1) based on pathway alignment	KC Metro	Both	6 blocks thru PS	6 blocks thru PS	3 blocks thru PS	3 blocks thru PS	6 blocks thru PS	6 blocks thru PS	6 blocks thru PS
3.1.6 Right-of-Way / Property Acquisition					●●●●○	●●●●○	●●●●○	●●●●○	●●●●○	●●●●○	●●●●○
Impacts to right-of-way	(number of intersections/locations requiring widening to adjacent property)	1) based on field trip and count the # of locations	Field		None	None	None	None	None	None	None
3.1.7 Environmental Justice					●●●●●	●●●●●	●●○○○	●●●○○	●●○○○	●●○○○	●●●●○
Minority populations	(provides new bus stop in minority population areas)	1) Map in GIS 2) Evaluate bus stop locations based on KC Metro	Field / GIS		serves 1st and 4th	serves 1st and 4th	Less stops b/c Alaskan	Less stops b/c Alaskan, but thru more PS	less stop b/c on I-5	Less stops b/c Alaskan	serves 1st and Airport Way
Low income populations	(provides new bus stop in low income population areas)	1) Map in GIS 2) Evaluate bus stop locations based on KC Metro	Field / GIS		serves 1st and 4th	serves 1st and 4th	Less stops b/c Alaskan	Less stops b/c Alaskan, but thru more PS	less stop b/c on I-5	Less stops b/c Alaskan	serves 1st and Airport Way
Transit dependent populations	(provides new bus stop in low income population areas)	1) Map in GIS 2) Evaluate bus stop locations based on KC Metro	Field / GIS		serves 1st and 4th	serves 1st and 4th	Less stops b/c Alaskan	Less stops b/c Alaskan, but thru more PS	less stop b/c on I-5	Less stops b/c Alaskan	serves 1st and Airport Way
3.1.8 Multimodal Connections					●●●●●	●●●●●	●●○○○	●●●●●	●●●●●	●●●●●	●●●●●
Connectivity to other major travel modes	(sum for each direction of the # of the 5 multimodal connections within 1/4 mile of proposed bus stops)	1) mark major connections on GIS 2) use KCM provided bus stop locations 3) use maps to calculate locations within 1/4 mile of stop	KC Metro / GIS		8	8	4	8	8	8	8
3.1.9 Transit Classification					●●●●●	●●●○○	●●●○○	●●●●○	●●●●●	●●○○○	●●●●●
Roadway transit classification	(percent of pathway on roads classified for transit use)	1) calculate percent of pathway on transit classified roadways	GIS / City of Seattle	Inbound	100%	92%	92%	94%	90%	91%	100%
				Outbound	92%	92%	92%	93%	100%	91%	90%

Appendix C

Two-Way Columbia Concept: Coach Test Report

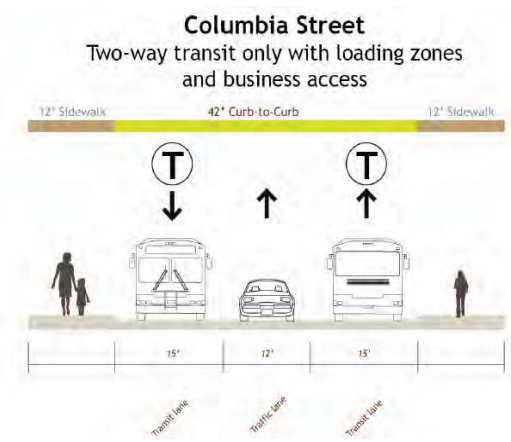
Two-Way Columbia Concept: Coach Test Report

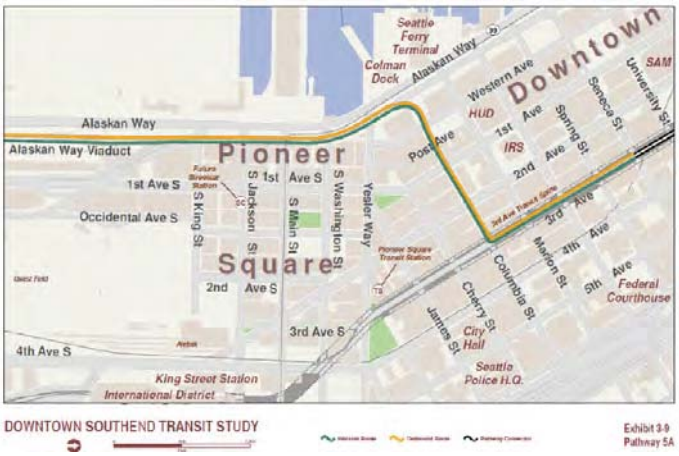
Background:

With the loss of the Columbia and Seneca Ramps during the SR 99 Tunnel project, King County Metro has been evaluating potential pathways to connect transit from south of downtown along surface Alaskan Way to the Third Avenue Transit Spine in downtown Seattle. Metro operates 45-50 coaches during the peak hour on the Columbia Street/Seneca Street ramps to and from the Alaskan Way Viaduct.

Over 19,000 riders on 11 routes use transit to get into and out of downtown Seattle every weekday using these ramps. These riders are traveling from West Seattle, Burien, White Center and other points southwest of Seattle. In fall 2012, RapidRide C Line will begin service from West Seattle to downtown Seattle. This route will be interlined with RapidRide D Line, serving Ballard, Interbay and Uptown to downtown Seattle, meaning that both lines will share the same stops through downtown.

Working with the City of Seattle, Metro evaluated 13 pathways that included surface streets, I-5 and SR99. Several pathways were eliminated due to a range of issues including traffic conflicts, impacts on transit reliability, difficulty with turn movements and other challenges that would prevent the delivery of high quality transit service. One of the remaining pathway options being considered by Metro is a Two-way Columbia street with a transit lane and general purpose lane westbound and a transit only lane in the eastbound direction from Alaskan Way to Third Avenue. Two-Way Columbia Street configuration and pathway map can be found below.





Two coach tests were conducted, the first on July 3, 2012 and the second on July 27, 2012, to evaluate the ability of transit coaches to turn on and off of Columbia Street from First and Third Avenues, and to negotiate the slope transitions at the intersections.

Staff in Attendance:

- Representatives from Metro Service Planning, Safety, Service Quality, Transit Systems and Traffic Engineering and Transit Route Facilities groups.
- Seattle Department of Transportation Transit Planning and Traffic Operations.
- Support from Metro Service Supervisors and Seattle Police Department

Coach Test Objectives

Between two coach tests, three areas of concern were tested.

Coach Test #1:

- A 40 foot coach and a RapidRide coach, with the extended nose were used for this test. Metro tested the following movements:
  1. Determine if coaches bottom out at the Second Avenue and Columbia Intersection – both at slow speeds and at operating speed.
  2. Left turn from eastbound Columbia Street to northbound Third Avenue with both coach types.

Coach Test #2:

- In-service coaches including RapidRide training coach and 60' articulated coaches were used. Metro tested the following movements:
  1. Right turn movements by coaches from southbound Third Avenue to westbound Columbia Street.

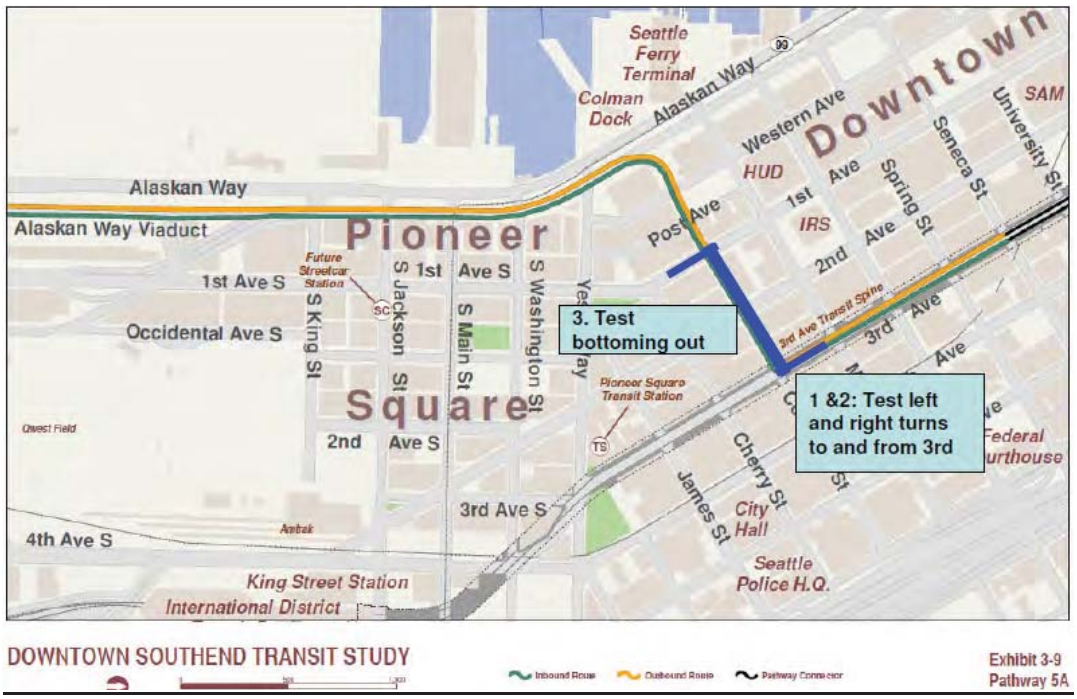


Figure 1: Coach Test Movements

Results

Coach Test #1

Due to SPD officer safety issues and traffic control, only two of the three movements were tested. Staff was able to test movement #1, the left turn from the curb lane on Columbia Street to Third Avenue and movement #3, the slow test of coaches travelling from First Avenue to Third Avenue to determine if there was bottoming out. The following was observed for these two movements:

- Coaches do not appear to bottom out at the intersection of Second Avenue and Columbia Street. Only the low- speed test was conducted and no load test was completed. A slow order may be required for coaches to negotiate these slope transitions.

- There are no fatal flaws in the turn movement from eastbound Columbia Street to northbound Third Avenue. However, there are additional improvements required to make the turn work including a setback stop bar and modifications to the intersection. The required improvements are outlined in the following section.

Coach Test #2
Staff was able to test movement #2, the right turn from the curb lane on southbound Third Avenue to westbound Columbia Street under three separate scenarios. The scenarios and observations are listed in the table below;

Scenario	Observations
No stop bar setback: Simulating a bus in the south curb lane on Columbia Street with a Metro van parked right behind the crosswalk	This turn was very tight for the RapidRide coach, requiring the operator to significantly reduce the speed of the coach to perform the turn. The turn is not possible without the coach encroaching into the left lane on southbound 3rd Ave.
10 foot stop bar setback: Simulating a bus in the south curb lane with a 10-foot stop bar setback with a Metro van.	Even with the setback, this turn was also tight for coaches with bike racks deployed. Coach gazed the van when passing. The setback provides more room to maneuver, but still cannot be completed without using both southbound lanes on 3rd Ave
15 foot stop bar setback: Simulating a bus in the south curb lane with a 15-foot stop bar setback.	The additional 5 feet of setback did not provide any improvement over the 10 foot setback.
Curb Bulb cutback, no stop bar set back: Cutting the SW corner curb bulb cut back 2 to 3 feet with no setback.	Like the stop bar setback, cutting out the curb bulb alone provides more room to maneuver, but the turn still cannot be completed without using both southbound lanes on 3rd Ave
Curb Bulb cutback, 10-foot stop bar setback: The south curb lane with a 10-foot setback and the current curb bulb cut back 2 to 3 feet.	Coaches successfully completed this turn with enough clearance to allow another bus to be in the south curb lane. Coaches could complete this turn occupying only the curb lane on southbound 3rd Ave.

Required improvements to make two-way Columbia Street work:

- **Street and intersection improvements on Columbia Street:** To ensure buses can operate on Columbia Street, several improvements are required including:
  - Intersection modifications including a 10-foot setback stop bar for the eastbound contraflow transit lane on Columbia Street, approaching Third Avenue. This will help to provide additional space for coaches turning from southbound Third Avenue onto westbound Columbia Street.
  - Preferred cut back of the bulb on the southwest corner by two to three feet including tree removal, signal pole relocation. Areaway issues need to be investigated further. Northwest corner is also an option to consider cutback to allow for more overall width on the approach.

- Early termination of pedestrian crossing on west leg of Columbia/Third Avenue intersection.
- Changes to the roadway profile between Alaskan Way and Second Avenue on Columbia Street. Needs to be designed so that coaches can operate at regular speed without bottoming out.
- Eastbound left turn signal phase for inbound buses at Third Avenue and Columbia Street. New signal span wire will need to be run across the east leg of the intersection for hanging new signal displays for new eastbound left turn phase; pole-mounted displays are not recommended due to stop bar setback. Signal poles on NE and SE corner need to be structurally evaluated to see if they can accommodate the additional signal span.
- Set back stop bar installation may also be required for coaches operating westbound Columbia Street to southbound Alaskan Way to permit right turn clearance for coaches travelling northbound Alaskan Way to eastbound Columbia Street.

- **Columbia Transit Plaza between Alaskan and Western on Columbia Street:** Further refinement to the Columbia Transit Hub, included in the city's waterfront designs.
  - Multimodal access and ease of connections between bicycles, pedestrians, transit and Washington State Ferries.
  - Full compliment of passenger amenities with RapidRide stations.
  - Enhance transit presence with shelters, signage and customer information.
  - Layover as needed for local routes
  - Minimal impacts from Streetcar operations if proposed for the waterfront.
  - Compatibility with taxi access and ferry passenger drop off areas.

- **Enhanced bus stop locations:** At least 220 feet of curb space along the pathway for each of the following:
  - One pair of bus stops near the stadiums between Dearborn and King Streets
  - One pair of RapidRide station stops on Columbia Street, nearest to Colman Dock and the waterfront.
  - Between Alaskan Way and Western Avenue for local bus service, separated from the RapidRide station stop.

- **Continuous priority pathway on Alaskan Way from Dearborn Street to Columbia Street and Third Avenue**
  - All-day, two-way bus lanes/ BAT lanes on Alaskan Way between Columbia Street and Dearborn Street that are minimally impacted by right turning traffic
  - Transit only lanes on Columbia Street
  - Transit signal priority along Alaskan Way; there is already a queue jump present in the westbound direction on Columbia Street.

Additional Considerations

Metro and City of Seattle staff, in observing the coach test, brought up additional concerns with operations on Two-Way Columbia, including:

- Grade transitions on Columbia between Western and 1st Ave need to be designed to prevent coaches from bottoming out. A coach test could be conducted on Spring Street, which has similar grades, to evaluate if significant re-grading would be needed.
- Volume of turns to and from Third Avenue and the affect of these volumes on transit operations.
- Bus stop locations on Columbia Street, which requires 180' capacity in each direction.

- Consideration of pedestrian and general purpose traffic design movement through this area, particularly the various parking garage locations on these segments and any possible conflicts. Also need to consider queue jump signal detection constraints.

Next Steps

- Begin discussions with the City of Seattle regarding the changes required.
- Perform coach test on address concerns about eastbound approach on Columbia from Alaskan Way to Third Avenue. Spring Street may have a comparable slope to test operations; also may require further discussions with the City on possible modifications when Columbia Street is redone once the Alaskan Way Viaduct on-ramp goes away.
- Investigate areaway and pole conditions at 3rd & Columbia intersection.

Appendix D

Southend Transit Pathways Survey Summary

Southend Transit Pathways Survey Summary

Construction of the Seattle central waterfront project (2016-2018) will continue affecting bus service for several more years. The construction project will close the Columbia and Seneca street ramps in 2016.

Metro is currently looking at ways to connect transit from areas to the south of downtown to Third Avenue via Alaskan Way, both during and after the construction. KCDOT Communications (Communications) and Transit conducted an online survey from June 13-28 to gather rider feedback about the two potential pathways being considered (see details below). The routes targeted for this survey included 15, 15 Express, 18, 18 Express, 21 Express, 54, 54 Express, 55, 56 Express, 113, 120, 121, 122, 125. A total of **1,561** people took the time to provide feedback via the online survey.

Columbia Street pathway

- Buses would travel in both directions on Columbia Street from Alaskan Way to Third Avenue, probably using bus-only lanes.
- A bus stop near Columbia Street and Western Avenue would be the southernmost stop in downtown Seattle for riders from Ballard, Interbay, Uptown, and Queen Anne.
- Riders in West Seattle, Burien, and southwest King County would get to destinations such as Pioneer Square and the International District via a stop near Columbia Street and Western Avenue (much like the stops that are there today).

Main/Washington streets pathway

- Buses would either travel into downtown on S Main Street and out of downtown on S Washington Street or in both directions on S Main Street, probably using bus-only lanes from Alaskan Way to Third Avenue.
- Buses would stop near S Main and S Washington streets at Occidental Avenue S.

Outreach approach and notification

The outreach process was designed to reach a sample of the bus riding population on the affected routes. More than 22,500 electronic notifications were sent to riders of the 14 routes via Metro's GovDelivery alert system, as well as to subscribers of the Metro Matters email list. In addition to direct notifications, traditional media and social media tools were used to notify people of the opportunity to 'Have a Say.' When asked how they heard about the project, the majority of survey respondents indicated a Metro email alert.

In addition to the targeted bus rider outreach, the Metro project team met with nearly a dozen neighborhood groups and business associations to hear their preferences for a pathway. A summary of these meetings is not included here.

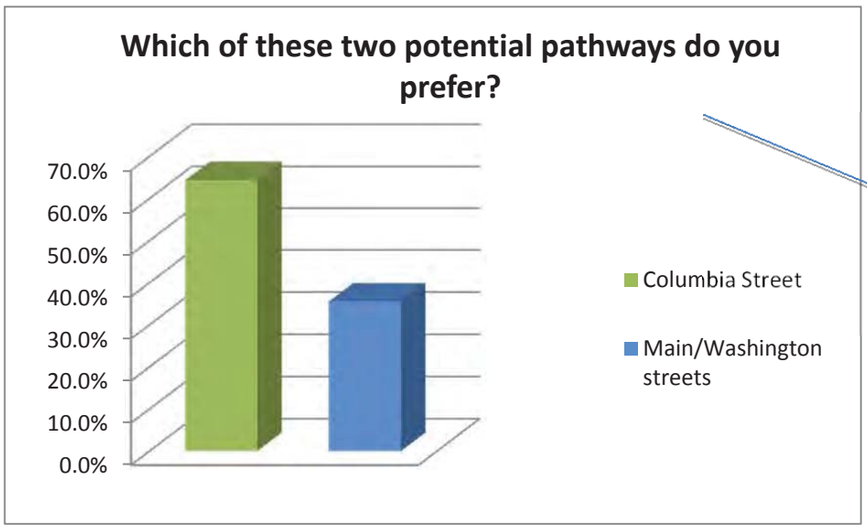
Survey respondent demographics

Survey analytics show that approximately 11 percent of respondents to the demographic questions would be classified as low income with an annual household income of $35,000 or less. Seven percent of respondents said they had a disability and of those, 70 percent said they were mobility impaired. Fourteen percent indicated they were a minority and one percent indicated English was not the primary language spoken at home.

Summary of community feedback

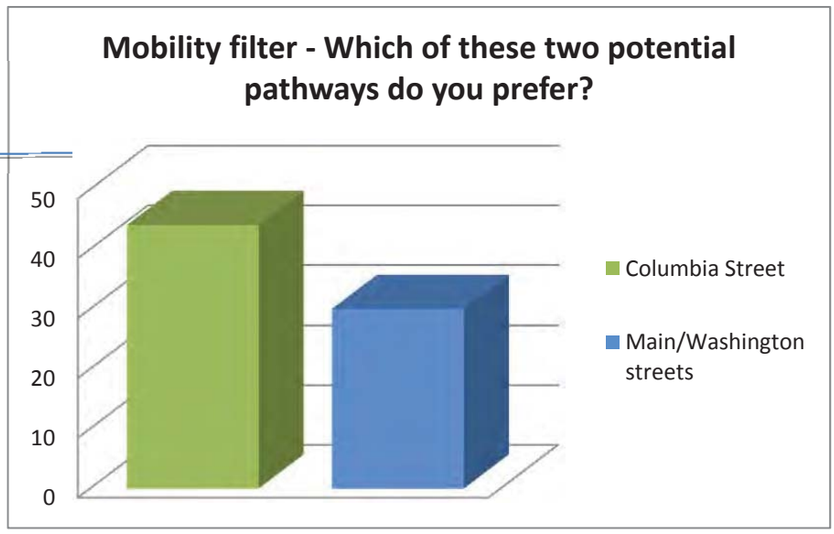
Survey respondents indicated:

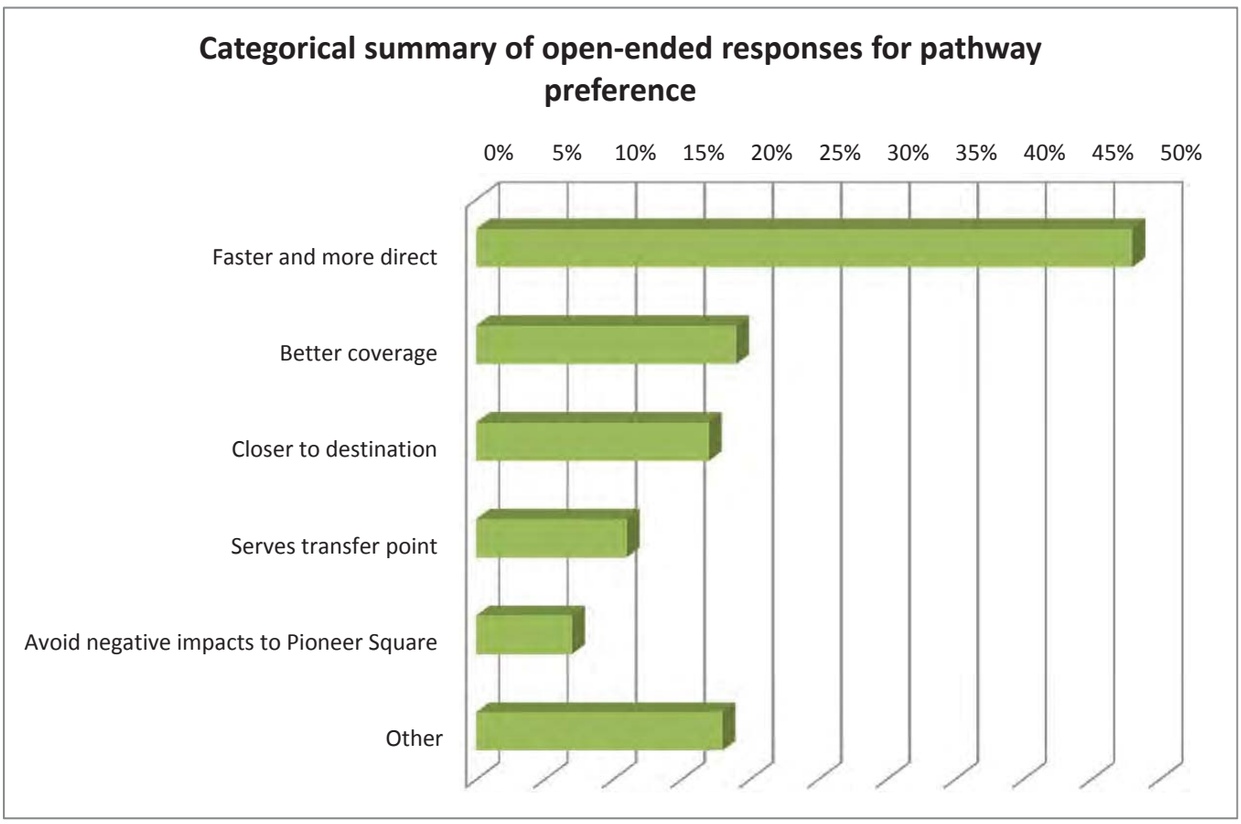
- Fast and reliable service were the most important factors in selecting a pathway; connection to Colman Ferry dock was ranked as the least important;
- A preference for the Columbia pathway among the general public and those with mobility issues; and
- City Center was the most frequent primary destination.

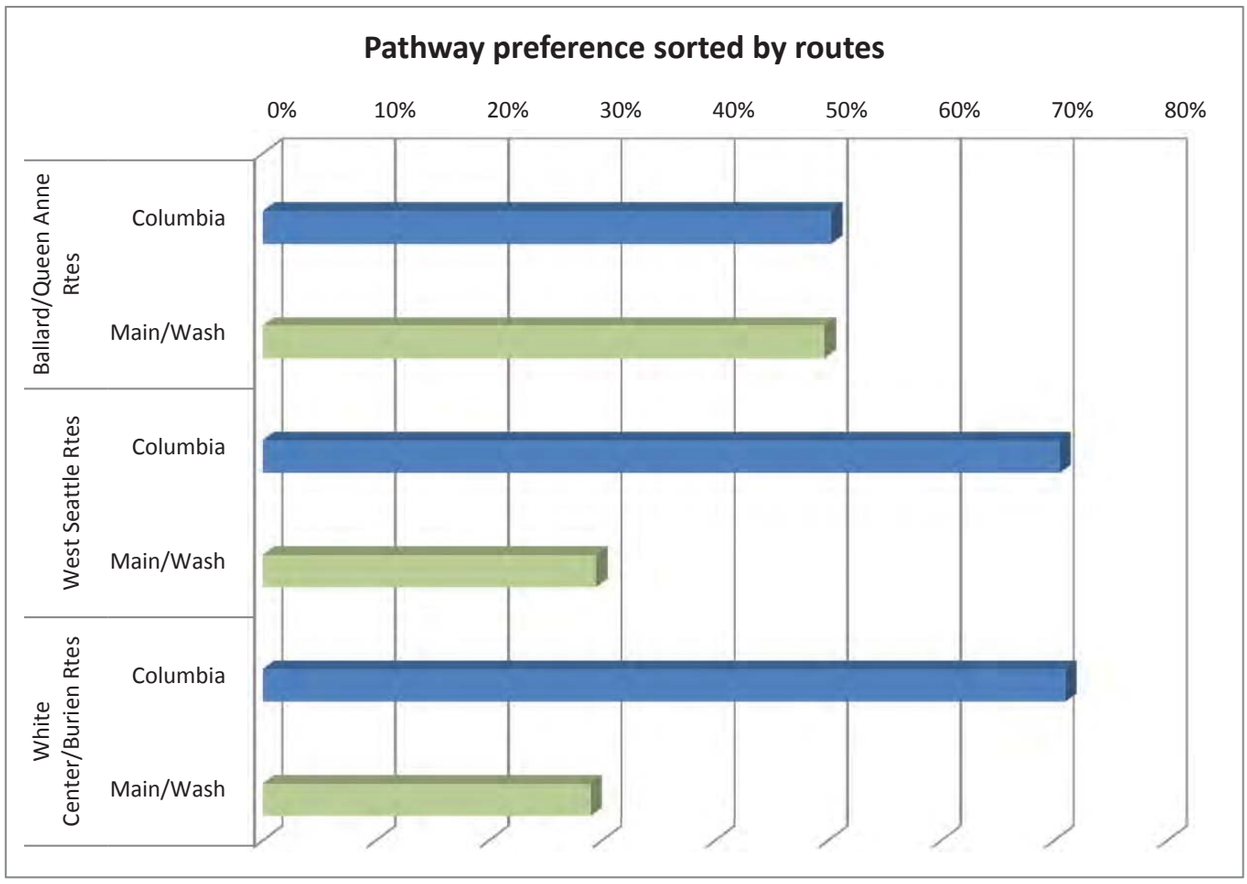


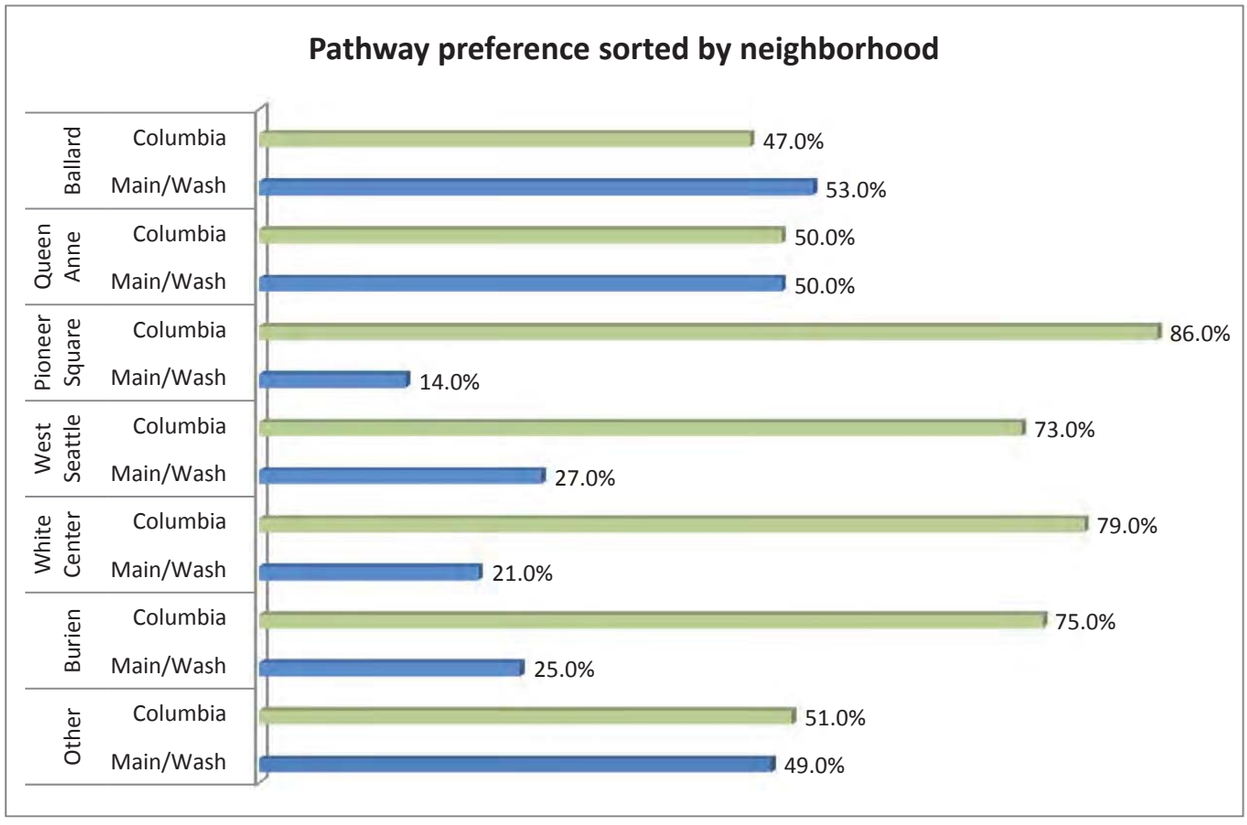
64% of the 1561 total survey respondents prefer Columbia pathway

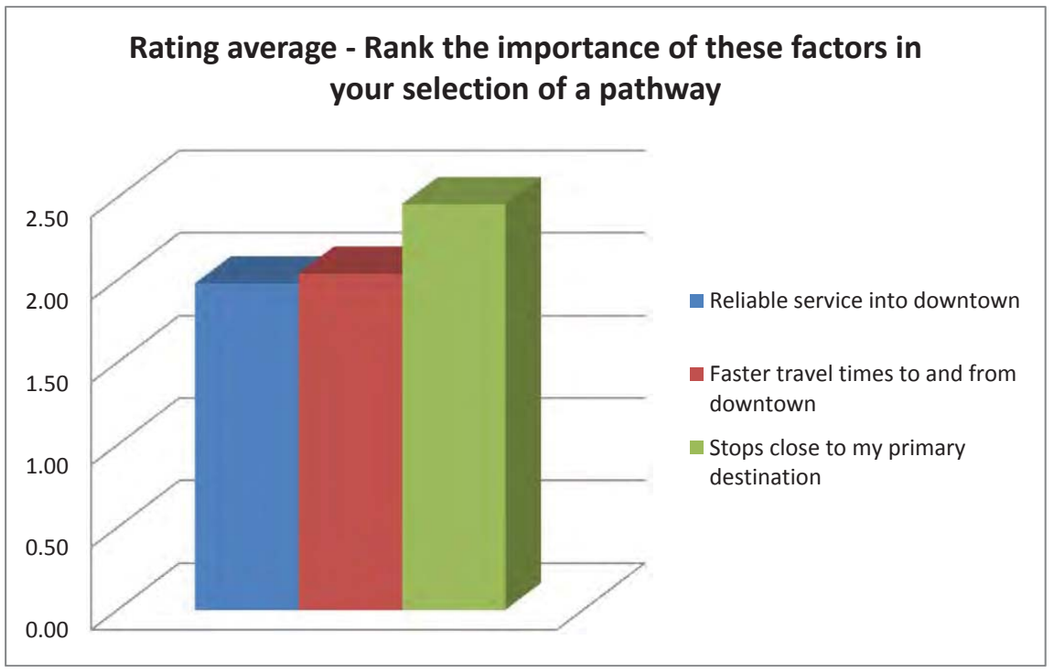
60% of the 74 respondents with mobility issues prefer Columbia pathway

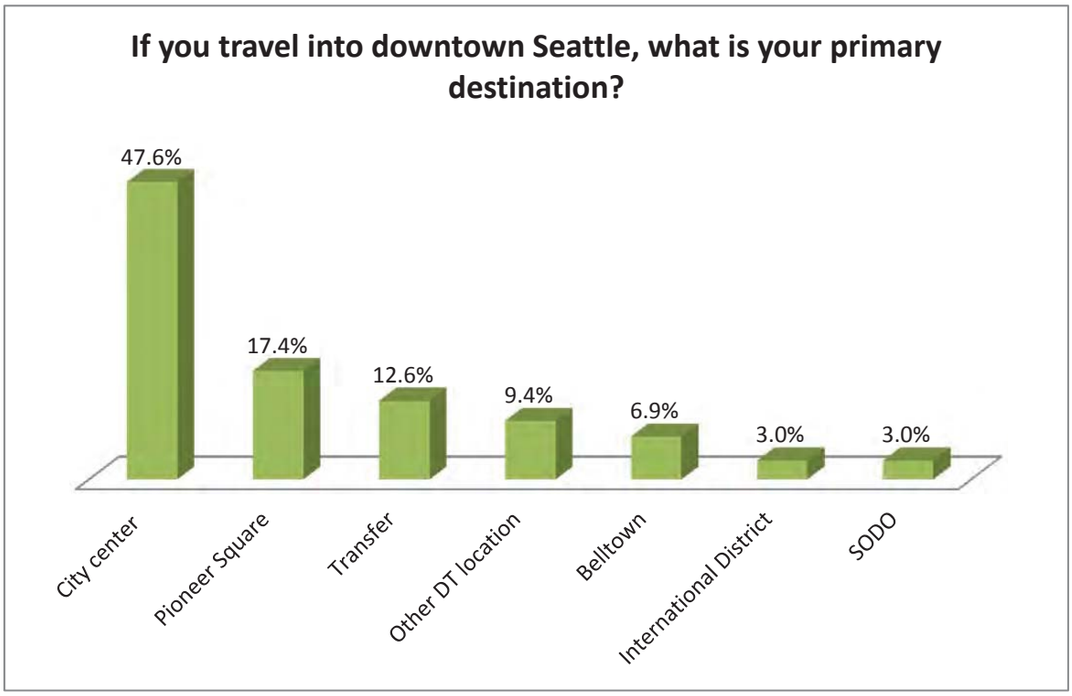


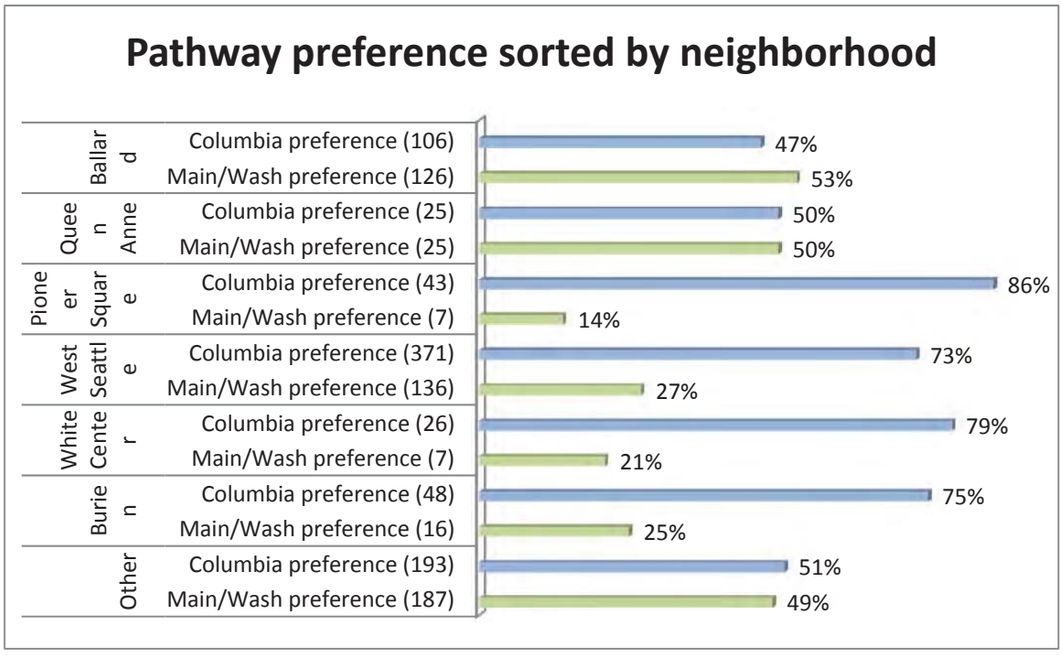



Pathway preference sorted by routes
0%
10%
20%
30%
40%
50%
60%
70%
80%
Ballard/Queen Anne Rtes
Columbia
Main/Wash
West Seattle Rtes
Columbia
Main/Wash
White Center/Burien Rtes
Columbia
Main/Wash


Pathway preference sorted by neighborhood
Ballard
Columbia
47.0%
Main/Wash
53.0%
Queen Anne
Columbia
50.0%
Main/Wash
50.0%
Pioneer Square
Columbia
86.0%
Main/Wash
14.0%
West Seattle
Columbia
73.0%
Main/Wash
27.0%
White Center
Columbia
79.0%
Main/Wash
21.0%
Burien
Columbia
75.0%
Main/Wash
25.0%
Other
Columbia
51.0%
Main/Wash
49.0%


Rating average - Rank the importance of these factors in your selection of a pathway
2.50
2.00
1.50
1.00
0.50
0.00
Reliable service into downtown
Faster travel times to and from downtown
Stops close to my primary destination


If you travel into downtown Seattle, what is your primary destination?
47.6%
17.4%
12.6%
9.4%
6.9%
3.0%
3.0%
City center
Pioneer Square
Transfer
Other DT location
Belltown
International District
SODO


Pathway preference sorted by neighborhood
Ballard
Columbia preference (106)
Main/Wash preference (126)
47%
53%
Queen Anne
Columbia preference (25)
Main/Wash preference (25)
50%
50%
Pioneer Square
Columbia preference (43)
Main/Wash preference (7)
86%
14%
West Seattle
Columbia preference (371)
Main/Wash preference (136)
73%
27%
White Center
Columbia preference (26)
Main/Wash preference (7)
79%
21%
Burien
Columbia preference (48)
Main/Wash preference (16)
75%
25%
Other
Columbia preference (193)
Main/Wash preference (187)
51%
49%