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Portland, OR 97232-2736
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Metro | *Agenda*

Meeting:	SW Corridor Plan Steering Committee
Date:	March 9, 2015
Time:	9:00am to 11:00 a.m.
Place:	Tigard Public Library, the Burgess Community Room
Purpose:	Progress update on engagement; Shared Investment Strategy roadway, bike and pedestrian improvements; and discussion of tradeoffs associated with direct vs. indirect access to Marquam Hill and Hillsdale.

9:00 a.m. Welcome and introductions — Co-chair Stacey

ACTION ITEM

9:05 a.m. Consideration of the Steering Committee meeting summary from December 8, 2014 ACTION REQUESTED — Co-chair Stacey

DISCUSSION ITEMS

9:10 a.m. Calendar overview — Co-Chair Dirksen
Review three main decision points for the Steering Committee: July 2015, December 2015, and April 2016.

9:20 a.m. Engagement update — Noelle Dobson, Metro
Summary of place-focused engagement activities in South Portland and Hillsdale, preview of upcoming opportunities for the PCC area, Tigard and corridor wide.

9:30 a.m. Shared Investment Strategy road, bike, ped projects — Brian Harper, Metro
Reminder of how the Steering Committee developed the Shared Investment Strategy project list and next steps for moving the projects towards implementation.

9:45 a.m. South Portland & Hillsdale key issues — Matt Bihn, Metro
Overview of tradeoffs for direct vs. indirect access to Marquam Hill and Hillsdale based on local considerations and corridor wide implications.

PUBLIC COMMENT

10:45 a.m. Public Comment — Co-Chair Stacey
Opportunity for citizens to provide short testimony (approximately 3 minute maximum depending on number of people) and/or submit written comments to inform the Steering Committee.

11:00 a.m. Adjourn

Materials for 3/09/2015 meeting:

- 12/8/2014 meeting summary
- South Portland Key Issues
- Hillsdale Key Issues
- 2015 SWCP Calendar

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700
503-797-1804 TDD
503-797-1797 fax
www.oregonmetro.gov

Metro | *Meeting Summary*

Southwest Corridor Plan Steering Committee
Monday, December 8, 2014
9:00 a.m. to 11:00 a.m.
Tigard Public Works Auditorium

Committee Members Present

Craig Dirksen, Co-chair	Metro Council
Bob Stacey, Co-chair	Metro Council
Marc Woodard	City of Tigard
Steve Novick	City of Portland
Lou Ogden	City of Tualatin
Denny Doyle	City of Beaverton
Krisanna Clark	City of Sherwood
Gery Schirado	City of Durham
Al Reu	City of King City
Roy Rogers	Washington County
Neil McFarlane	TriMet
Rian Windsheimer	ODOT

Metro Staff
Malu Wilkinson, Elissa Gertler, Noelle Dobson, Matt Bihn, Michaela Skiles, Brian Harper, Alan Gunn, Camille Freestone, Noah Siegel, Mei Yong

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1.0 Welcome and introductions

Co-chair Stacey called the meeting to order at 9:01 a.m. and welcomed the committee members and audience to the meeting. He asked that the committee members introduce themselves, and then gave an outline of the upcoming agenda. He emphasized the meeting's focus on the Shared Investment Strategy.

2.0 Consideration of the Steering Committee meeting summary from June 9, 2014

Co-chair Stacey asked for a motion to approve the meeting summary from the June 9, 2014 Southwest Corridor Plan Steering Committee meeting if there were no edits. Commissioner Steve Novick moved to accept the summary without revisions, and Mr. Neil McFarlane seconded the motion. The meeting summary was accepted unanimously.

3.0 Public Comment

Ms. Marianne Fitzgerald expressed disappointment in the speed of the planning process. She felt that there was a lack of productivity over the summer and fall, and worried that with the multi-layered planning process, no real progress towards construction would be made.

Mr. Roger Averbeck, representing SW Neighborhoods Inc (SWNI), expressed concern about the lack of project engagement with SWNI. He noted that they had not been included in any of the stakeholder conversations over the summer and fall, and they would like to be incorporated in future engagement as an important stakeholder in the area.

Mr. Kevin Watkins noted the amount of growth that has taken place in Tigard but explained that until recently infrastructure had kept pace. He suggested that the committee continue pursuing an integrated, reliable transportation system for the growing area. He further explained that the area will need better transit and other transportation infrastructure as it continues to grow. Additionally, he pointed out two fallacies which he believed helped pass Measure 34: light rail would come down Pacific Highway and no public involvement would be done.

Mr. Doug Allen, representing AORTA, requested that the committee reconsider the AORTA proposed option, which he believed needed to be included as an alternative. He cited three reasons that staff have given regarding why the proposal has not been included: there would be no acceptable staging area for a south waterfront tunnel portal, the cost of tunneling would be too high, and the travel time via south waterfront would be excessive. Mr. Allen refuted each of these reasons and asked that the AORTA alternative be considered and studied. (See written comments attached to the record.)

Mr. Mike Stevenson, owner of B&B Print Source, discussed the increasing costs of doing business in the corridor. He explained that previously his company had operated with two delivery trucks. Recently a third truck needed to be added to make deliveries more efficient due to the increasing traffic congestion. He felt favorably towards light rail, but also suggested roadway improvements. He emphasized the ways that traffic negatively affects businesses in the area.

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Ms. Sue Christenson gave six points in support of the system: all development is due to innovation, it is important to start now, economics, housing, connectivity, and health and livability. (See written comments attached to the record.)

Mr. Steve Schopp explained that he has followed the project for some time. He expressed concern about the vagueness of the process since the DEIS was postponed. He noted that the design process has been long and the public has been involved, but the process has been continually changed and the DEIS has been pushed back multiple times. Mr. Schopp expressed the belief that the public did not support the planning expenditure, and that there was a lack of trust between the project and the public. He also raised concern over a large capital expenditure with the lack of funding for basic road maintenance. He asked for information about the amount spent on the project and the amount that will be spent. He also asked for a clear and specific description of the process.

Mr. Ralph Hughes questioned the stability of a tunnel if a seismic event were to take place. He suggested that the vote in Tigard not be considered too large an obstacle due to the small turnout of voters and the slim margin of success. He asked that the voters be shown the facts and allowed to make their own decisions.

Ms. Elise Shearer approached her comments from a social justice perspective. She pointed out the need for better transit in Tigard, especially for those that rely on transit as their main mode of transportation. She noted that there are three major employment centers in Tigard that need better connections, and there are other areas for potential growth in the city. She also discussed the need for TOD around employment centers. She noted the average cost of owning a car and the need to make transportation more affordable.

Mr. Tim Esau explained that he was not totally opposed to light rail and mass transit. He did, however, note that he did not believe light rail was the right answer for the corridor currently. He expressed concern about the changing schedule and asked about the project's overall effectiveness. He also expressed concern about the availability of funding for the project. He asked that instead of light rail, increased local bus service and improved roads be considered as solutions. (See written comments attached to the record.)

Mr. Marland Henderson noted that Tigard is a young city in comparison to many others in the region. He explained that this lack of history sometimes denotes a lack of processes. Mr. Henderson discussed Measure 34 and explained that the vote was lost by only a few percentage points, and he felt that the measure had been unclear and difficult for the voters to understand. He asked that in future votes the explanation on the ballot be made very clear, so voters know what they will receive for their money. (See written comments attached to the record.)

Ms. Debi Mollahan pointed out her own commuting experience as a template for commuting in the region. She noted the high percentage of Tigard residents that commute out of the city for employment, and the high number of employees who commute into Tigard from elsewhere. She discussed the need for reliable business delivery and commuting options in the corridor. She asked that the committee continue exploring innovative solutions that integrate many modes into an effective system. (See written comments attached to the record.)

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Mr. Tom Murphy explained that one of Tigard residents' top concerns is traffic congestion, and noted that high capacity transit is a component of alleviating congestion. He also explained how high capacity transit could weave Tigard into the regional fabric, and complements its goal of walkability. He asked that Measure 34 not be considered the final word, and staff give the citizens a well-reasoned, visionary, comprehensive, and transparent plan.

Ms. Dianne Cassidy, a citizen of Lake Oswego, noted the impacts this project could have on Lake Oswego and refuted the previous comment that asserted that transit is beneficial for social justice. She asserted that automobiles are, in fact, more beneficial to social justice. Ms. Cassidy also asserted that transit oriented development does not work, as many people do not live and work in the same area and frequently change jobs. She also expressed concern about the last mile of trips, where the bus and train cannot take riders into their neighborhoods or directly to their places of business.

Mr. David Jorling approached his comments from a global warming perspective. He asked that the committee and audience read "This change everything," and consider light rail as a part of the solution to global warming.

4.0 Southwest Corridor: solving our transportation challenges

Mr. Matt Bihn reviewed the impetus for this project and the selection of this corridor as a priority. He consolidated the reasoning behind its selection into four main areas.

- High travel demand through and across the corridor paired with population and employment growth
- Lack of transportation choices
- Safety issues
- Congestion and reliability problems

He gave an overview of each of these areas, with special attention on the data that allows for modeling of travel times and reliability in the corridor. He then outlined the integrated strategies pulled from the Shared Investment Strategy that offer solutions to some of the problems in the corridor.

- Roadway projects
- Bike and pedestrian projects
- Local bus service improvements
- High capacity transit options
- Park projects

Co-chair Dirksen called for questions from the committee.

Commissioner Roy Rogers inquired about the Powell-Division project and asked if the two corridor projects will compete at the federal level for funding. Mr. Bihn and Co-chair Stacey explained that it is unlikely that the two projects will be competing for the same type of federal funding, and also somewhat unlikely that they will run on the same timeline. Commissioner Rogers also asked about the total cost of exploring the preferred solutions. He asked that the committee be transparent with potential costs of projects and planning.

He explained that he has been asked, if light rail is not selected, to build more roads, but many people do not understand that there is no money for roads.

5.0 Approach to develop a Preferred Package of Solutions

Mr. Alan Lehto, TriMet, explained the reasoning behind changing the order of the project process. He noted that when a project enters into a Draft Environmental Impact Statement (DEIS) it essentially requires that the design be frozen in its current state, and it leaves little room for refinement and responsiveness. Thus, it is more viable to further refine in a way that is responsive to everyone's needs before entering the federal process.

He also explained how high capacity transit could allow TriMet to redeploy local buses to other places in the corridor and increase local connections.

Mr. McFarlane noted his belief that this new process will allow the project to be more flexible and made more sense in the current situation. Mr. Lehto added that many projects have been done in this process order throughout the country, but none have been done here.

Per Commissioner Roger inquiries, Mr. McFarlane explained that the region has precedents for supporting more than one transit project at a time, and Co-chair Stacey noted that this project was prioritized higher than other corridor projects through a process that focused on areas with the highest potential demand and ridership.

Commissioner Rogers also inquired about the possibility of this project evolving into a standalone project on Barbur Blvd that could eventually connect to Tigard and Tualatin. Mr. McFarlane noted that this was possible, but the committee could shape the process and evolution of the project.

6.0 Activating the Shared Investment Strategy

A. Proposed Recommendation Timeline

Ms. Malu Wilkinson gave an overview of the timeline handed out. She noted that the refinement process will help resources to be used most efficiently and will narrow the scope of work prior to entering the federal process. She explained the project's goal of addressing transit and transportation needs today while shaping development and transportation in the future. By 2016 staff plans to have a preferred package ready for steering committee consideration.

Ms. Wilkinson then outlined the questions given to the staff by the Steering Committee last June and explained that staff plans to bring back the answers as the geographically relevant questions come up during place-focused discussions. She also explained that the project will engage in significant public engagement over the next 18 months. She then went over the areas covered during each time period of the next year and a half and laid out the overall needs for the final preferred package. She also noted there needs to be discussion about how local projects that are not part of the high capacity transit, but are complementary to the corridor's connections, will be funded.

Commissioner Novick inquired about the level of flexibility built into the schedule for the next 18 months and the committee's ability to make decisions as certain technical information becomes available. Ms. Wilkinson and Co-chair Dirksen pointed out that conversations can start prior to the committee being prepared to make a decision.

Mayor Denny Doyle asked about staff's confidence in the project's ability to achieve the timeline. Ms. Wilkinson responded that staff feels confident in the work, but wants the time to engage with the public and have community conversations.

B. Place-focused development strategy

At this point, this agenda item was deferred to the next meeting due to time constraints.

7.0 Proposed engagement to support decisions

Ms. Noelle Dobson introduced herself to the committee and reviewed the work she has done since joining the team in August 2014. She then gave an overview of the outreach approach and tools.

The integrated approach will:

- Focus on outcomes and integrated solutions
- Highlight places
- Aim to capture hearts and minds
- Leverage partner expertise and outreach experience
- Two way communication

The tools include:

- Series of local dialogues
- Storytelling
- Map-based online comment tool
- Online resource/social media
- Creative youth engagement

8.0 Direction on SWCP approach

Co-chair Stacey explained that the last direction given to staff was to enter the DEIS, and that direction must be formally changed.

Mayor Doyle moved to direct project staff to change the sequence of Southwest Corridor Plan milestones to develop a locally-driven preferred package of transportation solutions by spring 2016. Councilor Marc Woodard seconded the motion.

Commissioner Rogers inquired about increased costs due to the delay of the DEIS. Ms. Wilkinson explained that because DEIS level work will aim to be done during this phase or else delayed until the DEIS is started, the cost should be the same.

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Mayor Schirado expressed concern that Multnomah County was no longer a stakeholder in the process, and was no longer represented on the committee. Co-chair Stacey explained that Multnomah County ceded much of their transportation program and responsibility to Portland and now focuses most of their transportation efforts on maintaining their bridges.

The motion then passed unanimously.

9.0 Adjourn

Co-chair Dirksen noted that the next meeting would be on February 9, 2015 and adjourned the meeting at 11:00 a.m.

Meeting summary respectfully submitted by:

<SIGN HERE FOR FINAL VERSION>

_____

Camille Freestone

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Attachments to the Record:

Item	Type	Document Date	Description	Document Number
1	Agenda	12/08/14	December meeting agenda	120814swcpsc-01
2	Summary	06/09/14	06/09/14 meeting summary	120814swcpsc-02
3	Memo	12/08/14	SW Corridor Plan DEIS timing	120814swcpsc-03
4	Calendar	11/26/14	Meeting topic/Engagement calendar	120814swcpsc-04
5	Document	Nov. 2014	Winter 2014 project update	120814swcpsc-05
6	Map	12/01/14	HCT Options for Further Study map	120814swcpsc-06
7	Comment	12/08/14	Public comment: Doug Allen	120814swcpsc-07
8	Comment	12/08/14	Public comment: Marland Henderson	120814swcpsc-08
9	Comment	12/08/14	Public comment: Debi Mollahan	120814swcpsc-09
10	Comment	12/08/14	Public comment: Tim Esau	120814swcpsc-10
11	Comment	12/08/14	Public comment: Sue Christenson	120814swcpsc-11
12	Comment	12/08/14	Public comment: Laura Sciortino	120814swcpsc-12
13	Comment	12/08/14	Public comment: Pam Chandler	120814swcpsc-13
14	PPT	12/08/14	SW Corridor Challenges and Opportunities	120814swcpsc-14
15	PPT	12/08/14	Proposed recommendation timeline	120814swcpsc-15
16	PPT	12/08/14	SWCP Outreach	120814swcpsc-16

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Southwest Corridor Plan

Key Issues: South Portland

Discussion Draft, March 2, 2015

GREAT PLACES
SW Corridor
Portland • Sherwood • Tigard • Tualatin
Beaverton • Durham • King City
Washington County • ODOT • TriMet • Metro

Key Issues: South Portland

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South Portland Key Issues: introduction and summary

Southwest Corridor Plan overview

The Southwest Corridor Plan is a comprehensive approach to achieving community visions through integrated land use and transportation planning. The Southwest Corridor Plan incorporates high capacity transit (HCT) alternatives, roadway, bicycle and pedestrian projects, and adopted local land use visions, including the Barbur Concept Plan, the Tigard High Capacity Transit Land Use Plan, Linking Tualatin, and the Sherwood Town Center Plan. The Plan is exploring Bus Rapid Transit (BRT) and Light Rail Transit (LRT) alternatives for several alignments that connect the Portland Central City, Southwest Portland, Tigard, and Tualatin.

In July 2013, the Southwest Corridor Plan Steering Committee recommended a Shared Investment Strategy that includes key investments in transit, roadways, active transportation, parks, trails and natural areas. A refinement study was initiated in August 2013 to narrow HCT options, identify a preferred alternative and create a subset of roadway and active transportation projects. In June 2014, the Steering Committee accepted the recommendation of a narrowed set of HCT design options and requested additional refinement work from staff.

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. The Preferred Package is anticipated to be defined in spring 2016.

After a 2016 Preferred Package is defined and approved by the Steering Committee, the HCT alignments and associated roadway, bicycle and pedestrian projects will receive full environmental review in a Draft Environmental Impact Statement (DEIS) under the National Environmental Policy Act (NEPA). It is anticipated that additional roadway, transit, bicycle and pedestrian projects will be further studied, funded and implemented through other collective federal, state, regional and local efforts.

Desired outcome: Preferred Package

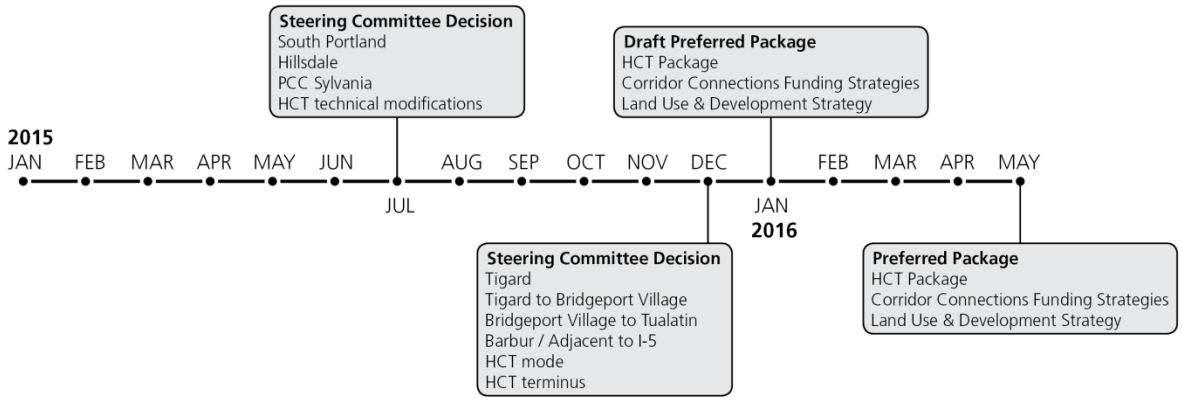
Project partners will work together to develop a Preferred Package by spring 2016 that addresses the needs and aspirations of Southwest Corridor residents and businesses. The Preferred Package will include the following components:

- ***HCT Preferred Alternative:*** Preferred HCT alignments to study further in a DEIS, including mode, alignments, terminus, and associated roadway, bicycle and pedestrian projects
- ***Corridor Connections:*** Potential funding source and timeframe for each of the roadway, bicycle and pedestrian projects identified in the Shared Investment Strategy
- ***Land use and development strategy:*** Partnership agreements and other pre-development work to activate land use and place-making strategies identified in local land use visions

Identifying the Preferred Package: 2015-2016 timeline overview

To reach a Preferred Package by spring 2016, two key Steering Committee decision-making points have been identified in 2015: July and December. Technical analysis, place-based public outreach and partner conversations will precede each Steering Committee decision. A draft recommendation report will be presented at community forums before each decision-making point, including public comment gathered during the place-based outreach period and any additional technical analysis compiled.

The July Steering Committee decision will focus on direct versus indirect access to key destinations in the corridor, including Marquam Hill, Hillsdale and the Portland Community College (PCC) Sylvania Campus, as well as technical modifications to HCT alignments. The December Steering Committee decision will focus on the remaining HCT alignments and terminus options as well as an HCT mode decision between LRT and BRT. In January 2016, the Steering Committee will identify a Draft Preferred Package, including HCT mode, alignment options, terminus options, and associated roadway and active transportation projects for further study in a DEIS, a funding strategy for additional priority roadway, bicycle, and pedestrian projects throughout the corridor, and integrated land use and development strategies.



How to use this Key Issues memo

The Southwest Corridor project partners are taking a place-based approach to understanding the key issues related to potential HCT and transportation investments as they relate to local concerns and community aspirations. The place-based key issues will be reviewed by the public and the Steering Committee in the context of their implications for achieving the multifaceted goals for the corridor as a whole. Decision makers and the public will have several months to discuss this report through public meetings and online engagement. Although this memo will not be revised after the March Steering Committee meeting, information from this report and other Key Issues memos will be combined with technical evaluation of the options in the South Portland, Hillsdale and PCC-Sylvania areas to form a draft Evaluation Report expected in May 2015. A summary of stakeholder feedback will be incorporated

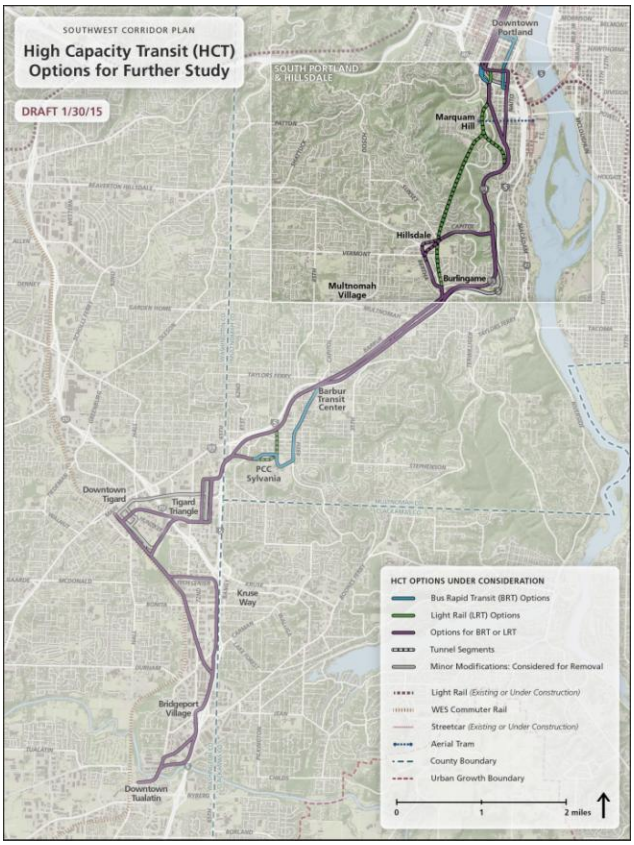
into the Evaluation Report and Recommendation that will be available prior to the July 2015 Steering Committee decision. The remaining place-based evaluation and recommendation reports will be available before the December 2015 Steering Committee decision.

This document fits into a broader array of technical information that supports Steering Committee decision making during this phase of the Southwest Corridor Plan. **Appendix A** lists the anticipated major project documents and their estimated dates of completion.

This document includes an overview of the decision making process as it relates to the key issues in South Portland, a description of the three proposed high capacity transit alignments to serve South Portland, a summary of technical information and a description of key issues for decision makers and the public to consider. Appendices contain supplemental information including maps and project lists of Shared Investment Strategy road, bicycle and pedestrian projects being considered for the South Portland area, a discussion of general transit mode considerations, and maps highlighting demographic factors in the study area.

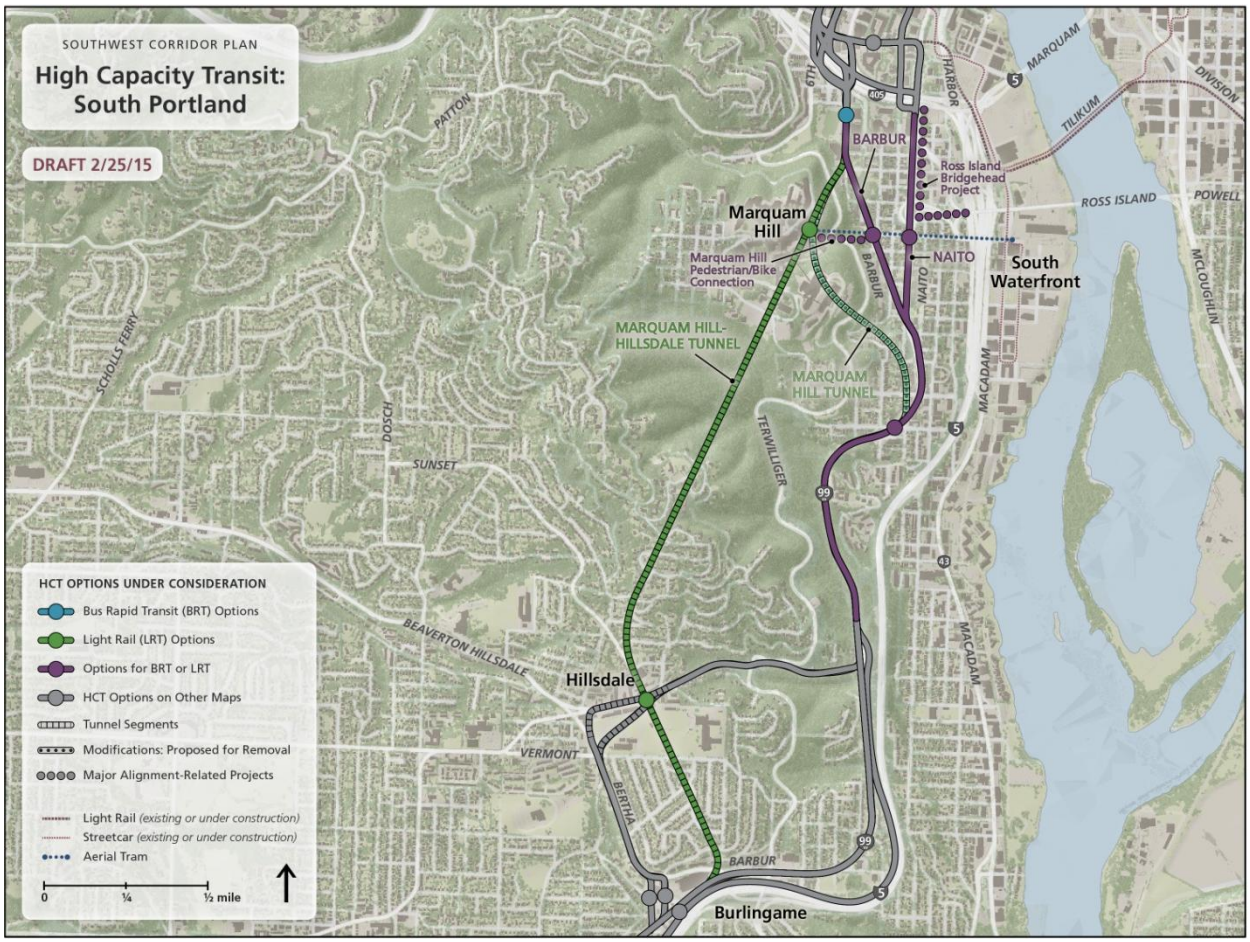
South Portland Key Issues summary

The South Portland area encompasses the project area between the Portland Transit Mall and SW Hamilton Street, but also includes a tunnel HCT alignment option that extends to the Hillsdale and Burlingame areas. This memo focuses on the following three HCT options under consideration for the South Portland area:



1. A Marquam Hill-Hillsdale deep-bored tunnel between downtown Portland and SW Bertha Boulevard (LRT only)
2. A surface alignment on SW Barbur Boulevard (BRT or LRT) between downtown Portland and SW Hamilton Street, including a new pedestrian and bike connection between Marquam Hill and Barbur Boulevard
3. A surface alignment on SW Naito Parkway from downtown Portland to the merge point with Barbur Boulevard and continuing to SW Hamilton Street, including a new pedestrian and bike connection between Marquam Hill and Barbur Boulevard, and including implementation of at least some portions of the Ross Island bridgehead project

Additional HCT options in the vicinity of Hillsdale overlap this geographic area but are addressed separately in the Hillsdale Key Issues memo. The Marquam Hill-Hillsdale Tunnel alignment is addressed in both the South Portland and Hillsdale Key Issues memos.



Major decisions in South Portland

In July 2015 the Southwest Corridor Plan Steering Committee will be asked to make a decision on which of the proposed HCT alignment choices serving the South Portland area will advance to further environmental review through a DEIS that could begin in late 2016.

While some distinctions between the Barbur and Naito options are described in this document, a decision to advance one over the other will require further detailed analysis that will be performed as part of the DEIS. As a result, a July 2015 decision to forward a surface alignment in South Portland would include both the Naito Parkway and Barbur Boulevard alignments, as well as local circulation options in the Ross Island bridgehead area. The Steering Committee will decide in July 2015 whether the Marquam Hill-Hillsdale Tunnel alignment will also proceed for further environmental review. This document focuses on the substantial tradeoffs between a tunnel option and the two surface options so that the public and decision makers can be confident that all options that will enter the DEIS are viable and aligned with project goals.

Timeline for major decisions in South Portland

July 2015:

- Should the Marquam Hill-Hillsdale Tunnel be studied in the DEIS?
- Should the surface alignments (Barbur and Naito) be studied in the DEIS? Advancement of the surface alignments would include study of both a Marquam Hill pedestrian and bike connection and the Ross Island bridgehead project.

December 2015:

- Is BRT or LRT the preferred mode to study in the DEIS?
- What is the best implementation approach for roadway, bike, and pedestrian projects that are not included as part of the HCT project but are defined in the Shared Investment Strategy in South Portland?

DEIS (anticipated 2016/2017):

- Should a surface alignment use Naito Parkway or Barbur Boulevard in South Portland?
- If the Marquam Hill-Hillsdale Tunnel is studied in the DEIS: will the tunnel or the surface alignment be selected for the LPA?

Evaluation factors

Deliberation and decision making will be driven by how well each element of the proposed project meets the Southwest Corridor Plan overarching Purpose and Need, including improved mobility and safety for all users and modes of transportation, efficient and reliable transportation choices, wise use of public resources, improved access to key places, and equitable distribution of the benefits and burdens of transportation and land use development.

This South Portland Key Issues memo outlines data collected through technical analysis, community knowledge and discussions with partners that will influence this decision, including:

- Transit performance
- Community development
- Mobility: traffic impacts and safety
- Capital cost estimates
- Engineering complexity and risk
- Community impacts

South Portland summary

The following table summarizes evaluation factors, key considerations, and analysis results for consideration in the South Portland area.

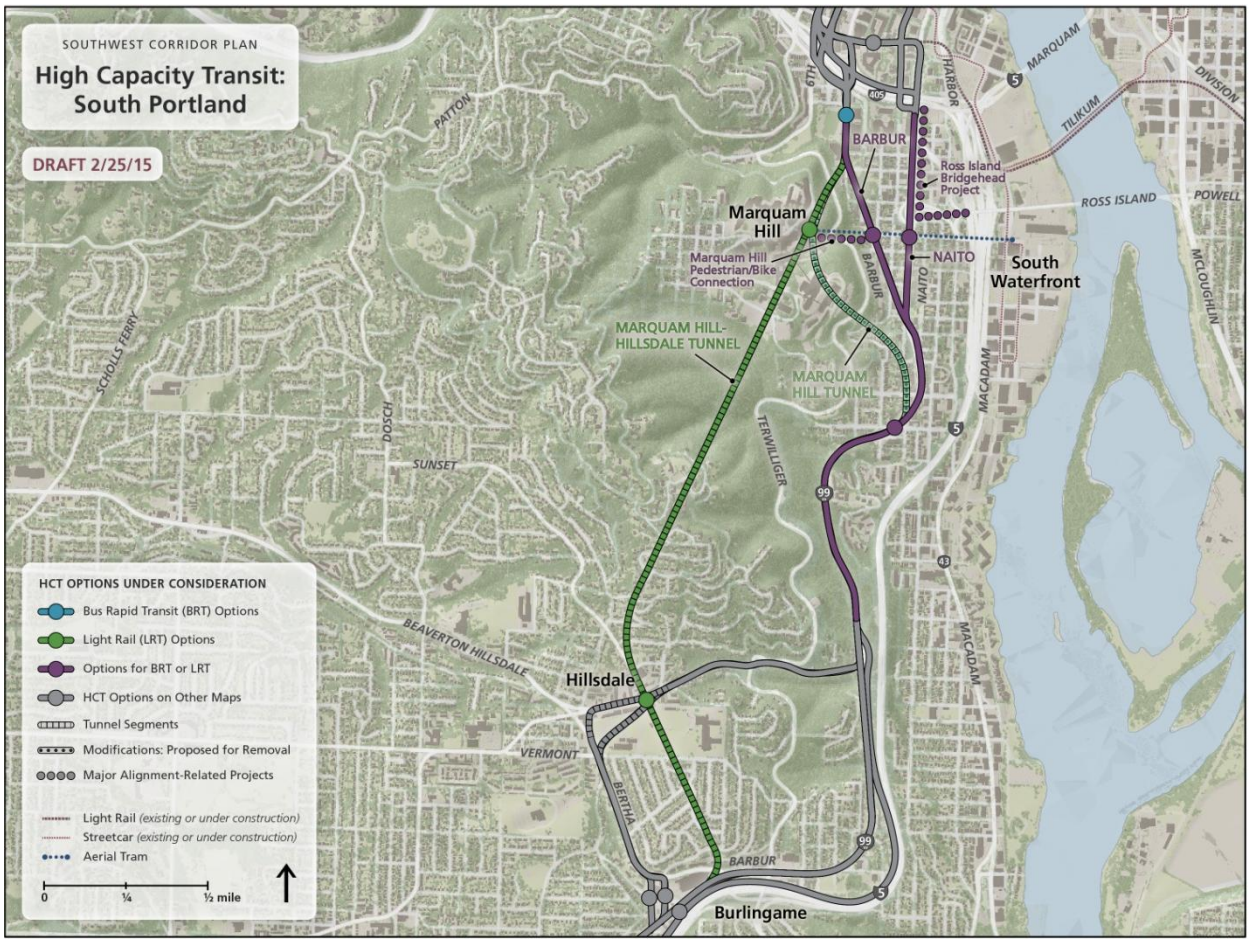
Key considerations	Evaluation factors	Marquam Hill-Hillsdale Tunnel	Surface Alignments	
			Barbur	Naito
Transit Performance • How would a Marquam Hill-Hillsdale tunnel alignment perform relative to a surface alignment? • Do the performance differences justify the higher capital costs, complexity, and risk associated with a tunnel? • How would an HCT project affect Marquam Hill transit and auto usage?	*2035 new transit trips*	New Transit Trips: 23,300	New Transit Trips: 22,600	New transit trips expected to be similar to Barbur
	2035 line riders	Line riders: 45,500 *(High number of bus transfers to LRT in Hillsdale results in high line ridership relative to new transit trips)*	Line riders: 36,900	Line ridership expected to be similar to Barbur
	Travel time (PSU to Tualatin)	Travel Time: 27 minutes	Travel Time: 30 minutes	Slightly slower than Barbur due to service along SW Lincoln and the additional station
	2035 Marquam Hill station usage and auto volume impacts	• Increases Marquam Hill transit ons & offs by 23% • Daily auto volumes on streets providing access to Marquam Hill would decline by 3%	• Increases Marquam Hill transit ons & offs by 13% • Daily auto volumes on streets providing access to Marquam Hill would decline by 2%	• Ons and offs expected to be similar to Barbur • Daily auto volumes on streets providing access to Marquam Hill expected to decline similar to Barbur alignment
Community Development • Do surface or tunnel alignments offer the most desirable redevelopment opportunities for communities in South Portland? • Can effective bicycle and pedestrian connections be developed so that a surface alignment can provide a good connection for transit riders to Marquam Hill?	*Access*	• Direct access to Marquam Hill • No connection between Lair Hill and Marquam Hill • No direct station access to South Waterfront (access via tram) • Includes sidewalk/bike improvements to access station	• Indirect access to Marquam Hill (via new pedestrian connection) • Potential stations at Hamilton and Gibbs in Lair Hill/South Portland • Walk access to South Waterfront via Gibbs St ped bridge • Includes sidewalk/bike improvements along Barbur and to access stations	• Indirect access to Marquam Hill (via new pedestrian connection) • Potential stations at Hamilton and Gibbs in Lair Hill/South Portland • Walk access to South Waterfront via Gibbs St ped bridge • Transforms the remnant expressway on this stretch of Naito into an urban boulevard with multimodal access to the HCT station
	Redevelopment potential	Redevelopment potential near stations	Some redevelopment potential along Barbur	Most redevelopment potential, including on land that could become available with Ross Island Bridgehead reconfiguration
	Support of local land use plans			Supports Barbur Concept Plan

Key considerations	Evaluation factors	Marquam Hill-Hillsdale Tunnel	Surface Alignments	
			Barbur	Naito
Mobility • Can high capacity transit be designed to minimize negative impacts to auto, freight, bicycle and pedestrian mobility and access? • Do surface or tunnel alignments offer more opportunities to improve safety for all users? • Can surface alignments on Naito or Barbur be designed to avoid creating a barrier effect for cars, bikes and pedestrians?	*Accessibility*	Includes sidewalk/bike improvements to access station	Includes sidewalk/bike improvements along alignment and to access stations	• Includes sidewalk/bike improvements along alignment and to access stations • Could include projects that improve auto access to Ross Island Bridge and reconnect street grid
	Mode considerations	Only LRT would operate in a tunnel option	• 20 BRT vehicles per hour in the peak in South Portland • 8 LRT vehicles per hour in the peak	• Same as Barbur alignment
Capital Costs • What are the cost differences between a tunnel and a surface option? • Does overall cost impact the length of the final high capacity transit project?	*Cost estimates in 2014 dollars*	Adds $900M - $1.0B compared to Barbur or Naito alignment Depending on regional funding capacity, could impact terminus options to the exclusion of Tigard or Tualatin	$1.9B - $2.4B (LRT) $750M - $1.2B (BRT)	$1.9B - $2.4B (LRT) $750M - $1.2B (BRT) Additional cost for Ross Island Bridgehead modifications
Engineering complexity/risk • Are the benefits and risks associated with construction of a deep-bored tunnel clear? • What aspects of each alignment option present noteworthy risk?	*Risk*	• Large area needed for tunnel mining/access for heavy equipment and trucks at each portal • Risk of complications with tunnel boring resulting in cost overruns • Traffic and physical roadway impacts from hauling excavated materials • Potential 4(f) impacts to Duniway Park with tunnel construction	• Right-of-way impacts • Potential 4(f) impacts to Duniway Park	• Complexity of Ross Island bridgehead modification construction • Potential right-of-way impacts if maintaining all travel lanes on Naito • Modification of existing structures along Naito
Community impacts • Can the benefits and burdens of an HCT alignment be equally distributed among all population groups in the corridor? • Do surface or tunnel alignments offer greater access to key places such as education, employment, health care and retail centers?	*Distribution of impacts*	• Most direct access to education, employment and health care services on Marquam Hill • Limited access to education, health care, employment and retail services on Naito Parkway, South Waterfront, and local retail centers • Portal may be a visual or potential 4(f) concern if impacting parks/open space	• Potential right of way impacts • Provides more direct access to education, employment, health care and retail services not located on Marquam Hill	• Potential right of way impacts • Most improved access to education and health care services along Naito Parkway via HCT station areas and road, bicycle and pedestrian improvements

South Portland Key Issues

HCT alignment option descriptions

There are three HCT alignments in South Portland: two surface and one tunnel. A number of other HCT alignment options were removed from further consideration by the Steering Committee in April and June 2014. More information on these options may be found on the Southwest Corridor Plan website: http://www.oregonmetro.gov/public-projects/southwest-corridor-plan/project-library.



Surface

The two surface alignment options in South Portland would both include a pedestrian connection from Barbur Boulevard to Marquam Hill near Gibbs Street for both BRT and LRT. Either BRT or LRT alignment options on Naito Parkway could potentially include modifications to the current Ross Island bridgehead access.

Naito Parkway surface alignment

This option would connect to downtown Portland via Lincoln Street at Naito Parkway, with LRT tying into the Portland-Milwaukie light rail (PMLR) tracks on Lincoln and BRT using the new bus-only lanes between Naito and 1st Avenue on Lincoln. LRT would utilize the PMLR station on Lincoln while the BRT would stop adjacent to the station at curb side stops near the Lincoln LRT station to facilitate transfers. Continuing south, the Naito alignment would likely locate a station north of Gibbs Street in the vicinity of the existing Ross Island Bridge ramps. This location minimizes impacts to adjacent properties due to the necessary width of the station area and also allows the station to better serve the National College of Natural Medicine (NCNM) while still providing a connection to the Gibbs corridor with the Hooley pedestrian bridge connection to South Waterfront. This alignment could convert travel lanes on Naito to transit only and remove existing grade-separated intersections along the corridor. This alignment would include the Marquam Hill pedestrian/bike access project and could require inclusion of the Ross Island bridgehead access project, both described later in this section.

Barbur Boulevard surface alignment

This option would tie into downtown via a new bridge at 4th Avenue connecting to the PMLR tracks at Lincoln for LRT or would utilize existing bridges on 5th and 6th for BRT in a combination of dedicated guideway and mixed traffic, making connections directly to the Transit Mall. LRT would utilize the existing Jackson Street station and would locate a second station on Barbur in the vicinity of Gibbs Street to the south. BRT would utilize the existing station on the Transit Mall near Mill Street and PSU Plaza and would likely locate another station near Sheridan Street to the south as well as a third station in the vicinity of Gibbs Street. This alignment could convert travel lanes on Barbur to transit only and remove existing grade-separated Naito intersection. This alignment would include the Marquam Hill pedestrian/bike access project described below.

Tunnel

The LRT tunnel option would run between the downtown Portland Transit Mall and Burlingame, including direct access to Marquam Hill and Hillsdale.

Marquam Hill-Hillsdale Tunnel

This option would tie into the downtown Transit Mall via a new bridge at 4th Avenue connecting to the PMLR tracks at Lincoln Street. Access to the tunnel portal would be in the vicinity of Hooker Street. The tunnel would extend under Marquam Hill with a deep station 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 deep station would be located under the Hillsdale town center, near the intersection of Capitol Highway and Sunset Boulevard. The tunnel would exit the hillside in the vicinity of Bertha Boulevard where it meets Barbur Boulevard.

With this alignment option there would be no surface connections to inner southwest Portland except those north of I-405 described above. The Marquam Hill-Hillsdale Tunnel alignment would not assume a

direct pedestrian and bicycle connection between Marquam Hill and Barbur Boulevard since the area would be served by an underground station with an elevator.

Roadway, pedestrian and bicycle projects

All options include a range of roadway, pedestrian and bicycle improvements to better connect the corridor to the surrounding neighborhoods near stations and along surface portions of alignments. The specific improvements vary depending on the alignment and multimodal needs. Maps and lists of potential roadway, pedestrian and bicycle projects that would accompany HCT alignments in South Portland are included in Appendix B. Two major projects, Marquam Hill pedestrian/bike access and the Ross Island bridgehead project, are described in more detail below.

Marquam Hill pedestrian/bike access

This connection has been studied at a conceptual level through the Marquam Hill Design Challenge. Two firms were hired to conceptually render new connections from a Barbur or Naito transit stop up to Marquam Hill. Options studied included a sky bridge, several escalator options and a pedestrian tunnel. Connections on the hill were proposed at Terwilliger and/or within the OHSU campus. The project engaged the surrounding neighborhood groups, adjoining property owners and several health care providers; these included the Veterans Medical Center, NCNM, and OHSU. It is clear that a well-designed connection from Barbur to the OHSU campus and beyond to the VA Medical Center is feasible, and it is assumed this connection would be constructed as part of a Barbur or Naito surface alignment.

Ross Island bridgehead project

The set of projects referred to collectively as the Ross Island bridgehead project is a set of modifications to the roadway system at the west end of the Ross Island Bridge, in the South Portland/Lair Hill neighborhood. The modifications are based on previous planning work, including the South Portland Circulation Study, the Portland City Council-adopted Barbur Concept Plan, and the I-405 Design Workshop, and include changes to roadways and ramps intended to improve street connectivity, reduce the barrier effect of Naito Parkway for the neighborhood, improve pedestrian and bicycle connections, and modify motor vehicle connections to the Ross Island Bridge. The project involves converting Naito from an arterial to a collector, converting the complex networks of ramps, frontage roads, and disconnected streets to a more typical grid street pattern, and providing accommodations for through vehicles and vehicles accessing the bridge. At a minimum, it would be necessary to implement portions of the bridgehead project in order for a Naito surface alignment to function safely and effectively.

South Portland analysis and findings

Transit performance

Key considerations:

- How would a Marquam Hill-Hillsdale tunnel alignment between downtown Portland and Burlingame perform relative to a surface alignment in the same area?
- Do the performance differences justify the higher capital costs, complexity and risk associated with a tunnel?
- How would an HCT project affect Marquam Hill transit and auto usage?
- How would the lack of a surface connection to inner SW neighborhoods (including South Waterfront) affect the long-term goals and visions for these areas?

Key findings:

- Marquam Hill-Hillsdale Tunnel alignment travel time would be 2.8 minutes faster than the surface Barbur option between downtown and Burlingame. This difference is due to the faster travel speeds and shorter distance of the tunnel alignment.
- Marquam Hill-Hillsdale tunnel would result in 8,600 additional line riders but only 700 more new transit trips in 2035 when compared to the LRT surface alignment on Barbur (line riders and system trips are defined in the following section). The difference occurs because projections show that many of the additional line riders would be transferring to LRT from local buses and riding one stop to a Marquam Hill station.
- All three alignment options would increase daily on and off transit boardings at Marquam Hill from a no-build option by 13-23 percent in 2035. Daily auto volumes on streets leading providing access to Marquam Hill would decline by a projected two to three percent.

The South Portland transit analysis focuses on differences between LRT operating through a tunnel under Marquam Hill and LRT routed on the surface on Barbur Boulevard and utilizes two travel demand model runs to reflect these alternatives. Any transit performance comparisons of the Naito alternative to these are at this time qualitative. Model runs used LRT as the mode for comparison because the tunnel option is not under consideration for BRT. Future model runs may be utilized to quantify differences. **All model results at this time should be considered preliminary as developments in HCT options and local bus service assumptions will necessitate updated model runs throughout the DEIS process.**

Travel time and reliability

The Marquam Hill-Hillsdale Tunnel alignment would be slightly shorter than the Barbur surface alignment and could travel at a higher speed because it would be completely separated from cars, pedestrians and bikes. Therefore it would provide the fastest and most reliable LRT travel times of the options in South Portland, saving 2.8 minutes over LRT on Barbur, or about 10 percent of the total travel

time projected between the Transit Mall and a Tualatin terminus. The Naito alignment would be slightly slower than the Barbur option due to its longer distance and an additional station at Lincoln Street.

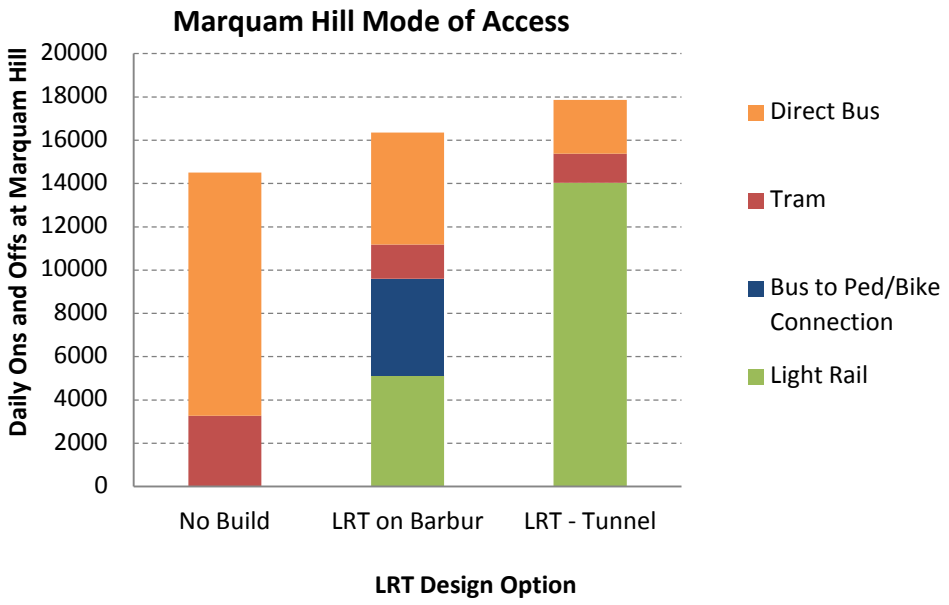
Line and system ridership

Future transit ridership forecasts are largely determined by the speed of the service relative to competing modes and by the numbers of households and jobs the line serves. Ridership is expressed in two ways: **line ridership** measures the number of daily riders on the specific HCT line (between the Tualatin terminus and downtown Portland)—this includes both new transit riders and those who rode buses in a no-build scenario (without the HCT project). **Change in system transit trips** measures the growth of total system ridership with implementation of the proposed project compared to a no-build alternative—this isolates new transit riders only. While shifts from buses to HCT in the model reflect riders who mostly benefit from improved accessibility with a project, new riders represent shifts in mode, usually from autos to transit, which are more likely to benefit the transit system as a whole. All measures are for forecast year 2035.

The Marquam Hill-Hillsdale Tunnel option would result in 8,600 more line riders compared to LRT on Barbur, a 23 percent increase, but only 700 more new transit riders (system transit trips), a three percent increase. This discrepancy occurs because of the difference in access to Marquam Hill between the tunnel alternative and the surface alternatives. With HCT on either Barbur or Naito, a surface pedestrian and bicycle connection between Barbur Boulevard and Marquam Hill is assumed to be built as part of the HCT project regardless of the mode selected. This connection, whether it is an elevator, escalator, walkway, or other design, would be accessible to HCT riders and to local bus riders at Barbur Boulevard near Gibbs Street. Approximately half of the projected users of the pedestrian/bicycle connection would be local bus riders. For the Marquam Hill-Hillsdale Tunnel alternative, without the direct connection between Barbur and Marquam Hill, local bus riders instead would transfer to LRT in either Hillsdale or downtown Portland and travel one stop to the tunnel station under Marquam Hill. These transfers result in higher line ridership for LRT in a tunnel, but a much smaller difference in net new transit riders compared to the surface alternatives.

Marquam Hill transit ridership impact to auto volumes and local transit service

Both the surface and tunnel HCT alternatives would attract higher transit ridership to Marquam Hill compared to a no-build alternative (without an HCT project), with an increase of 1,850 average weekday station ons and offs (13 percent) and 3,350 station ons and offs (23percent) respectively (see figure below). The Tunnel option would result in 1,500 more daily ons and offs at Marquam Hill compared to the Barbur option, a nine percent increase.



Mode of Access	No Build	LRT on Barbur	LRT in Tunnel
Direct Bus	11,250	5,150	2,500
Tram	3,250	1,600	1,350
Bus to Ped/Bike Connection		4,450	
Light Rail		5,150	14,050
Transit Riders	**14,500**	**16,350**	**17,900**

Select Line Ridership		36,900	45,500
System Ridership Change		22,600	23,300

Roads accessing Marquam Hill would experience some reductions in auto volumes with the introduction of HCT, with projected daily auto volumes reduced by approximately two percent with the LRT on Barbur scenario, and by approximately three percent with the LRT in a tunnel. With or without HCT, vehicle trips to the hilltop are constrained by parking capacity limits, resulting in latent demand for auto travel on the three road access points (Terwilliger to the north and south, and Marquam Hill Road to the west).

HCT service could possibly reduce the number of local buses traveling directly to Marquam Hill as riders shift to LRT or BRT. Both LRT on Barbur and the Tunnel would reduce the daily direct local bus ons and offs at Marquam Hill by more than half – a drop of 6,100 (54 percent) and 8,750 (78 percent),

respectively, while increasing the total transit ridership to Marquam Hill based on 2035 Regional Transportation Plan assumed local bus network.

Naito compared to Barbur

While modeling has not been performed to assess a Naito option, its transit performance relative to a Barbur option can be inferred based on alignment differences. A station near Gibbs would be expected to perform similarly whether HCT is on Barbur or Naito. An alignment on Barbur would provide slightly faster travel times due to one less station in downtown and therefore would attract slightly higher ridership along the entire route. A Naito alignment, however, would serve an additional station at Lincoln Street and 3rd Avenue, currently under construction as part of TriMet's new Portland-Milwaukie light rail. This additional stop of BRT or LRT would attract additional ridership destined to and from the southern portion of the Portland central business district. It can be expected that Barbur and Naito transit performance would be similar, but further modeling is needed to quantify the differences.

South Portland mode considerations

Appendix C includes a general discussion of differences between BRT and LRT modes and their corridor-wide impacts; this section addresses issues particular to the South Portland area.

Consideration should be made for the number of transit vehicles traveling through South Portland, with a project on either Barbur or Naito. Today four bus routes and up to 20 buses travel along Barbur Boulevard in South Portland in the peak hour on weekdays, and six bus lines and up to 14 buses travel along Naito Parkway, and bus service will likely increase as future demand grows. Introduction of HCT, regardless of mode, would reduce the number of local buses traveling through South Portland as riders would shift to either LRT or BRT. However, because of differences in carrying capacities more BRT vehicles than LRT vehicles would be needed to carry an equivalent passenger load (see Appendix C). The projected 2035 demand would require 20 BRT vehicles per hour in the peak in South Portland, while LRT is assumed to operate with eight vehicles per hour in the peak with enough capacity still available to accommodate ridership growth beyond 2035. For BRT, growth above the projected 2035 demand would require yet more increases in service.

HCT service operates faster than local buses because of exclusive right of way but also because of signal pre-emption or signal priority at intersections. The high number of hourly vehicles required for BRT can be expected to diminish some of this travel time benefit. The more frequently HCT vehicles pass through an intersection, the less likely signal priority could be given to the transit vehicles over cars. When the frequency of signal priority requests interferes with auto movement, priority for HCT vehicles is limited. Detailed traffic analysis performed in the DEIS will help estimate the effects of transit pre-emption on traffic and transit performance. The frequency required for BRT and the limitations of existing transit priority infrastructure would make it less likely than LRT to be granted signal pre-emption or signal priority.

Today six bus routes and up to 23 buses serve Marquam Hill in the peak hour on weekdays, and service will likely increase with future demand growth. Since HCT options are either in a tunnel (LRT) or on

Barbur or Naito (LRT or BRT) with a direct connection to the hilltop, the number of buses serving Marquam Hill would likely be reduced as demand shifts to HCT, regardless of mode or alignment.

Community development

Key considerations:

- Does a surface or a tunnel alignment offer the most desirable redevelopment opportunities for communities in South Portland?
- Can effective bicycle and pedestrian connections be developed so that a surface HCT alignment can directly connect transit riders to Marquam Hill?

Key findings:

- The Marquam Hill Tunnel alignment would provide the most direct access to OHSU and the VA Hospital via an underground station with elevator access above ground within the OHSU campus. This alignment would not provide access to Naito Parkway, Barbur Boulevard or South Waterfront
- A Barbur or Naito alignment would require multimodal investments to provide pedestrian and bicycle access from Barbur or Naito to Marquam Hill.
- A Barbur or Naito alignment would provide opportunities for enhanced transit travel between inner SW Portland destinations south of the city limits.
- A Barbur or Naito alignment would provide connections between educational campuses at PSU, OSHU in South Waterfront and Marquam Hill, NCNM, and PCC.
- A Naito alignment would offer the most redevelopment potential of the each of the proposed alignments, including parcels of land that could become available through the reconfiguration of the Ross Island Bridgehead.
- A Naito alignment would fulfill the goals and visions contained in the Portland City Council-adopted Barbur Concept Plan, including reconnecting the adjacent neighborhood that was separated by the Ross Island Bridge connection to I-405 and Barbur.
- A Naito alignment would provide additional transit service in the south end of downtown Portland via Lincoln.

The key Community Development considerations of each alignment option in South Portland are access, redevelopment potential, and support of local land use plans. Access relates to the ability of surrounding land uses to access the proposed transit alignment. Redevelopment potential is the availability of vacant and underutilized properties to redevelop based on impacts of the implementation of the Shared Investment Strategy. Support of local land use plans is a reference to how the proposed investment options fit in the scheme of adopted local land use plans.

The specific Community Development issues surrounding the South Portland area are tied directly to the three alignment choices in this area. There are different considerations around how each of the remaining alignments would support local land use goals and regional employers. An important point to consider is the existing ridership that travels to and from this area on a daily basis on current transit

lines. The area contains a mix of large employers (OHSU, PSU, VA hospital), educational institutions (PSU, NCNM, OHSU), established residential areas in Lair Hill and Homestead and a growing residential population in South Waterfront. Combined with ongoing investment by the City of Portland in the Education and North Macadam Urban Renewal Areas, these generate strong transit ridership demands today that will continue into the future.

The choice of HCT alignment will have a direct impact on existing jobs and residents, impacts to the existing residential neighborhoods and what kind of future growth may occur. The singular point of convergence for the existing employers, education institutions and future residents is the South Portland/Lair Hill neighborhood. Bisected by large-scale infrastructure projects over the last 60 years, the area exists as a "pass-through" neighborhood since it provides the only city street connection of the northern and southern limits of downtown Portland. It has been a long-held goal of the city to knit the neighborhood back together. Future investment of a high capacity transit project in the corridor could profoundly impact the built environment in South Portland for many decades to come.

Marquam Hill-Hillsdale Tunnel

Access: An elevator connection from a tunnel station would offer the most direct connection to Marquam Hill, which currently employs more than 20,000 people between OHSU and the VA Medical Center and provides services daily to patients and families. It would not provide direct connections to South Waterfront or other South Portland neighborhoods. With the projected growth of South Waterfront from an existing 3,200 residential units today to 11,600 units in 2035, some investment in a stronger surface connection for pedestrians and bikes for the east/west connection would need to supplement any tunnel construction. Without a direct HCT connection, the South Portland neighborhood and other transit riders seeking access to the neighborhood and to South Waterfront would need a safe and efficient east/west connection that does not currently exist.

Redevelopment potential: The Tunnel alignment would not offer redevelopment potential to existing properties along Barbur and Naito. Although some natural, market-driven increases in land value based on proximity to Downtown may occur along the northern portion of Barbur, the remaining neighborhood would likely see little to no impact to property values from the construction of a tunnel alignment since no station would serve the neighborhood. This would potentially limit the ability of some underutilized and undervalued properties to redevelop in the short and medium term.

Support of local land use plans: The tunnel alignment would not support the existing Barbur Concept Plan, which calls for some form of High Capacity Transit investment along Naito. A key element of the Barbur Concept Plan is to realign the existing Ross Island Bridge ramps that weave through the South Portland neighborhood, which would not be addressed with this alignment choice.

Barbur

Access: Although the Barbur alignment would provide enhanced transit options to a portion of the South Portland neighborhood, there are significant grade differences between Barbur and Naito that make full access to areas east of Barbur a challenge. The significant grade drop to the east of Barbur

poses a challenge to the movement of pedestrians and cyclists from the east up to any proposed transit station. It is likely that a station along Barbur would necessitate investment in a stronger pedestrian/bicycle connection to the east. This alignment would also not offer a direct connection to Marquam Hill, which would necessitate some form of multimodal investment that would allow pedestrians and cyclists to get from an HCT station along Barbur up to the Hill.

Redevelopment potential: The redevelopment potential of this alignment is primarily focused on properties along the northern end of Barbur. Although some redevelopment would likely occur in this area, the fact that very little developable acreage exists along Barbur south of Hooker Street means that expectations should be tempered regarding redevelopment returns.

Support of local land use plans: The Barbur alignment was not the selected alignment in the Barbur Concept Plan. It is unclear, at this time, how placing HCT service on Barbur may affect the preferred land use scenario envisioned in the Barbur Concept Plan.

Naito

Access: A significant access benefit from this alignment choice is the re-design of Naito Parkway, which would offer more pedestrian crossings. The current design of Naito Parkway is that of a limited access highway, with very few crossing opportunities. The proposed redesign that would occur with the HCT investment would increase opportunities for controlled crossings. This would have the effect of increasing mobility in the neighborhood and opening up new opportunities for direct east/west connections from South Waterfront to Marquam Hill. This alignment option would also require a direct connection to be built to Marquam Hill, but as discussed in the Barbur alignment this connection has been studied at a conceptual level, appears feasible, and is assumed to be constructed as part of the Naito alignment. Another access benefit is the ability to serve a station on Lincoln.

Redevelopment potential: Based on work done by the City of Portland on the Barbur Concept Plan, the Naito alignment produces the most potential for redevelopment of existing vacant and underutilized parcels within the Kelly Focus Area. Barbur Concept plan work included an assessment of redevelopable parcels that identified significant opportunity on existing parcels, and on parcels that would be created through the reconfiguration of the Ross Island Bridge ramps. Either BRT or LRT on Naito would have a positive effect on property values along the route through the design of a more pedestrian and bicycle friendly streetscape and the direct access to HCT. The existing Lair Hill historic overlay would serve to guide the form and intensity of redevelopment in certain portions of the area, which may address some local concerns regarding the impacts of future redevelopment sites on the character of the neighborhood. Additionally, redevelopment opportunities would become available in downtown Portland, as the alignment would move off of the Transit Mall and head east before joining with Naito. This would activate a portion of downtown currently characterized by lower intensity uses.

Support of local land use plans: The Naito alignment would be the most supportive of local land use plans, specifically the Barbur Concept Plan. The South Portland neighborhood falls into the Kelly Focus area of that plan, which identifies Naito Parkway as the spine for HCT, and a potential reconfiguration of

the Ross Island Bridge ramps, allowing reconnection of the historic street grid in the Lair Hill neighborhood. These changes would bring new activity and increased housing options to portions of the neighborhood, while maintaining its unique character.

Mobility (traffic, freight, bike, and pedestrian safety and access)

Key considerations:

- Can high capacity transit be designed to minimize negative impacts to auto, freight, bicycle and pedestrian mobility and access?
- Do surface or tunnel alignments offer more opportunities to improve safety for all travel modes?
- Can surface alignments on Naito or Barbur be designed to avoid creating additional barrier effects for cars, bikes and pedestrians?

Key findings:

- None of the alignment options overlap with regional or statewide freight routes in South Portland.
- The Naito and Barbur alignments utilize the most heavily-trafficked segment of Barbur Boulevard in Portland; the Marquam Hill-Hillsdale Tunnel avoids this segment.
- Design treatments for a Barbur or Naito alignment could include addressing observed crash types and improve pedestrian and bicycle facilities.
- A Naito alignment would remove the barrier within the neighborhood created by the regional roadway system.

Motor vehicle and freight mobility

The Barbur and Naito alignment options would utilize the most heavily-trafficked segment of Barbur Boulevard in Portland, between Hamilton Street and Capitol Highway, while the tunnel would avoid this segment. All of Barbur and a portion of Naito (north of the Ross Island Bridge) are designated Major Truck Streets by the city, but are not regional or statewide (Oregon Highway Plan) freight routes. Freight stakeholders have expressed interested in avoiding overlap between high-capacity transit and freight routes; none of the alignment options in South Portland overlap with regional or state designations, but care will need to be taken to ensure continued freight mobility on locally designated Major Truck Streets. Transit designs would be required to accommodate freight trucks including vertical and horizontal clearances along all alignment options.

Initial traffic analysis considered traffic operations on the South Portland alignments. The following table summarizes the intersections analyzed and the initial findings.

	Meets motor vehicle performance target?*	
	2035 No-Build	2035 Build
Broadway Ave & I-405 SB Exit Ramp	Yes	Yes
6th Ave & Broadway	No	No
5th Ave & Broadway	Yes	Yes
4th Ave & Lincoln St	Yes	Yes
4th Ave & Caruthers/Broadway	Yes	Yes
Barbur Blvd/4th Ave & Sheridan St	Yes	Yes
1st Ave & Arthur St	Yes	Yes
Hood Ave & Kelly Ave/Ross Island Bridge	No	Yes
Naito Pkwy & Hooker St	Yes	Yes
Naito Pkwy & Ross Island Bridge	No	Yes
Naito Pkwy & Gibbs St	Yes	Yes
Naito Pkwy & Whitaker St	Yes	Yes
Barbur Blvd & Naito Pkwy	Yes	No
Barbur Blvd & Bancroft St	Yes	No
Barbur Blvd & Hamilton St	No	No

* Within permitted margin of accuracy

Source: Final SW Corridor Traffic Analysis and Operations Memorandum, DKS, July 29, 2014

During the DEIS phase, more detailed analysis will be performed, and mitigation would be developed for intersections not expected to meet the 2035 motor vehicle performance target. This could include changes in lane configurations, traffic signals, or other mitigation options. This level of analysis will likely be required in a decision between surface options Barbur and Naito.

The west end of the Ross Island Bridge provides a major connection point for multiple arterials and freeways. The project may modify how traffic accesses the Ross Island Bridge. More detailed traffic analysis will be performed in the DEIS to determine the effects on mobility, throughput, and safety in this area.

Pedestrians and bicycles

Use of the Naito or Barbur alignments would bring opportunities to improve the roadway for pedestrians and bicyclists. Barbur between Hamilton Street and Burlingame largely lacks sidewalks, and the bike lanes have gaps and are not wide enough to comfortably serve most people when accounting for the speed and volume of vehicle traffic. A transit alignment following Barbur could address these pedestrian and bicycle gaps and deficiencies. The Marquam Hill-Hillsdale Tunnel alignment would not preclude these improvements in the future, but would not implement them.

Safety

Use of the Naito or Barbur alignments could bring opportunities to improve the roadway for safety of all modes of travel. Barbur is a high-crash corridor, and has been the location of high-severity crashes between South Portland and Burlingame. Design treatments to address observed crash types and improve pedestrian and bicycle facilities could improve the roadway's safety. The Marquam Hill-Hillsdale Tunnel alignment would not preclude such improvements in the future, but would not implement them as part of an HCT project.

Access

Presuming use of center-running transit for the in-street segments, the Naito or Barbur alignment options would all result in minor changes to motor vehicle access along Barbur south of Hamilton Street, where there are few destination and access points. North of Hamilton, the Barbur alignment would result in significant changes in access to the local streets and driveways along the segment, and the likely elimination of some left-turn access. Access control already exists along the Naito alignment. Selection of the Naito alignment could modify traffic circulation patterns to and from the Ross Island Bridge.

Lane conversions

The only places in the corridor that are being considered for lane conversion are sections of roadways that currently appear to have excess capacity based on early traffic analysis. One of these locations is on Barbur Boulevard between Hooker Street and Naito Parkway. Currently, this segment of Barbur has two northbound travel lanes, one southbound travel lane, and a two-way center turn lane. On this stretch of Barbur, the project team is looking at the potential to convert one northbound travel lane and portions of the middle turn lane in order to minimize impacts to adjacent properties. The project team is also looking at running BRT vehicles in mixed traffic in this segment. If decisions are made to exclude lane conversions, designs can be modified to maintain existing lane configurations, with the tradeoff of more property impacts. On Naito, the project team is looking at a range of potential lane configurations, including a scenario that incorporates the Ross Island bridgehead access project into the alignment for LRT or BRT.

As the project progresses, further traffic analysis will look in detail at traffic flows at intersections as well as in the broader network to assess whether lane conversions could work and whether additional mitigations might be needed to allow conversion, such as new turn lanes or signals. Additionally, more detailed consideration of the property impacts of different lane configurations will allow for a discussion about the trade-offs between minimizing impacts and maintaining existing auto capacity.

Cost estimates

Key considerations:

- What are the cost differences for the entire project between a tunnel and a surface option?
- What are the trade-offs between cost of a project and other factors such as reliability, safety, access and community development opportunities?

- How does cost impact the length of the final high capacity transit alignment?

Key findings:

- BRT estimates range from $750M to $1.2B. The range reflects options for direct service to Hillsdale and dedicated transit lanes.
- LRT estimates range from $1.9B to $2.4B. The range includes direct access to Hillsdale and PCC Sylvania but does not include the cost of a Marquam Hill-Hillsdale bored tunnel.
- A Marquam Hill-Hillsdale bored tunnel would add an estimated $1.28B to the cost of an LRT project.

Current cost estimates for corridor HCT alignments are based on conceptual design. Estimates will continue to be refined as options are narrowed and designs are developed, but current estimates are useful in understanding the relative differences between current options. **All figures are in year 2014 dollars, and exclude escalation and finance costs.** Cost estimates are not yet complete for all modes, options, and segments; estimates will be updated and reported as the project progresses.

Corridor-wide costs

Current estimates for a BRT alignment from downtown Portland to Tualatin range from $750M to $1.2B. The range reflects options for cut-and-cover tunneling and for infrastructure improvements to allow BRT to operate in dedicated transit lanes.

Current estimates for an LRT alignment from downtown Portland to Tualatin range from $1.9B to $2.4B. The range reflects options for cut-and-cover tunnel and surface options in Hillsdale and at PCC but excludes the deep-bored Tunnel option under Marquam Hill. The region's funding capacity will impact the final inclusion of expensive HCT alignment choices that provide direct service to important destinations versus serving more communities to the south.

South Portland area costs

Marquam Hill Tunnel

The approximately 2.5-mile long Marquam Hill Tunnel, considered only for LRT, would cost an estimated $1.28B. The Marquam Hill Tunnel would increase project costs by $900M to $1.0B over a surface-only alignment.

Barbur and Naito

Cost estimates for individual Barbur and Naito segments that would allow for a direct comparison have not been completed. Both options would include one new station in the vicinity of Gibbs Street. For BRT an additional station could be included near Sheridan Street, since the next closest station on the Transit Mall would be further north than the Jackson Station, the next closest LRT station. While the Barbur option for LRT would include a new short transit bridge over I-405 near 4th Avenue for LRT, costs for the Naito option could be higher for both modes due to the reconstruction of Naito Parkway necessary for HCT operations and access, and due to the potential reconstruction of the Ross Island bridgehead.

Engineering complexity and risk

Key considerations:

- Are the benefits and risks associated with construction of a deep-bored tunnel clear?
- What aspects of each alignment option present noteworthy risk?

Key findings:

- A Marquam Hill-Hillsdale bored Tunnel has the highest level of complexity and risk of the proposed alignments.
- The primary engineering risk of an alignment on Barbur would be balancing traffic operations with right-of-way impacts to adjacent properties.
- Construction phasing, traffic control and maintaining access to homes and businesses would be complex during the construction of a Naito or Barbur alignment

Complexity and risk analysis in the South Portland area focuses on differences between LRT operating through a tunnel under Marquam Hill, LRT or BRT routed on the surface of Barbur Boulevard and LRT or BRT routed on the surface of Naito Parkway. Complexity and risk analysis comparisons of these options are at this time a mix of quantitative and qualitative assessments. Additional analysis will be developed in the coming months to further define geotechnical/structural complexity and risk as well as to identify the potential for impacts to major utilities.

Marquam Hill-Hillsdale Tunnel

Of the options under consideration the deep-bored tunnel under Marquam Hill has the highest level of complexity and risk. Tunnels are inherently risky given the unexpected subsurface conditions to be encountered and overcome. The West Hills, formed by basalt flows, are geologically complex including numerous faults, resulting in a high degree of risk. Many tunnels constructed for transportation worldwide exceed their estimated costs by substantial amounts. For example, the Robertson Tunnel, which provides transit access to the Oregon Zoo, ultimately cost 80% more than the original construction bid due to unforeseen complications and related schedule delays.

In the case of a bored tunnel particular consideration must be given to the impacts to the portal areas near Hooker Street and near the intersection of Barbur and Bertha Boulevards. These include the large footprint required for the mining operation staging areas, access to these locations for heavy equipment and trucks, complex sequencing of work and materials delivery, as well as materials to be hauled off site. A considerable amount of construction traffic would be generated by hauling off excavated soil and rock. This would add complexity to the transportation system surrounding the site and the need to mitigate impacts along the haul route, which would likely include phasing reconstruction of roadways damaged by very heavy trucks continually travelling through. In addition, the northern portal's proximity to Duniway Park could have Section 4(f) implications and the southern portal's proximity to a busy commercial area in Burlingame would be likely to impact businesses.

A technical tunneling memo expected in May 2015 will more fully describe the geotechnical issues associated with tunnel construction.

Inner Barbur Boulevard, Tie-in to Naito

The primary engineering risk with an alignment on Barbur Boulevard would be balancing traffic operations with right-of-way impacts to adjacent properties, including the adjacent Lair Hill Park. Detailed traffic analysis will be performed in the DEIS to identify or verify feasible configurations. Traffic control and maintaining access during construction are key short term risks.

Naito Parkway with Ross Island Bridgehead Project, Tie-in to Barbur

The Naito alignment has a number of risks worth mentioning. Initial traffic analysis has been promising; however, as with the Barbur alignment, a more detailed traffic study will be necessary for evaluating the project and defining the extent of necessary improvements. It is possible that the extent of improvements could expand beyond the current scope of the defined project, increasing the cost and complexity. Complexity would likely be greater for the Naito alignment relative to the Barbur alignment because of the Ross Island bridgehead modifications. Phasing, traffic control and maintaining access to homes and businesses will complicate construction, given the existing congestion already experienced in the area, and many of the connections around the bridgehead would likely be under construction simultaneously.

Community impacts

Key considerations:

- Can benefits and burdens of a high capacity transit alignment be equally distributed among all population groups in the corridor?
- Do surface or tunnel alignments offer the greatest access to key places such as education, employment, health care and retail centers?

Key findings:

- Based on spatial analysis of demographic maps, there is no significant difference in how each alignment option runs through areas of non-white or non-English speaking populations.
- Based on spatial analysis of demographic maps, there are slight differences in how each alignment option runs through areas of low-income and senior populations.
- Subsequent analysis and conversations with residents, employees and visitors to the corridor will further detail the potential for unequal distribution of benefits and burdens of high capacity transit construction and service.

Demographic maps for non-white, non-English speaking, low-income and senior populations were overlaid with maps of the proposed HCT alignments (see Appendix D). Subsequent discussions with residents, employees and visitors to these areas will help us to further understand how different racial, ethnic and language groups may be impacted by the proposed alignments.

Non-white and non-English speaking populations

Based on spatial analysis of the maps, none of the alignment options runs through areas with more than average non-white populations; however, disaggregation by ethnicity shows that a Marquam Hill Tunnel alignment would pass under one area of higher than average concentration of Asian population south of

Marquam Hill. Each alignment runs primarily through areas with very low percentages of non-English-speaking populations, with one exception of a higher than average parcel of non-English speaking population west of Marquam Hill.

Low-income and senior populations

Based on spatial analysis of the maps, the Barbur Boulevard and Naito Parkway alignments run primarily through areas with higher than average low-income populations; the Marquam Hill alignment runs under a portion of higher than average low-income population and also under below average areas. Each of the three alignment choices run through areas with significantly higher than average populations of seniors 65 years and older. The Hillsdale Loop option runs through areas with somewhat higher than average populations of seniors.

Access to services

Investments in the transportation systems throughout the Southwest Corridor aim to improve access to important community services such as education, health care, retail and employment centers for all residents.

Education centers identified in South Portland include National College of Natural Medicine, OHSU Marquam Hill campus, Portland State University, Wilson High School, Rieke and Hayhurst Elementary schools. Portland State University would be served by any of the three alignments since all stop on the Transit Mall. Access to the planned southern expansion of the PSU campus at Lincoln would be served by a Naito alignment. Access to PSU's life science program in South Waterfront would be served by either surface alignment. A Marquam Hill-Hillsdale Tunnel would provide the most direct service to Oregon Health Sciences University Marquam Hill campus via an underground elevator, but would not provide access to NCNM because it would not include significant roadway, pedestrian and bicycle improvements to Naito Boulevard nor a surface connection from the hill to Barbur. A Naito alignment would provide the most direct access and improvements to NCNM.

Health care services identified in South Portland include NCNM, the OHSU Marquam Hill and South Waterfront campuses, and VA Hospital. A Marquam Hill-Hillsdale Tunnel would provide the most direct service to the OHSU Marquam Hill campus via an underground elevator, but would provide limited access improvements to NCNM because it would not include significant roadway, pedestrian and bicycle improvements to Naito. A Naito alignment would provide the most direct access and improvements to NCNM. The Naito and Barbur surface alignments both provide access to the SOWA campus via the Hooley pedestrian bridge.

Key retail and employment centers in South Portland include the OHSU Marquam Hill campus, VA Hospital, South Waterfront, and retail centers along Corbett and in the Lair Hill district. A Marquam Hill-Hillsdale Tunnel would provide the most direct service to the OHSU Marquam Hill campus via elevator and indirectly to the VA Hospital from Terwilliger. The Naito and Barbur alignments would provide the most direct access to South Waterfront and other retail centers in South Portland.

Property impacts

The options under consideration all have varying levels of impact to adjacent private properties. In many cases, property impacts are limited to only a narrow strip of area needed to widen the roadway and sidewalks. In other cases, temporary construction easements may be all that is needed to allow for construction of new roadway and sidewalks. In extreme cases, large or complete acquisitions may be necessary when impacts to buildings or other major infrastructure are unavoidable. The project team is currently quantifying the areas of potential impact on each of the options and will be presenting the level of impact of the various options relative to one another once the data is assembled. In areas where converting an auto travel lane to a transit lane is under consideration, property impacts will be evaluated for scenarios both with and without the lane conversion in order to facilitate discussion about the trade-offs of minimizing impacts and maintaining auto capacity.

Next steps

This Key Issues memo formally introduces to decision-makers and the public information relevant to a decision on high capacity transit alignments in South Portland. Between March and July 2015, project staff will present information on South Portland and other Southwest Corridor Plan issues and invite public comment at numerous public meetings, including a Community Planning Forum and a Community Technical Workshop. An updated calendar can be found on our website:

http://www.oregonmetro.gov/public-projects/southwest-corridor-plan

May 2015: staff will produce a technical evaluation report that will include assessments of options accessing South Portland, Hillsdale and Portland Community College, followed by staff recommendations to the steering committee.

July 13, 2015: the steering committee will be asked to consider making decisions on what options in these three areas should continue to be studied in a Draft Environmental Impact Study.

December 2015: the steering committee will be asked to consider making a recommendation on the mode, terminus and remaining HCT alignments to be studied further in a DEIS, along with an implementation strategy for the corridor connection projects defined in the Shared Investment Strategy.

Appendices

Appendix A: Anticipated major project documents and estimated dates of completion
Appendix B: Shared Investment Strategy roadway and active transportation projects
Appendix C: Corridor-wide mode considerations
Appendix D: Demographic maps

Appendix A: Anticipated major project documents and estimated dates of completion

July Steering Committee decision: direct vs. indirect service to Marquam Hill, Hillsdale and PCC Sylvania

- Key Issue Memos:
    - South Portland – March
    - Hillsdale – March
    - PCC Sylvania – May
- Draft Evaluation Report – May
- Evaluation Report and Recommendation – June
- Supplementary documents:
    - Tunnel fact sheet – March
    - Modeling report – May
    - Cost estimate report – May
    - Tunnel technical memo – May

December Steering Committee decision: remaining HCT alignments, mode, and terminus and SIS funding strategy

- Key Issue Memos:
    - Tigard – May
    - Tigard to Bridgeport Village – September
    - Bridgeport Village to Tualatin – September
    - Barbur / Adjacent to I-5 – October
    - HCT mode – October
    - HCT terminus – October
- Evaluation Report – October
- Evaluation Report and Recommendation – November
- Supplementary documents:
    - Modeling report – October
    - Cost estimate report – October
    - Traffic report - October
- Funding strategy for Shared Investment Strategy roadway, bike and pedestrian projects – December

Appendix B: Shared Investment Strategy roadway and active transportation projects

The information in this appendix will be further developed and presented as a stand-alone document.

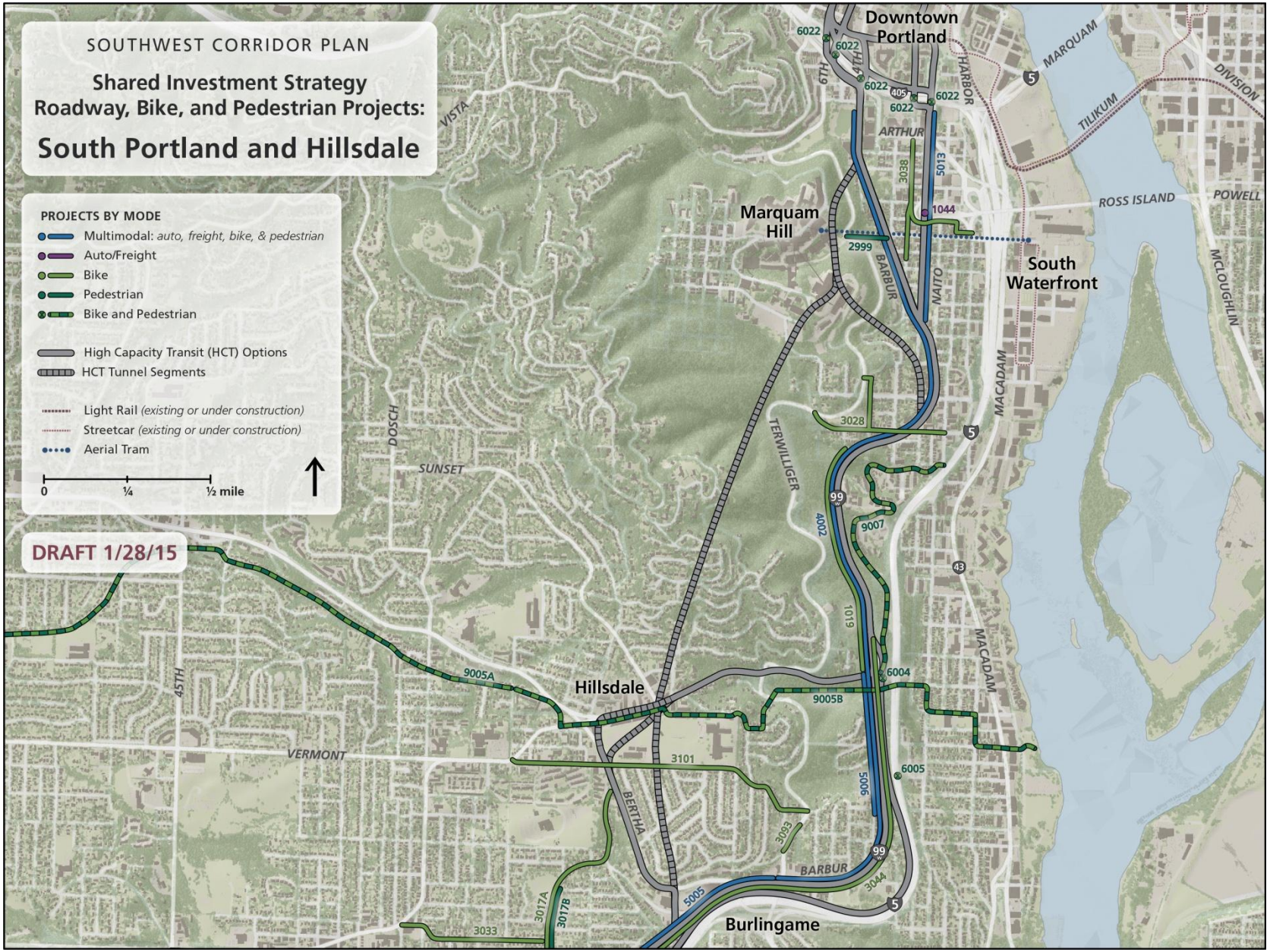
The Shared Investment Strategy (SIS) Roadway and Active Transportation Project List includes projects that improve access to both key places in the corridor and to the high capacity transit (HCT) alignments currently under consideration:

- ***HCT-aligned projects*** are roadway, bikeway and pedestrian projects that were initially identified in the SIS in July 2013, and then were further refined in July 2014 as the HCT alignments were narrowed. These projects either run along the HCT alignment (and would be incorporated into HCT designs and cost estimates) or improve access to station areas.
- ***Corridor Connections*** are roadway, bikeway and pedestrian projects that improve connectivity and mobility across the corridor, beyond the immediate geographic area of a potential HCT line. These were identified in the SIS in July 2013 as critical for the support of land use goals in essential and priority places.

Some of the projects identified as HCT-supportive are also critical land use supportive projects, and will remain on the SIS Roadway and Active Transportation Project List as Corridor Connections projects if their associated HCT station or alignments are removed from consideration. Other HCT-supportive projects that do not support key land uses will be removed from the SIS project list as their associated HCT alignments or stations are removed from consideration.

For all projects on the SIS Roadway and Active Transportation Project List, potential funding sources will be identified. For HCT-supportive projects, one potential funding approach will be as part of the HCT package, but other potential funding sources will be identified for each project to support their implementation whether as part of a transit project or as a standalone project. Some projects will need to undergo traffic analysis and other evaluation to assess impacts prior to project partner agreement on implementation.

The following map and list show both the HCT-supportive and corridor connections projects in the South Portland and Hillsdale areas.


SOUTHWEST CORRIDOR PLAN
Shared Investment Strategy
Roadway, Bike, and Pedestrian Projects:
South Portland and Hillsdale
PROJECTS BY MODE
Multimodal: auto, freight, bike, & pedestrian
Auto/Freight
Bike
Pedestrian
Bike and Pedestrian
High Capacity Transit (HCT) Options
HCT Tunnel Segments
Light Rail (existing or under construction)
Streetcar (existing or under construction)
Aerial Tram
0
¼
½ mile
DRAFT 1/28/15
Downtown Portland
Marquam Hill
South Waterfront
Hillsdale
Burlingame
MARQUAM
DIVISION
TILIKUM
ROSS ISLAND
POWELL
MCLOUGHLIN
HARBOR
ARTHUR
BARBUR
NAITO
MACADAM
TERWILLIGER
VISTA
DOSCH
SUNSET
45TH
VERMONT
BERTHA
6TH
HIGH
6022
405
5013
3038
1044
2999
3028
9007
4002
1019
6004
9005A
9005B
3101
6005
5006
3093
3044
5005
3017A
3017B
3033
5
99
43

Project # Location/ Ownership	**Title** Description	**Cost**	**Primary Mode**	**Primary Project Type**	**Time-frame**	**Potential Funding Sources**	**Notes**
1019 Portland ODOT	**Barbur Lane Diet - Capitol to Hamilton (reduce northbound lanes from three to two with multimodal improvements)** Reduce number of northbound lanes from three to two from Capitol Hwy (north) to 1/4 mile south of Hamilton to reduce speeds and improve safety, improve ped/bike crossing safety and add protected bike lanes	¢	Bicycle	Corridor Connections			
1044 Portland ODOT	**South Portland Circulation and Connectivity (Ross Island Bridge ramp connections)** Adds a new ramp connection between I-405 and the Ross Island Bridge from Kelly Avenue. Restore at-grade intersections along Naito Parkway, with new signalized intersections at Ross Island Bridge access and at Hooker Street. Removes several existing roadways and ramp connections.	$$$$	Multimodal	HCT Supportive		HCT Package	With HCT on Naito Parkway: Include
2999 Portland	**Pedestrian connection from Barbur to Terwilliger at Gibbs** Construct a new pedestrian walkway under the tram within the Gibbs right-of-way through the Terwilliger Parkway. The steep grade and forested area will require lighting and stairs.	$	Pedestrian	HCT Supportive		HCT Package	With HCT station at Barbur/Naito & Gibbs: Include
3028 Portland	**Inner Hamilton bikeway -from SW Terwilliger Blvd to SW Corbett Ave.** Enhanced shared roadway. Includes connection to Terwilliger on SW Hamilton Terrace	¢	Bicycle	HCT Supportive		HCT Package	With HCT station at Barbur & Hamilton: Include

Multimodal | Auto/Freight | Bicycle | Pedestrian | Bike/Ped

Cost: ¢ - up to $500,000; $ - up to $5 M; $$ - up to $10 M; $$$ - up to $20 M; $$$$ - More than $20 M

Project # Location/ Ownership	**Title** Description	**Cost**	**Primary Mode**	**Primary Project Type**	**Time-frame**	**Potential Funding Sources**	**Notes**
3038 Portland	**Lower SW 1st bikeway -from SW Barbur Blvd to SW Arthur St.** Multiple bicycle facility types: separated in-roadway (Corbett: Gibbs - Grover); bicycle boulevard (all other segments). Includes connection to SW Kelly Ave on SW Grover St and SW Corbett Ave	¢	Bicycle	HCT Supportive		HCT Package	With HCT station at Barbur/Naito & Gibbs: Include
3044 Portland ODOT	**Middle Barbur bikeway -from SW 23rd Ave to SW Capitol Hwy-Barbur Blvd Ramp.** Separated bicycle route in-roadway. Listed as a Regional Bicycle Parkway in the Regional Active Transportation Plan (5/9/13).	$	Bicycle	HCT Supportive		HCT Package	With HCT adjacent to I-5: Include within 1/2 mile of stations With HCT on Barbur: Include
3093A Portland	**Terwilliger bikeway gaps** Separated bicycle route in-roadway. Eliminate key gaps in the Terwilliger Blvd bikeway	¢	Bicycle	HCT Supportive		HCT Package	With HCT station at Barbur & Terwilliger: Include lower section near Barbur (50%)
3101 Portland	**Vermont-Chestnut bikeway -from SW Capitol Hwy to SW Terwilliger Blvd.** Bicycle boulevard	¢	Bicycle	HCT Supportive		HCT Package	With HCT station at Barbur & Terwilliger: Include Include with HCT station at 13th instead of Terwilliger?
4002 Portland ODOT	**Barbur Blvd, SW (3rd - Terwilliger): Multimodal Improvements** Construct Improvements for transit, bikes and pedestrians. Transit improvements include preferential signals, pullouts, shelters, left turn lanes, sidewalks, and crossing improvements.	$$	Multimodal	HCT Supportive		HCT Package	With HCT on Barbur Boulevard: Include

Project # Location/ Ownership	**Title** Description	**Cost**	**Primary Mode**	**Primary Project Type**	**Time-frame**	**Potential Funding Sources**	**Notes**
5005 Portland ODOT	**Barbur Blvd, SW (Terwilliger - City Limits): Multimodal Improvements** Complete boulevard design improvements including sidewalks and street trees, safe pedestrian crossings, enhance transit access and stop locations, and bike lanes (Terwilliger - SW 64th or Portland City Limits).	$$$$	Multimodal	HCT Supportive		HCT Package	With HCT adjacent to I-5: Include within 1/2 mile of stations (20%) With HCT on Barbur Boulevard: Include
5006 Portland ODOT	**Barbur Lane Diet: Miles to Capitol** Reduce number of northbound travel lanes on Barbur from Miles to Capitol Highway (north) from two to one to reduce speed and improve safety. Adds bike lanes over Newberry and Vermont bridges.	¢	Bicycle	Corridor Connections			
5013 Portland ODOT	**Naito/South Portland Improvements (left turn pockets with bike/ped and remove tunnel, ramps and viaduct)** Reconstruct Naito Pkwy as two-lane road w/bike lanes, sidewalks, left turn pockets, & on-street parking. Remove grade separation along Naito at Barbur Blvd. (tunnel), the Ross Island Bridge, Arthur/Kelly (viaduct), and the Grover pedestrian bridge.	$$$$	Multimodal	HCT Supportive		HCT Package	With HCT station at Barbur & Gibbs: Include signalized pedestrian crossing(s) of Naito near station (1%) With Naito alignment: Include
6004 Portland ODOT	**Newbury viaduct bicycle and pedestrian facilities** Construct new bicycle and pedestrian facilities at/parallel to Newbury St. viaduct	$	Bike/Ped	Corridor Connections			

Project # Location/ Ownership	**Title** Description	**Cost**	**Primary Mode**	**Primary Project Type**	**Time-frame**	**Potential Funding Sources**	**Notes**
6005 Portland ODOT	**Vermont viaduct bicycle and pedestrian facilities** Construct new bicycle and pedestrian facilities at/parallel to Vermont St. viaduct	$$	Bike/Ped	Corridor Connections			
6022 Portland ODOT	**I-405 Bike/Ped Crossing Improvements** Improve opportunities for bicycles and pedestrians to cross over/under I-405 on Harbor Drive, Naito Parkway, 1st, 4th, 5th, 6th and Broadway.	$	Bike/Ped	HCT Supportive		HCT Package	Consider opportunity to address with HCT crossing of I-405
9005A Portland	**Red Electric Trail: Fanno Creek Trail to Willamette Park - Hillsdale to Shattuk** Provide east-west route for pedestrians and cyclists in SW Portland that connects and extends the existing Fanno Creek Greenway Trail to Willamette Park. Listed as a Regional Bicycle Parkway and Regional Pedestrian Parkway in the Regional Active Transportation Plan (5/9/13).	$	Bike/Ped	HCT Supportive		HCT Package	With HCT station in Hillsdale: Include
9005B Portland	**Red Electric Trail: Fanno Creek Trail to Willamette Park - to Hillsdale** Provide east-west route for pedestrians and cyclists in SW Portland that connects and extends the existing Fanno Creek Greenway Trail to Willamette Park. Listed as a Regional Bicycle Parkway and Regional Pedestrian Parkway in the Regional Active Transportation Plan (5/9/13).	$$$	Bike/Ped	Corridor Connections			

Project # Location/ Ownership	**Title** Description	**Cost**	**Primary Mode**	**Primary Project Type**	**Time-frame**	**Potential Funding Sources**	**Notes**
9007 Portland	**Slavin Road to Red Electric Trail: Barbur to Corbett** Build Multi use trail on Slavin Road from Barbur to Corbett. The Red Electric Trail is listed as a Regional Bicycle Parkway and Regional Pedestrian Parkway in the Regional Active Transportation Plan (5/9/13).	$	Bike/Ped	Corridor Connections			

HCT-supportive projects in South Portland

Most of the HCT-supportive projects in South Portland focus on improving bike and pedestrian connectivity in South Portland and across I-405 into downtown Portland.

The Naito and Barbur alignments would both include a pedestrian and bike connection between Marquam Hill and an HCT station near Gibbs and either Barbur or Naito. This connection, paired with the Hooley Pedestrian Bridge, would provide a pedestrian and bike connection between Marquam Hill and the South Waterfront.

The Naito alignment would also include two interconnected projects that modify auto access to the Ross Island Bridge (1044) and reconnect the street grid across Naito Parkway (5013). The Ross Island bridgehead modifications would shift bridge traffic from local streets and open up land currently occupied by bridge ramps. New signals would be added along Naito Parkway, providing crossing opportunities for cars, bikes, and pedestrians. The west end of the Ross Island Bridge provides a major connection hub of multiple arterials and freeways. Traffic analysis will be needed to determine the effects on mobility and safety to the west end of the Ross Island Bridge from these projects.

		% of project included with each HCT alignment option				
#	Title	Naito LRT	Naito BRT	Barbur LRT	Barbur BRT	Marquam Hill-Hillsdale tunnel LRT
1044	South Portland Circulation and Connectivity	100	100	0	0	0
2999	Pedestrian connection from Barbur to Terwilliger	100	100	100	100	0
3028	Inner Hamilton bikeway	100	100	100	100	0
3038	Lower SW 1st bikeway	100	100	100	100	0
4002	Barbur Blvd Multimodal Improvements	100	100	100	100	0
5013	Naito/South Portland Improvements	100	100	1	1	0
6022	I-405 Bike/Ped Crossing Improvements	20	20	20	40	20

0	not included with HCT alignment
%	1 to 33% of project included with HCT alignment
%	34 to 66% of project included with HCT alignment
%	67 to 100% of project included with HCT alignment

Corridor connections projects in South Portland

The only corridor connections project within South Portland is the Slavin Road to Red Electric multi-use trail between Barbur and Corbett (9007). Paired with the Red Electric Trail (9005A and 9005B), the Slavin Road trail would provide a new bike and pedestrian connection between Hillsdale and South Portland.

Other corridor connections projects on the South Portland and Hillsdale SIS Projects map and list are addressed in the Hillsdale Key Issues Memo.

Appendix C: Corridor-wide mode considerations

The information in this appendix will be further developed and presented as a stand-alone document.

Two high capacity transit (HCT) modes are under consideration for the corridor:

- Light rail transit (LRT)
- Bus rapid transit (BRT)

Bus Rapid Transit description

There are currently four operating LRT (or MAX) lines and one under construction in the Portland area. In 2014, BRT was selected as the preferred mode for the under-development Powell-Division Transit Development Project, but to date BRT does not operate in the region. Typically, BRT is differentiated from standard bus service by several characteristics:

- Fifty percent or more of the alignment operate in dedicated transitway lanes to increase speed and reliability.
- Portions of the alignment may have queue bypass lanes, signal priority, or other design elements to speed travel.
- Vehicles are larger capacity and have multiple doors for entry and exit.
- Fare payment is made off-board to reduce dwell time
- Stations are similar to LRT or streetcar stations, and are spaced further apart than local service bus stops for faster service.

Capital costs

Depending on the percentage of dedicated transitway for a BRT alternative, capital costs to construct physical infrastructure are more expensive for LRT, which operates in fully dedicated transitway, in large part due to right-of-way acquisition of property required for construction. It is important that BRT planning consider the risks of "watering down" a project by deciding to operate BRT in congested roadways to avoid high capital costs or engineering complexity. This can diminish the effectiveness of BRT service as the most difficult places to attain exclusive right of way are often the places it is most needed.

Capital costs are a one-time cost shared by many partners including the federal government, which usually contributes 50% of a project's capital cost, as well as state and local governments, municipal planning organizations, transit agencies, and other private partners.

Operating and maintenance costs

The vehicle operator accounts for the largest share of operating costs regardless of mode. Since an LRT vehicle has greater capacity compared to a BRT vehicle (266 versus approximately 86), fewer LRT vehicles are required to carry an equivalent passenger load, making LRT less expensive to operate than BRT. SW Corridor model runs indicate that in the year 2035 the 7.5 minutes assumed peak headway

(number of minutes between vehicle arrivals) for LRT is sufficient to accommodate peak-hour, peak-direction demand. For BRT, however, the peak frequencies would need to be increased to 3 minute headways to accommodate demand. This would result in higher operating costs for BRT for the lifetime of the service. On-going operating and maintenance costs are largely locally funded.

Speed, service and ridership

LRT attracts more riders than BRT. Because LRT always operates in exclusive transit lanes and because it is more likely to be granted signal priority at intersections, light rail is faster and more reliable than BRT. Stated preference surveys also show that LRT attracts more discretionary riders than BRT, due to speed advantages but also to better perceived ride quality compared to BRT.

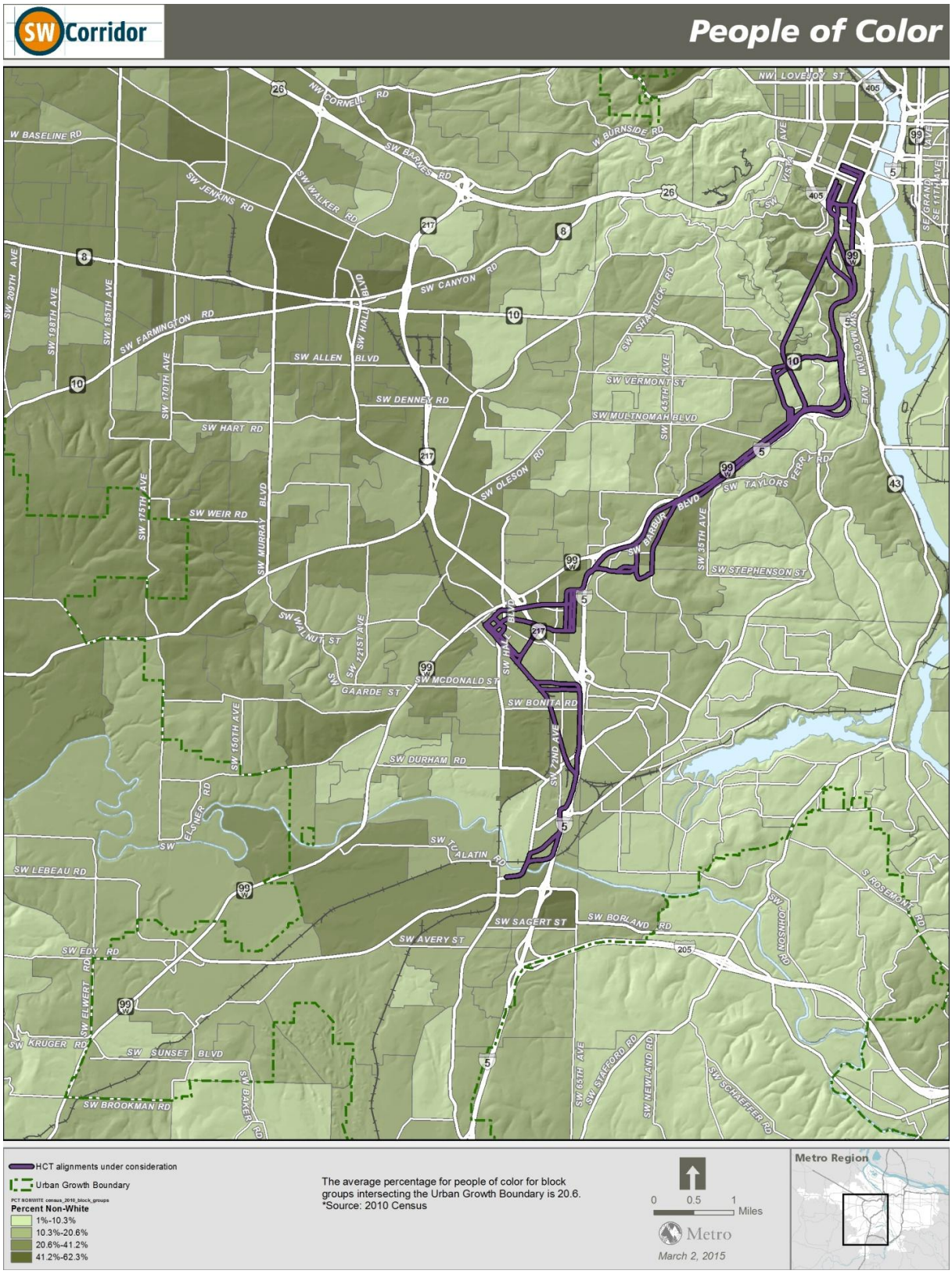
Models indicate that in 2035 the demand for HCT in the Southwest Corridor would require 20 BRT vehicles per hour in the peak, while LRT is assumed to operate with eight vehicles per hour in the peak with enough capacity still available to accommodate ridership growth beyond 2035. For BRT, growth above the projected 2035 demand would require yet more increases in service.

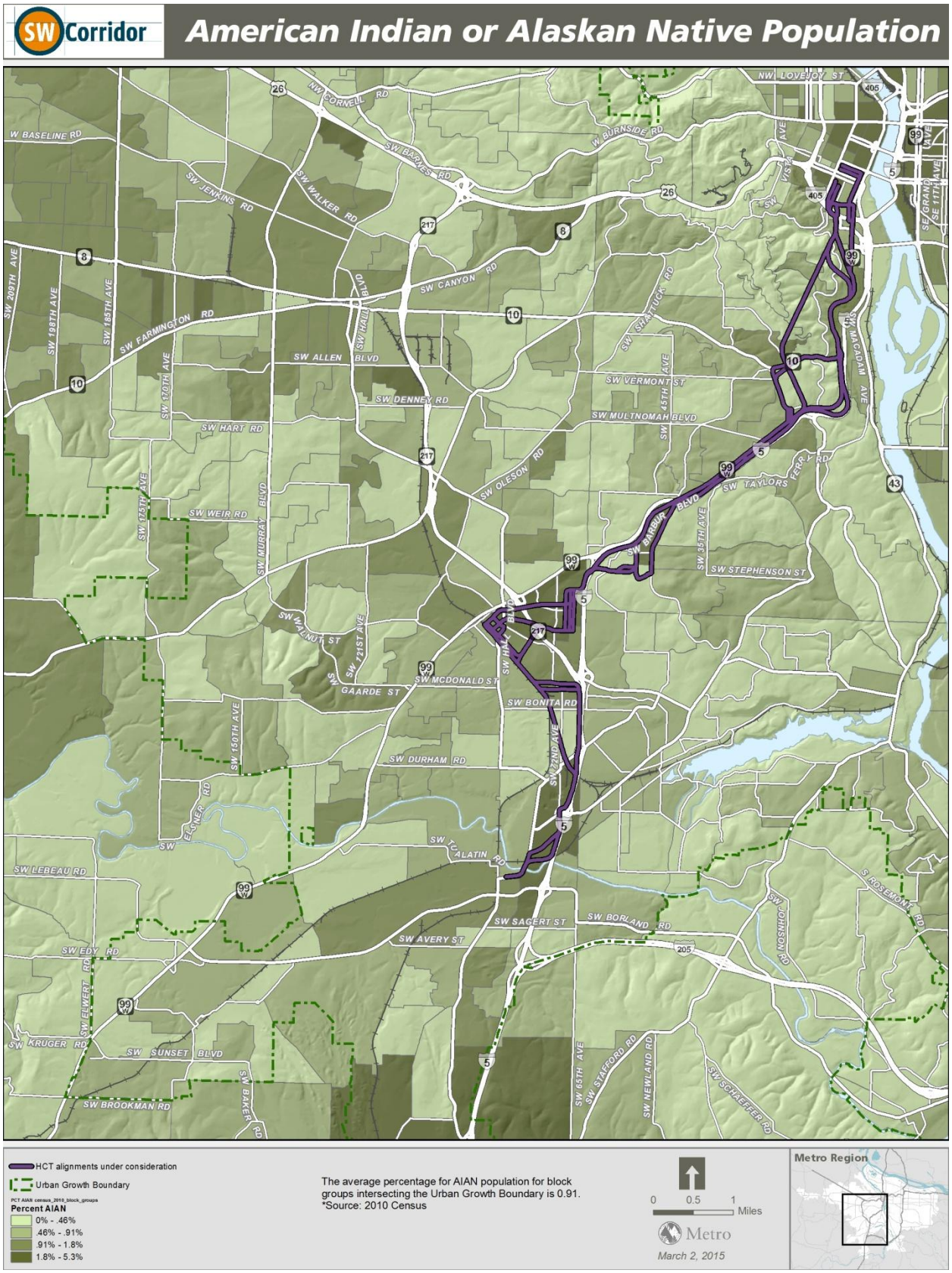
HCT service provides travel time advantages over local buses because of exclusive right of way but also because of longer distances between stations and signal priority at intersections. The high number of hourly vehicles required for BRT can be expected to diminish some of the travel time benefit from signal priority. The more frequently HCT vehicles pass through an intersection, the less likely signal priority can be given to the transit vehicles over autos. When the frequency of signal priority requests interferes with auto movement, priority for HCT vehicles is limited. It's expected that traffic would be largely unaffected by the eight LRT vehicles per hour assumed in the peak in 2035; however, the frequency required for BRT would likely prohibit full priority.

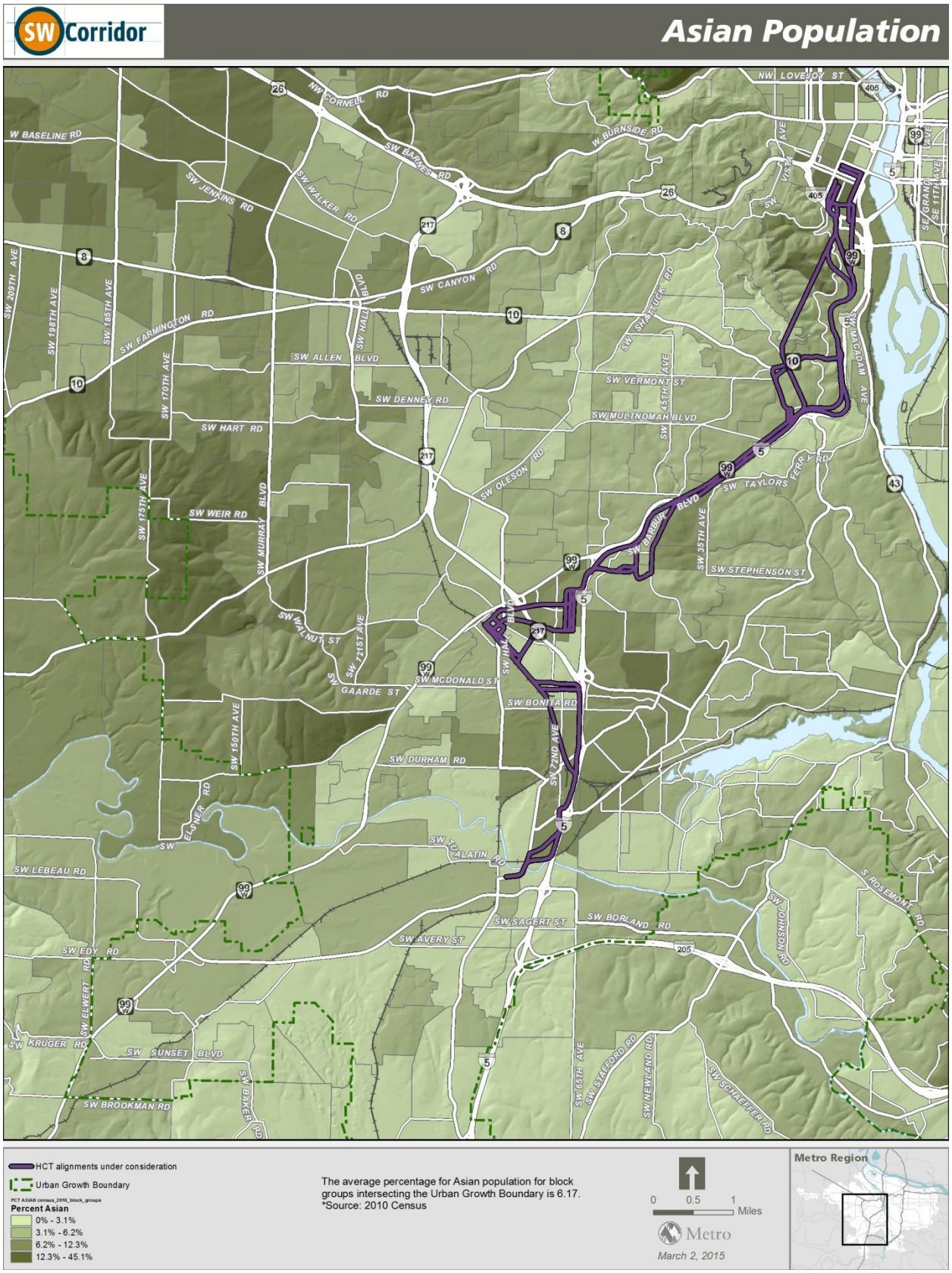
Development

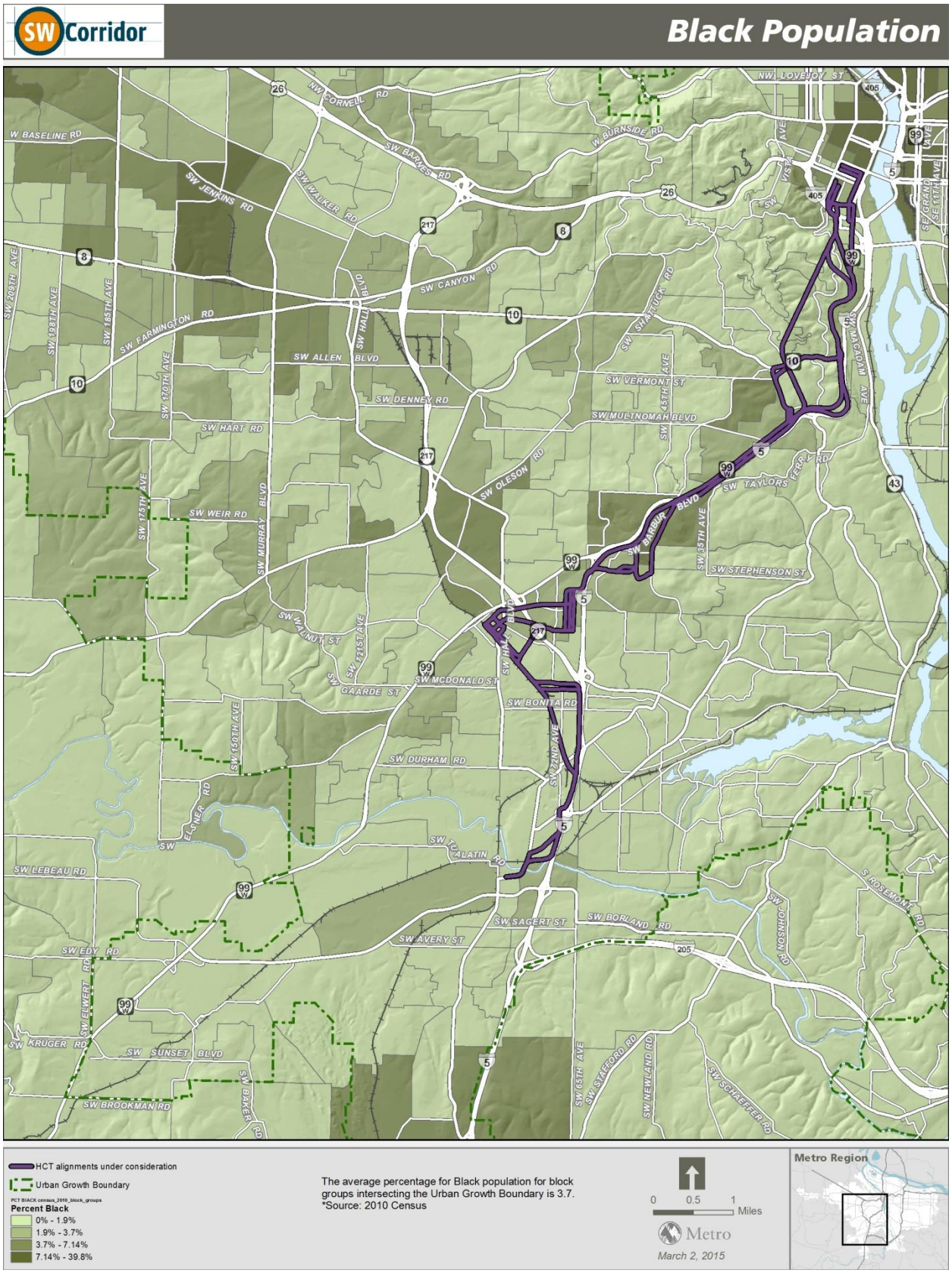
Both BRT and LRT would leverage private development investment at station areas. Available research assessing the difference in scale of development by mode is inconsistent and contradictory. Staff will address development by mode over the course of the next year.

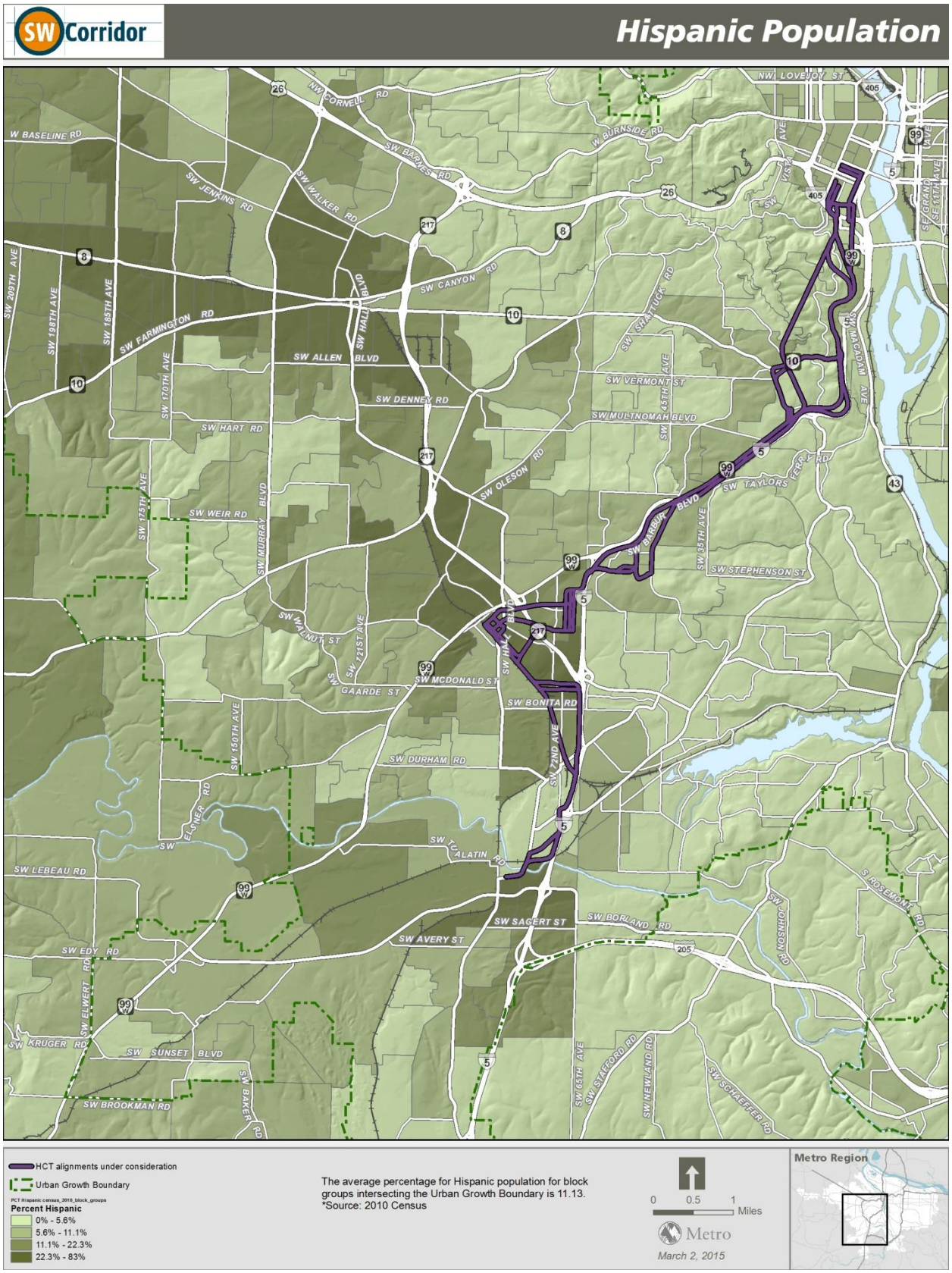
Appendix D: Demographic maps

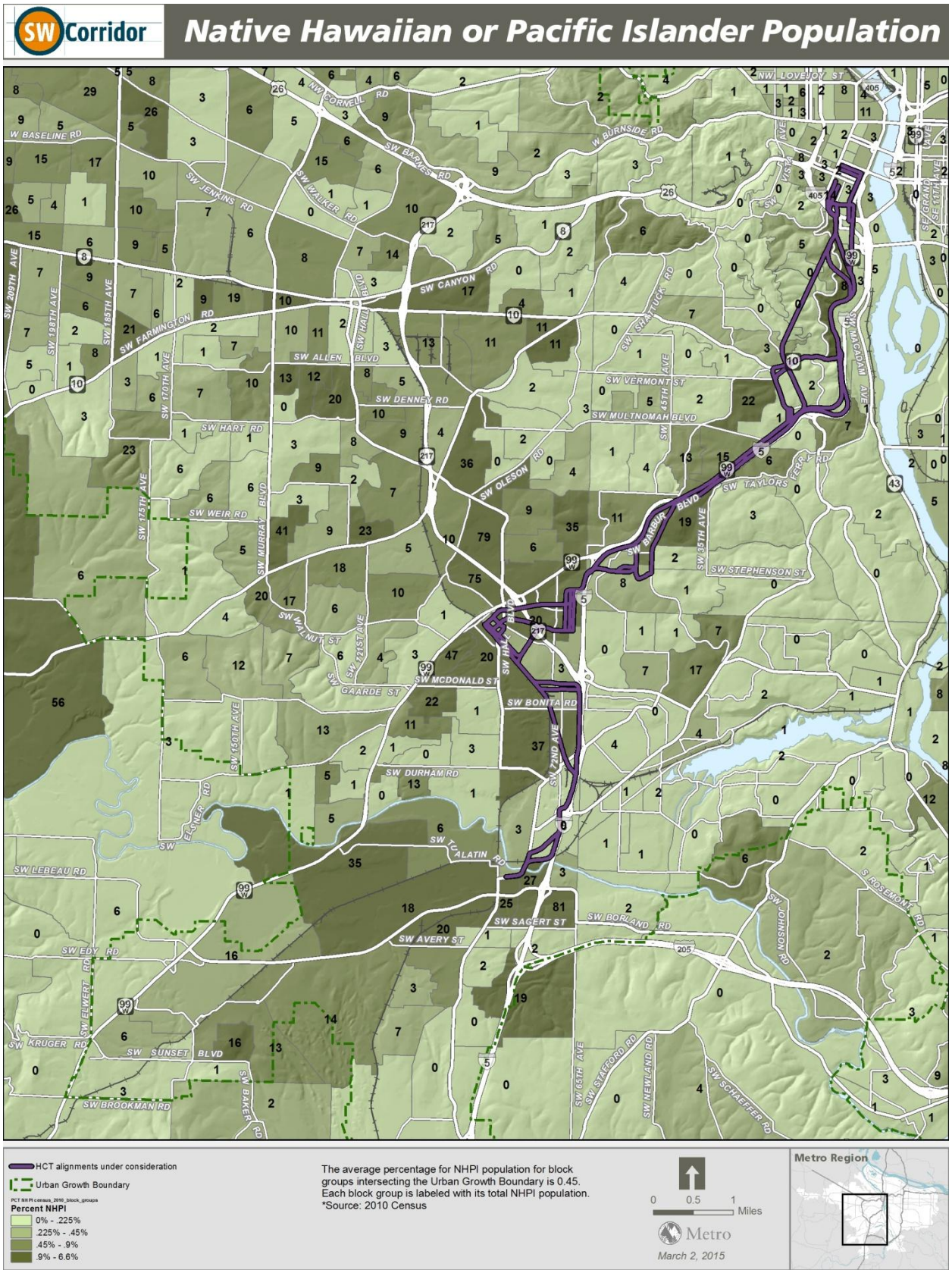


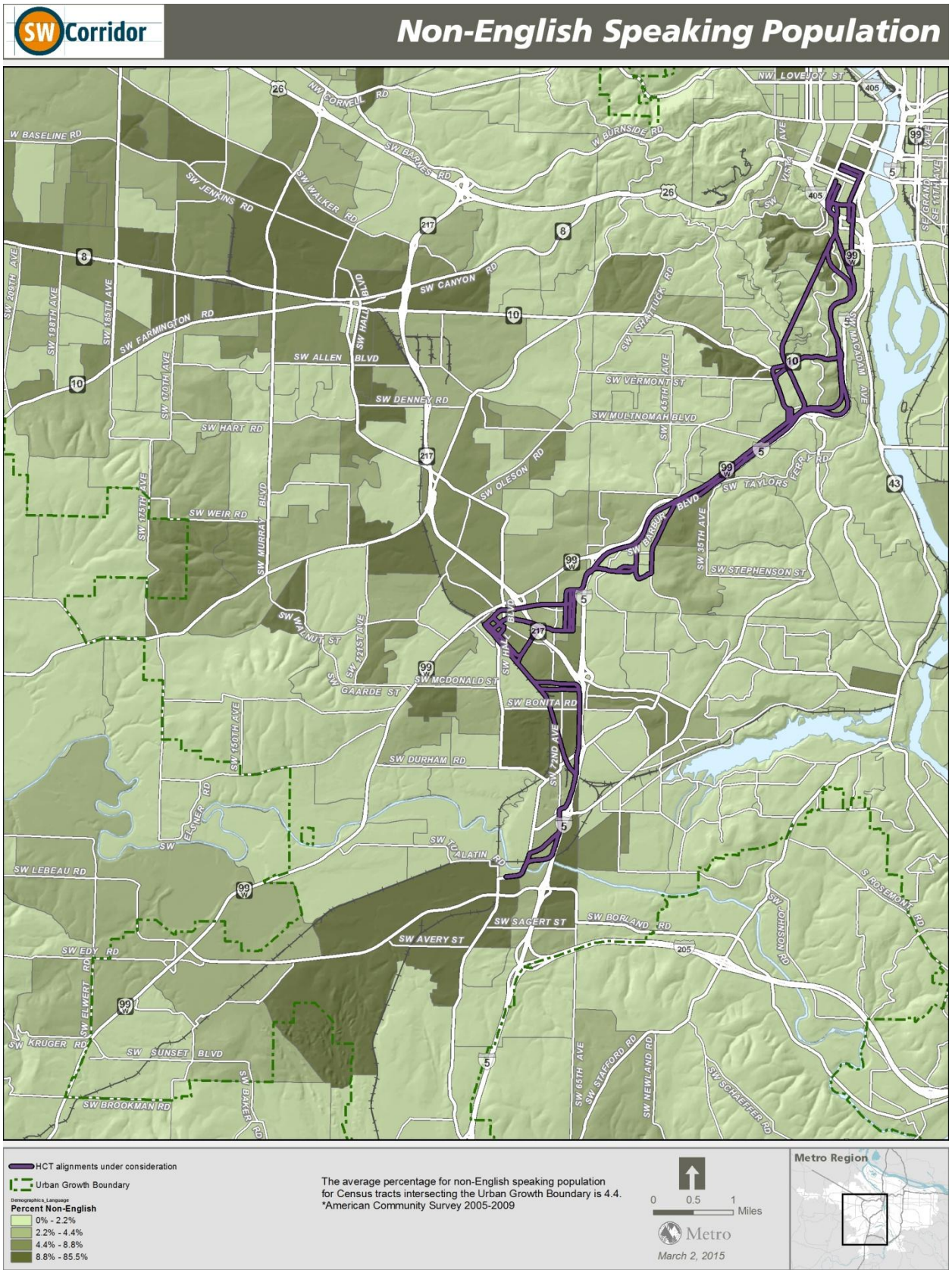

SW Corridor
American Indian or Alaskan Native Population
HCT alignments under consideration
Urban Growth Boundary
PCT AIAN census_2010_block_groups
Percent AIAN
0% - .46%
.46% - .91%
.91% - 1.8%
1.8% - 5.3%
The average percentage for AIAN population for block groups intersecting the Urban Growth Boundary is 0.91.
*Source: 2010 Census
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region
NW LOVEJOY ST
NW CORNELL RD
W BASELINE RD
W BURNSIDE RD
SW BARNES RD
SW JENKINS RD
SW WALKER RD
SW CANYON RD
SW FARMINGTON RD
SW ALLEN BLVD
SW DENNEY RD
SW HART RD
SW WEIR RD
SW MURRAY BLVD
SW OLESON RD
SW SHATTUCK RD
SW VERMONT ST
SW MULTNOMAH BLVD
SW MACADAM AVE
SW TAYLORS FERRY RD
SW BARBUR BLVD
SW STEPHENSON ST
SW 35TH AVE
SW HALL BLVD
SW WALNUT ST
SW 121ST AVE
SW GAARDE ST
SW MCDONALD ST
SW BONITA RD
SW 92ND AVE
SW DURHAM RD
SW TUALATIN RD
SW LEBEAU RD
SW ELLIOTT RD
SW EDY RD
SW ELWERT RD
SW KRUGER RD
SW SUNSET BLVD
SW BROOKMAN RD
SW BAKER RD
SW 150TH AVE
SW 175TH AVE
SW 185TH AVE
SW 198TH AVE
SW 209TH AVE
SW AVERY ST
SW SAGERT ST
SW BORLAND RD
SW 65TH AVE
SW STAFFORD RD
SW NEWLAND RD
SW SCHAEFFER RD
SW KOSHNHOLZ RD
S ROSEMONT RD
SE GRAND AVE
SE 11TH AVE


SW Corridor
Asian Population
HCT alignments under consideration
Urban Growth Boundary
PCT ASIAN census_2010_block_groups
Percent Asian
0% - 3.1%
3.1% - 6.2%
6.2% - 12.3%
12.3% - 45.1%
The average percentage for Asian population for block groups intersecting the Urban Growth Boundary is 6.17.
*Source: 2010 Census
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region
NW LOVEJOY ST
NW CORNELL RD
W BASELINE RD
W BURNSIDE RD
SW BARNES RD
SW JENKINS RD
SW WALKER RD
SW CANYON RD
SW FARMINGTON RD
SW ALLEN BLVD
SW DENNEY RD
SW HART RD
SW WEIR RD
SW MURRAY BLVD
SW 209TH AVE
SW 198TH AVE
SW 185TH AVE
SW 170TH AVE
SW 175TH AVE
SW 150TH AVE
SW HALL BLVD
SW SHATTUCK RD
SW VERMONT ST
SW 45TH AVE
SW MULTNOMAH BLVD
SW MACADAM AVE
SW OLESON RD
SW TAYLORS FERRY RD
SW BARBUR BLVD
SW 35TH AVE
SW STEPHENSON ST
SW WALNUT ST
SW 121ST AVE
SW GAARDE ST
SW MCDONALD ST
SW BONITA RD
SW 72ND AVE
SW DURHAM RD
SW ELSNER RD
SW TUALATIN RD
SW LEBEAU RD
SW SAGERT ST
SW BORLAND RD
SW AVERY ST
SW EDY RD
SW ELWERT RD
SW KRUGER RD
SW SUNSET BLVD
SW BROOKMAN RD
SW BAKER RD
SW 65TH AVE
SW STAFFORD RD
SW NEWLAND RD
SW SCHAEFFER RD
SW KOSHHOH RD
S ROSEMONT RD
SE GRAND AVE
SE 11TH AVE


SW Corridor
Black Population
HCT alignments under consideration
Urban Growth Boundary
PCT BLACK census_2010_block_groups
Percent Black
0% - 1.9%
1.9% - 3.7%
3.7% - 7.14%
7.14% - 39.8%
The average percentage for Black population for block groups intersecting the Urban Growth Boundary is 3.7.
*Source: 2010 Census
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region


SW Corridor
Hispanic Population
HCT alignments under consideration
Urban Growth Boundary
PCT Hispanic census_2010_block_groups
Percent Hispanic
0% - 5.6%
5.6% - 11.1%
11.1% - 22.3%
22.3% - 83%
The average percentage for Hispanic population for block groups intersecting the Urban Growth Boundary is 11.13.
*Source: 2010 Census
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region


SW Corridor
Native Hawaiian or Pacific Islander Population
HCT alignments under consideration
Urban Growth Boundary
Percent NHPI
0% - .225%
.225% - .45%
.45% - .9%
.9% - 6.6%
The average percentage for NHPI population for block groups intersecting the Urban Growth Boundary is 0.45.
Each block group is labeled with its total NHPI population.
*Source: 2010 Census
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region


SW Corridor
Non-English Speaking Population
HCT alignments under consideration
Urban Growth Boundary
Demographics_Language
Percent Non-English
0% - 2.2%
2.2% - 4.4%
4.4% - 8.8%
8.8% - 85.5%
The average percentage for non-English speaking population for Census tracts intersecting the Urban Growth Boundary is 4.4.
*American Community Survey 2005-2009
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region
W BASELINE RD
NW CORNELL RD
W BURNSIDE RD
NW LOVEJOY ST
SW BARNES RD
SW JENKINS RD
SW WALKER RD
SW CANYON RD
SW FARMINGTON RD
SW ALLEN BLVD
SW DENNEY RD
SW HART RD
SW WEIR RD
SW MURRAY BLVD
SW OLESON RD
SW SHATTUCK RD
SW VERMONT ST
SW MULTNOMAH BLVD
SW MACADAM AVE
SE GRAND AVE
SE 11TH AVE
SW TAYLORS FERRY RD
SW BARBUR BLVD
SW 35TH AVE
SW STEPHENSON ST
SW HALL BLVD
SW MCDONALD ST
SW GAARDE ST
SW BONITA RD
SW 72ND AVE
SW DURHAM RD
SW TUALATIN RD
SW LEBEAU RD
SW ELLIOTT RD
SW SAGERT ST
SW AVERY ST
SW BORLAND RD
S ROSEMONT RD
SW EDY RD
SW ELWERT RD
SW KRUGER RD
SW SUNSET BLVD
SW BROOKMAN RD
SW BAKER RD
SW 65TH AVE
SW STAFFORD RD
SW NEWLAND RD
SW SCHAEFFER RD
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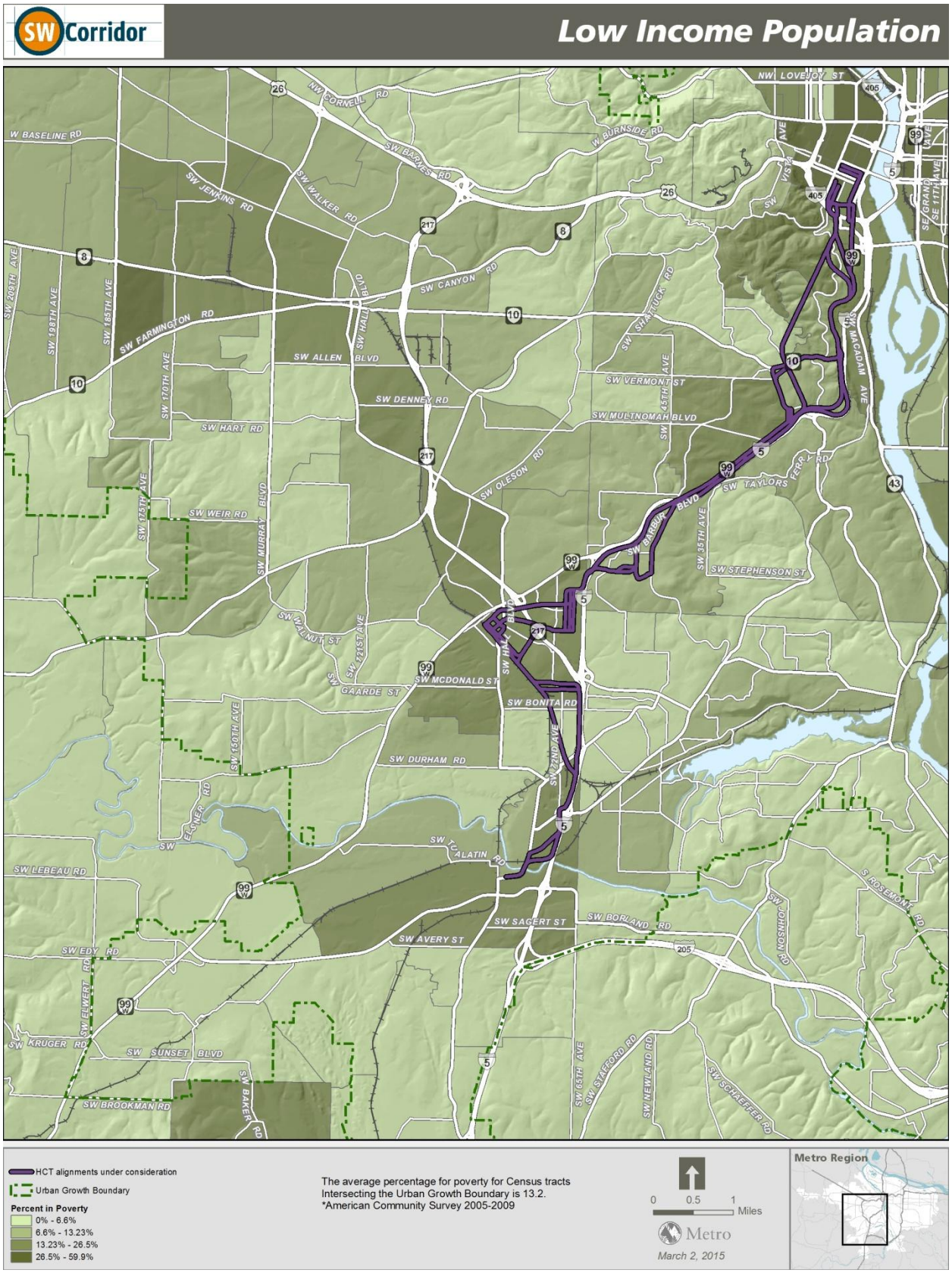
SW 121ST AVE
SW 150TH AVE
SW 124TH AVE


SW Corridor
Low Income Population
HCT alignments under consideration
Urban Growth Boundary
Percent in Poverty
0% - 6.6%
6.6% - 13.23%
13.23% - 26.5%
26.5% - 59.9%
The average percentage for poverty for Census tracts Intersecting the Urban Growth Boundary is 13.2.
*American Community Survey 2005-2009
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region
W BASELINE RD
NW CORNELL RD
W BURNSIDE RD
NW LOVEJOY ST
SW BARNES RD
SW JENKINS RD
SW WALKER RD
SW CANYON RD
SW FARMINGTON RD
SW ALLEN BLVD
SW DENNEY RD
SW HART RD
SW WEIR RD
SW MURRAY BLVD
SW 170TH AVE
SW 185TH AVE
SW 198TH AVE
SW 209TH AVE
SW 175TH AVE
SW HALL BLVD
SW OLESON RD
SW SHATTUCK RD
SW VERMONT ST
SW 45TH AVE
SW MULTNOMAH BLVD
SW MACADAM AVE
SW TAYLORS FERRY RD
SW BARBUR BLVD
SW 35TH AVE
SW STEPHENSON ST
SW WALNUT ST
SW 121ST AVE
SW GAARDE ST
SW MCDONALD ST
SW BONITA RD
SW DURHAM RD
SW 150TH AVE
SW ELLIOTT RD
SW TUALATIN RD
SW LEBEAU RD
SW SAGERT ST
SW AVERY ST
SW BORLAND RD
SW NOSNHOLKON RD
S ROSEMONT RD
SW EDY RD
SW ELWERT RD
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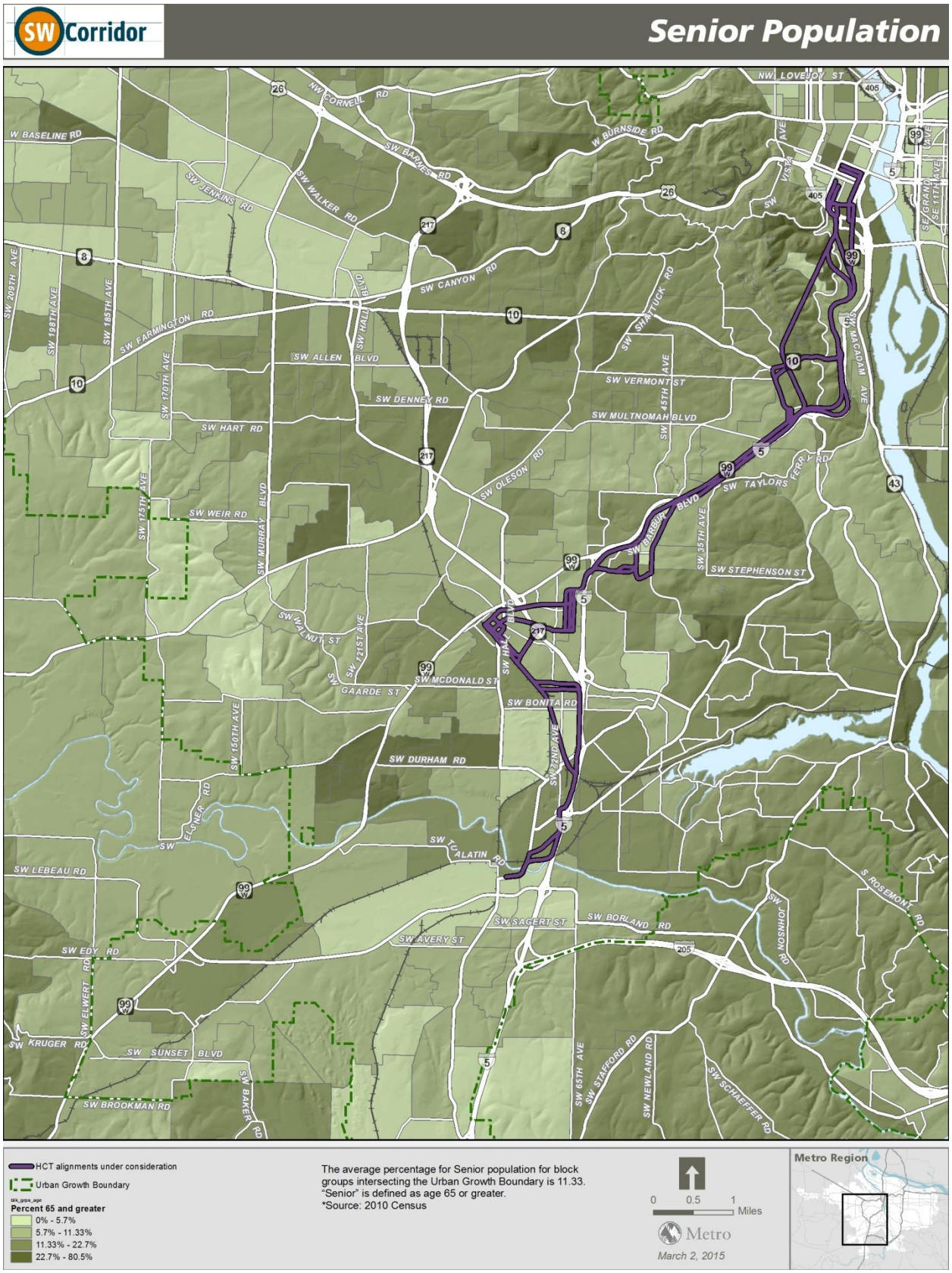
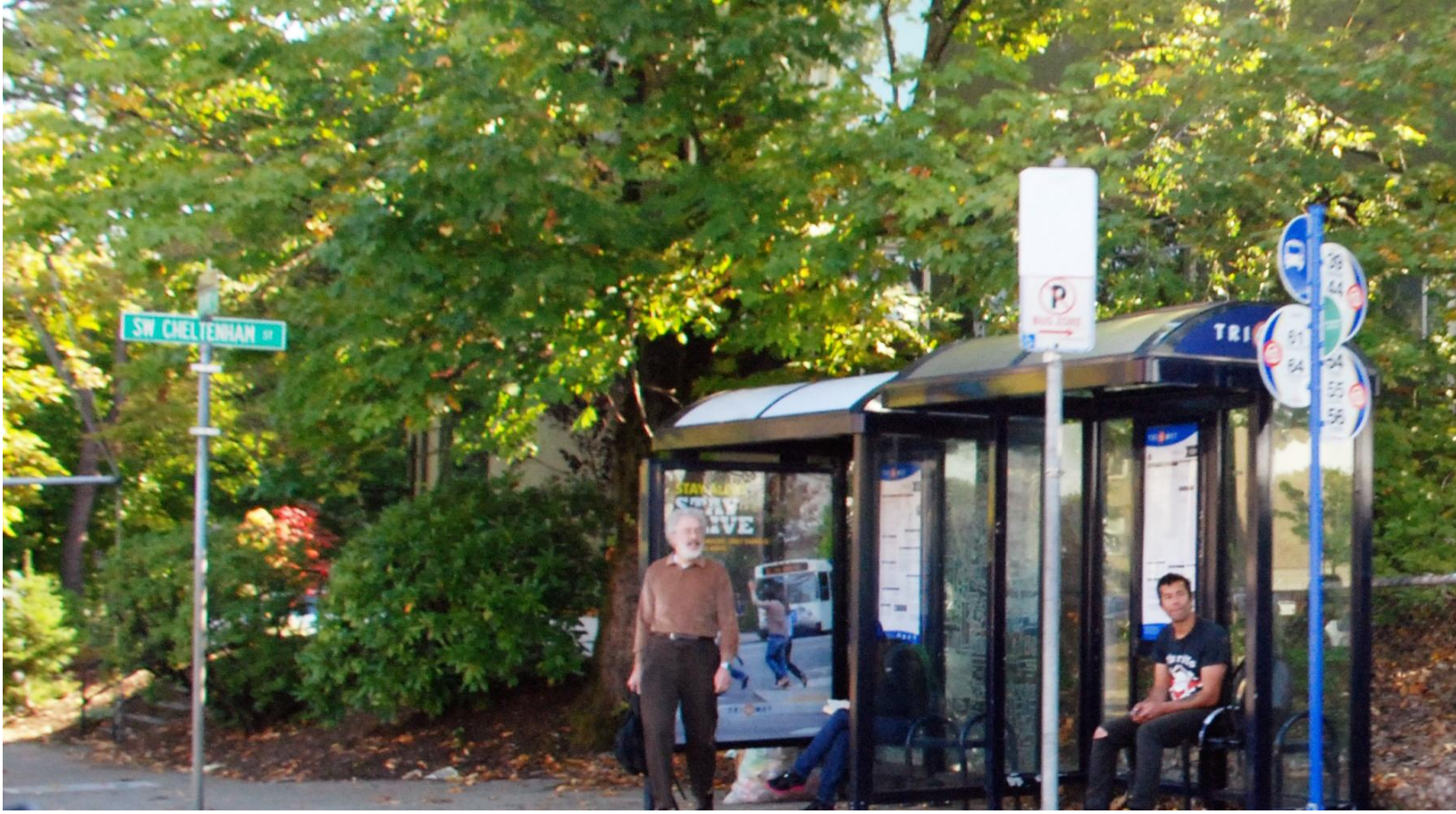
SW BROOKMAN RD
SW BAKER RD
SW 65TH AVE
SW STAFFORD RD
SW NEWLAND RD
SW SCHAEFFER RD


SW Corridor
Senior Population
HCT alignments under consideration
Urban Growth Boundary
Percent 65 and greater
0% - 5.7%
5.7% - 11.33%
11.33% - 22.7%
22.7% - 80.5%
The average percentage for Senior population for block groups intersecting the Urban Growth Boundary is 11.33.
"Senior" is defined as age 65 or greater.
*Source: 2010 Census
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region



Southwest Corridor Plan

Key Issues: Hillsdale

Discussion Draft, March 2, 2015

GREAT PLACES
SW Corridor
Portland • Sherwood • Tigard • Tualatin
Beaverton • Durham • King City
Washington County • ODOT • TriMet • Metro

Key Issues: Hillsdale

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Hillsdale Key Issues: introduction and summary

Southwest Corridor Plan overview

The Southwest Corridor Plan is a comprehensive approach to achieving community visions through integrated land use and transportation planning. The Southwest Corridor Plan incorporates high capacity transit (HCT) alternatives, roadway, bicycle and pedestrian projects and adopted local land use visions, including the Barbur Concept Plan, the Tigard High Capacity Transit Land Use Plan, Linking Tualatin and the Sherwood Town Center Plan. The Plan is exploring Bus Rapid Transit (BRT) and Light Rail Transit (LRT) alternatives for several alignments that connect the Portland Central City, Southwest Portland, Tigard, and Tualatin.

In July 2013, the Southwest Corridor Plan Steering Committee recommended a Shared Investment Strategy that includes key investments in transit, roadways, active transportation, parks, trails and natural areas. A refinement study was initiated in August 2013 to narrow HCT options, identify a preferred alternative and create a subset of road and active transportation. In June 2014, the Steering Committee accepted the recommendation of a narrowed set of HCT design options and requested additional refinements work from staff.

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. The Preferred Package is anticipated to be defined in spring 2016.

After a 2016 Preferred Package is defined and approved by the Steering Committee that identifies an HCT mode choice, the HCT alignment options, roadway, bicycle and pedestrian projects will receive full environmental review in a Draft Environmental Impact Statement (DEIS) under the National Environmental Policy Act (NEPA). It is anticipated that additional roadway, transit, bicycle and pedestrian projects will be further studied, funded and implemented through other collective federal, state, regional and local efforts.

Desired outcome: Preferred Package

Project partners will work together to develop a Preferred Package by spring 2016 that addresses the needs and aspirations of Southwest Corridor residents and businesses. The Preferred Package will include the following components:

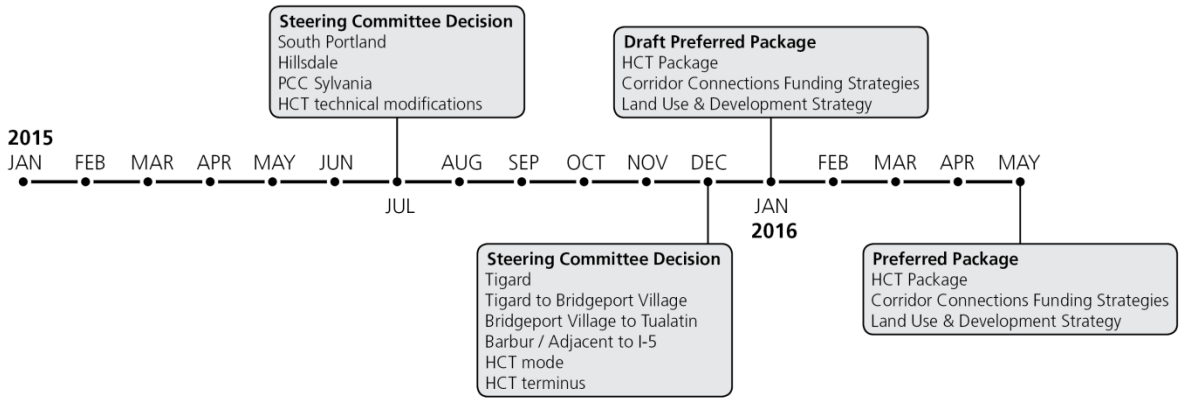
- ***HCT Preferred Alternative:*** Preferred HCT alignments to study further in a DEIS, including mode, alignments, terminus, and associated roadway, bicycle, and pedestrian projects
- ***Corridor Connections:*** Potential funding source and timeframe for each of the roadway, bicycle, and pedestrian projects identified in the Shared Investment Strategy

- ***Land use and development strategy:*** Partnership agreements and other pre-development work to activate land use and place-making strategies identified in local land use visions

Identifying the Preferred Package: 2015-2016 timeline overview

To reach a Preferred Package by spring of 2016, two key Steering Committee decision-making points have been identified in 2015: July and December. Technical analysis, place-based public outreach, and partner conversations will precede each Steering Committee decision. A draft recommendation report will be presented at community forums before each decision-making point, including public comment gathered during the place-based outreach period and any additional technical analysis compiled.

The July Steering Committee decision will focus on direct versus indirect access to key destinations in the corridor, including Marquam Hill, Hillsdale, and the Portland Community College (PCC) Sylvania Campus, as well as technical modifications to HCT alignments. The December Steering Committee decision will focus on the remaining HCT alignments and terminus options as well as an HCT mode decision between LRT and BRT. In January 2016, the Steering Committee will identify a Draft Preferred Package, including HCT mode, alignment options, terminus options, and associated roadway and active transportation projects for further study in a DEIS, a funding strategy for additional priority roadway, bicycle, and pedestrian projects throughout the corridor, and integrated land use and development strategies.



How to use this Key Issues memo

The Southwest Corridor project partners are taking a place-based approach to understanding the key issues related to potential HCT and transportation investments as they relate to local concerns and community aspirations. The place-based key issues will be reviewed by the public and the Steering Committee in the context of their implications for achieving the multifaceted goals for the corridor as a whole. Decision makers and the public will have several months to discuss this report through public meetings and online engagement. Although this memo will not be revised after the March Steering

Committee meeting, information from this report and other Key Issues memos will be combined with technical evaluation of the options in South Portland, Hillsdale and PCC-Sylvania areas to form a draft Evaluation Report expected in May 2015. A summary of stakeholder feedback will be incorporated into a the Evaluation and Recommendation Report that will be available prior to the July 2015 Steering Committee decision. The remaining place-based evaluation and recommendation reports will be available before the December 2015 Steering Committee decision.

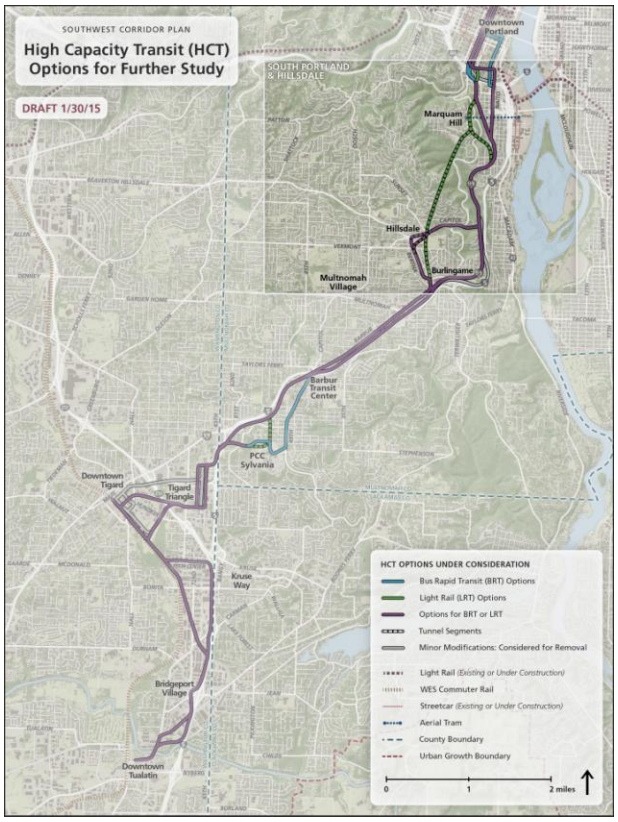
This document fits into a broader array of technical information that supports Steering Committee decision making during this phase of the Southwest Corridor Plan. **Appendix A** lists the anticipated major project documents and their estimated dates of completion.

This document includes an overview of the decision making process as it relates to the key issues in South Portland, a description of the three proposed high capacity transit alignments to serve South Portland, a summary of technical information and a description of key issues for decision makers and the public to consider. Appendices contain supplemental information including maps and project lists of Shared Investment Strategy road, bicycle and pedestrian projects being considered for the South Portland area, a discussion of general transit mode considerations, and maps highlighting demographic factors in the study area.

Hillsdale Key Issues summary

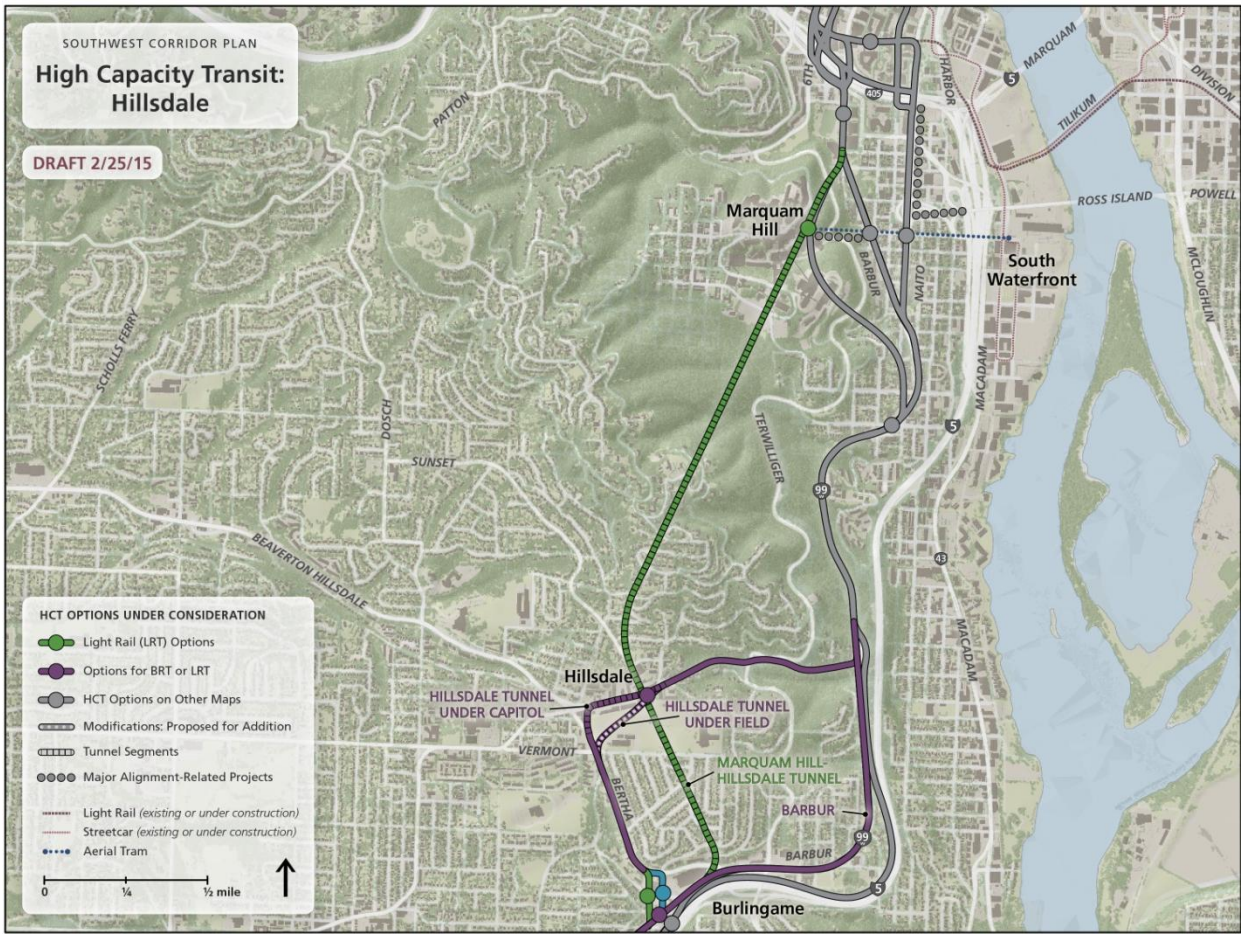
The Hillsdale area encompasses the project area between Capitol Highway to the north and Burlingame to the south and includes three HCT options under consideration:

1. Barbur Boulevard between SW Hamilton Street and SW Bertha Boulevard (BRT or LRT) (does not provide direct HCT access to Hillsdale)
2. Hillsdale Loop using Barbur between Hamilton and looping through the Hillsdale town center via SW Capitol Highway and Bertha, including a cut-and-cover tunnel in or near the town center commercial area* (BRT or LRT)
3. Marquam Hill-Hillsdale deep-bored Tunnel between downtown Portland and Bertha (LRT only)



* *In May 2014 the Southwest Corridor Steering Committee specified that LRT though Hillsdale should be studied only with a cut-and-cover tunnel to avoid property impacts and removal of traffic lanes in the congested commercial area. In June 2014 the Southwest Corridor Steering Committee specified that BRT through Hillsdale should be studied only with the cut-and-cover tunnel to avoid placing buses in mixed traffic where congestion is anticipated.*

Additional HCT options serving South Portland and Lair Hill are addressed separately in the South Portland Key Issues memo.



Major decisions in Hillsdale

In July 2015 the Southwest Corridor Plan Steering Committee will be asked to make a recommendation on which of the proposed HCT alignment choices for serving the Hillsdale area will advance to further environmental review through a DEIS that could begin as early as late 2016. This document focuses on the substantial tradeoffs between options so that the public and decision makers can be confident that all options that will enter the DEIS are viable and aligned with project goals.

Timeline for major decisions in Hillsdale

July 2015:

- Should the DEIS include study of an HCT alignment and station in the Hillsdale town center, or should the area continue to be served by a high level of local bus service with emphasis on connections to HCT stations near the town center?
- If HCT should be routed through the Hillsdale town center, should the Marquam Hill-Hillsdale Tunnel, the Capitol Highway cut-and-cover tunnel, or both be studied in the DEIS?
- Should the Barbur Boulevard surface HCT alignment and any associated local transit, roadway, bike and pedestrian projects necessary to link Hillsdale to the HCT system be studied further in the DEIS?

December 2015:

- Is BRT or LRT the preferred mode for the corridor to study in the DEIS?
- What is the timeframe for designing and implementing local transit service improvements to enhance connections to and through Hillsdale to the HCT project?
- What is the best implementation approach for corridor connection projects defined in the Shared Investment Strategy for Hillsdale?

Deliberation and decision making will be driven by how well each element of the proposed project meets the Southwest Corridor Plan overarching Purpose and Need, including improved mobility and safety for all users and modes of transportation, efficient and reliable transportation choices, wise use of public resources, improved access to key places, and equitable distribution of the benefits and burdens of transportation and land use development.

Evaluation factors

This Hillsdale Key Issues memo outlines data collected through technical analysis, local knowledge and partners discussions that will influence this decision including:

- Transit performance
- Community development
- Mobility: traffic impacts and safety
- Capital cost estimates
- Engineering complexity and risk
- Community impacts

Hillsdale summary

The following table summarizes evaluation factors, key considerations, and analysis results for consideration in the Hillsdale area.

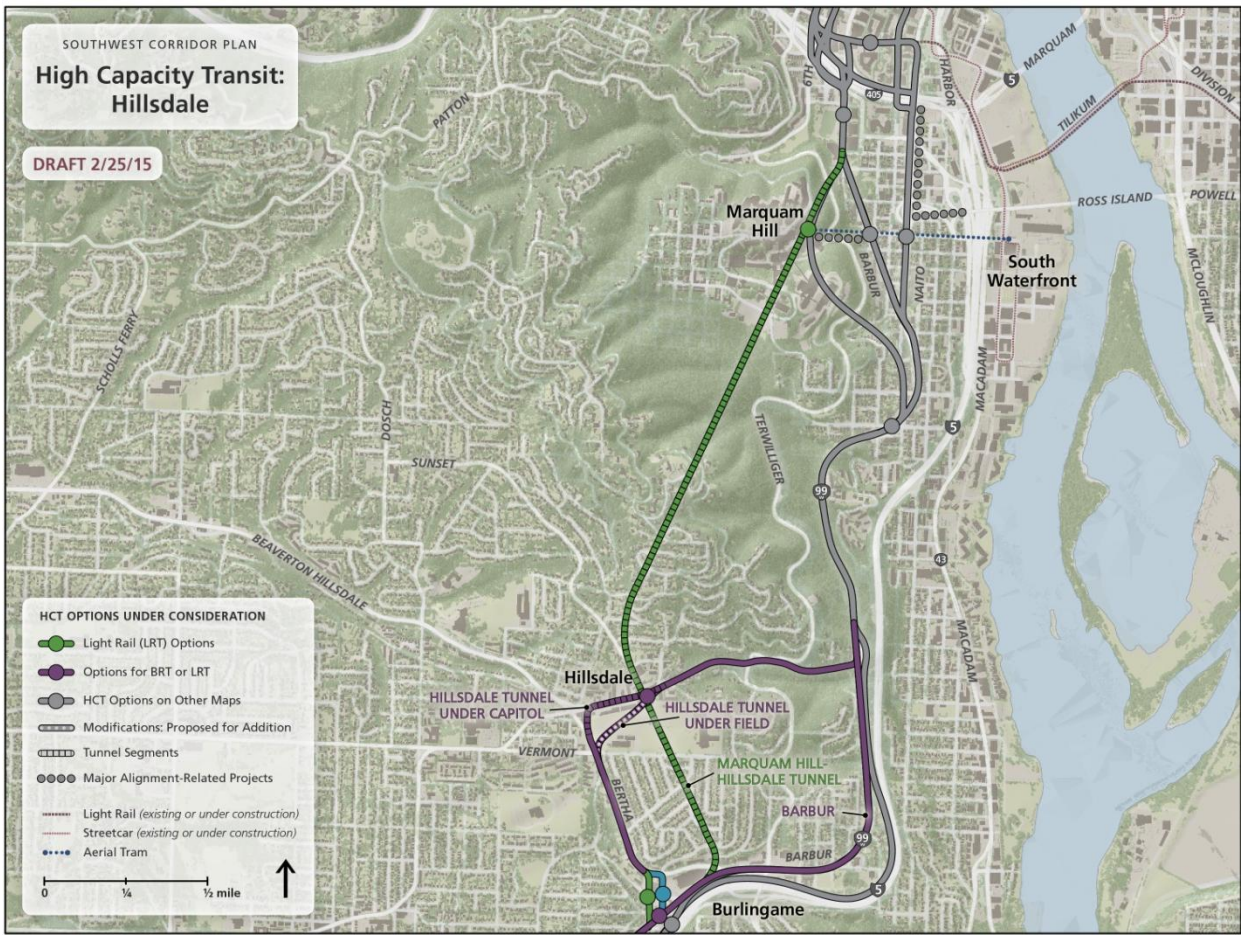
Key considerations	Evaluation factors	Marquam Hill-Hillsdale Tunnel	Barbur	Hillsdale Loop
Transit Performance • What are the tradeoffs to consider between transit performance of proposed tunnel alignments and other factors such as cost, construction complexity and risk, and community development impacts?	*2035 new transit trips*	New Transit Trips: 23,300	New Transit Trips: 22,600	New Transit Trips: 21,700
	2035 line riders	Line riders: 45,500 *(High number of bus transfers to LRT in Hillsdale results in high line ridership relative to new transit trips)*	Line riders: 36,900	Line riders: 35,500
	Travel time (PSU to Tualatin)	Travel Time: 27 minutes	Travel Time: 30 minutes	Travel Time: 33 minutes
Community Development • Can local transit, road, bike and pedestrian improvements effectively connect Hillsdale to a surface alignment on Barbur? • Are the positive and negative impacts of development growth that could occur with an HCT investment clearly defined?	*Access*	• Direct HCT service to Hillsdale with underground station • Includes sidewalk/bike improvements along to access station	• Local bus service improvements to Hillsdale, Multnomah Village, and Crossroads provide connection to HCT • Station at Burlingame • Includes sidewalk/bike improvements along Barbur and to access station	• Direct HCT service to Hillsdale with underground station • Includes sidewalk/bike improvements along Capitol and to access station
	Redevelopment potential	• Promotes higher intensity mixed use development in Hillsdale center • Likely to require consideration of a transit center in Hillsdale		Promotes higher intensity mixed use development in Hillsdale center
Mobility • Can a Hillsdale Loop be designed to mitigate traffic impacts for cars, bikes and pedestrians? • How do alignment choices impact road, bike and pedestrian improvement projects that could serve Hillsdale?	*Accessibility*	Includes sidewalk/bike improvements to access station	• Includes sidewalk/bike improvements along Barbur and to access station • Includes replacement of Barbur viaducts or provides new parallel ped/bike facility	Includes sidewalk/bike improvements along Capitol and to access station •
	Mode considerations		• 20 BRT vehicles per hour in the peak in Hillsdale • 8 LRT vehicles per hour in the peak	• Same as Barbur alignment option
Capital Costs • Are the trade-offs between cost of a	*Cost estimates in 2014 dollars*	Adds $900M - $1.0B compared to Barbur or Naito alignment	$1.9B - $2.4B (LRT) $750M - $1.2B (BRT)	Adds $45M (BRT) compared to Barbur alignment

Key considerations	Evaluation factors	Marquam Hill-Hillsdale Tunnel	Barbur	Hillsdale Loop
project and other factors such as reliability, safety, access and community development opportunities clear? • How does cost impact the length of the final high capacity transit alignment?				LRT cost not available but will be higher than Barbur
Engineering complexity/risk • Are the benefits and risks associated with construction of a deep-bored tunnel clear? • What aspects of each alignment option present noteworthy risk?	*Risk*	• Large area needed for tunnel mining/access for heavy equipment and trucks at each portal • Risk of complications with tunnel boring resulting in cost overruns • Traffic and physical roadway impacts from hauling excavated materials	• Right-of-way impacts	• Potential right of way impacts • Potential traffic and business disruptions during cut-and-cover tunnel construction • Risk of complications with cut-and – cover tunnel
Community impacts • Can the benefits and burdens of an HCT alignment be equally distributed among all population groups in the corridor? • Do surface or tunnel alignments offer greater access to key places such as education, employment, health care and retail centers?	*Distribution of impacts*	• Most direct access to education, employment and health care services on Marquam Hill • Limited access to education, health care, employment and retail services on Naito Parkway, South Waterfront, and local retail centers	• Potential right of way impacts	• Potential right of way impacts

Hillsdale Key Issues

There are three HCT alignments in the vicinity of Hillsdale: two underground and one surface. A number of other HCT alignment options were removed from further consideration by the Steering Committee in April and June 2014. More information on these options may be found on the Southwest Corridor Plan website: http://www.oregonmetro.gov/public-projects/southwest-corridor-plan/project-library.

Hillsdale HCT alignment option descriptions



Surface

Barbur Boulevard HCT alignment

The portion of the Barbur alignment discussed in this memo is between the Capitol Highway ramps and the Burlingame area. The Barbur alignment is a surface route, which would continue along Barbur Boulevard from South Portland into the Burlingame area, with a station near Barbur and 13th Avenue, approximately two-thirds of a mile from the Hillsdale Town Center. Either BRT or LRT would be center-running in exclusive right-of-way on this stretch of Barbur. With this alignment local bus service would

be improved to ensure efficient transit connections between the Hillsdale town center area and high capacity transit stations on Barbur. It would also improve bicycle and pedestrian facilities on Barbur in this portion of the alignment. Opportunities for improving bicycle and pedestrian access between the town center and a Bertha station would also be explored. Further north, a surface Barbur Boulevard or Naito Parkway alignment would include the Marquam Hill pedestrian/bike access project described below. The alignment is considering converting 1 of 3 north bound travel lanes north of the Capitol Hwy Barbur on ramp to minimize impacts to adjacent properties. The lane conversion would be approximately 3500' approaching Hamilton. At Hamilton about 400' of the third lane would be retained to accommodate right turns. All lane conversions considered will be analyzed at a higher level of detail in the DEIS phase to confirm road capacity is available to support conversion without unacceptably impacting traffic.

Tunnels

Hillsdale Loop with cut-and-cover tunnel: under Capitol Highway or fields

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 Southwest Corridor Steering Committee recommended that only an alignment 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 Highway southbound off-ramp. HCT would fly over the southbound lanes of Barbur Boulevard on a new structure to land in the center of Capitol Highway. Due to the slope issues and the need to transition the center running alignment onto Capitol highway, HCT would continue west on Capitol Highway on structure and retained fill until reaching Terwilliger Boulevard. Beyond Terwilliger, approaching Hillsdale, HCT would continue on the surface along Capitol Hwy. Near Sunset Boulevard, HCT would enter a portal to drop under Capitol Hwy in the cut-and-cover tunnel, and then could either continue under SW Capitol to SW Bertha or sweep to the south, passing behind the commercial buildings and under the sports fields next to Rieke Elementary School. HCT would emerge at a portal on Bertha Boulevard near the intersection with Vermont Street. This alignment, similar to the alignment on Barbur, is also considering converting 1 of 3 north bound travel lanes north of the Capitol Hwy Barbur on ramp for transit use. It is also looking at the possibility of converting 1 of 2 west bound lanes between Barbur and Terwilliger on Capitol Hwy to minimize impacts to the park and adjacent properties. Approaching Terwilliger, the second lane would be retained to accommodate turn movements at Terwilliger. All lane conversions considered will be analyzed at a higher level of detail in the DEIS phase to confirm road capacity is available to support conversion without unacceptably impacting traffic.

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 Barbur, Custer Street, and 13th Avenue.

For an LRT mode in this Hillsdale option, the Burlingame station location is particularly difficult due to the steep grades on 13th and could result in an elevated station above Custer near 13th. For a BRT mode in this option an elevated station would not be required.

Marquam Hill-Hillsdale Tunnel

This option would tie into the downtown Transit Mall via a new bridge at 4th Avenue connecting to the PMLR tracks at Lincoln Street. Access to the tunnel portal would be in the vicinity of Hooker Street. The tunnel would extend under Marquam Hill with a deep station 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 deep station would be located under the Hillsdale town center, near the intersection of Capitol Highway and Sunset Boulevard. The tunnel would exit the hillside in the vicinity of Bertha Boulevard where it meets Barbur Boulevard. A station in this location (near Custer and 13th) will likely need to be elevated above Barbur to avoid traffic impacts and to provide a station area in the desired vicinity.

With this alignment option there would be no surface connections to inner southwest Portland except those north of I-405 described above. The Marquam Hill-Hillsdale Tunnel alignment would not assume a direct pedestrian and bicycle connection between Marquam Hill and Barbur Boulevard, since the area would be served by an underground station with an elevator.

Roadway, pedestrian and bicycle projects

All options include a range of roadway, pedestrian and bicycle improvements to better connect the corridor to the surrounding neighborhoods. The specific improvements vary depending on the alignment and multi-modal needs. Maps and lists of potential roadway, pedestrian and bicycle projects that would accompany HCT alignments in South Portland are included in Appendix B. One major project, Marquam Hill pedestrian/bike access, is described in more detail below.

Marquam Hill pedestrian/bike access

This connection has been studied at a conceptual level through the Marquam Hill Design Challenge. Two firms were hired to conceptually render new connections from a Barbur or Naito transit stop up to Marquam Hill. Options studied included a sky bridge, several escalator options and a pedestrian tunnel. Connections on the hill were proposed at Terwilliger and/or within the OHSU campus. The project engaged the surrounding neighborhood groups, adjoining property owners and several health care providers; these included the Veterans Medical Center, NCNM, and OHSU. It is clear that a well-designed connection from Barbur to the OHSU campus and beyond to the VA Medical Center is feasible, and it is assumed this connection would be constructed as part of a Barbur or Naito surface alignment.

Hillsdale analysis and findings

Transit performance

Key considerations:

- What are the tradeoffs to consider between transit performance of proposed tunnel alignments and other factors such as cost, construction complexity and risk, and community development impacts?

Key findings:

- Marquam Hill-Hillsdale Tunnel travel time would be 2.8 minutes faster than the Barbur option (about 10% of the total Barbur line time) between Burlingame and downtown Portland
- Using a Hillsdale Loop instead of surface Barbur for this segment would be nearly 3 minutes slower than the surface Barbur alignment
- Marquam Hill – Hillsdale Tunnel would result in more line riders and system riders than a surface alignment on Barbur between Burlingame and downtown Portland
- The Hillsdale Loop would result in 1,400 fewer line riders and 900 fewer new system trips compared to LRT on Barbur.
- With a Marquam Hill-Hillsdale Tunnel there would be 4,800 daily on and offs at a Hillsdale station, including 2,200 transfers, which would require consideration of a transfer station in Hillsdale. This is due to the faster travel time between Hillsdale and Marquam Hill for the tunnel option versus transit riders accessing the Hill from Barbur using the surface connector.

Transit performance analysis in the Hillsdale area focuses on differences between LRT operating through a tunnel under Marquam Hill and Hillsdale, LRT routed through Hillsdale via a cut-and-cover tunnel under Capitol Highway or the field behind Rieke Elementary School (Hillsdale Loop options), and an indirect Hillsdale connection with LRT remaining on Barbur Boulevard below Hillsdale, utilizing three travel demand model runs to reflect these alternatives. Model runs used LRT as the mode for comparison because a Marquam Hill-Hillsdale Tunnel is not under consideration for BRT. It is assumed that travel times for BRT for either the loop or the surface option on Barbur are similar to LRT. **All model results at this time should be considered preliminary as refinements of HCT options, traffic analyses and local bus service assumptions will necessitate updated modeling throughout the DEIS process.**

Travel time and reliability

The Marquam Hill-Hillsdale Tunnel has a slightly shorter alignment than the Barbur alignment and is completed separated from cars, pedestrians, and bikes. Therefore it provides the fastest and most reliable LRT travel times of the options in South Portland, saving two minutes and 48 seconds over a Barbur option between Burlingame and downtown Portland, reducing total line time between Tualatin and Portland by about 10 percent. The Hillsdale Loop options would be the slowest, with two minutes and 48 seconds additional travel time compared to the Barbur option, resulting from sharp curves and

elevation changes. In total, the Marquam Hill-Hillsdale Tunnel alignment would be five minutes and 36 seconds faster than a surface Barbur alignment that includes the Hillsdale Loop alternative.

Corridor line and system ridership

Future transit ridership forecasts are largely determined by the speed of the service relative to competing modes and by the numbers of households and jobs it serves. Ridership is expressed in two ways: **line ridership** measures the number of daily riders on the specific HCT line (between the terminus and downtown Portland)—this includes both new transit riders and those who rode buses in a no-build scenario (without the HCT project). **Change in system transit trips** measures the growth of total system ridership with implementation of the proposed project compared to a no-build alternative—this isolates new transit riders only. While shifts from buses to HCT in the model reflect riders who mostly benefit from improved accessibility with a project, new riders represent shifts in mode, usually from autos to transit, that are more likely to benefit the transit system as a whole. All measures are for forecast year 2035.

The Marquam Hill-Hillsdale Tunnel option would result in 8,600 more line riders compared to LRT on Barbur, a 23 percent increase, but only 700 more new riders (system transit trips), a three percent increase. This disparity results from the difference in access to Marquam Hill between the Tunnel alternative and the surface alternatives. With HCT on either Barbur or Naito, a direct pedestrian and bicycle connection between Barbur Boulevard and Marquam Hill is assumed to be built as part of the HCT project. This connection, whether it is an elevator, escalator, walkway, or other design, would be accessible to HCT riders and to local bus riders at Barbur Boulevard near Gibbs Street. Approximately half of the projected users of the pedestrian/bicycle connection would be local bus riders. For the Marquam Hill-Hillsdale Tunnel alternative, without the direct connection between Barbur and Marquam Hill, local bus riders instead would transfer to LRT in either Hillsdale or downtown Portland and travel one stop to the tunnel station under Marquam Hill. These transfers result in higher line ridership for LRT in a tunnel, but a much smaller difference in net new transit riders compared to the surface alternatives.

The LRT Hillsdale Loop option would result in 1,400 fewer line riders compared to LRT on Barbur, a six percent decrease, and 900 fewer new system trips, a two percent decrease. While a station in Hillsdale would add riders, the slower travel time relative to a Barbur alignment would reduce demand at other stations along the line and result in a net loss in line ridership. With several existing transit lines serving Hillsdale today and assumed to continue to do so in future no-build model runs (where no HCT project is assumed), many of the LRT riders who would use the Hillsdale station would be shifting their ridership from local buses, resulting in the lower new system trips figure relative to the line ridership.

Transfers in Hillsdale

As described earlier, a Marquam Hill-Hillsdale Tunnel option would result in a significant number of transfers between local buses and LRT in Hillsdale, many by riders destined to or from Marquam Hill, one stop away. Under both the LRT on Barbur option and the Hillsdale Loop option, these local bus riders would continue through Hillsdale on their local bus, using the pedestrian/bicycle connection from

Barbur at Gibbs to access Marquam Hill. Under the LRT Tunnel alternative, Marquam Hill-bound riders of six bus lines (lines 44, 45, 54, 55, 56, 92) would transfer between local bus and LRT at the Hillsdale station. With a Marquam Hill-Hillsdale there would be nearly 4,800 daily ons and offs at the station, representing a nearly 50 percent increase in usage compared to a station in the Hillsdale Loop option. Of these 4,800 ons and offs, 2,200 would be transfers, requiring consideration of a transit center in Hillsdale. Changes to the local bus network resulting from the addition of the HCT project would affect these assumptions.

Hillsdale mode considerations

Appendix C includes a general discussion of differences between BRT and LRT modes and their corridor-wide impacts; this section addresses issues particular to Hillsdale.

With the Hillsdale Loop alignment, consideration should be made for the number of transit vehicles travelling through the town center. Today eight local bus routes travel through the town center, with over 20 buses on Capitol Highway in the peak hour on weekdays, and service will increase as future demand grows. Introduction of HCT, regardless of mode, could reduce the number of local buses operating through Hillsdale as riders would shift to the HCT. However, because of differences in carrying capacities, more BRT vehicles than LRT vehicles would be needed to carry an equivalent passenger load (see Appendix C). The projected 2035 demand would require 20 BRT vehicles per hour in the peak through Hillsdale or along Barbur, while LRT is assumed to operate with eight vehicles per hour in the peak with enough capacity still available to accommodate ridership growth beyond 2035. For BRT, growth above the projected 2035 demand would require yet more increases in service. As detailed in the Engineering Complexity and Risk section, an LRT or BRT project could impact the park adjacent to Capitol Highway if both westbound travel lanes are required for autos. With BRT, park impacts could be avoided by operating in mixed traffic; however, this would likely affect BRT travel time and reliability.

Community development

Key considerations:

- Can local transit, road, bike and pedestrian improvements effectively connect Hillsdale to an indirectsurface alignment on Barbur?
- Are the positive and negative impacts of development growth that could occur with an HCT investment clearly defined?
- Would construction of a cut-and-cover tunnel cause significant disruption to traffic flow and business access?

Key findings:

- An HCT investment in Hillsdale could spur higher intensity mixed use development due to a possible increase in markets rents.
- The Marquam Hill-Hillsdale and Hillsdale Loop options would require an underground station near the commercial corridor along Capitol Highway. A surface entry point (e.g. elevator) would provide access to the station.

The Barbur Boulevard alignment between Burlingame and downtown Portland would have stations at Hamilton and Gibbs (and Lincoln for the Naito alignment) in South Portland and at Bertha/13th, and would likely include improved local bus service to connect Hillsdale to downtown Portland and other destinations. The information presented in this section is meant to highlight the trade-offs between serving Hillsdale directly with a tunnel alignment or indirectly via a surface alignment on Barbur Boulevard. Hillsdale currently has eight bus lines that run through it during normal weekly service hours, and experiences high levels of automobile traffic at peak hours. There is a challenge in determining the investments that will alleviate current concerns at a reasonable cost to the Southwest Corridor project.

Access

Both alignment options providing direct service to Hillsdale would include a tunnel station located in the commercial corridor of Capitol Highway. This location would offer best access to the heart of the commercial service district, Wilson High School, Multnomah County Library, and the surrounding single-family neighborhoods. The station for any alignment through Hillsdale would be underground and would necessitate construction of a surface entry point, with an elevator system. As detailed in the Transit Performance section, the volume of existing riders on local transit that are forecasted to transfer between Hillsdale and Marquam Hill would likely require the addition of a transit center serving bus transfers. The location of a transit/transfer station relative to the existing transportation system has not been explored in detail.

A surface HCT on Barbur would not directly serve the Hillsdale town center, but local bus service, along with bike and pedestrian facilities, could be improved to ensure efficient connections to this regional system.

Redevelopment potential

The center of Hillsdale along Capitol Highway is almost exclusively one-story retail, consisting mainly of low-intensity linear developments set back from the roadway with street fronting parking lots. Only a few of the retail uses front the street. There are redevelopment opportunities along Capitol Highway on properties that are underutilized. Current zoning would allow existing properties to be redeveloped to a higher density, if market rents were positively impacted by an HCT line. It is unclear if BRT would have the same impact on redevelopment as LRT, thus lowering the possible return from redevelopment in the town center. Initial efforts to understand the impact that an HCT investment might have on market rents show that the majority of the redevelopment opportunities in Hillsdale would be found on the north side of Capitol Highway. Most likely, these opportunities would be higher-density multifamily with ground floor retail or some form of 3-4 story office use. Parcels further from the core retail area could experience some increased medium-density multifamily housing opportunities along Bertha Boulevard and Beaverton-Hillsdale Highway. There is also the possibility of scattered townhome development within some of the existing neighborhoods, depending on how land values respond to the investment of a new HCT line in the area.

Support of local land use plans

Hillsdale is identified as a 2040 Town Center on the Metro Growth Concept Map. Town Centers serve local populations with everyday needs and on occasion have specialty and destination retail. Town Centers are usually connected to regional centers via major road networks and transit, although the development of Town Centers varies greatly.

Hillsdale is identified as a 2040 Town Center on the Metro Growth Concept Map. Forecasts project low to moderate growth in Hillsdale over the next 20 years. Regardless of any HCT investment, households are expected to grow by about 850 units, while employment forecasts only show a net increase of 350 jobs. While both figures are significant in terms of Hillsdale's size, the totals are not large when compared to some other area forecasts in South Portland or along long stretches of Barbur Boulevard to the south. The Hillsdale Town Center Plan does not expressly state a desire for HCT service, but it does call out the need for better bus service to the Town Center. Additionally, the plan does identify commercial properties in the core as opportunity sites for new, mixed-use development.

Mobility

Key considerations:

- Can high capacity transit be designed to minimize negative impacts to auto, freight, bicycle and pedestrian mobility and access?
- How do alignment choices impact road, bike and pedestrian improvement projects that could serve Hillsdale?

Key findings:

- None of the alignments options overlap with regional or statewide freight routes.
- The Barbur Boulevard surface alignment would include design treatments that could improve road safety for all users on Barbur.
- The Hillsdale Loop alignment would include design treatments that could improve road safety for all users on Capitol Highway.
- The Tunnel alignment avoids interaction with traffic, and does not include opportunities to improve access or safety along Barbur or Capitol.

Motor vehicle and freight mobility

The Barbur alignment would pass through the intersection of Barbur & Terwilliger, a key vehicle capacity constraint on Barbur, necessitating a design that would mitigate impact on traffic operations, such as an exclusive transitway or grade separation. With the Hillsdale Loop alignment, the route through Hillsdale along Capitol Highway would require grade separation, envisioned as a cut-and-cover tunnel, to avoid traffic impacts in the Hillsdale town center. HCT in the Hillsdale Loop alignment would operate in-street on Capitol Highway east of the town center and along Bertha Boulevard south of the town center. With the cut-and-cover tunnel the effect on traffic would be limited. The Hillsdale Loop alignment would avoid the intersection of Barbur & Terwilliger. Barbur and Bertha are both designated Major Truck Streets by the City, while Capitol is designated a Truck Access Street. Freight stakeholders have expressed interested in avoiding overlap between HCT and freight routes. None of the alignment

options overlap with regional or statewide freight routes. Transit designs would be required to accommodate freight trucks including vertical and horizontal clearances for all alignment options.

Initial traffic analysis considered traffic operations on the Hillsdale alignments. The following table summarizes the intersections analyzed and the initial findings.

	Meets motor vehicle performance target?*	
	2035 No-Build	2035 Build
Barbur Blvd & 3rd Ave/2nd Ave	No	Yes
Terwilliger Blvd & Barbur Blvd	No	No
I-5 Ramps/Bertha Blvd & Barbur Blvd	Yes	Yes

* Within permitted margin of accuracy

Source: Final SW Corridor Traffic Analysis and Operations Memorandum, DKS, July 29, 2014

During the DEIS phase, more detailed traffic analysis will be performed including queuing analysis, and mitigation would be developed for intersections not expected to meet the 2035 motor vehicle performance target. This could include changes in lane configurations, traffic signals, or other mitigation options. If the Hillsdale Loop alignment is included in the DEIS, detailed traffic analysis of this route would be needed to determine traffic impacts.

Pedestrians and bicycles

The Barbur surface alignment and Hillsdale Loop alignment would both improve pedestrian and bicycle facilities along their respective routes. The Barbur route would directly address segments without sidewalks and bike lane gaps at the Newbury and Vermont structures. The Hillsdale Loop alignment would improve segments lacking sidewalks and bike lanes just east of the town center. The Tunnel alignment would not preclude these improvements in the future, but is not anticipated to implement them.

Safety

Use of the Barbur or Hillsdale Loop alignments would also bring opportunities to improve the roadway for safety of all modes of travel. Barbur is a designated high-crash corridor, and has been the location of six fatal crashes between South Portland and Burlingame (adjacent to Hillsdale) between 2007 and 2013. The segment of Capitol Highway in Hillsdale is the location of several high-severity crashes including one fatal crash between 2007 and 2013. Design treatments to address observed crash types and improve pedestrian and bicycle facilities could improve safety, with a particular opportunity on Barbur to address a high-crash location. The Tunnel alignment would not preclude improvements on Barbur or on Capitol in the future, but would not implement them as part of an HCT project.

Access

Presuming use of center-running transit for the in-street segments, the Barbur and Hillsdale Loop alignment options would both result in minor changes to motor vehicle access, where there are few destination and access points. Both options would likely involve elimination of some left-turn accesses, but changes to circulation patterns to continue to provide access would be evaluated.

Lane conversions

The only places in the corridor that are being considered for lane conversion are sections of roadways that currently appear to have excess capacity based on early traffic analysis. One of these locations is on Barbur Boulevard between Hamilton Street and Capitol Highway in "the woods." This segment of Barbur currently has three northbound travel lanes and two southbound travel lanes, so the project team is looking at the potential to convert one of the northbound travel lanes for LRT in order to reduce cost and minimize impacts to adjacent properties. If decisions are made to exclude lane conversions, designs can be modified to leave maintain existing lane configurations, with the tradeoff of more property impacts. For BRT, the project team is looking at running the BRT vehicles in mixed traffic in this segment of Barbur.

Previously, there was a Hillsdale loop surface alignment under consideration in addition to the Barbur alignment, Hillsdale cut-and-cover tunnel options, and the Marquam Hill-Hillsdale tunnel. However, the surface alignment through Hillsdale was removed from consideration in June 2014 because preliminary traffic analysis indicated the Capitol Highway main street required the full existing auto capacity, BRT would perform poorly in mixed traffic in the town center, and widening the street to add dedicated transit lanes would result in too many property impacts.

As the project progresses, further traffic analysis will look in detail at traffic flows at intersections as well as in the broader network to confirm whether lane conversions could work and whether additional mitigations might be needed to allow conversion, such as new turn lanes or signals. Additionally, more detailed consideration of the property impacts of different lane configurations will allow for a discussion about the trade-offs between minimizing impacts and maintaining existing auto capacity.

Cost Estimates

Key considerations:

- Are the trade-offs between cost of a project and other factors such as reliability, safety, access and community development opportunities clear?
- How does cost impact the length of the final high capacity transit alignment?

Key findings:

- BRT estimates range from $750M to $1.2B.
- LRT estimates that include a cut-and-cover tunnel in Hillsdale and PCC Sylvania range from $1.9B to $2.4B. This does not include the cost of a Marquam Hill-Hillsdale bored Tunnel.
- A Marquam Hill-Hillsdale bored Tunnel would add an estimated $900M to $1.0B to the cost of an LRT project.

Current cost estimates for corridor HCT alignments are based on conceptual designs. Estimates will continue to be refined during the DEIS process as options are narrowed and designs progress, but are useful now in understanding the relative differences between current options. **All figures are in year 2014 dollars, and exclude escalation and finance costs.** Cost estimates are not yet complete for all modes, options, and segments; estimates will be updated and reported as the project progresses.

Corridor-wide costs

Current estimates for a BRT alignment from downtown Portland to Tualatin range from $750M to $1.2B. The range reflects options for cut-and-cover tunneling and for infrastructure improvements to allow BRT to operate in dedicated transit lanes.

Costs for an LRT alignment extending from downtown Portland to Tualatin would range from $1.9B to $2.4B. The range is inclusive of surface and shallow cut-and-cover tunnel options in Hillsdale and at PCC but excludes the deep-bored tunnel option under Marquam Hill. The region's funding capacity will impact the final inclusion of expensive HCT alignment choices that provide direct service to important destinations versus serving more communities to the south.

Hillsdale area costs

BRT or LRT running south from downtown Portland could follow Barbur to the Custer and 13th intersection, or could loop up through Hillsdale via Capitol Highway returning on Bertha to Barbur at Custer and 13th. BRT staying on Barbur in this segment is estimated at $61M. This estimate assumes that BRT operates in mixed traffic through the "woods", and replacement of the Vermont and Newbury viaducts is not assumed, but does include new pedestrian and bicycle facilities on separate structures parallel to the viaducts. An option for BRT that routes through the Hillsdale town center would include a structure beginning on Barbur and elevates the guideway to pass over Barbur and meet grade at Terwilliger. BRT would operate through a cut-and-cover tunnel under Capitol Highway between Sunset and through the Hillsdale Town Center. Costs are under development for the Hillsdale Loop option for BRT.

LRT costs have not yet been estimated for the Hillsdale Loop alignment option, but are currently under development. Major cost considerations for the Barbur alignment for LRT include replacement of the existing Vermont and Newbury Viaducts with new structures for autos, transit, pedestrians and cyclists. Similar to BRT, the LRT Hillsdale Loop alignment would include a structure beginning on Barbur and elevating the guideway to pass over Barbur and meet grade at Terwilliger. Short of the Hillsdale town center, the LRT option would enter a portal and slip underground passing south of the town center under existing playfields, reemerging near Vermont at Bertha. The option would also require an elevated station above Custer before continuing south in a center running condition in Barbur.

Engineering complexity and risk

Key considerations:

- Are the benefits and risks associated with construction of deep-bored or cut-and-cover tunnels clear?
- What aspects of each alignment option present noteworthy risk?

Key findings:

- The primary risks of an alignment on Barbur Boulevard would be balancing traffic operations with right-of-way impacts to adjacent properties, and the complex engineering required to build retaining walls on steep slopes.
- The primary risks of a Hillsdale Loop alignment are balancing traffic operations with right-of-way impacts to adjacent properties, the complex engineering required to build retaining walls on steep slopes, and the risks inherent to tunneling.
- A Marquam Hill-Hillsdale bored Tunnel has the highest level of engineering complexity and risk of the three proposed alignments.

Complexity and risk analysis in the Hillsdale segment focuses on differences between LRT operating through a tunnel under Marquam Hill and Hillsdale, LRT or BRT routed on the surface of Barbur Boulevard, and LRT or BRT options which connect through Hillsdale via Capitol and Bertha. While the Southwest Corridor steering committee decided in July 2014 that either LRT or BRT would utilize a cut-and-cover tunnel through the Hillsdale town center area, the risk analysis assessed LRT in the tunnel, but BRT operating in mixed traffic through the town center with on-street stations. Complexity and Risk Analysis comparisons of these options are at this time a mix of quantitative and qualitative factors. Additional analysis will be developed in the coming months to further define geotechnical/structural complexity and risk for tunnels, as well as to identify the potential for impacts to major utilities.

Marquam Hill-Hillsdale Tunnel

Of the options under consideration, the deep-bored tunnel under Marquam Hill has the highest level of complexity and risk. Tunnels are inherently risky given the potential for unexpected subsurface complications to be encountered and overcome. The West Hills, formed by basalt flows, are geologically complex including numerous faults, resulting in a high degree of risk. Many tunnels constructed for transportation worldwide exceed their estimated costs by substantial amounts. For example, the Robertson Tunnel, which provides transit access to the Oregon Zoo, ultimately cost 80 percent more than the original construction bid due to unforeseen complications and related schedule delays. The deep bored roadway tunnel project in Seattle has had a one year delay due to problems with the tunnel boring machine.

In the case of a bored tunnel particular consideration must be given to the impacts to the portal areas near Hooker Street and near the intersection of Barbur and Bertha Boulevards. These include the large footprint required for the mining operation staging areas, access to these locations for heavy equipment and trucks, complex sequencing of work and materials delivery as well as materials to be hauled off. A

considerable amount of construction traffic would be generated for hauling off excavated soil and rock. This would add complexity to the transportation system surrounding the site and the need to mitigate impacts along the haul route, which would likely include phasing reconstruction of roadways damaged by very heavy trucks continually travelling through. In addition, the northern portal's proximity to Duniway Park could have Section 4(f) implications and the southern portal's proximity to a busy commercial area in Burlingame would be likely to impact businesses.

A technical tunneling memo expected in May 2015 will more fully describe these geotechnical issues associated with tunnel construction.

Barbur

The LRT in this segment would operate in continuous dedicated guideway and, as a result, would have greater levels of risk due to the need for large retaining walls to accommodate the necessary widening of roadways and possible geotechnical complications. Due to the added weight of the LRT system, both viaduct structures on Barbur would need to be replaced, or instead new combined LRT/Pedestrian and Bicycle structures would be necessary parallel to the existing viaducts which would continue to be used for auto traffic. This choice includes some risk and complexity related to the potential for phased replacement of the existing viaducts or construction of new structures nearby, in addition to the challenges of maintaining traffic movements though the construction zone. The viaduct replacement option would be a more complicated construction effort with a higher cost and level of risk.

This segment of Barbur has known geotechnical factors, which could complicate widening Barbur for HCT north of the viaducts. Widening would be necessary to provide an exclusive operating guideway for HCT while maintaining existing lanes for vehicular traffic. These would require large retaining walls along the hillside. The topography would also complicate the construction of new parallel pedestrian and bicycle structures. Much of this segment has relatively free-flowing traffic, even during peak periods, which would allow the BRT vehicle to not be delayed much when in mixed traffic. Widening between Miles and Terwilliger could be necessary to accommodate a southbound dedicated lane to reduce congestion that queues back to Miles Place during peak periods. If this is necessary, there is the potential for adjacent property impacts and an impact at Fulton Park.

Hillsdale Loop with cut-and-cover tunnel

With either mode, the Hillsdale Loop alignment would require a new structure on Capitol Highway to address the steep slope between Barbur Boulevard and Terwilliger Boulevard and to transition the center running HCT to and from Capitol Highway. This structure would begin on Barbur and would slope up above Barbur and cross over the lanes below into Capitol Highway. The topography and potential complexity with large retaining walls on the steep slope would involve considerable engineering complexity and risk.

The cut-and-cover tunnel, like the bored Tunnel described earlier, 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 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 Bertha where the portal and tunnel transition to roadway.

Community impacts

Key considerations:

- Can the benefits and burdens of a high capacity transit alignment be equally distributed among all population groups in the corridor?
- Do surface or tunnel alignments offer the greatest access to key places such as education, employment, health care and retail centers?

Key findings:

- Based on spatial analysis of demographic maps, there is no significant difference in how each alignment option runs through areas of non-white or non-English speaking populations.
- Based on spatial analysis of demographic maps, there are slight differences in how each alignment option runs through areas of low-income and senior populations.
- Subsequent analysis and conversations with residents, employees and visitors to the corridor will further detail the potential for unequal distribution of benefits and burdens of high capacity transit construction and service.

Demographic maps for non-white, non-English speaking, low-income and senior populations were overlaid with maps of the proposed HCT alignments (see Appendix D). Subsequent discussions with residents, employees and visitors to these areas will help us to further understand how different racial, ethnic and language groups may be impacted by the proposed alignments.

Non-white and non-English speaking populations

Based on spatial analysis of the maps, none of the alignment options runs through areas with more than average non-white populations; however, disaggregation by ethnicity shows that a Marquam Hill tunnel alignment would pass under one area of higher than average concentration of Asian population south of Marquam Hill. Each alignment runs primarily through areas with very low percentages of non-English-speaking populations, with one exception of a higher than average parcel of non-English speaking population west of Marquam Hill.

Low-income and senior populations

Based on spatial analysis of the maps, the Barbur Boulevard and Naito Parkway alignments run primarily through areas with higher than average low-income populations; the Marquam Hill alignment runs under a portion of higher than average low-income population and also under below average areas. Each of the three alignment choices run through areas with significantly higher than average populations of seniors 65 years and older. The Hillsdale Loop option runs through areas with somewhat higher than average populations of seniors.

Access to services

Improvements to the transportation systems throughout the Southwest Corridor aim to improve access to important community services such as education, health care, retail and employment centers for all residents.

Education centers identified in the Hillsdale study area include Oregon Health Sciences University Marquam Hill campus, Wilson High School, Rieke and Hayhurst Elementary schools and Hillsdale public library. A Marquam Hill-Hillsdale tunnel would provide the most direct service to Oregon Health Sciences University Marquam Hill campus via an underground elevator, but would provide limited access improvements to K-12 schools. K-1 schools could be served directly by a Hillsdale Loop option, or from a station 2/3 mile away on a Barbur alignment. Rieke Elementary could potentially be impacted during construction of a Hillsdale Loop alignment but would benefit from long term improvements to the site.

Health care services identified in the Hillsdale study area OHSU Oregon Health Sciences University Marquam Hill campus and the VA Medical Center. A Marquam Hill-Hillsdale tunnel would provide the most direct service to Marquam Hill via an underground elevator. With a Barbur Boulevard alignment, riders could access Marquam Hill via local transit, bicycle and pedestrian connections.

Key retail and employment centers in Hillsdale include the town center along Capitol Highway and areas along Barbur Boulevard south of Terwilliger. The Hillsdale town center would be most directly served by HCT with a Marquam Hill-Hillsdale tunnel or Hillsdale Loop tunnel. One of the Hillsdale Loop alignment options would result in major impacts to retail and employment along Capitol Highway during cut-and-cover tunnel construction. For HCT riders coming from north or south on the alignment, the additional 2.8 minutes of travel time for a Hillsdale Loop alignment would increase the travel time needed to access retail and employment centers north and south of Hillsdale.

Property impacts

The options under consideration all have varying levels of impact to adjacent private properties. In many cases, property impacts are limited to only a narrow strip of area needed to widen the roadway and sidewalks. In other cases, temporary construction easements may be all that is needed to allow for construction of new roadway and sidewalks. In extreme cases, large or complete acquisitions may be necessary when impacts to buildings or other major infrastructure are unavoidable. The project team is currently quantifying the areas of potential impact on each of the options and will be presenting the level of impact of the various options relative to one another once the data is assembled. In areas where converting an auto travel lane to a transit lane is under consideration, property impacts will be evaluated for scenarios both with and without the lane conversion in order to facilitate discussion about the trade-offs of minimizing impacts and maintaining auto capacity.

Next steps

This Key Issues Memo formally introduces to decision-makers and the public information relevant to a decision on high capacity transit alignments in South Portland. Between March and July 2015, project staff will present information on Hillsdale and other Southwest Corridor Plan issues and invite public comment at numerous public meetings, including a Community Planning Forum and a Community Technical workshop. An updated calendar can be found on our website:

http://www.oregonmetro.gov/public-projects/southwest-corridor-plan

May 2015: staff will produce a technical evaluation report that will include assessments of options accessing South Portland, Hillsdale and Portland Community College, followed by staff recommendations to the steering committee.

July 13, 2015: the steering committee will be asked to consider making decisions on what options in these three areas should continue to be studied in a Draft Environmental Impact Study.

December 2015: the steering committee will be asked to consider making a recommendation on the mode, terminus and remaining HCT alignments to be studied further in a DEIS, along with an implementation strategy for the corridor connection projects defined in the Shared Investment Strategy.

Appendices

Appendix A: Anticipated major project documents and estimated dates of completion
Appendix B: Shared Investment Strategy roadway and active transportation projects
Appendix C: Corridor-wide mode considerations
Appendix D: Demographic map

Appendix A: Anticipated major project documents and estimated dates of completion

July Steering Committee decision: direct vs. indirect service to Marquam Hill, Hillsdale and PCC Sylvania

- Key Issue Memos:
    - South Portland – March
    - Hillsdale – March
    - PCC Sylvania – May
- Draft Evaluation Report – May
- Evaluation Report and Recommendation – June
- Supplementary documents:
    - Tunnel fact sheet – March
    - Modeling report – May
    - Cost estimate report – May
    - Tunnel technical memo – May

December Steering Committee decision: remaining HCT alignments, mode, and terminus and SIS funding strategy

- Key Issue Memos:
    - Tigard – May
    - Tigard to Bridgeport Village – September
    - Bridgeport Village to Tualatin – September
    - Barbur / Adjacent to I-5 – October
    - HCT mode – October
    - HCT terminus – October
- Draft Evaluation Report – October
- Evaluation Report and Recommendation – November
- Supplementary documents:
    - Modeling report – October
    - Cost estimate report – October
    - Traffic report - October
- Funding strategy for Shared Investment Strategy roadway, bike and pedestrian projects – December

Appendix B: Shared Investment Strategy roadway and active transportation projects

The information in this appendix will be further developed and presented as a stand-alone document.

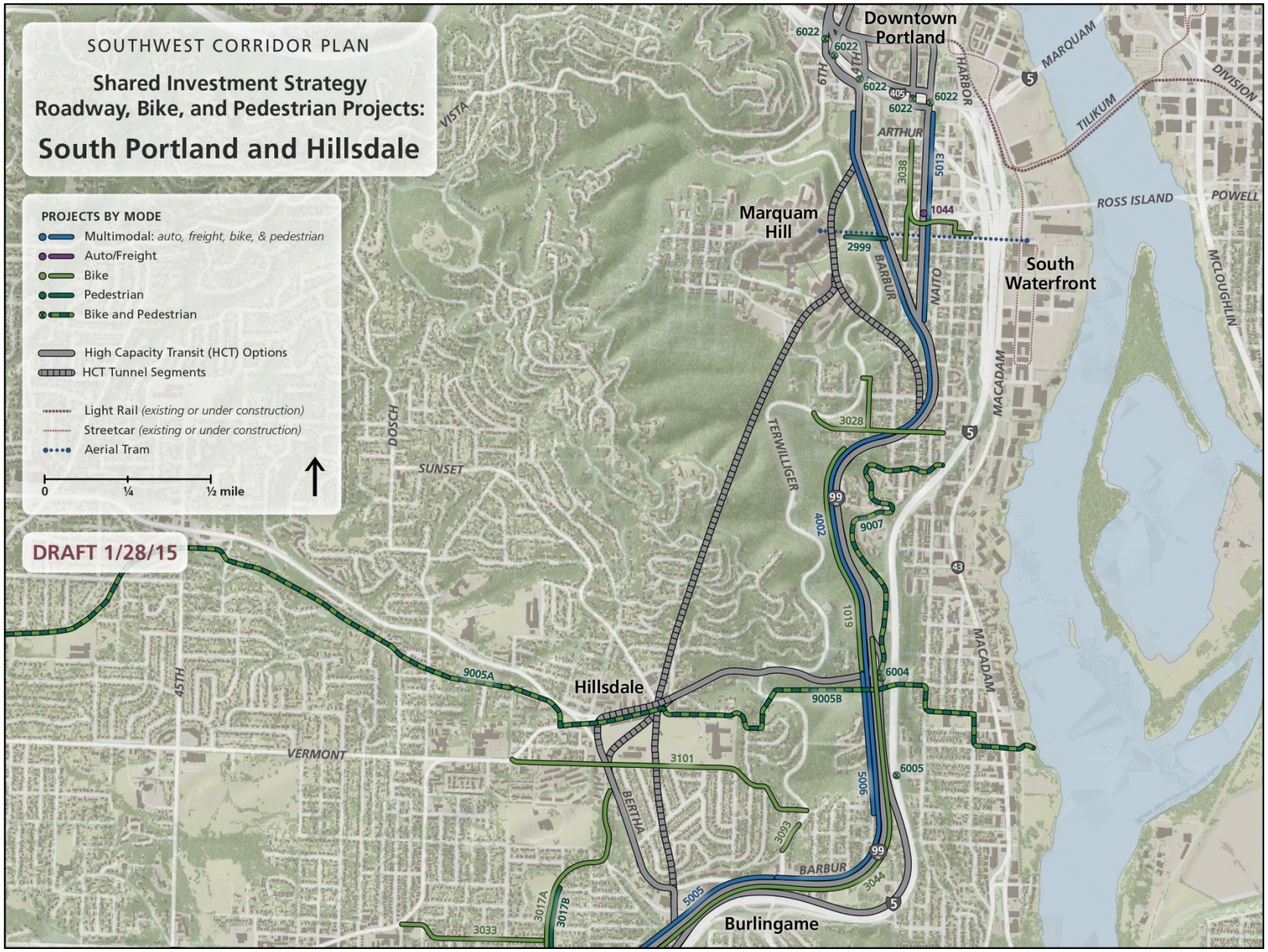
The Shared Investment Strategy (SIS) Roadway and Active Transportation Project List includes projects that improve access to both key places in the corridor and to the high capacity transit (HCT) alignments currently under consideration:

- ***HCT-aligned projects*** are roadway, bikeway and pedestrian projects that were initially identified in the SIS in July 2013, and then were further refined in July 2014 as the HCT alignments were narrowed. These projects either run along the HCT alignment (and would be incorporated into HCT designs and cost estimates) or improve access to station areas.
- ***Corridor Connections*** are roadway, bikeway and pedestrian projects that improve connectivity and mobility across the corridor, beyond the immediate geographic area of a potential HCT line. These were identified in the SIS in July 2013 as critical for the support of land use goals in essential and priority places.

Some of the projects identified as HCT-supportive are also critical land use supportive projects, and will remain on the SIS Roadway and Active Transportation Project List as Corridor Connections projects if their associated HCT station or alignments are removed from consideration. Other HCT-supportive projects that do not support key land uses will be removed from the SIS project list as their associated HCT alignments or stations are removed from consideration.

For all projects on the SIS Roadway and Active Transportation Project List, potential funding sources will be identified. For HCT-supportive projects, one potential funding approach will be as part of the HCT package, but other potential funding sources will be identified for each project to support their implementation whether as part of a transit project or as a standalone project. Some of the projects will require traffic analysis and evaluation of other impacts prior to project partner support for implementation.

The following map and list show both the HCT-supportive and corridor connections projects in the South Portland and Hillsdale areas.


SOUTHWEST CORRIDOR PLAN
Shared Investment Strategy
Roadway, Bike, and Pedestrian Projects:
South Portland and Hillsdale
PROJECTS BY MODE
Multimodal: auto, freight, bike, & pedestrian
Auto/Freight
Bike
Pedestrian
Bike and Pedestrian
High Capacity Transit (HCT) Options
HCT Tunnel Segments
Light Rail (existing or under construction)
Streetcar (existing or under construction)
Aerial Tram
0
¼
½ mile
DRAFT 1/28/15
Downtown Portland
Marquam Hill
South Waterfront
Hillsdale
Burlingame
MARQUAM
DIVISION
TILIKUM
ROSS ISLAND
POWELL
MCLOUGHLIN
HARBOR
ARTHUR
BARBUR
NAITO
MACADAM
TERWILLIGER
BERTHA
VERMONT
SUNSET
DOSCH
VISTA
45TH
6TH
6022
405
5013
3038
1044
2999
3028
4002
9007
1019
6004
9005A
9005B
3101
5006
6005
3093
3044
5005
3017A
3017B
3033
5
99
43

Project # Location/ Ownership	**Title** Description	**Cost**	**Primary Mode**	**Primary Project Type**	**Time-frame**	**Potential Funding Sources**	**Notes**
1019 Portland ODOT	**Barbur Lane Diet - Capitol to Hamilton (reduce northbound lanes from three to two with multimodal improvements)** Reduce number of northbound lanes from three to two from Capitol Hwy (north) to 1/4 mile south of Hamilton to reduce speeds and improve safety, improve ped/bike crossing safety and add protected bike lanes	¢	Bicycle	Corridor Connections			
1044 Portland ODOT	**South Portland Circulation and Connectivity (Ross Island Bridge ramp connections)** Adds a new ramp connection between I-405 and the Ross Island Bridge from Kelly Avenue. Restore at-grade intersections along Naito Parkway, with new signalized intersections at Ross Island Bridge access and at Hooker Street. Removes several existing roadways and ramp connections.	$$$$	Multimodal	HCT Supportive		HCT Package	With HCT on Naito Parkway: Include
2999 Portland	**Pedestrian connection from Barbur to Terwilliger at Gibbs** Construct a new pedestrian walkway under the tram within the Gibbs right-of-way through the Terwilliger Parkway. The steep grade and forested area will require lighting and stairs.	$	Pedestrian	HCT Supportive		HCT Package	With HCT station at Barbur/Naito & Gibbs: Include
3028 Portland	**Inner Hamilton bikeway -from SW Terwilliger Blvd to SW Corbett Ave.** Enhanced shared roadway. Includes connection to Terwilliger on SW Hamilton Terrace	¢	Bicycle	HCT Supportive		HCT Package	With HCT station at Barbur & Hamilton: Include

Multimodal | Auto/Freight | Bicycle | Pedestrian | Bike/Ped

Cost: ¢ - up to $500,000; $ - up to $5 M; $$ - up to $10 M; $$$ - up to $20 M; $$$$ - More than $20 M

Project # Location/ Ownership	**Title** Description	**Cost**	**Primary Mode**	**Primary Project Type**	**Time-frame**	**Potential Funding Sources**	**Notes**
3038 Portland	**Lower SW 1st bikeway -from SW Barbur Blvd to SW Arthur St.** Multiple bicycle facility types: separated in-roadway (Corbett: Gibbs - Grover); bicycle boulevard (all other segments). Includes connection to SW Kelly Ave on SW Grover St and SW Corbett Ave	¢	Bicycle	HCT Supportive		HCT Package	With HCT station at Barbur/Naito & Gibbs: Include
3044 Portland ODOT	**Middle Barbur bikeway -from SW 23rd Ave to SW Capitol Hwy-Barbur Blvd Ramp.** Separated bicycle route in-roadway. Listed as a Regional Bicycle Parkway in the Regional Active Transportation Plan (5/9/13).	$	Bicycle	HCT Supportive		HCT Package	With HCT adjacent to I-5: Include within 1/2 mile of stations With HCT on Barbur: Include
3093A Portland	**Terwilliger bikeway gaps** Separated bicycle route in-roadway. Eliminate key gaps in the Terwilliger Blvd bikeway	¢	Bicycle	HCT Supportive		HCT Package	With HCT station at Barbur & Terwilliger: Include lower section near Barbur (50%)
3101 Portland	**Vermont-Chestnut bikeway -from SW Capitol Hwy to SW Terwilliger Blvd.** Bicycle boulevard	¢	Bicycle	HCT Supportive		HCT Package	With HCT station at Barbur & Terwilliger: Include Include with HCT station at 13th instead of Terwilliger?
4002 Portland ODOT	**Barbur Blvd, SW (3rd - Terwilliger): Multimodal Improvements** Construct Improvements for transit, bikes and pedestrians. Transit improvements include preferential signals, pullouts, shelters, left turn lanes, sidewalks, and crossing improvements.	$$	Multimodal	HCT Supportive		HCT Package	With HCT on Barbur Boulevard: Include

Project # Location/ Ownership	**Title** Description	**Cost**	**Primary Mode**	**Primary Project Type**	**Time-frame**	**Potential Funding Sources**	**Notes**
5005 Portland ODOT	**Barbur Blvd, SW (Terwilliger - City Limits): Multimodal Improvements** Complete boulevard design improvements including sidewalks and street trees, safe pedestrian crossings, enhance transit access and stop locations, and bike lanes (Terwilliger - SW 64th or Portland City Limits).	$$$$	Multimodal	HCT Supportive		HCT Package	With HCT adjacent to I-5: Include within 1/2 mile of stations (20%) With HCT on Barbur Boulevard: Include
5006 Portland ODOT	**Barbur Lane Diet: Miles to Capitol** Reduce number of northbound travel lanes on Barbur from Miles to Capitol Highway (north) from two to one to reduce speed and improve safety. Adds bike lanes over Newberry and Vermont bridges.	¢	Bicycle	Corridor Connections			
5013 Portland ODOT	**Naito/South Portland Improvements (left turn pockets with bike/ped and remove tunnel, ramps and viaduct)** Reconstruct Naito Pkwy as two-lane road w/bike lanes, sidewalks, left turn pockets, & on-street parking. Remove grade separation along Naito at Barbur Blvd. (tunnel), the Ross Island Bridge, Arthur/Kelly (viaduct), and the Grover pedestrian bridge.	$$$$	Multimodal	HCT Supportive		HCT Package	With HCT station at Barbur & Gibbs: Include signalized pedestrian crossing(s) of Naito near station (1%) With Naito alignment: Include
6004 Portland ODOT	**Newbury viaduct bicycle and pedestrian facilities** Construct new bicycle and pedestrian facilities at/parallel to Newbury St. viaduct	$	Bike/Ped	Corridor Connections			

Project # Location/ Ownership	**Title** Description	**Cost**	**Primary Mode**	**Primary Project Type**	**Time-frame**	**Potential Funding Sources**	**Notes**
6005 Portland ODOT	**Vermont viaduct bicycle and pedestrian facilities** Construct new bicycle and pedestrian facilities at/parallel to Vermont St. viaduct	$$	Bike/Ped	Corridor Connections			
6022 Portland ODOT	**I-405 Bike/Ped Crossing Improvements** Improve opportunities for bicycles and pedestrians to cross over/under I-405 on Harbor Drive, Naito Parkway, 1st, 4th, 5th, 6th and Broadway.	$	Bike/Ped	HCT Supportive		HCT Package	Consider opportunity to address with HCT crossing of I-405
9005A Portland	**Red Electric Trail: Fanno Creek Trail to Willamette Park - Hillsdale to Shattuk** Provide east-west route for pedestrians and cyclists in SW Portland that connects and extends the existing Fanno Creek Greenway Trail to Willamette Park. Listed as a Regional Bicycle Parkway and Regional Pedestrian Parkway in the Regional Active Transportation Plan (5/9/13).	$	Bike/Ped	HCT Supportive		HCT Package	With HCT station in Hillsdale: Include
9005B Portland	**Red Electric Trail: Fanno Creek Trail to Willamette Park - to Hillsdale** Provide east-west route for pedestrians and cyclists in SW Portland that connects and extends the existing Fanno Creek Greenway Trail to Willamette Park. Listed as a Regional Bicycle Parkway and Regional Pedestrian Parkway in the Regional Active Transportation Plan (5/9/13).	$$$	Bike/Ped	Corridor Connections			

Project # Location/ Ownership	**Title** Description	**Cost**	**Primary Mode**	**Primary Project Type**	**Time-frame**	**Potential Funding Sources**	**Notes**
9007 Portland	**Slavin Road to Red Electric Trail: Barbur to Corbett** Build Multi use trail on Slavin Road from Barbur to Corbett. The Red Electric Trail is listed as a Regional Bicycle Parkway and Regional Pedestrian Parkway in the Regional Active Transportation Plan (5/9/13).	$	Bike/Ped	Corridor Connections			

HCT-supportive projects in Hillsdale

The HCT-supportive projects in the Hillsdale area would focus on improving bike and pedestrian access to the Hillsdale HCT station and along the Barbur Boulevard alignment.

The Hillsdale HCT alignment options would have implications for the HCT-supportive projects in South Portland because the Marquam Hill-Hillsdale tunnel spans both the South Portland and Hillsdale areas. With the Marquam Hill-Hillsdale tunnel, bike and pedestrian improvements in South Portland on 1st Avenue and Hamilton, a new pedestrian connection between Barbur and Terwilliger, and Naito/Ross Island Bridgehead multimodal improvements would not be included with HCT.

		% of project included with each HCT alignment option				
#	**Title**	**Barbur LRT**	**Barbur BRT**	**Hillsdale Tunnel LRT**	**Hillsdale Tunnel BRT**	**Marquam Hill-Hillsdale tunnel LRT**
1044	South Portland Circulation and Connectivity	0 to 100	0 to 100	0 to 100	0 to 100	0
2999	Pedestrian connection from Barbur to Terwilliger	100	100	100	100	0
3028	Inner Hamilton bikeway	100	100	100	100	0
3038	Lower SW 1st bikeway	100	100	100	100	0
3093A	Terwilliger bikeway gaps	50	50	50	50	50
4002	Barbur Blvd Multimodal Improvements	100	100	30	30	5
5013	Naito/South Portland Improvements	1 to 100	1 to 100	1 to 100	1 to 100	0
9005A	Red Electric Trail: Hillsdale to Shattuck	0	0	100	100	100

0	not included with HCT alignment
% to %	potentially included with HCT alignment, depending on options in other areas
%	1 to 33% of project included with HCT alignment
%	34 to 66% of project included with HCT alignment
%	67 to 100% of project included with HCT alignment

Corridor Connections projects in Hillsdale

The Shared Investment Strategy includes several additional bike and pedestrian projects in the Hillsdale and Burlingame area that would not be directly linked to the HCT alignments, including two different approaches to improving bike and pedestrian safety along Barbur Boulevard.

The first approach, used by projects 1019 and 5006, would remove one northbound vehicle lane on Barbur Boulevard to improve safety by reducing traffic speeds and adding protected bike lanes. The other approach, used by projects 6004 and 6005, is to add bike and pedestrian facilities parallel to the Newbury and Vermont viaducts on Barbur Boulevard, which currently have no bike lanes and a narrow sidewalk. The lane reductions would cost less than the parallel structures while providing enhanced bicycle and pedestrian facilities along a longer stretch of Barbur.

In addition to the Barbur improvements, the Corridor Connections list includes the portion of the Red Electric Trail that would not be included with an HCT station at Hillsdale and the Slavin Road multi-use trail that connects the Red Electric Trail to South Portland.

Appendix C: Corridor-wide mode considerations

The information in this appendix will be further developed and presented as a stand-alone document.

Two high capacity transit (HCT) modes are under consideration for the corridor:

- Light rail transit (LRT)
- Bus rapid transit (BRT)

Bus Rapid Transit description

There are currently four operating LRT (or MAX) lines and one under construction in the Portland area. In 2014, BRT was selected as the preferred mode for the under-development Powell-Division Transit Development Project, but to date BRT does not operate in the region. Typically, BRT is differentiated from standard bus service by several characteristics:

- Fifty percent or more of the alignment operate in dedicated transitway lanes to increase speed and reliability.
- Portions of the alignment may have queue bypass lanes, signal priority, or other design elements to speed travel.
- vehicles are larger capacity and have multiple doors for entry and exit.
- Fare payment is made off-board to reduce dwell times.
- Stations are similar to LRT or streetcar stations, and are spaced further apart than local service bus stops for faster service.

Capital costs

Depending on the percentage of dedicated transitway for a BRT alternative, capital costs to construct physical infrastructure are more expensive for LRT, which operates in fully dedicated transitway, in large part due to right-of-way acquisition of property required for construction. It is important that BRT planning consider the risks of "watering down" a project by deciding to operate BRT in congested roadways to avoid high capital costs or engineering complexity. This can diminish the effectiveness of BRT service as the most difficult places to attain exclusive right of way are often the places it is most needed.

Capital costs are a one-time cost shared by many partners including the federal government, which usually contributes 50% of a project's capital cost, as well as state and local governments, municipal planning organizations, transit agencies, and other private partners.

Operating and maintenance costs

The vehicle operator accounts for the largest share of operating costs regardless of mode. Since an LRT vehicle has greater capacity compared to a BRT vehicle (266 versus approximately 86), fewer LRT vehicles are required to carry an equivalent passenger load, making LRT less expensive to operate than BRT. SW Corridor model runs indicate that in the year 2035 the 7.5 minutes assumed peak headway

(number of minutes between vehicle arrivals) for LRT is sufficient to accommodate peak-hour, peak-direction demand. For BRT, however, the peak frequencies would need to be increased to 3 minute headways to accommodate demand. This would result in higher operating costs for BRT for the lifetime of the service. On-going operating and maintenance costs are largely locally funded.

Speed, service and ridership

LRT attracts more riders than BRT. Because LRT always operates in exclusive transit lanes and because it is more likely to be granted signal priority at intersections, light rail is faster and more reliable than BRT. Stated preference surveys also show that LRT attracts more discretionary riders than BRT, due to speed advantages but also to better perceived ride quality compared to BRT.

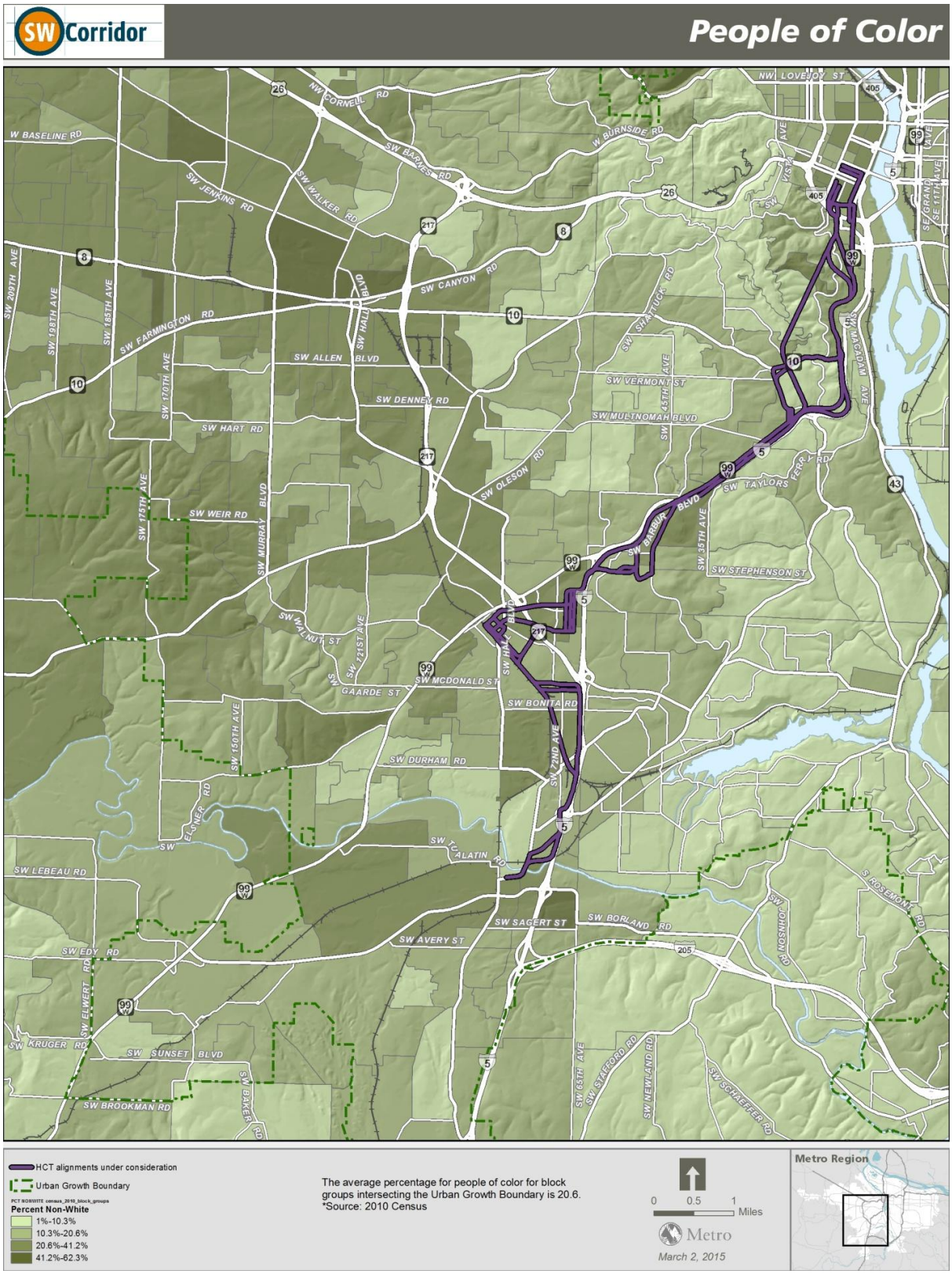
Models indicate that in 2035 the demand for HCT in the Southwest Corridor would require 20 BRT vehicles per hour in the peak, while LRT is assumed to operate with eight vehicles per hour in the peak with enough capacity still available to accommodate ridership growth beyond 2035. For BRT, growth above the projected 2035 demand would require yet more increases in service.

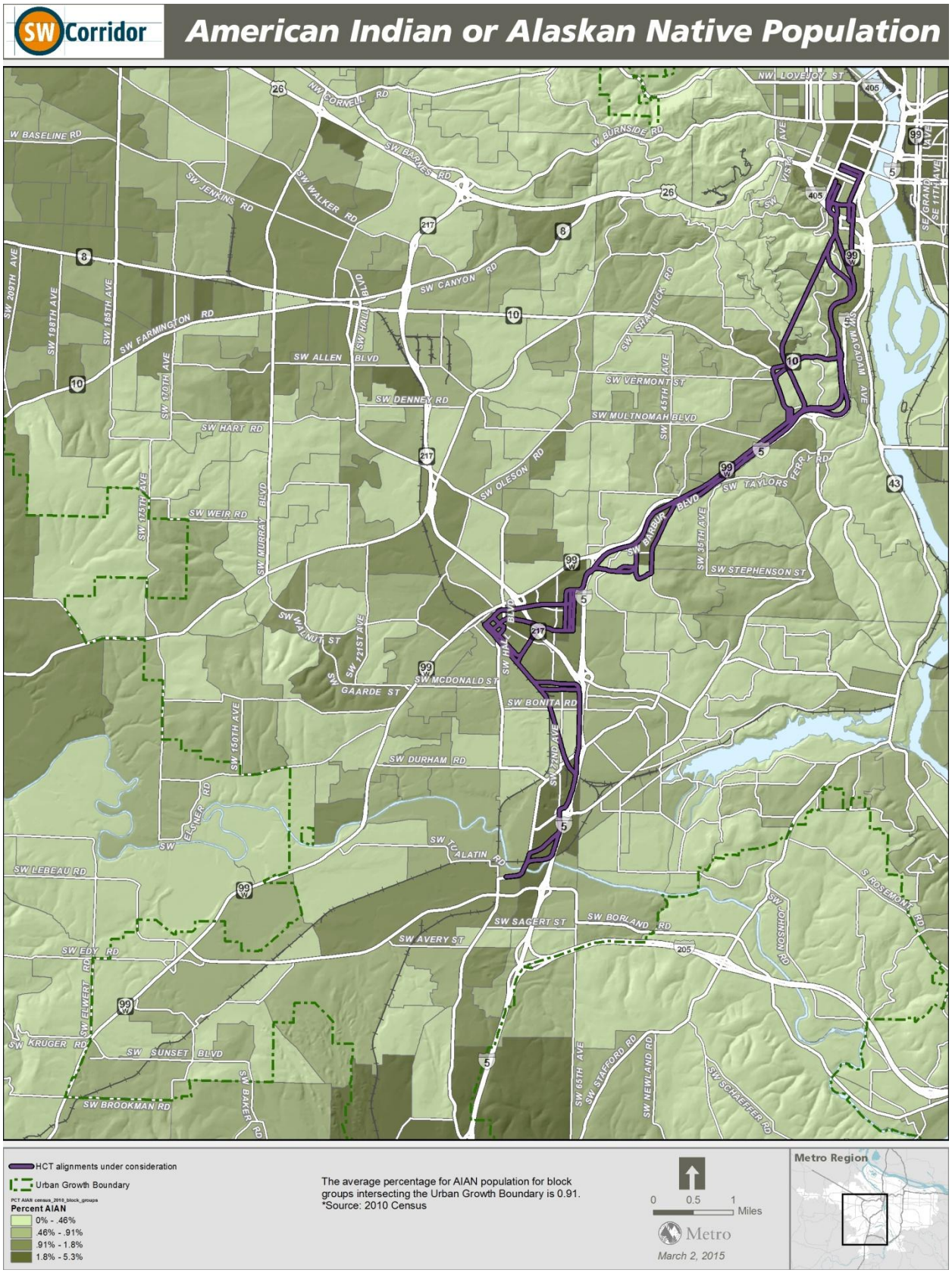
HCT service provides travel time advantages over local buses because of exclusive right of way but also because of longer distances between stations and signal priority at intersections. The high number of hourly vehicles required for BRT can be expected to diminish some of the travel time benefit from signal priority. The more frequently HCT vehicles pass through an intersection, the less likely signal priority can be given to the transit vehicles over autos. When the frequency of signal priority requests interferes with auto movement, priority for HCT vehicles is limited. It's expected that traffic would be largely unaffected by the eight LRT vehicles per hour assumed in the peak in 2035; however, the frequency required for BRT would likely prohibit full priority.

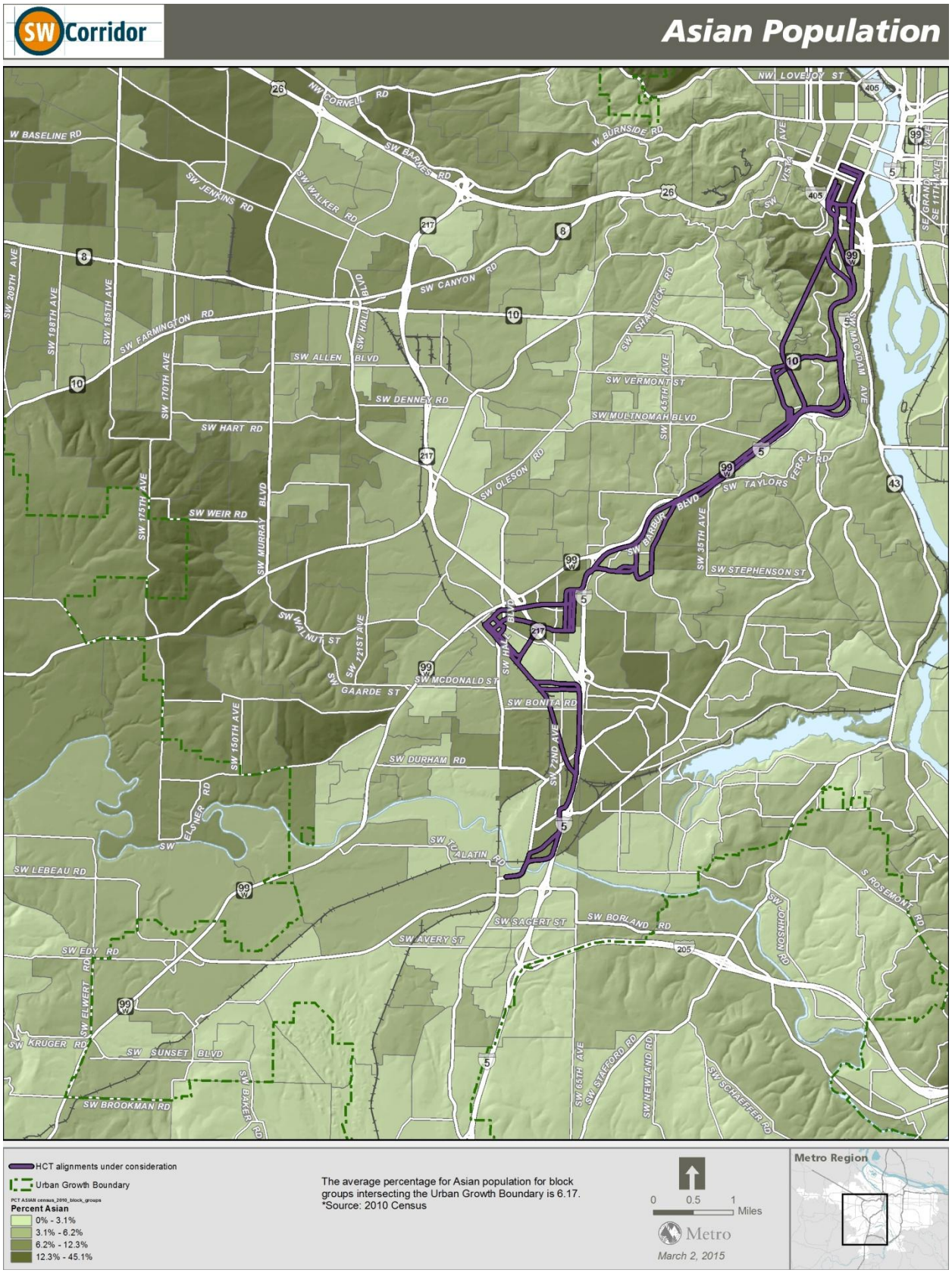
Development

Both BRT and LRT would leverage private development investment at station areas. Available research assessing the difference in scale of development by mode is inconsistent and contradictory. Staff will address development by mode over the course of the next year.

Appendix D: Demographic maps




SW Corridor
American Indian or Alaskan Native Population
HCT alignments under consideration
Urban Growth Boundary
PCT AIAN census_2010_block_groups
Percent AIAN
0% - .46%
.46% - .91%
.91% - 1.8%
1.8% - 5.3%
The average percentage for AIAN population for block groups intersecting the Urban Growth Boundary is 0.91.
*Source: 2010 Census
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region


SW Corridor
Asian Population
HCT alignments under consideration
Urban Growth Boundary
PCT ASIAN census_2010_block_groups
Percent Asian
0% - 3.1%
3.1% - 6.2%
6.2% - 12.3%
12.3% - 45.1%
The average percentage for Asian population for block groups intersecting the Urban Growth Boundary is 6.17.
*Source: 2010 Census
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region
W BASELINE RD
NW CORNELL RD
SW BARNES RD
W BURNSIDE RD
NW LOVEJOY ST
SW JENKINS RD
SW WALKER RD
SW CANYON RD
SW FARMINGTON RD
SW ALLEN BLVD
SW DENNEY RD
SW HART RD
SW WEIR RD
SW MURRAY BLVD
SW HALL BLVD
SW OLESON RD
SW VERMONT ST
SW MULTNOMAH BLVD
SW MACADAM AVE
SW TAYLORS FERRY RD
SW BARBUR BLVD
SW STEPHENSON ST
SW 35TH AVE
SW WALNUT ST
SW 121ST AVE
SW GAARDE ST
SW MCDONALD ST
SW BONITA RD
SW 72ND AVE
SW DURHAM RD
SW TUALATIN RD
SW LEBEAU RD
SW ELSNER RD
SW SAGERT ST
SW AVERY ST
SW BORLAND RD
S ROSEMONT RD
SW EDY RD
SW ELWERT RD
SW KRUGER RD
SW SUNSET BLVD
SW BROOKMAN RD
SW BAKER RD
SW 65TH AVE
SW STAFFORD RD
SW NEWLAND RD
SW SCHAEFFER RD
SW 209TH AVE
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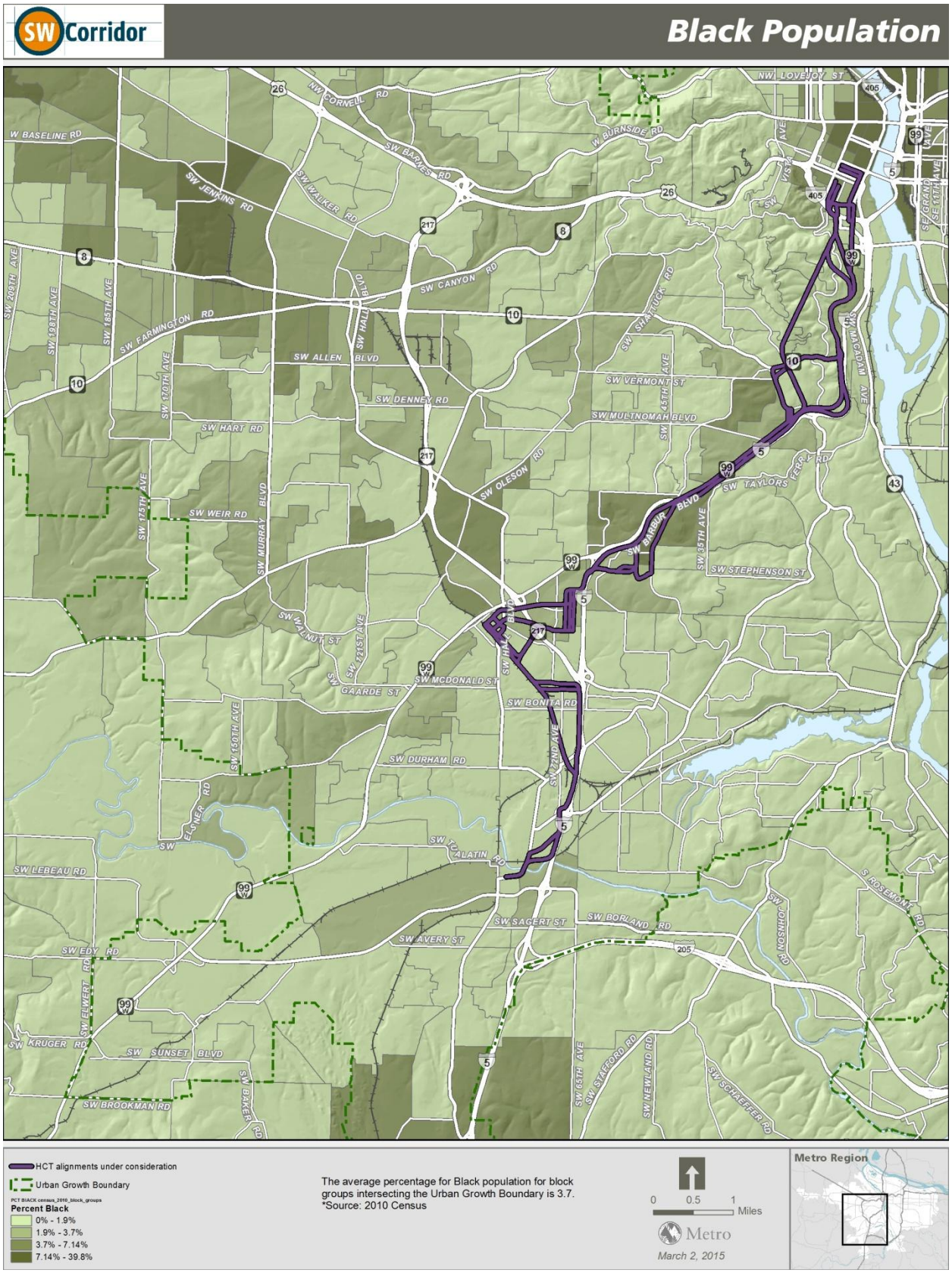
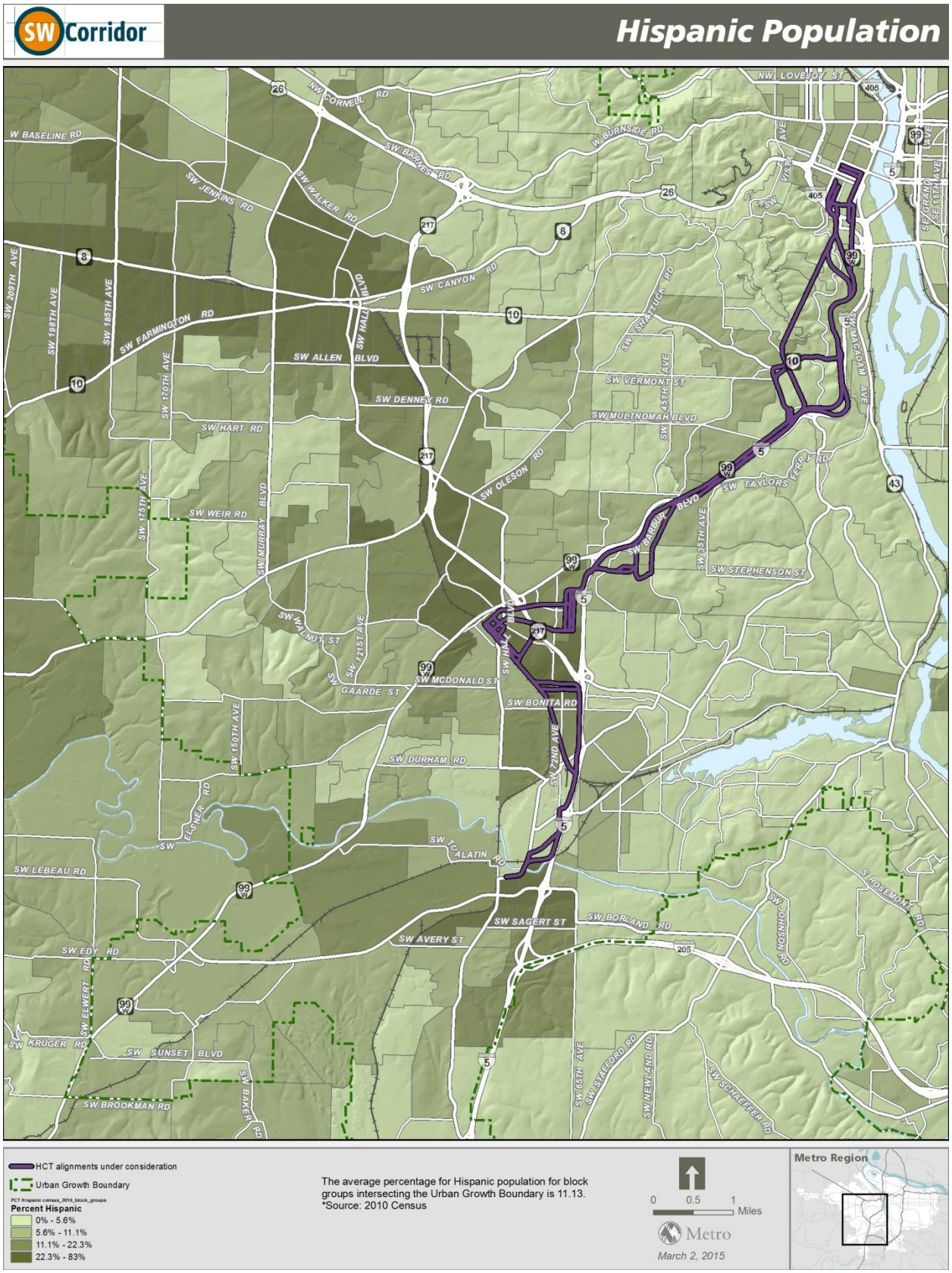
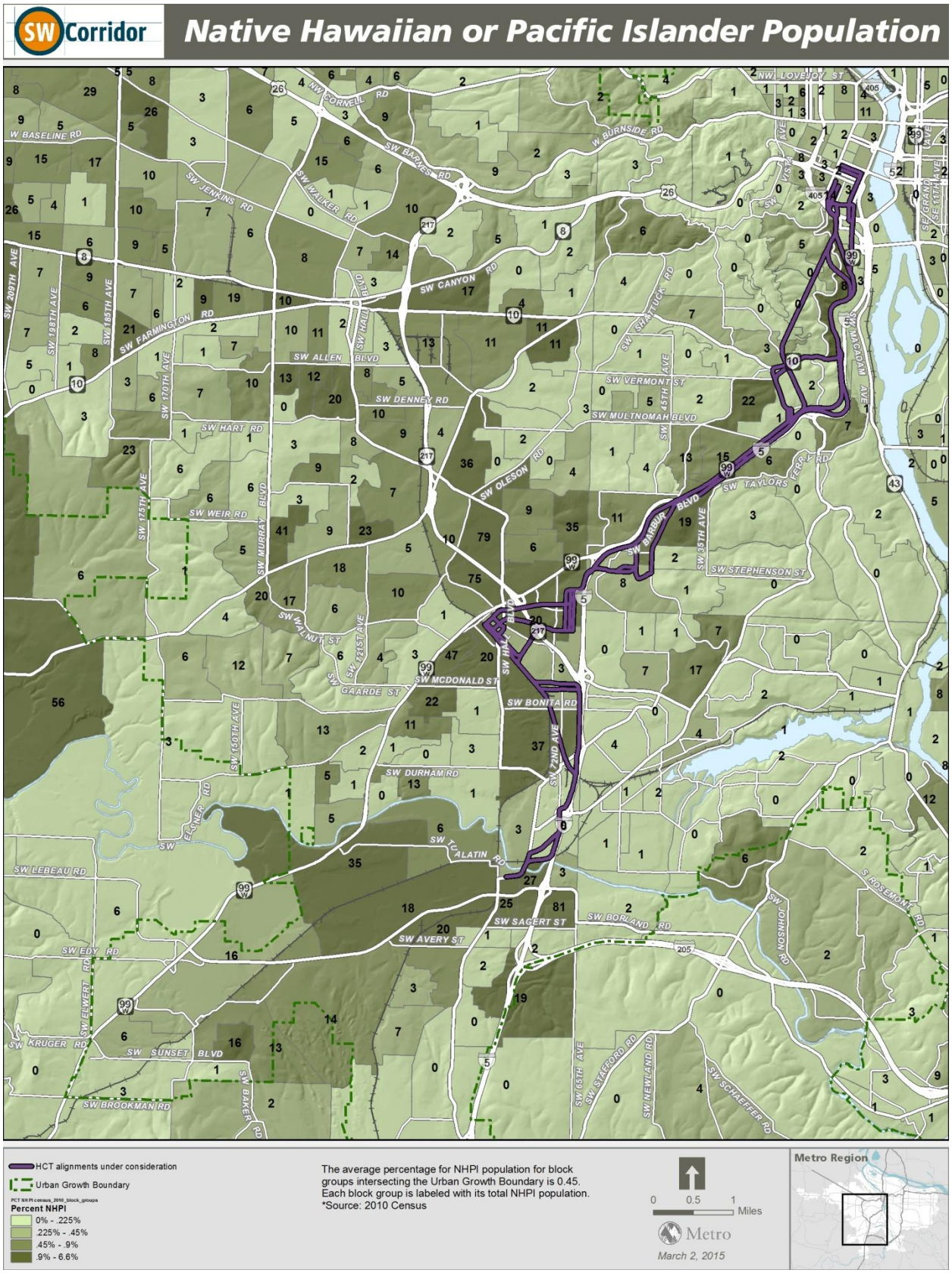
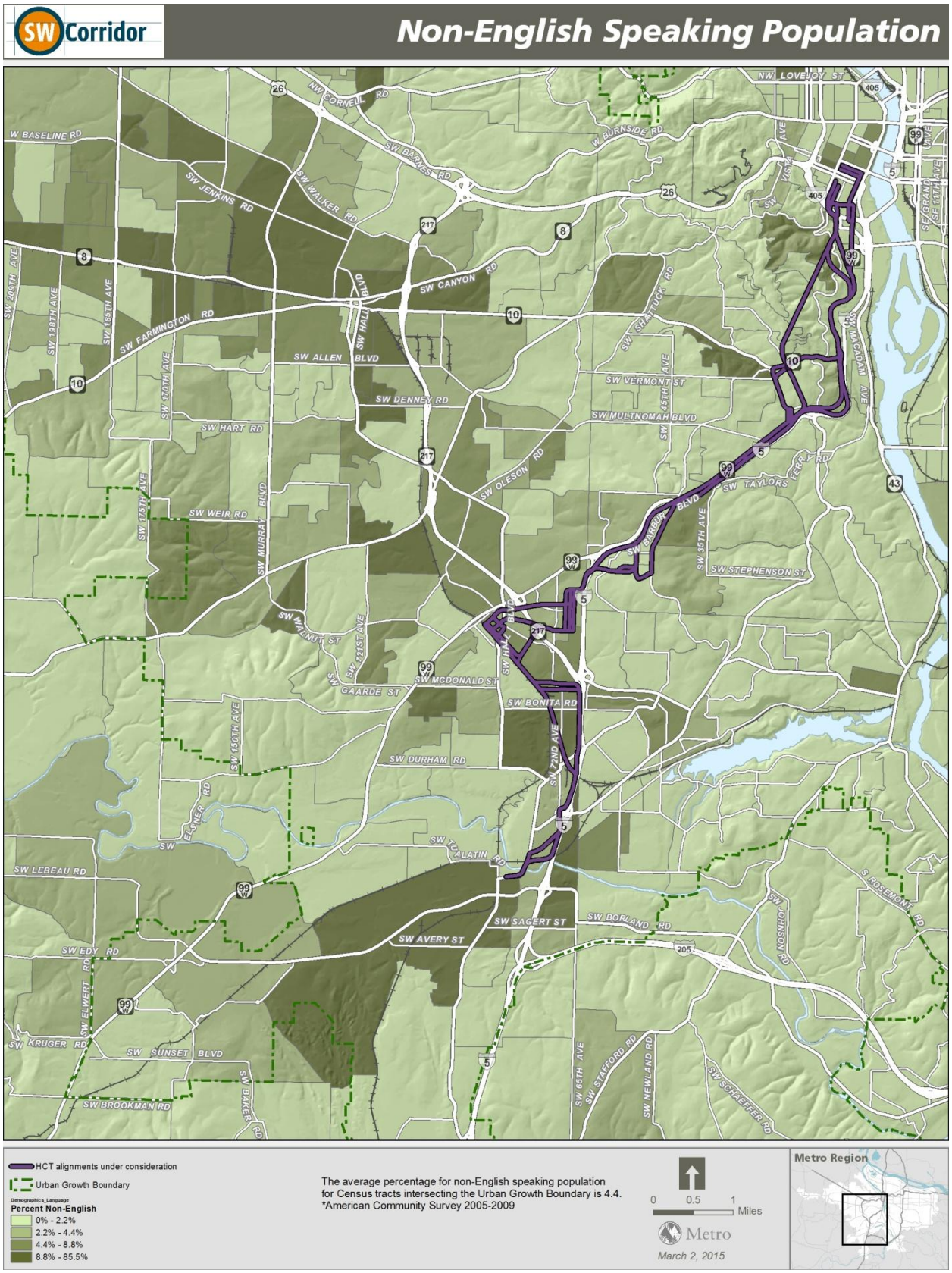
SW 185TH AVE
SW 170TH AVE
SW 175TH AVE
SW 150TH AVE


SW Corridor
Black Population
HCT alignments under consideration
Urban Growth Boundary
PCT BLACK census_2010_block_groups
Percent Black
0% - 1.9%
1.9% - 3.7%
3.7% - 7.14%
7.14% - 39.8%
The average percentage for Black population for block groups intersecting the Urban Growth Boundary is 3.7.
*Source: 2010 Census
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region


SW Corridor
Hispanic Population
HCT alignments under consideration
Urban Growth Boundary
PCT Hispanic census_2010_block_groups
Percent Hispanic
0% - 5.6%
5.6% - 11.1%
11.1% - 22.3%
22.3% - 83%
The average percentage for Hispanic population for block groups intersecting the Urban Growth Boundary is 11.13.
*Source: 2010 Census
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region


SW Corridor
Native Hawaiian or Pacific Islander Population
HCT alignments under consideration
Urban Growth Boundary
PCT NHPI census_2010_block_groups
Percent NHPI
0% - .225%
.225% - .45%
.45% - .9%
.9% - 6.6%
The average percentage for NHPI population for block groups intersecting the Urban Growth Boundary is 0.45.
Each block group is labeled with its total NHPI population.
*Source: 2010 Census
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region


SW Corridor
Non-English Speaking Population
HCT alignments under consideration
Urban Growth Boundary
Demographics_Language
Percent Non-English
0% - 2.2%
2.2% - 4.4%
4.4% - 8.8%
8.8% - 85.5%
The average percentage for non-English speaking population for Census tracts intersecting the Urban Growth Boundary is 4.4.
*American Community Survey 2005-2009
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region
W BASELINE RD
NW CORNELL RD
W BURNSIDE RD
NW LOVEJOY ST
SW BARNES RD
SW JENKINS RD
SW WALKER RD
SW CANYON RD
SW FARMINGTON RD
SW ALLEN BLVD
SW DENNEY RD
SW HART RD
SW WEIR RD
SW MURRAY BLVD
SW HALL BLVD
SW OLESON RD
SW SHATTUCK RD
SW VERMONT ST
SW MULTNOMAH BLVD
SW MACADAM AVE
SW TAYLORS FERRY RD
SW BARBUR BLVD
SW 35TH AVE
SW STEPHENSON ST
SW WALNUT ST
SW 121ST AVE
SW MCDONALD ST
SW GAARDE ST
SW BONITA RD
SW 2ND AVE
SW DURHAM RD
SW TUALATIN RD
SW LEBEAU RD
SW SAGERT ST
SW AVERY ST
SW BORLAND RD
S ROSEMONT RD
SW EDY RD
SW ELWERT RD
SW KRUGER RD
SW SUNSET BLVD
SW BROOKMAN RD
SW BAKER RD
SW 65TH AVE
SW STAFFORD RD
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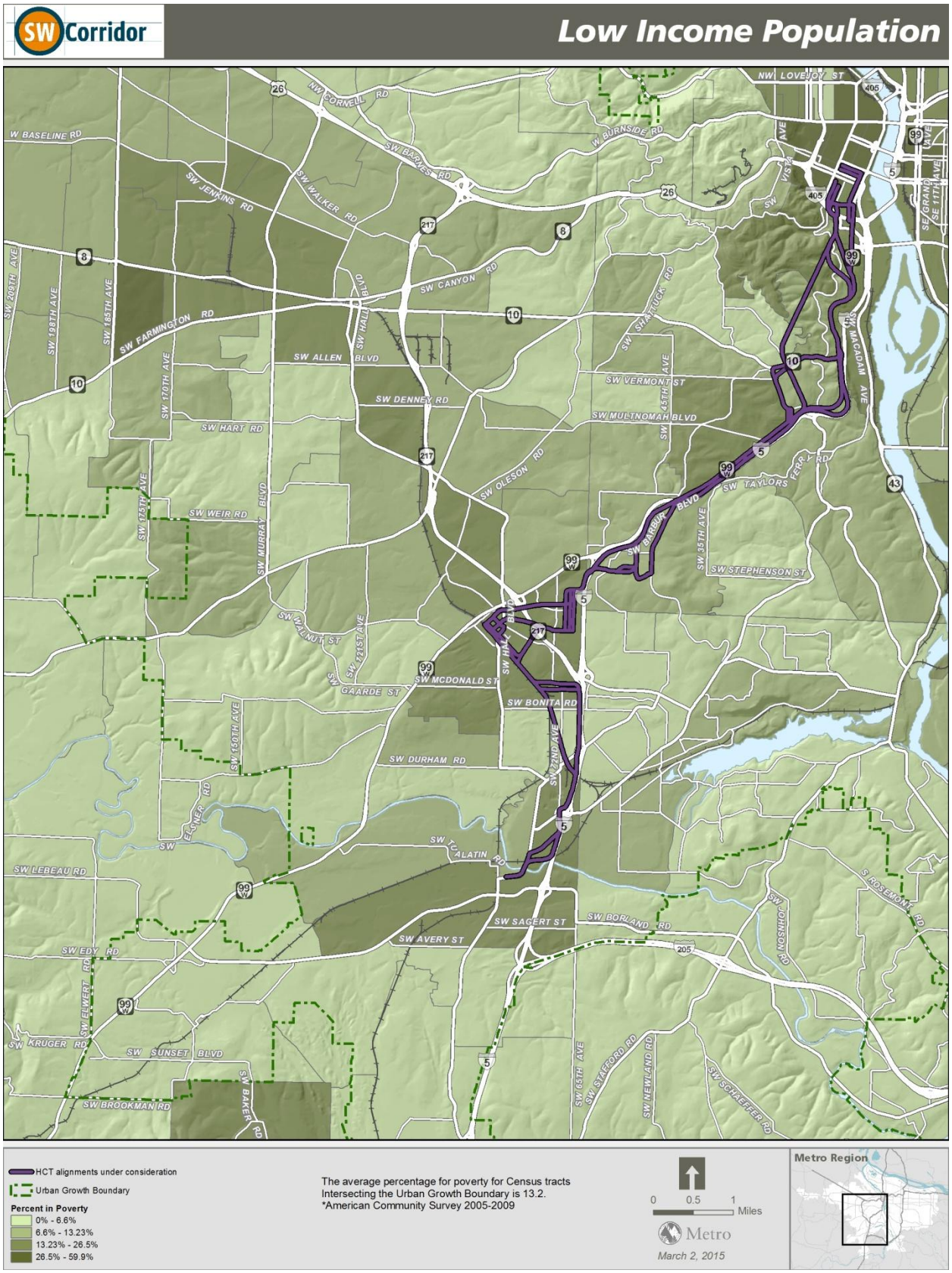
SW 150TH AVE
SE 17TH AVE


SW Corridor
Low Income Population
HCT alignments under consideration
Urban Growth Boundary
Percent in Poverty
0% - 6.6%
6.6% - 13.23%
13.23% - 26.5%
26.5% - 59.9%
The average percentage for poverty for Census tracts Intersecting the Urban Growth Boundary is 13.2.
*American Community Survey 2005-2009
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region
W BASELINE RD
NW CORNELL RD
W BURNSIDE RD
NW LOVEJOY ST
SW BARNES RD
SW JENKINS RD
SW WALKER RD
SW CANYON RD
SW FARMINGTON RD
SW ALLEN BLVD
SW DENNEY RD
SW HART RD
SW WEIR RD
SW MURRAY BLVD
SW 170TH AVE
SW 185TH AVE
SW 198TH AVE
SW 209TH AVE
SW 175TH AVE
SW HALL BLVD
SW OLESON RD
SW SHATTUCK RD
SW VERMONT ST
SW 45TH AVE
SW MULTNOMAH BLVD
SW MACADAM AVE
SW TAYLORS FERRY RD
SW BARBUR BLVD
SW 35TH AVE
SW STEPHENSON ST
SW WALNUT ST
SW 121ST AVE
SW GAARDE ST
SW MCDONALD ST
SW BONITA RD
SW DURHAM RD
SW 150TH AVE
SW ELMER RD
SW TUALATIN RD
SW LEBEAU RD
SW SAGERT ST
SW AVERY ST
SW BORLAND RD
S ROSEMONT RD
SW EDY RD
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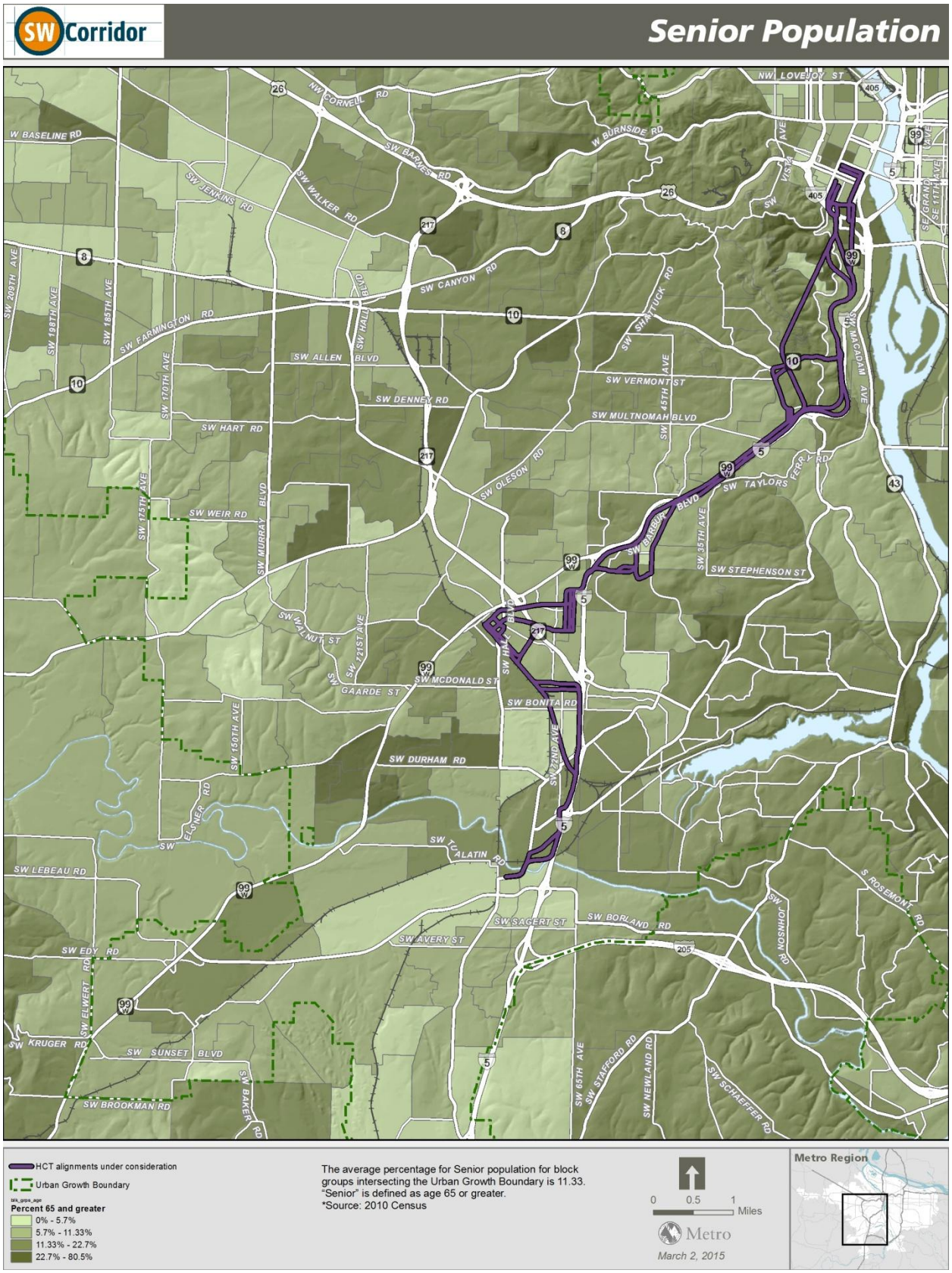
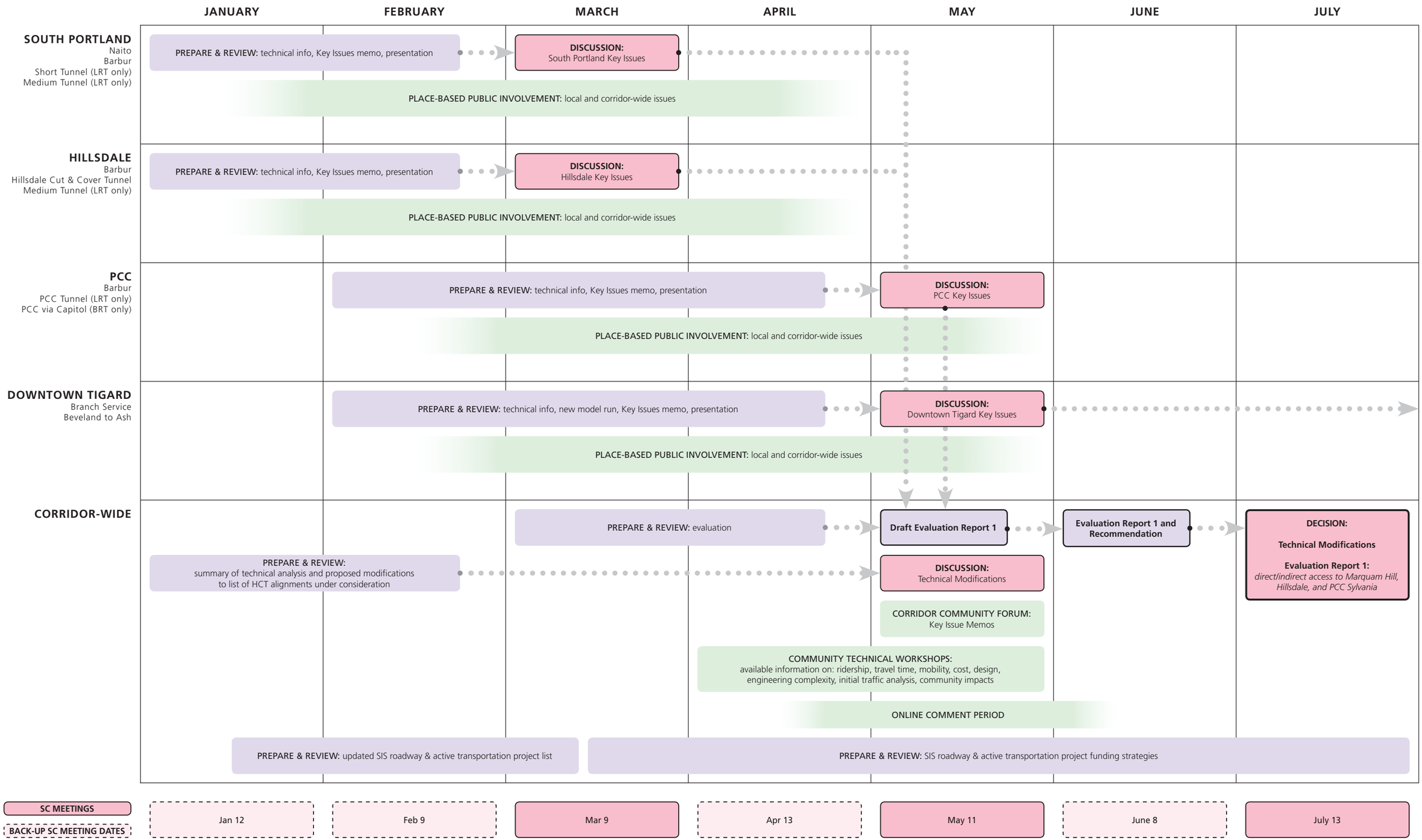
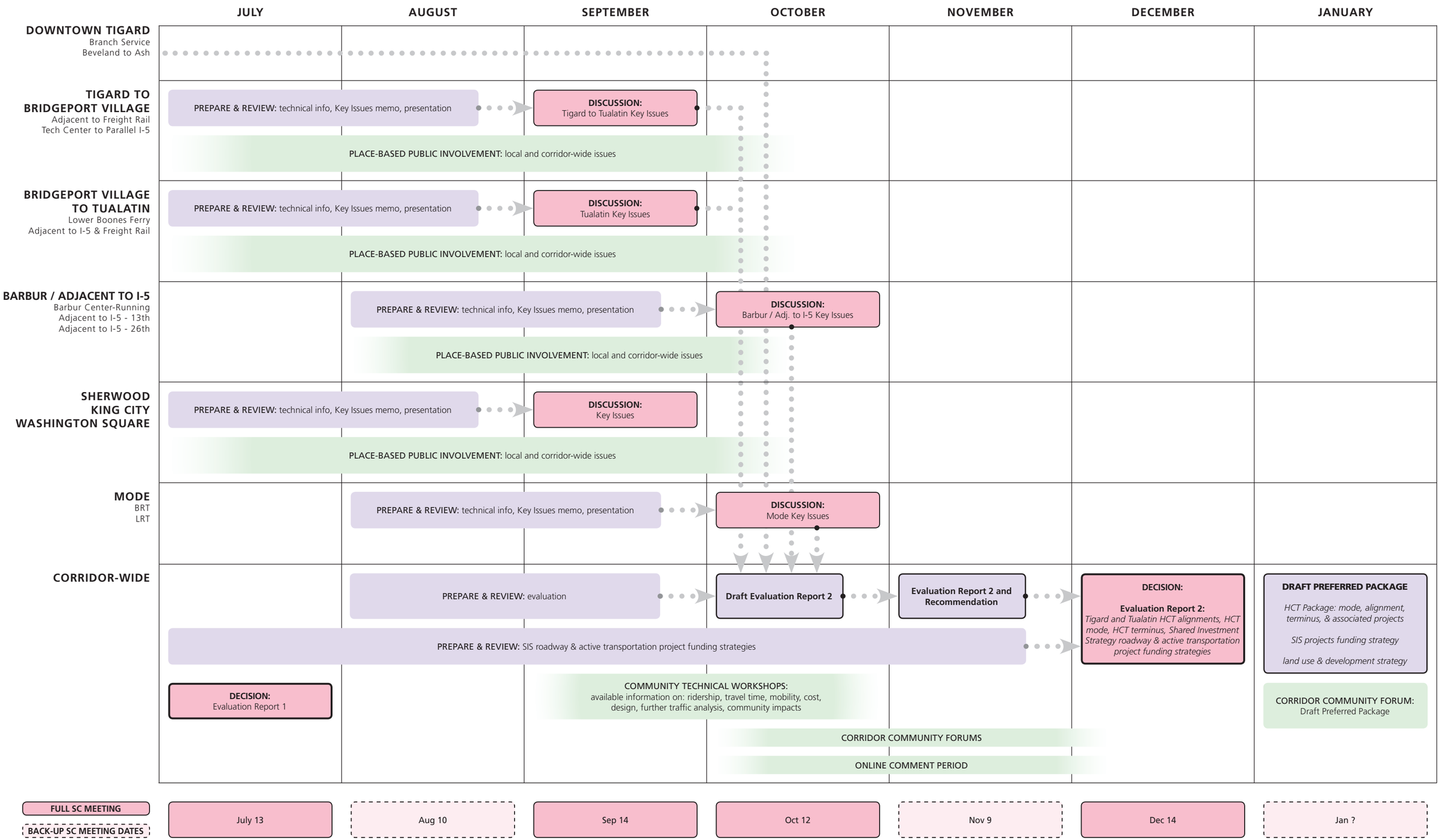
SW STAFFORD RD
SW NEWLAND RD
SW SCHAEFFER RD


SW Corridor
Senior Population
HCT alignments under consideration
Urban Growth Boundary
Percent 65 and greater
0% - 5.7%
5.7% - 11.33%
11.33% - 22.7%
22.7% - 80.5%
The average percentage for Senior population for block groups intersecting the Urban Growth Boundary is 11.33.
"Senior" is defined as age 65 or greater.
*Source: 2010 Census
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region

SW CORRIDOR PLAN TIMELINE | January - July 2015

DISCUSSION DRAFT 3/2/15



SW CORRIDOR PLAN TIMELINE | July 2015 - January 2016

DISCUSSION DRAFT 3/2/15