

SOUTHWEST CORRIDOR PLAN - DRAFT STAFF RECOMMENDATION FOR JULY 2015 DECISIONS

Making investments in the Southwest corridor

The Southwest Corridor Plan is an outcomes-oriented effort focused on supporting community-based development and placemaking that targets, coordinates and leverages public investments to make efficient use of public and private resources. The plan was developed to support achieving four balanced goals:

Accountability and partnership Partners manage resources responsibly, foster collaborative investments, implement strategies effectively and fairly, and reflect community support.

Prosperity People live, work, play and learn in thriving and economically vibrant communities where everyday needs are easily met.

Health People live in an environment that supports the health of the community and ecosystems.

Access and mobility People have a safe, efficient and reliable network that enhances economic vitality and quality of life.

Overview

The Southwest Corridor of the Portland metropolitan region contains diverse cities and neighborhoods, natural areas and landmarks that contribute to its identity and regional significance. Interstate 5, Highway 217 and 99W-Pacific Highway carry cars, buses and trucks in and around the corridor each day, communities are creating walkable and bikeable town centers, and people come from throughout the region to enjoy natural areas such as the Fanno Creek Trail and the Tualatin River Greenway Trail.

Yet the quality of life is being compromised by traffic gridlock and lack of mobility and connections between and among communities for people driving, taking transit, bicycling or walking.

The Southwest Corridor is home to tens of thousands of the region’s residents and provides a quarter of the region’s jobs. These numbers are expected to double by 2035, making safer, more efficient travel in and around the corridor a top priority for the entire metropolitan region.

Five years ago, regional leaders began envisioning a set of transportation and land use solutions to address key challenges and enhance livability in the Southwest

Corridor. Some people think the Southwest Corridor Plan is only about high capacity transit (light rail or bus rapid transit) – but it’s much more.

The Southwest Corridor Plan is a package of transit, roadway, bicycle and pedestrian solutions that can help reduce congestion, improve circulation and improve quality of life in this corridor. The Southwest Corridor Plan defines investments to help realize the local land use visions adopted by each community in the area. Community members, business leaders, transit providers, the state and local governments are working together now to plan for these transportation and community development improvements in this corridor.

On July 13, 2015, the Southwest Corridor Plan Steering Committee will consider whether several high capacity transit (HCT) alignments under consideration in Southwest Portland will continue to be studied as part of the project. Staff from Southwest Corridor project partners have developed this set of draft recommendations to inform the committee and aid their deliberations and decision making. Staff formed these recommendations based upon direction from the committee, technical analysis and consideration of input from community groups and the general public.

Steering committee members

- Metro Councilor Craig Dirksen, co-chair
- Metro Councilor Bob Stacey, co-chair
- Sherwood Mayor Krisanna Clark
- Tigard Mayor John Cook
- Beaverton Mayor Denny Doyle
- TriMet General Manager Neil McFarlane
- Portland Commissioner Steve Novick
- Tualatin Mayor Lou Ogden
- Washington County Commissioner Roy Rogers
- Durham Mayor Gery Schirado
- King City Commissioner Suzan Turley
- ODOT Region 1 Manager Rian Windsheimer

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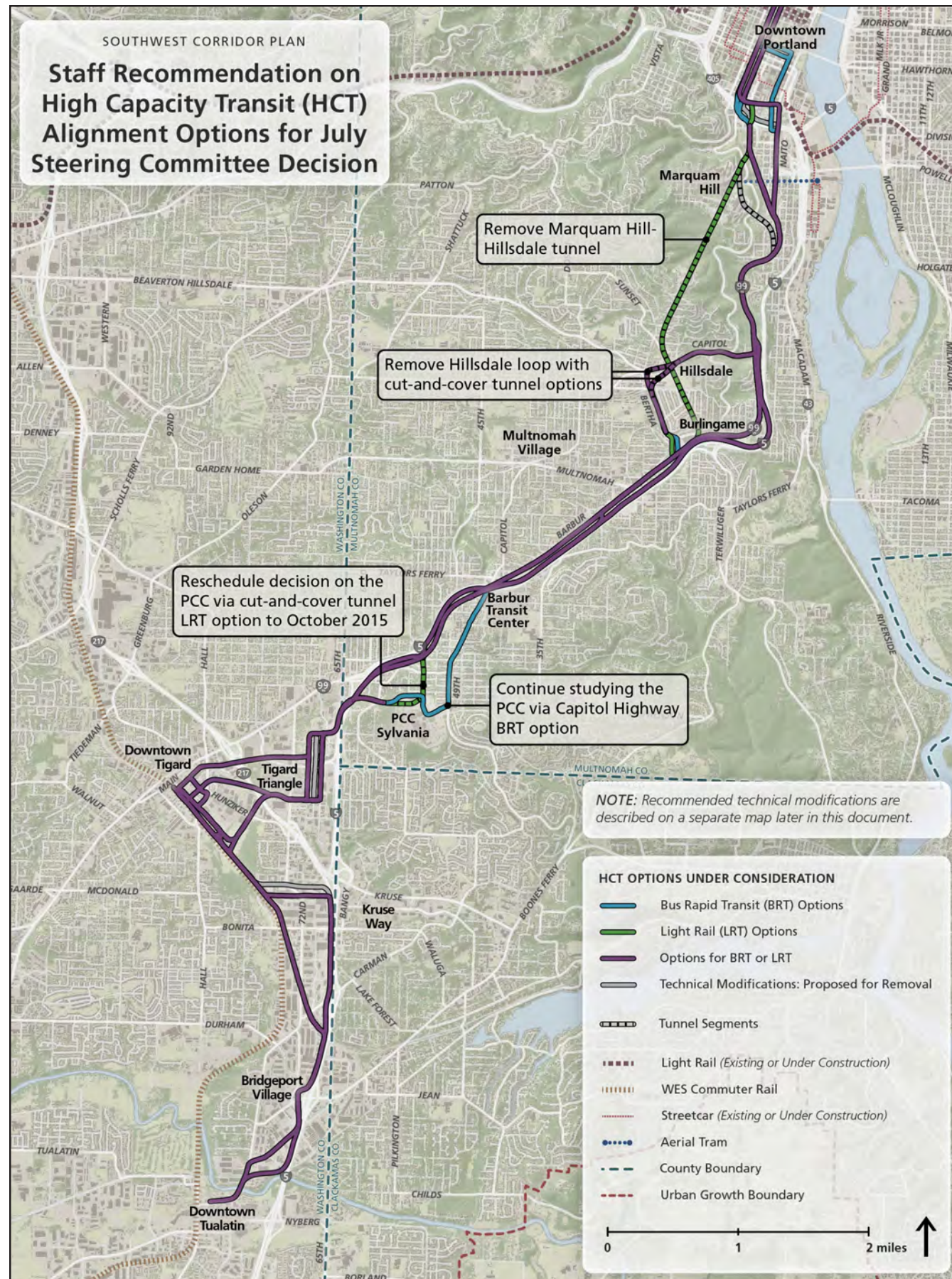
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Staff recommendation summary

Staff requests that the steering committee consider the following recommendations:

- Remove the Marquam Hill-Hillsdale tunnel from further consideration and continue to study alternative means of accessing Marquam Hill from a surface HCT alignment, as well as improvements to local transit service.
- Remove the Hillsdale cut-and-cover tunnel alignments for light rail and bus rapid transit from further consideration and continue to study other means of improving access to the Hillsdale town center.
- Reschedule the decision regarding the PCC-Sylvania light rail cut-and-cover tunnel to October 2015. From July through September, the project team will conduct additional analysis and public outreach to better understand trade-offs of direct service versus cost and construction impacts, and to learn more about future campus planning efforts.
- Continue further study of the bus rapid transit direct connection to the PCC Sylvania campus, via SW Capitol Highway.
- Adopt several HCT alignment modifications both in response to steering committee requests and based on further technical analysis, as published in the 'HCT alignment modifications based on technical analysis' document.

Alignments under consideration

The committee is considering whether to continue the study of the following alignments:

Marquam Hill-Hillsdale deep-bored tunnel between downtown Portland and SW Bertha Boulevard (light rail only)

- This option would tie into the downtown Transit Mall via a new bridge at SW Fourth Avenue connecting to the Portland-Milwaukie light rail (Orange Line MAX) tracks at SW Lincoln Street. Access to the tunnel portal would be in the vicinity of SW Hooker Street.
- The tunnel would extend under Marquam Hill with a deep station (more than 220 feet below grade) to directly access Oregon Health & Science University (OHSU) and indirectly connect to the VA Medical Center and Casey Eye Institute through the OHSU campus.
- A second station (approximately 140 feet deep) would be located under the Hillsdale town center, near the intersection of SW Capitol Highway and SW Sunset Boulevard.
- The tunnel would exit the hillside in the vicinity of SW Bertha Boulevard where it meets SW Barbur Boulevard. A station in this location (near SW Custer Street and SW 13th Avenue) would likely need to be elevated above Barbur to avoid traffic impacts and to provide a station in the desired area.
- With this alignment option, there would be no surface connections to inner southwest Portland south of I-405.

Hillsdale loop with cut-and-cover tunnel using Barbur Boulevard south of SW Hamilton Street, looping through the Hillsdale town center via Capitol Highway and Bertha Boulevard, including a cut-and-cover tunnel in or near the town center commercial area (bus rapid transit or light rail)

- A surface alignment on Capitol Highway in Hillsdale would have major impacts to the main street in order to maintain vehicle lanes and run HCT in exclusive right-of-way. Therefore, in July 2014 the steering committee recommended that only HCT in a cut-and-cover tunnel should be considered further. A cut-and-cover tunnel entails excavating along the path of the tunnel, building the tunnel structure within this excavated trench, and then covering up the tunnel and rebuilding any disrupted roadways, structures or fields above.
- This option would depart from the Barbur alignment at the Capitol southbound off-ramp. HCT would cross the southbound lanes of Barbur on a new overpass structure and then run in the center of Capitol. Near SW Sunset Boulevard, HCT would enter a portal to drop under Capitol in the cut-and-cover tunnel, and then could either continue under Capitol to SW Bertha Boulevard or sweep to the south, passing behind the commercial buildings and under the sports fields next to Rieke Elementary School. HCT would emerge from the tunnel at a portal on Bertha near the intersection with SW Vermont Street.
- The Hillsdale HCT station would be located underground near the intersection of Capitol and Sunset. The Burlingame station on Barbur would be located in the vicinity of SW Custer Street and 13th Avenue.

PCC via Capitol Highway (bus rapid transit only)

- This alignment is unique to bus rapid transit due to the steep slopes around the Campus, which light rail cannot operate on without a tunnel.
- The route would depart Barbur at the Crossroads intersection and run in the center of Capitol Highway and SW 49th Avenue to the PCC Sylvania campus. Bus rapid transit would then head west through campus and then run on a new structure stretching from SW Lesser Road across I-5 to the Tigard Triangle.
- This alignment would include a station at the “front door” of the PCC campus, as well as a station on Capitol Highway, near Holly Farm Park and the Capitol Hill Library. The alignment would include parallel bike and pedestrian facilities along Capitol and SW 49th Avenue.

PCC via cut-and-cover tunnel (light rail only)

- This light rail-only alignment would run along Barbur from the Barbur Transit Center to SW 53rd Avenue, and then enter a cut-and-cover tunnel running underneath 53rd Avenue toward the PCC campus. An underground station would serve PCC. Light rail would then run west and emerge from the cut-and-cover tunnel near SW Lesser Road. As with the direct bus rapid transit connection alignment, light rail would travel through a wooded area and across I-5 into the Tigard Triangle on a new bridge.
- This alignment would include bike and pedestrian facilities along Barbur north of 53rd Avenue.



High capacity transit options in the South Portland and Hillsdale areas (view looking north)



High capacity transit options in the PCC Sylvania area (view looking south)

Shared Investment Strategy progress

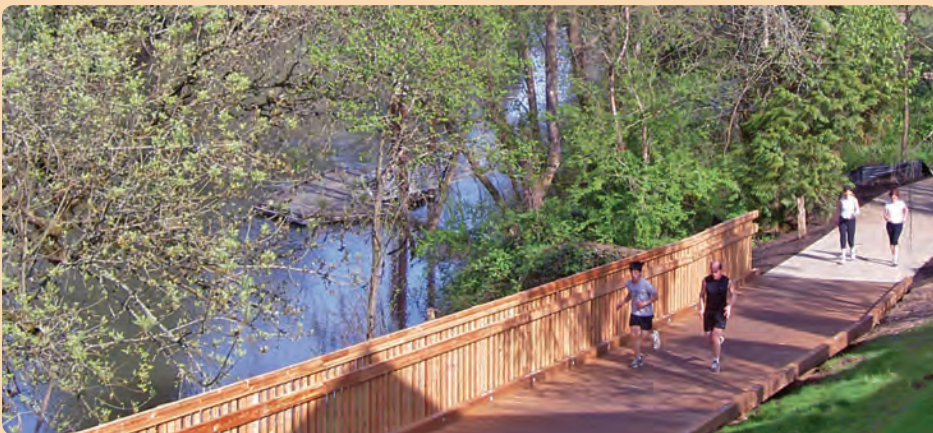
Approximately 80 bikeway, pedestrian and roadway project have been identified that can improve connectivity, safety and choices for all types of travel in the corridor. These projects are part of the Southwest Corridor Shared Investment Strategy (SIS) that the steering committee adopted in 2013. Several projects have already been built or funded, and project partners are identifying funding strategies and implementation timelines for other projects on the list.

For example, in Sherwood, the Cedar Creek trail is funded and proceeding toward construction, and widening of Tualatin-Sherwood Road near Highway 99W is designed and funded for construction. In Portland, parts of Southwest Multnomah Boulevard were recently reconstructed to include curbs, sidewalks and a protected bicycle facility.

The Shared Investment Strategy also calls for improvements to local transit service. TriMet has released a draft vision for the Southwest Service Enhancement Plan (SWSEP). The SWSEP spells out changes to bus routes and frequency of service throughout the greater Southwest Corridor area, intended to serve evolving needs. Many of these changes will integrate with the potential future HCT “spine” to improve mobility within the Southwest Corridor.

Examples include increased bus service to PCC-Sylvania on Line 44 and a new bus line along Tualatin-Sherwood Road and 72nd Avenue, which will connect population and employment centers with the proposed HCT service. Such investments are an important outcome of the Southwest Corridor SIS planning process. TriMet’s Fiscal Year 2015-16 budget begins implementation of the SWSEP, which will be rolled out as funding permits. TriMet will also be releasing the SWSEP Final Vision shortly.

In addition to projects in the Shared Investment Strategy, ODOT and TriMet have identified a series of low-cost improvements that are supported by the local jurisdictions and the public. These projects are completed or will be within the next two years, and include Barbur Boulevard bike lane markings, pedestrian improvements and vehicle crossings, as well as OR 99-W sidewalk, bus stop and illumination improvements.



Planning process

2009-2011: Shared goals, current conditions

The Southwest Corridor project truly originated in Metro’s 1982 Light Rail System Plan, which envisioned possible regional transit extending between downtown Portland, Tigard and Tualatin at a conceptual level. In 2009, the project was highlighted as a “near-term regional priority corridor” in Metro’s Regional High Capacity Transit System Plan, which guided investments in light rail, commuter rail, bus rapid transit and rapid streetcar in the Portland metropolitan area.

Initial study of high capacity transit (HCT) in the Southwest Corridor began that same year, with potential HCT destinations, routes and travel modes evaluated at a high level. The foundation of the Southwest Corridor Plan is the local land use vision, which reflects each community’s unique characteristics and aspirations and identifies areas to focus new development. The Plan’s steering committee – elected leaders from each of the Plan’s partner communities, plus representatives from TriMet and ODOT – began its work by identifying the goals that the communities in this region share for living, working and getting around. To understand what makes these communities great, early steps in the project focused on assessing both existing conditions in the corridor and what the future may hold.

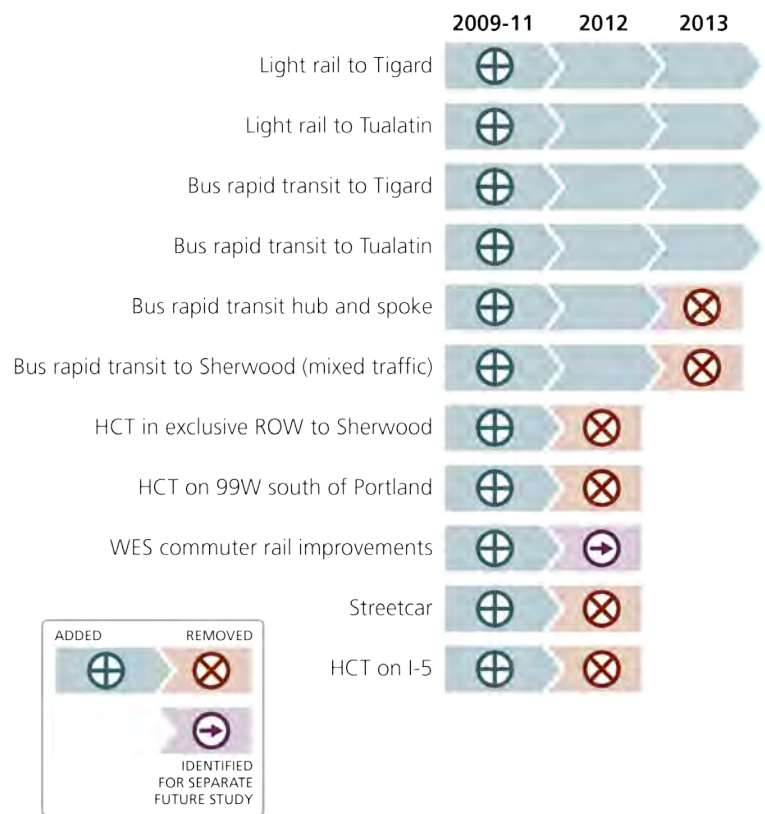


2012-2013: The elements of great places

Beginning in 2012, the Southwest Corridor partners worked to identify a set of collective investments that would help achieve local visions and link these communities with a more effective, reliable and safe regional transportation network. The project partners engaged the public on the investments that would make it easier, safer and more enjoyable to get around in their communities and studied the viability of different options for new transit to serve the whole Corridor.

In 2013, the Southwest Corridor adopted a comprehensive Shared Investment Strategy that established a vision of investments in parks, trails, sidewalks, transit and roadways from Portland to Sherwood, Beaverton to Lake Oswego to support community goals. Some projects in the strategy are already underway; others require further study or funding for implementation.

The steering committee also made key decisions on a potential high capacity transit route, including keeping HCT off of Highway 99W south of Portland and not extending an HCT alignment to Sherwood or King City.



2013-2016: Project refinement

This phase of the Southwest Corridor planning process aims to define and select the most promising HCT alignments that best meet the project goals.

From late 2013 through 2014, the Southwest Corridor Plan partners conducted a focused refinement study of the usage, community benefits, traffic impact and potential costs of high capacity transit options. In December 2014, the steering committee directed project staff to use these findings and further community input to develop a Preferred Package of transportation investments to support community land use goals. To reach a Preferred Package by spring of 2016, the steering committee will make project decisions in July, October and December 2015.

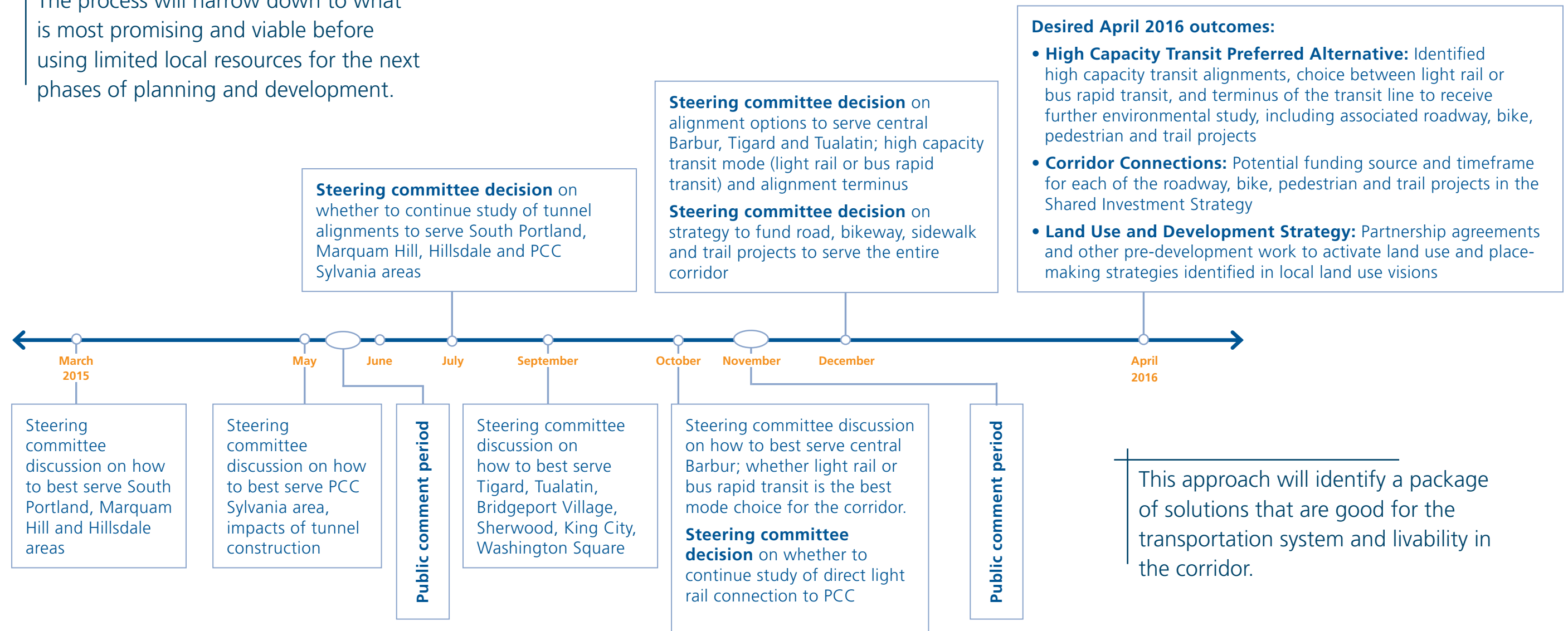
The July 2015 steering committee decisions addressed in this document will focus on direct versus indirect access to key destinations in the Portland segment of the corridor: Marquam Hill, Hillsdale town center and the PCC Sylvania campus. The steering committee will also consider technical modifications to other HCT alignments.

The December 2015 steering committee decisions will focus on the remaining HCT alignment and terminus options, as well as an HCT mode decision between light rail and bus rapid transit. In early 2016, the steering committee will identify a draft Preferred Package, including:

- HCT travel mode (light rail or bus rapid transit)
- alignment options
- terminus options
- associated roadway and active transportation projects for further study in a Draft Environmental Impact Study (DEIS)
- a funding strategy for additional priority roadway, bicycle and pedestrian projects throughout the corridor
- integrated land use and development strategies

Current proposed alignments along SW Barbur Blvd and Naito Parkway will continue to be studied through the DEIS phase.

The process will narrow down to what is most promising and viable before using limited local resources for the next phases of planning and development.



Public input

Building on their previous outreach from November 2014 to June 2015, project partner staff had many opportunities to connect with people interested in the Southwest Corridor. Staff met with hundreds of people in person through local community meetings, small group discussions, individual conversations and a forum in May 2015. The outreach strategy focused on the key places throughout the corridor to better understand the unique opportunities, challenges and community perspectives that exist. Staff also gathered public input on how the Southwest Corridor Plan can provide benefit to both individual communities and the corridor as a whole.

During an online comment period from May 8–May 22, 2015, more than 1,600 individuals responded to online survey questions and 3,000 people visited the online interactive map tool.

Connecting input to decision makers

Decision-makers know that this is a complex, technical project that will have real impact on people's lives. Feedback from the public highlights the different needs and choices that each community is facing. Each month, project staff and decision-makers receive updates on what we are hearing from the public. Key findings from our online and in-person outreach are integrated into these draft recommendations. A detailed public engagement summary will be released prior to the July 2015 steering committee meeting.

"As representatives of the people, we understand there are a lot of different opinions throughout the corridor. We need to hear from as many people as possible in order to form a basis for our decisions."

– Metro Councilor Craig Dirksen

Key findings

- Many survey respondents and meeting participants were supportive of transportation improvements in the Southwest Corridor that will increase choices and create better transit service.
- Most people who responded online and in person felt that directly serving Marquam Hill and PCC Sylvania with high capacity transit was important. Many online respondents felt that transit tunnels were the best way to achieve this, while others felt that tunnels were not worth the project cost and impacts to communities.
- Walk and bike improvements are very important to many people online and in person. Roadway improvements were less important to online respondents, while maintaining road capacity was occasionally discussed at in-person meetings. Many online respondents feel there is inadequate transit service to OHSU, PCC Sylvania and Hillsdale today.
- Many people online and in-person felt that the high cost of tunnels made them a non-viable option. A smaller group felt it was worth it to spend the money to ensure the project delivers top benefit to the region over the long term.
- People who participated in-person at meetings felt more strongly than online respondents that construction impacts should be a major factor for decision makers to consider.

We asked online and in-person survey respondents to pick the top three factors that decision makers should consider when making decisions about which alignments will continue as part of the project. Here are the factors people chose most:

Marquam Hill-Hillsdale light rail tunnel:

- 50% High project cost
- 50% Alignment has high ridership projections
- 47% Alignment has fast travel time
- 44% Alignment provides a direct connection to the top of Marquam Hill

Hillsdale loop bus rapid transit or light rail tunnel:

- 47% High project cost
- 46% Alignment includes walk/bike improvements on Capitol Highway
- 44% Alignment has longer travel time and lower ridership projections than other alternatives

PCC Sylvania light rail tunnel:

- 62% Alignment provides direct access to PCC Sylvania
- 49% Alignment has high ridership projections
- 47% Alignment includes walk/bike improvements on Barbur Boulevard
- 39% High project cost

PCC Sylvania BRT Capitol surface alignment:

- 51% Alignment provides direct access to PCC Sylvania
- 44% Alignment includes walk/bike improvements on Capitol Highway
- 43% Alignment has high ridership projections
- 40% Concern for closing lanes on Capitol Highway

"I strongly support use of money on bike and pedestrian connectivity to a major transit line."



"The tunnel represents the best investment for the long-term."



"Far, far too expensive when a reasonable alternative exists."

"Tunneling would negatively affect the businesses and hurt the community."

We asked respondents to the online survey to select all of the positive outcomes can the Southwest Corridor Plan bring to local communities. Here is what they said:

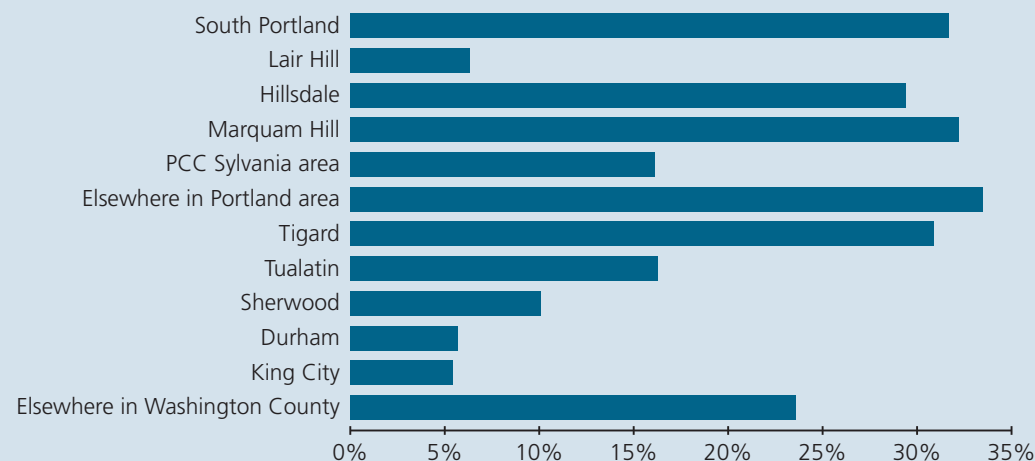
- 78%** Fast, reliable transit travel times
- 65%** Increased access to employment and education centers in the Corridor
- 57%** Results in fewer cars on the road
- 46%** Walk/bike improvements
- 39%** Generates significant number of new transit riders
- 38%** Improved access to key regional destinations
- 28%** Wise use of public resources

“Get us out of cars!”

“Connecting PSU, OHSU and PCC would be a great investment in empowering people with education.”

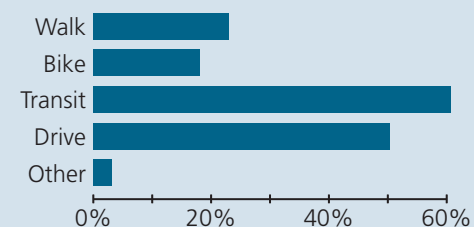
Who did we hear from during our online comment period?

Which parts of the corridor do respondents primarily live in, work in, or frequently visit?

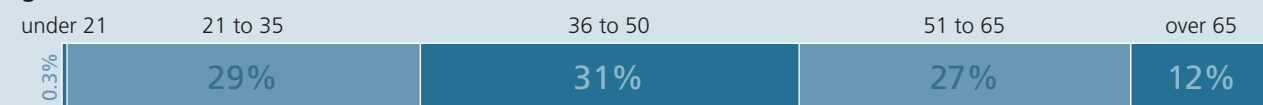


Note: Bar chart values do not sum to 100% because respondents were allowed to select more than one option.

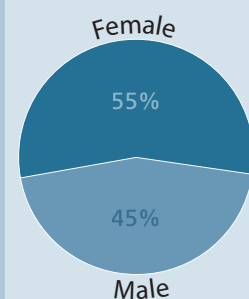
Which types of transportation do respondents use most often?



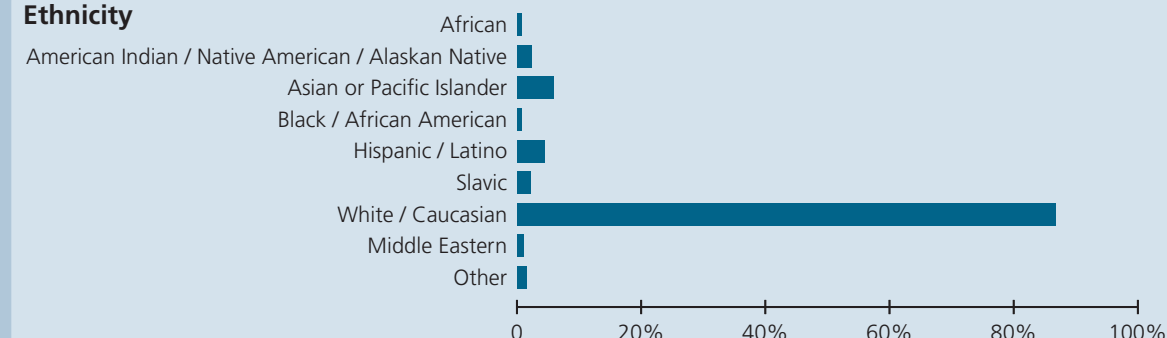
Age



Gender



Ethnicity



Community Conversations

Our outreach approaches include Community Conversations – opportunities to talk and build relationships with people whose perspectives are too often left out of the planning process. The goals of the Community Conversations are to meet groups and individuals where they are, to understand how transportation planning does or does not align with the organizational mission and to hear their ideas about their transportation needs and solutions before asking them to engage with or provide feedback on our approach. These conversations included meetings with affordable housing residents, youth gardeners and Somali families.

“Face-to-face meetings are good because you can talk to people, it’s nice when you can come to our site” – *Jessica*

“TriMet is my limo.” – *Elias*

“Southwest needs sidewalks. It’s scary to walk on the street in Southwest.” – *Kaltun*

How are we doing?

The overarching objectives of the Southwest Corridor outreach plan are to:

- provide relevant information to the public about upcoming project deliberations
- generate public feedback and ensure that feedback is presented to decision makers
- communicate with stakeholders in a way that generates understanding and enthusiasm for the project
- build on existing relationships with engaged members of the public and build new relationships with public whose perspectives have been underrepresented to date.

Based on what we’ve learned throughout the last nine months of outreach, our goals moving forward are to better understand what benefits the project can deliver that will have the greatest value to the public, and to better understand how the plan could impact youth, seniors, communities of color and lower-income residents throughout the corridor.

Tell us what you think at swcorridorplan@oregonmetro.gov.

Project purpose and need

The purpose of the Southwest Corridor project is to improve the transportation network that links Tualatin, Tigard, Southwest Portland, central Portland and neighboring communities by investing in high capacity transit, roadway, bicycle and pedestrian solutions. Early on, stakeholders identified key needs the project should address.

Needs:

- Transit service to places where people need or want to go is limited.
- Limited street connectivity and gaps in pedestrian and bicycle networks create barriers and unsafe conditions for transit access and active transportation.
- Travel is slow and unreliable on congested roadways.
- There is increasing unmet demand for transit service in the corridor.
- There is a limited supply and range of housing options with good access to multimodal transportation networks.
- The corridor is rich in parks, trails and natural areas that need to be protected or enhanced.

To address these needs, in 2014 the Southwest Corridor Steering Committee adopted a project Purpose and Need that includes 13 goals.

Goals:

- Serve the existing and projected transit demand in the corridor.
- Improve transit service reliability in the corridor.
- Improve transit frequency and travel times.
- Provide options that reduce overall transportation costs.
- Improve multimodal access to a range of housing types and business in growing communities.
- Improve potential for housing and commercial development in the corridor and encourage development in centers and transit-oriented development at stations along the corridor.
- Ensure benefits and impacts promote community equity.
- Increase multimodal transportation options and improve mobility in the corridor.
- Complete multimodal transportation networks in the corridor.
- Advance transportation projects that increase active transportation and encourage physical activity.
- Provide transit service that is cost-effective to build and operate with limited local resources.
- Advance transportation projects that are sensitive to the environment, improve water and air quality and help reduce carbon emissions.
- Catalyze improvements to natural resources, habitat and parks in the corridor.

Evaluation summary

The steering committee is working to define a package of investments that address the needs in the Southwest Corridor while being realistic about the region's funding capacity. The HCT alignments under consideration largely meet the project's Purpose and Need (see box on this page). Our current efforts are to further refine which alignments have the strongest potential to maximize the benefits that this project can deliver within this Purpose and Need framework.

Project staff developed these recommendations based on technical evaluation, public input and direction from the steering committee. The facing page shows the criteria and specific measures used to evaluate the alignment options, and their link to the project's Purpose and Need.

Note that the proposed HCT alignments under consideration are at a very preliminary level of design, meaning they have been evaluated at a conceptual level for feasibility and performance. A much greater level of design detail will be developed within a future federal Draft Environmental Impact Statement process to better evaluate engineering requirements, construction cost, refined alignment and local impacts such as traffic congestion. Such evaluations will involve more precise and specific investigation such as surveying, noise measurements and geologic borings.



Evaluation criteria	Measures	Project goals addressed
Transit performance	New system transit trips Line ridership ¹ Travel time Mixed traffic Signalized intersections crossed	• Serve the existing and projected transit demand in the corridor • Improve transit service reliability in the corridor • Improve transit frequency and travel times
Access and development	Equitable access to transit Redevelopment potential ² Support for existing plans	• Provide options that reduce overall transportation costs • Improve multimodal access to a range of housing types and business in growing communities • Improve potential for housing and commercial development in the corridor and encourage development in centers and transit-oriented development at stations along the corridor • Ensure benefits and impacts promote community equity
Mobility	Freight Traffic Transportation safety Street connectivity Bike improvements Pedestrian improvements	• Increase multimodal transportation options and improve mobility in the corridor • Complete multimodal transportation networks in the corridor • Advance transportation projects that increase active transportation and encourage physical activity
Cost	Capital cost Operations and maintenance costs	• Provide transit service that is cost-effective to build and operate with limited local resources • Provide options that reduce overall transportation costs
Engineering complexity	Construction impacts Engineering risk	• Provide transit service that is cost-effective to build and operate with limited local resources • Ensure benefits and impacts promote community equity
Community and environmental impacts	Property impacts Property access impacts Property impacts to historically under-represented populations Visual impacts Impacts to natural areas and historic properties	• Advance transportation projects that are sensitive to the environment, improve water and air quality and help reduce carbon emissions • Catalyze improvements to natural resources, habitat and parks in the corridor • Ensure benefits and impacts promote community equity

Technical reports

Staff have prepared and publicly released a series of place-based Key Issue memos and technical and evaluation reports. Project partners and Southwest Corridor Plan Steering Committee have reviewed these reports over the last several months.

- Key Issues: South Portland
- Key Issues: Hillsdale
- Key Issues: PCC Sylvania
- HCT alignment modifications based on technical analysis
- Tunnel alignments technical report
- HCT technical evaluation: South Portland, Hillsdale and PCC Sylvania areas

Facts and findings from these reports are integrated into the staff recommendation section of this document and are combined with public input to form the basis of this recommendation.

Electronic versions of these documents are available online at www.swcorridorplan.org.



Summary of evaluation results: South Portland and Hillsdale

The following table summarizes evaluation factors, key considerations and analysis results for the South Portland and Hillsdale areas. *Staff comments are included in blue italics.*

Key considerations	Surface alignment (BRT or LRT) <i>Barbur Boulevard or Naito Parkway in South Portland; Barbur south of Naito</i>	Marquam Hill-Hillsdale tunnel (LRT)	Hillsdale loop via cut-and-cover tunnel (BRT and LRT)
Transit performance	2035 daily new transit trips: 8,400 (BRT) 15,700 (LRT)	Compared to surface alignments: Adds 1,200 daily new transit trips <i>This is a low increase in ridership relative to the high cost differential.</i>	Compared to surface alignments: - Loses 700 daily transit trips with BRT - Loses 1,400 daily transit trips with LRT
	2035 daily line riders: 30,800 - 31,200 (BRT) 43,500 - 44,100 (LRT)	Compared to surface alignments: Adds 8,300 - 8,900 daily line riders <i>This is a large number but largely results from high rates of bus transfers to LRT in Hillsdale and downtown Portland by people travelling one stop to Marquam Hill, which is why the new transit trips are relatively much lower.</i>	Compared to surface alignments: - Loses 1,500 daily line riders with BRT - Loses 1,700 daily line riders with LRT <i>Provides fewer ridership benefits with higher costs.</i>
	Travel time (PSU to Tualatin): 33-34 minutes (BRT) 30-31 minutes (LRT)	Compared to surface alignments: Saves 1-2 minutes	Compared to surface alignments: - Adds 4 minutes (BRT) - Adds 3 minutes (LRT)
Capital costs	Estimate in 2014 dollars: \$680M - \$990M (BRT) \$1.9B - \$2.1B (LRT) <i>Surface options on Barbur represent the least expensive options.</i>	Compared to surface alignments: Adds \$732M - \$900M (35% - 46%) to project cost <i>A tunnel investment of this magnitude could affect the length of alignment because of regional funding capacity.</i>	Compared to surface alignments: - Adds \$137M (14%-18%) to project cost (BRT) - Adds \$226M (11%-12%) to project cost (LRT)
Mobility	- Includes sidewalk/bike improvements along Barbur alignment and to access stations - Includes replacement of Vermont and Newbury viaducts on Barbur Boulevard, or construction of parallel bike and pedestrian bridges	Includes sidewalk/bike improvements to access stations <i>Does not include sidewalks or bike lanes along alignment when underground. Replacement of Barbur viaducts or construction of parallel bike and pedestrian bridges is unlikely to be federally funded as part of the HCT project.</i>	Includes sidewalk/bike improvements along Capitol Highway/Bertha alignment near Hillsdale and to access stations <i>Replacement of Barbur viaducts or construction of parallel bike and pedestrian bridges is unlikely to be federally funded as part of the HCT project.</i>
Access and development	- Includes new walk/bike connection between Barbur/Naito and Marquam Hill (indirect access from station) - Walk/bike access to South Waterfront via Hooley (Gibbs) pedestrian bridge - Indirect connection to Hillsdale by local bus service, pedestrian and bike enhancements	- Includes direct connection to Marquam Hill via underground station - Includes direct connection to Hillsdale via underground station <i>Provides best connection to Marquam Hill, but does not include a station in the Lair Hill neighborhood or South Waterfront.</i>	- Includes new walk/bike connection between Barbur/Naito and Marquam Hill (indirect access from station) - Walk/bike access to South Waterfront via Hooley (Gibbs) pedestrian bridge - Includes direct connection to Hillsdale via underground station
Engineering complexity	Complex modifications of Ross Island bridgehead and overpass structures if Naito is chosen	- Large area needed for tunnel mining and access for trucks and other heavy equipment at each portal - Risk of complications with tunnel boring leading to cost and schedule overruns - Traffic and physical roadway impacts from hauling excavated materials. - Potential impacts to Duniway Park with tunnel construction <i>Much higher construction impacts and risk compared to surface options.</i>	- Traffic and business disruptions in Hillsdale during cut-and-cover tunnel construction - Risk of complications with cut-and-cover tunnel construction leading to cost and schedule overruns
Community and environmental impacts	Potential impacts if HCT right-of-way added while maintaining existing auto lanes	Potential impacts if HCT right-of-way added while maintaining existing auto lanes	Potential impacts if HCT right-of-way added while maintaining existing auto lanes
Staff interpretation	<i>High ridership projections with least cost and complexity. Does not provide a direct connection to Marquam Hill but includes a new bike/pedestrian connection to the hill and provides a connection to South Waterfront to a Lair Hill station.</i>	<i>Highest cost option. Provides direct access to Marquam Hill and Hillsdale via tunnel stations, but does not include a Lair Hill station, direct station access to South Waterfront or replacement of Barbur viaducts. Results in a low increase in system trips and small travel time benefit relative to large cost differential in comparison to surface options. Results in high line ridership increases but mostly due to bus transfers traveling one stop to Marquam Hill. Has substantial construction impacts at portals and on Marquam Hill and in Hillsdale. Carries the most engineering risk.</i>	<i>Provides a direct connection to Hillsdale but results in fewer ridership benefits and slower travel times at a higher cost compared to surface options. Includes walk/bike improvements in Hillsdale but is unlikely to include federal funding for Barbur viaduct replacement or improvements. Cut-and-cover tunnel construction would impact commercial businesses in Hillsdale.</i>

Summary of evaluation results: PCC Sylvania area

The following table summarizes evaluation factors, key considerations and analysis results for the PCC Sylvania area. *Staff comments are included in blue italics.*

Key considerations	Barbur Boulevard (BRT or LRT)	PCC via cut-and-cover tunnel (LRT)	PCC via Capitol Highway (BRT and LRT)
Transit performance	2035 daily new transit trips: 8,400 (BRT) 15,700 (LRT)	Compared to Barbur alignment: Adds 2,100 daily new transit trips	Compared to Barbur alignment: Adds 1,300 daily new transit trips
	2035 daily line riders: 30,800 (BRT) 43,500 (LRT)	Compared to Barbur alignment: Adds 2,700 daily line riders <i>Provides ridership benefits but with higher costs than Barbur option.</i>	Compared to Barbur alignment: Adds 2,100 daily line riders <i>Provides ridership benefits with similar costs to Barbur option.</i>
	Travel time (PSU to Tualatin): 33 minutes (BRT) 31 minutes (LRT)	Compared to Barbur alignment: Adds 1 minute	Compared to Barbur alignment: Adds 3 minutes
Capital costs	Estimate in 2014 dollars: \$680M - \$990M (BRT) \$1.9B - \$2.1B (LRT)	Compared to Barbur alignment: Adds \$244M (12%) to project cost	Compared to Barbur alignment: Adds \$4M to project cost
Mobility	Includes sidewalk/bike improvements along Barbur north of PCC	Includes sidewalk/bike improvements along Barbur north of SW 53rd Avenue alignment near PCC and to access stations	Includes sidewalk/bike improvements along SW Capitol Highway and SW 49th Avenue near PCC and to access stations <i>This is the only alignment that would provide pedestrian and bike improvements on Capitol near PCC.</i>
Access and development	Indirect connection to PCC campus by improved walk/bike connection between SW 53rd Avenue station and PCC campus, 1/3 to 1/2 mile uphill, including pavement, sidewalks, lighting and possibly a mechanized connector	- Includes PCC campus station - Opportunity for significant campus redevelopment <i>More direct access to PCC campus is reflected by increased ridership compared to Barbur option.</i>	- Includes PCC campus station - Includes additional station on Capitol serving diverse neighborhood - Opportunity for significant campus redevelopment <i>More direct access to PCC campus is reflected by increased ridership compared to Barbur option.</i>
Engineering complexity	Major improvements to 53rd Avenue required to provide access between station and PCC campus	- Complex cut-and-cover tunnel includes potential geotechnical and construction risks that could lead to cost and schedule overruns - Traffic and physical roadway impacts from hauling excavated materials	Potential for low complexity and risk on Capitol depending on chosen BRT operations (in mixed traffic or lane conversion). Higher complexity if HCT right-of-way added while maintaining existing auto lanes
Community and environmental impacts	Potential impacts if HCT right-of-way added while maintaining existing auto lanes	- Potential impacts if HCT right-of-way added while maintaining existing auto lanes - Potential displacement of neighborhood residents along 53rd Avenue during cut-and-cover tunnel construction, which could limit access to homes for long periods of time <i>High impacts to the neighborhood on and near SW 53rd Avenue.</i>	- Potential impacts if HCT right-of-way added while maintaining existing auto lanes - Includes additional station on Capitol serving diverse neighborhood <i>Additional station would serve the largest mosque in Oregon and a Somali population in the neighborhood.</i>
Staff interpretation	<i>High ridership projections with least cost and complexity for LRT. Does not provide a direct connection to PCC-Sylvania but includes bike/pedestrian improvements to 53rd Avenue for campus access.</i>	<i>Provides direct access to PCC with a station on the edge of campus and provides opportunity for campus redevelopment. Results in greater ridership benefits compared to a Barbur alignment but at a higher cost and with considerable complexity and construction impacts, including potential displacement of residents along SW 53rd Avenue.</i>	<i>Provides direct access to PCC with a station on campus and provides opportunity for campus redevelopment. Includes an additional neighborhood station on Capitol Highway. Results in greater ridership benefits compared to Barbur alignment at a comparable cost. BRT operations on Capitol need more study to determine impacts on properties and traffic.</i>

Staff recommendation

The following recommendations weigh multiple factors for each potential alignment, as explained above. Staff did not apply a quantitative scoring system but generally found the following factors to be the most compelling in developing the recommendation:

- **Modest benefits disproportionate to substantial impacts:** Some alignments would result in temporary construction and long-term impacts to parks and neighborhoods disproportionate to gains in system and line ridership.
- **Community support:** Some alignments lack noticeable support from local residents and businesses.
- **Lost opportunities:** Some alignments would not include desired bike and pedestrian improvements and place-making opportunities that would be included in alternative routes.
- **Alternative access options:** Effective improvements to transit, bike and pedestrian facilities included in alternative alignments and/or Southwest Corridor Shared Investment Strategy would allow the project to enhance access to destinations without direct HCT service.

Should the light rail Marquam Hill-Hillsdale tunnel continue to be part of the project?

Recommendation: Remove the Marquam Hill-Hillsdale tunnel from further consideration and continue to study alternative means of accessing Marquam Hill from a surface HCT alignment, as well as improvements to local transit service.

The travel time and ridership benefits of the Marquam Hill-Hillsdale tunnel are not commensurate with the very high additional cost compared to the surface options. In addition, tunnel construction would have substantial multi-year impacts at both the portals and the station areas, affecting the commercial district in Hillsdale, sensitive medical facilities and services on Marquam Hill, nearby residences and public parks, and requiring property acquisitions at the portal areas. The significant risks inherent in tunnel boring could add unanticipated cost and delay the project. The SW Barbur Boulevard and SW Naito Parkway surface options are viable alternatives that not only serve Marquam Hill, but also provide access to the South Portland and South Waterfront areas.

The elimination of the Marquam Hill-Hillsdale tunnel from further study means that HCT would utilize a surface alignment on Barbur or Naito through South Portland, with no station directly serving the OHSU Marquam Hill campus.

Staff recommends that further investigation of alternative access to Marquam Hill be undertaken as part of the Southwest Corridor project. In particular:

- **Proposed local bus improvements:** TriMet's Southwest Service Enhancement Plan proposes rerouting line 65 to connect Lewis & Clark College and Marquam Hill via SW Terwilliger Boulevard, and upgrading the line to all-day service. Staff recommend that these proposals be implemented and sustained.



Marquam Hill-Hillsdale tunnel light rail alignment option (view looking north)

- **Feasible pedestrian and bike connection from a surface HCT alignment:** The Barbur or Naito surface option would include a new direct pedestrian and bike connection between a station on Barbur or Naito and Marquam Hill that would be accessible to HCT riders, local bus riders and the neighborhood. The connection would also provide a surface route to the existing Hooley pedestrian bridge to South Waterfront, where OHSU plans significant expansion. Staff recommends investigation and development of design options for this connection once the steering committee selects a draft Preferred Package in January 2016.

Staff finds that the following facts, established in prior reports released and incorporated by reference, provide adequate reasons for removing the Marquam Hill-Hillsdale tunnel alignment from further study:

Significantly higher capital cost for relatively small gains in new transit trips and travel time improvement:

- The tunnel adds \$730-900 million (2015 dollars) compared to the surface alignment using Barbur or Naito, which equates to a 220-305 percent increase to the segment cost and a 35-46 percent increase to the full HCT project cost. In the increasingly competitive environment for declining federal matching funds, such a large increase in construction cost should be justified by a proportional improvement in ridership and travel time. However, the tunnel will only provide an 8 percent increase in daily new system transit trips and a 3-7 percent travel time improvement.

- The high risk involved in tunnel construction would result in higher contingency costs and increased likelihood of both cost and schedule overruns.
- Community feedback at online events and through in-person discussions emphasized that the high cost of this option should be a major factor in decision making.
- There are community concerns about sufficient funding to extend an HCT alignment into Washington County if a high proportion of the investment is dedicated to a tunnel. A substantial shortening of the HCT route could result in lower ridership and reduced local and federal funding opportunities, further impacting the project.

Multiple years of highly disruptive construction impacts to Duniway Park, residential areas, the OHSU Marquam Hill campus and the Hillsdale town center:

- Suitable locations for a north portal, where the tunnel boring machine would most likely be launched, are limited. An area of at least five acres would be needed for tunnel construction in the vicinity of the portal. The most viable location identified would require acquisition of the former YMCA building recently purchased by Under Armour as well as some residences and would likely impact Duniway Park. There are federal laws that restrict transportation projects from impacting parks when other options are available.
- The most feasible location for a southern portal would be near the Fred Meyer store and other commercial buildings in Burlingame near SW Bertha Boulevard. Tunnel construction would likely impact these



View of OHSU and VA Hospital campuses on Marquam Hill (Google Earth)

businesses and nearby residents, and long-term noise and vibration at the south portal may necessitate residential acquisitions.

- The identified potential station location on Marquam Hill would be at the current location of a parking garage adjacent to the Casey Eye Institute and near the Kohler Pavilion, one of OHSU's major inpatient and outpatient facilities. The OHSU complex is likely to be especially vulnerable to the noise and vibration that tunneling activities would generate, potentially affecting surgery scheduling, overnight patients and sensitive equipment. Construction of the elevator and vent shafts would likely use a top down method and would require blasting more than 200 feet down to the tunnel.
- Trucking needed for soils removal, trucking equipment transport and materials delivery, including large or oversize loads, would occur at all staging areas and would potentially last for three to five years, with varying levels of impacts throughout that time. The northern portal area could experience up to several hundred truck trips per day, with 20 or more trucks per hour during high activity periods, which could cause congestion and the need for road repairs.
- Community feedback from in-person discussions emphasized that construction impacts were a major concern, particularly in the Hillsdale community.

Would not include improvements in South Portland and along Barbur toward Burlingame:

- The Barbur and Naito surface alignments in South Portland would include complete sidewalks and bike lanes along the alignment and provide new safe crossings. For example, the Naito surface alignment would add two miles of bike lanes and over three miles of sidewalks along and adjacent to the HCT route. However, the tunnel option would not include such investments along Barbur or Naito between the I-405 crossing and the tunnel portal at Bertha as part of the HCT project.
- The Barbur and Naito surface alignments would likely spur redevelopment opportunities in the South Portland area, resulting in new or improved homes and businesses. The tunnel option largely bypasses South Portland and would not

Marquam Hill connection

Over 20,000 people per day visit Marquam Hill, making it one of the largest regional destinations in the Southwest Corridor. Multiple rush hour and regular bus lines connect the hilltop with the region, but congestion on Terwilliger Boulevard affects this service.

As a result, the project assumes a surface alignment through South Portland would include a strong pedestrian/bicycle link from Barbur Boulevard or Naito Parkway to the hilltop. Two design firms were commissioned to explore a new connection to Marquam Hill that would align with the current Hooley (Gibbs) Street bridge to South Waterfront, directly linking the OHSU campuses on the hill and along the Willamette River. Neighborhood residents, OHSU and VA staff, and other stakeholders reviewed five designs on a range of options, including a pedestrian tunnel, escalators and two different sky bridge options.

The next phase of the Southwest Corridor Plan will explore one or more of these options in greater engineering detail.



Example of a potential walking and biking connection to Marquam Hill

catalyze such opportunities. Redevelopment opportunities were not an important factor cited by public respondents to online surveys.

- The tunnel alignment would not provide direct access to the National College of Naturopathic Medicine, direct walk or bike connections to South Waterfront or other South Portland neighborhoods, or placemaking opportunities associated with HCT stations.
- Community input shows strong support for pedestrian and bicycling improvements as part of any high capacity transit project. Either the Barbur or Naito surface alignment would likely replace the Vermont and Newbury viaducts on Barbur with new structures that would include sidewalks and bike lanes, or would add a parallel bike and pedestrian bridge. Such improvements would likely not be part of the federal funding package with a tunnel alternative that bypasses the viaducts.

Staff's recommendation takes into consideration the benefits of the Marquam Hill-Hillsdale tunnel alignment, which include:

Direct connection to Marquam Hill and Hillsdale:

- The tunnel option would provide the most direct service to OHSU's Marquam Hill campus and the VA Medical Center via a deep underground elevator.
- Online public comment showed strong support for direct high capacity transit service to Marquam Hill.

Moderate travel time savings:

- The Marquam Hill-Hillsdale tunnel would provide the fastest travel time, saving 1.2 to 2.1 minutes compared to a surface alignment through South Portland on Barbur or Naito.
- Travel time was cited as very important in online public comments.

Increased transit reliability and reduced traffic impacts:

- Light rail in a tunnel is less likely to have service disruptions compared to surface alignments, due to minimal weather and track interference factors.
- The tunnel would not require travel lane conversions or left turn limits, which can impede existing traffic patterns.

High increase in line ridership and small increase in new transit trips:

- The tunnel would result in 1,200 (8 percent) more new system transit trips than a surface alignment through South Portland on Barbur or Naito.
- The tunnel alternative would have 8,300-8,900 (19-20 percent) more daily line riders than a surface alignment through South Portland on Barbur or Naito. However, many of these riders would be transferring to the HCT line in Hillsdale or downtown Portland from existing transit lines, and so represent relatively few new system riders.
- High ridership was cited as important in online public comments.

Should the Hillsdale loop cut-and-cover tunnel for bus rapid transit and light rail continue to be part of the project?

Recommendation: Remove the Hillsdale cut-and-cover tunnel alignments for light rail and bus rapid transit from further consideration and continue to study other means of improving access to the Hillsdale town center.

The Hillsdale loop alignment with a cut-and-cover tunnel through the town center adds considerable capital cost while increasing travel time and reducing ridership. Furthermore, the tunnel would have substantial construction impacts to the town center, potentially including impacts to school playing fields and businesses along SW Capitol Highway.

The elimination of the Hillsdale cut-and-cover tunnel from further study means that HCT would utilize a surface alignment on Barbur or along I-5 between Capitol (in "the woods") and Bertha, and not directly service the Hillsdale town center. That said, Hillsdale town center has an existing high level of transit service, with connections to downtown Portland via frequent bus service on lines 54 and 56, regular service on lines 44, 45 and 55, and five lines with rush hour service.



Hillsdale loop with cut-and-cover tunnel alignment option for bus rapid transit and light rail (view looking north)

Staff recommends that further investigation of alternative access to Hillsdale be undertaken as part of the Southwest Corridor project. In particular, staff recommends studying the following in more detail:

- **Proposed local bus improvements.** TriMet's Southwest Service Enhancement Plan proposes upgrading bus lines 44 and 54 to frequent service. Although lines 55 and 56 would be routed away from Hillsdale, the Service Enhancement Plan recommends line 39 be extended from Hillsdale to the neighborhoods in the West Hills via SW Dosch Road with weekend service added. Staff recommend that these proposals be evaluated to ensure that Hillsdale is appropriately served.
- **Local bus use of the transitway.** Staff recommend consideration of whether frequent service buses serving Hillsdale could utilize the dedicated transitway on Barbur into downtown Portland, thereby reducing travel time along this 2-mile section to downtown Portland. Factors to evaluate include construction standards for the transitway, possible effects on HCT operations and local traffic circulation, and whether different vehicle configurations would be required.
- **Pedestrian and bike connection to HCT.** Although Bertha currently has sidewalks and bike lanes between Barbur and Capitol, they are sub-standard and do not meet City of Portland standards. Staff recommend consideration of what further improvements would be needed to improve the bike and pedestrian facilities for improved access between Hillsdale and an HCT station at or near Barbur and SW 13th Avenue, including the potential for a bike parking hub near the station.

Staff finds that the following facts, established in prior reports released and incorporated by reference, provide adequate reasons for removing the Hillsdale loop cut-and-cover tunnel alignment from further study:

Adds cost while increasing travel time and reducing ridership:

- For light rail, the Hillsdale tunnel adds \$230 million compared to an alignment along SW Barbur Boulevard, which equals a 38-52 percent increase to the segment cost and an 11-12 percent increase to the full alignment cost. For bus rapid transit, the Hillsdale tunnel adds \$140 million compared to Barbur, which equals a 42-100 percent increase to the segment cost and a 14-18 percent increase to the full alignment cost.
- The Hillsdale tunnel increases travel time by 2.6 minutes compared to the Barbur alignment.
- The light rail Hillsdale tunnel has 1,500 (10 percent) fewer new system transit trips and 1,700 (4 percent) fewer line riders than the Barbur alignment. The bus rapid transit Hillsdale tunnel has 700 (8 percent) fewer new system transit trips and 1,500 (5 percent) fewer line riders than the Barbur alignment.
- Community feedback at online events and in person discussions emphasized that the high cost of this option should be a major factor in decision making.

Multiple years of disruptive construction impacts to parks, the Hillsdale town center and potentially an elementary school:

- During construction, access to the cut-and-cover tunnel and station sites would be restricted, requiring alternative routes and detours, restricting movements in and through the Hillsdale area.
- The Hillsdale loop alignment could impact the parks adjacent to Capitol if both westbound travel lanes must be maintained for auto traffic.
- The tunnel option under the Rieke Elementary playing fields would limit use of the fields and create noise and vibration at the school site.
- The tunnel option under Capitol Highway would result in major impacts to retail and employment along Capitol during cut-and-cover tunnel construction.
- Community feedback from in-person discussions emphasized that construction impacts in Hillsdale were a major concern.
- The cut-and-cover tunnel is inherently risky given the likelihood for unexpected subsurface complications to be encountered and overcome. The cut-and-cover tunnel must navigate and relocate utilities and has the potential to encounter sites with archaeological value. Additionally, a cut-and-cover tunnel would require a complex sequencing plan to maintain traffic on Capitol and SW Bertha Boulevard where the portal and tunnel transition to roadway.



Barbur Boulevard alignment option for bus rapid transit and light rail (view looking north)

Community input:

- There is heightened concern about the high additional cost of the Hillsdale tunnel.
- Local comments portray Hillsdale as a vibrant, liveable town center.
- Community input shows strong support for pedestrian and bicycling improvements as part of any high capacity transit project. Either the Barbur or Naito surface alignment would replace the Vermont and Newbury viaducts with new structures that would include sidewalks and bike lanes, or would add a parallel bike and pedestrian bridge. Such improvements would likely not be part of the federal funding with a tunnel alternative that bypasses the viaducts.

Staff's recommendation takes into consideration the benefits of the Hillsdale Loop tunnel alignments, which include:

Direct connection to Hillsdale:

- The Hillsdale tunnel alignment would provide direct access to the Hillsdale town center, which includes commercial destination, Wilson High School and several bus lines.

Design treatments that could improve road safety on Capitol Highway for autos, bicyclists and pedestrians:

- Online public comment showed support for safety improvements on Capitol that could accompany this alignment option.



PCC via cut-and-cover tunnel alignment option for light rail (view looking south)

Should the light rail direct to PCC option with cut-and-cover tunnel continue to be part of the project?

Recommendation: Reschedule the decision regarding the PCC-Sylvania light rail cut-and-cover tunnel to October 2015. From July through September, the project team will conduct additional analysis and public outreach to better understand trade-offs of direct service versus cost and construction impacts, and to learn more about future campus planning efforts.

The PCC Sylvania campus is a major regional destination and direct HCT service would serve employees and students from across the region. Its topography, however, makes the campus difficult to reach by high capacity transit, requiring a tunnel for light rail access. In June 2014, the steering committee identified a cut-and-cover option as the most promising tunnel approach to serve the campus. The committee removed from consideration longer bored tunnels via SW Barbur Boulevard and via SW Capitol Highway because both would cost considerably more than the cut-and-cover option without providing significantly greater benefits in terms of ridership and travel time.

A cut-and-cover tunnel with a direct PCC campus connection would attract more transit riders than an alignment that remains on Barbur, but would cost more to build and would impact the neighborhood immediately north of the campus. The Sylvania campus master plan is outdated and existing plans do not anticipate HCT on campus. Given these unique factors, additional time will allow more thorough consideration of this alignment option.

Specifically, staff recommends the following actions:

- The Southwest Corridor project team will continue to refine preliminary tunnel designs in order to better define tunnel impacts and potential mitigation.
- The Southwest Corridor project team will continue to explore alternative mechanized connections between a Barbur station and the campus, such as a shuttle bus system or people mover, in the event that the option on Barbur is identified as the preferred alignment.
- PCC is asked to work with the Southwest Corridor project team to develop campus visioning prior to master planning efforts, identifying potential redevelopment opportunities and the scale of desired redevelopment in response to an investment in an light rail station on campus.
- PCC is asked to share student and staff travel data so that Southwest Corridor project team can understand how to best support improved transit to the Sylvania campus.
- The Southwest Corridor project team and PCC will work together on engagement with the neighborhoods surrounding the campus as well as the college community.
- Finally, Southwest Corridor project team, in particular Metro, TriMet and the City of Portland, will work with PCC officials to define a formal partnership in support of the Southwest Corridor Plan.

Staff finds that the following facts, established in prior reports released and incorporated by reference, provide reasons that could support a decision to further study the PCC Sylvania cut-and-cover light rail tunnel:

Major regional destination:

- Sylvania has the largest enrollment of the four PCC campuses, with nearly 32,000 students from throughout the Metro Portland region. Over the last 10 years, student headcount at Sylvania has increased by 5,000.
- Sylvania students come from throughout the Southwest Corridor and beyond, notably Southwest Portland, Tigard, Tualatin, and King City, as well as Beaverton, Lake Oswego and unincorporated Washington County.
- According to a 2013 student commute survey, 20 percent of students use TriMet buses to reach the Sylvania campus and 10 percent ride on the PCC shuttles.
- Public comment showed very strong support for directly serving this important regional destination.

Balanced costs and benefits:

- A PCC tunnel would attract 2,700 (6 percent) more line riders and 2,100 (13 percent) more new system transit trips compared to the Barbur alignment.
- A PCC tunnel would add \$244 million (12 percent) to the cost of the Barbur alignment.

Clear need for improved transit service to the campus:

- Up to 17,500 student trips are made to the Sylvania campus each day. Currently, 60 percent of students drive to Sylvania, and the 2,400-capacity lots are 86-96 percent full in the morning (data from 2013 and 2011).
- Student survey respondents who drive cite issues with existing transit service (crowding, travel times, service hours and frequency).

Potential for campus redevelopment while limiting local traffic impact:

- The existing parking lots provide an opportunity for PCC to add future development and program expansion.
- Direct HCT access would influence future mode splits on the campus. This, in turn, would likely free up some of the existing surface parking for other college uses and work toward the climate action goals of both PCC and the City of Portland.

Staff's recommendation takes into consideration the impacts of the PCC cut-and-cover tunnel, which include:

Construction impacts to residential area and parks:

- Access to the residences along SW 53rd Avenue may be limited or closed, and construction activities would cause localized noise and vibration. The high volume of trucks serving

the construction site would also affect local circulation. Project staff will conduct further study on options for minimizing these impacts.

- Sylvania Park could incur temporary impacts during tunnel construction.
- In-person discussion with the public showed high levels of concern for construction impacts in the Far Southwest neighborhood.

Substantial added capital cost and risk:

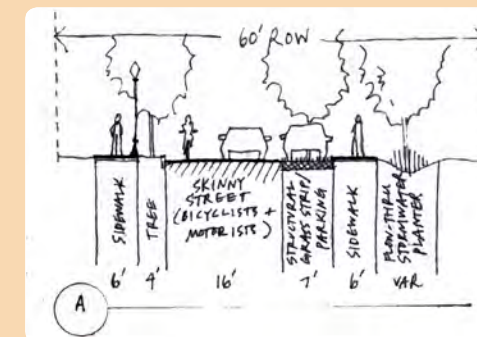
- The PCC tunnel would add \$244 million (2015 dollars) compared to a Barbur option, which equals a 93 percent increase to the segment cost and a 12 percent increase to the full alignment cost.
- The relative depth and width of the proposed tunnel poses challenges for cut-and-cover techniques. The available right-of-way is 60 feet, with houses built up to the public right-of-way. At least 32 feet is needed for the tunnel, with more space potentially needed to accommodate construction activities. Further, the alignment would require a tunnel that is 70 feet deep. To dig the trench for the tunnel, deep shoring walls or other measures will be needed to provide support.
- The higher risk involved in tunnel construction would result in higher contingency costs and increased likelihood of both cost and schedule overruns.
- Public input indicated that the high cost of tunnel construction should be a major factor in decision making.

Viable alternative approaches to improving transit access to PCC Sylvania campus:

- A Barbur HCT alignment would include an improved pedestrian and bike connection to campus along 53rd Avenue. Further study of the potential for a mechanized connection such as a shuttle bus or a "people mover" will occur over the next several months.
- TriMet's Southwest Service Enhancement Plan proposes upgrading line 44 to the PCC campus to frequent service and extending the route to Tualatin via Lake Grove.
- PCC shuttles could connect between the Barbur Transit Center, a Barbur and 53rd Avenue station, and/or stations to the south to provide additional transit connections to the campus.

SW 53rd Avenue bike and pedestrian connection

If HCT runs along Barbur Boulevard, the most direct access point to the campus would be 53rd Avenue, which is currently unimproved for the majority of its length. Conceptual designs for a new streetscape are now underway, focusing on enhanced pedestrian and bicycle facilities along 53rd while continuing to serve local traffic. This connection, paired with new frequent service on the line 44 bus, would encourage more students to select transit, which would reduce parking demand on campus and traffic in the surrounding neighborhoods.



Should the bus rapid transit direct to PCC via SW Capitol Highway option continue to be part of the project?

Recommendation: Continue further study of the bus rapid transit direct connection to the PCC Sylvania campus, via SW Capitol Highway.

Recommendation: This option would provide direct access to the PCC Sylvania campus at nearly the same cost of a bus rapid transit alignment remaining on SW Barbur Boulevard. It would also include an additional station along Capitol that would serve the neighborhood, which includes a Somali community and Oregon's largest mosque. Projections show this option would attract more transit riders than a Barbur Boulevard option despite adding travel time for through-riders.

Staff finds that the following facts, established in prior reports released and incorporated by reference, provide adequate reasons include bus rapid transit direct to PCC via Capitol for further study:

Gains in ridership with little change in capital cost:

- The PCC via Capitol bus rapid transit option would attract 2,100 (7 percent) more line riders and 1,300 (15 percent) more new system transit trips compared to a Barbur bus rapid transit option.
- The PCC via Capitol bus rapid transit option would attract 4,300 daily ons and offs at a campus station. This represents an increase of over 1,900 ons and offs compared with a 53rd Avenue station with the Barbur bus rapid transit route option.
- The PCC via Capitol bus rapid transit option would have only slightly higher capital costs (\$4 million) compared to a Barbur bus rapid transit option.
- Public input showed that ridership numbers are an important factor to consider.

Improved neighborhood transit access:

- The PCC via Capitol bus rapid transit option would include an additional station on Capitol Highway, which would provide access to the neighborhood that is home to the Islamic Center of Portland-Masjed As-Saber, Oregon's largest mosque, and a Somali population along with multifamily housing. It would also provide access to a nearby park, library and school. This neighborhood station would attract an additional 1,140 daily ons and offs.

Major regional destination, clear need for improved transit service to the campus and potential for campus redevelopment while limiting local traffic impacts

- See the section above on the direct light rail connection to PCC.



PCC via Capitol Highway alignment option for bus rapid transit (view looking south)

Staff's recommendation takes into consideration the disadvantages of the PCC via Capitol bus rapid transit option, which include:

Slower travel time:

- The PCC via Capitol bus rapid transit option would add 1.6 minutes in travel time compared to Barbur alignment, slowing the trip for riders travelling past the campus and reducing ridership outside of the PCC Sylvania area.

Substantial potential property impacts, though some could be avoided with revised design:

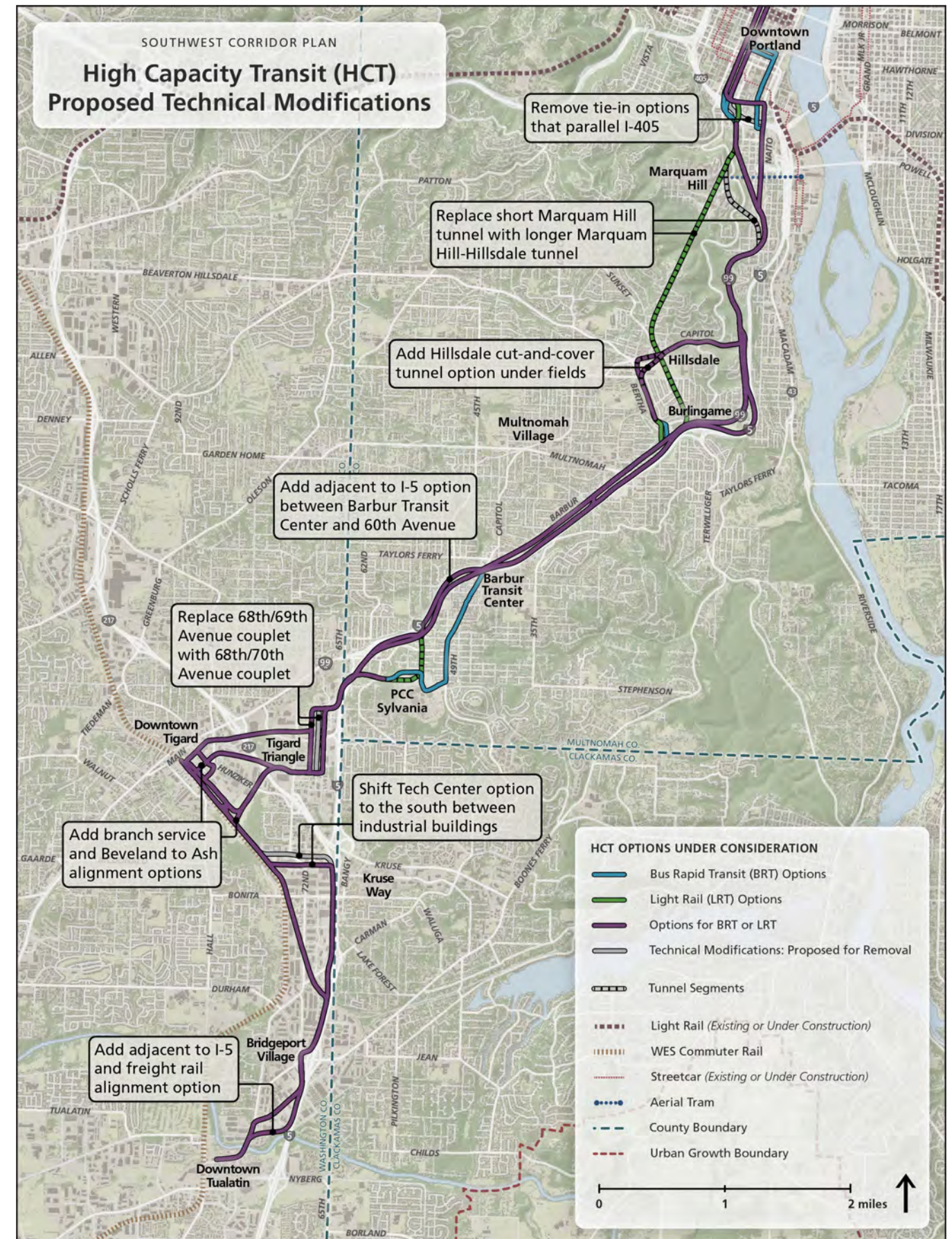
- The PCC via Capitol bus rapid transit option would result in more property impacts than the Barbur option under the current design, which converts two travel lanes and replaces substandard sidewalks and bike lanes with bike and pedestrian facilities meeting current standards. Property impacts would be reduced with mixed traffic operations. Further analysis would be needed to determine the impacts to traffic of these choices.

Technical modifications

Recommendation: Adopt several HCT alignment modifications both in response to steering committee requests and based on further technical analysis, as published in the 'HCT alignment modifications based on technical analysis' document.

In June 2014, the steering committee directed staff to address questions regarding HCT alignment options. In response, staff completed additional traffic analysis, technical drawings and transit demand model runs. Staff also further examined the existing alignment options and developed new alignments as needed. As a result of this technical work, staff proposed several modifications to the list of HCT alignment options under consideration, including removing, replacing, revising and adding options. These recommendations were published in April 2015 and include:

- **Tie-in to existing transit:** The committee requested determination of the best approach to tie in to downtown Portland and the existing transit system through additional traffic analysis and partner discussion. Staff recommends removing bus rapid transit and light rail options parallel to I-405 and keeping SW First Avenue bus rapid transit as contingency option.
- **Tunnels to Marquam Hill:** The committee requested exploration of replacing the shorter Marquam Hill tunnel (formerly "short tunnel") with the longer Marquam Hill-Hillsdale tunnel (formerly "medium tunnel") for light rail. Staff recommends replacing the Marquam Hill light rail tunnel with the Marquam Hill-Hillsdale light rail tunnel. As discussed earlier in this document, staff also recommends removal of the Marquam Hill-Hillsdale tunnel from further consideration based on more detailed evaluation of the South Portland and Hillsdale alignment options.
- **HCT branch service to Tigard and Tualatin:** The committee requested exploration of opportunities to implement branched service to downtown Tigard and south to Tualatin to achieve operational efficiencies. Staff recommends adding branch service and Beveland to Ash options for both bus rapid transit and light rail. These options will be analyzed in a Key Issues memo to be released in fall 2015.
- **Additional recommended modifications:** In addition to the above changes in response to steering committee requests, staff identified several other alignment modifications based on further technical analysis. These changes are identified on the map to the right.



Next steps

Project staff will share feedback regarding these draft recommendations and report any adjustments for steering committee consideration one week prior to the July 2015 meeting. A final report documenting the steering committee actions will be produced after the July meeting.

At the October 2015 steering committee meeting, staff will produce a report summarizing additional analysis on the PCC cut-and-cover tunnel including:

- more developed information regarding tunnel impacts and mitigation
- PCC's vision for the Sylvania campus in response to a light rail station on campus
- potential alternative mechanized connections between an HCT station on SW Barbur Boulevard and the Sylvania campus if a tunnel is not constructed.

Technical work and outreach from July to December will focus on:

- remaining HCT alignment options in Tigard and Tualatin
- whether to align HCT along Barbur, I-5 or some combination of both
- options for the HCT terminus
- the choice between light rail and bus rapid transit as the travel mode.

The committee will deliberate on these options in December 2015.

In early 2016, the steering committee will identify a draft Preferred Package that will include HCT alignment and mode; funding strategy for bicycle, pedestrian and roadway projects in the Shared Investment Strategy; and land use and development strategies. The steering committee will be asked to adopt a final Preferred Package in May 2016.

