Southwest Corridor Plan

High Capacity Transit Technical Evaluation Results and Methodology Part 2:

Downtown Tigard, Southeast Tigard and Tualatin

October 15, 2015

GREAT PLACES
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Introduction

This document, the Technical Evaluation Results and Methodology, Part 2, has been produced by the Southwest Corridor project team to support the decisions of the Southwest Corridor Steering Committee. In December 2015, the steering committee will decide whether to continue studying certain alignments of the proposed high capacity transit (HCT) line through the Southwest Corridor.

This document summarizes and compares the performance of the alignment options across a number of factors. A subsequent recommendation from project staff, due in November 2015, will balance the importance of various factors and consider the data in a broader context.

Project Purpose and Need

The purpose of the Southwest Corridor project is to interconnect Tualatin, Tigard, Southwest Portland and central Portland through high capacity transit and other transportation investments in the congested I-5 corridor in order to improve mobility and create the conditions that will allow communities in the corridor to achieve their established land use visions. The project is needed to address the following issues:

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

The factors analyzed in this document were selected for their relationship to the project's 13 goals. Appendix A lists these project goals and relates them to the studied factors.

Using this document and the related Key Issues memos

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. Key Issues memos were released for the downtown Tigard and Tualatin areas in the fall of 2015. Each memo describes in detail the HCT alignments under consideration in the area and describes them regarding transit performance, community development, mobility, capital cost estimates, engineering complexity and risk, and community impacts.

This document supplements the Key Issues memos by providing a greater level of data analysis. It also provides a series of summary tables allowing for a quick overview of how the alignments perform in comparison to one another.

The tables in this document are shaded to visually distinguish outcomes between alignment options. However, the reader should not extrapolate conclusions from these colors. Please keep the following in mind:

- The darkest color does not necessarily represent the best performing option. Some factors can be interpreted as good, bad, or a complex mix. One example is redevelopment potential, which can suggest either investment and better construction or unwanted change and displacement, depending on the reader's circumstances and personal perspective. The colors assigned to redevelopment potential outcomes simply distinguish between "more" and "less" without suggesting which is better.
- Outcomes reported are not weighted, rather all reported equally. In reality, certain factors may be more important or impactful than others.
- The document contains a mix of "rating" and "ranking" outcomes. Results for some measures are rated by comparing how they perform to some scale and others are ranked by how they perform compared to each other.
- The analysis in this document is preliminary in nature. The project is at approximately three percent of design, meaning a great deal of uncertainty still remains regarding details of construction and operations. As a result, some data may change significantly between issuance of this document and the preparation of the federally-required Draft Environmental Impact Statement.

Next steps and opportunities for Input

This document is being released in conjunction with the Southwest Corridor Steering Committee meeting of October 12, 2015 and a community forum at the Public Works Building in Tigard on October 19, 2015. An online interactive map tool is also open for public review and input from October 19, 2015 through November 20, 2015. This map shows the locations of proposed HCT alignments, as well as other key locations throughout the project area. Clicking on locations will provide a brief summary of basic information, links to more detailed documents, and the opportunity to provide input on important factors for decision-makers to consider.

Public comments submitted through these opportunities will be factored into a recommendation report from project staff. The recommendation report will summarize the major findings from the Key Issues memos, stakeholder feedback, and this document and provide a draft recommendation to the steering committee on alignment options to study further. This report will be available at least 30 days prior to the December 14 steering committee meeting.

In December, the steering committee will discuss each alignment option analyzed in this document and decide whether to continue studying it. The December steering committee decision will focus on the HCT alignments in Tigard and Tualatin and terminus options. In February, the steering committee will decide whether to select light rail (LRT) or bus rapid transit (BRT) as the best mode to serve the corridor. See the "Project Background and Decision Timeline" section in this document for more details.

This document is available on the project website at:

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

Project Background and Decision Timeline

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 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 the steering committee approves the Preferred Package, the identified HCT mode, 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

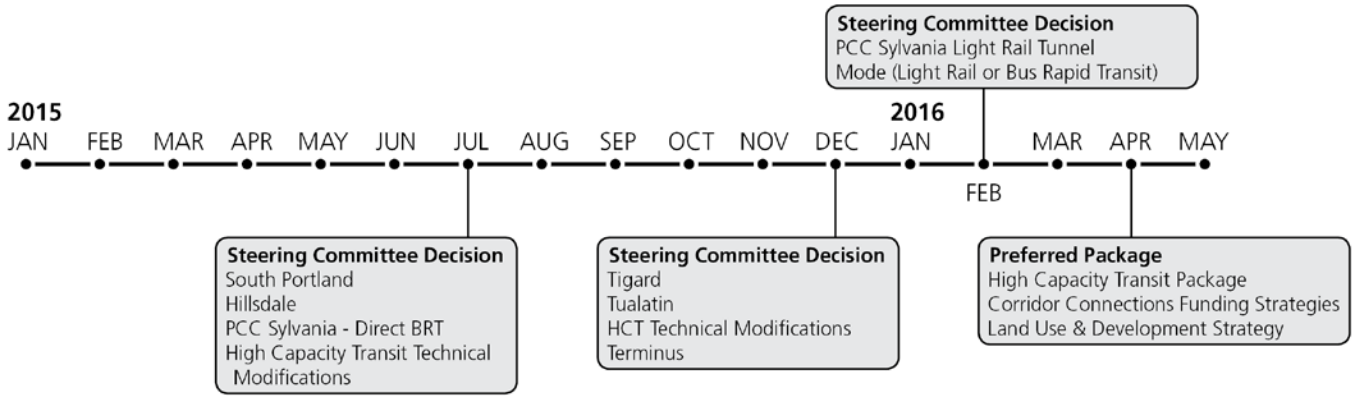
To reach a Preferred Package by spring 2016, steering committee decision-making points were identified for July and December 2015. Technical analysis, place-based public outreach, and partner conversations will precede each steering committee decision. A draft recommendation report will also be available to the public before each decision-making point; these recommendations will take into account public comment gathered during the place-based outreach period and any additional technical analysis compiled.

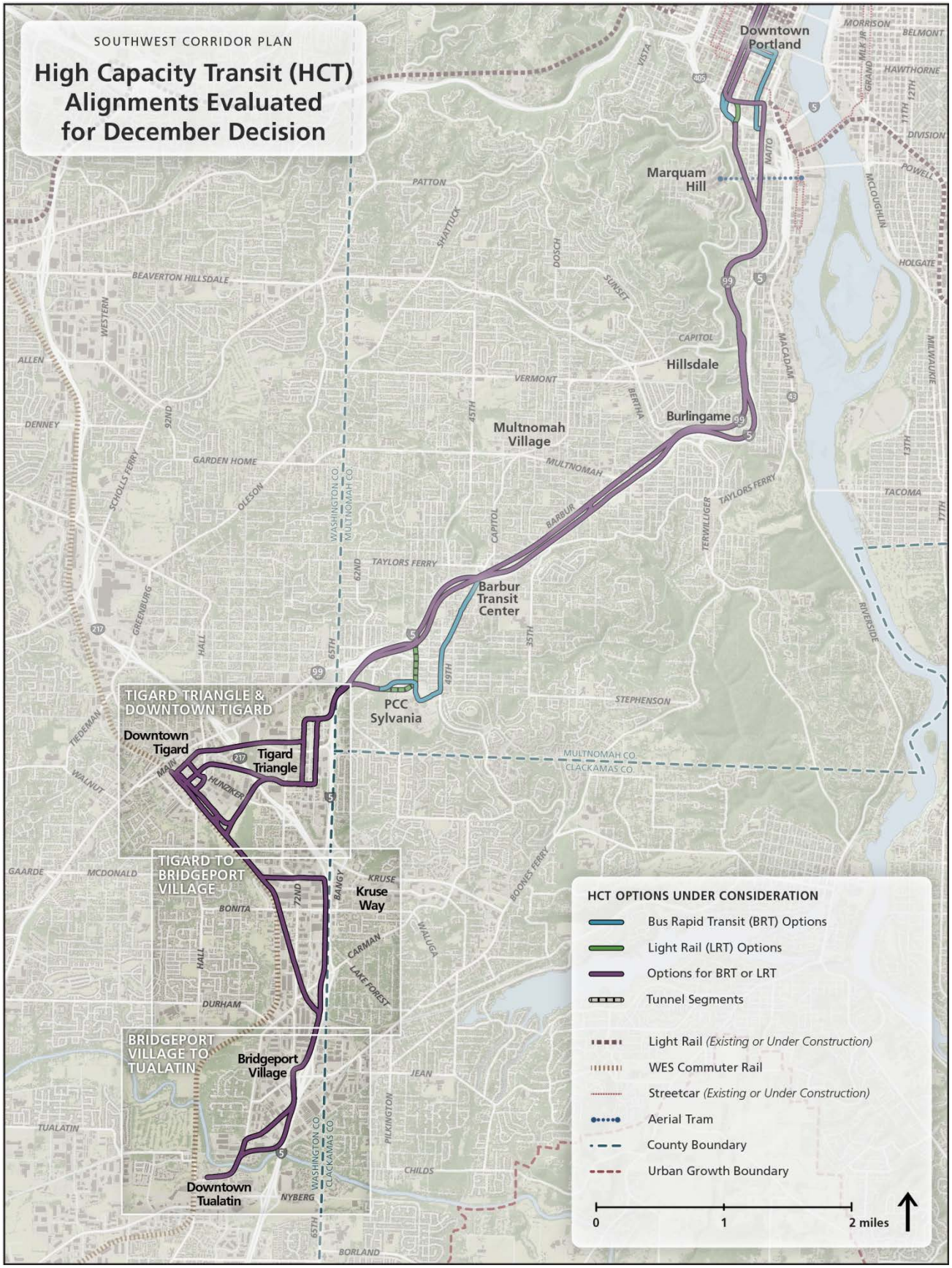
In July 2015, the steering committee took action on HCT alignment options in the South Portland, Hillsdale and Portland Community College (PCC) Sylvania areas of the corridor. The committee recommended continued study of a direct bus rapid transit connection to PCC Sylvania via SW Capitol Highway and removal of the Marquam Hill-Hillsdale tunnel and the Hillsdale Loop cut-and-cover tunnel from further consideration. The committee recommended rescheduling the decision regarding a direct light rail tunnel connection to PCC Sylvania; this decision is currently scheduled for February 2016.

In December 2015, the steering committee is scheduled to make recommendations for public review on continued study of HCT alignment options in Tigard and Tualatin, and the preferred HCT southern terminus.

In February 2016, the steering committee will make a recommendation for public review on whether bus rapid transit or light rail is the preferred HCT travel mode.

Steering committee members and the public will have an opportunity in early 2016 to discuss the draft Preferred Package resulting from these decisions. The final Preferred Package is anticipated to be adopted in April 2016. Comprehensive environmental review of the Preferred Package would likely begin later in 2016. Construction of the HCT line could begin as early as 2021.




SOUTHWEST CORRIDOR PLAN
High Capacity Transit (HCT) Alignments Evaluated for December Decision
Downtown Portland
Marquam Hill
Hillsdale
Burlingame
Multnomah Village
Barbur Transit Center
PCC Sylvania
TIGARD TRIANGLE & DOWNTOWN TIGARD
Downtown Tigard
Tigard Triangle
TIGARD TO BRIDGEPORT VILLAGE
Kruse Way
BRIDGEPORT VILLAGE TO TUALATIN
Bridgeport Village
Downtown Tualatin
HCT OPTIONS UNDER CONSIDERATION
Bus Rapid Transit (BRT) Options
Light Rail (LRT) Options
Options for BRT or LRT
Tunnel Segments
Light Rail (Existing or Under Construction)
WES Commuter Rail
Streetcar (Existing or Under Construction)
Aerial Tram
County Boundary
Urban Growth Boundary
0
1
2 miles

Results Summary

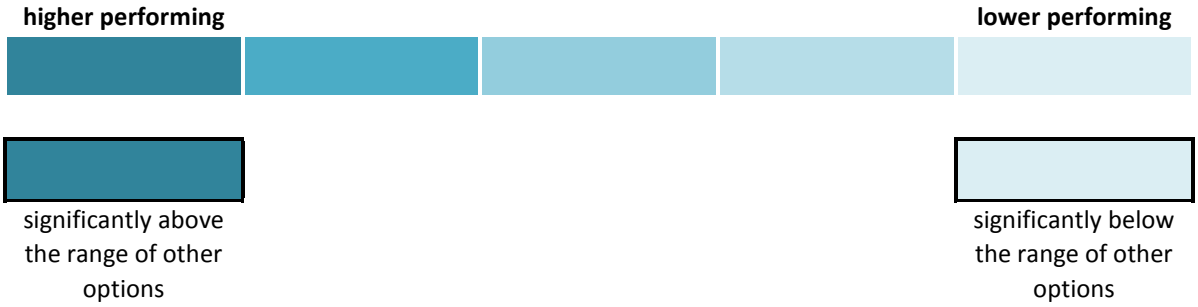
Alignments evaluated

This report focuses on the alignments under consideration in the December steering committee decision, which are highlighted on the map on the previous page and listed in the table below. These alignments are explained in more detail in the Alignment Definitions section of this document.

	LRT	BRT
Downtown Tigard		
Downtown loop	✓	✓
Commercial loop	✓	✓
Clinton crossing	✓	✓
Ash Avenue	✓	✓
Branch service	✓	✓
Southeast Tigard		
Adjacent to freight rail	✓	✓
Adjacent to I-5	✓	✓
Tualatin		
Lower Boones Ferry	✓	✓
Adjacent to I-5 and freight rail	✓	✓

Key

The tables on the following tabloid pages summarize the results. As shown in the key below, darker colors in the tables indicate higher performance in each measure. Alignments that are significantly above or below the performance range of other options are highlighted with a black outline. See the Detailed Methodology and Results section at the end of this report for more information on how the information was developed and how colors were assigned.



Downtown Tigard: LRT

	Looped routes		Direct routes		Branched route
	Downtown loop	**Commercial loop**	**Clinton crossing**	**Ash Avenue**	**Branch service**
Transit performance					
New system transit trips *2035 with HCT - 2035 low build*	14,500 *daily new system transit trips*	14,500* *daily new system transit trips*	15,600 *daily new system transit trips*	15,700 *daily new system transit trips*	16,700 *daily new system transit trips*
Line ridership *2035 HCT in SW Corridor*	41,800 *daily line riders*	41,800* *daily line riders*	43,600 *daily line riders*	43,500 *daily line riders*	44,400 *daily line riders*
Travel time *2035 Portland State University to Tualatin*	33.7 minutes	31.5 minutes	29.7 minutes	31.2 minutes	30.2 minutes
Signalized intersections crossed *along segment*	20 *intersections*	18 *intersections*	10 *intersections*	18 *intersections*	16 *intersections*
Access and development					
Equitable access to transit *areas with above-average rates of people of color, low income, and limited English proficiency*	moderate access	moderate access	moderate to high access	moderate to high access	moderate to high access
Redevelopment potential *based on acres of redevelopable land within ¼ mile from stations along segment*	39 acres	40 acres	24 acres	41 acres	90 acres
Support for existing plans	moderate to high support	moderate to high support	moderate support	moderate to high support	moderate to high support
Mobility					
Freight *based on overlap with local, regional and state freight networks*	some local overlap	minimal or no overlap	minimal or no overlap	minimal or no overlap	minimal or no overlap
Traffic *based on V/C ratio, vehicle delays, and vehicle queuing*	some opportunity for improvement	major opportunity for improvement	negligible impact	negligible impact	major opportunity for improvement
Transportation safety *opportunity to address high-crash locations*	minor improvement potential	minor improvement potential	minor improvement potential	minor improvement potential	minor improvement potential
Street connectivity *change in street connections, including bike and pedestrian connections*	4 new connections	3 new connection	4 new connections	4 new connections	3 new connection
Bike improvements *miles of bike gaps filled (included in project cost estimates)*	2.8 miles	2.4 miles	1.9 miles	2.1 miles	1.9 miles
Pedestrian improvements *miles of sidewalk gaps filled (included in project cost estimates)*	2.6 miles	2.2 miles	2.3 miles	2.0 miles	1.9 miles
Cost					
Capital cost: segment *millions of 2014 dollars*	$442 million	*not available*	$353 million	$355 million	$388 million
Operations and maintenance costs *based on average weekday vehicle hours*	moderate cost	moderate cost*	low cost	low to moderate cost	high cost
Engineering complexity					
Construction impacts *qualitative analysis of temporary impacts that could occur during project construction*	high impact	moderate impact	moderate to high impact	moderate to high impact	low to moderate impact
Engineering risk *qualitative analysis of relative risks associated with special elements of design options*	moderate risk	moderate risk	high risk	moderate to high risk	moderate risk
Community and environmental impacts					
Property impacts *qualitative analysis of potential impacts to properties*	high impact	moderate impact	low to moderate impact	moderate to high impact	low impact
Property access impacts *changes to driveway access along alignment*	70 driveways *along 2.4 mile segment*	52 driveways *along 2.3 mile segment*	18 driveways *along 2.1 mile segment*	39 driveways *along 2.4 mile segment*	37 driveways *along 2.3 mile segment*
Property impacts to historically under-represented populations *areas with above-average rates of people of color, low income, and limited English proficiency*	moderate to high impact	moderate impact	moderate impact	high impact	moderate impact
Visual impacts *based on degree of visual change*	high *degree of change*	moderate to high *degree of change*	high *degree of change*	high *degree of change*	moderate *degree of change*
Impacts to parks and historic properties *potential impacts to parks, wetlands, and historic properties*	low to moderate impact	low to moderate impact	low to moderate impact	moderate impact	low to moderate impact

* estimated based on related model runs

higher performing — **lower performing**

Downtown Tigard: BRT

	Looped routes		Direct routes		Branched route
	Downtown loop	**Commercial loop**	**Clinton crossing**	**Ash Avenue**	**Branch service**
Transit performance**					
New system transit trips *2035 with HCT - 2035 low build*	7,800* *daily new system transit trips*	7,800* *daily new system transit trips*	8,400* *daily new system transit trips*	8,400 *daily new system transit trips*	9,000* *daily new system transit trips*
Line ridership *2035 HCT in SW Corridor*	29,600* *daily line riders*	29,600* *daily line riders*	30,900* *daily line riders*	30,800 *daily line riders*	31,400* *daily line riders*
Travel time *2035 Portland State University to Tualatin (*	37.6 minutes	34.4 minutes	32.8 minutes	34.1 minutes	31.0 minutes
Mixed traffic *miles of operations in mixed traffic*	0.5 miles *along 2.4 mile segment*	0.5 miles *along 2.3 mile segment*	0 miles *along 2.1 mile segment*	0.5 miles *along 2.4 mile segment*	0.5 miles *along 2.3 mile segment*
Signalized intersections crossed *along segment*	20 *intersections*	18 *intersections*	10 *intersections*	18 *intersections*	16 *intersections*
Access and development					
Equitable access to transit *areas with above-average rates of people of color, low income, and limited English proficiency*	moderate access	moderate access	moderate access	moderate access	moderate access
Redevelopment potential *based on acres of redevelopable land within ¼ mile from stations along segment*	39 acres	40 acres	24 acres	41 acres	90 acres
Support for existing plans	moderate to high support	moderate to high support	moderate support	moderate to high support	moderate to high support
Mobility					
Freight *based on overlap with local, regional and state freight networks*	some local overlap	minimal or no overlap	minimal or no overlap	minimal or no overlap	minimal or no overlap
Traffic *based on V/C ratio, vehicle delays, and vehicle queuing*	some opportunity for improvement	major opportunity for improvement	negligible impact	negligible impact	major opportunity for improvement
Transportation safety *opportunity to address high-crash locations*	minor improvement potential	minor improvement potential	minor improvement potential	minor improvement potential	minor improvement potential
Street connectivity *change in street connections, including bike and pedestrian connections*	4 new connections	3 new connection	4 new connections	4 new connections	3 new connection
Bike improvements *miles of bike gaps filled (included in project cost estimates)*	2.8 miles	2.4 miles	1.9 miles	2.1 miles	1.9 miles
Pedestrian improvements *miles of sidewalk gaps filled (included in project cost estimates)*	2.6 miles	2.2 miles	2.3 miles	2.0 miles	1.9 miles
Cost					
Capital cost: segment *millions of 2014 dollars*	$252 million	*not available*	*not available*	$239 million	$246 million
Operations and maintenance costs *based on average weekday vehicle hours*	moderate cost*	moderate cost*	low cost*	low to moderate cost	high cost*
Engineering complexity					
Construction impacts *qualitative analysis of temporary impacts that could occur during project construction*	high impact	moderate impact	moderate to high impact	moderate to high impact	low to moderate impact
Engineering risk *qualitative analysis of relative risks associated with special elements of design options*	moderate risk	moderate risk	high risk	moderate to high risk	moderate risk
Community and environmental impacts					
Property impacts *qualitative analysis of potential impacts to properties*	*not available*	*not available*	*not available*	moderate impact	low impact
Property access impacts *changes to driveway access along alignment*	70 driveways *along 2.4 mile segment*	52 driveways *along 2.3 mile segment*	18 driveways *along 2.1 mile segment*	39 driveways *along 2.4 mile segment*	37 driveways *along 2.3 mile segment*
Property impacts to historically under-represented populations *areas with above-average rates of people of color, low income, and limited English proficiency*	moderate to high impact	moderate impact	moderate impact	high impact	moderate impact
Visual impacts *based on degree of visual change*	high *degree of change*	moderate to high *degree of change*	high *degree of change*	high *degree of change*	moderate *degree of change*
Impacts to parks and historic properties *potential impacts to parks, wetlands, and historic properties*	low to moderate impact	low to moderate impact	low to moderate impact	moderate impact	low to moderate impact

* estimated based on related model runs

**see “mode” section on page 17 for important information regarding BRT transit performance

higher performing					lower performing

Southeast Tigard: LRT

	Adjacent to freight rail	Adjacent to I-5
Transit performance		
New system transit trips *2035 with HCT - 2035 low build*	15,700 *daily new system transit trips*	16,000 *daily new system transit trips*
Line ridership *2035 HCT in SW Corridor*	43,500 *daily line riders*	43,600 *daily line riders*
Travel time *2035 Portland State University to Tualatin*	31.2 minutes	32.3 minutes
Signalized intersections crossed *along segment*	3 *intersections*	1 *intersection*
Access and development		
Equitable access to transit *areas with above-average rates of people of color, low income, and limited English proficiency*	moderate access	moderate to high access
Redevelopment potential *based on acres of redevelopable land within ¼ mile from stations along segment*	13 acres	15 acres
Support for existing plans	moderate support	moderate support
Mobility		
Freight *based on overlap with local, regional and state freight networks*	minimal or no overlap	minimal or no overlap
Traffic *based on V/C ratio, vehicle delays, and vehicle queuing*	some negative impact	negligible impact
Transportation safety *opportunity to address high-crash locations*	some negative impact	negligible impact
Street connectivity *change in street connections, including bike and pedestrian connections*	no change	no change
Bike improvements *miles of bike gaps filled (included in project cost estimates)*	0 miles	0 miles
Pedestrian improvements *miles of sidewalk gaps filled (included in project cost estimates)*	0 miles	0 miles
Cost		
Capital cost: segment *millions of 2014 dollars*	$233 million	$238 million
Operations and maintenance costs *based on average weekday vehicle hours*	moderate cost	moderate cost
Engineering complexity		
Construction impacts *qualitative analysis of temporary impacts that could occur during project construction*	moderate impact	moderate to high impact
Engineering risk *qualitative analysis of relative risks associated with special elements of design options*	moderate to high risk	moderate to high risk
Community and environmental impacts		
Property impacts *qualitative analysis of potential impacts to properties*	moderate impact	moderate to high impact
Property access impacts *changes to driveway access along alignment*	1 driveway *along 1.9 mile segment*	1 driveway *along 2.3 mile segment*
Property impacts to historically under-represented populations *areas with above-average rates of people of color, low income, and limited English proficiency*	low impact	low impact
Visual impacts *based on degree of visual change*	low *degree of change*	low *degree of change*
Impacts to parks and historic properties *potential impacts to parks, wetlands, and historic properties*	low impact	low impact

* estimated based on related model runs

Southeast Tigard: BRT

	Adjacent to freight rail	Adjacent to I-5
Transit performance**		
New system transit trips *2035 with HCT - 2035 low build*	8,400 *daily new system transit trips*	8,600* *daily new system transit trips*
Line ridership *2035 HCT in SW Corridor*	30,800 *daily line riders*	30,900* *daily line riders*
Travel time *2035 Portland State University to Tualatin (please refer to "mode" section on page 17 for important information regarding BRT travel time)*	34.1 minutes	35.2 minutes
Mixed traffic *miles of operations in mixed traffic*	0 miles *along 1.9 mile segment*	0 miles *along 2.3 mile segment*
Signalized intersections crossed *along segment*	3 *intersections*	1 *intersection*
Access and development		
Equitable access to transit *areas with above-average rates of people of color, low income, and limited English proficiency*	moderate access	moderate access
Redevelopment potential *based on acres of redevelopable land within ¼ mile from stations along segment*	13 acres	15 acres
Support for existing plans	moderate support	moderate support
Mobility		
Freight *based on overlap with local, regional and state freight networks*	minimal or no overlap	minimal or no overlap
Traffic *based on V/C ratio, vehicle delays, and vehicle queuing*	some negative impact	negligible impact
Transportation safety *opportunity to address high-crash locations*	some negative impact	negligible impact
Street connectivity *change in street connections, including bike and pedestrian connections*	no change	no change
Bike improvements *miles of bike gaps filled (included in project cost estimates)*	0 miles	0 miles
Pedestrian improvements *miles of sidewalk gaps filled (included in project cost estimates)*	0 miles	0 miles
Cost		
Capital cost: segment *millions of 2014 dollars*	$155 million	$167 million
Operations and maintenance costs *based on average weekday vehicle hours*	moderate cost	moderate cost
Engineering complexity		
Construction impacts *qualitative analysis of temporary impacts that could occur during project construction*	moderate impact	moderate to high impact
Engineering risk *qualitative analysis of relative risks associated with special elements of design options*	moderate risk	moderate to high risk
Community and environmental impacts		
Property impacts *qualitative analysis of potential impacts to properties*	moderate impact	moderate to high impact
Property access impacts *changes to driveway access along alignment*	1 driveway *along 1.9 mile segment*	1 driveway *along 2.3 mile segment*
Property impacts to historically under-represented populations *areas with above-average rates of people of color, low income, and limited English proficiency*	low impact	low impact
Visual impacts *based on degree of visual change*	low *degree of change*	low *degree of change*
Impacts to parks and historic properties *potential impacts to parks, wetlands, and historic properties*	low impact	low impact

* estimated based on related model runs

**see "mode" section on page 17 for important information regarding BRT transit performance

Tualatin: LRT

	Lower Boones Ferry Road	Adjacent to I-5 and freight rail
Transit performance		
New system transit trips *2035 with HCT - 2035 low build*	15,700 *daily new system transit trips*	15,700* *daily new system transit trips*
Line ridership *2035 HCT in SW Corridor*	43,500 *daily line riders*	43,500* *daily line riders*
Travel time *2035 Portland State University to Tualatin*	31.2 minutes	31.2 minutes*
Signalized intersections crossed *along segment*	3 *intersections*	0 *intersections*
Access and development		
Equitable access to transit *areas with above-average rates of people of color, low income, and limited English proficiency*	moderate access	moderate access
Redevelopment potential *based on acres of redevelopable land within ¼ mile from stations along segment*	4 acres	4 acres
Support for existing plans	moderate support	moderate support
Mobility		
Freight *based on overlap with local, regional and state freight networks*	some state or regional overlap	minimal or no overlap
Traffic *based on V/C ratio, vehicle delays, and vehicle queuing*	negligible impact	negligible impact
Transportation safety *opportunity to address high-crash locations*	minor improvement potential	negligible impact
Street connectivity *change in street connections, including bike and pedestrian connections*	no change	no change
Bike improvements *miles of bike gaps filled (included in project cost estimates)*	0 miles	0 miles
Pedestrian improvements *miles of sidewalk gaps filled (included in project cost estimates)*	0 miles	0 miles
Cost		
Capital cost: segment *millions of 2014 dollars*	$261 million	$256 million
Operations and maintenance costs *based on average weekday vehicle hours*	moderate cost	moderate cost
Engineering complexity		
Construction impacts *qualitative analysis of temporary impacts that could occur during project construction*	moderate to high impact	moderate impact
Engineering risk *qualitative analysis of relative risks associated with special elements of design options*	moderate risk	moderate to high risk
Community and environmental impacts		
Property impacts *qualitative analysis of potential impacts to properties*	moderate impact	moderate to high impact
Property access impacts *changes to driveway access along alignment*	3 driveways *along 1.2 mile segment*	0 driveways *along 1.1 mile segment*
Property impacts to historically under-represented populations *areas with above-average rates of people of color, low income, and limited English proficiency*	low to moderate impact	low to moderate impact
Visual impacts *based on degree of visual change*	high *degree of change*	moderate to high *degree of change*
Impacts to parks and historic properties *potential impacts to parks, wetlands, and historic properties*	low to moderate impact	low to moderate impact

* estimated based on related model runs

Tualatin: BRT

	Lower Boones Ferry Road	Adjacent to I-5 and freight rail
Transit performance**		
New system transit trips *2035 with HCT - 2035 low build*	8,400 *daily new system transit trips*	8,400* *daily new system transit trips*
Line ridership *2035 HCT in SW Corridor*	30,800 *daily line riders*	30,800* *daily line riders*
Travel time *2035 Portland State University to Tualatin (please refer to "mode" section on page 17 for important information regarding BRT travel time)*	34.1 minutes	34.1 minutes*
Mixed traffic *miles of operations in mixed traffic*	0 miles *along 1.2 mile segment*	0 miles *along 1.1 mile segment*
Signalized intersections crossed *along segment*	3 *intersections*	0 *intersections*
Access and development		
Equitable access to transit *areas with above-average rates of people of color, low income, and limited English proficiency*	moderate access	moderate access
Redevelopment potential *based on acres of redevelopable land within ¼ mile from stations along segment*	4 acres	4 acres
Support for existing plans	moderate support	moderate support
Mobility		
Freight *based on overlap with local, regional and state freight networks*	some state or regional overlap	minimal or no overlap
Traffic *based on V/C ratio, vehicle delays, and vehicle queuing*	negligible impact	negligible impact
Transportation safety *opportunity to address high-crash locations*	minor improvement potential	negligible impact
Street connectivity *change in street connections, including bike and pedestrian connections*	no change	no change
Bike improvements *miles of bike gaps filled (included in project cost estimates)*	0 miles	0 miles
Pedestrian improvements *miles of sidewalk gaps filled (included in project cost estimates)*	0 miles	0 miles
Cost		
Capital cost: segment *millions of 2014 dollars*	$152 million	$158 million
Operations and maintenance costs *based on average weekday vehicle hours*	moderate cost	moderate cost
Engineering complexity		
Construction impacts *qualitative analysis of temporary impacts that could occur during project construction*	moderate to high impact	moderate impact
Engineering risk *qualitative analysis of relative risks associated with special elements of design options*	moderate risk	moderate to high risk
Community and environmental impacts		
Property impacts *qualitative analysis of potential impacts to properties*	moderate impact	moderate to high impact
Property access impacts *changes to driveway access along alignment*	3 driveways *along 1.2 mile segment*	0 driveways *along 1.1 mile segment*
Property impacts to historically under-represented populations *areas with above-average rates of people of color, low income, and limited English proficiency*	low to moderate impact	low to moderate impact
Visual impacts *based on degree of visual change*	high *degree of change*	moderate to high *degree of change*
Impacts to parks and historic properties *potential impacts to parks, wetlands, and historic properties*	low to moderate impact	low to moderate impact

* estimated based on related model runs

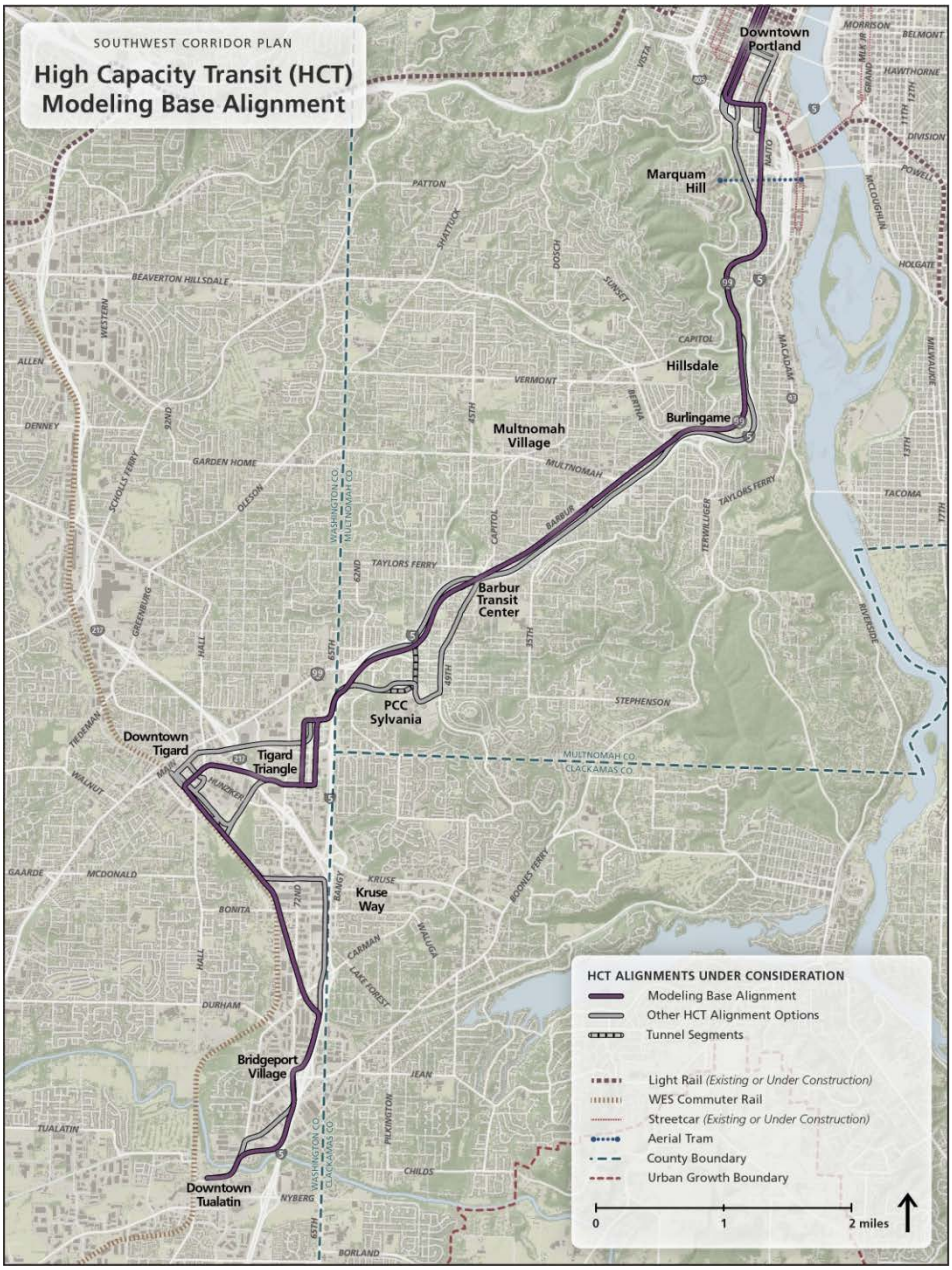
** see "mode" section on page 17 for important information regarding BRT transit performance

higher performing ← lower performing

General Assumptions

Base modeling alignments

While most evaluation measures focus on a particular segment of the full HCT alignment, certain measures are inherently corridor-wide. For these measures, the modeling base alignment is assumed beyond the segment in question. The following map illustrates the modeling base alignment.



Mode

For many measures, such as capital cost and new system transit trips, there is a relatively broad gap between BRT and LRT performance. Because the purpose of this report is to inform alignment narrowing decisions and not a mode decision, BRT and LRT are colored according to a different scale when appropriate. In general, the coloration of evaluation measures should not be directly compared between the BRT and LRT tables.

A separate mode evaluation report will be completed in December 2015, in anticipation of the February 2016 steering committee decision on which mode to carry forward into a DEIS.

BRT travel times are in the process of being adjusted by TriMet to reflect new research regarding BRT performance in other cities. The new BRT travel times will be slower than those included in this evaluation and will affect new system trips and line ridership. New model runs could not be performed in time for publication of this document, but the relationship of travel time, new system trips, and line ridership between BRT options is not expected to change, so the rankings will be similar to those expressed here.

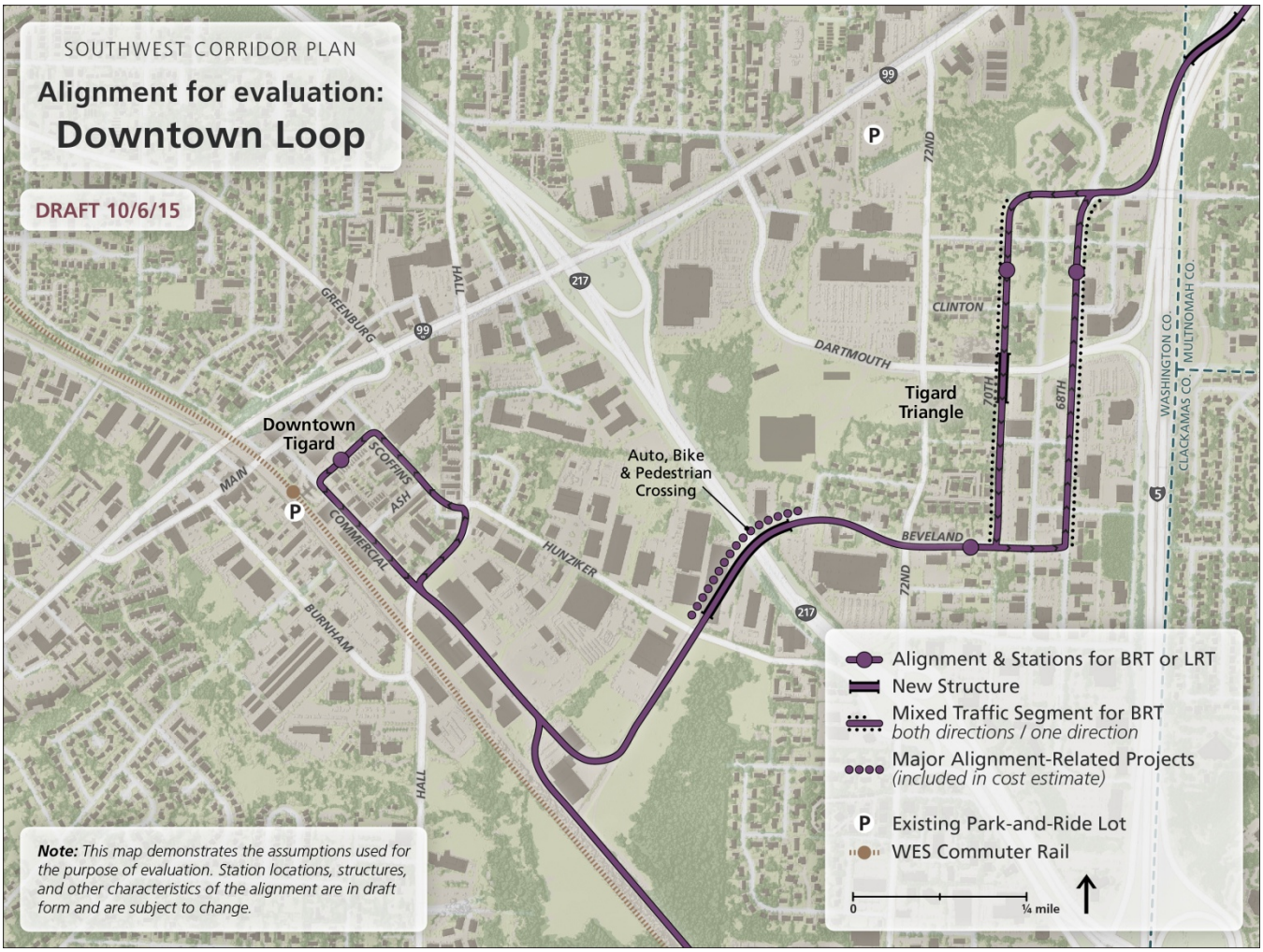
Alignment Definitions

The following maps illustrate what is assumed to be included with each alignment option for the purpose of analysis, including structures, stations, key roadway and active transportation projects, and mixed traffic segments. The alignments are currently at a three percent level of design, so these assumptions are subject to change upon further study.

Downtown Tigard: BRT and LRT

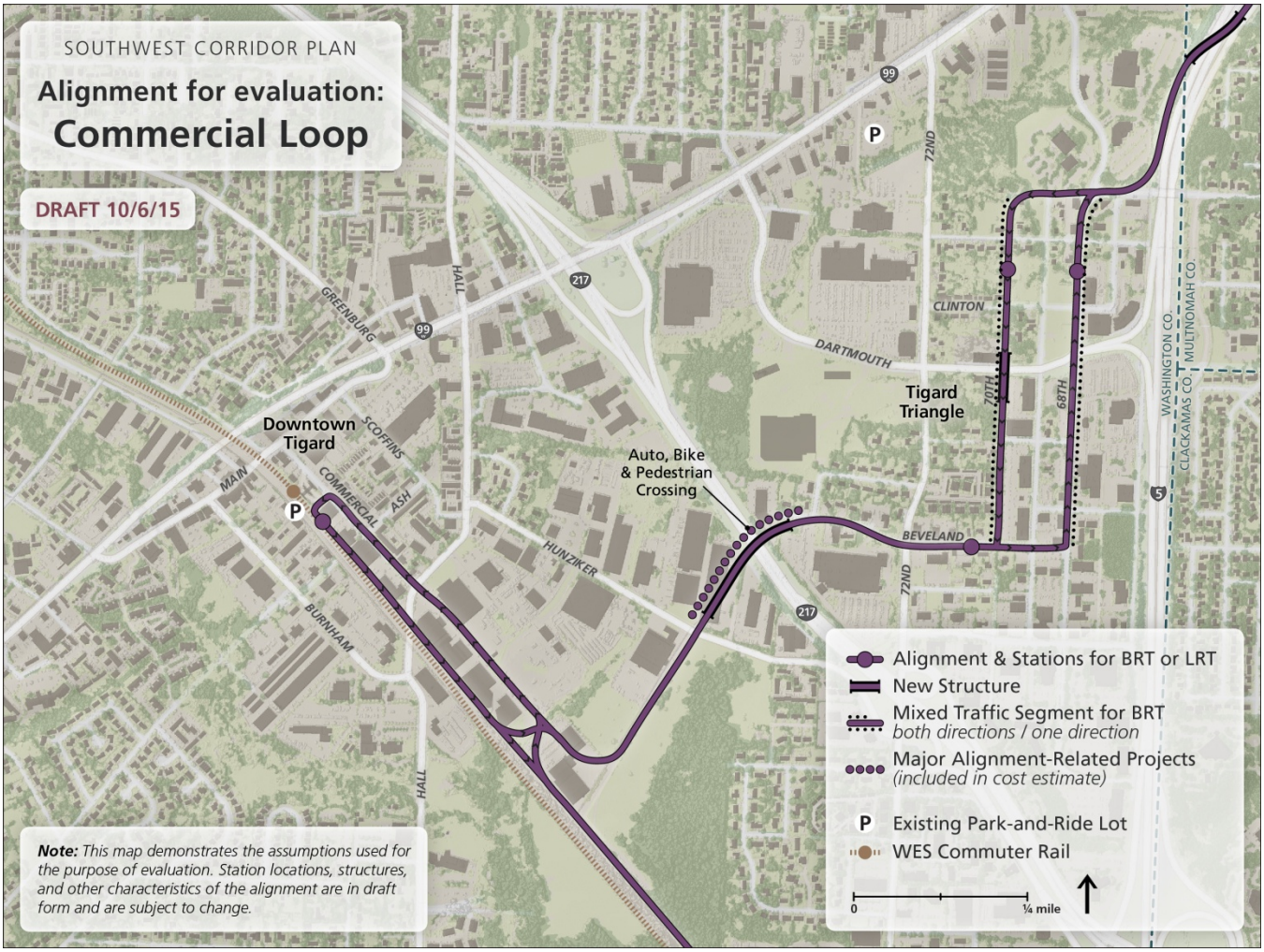
Downtown loop via Beveland crossing *Downtown loop*

HCT would cross OR-217 at a new bridge curving from Beveland Street to Wall Street, which would also include facilities for cars, bikes, and pedestrians. HCT would continue southwest on Wall, then turn towards downtown Tigard along a new street extending southeast from Commercial Street. In downtown Tigard, HCT vehicles would run in a one-way counter-clockwise transit loop (in two-way streets) from the new alignment along Hall Boulevard, Scoffins Street, and a new road south of Main Street and returning on Commercial. Southbound vehicles would then shift over to parallel the WES tracks near Wall to head toward the Bonita station.



Commercial loop via Beveland crossing *Commercial loop*

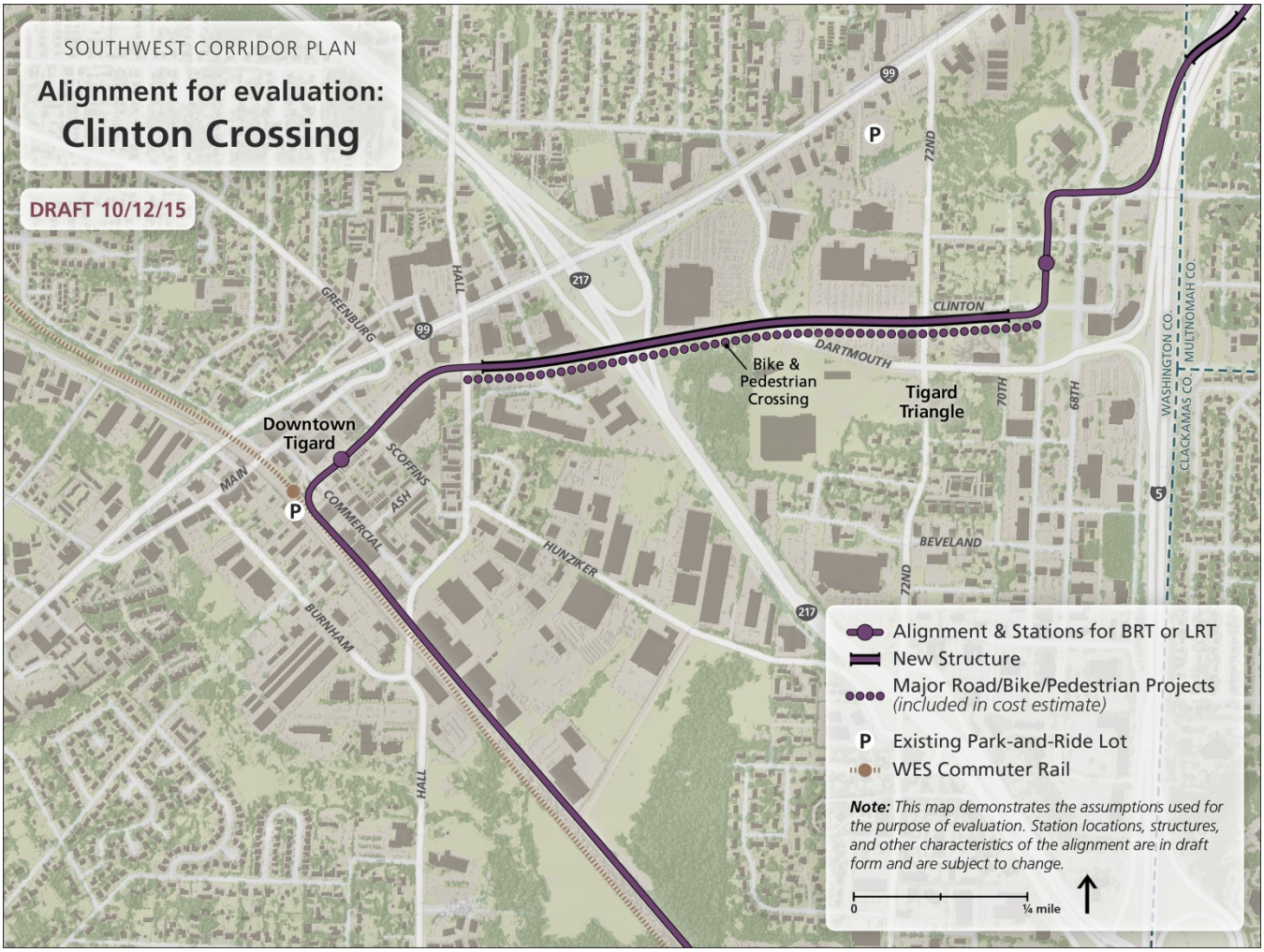
As with the downtown loop, HCT would cross OR-217 at a new bridge between Beveland Street and Wall Street, which would include facilities for cars, bikes, and pedestrians. HCT would continue south on Wall, then turn towards downtown Tigard in a one-way transit loop along a new two-way street extending from Commercial Street. Instead of looping through downtown, the Commercial to WES Alignment would run in a one-way counter-clockwise loop along Commercial and parallel to the WES tracks, with a sharp turn near the existing Tigard Transit Center. The downtown Tigard station would be located near this turn.



Clinton Street crossing *Clinton crossing*

HCT would run ¾ of a mile on an elevated structure from 70th Avenue and Clinton Street across OR-217 to Hall Boulevard, which would include a bike and pedestrian path. At Hall the alignment would transition to center running in a new street connecting Hall to Commercial. The alignment would then turn southeast to parallel the WES alignment heading toward Tualatin. A station would be located near the existing Tigard TC on the new street. Unlike most of the other downtown Tigard options, this alignment would not have a Beveland station to serve the southern portion of the Tigard Triangle.

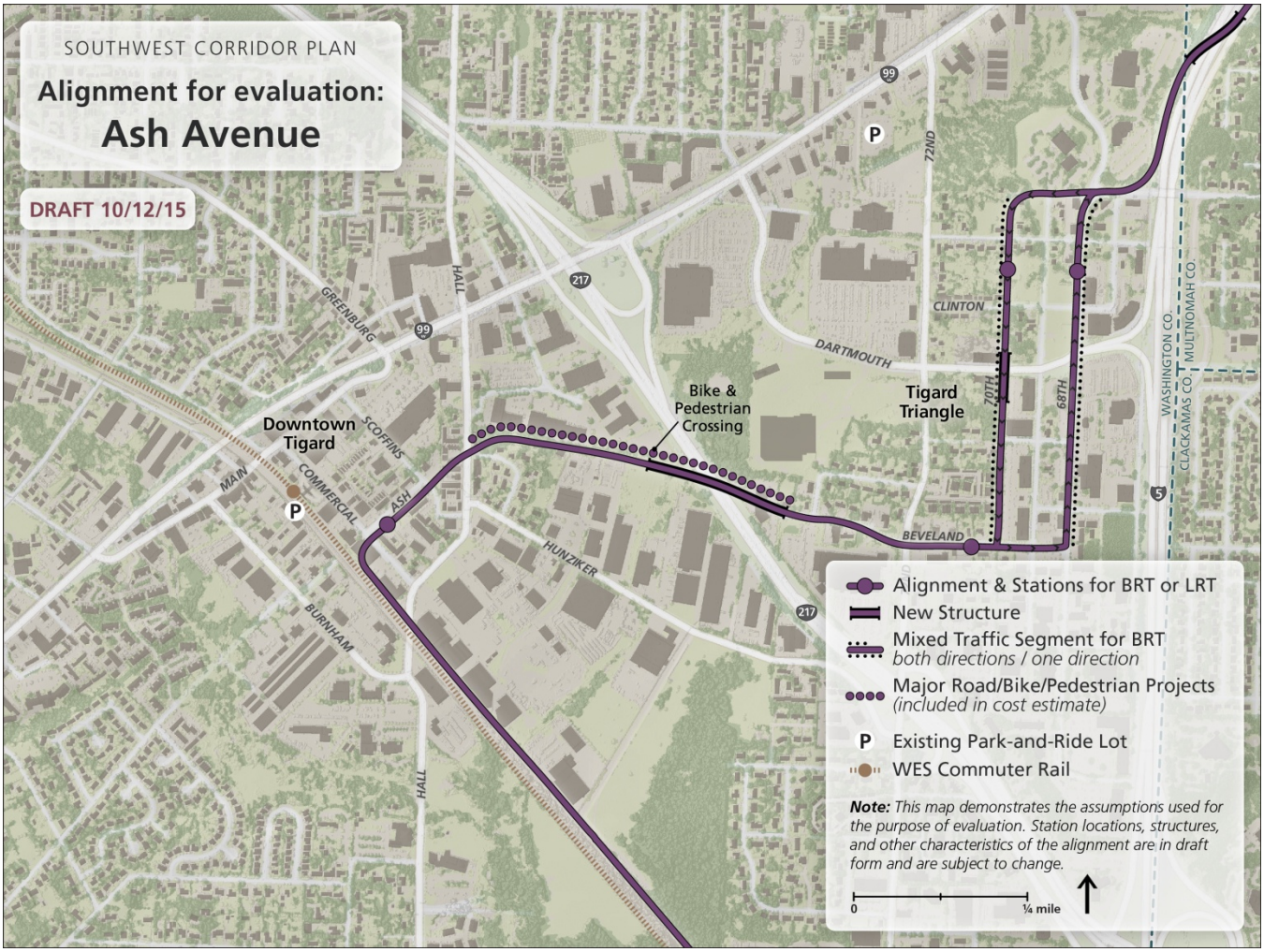
A new auto, bike, and pedestrian bridge could connect from Beveland to Hunziker near Wall Street, as with the other alignment options, though the cost of this bridge would likely be ineligible for federal New Starts funding because it is separate from the transit project.



Ash Avenue via Beveland Street crossing *Ash Avenue*

HCT would cross OR-217 on a new bridge between Beveland Street, passing behind industrial properties fronting Hunziker and would cross Hall at Knoll Drive. This new bridge is assumed to include a bike and pedestrian path. From Hall, the alignment would connect to Ash Avenue, with a station on Ash between Scoffins and Commercial, and then turn southeast to parallel the WES tracks. The station on Ash would be within a quarter mile of the Tigard Transit Center and WES station. The alignment may provide an opportunity to extend Ash Avenue across the WES and freight rail tracks with a new crossing, pending negotiations with the regulating authorities of the rail corridor.

A new auto, bike, and pedestrian bridge could connect from Beveland to Hunziker near Wall Street, as with the other alignment options, though the cost of this bridge would likely be ineligible for federal New Starts funding because it is separate from the transit project.



Branch service via Beveland Street crossing *Branch service*

As with the downtown loop option, HCT would cross OR-217 at a new bridge between Beveland Street and Wall Street, which would include facilities for cars, bikes, and pedestrians. The alignment would include a station with a new park and ride lot near Hunziker and Wall. From there, transit vehicles would continue along Wall connecting to the WES corridor. Wall would continue to be a dead end street for other modes. At the Hunziker Station, every other HCT vehicle would continue to a terminus in downtown Tigard or to a terminus in Tualatin. Tigard vehicles would reverse direction at the downtown Tigard station, and then return to the Hunziker/Wall station heading northbound to Portland. From the Hunziker station, the other southbound vehicles would continue along Wall, then turn southeast to parallel the WES tracks, bypassing the downtown Tigard station and continue to Tualatin. This arrangement would mean a transfer at the Hunziker Station to travel between Tigard Transit Center and Tualatin via HCT.

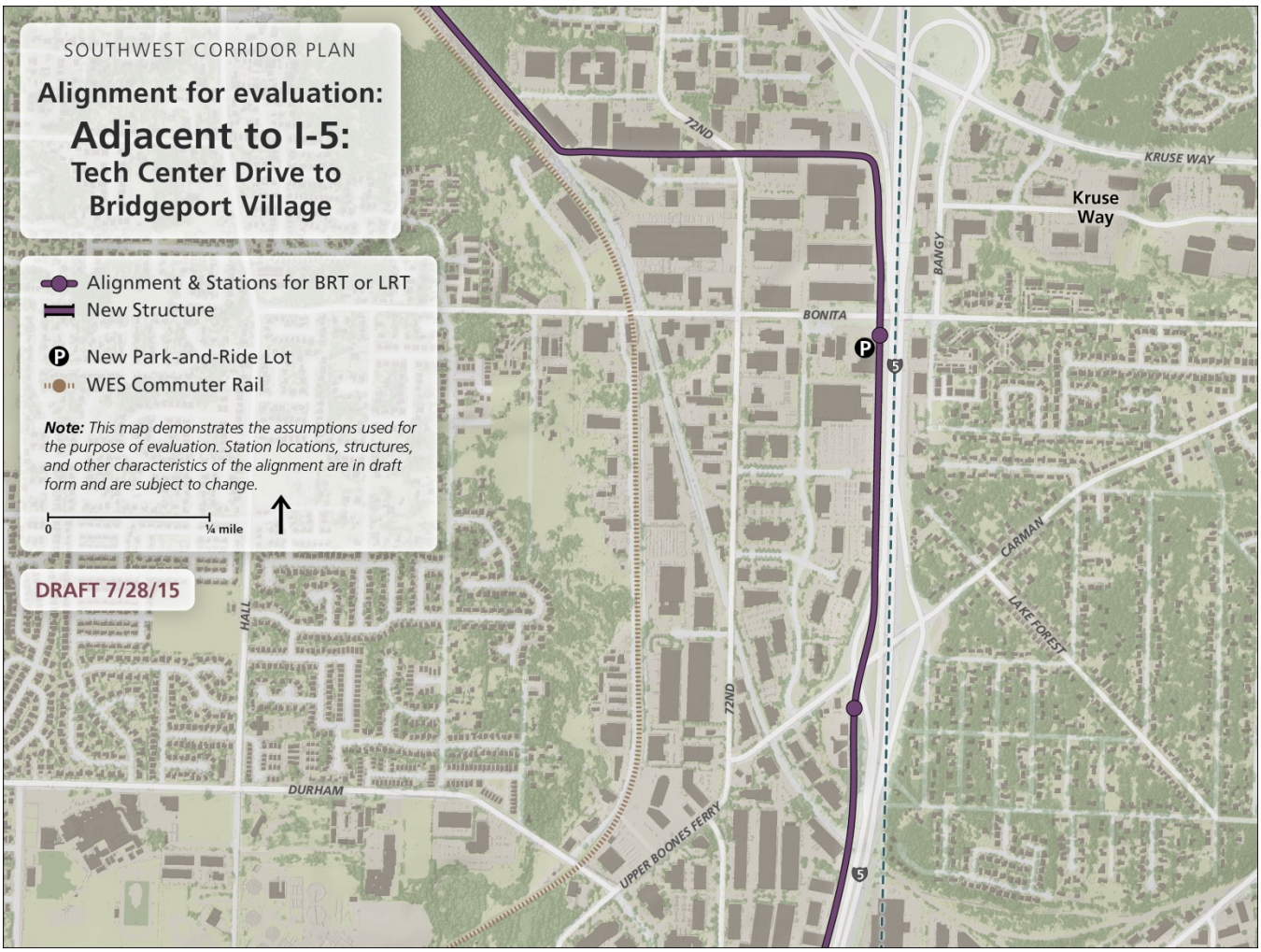
Southeast Tigard: BRT and LRT

Adjacent to freight rail *Adjacent to freight rail*

HCT would run alongside the WES commuter rail tracks between downtown Tigard and SW Bonita Road. South of Bonita, the alignment would split off from WES to run alongside the Union Pacific Railroad (UPRR) tracks. Where the UPRR tracks run under I-5, the HCT alignment would turn south to parallel the freeway approaching a Bridgeport Village station and park-and-ride lot. There would be two stations along the alignment between downtown Tigard and Bridgeport Village, one located near Bonita and the other near SW Upper Boones Ferry Road.

Adjacent to I-5: Tech Center Drive to Bridgeport Village *Adjacent to I-5*

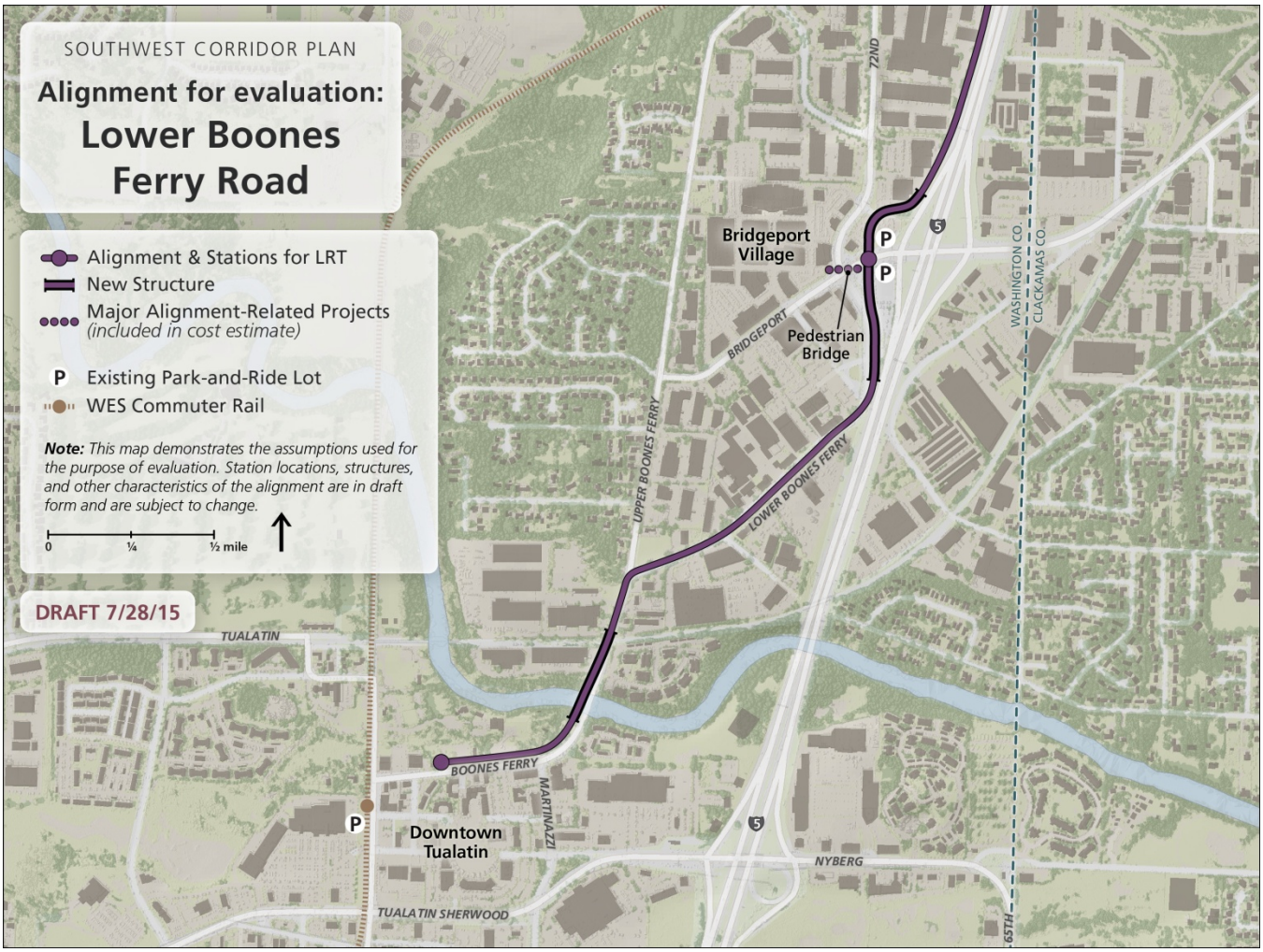
HCT would run alongside the WES tracks between downtown Tigard and just south of SW Tech Center Drive, where it would turn east and run between industrial businesses. HCT would run along the west side of I-5 between the OR-217 interchange and a Bridgeport Village station and park-and-ride lot. There would be two stations along the alignment between downtown Tigard and Bridgeport Village, one located near Bonita Road and the other near SW Carman Drive/SW Upper Boones Ferry Road.



Tualatin: BRT and LRT

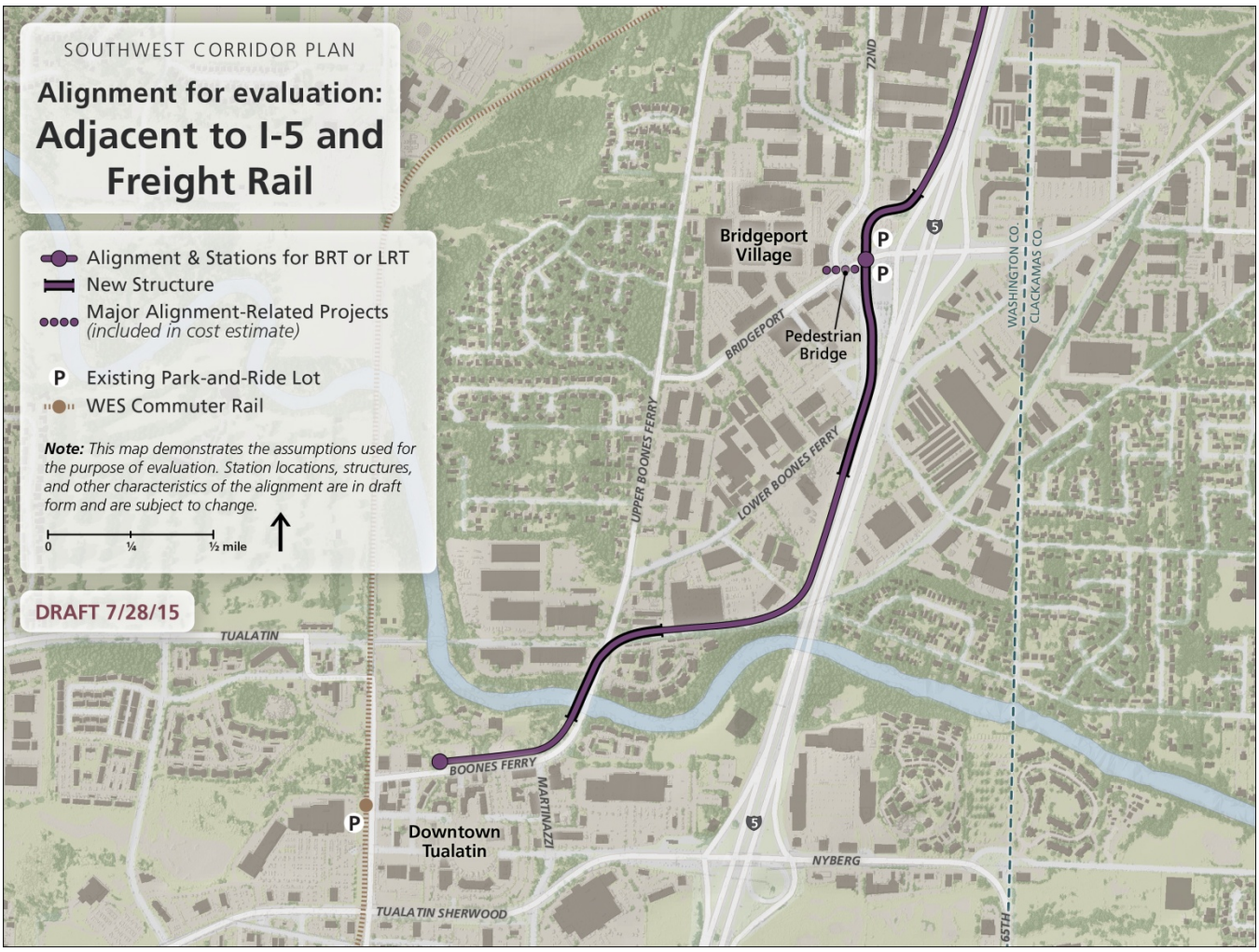
Lower Boones Ferry Road *Lower Boones Ferry*

HCT would drop into the center of SW Lower Boones Ferry Road from an elevated station above Bridgeport Road. HCT would cross over the UPRR freight rail tracks and the Tualatin River on a new structure just west of the existing SW Boones Ferry Road auto bridge. A terminus station would be located north of Boones Ferry Road.



Adjacent to I-5 and freight rail *Adjacent to I-5 and freight rail*

HCT would continue south adjacent to I-5 from an elevated Bridgeport Village station, then turn west to run alongside the Portland Western freight rail tracks. At Boones Ferry Road, HCT would cross over both the rail tracks and the road. The structure would continue across the Tualatin River parallel to the existing Boones Ferry auto bridge. A terminus station would be located north of Boones Ferry Road.



Detailed Methodology and Results

Transit performance

	higher performing				lower performing	
Change in system transit trips	##### *daily new system transit trips*	#### *daily new system transit trips*	### *daily new system transit trips*	## *daily new system transit trips*	# *daily new system transit trips*	*corridor*
Line ridership	##### *daily line riders*	#### *daily line riders*	### *daily line riders*	## *daily line riders*	# *daily line riders*	*corridor*
Travel time	# minutes	## minutes	### minutes	#### minutes	##### minutes	*corridor*
Mixed traffic (BRT only)	0 miles *along # mile segment*	# miles *along # mile segment*	## miles *along # mile segment*	### miles *along # mile segment*	#### miles *along # mile segment*	*segment*
Signalized intersections crossed	# *intersections*	## *intersections*	### *intersections*	#### *intersections*	##### *intersections*	*segment*

smaller number				larger number
#	##	###	####	#####

New system transit trips

Methodology

New system transit trips, or new riders**,** measures the growth of the total transit system ridership with implementation of the proposed project compared to a transit no-build alternative (where no new HCT project is assumed). For the purpose of analysis, the modeling base alignment is used outside of the segment in question for all model runs and the local bus network remains constant between model runs (see page 16 for more information on the modeling base alignment).

Most alignment options are represented by model runs defined to isolate those options relative to the modeling base alignment. Some alignment options are not reflected in model runs; those alignments are assessed by estimates of ridership based on related alignments. Estimated ridership numbers are indicated with an asterisk.

Due to a combination of several factors, BRT has much fewer new system transit riders than LRT. In order to inform the July alignment decisions, BRT and LRT values have been colored based on their respective ranges. As a result, LRT and BRT tables are not directly comparable in terms of color. lease refer to the "mode" section on page 17 for important information regarding BRT new system trips.

Colors are assigned to reflect the differences between alignment options, rather than set numerical ranges.

higher performing				**lower performing**
##### *daily new system transit trips*	#### *daily new system transit trips*	### *daily new system transit trips*	## *daily new system transit trips*	# *daily new system transit trips*
larger number				**smaller number**

Results

LRT: Downtown Tigard	
	New system transit trips
Downtown loop	14,500
Commercial loop	14,500*
Clinton crossing	15,600
Ash Avenue	15,700
Branch service	16,700

**Estimated based on related model runs*

BRT: Downtown Tigard	
	New system transit trips
Downtown loop	7,800*
Commercial loop	7,800*
Clinton crossing	8,400*
Ash Avenue	8,400
Branch service	9,000*

**Estimated based on related model runs*

LRT: Southeast Tigard	
	New system transit trips
Adjacent to freight rail	15,700
Adjacent to I-5	16,000

**Estimated based on related model runs*

BRT: Southeast Tigard	
	New system transit trips
Adjacent to freight rail	8,400
Adjacent to I-5	8,600*

**Estimated based on related model runs*

LRT: Bridgeport Village to Tualatin	
	New system transit trips
Lower Boones Ferry	15,700
Adj. to I-5 and freight rail	15,700*

**Estimated based on related model runs*

BRT: Bridgeport Village to Tualatin	
	New system transit trips
Lower Boones Ferry	8,400
Adj. to I-5 and freight rail	8,400*

**Estimated based on related model runs*

Line ridership

Methodology

BRT or LRT projected line ridership is an output of Metro's travel demand model. Model runs were performed for a 2035 horizon year. Line ridership measures the number of daily riders on the specific HCT line (between the terminus and downtown Portland).

Most alignment options are represented by model runs defined to isolate those options relative to the modeling base alignment (see page 16 for more information on the modeling base alignment). Some alignment options are not reflected in model runs; those alignments are assessed by estimates of ridership based on related alignments. Estimated ridership numbers are indicated with an asterisk.

Due to a combination of several factors, BRT has fewer line riders than LRT. In order to inform the July alignment decisions, BRT and LRT values have been colored based on their respective ranges. As a result, LRT and BRT tables are not directly comparable in terms of color. Please refer to the "mode" section on page 17 for important information regarding BRT line ridership.

Colors are assigned to reflect the differences between alignment options, rather than set numerical ranges.

Results

LRT: Downtown Tigard	*Line ridership*
Downtown loop	41,800
Commercial loop	41,800*
Clinton crossing	43,600
Ash Avenue	43,500
Branch service	44,400

**Estimated based on related model runs*

BRT: Downtown Tigard	*Line ridership*
Downtown loop	29,600*
Commercial loop	29,600*
Clinton crossing	30,900*
Ash Avenue	30,800
Branch service	31,400*

**Estimated based on related model runs*

LRT: Southeast Tigard	*Line ridership*
Adjacent to freight rail	43,500
Adjacent to I-5	43,600

**Estimated based on related model runs*

BRT: Southeast Tigard	*Line ridership*
Adjacent to freight rail	30,800
Adjacent to I-5	30,900*

**Estimated based on related model runs*

LRT: Bridgeport Village to Tualatin	
	Line ridership
Lower Boones Ferry	43,500
Adj. to I-5 and freight rail	43,500*

**Estimated based on related model runs*

BRT: Bridgeport Village to Tualatin	
	Line ridership
Lower Boones Ferry	30,800
Adj. to I-5 and freight rail	30,800*

**Estimated based on related model runs*

Travel time

Methodology

Travel times for HCT alignments are developed by TriMet based on preliminary design, and represent the travel time from Portland State University (near Jackson Street on the Transit Mall) to downtown Tualatin. Travel times for segments of BRT in mixed traffic are determined by the model. Outside of the particular segment in question, the modeling base alignment is used in order to determine the full-corridor travel time (see page 16 for more information on the modeling base alignment).

BRT travel times are several minutes slower than the equivalent LRT travel times. In order to inform the alignment decisions, BRT and LRT values have been colored based on their respective ranges. As a result, LRT and BRT tables are not directly comparable in terms of color. Please refer to the "mode" section on page 17 for important information regarding BRT travel time.

Colors are assigned to reflect the differences between alignment options, rather than set numerical ranges.

Results

LRT: Downtown Tigard	
	Travel time (min)
Downtown loop	33.7
Commercial loop	31.5
Clinton crossing	29.7
Ash Avenue	31.2
Branch service	30.2

BRT: Downtown Tigard	
	Travel time (min)
Downtown loop	37.6
Commercial loop	34.4
Clinton crossing	32.8
Ash Avenue	34.1
Branch service	31.0

LRT: Southeast Tigard	
	Travel time (min)
Adjacent to freight rail	31.2
Adjacent to I-5	32.3

BRT: Southeast Tigard	
	Travel time (min)
Adjacent to freight rail	34.1
Adjacent to I-5	35.2

LRT: Bridgeport Village to Tualatin	
	Travel time (min)
Lower Boones Ferry	31.2
Adj. to I-5 and freight rail	31.2

BRT: Bridgeport Village to Tualatin	
	Travel time (min)
Lower Boones Ferry	34.1
Adj. to I-5 and freight rail	34.1

Mixed traffic (BRT only)

Methodology

Mixed traffic measures the distance of mixed traffic operations within each segment, based on an average of the northbound and southbound miles in mixed traffic. Because light rail operates entirely in exclusive right-of-way, light rail options are not evaluated using the mixed traffic measure at this time.

Colors are assigned to reflect the differences between alignment options, rather than set numerical ranges.

Results

BRT: Downtown Tigard		
	Total segment length (miles)	*Mixed traffic in segment (miles)*
Downtown loop	2.4	0.5
Commercial loop	2.3	0.5
Clinton crossing	2.1	0.0
Ash Avenue	2.4	0.5
Branch service	2.3	0.5

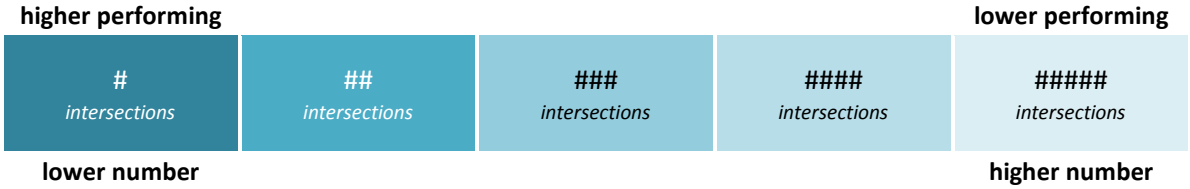
BRT: Southeast Tigard		
	Total segment length (miles)	*Mixed traffic in segment (miles)*
Adjacent to freight rail	1.9	0.0
Adjacent to I-5	2.3	0.0

BRT: Bridgeport Village to Tualatin		
	Total segment length (miles)	*Mixed traffic in segment (miles)*
Lower Boones Ferry	1.2	0.0
Adj. to I-5 and freight rail	1.1	0.0

Signalized intersections crossed

Methodology

Crossing signalized intersections creates opportunities for unexpected delay for both BRT and LRT. This measure is a count of the number of signalized intersections each HCT alignment traverses along the segment in question.



Results

LRT: Downtown Tigard	*Signalized intersections crossed*
Downtown loop	20
Commercial loop	18
Clinton crossing	10
Ash Avenue	18
Branch service	16

BRT: Downtown Tigard	*Signalized intersections crossed*
Downtown loop	20
Commercial loop	18
Clinton crossing	10
Ash Avenue	18
Branch service	16

LRT: Southeast Tigard	*Signalized intersections crossed*
Adjacent to freight rail	3
Adjacent to I-5	1

BRT: Southeast Tigard	*Signalized intersections crossed*
Adjacent to freight rail	3
Adjacent to I-5	1

LRT: Bridgeport Village to Tualatin	*Signalized intersections crossed*
Lower Boones Ferry	3
Adj. to I-5 and freight rail	0

BRT: Bridgeport Village to Tualatin	*Signalized intersections crossed*
Lower Boones Ferry	3
Adj. to I-5 and freight rail	0

Access and development

	higher performing				**lower performing**	
Equitable access to transit	high access	moderate to high access	moderate access	low to moderate access	low access	*corridor*
Redevelopment potential	##### acres	#### acres	### acres	## acres	# acres	*segment*
Support for existing plans	high support	moderate to high support	moderate support	low to moderate support	low support	*segment*

smaller number				**larger number**
#	##	###	####	#####

Equitable access to transit

Methodology

This measure is based on the number of 2035 home-based system transit trips originating in areas with above average rates of low income, limited English proficiency, and people of color.

In order to sum transit trips in these areas, 2010 census data were spatially recalculated according to Metro's transportation analysis zones (TAZs), the boundaries by which the model outputs are organized. Low income and limited English proficiency data were based on census tracts, while people of color data were based on census blocks. In the process of reallocating population data to TAZs, non-residential areas were masked to achieve more accurate distribution. TAZs with a proportion of each group above the regional average were used to sum home-based system transit trips. Each build alternative was compared to the no-build model run in order to calculate the total number of new trips.

Some alignment options are not reflected in model runs; those alignments are assessed by estimates based on other related model runs. Estimated numbers are indicated with an asterisk.

Results

LRT: Downtown Tigard				
	New home-based system transit trips in areas with above average rates of…			
	low income	limited English proficiency	people of color	*Rating*
Downtown loop	3,900	1,800	3,300	moderate access
Commercial loop	3,900*	1,800*	3,300*	moderate access
Clinton crossing	4,100	1,900	3,600	moderate to high access
Ash Avenue	4,100	2,000	3,600	moderate to high access
Branch service	4,500	1,800	3,500	moderate to high access

**Estimated based on related model runs*

BRT: Downtown Tigard				
	New home-based system transit trips in areas with above average rates of…			
	low income	limited English proficiency	people of color	*Rating*
Downtown loop	2,300*	900*	1,700*	moderate access
Commercial loop	2,300*	900*	1,700*	moderate access
Clinton crossing	2,500*	1,000*	1,700*	moderate access
Ash Avenue	2,500	1,000	1,900	moderate access
Branch service	2,700*	900*	1,800*	moderate access

**Estimated based on related model runs*

LRT: Southeast Tigard				
	New home-based system transit trips in areas with above average rates of…			
	low income	limited English proficiency	people of color	*Rating*
Adjacent to freight rail	4,100	2,000	3,600	moderate access
Adjacent to I-5	4,300	2,200	3,600	moderate to high access

**Estimated based on related model runs*

BRT: Southeast Tigard				
	New home-based system transit trips in areas with above average rates of…			
	low income	limited English proficiency	people of color	*Rating*
Adjacent to freight rail	2,500	1,000	1,900	moderate access
Adjacent to I-5	2,500*	1,200*	1,900*	moderate access

**Estimated based on related model runs*

LRT: Bridgeport Village to Tualatin				
	New home-based system transit trips in areas with above average rates of…			
	low income	limited English proficiency	people of color	*Rating*
Lower Boones Ferry	4,100*	2,000*	3,600*	moderate access
Adj. to I-5 and freight rail	4,100	2,000	3,600	moderate access

**Estimated based on related model runs*

BRT: Bridgeport Village to Tualatin				
	New home-based system transit trips in areas with above average rates of…			
	low income	limited English proficiency	people of color	*Rating*
Lower Boones Ferry	2,500*	1,000*	1,900*	moderate access
Adj. to I-5 and freight rail	2,500	1,000	1,900	moderate access

**Estimated based on related model runs*

Redevelopment potential

Methodology

Redevelopment potential measures the total acreage of buildable and redevelopable land within a quarter mile from the HCT stations along the segment in question. This is merely a representation of the potential for land to have new construction on it during and/or after construction of an HCT line. This number does not represent an assurance that HCT will spur redevelopment on a particular location. An analysis of the impact of HCT on site-specific redevelopment parcels will occur later in the project.

The methodology for this calculation is:

- Step 1: Identify vacant tax lots (and complement developed tax lots) by zoning class
- Step 2: Remove tax lots from the BLI that don't have the potential to provide residential or employment growth capacity (e.g., parks)
- Step 3: Calculate deductions for environmental resources[1]
- Step 4: Calculate deductions for "future streets"[2]
- Step 5: Sum up total remaining acreage that is considered buildable/redevelopable

Because the downtown Tigard alignments cover a longer distance with more stations than the Southeast Tigard and Tualatin alignments, the acreage values differ greatly between the two areas. As a result, colors are assigned to reflect the differences between alignment options, rather than set numerical ranges.

[1] Environmental resources considered include Metro's Title 3, Title 13, FEMA flood way and steep slopes over 25%.

[2] The BLI accounts for future streets on a tax lot-by-tax lot basis. The buildable area of each tax lot is reduced on the basis of individual tax lot size.

Results

LRT and BRT: Downtown Tigard	
	Redevelopable acres
Downtown loop	39
Commercial loop	40
Clinton crossing	24
Ash Avenue	41
Branch service	90

LRT and BRT: Southeast Tigard	
	Redevelopable acres
Adjacent to freight rail	13
Adjacent to I-5	15

LRT and BRT: Bridgeport Village to Tualatin	
	Redevelopable acres
Lower Boones Ferry	4
Adj. to I-5 and freight rail	4

Support for existing plans

Methodology

Qualitative analysis of the extent to which each alignment supports local plans, such as the Barbur Concept Plan and Tigard Triangle Strategic Plan.

higher performing				**lower performing**
high support	moderate to high support	moderate support	low to moderate support	low support
Alignment identified in a local land use plan as integral to the successful implementation of the plan goals	*Alignment still within the boundaries of the plan and will play a large role in the implementation of the plan goals*	*Alignment will serve some of the plan goals in one area, while possibly bypassing other areas altogether*	*Alignment will offer minimal support of a local adopted land use plan*	*Alignment offers no tangible benefit to local adopted land use plans*

Results

LRT and BRT: Downtown Tigard		
	Support for existing plans	*Rating*
Downtown loop	Project supports vision outlined in the Tigard Triangle Strategic Plan. Offers additional multimodal crossing of OR-217. Project is supportive of Downtown Vision, but conflicts somewhat with Tigard Downtown Improvement Plan by placing transit alignment along a designated urban greenway south of Main Street.	moderate to high support
Commercial loop	Project supports vision outlined in the Tigard Triangle Strategic Plan. Offers additional multimodal crossing of OR-217. Project is supportive of Downtown Vision and Tigard Downtown Improvement Plan.	moderate to high support
Clinton crossing	Project is not fully supportive of the Tigard Triangle Strategic Plan, as it does not support enhanced connectivity and by-passes land uses in the southern portion of the area. Project is supportive of Downtown Vision, but conflicts somewhat with Tigard Downtown Improvement Plan by placing transit alignment along a designated urban greenway south of Main Street.	moderate support
Ash Avenue	Project supports vision outlined in the Tigard Triangle Strategic Plan. Offers additional transit/bike/ped crossing, as well as a separate auto crossing, of OR-217. Project is supportive of Downtown Vision.	moderate to high support
Branch service	Project supports vision outlined in the Tigard Triangle Strategic Plan. Project is supportive of Downtown Vision and Tigard Downtown Improvement Plan.	moderate to high support

LRT and BRT: Southeast Tigard		
	Support for existing plans	*Rating*
Adjacent to freight rail	The City of Tigard has no plans to explore land use changes in the area. The project is not in conflict with existing land use designations in the Tigard Comprehensive Plan.	moderate support
Adjacent to I-5	The City of Tigard has no plans to explore land use changes in the area. The project is not in conflict with existing land use designations in the Tigard Comprehensive Plan.	moderate support

LRT and BRT: Bridgeport Village to Tualatin		
	Support for existing plans	*Rating*
Lower Boones Ferry	The City of Tualatin completed and adopted the *Linking Tualatin Plan* in 2013, amending the Tualatin Development Code to allow for greater flexibility to support transit use. This option supports that plan.	moderate support
Adj. to I-5 and freight rail	The City of Tualatin completed and adopted the *Linking Tualatin Plan* in 2013, amending the Tualatin Development Code to allow for greater flexibility to support transit use. This option supports that plan.	moderate support

Mobility

	higher performing				**lower performing**	
Freight	minimal or no overlap	some local overlap	substantial local overlap	some state or regional overlap	substantial state or regional overlap	*segment*
Traffic	major opportunity for improvement	some opportunity for improvement	negligible impact	some negative impact	major negative impact	*segment*
Transportation safety	major improvement potential	minor improvement potential	negligible impact	minor negative impact	major negative impact	*segment*
Street connectivity	## new connections	# new connections	no change	# connections eliminated	## connections eliminated	*segment*
Bike improvements	#### miles	### miles	## miles	# miles	0 miles	*segment*
Pedestrian improvements	#### miles	### miles	## miles	# miles	0 miles	*segment*

smaller number				**larger number**
#	##	###	####	#####

Freight

Methodology

Overlap between freight networks and other modal improvements were identified by comparing project improvements with state, regional, and local freight designations. State designations include the OHP Freight Map and the ORS 366.215 Oversize Freight Map. Regional designations include the RTP Freight Map. Local designations include the Portland Freight Plan Maps. Any transit system would be design to maintain freight access and movement.

higher performing				lower performing
minimal or no overlap	some local overlap	substantial local overlap	some state or regional overlap	substantial state or regional overlap

Results

LRT and BRT: Downtown Tigard		
	Freight route overlap	*Rating*
Downtown loop	Overlaps with Hall, a local truck route. No overlap with state or regional freight routes. Includes at-grade crossing of Hunziker, which is a regional freight connector.	some local overlap
Commercial loop	No overlap with state, regional, or local freight routes. Includes at-grade crossings of Hunziker, which is a regional freight connector, and Hall, which is a local truck route.	minimal or no overlap
Clinton crossing	No overlap with state, regional, or local freight routes. Includes at-grade crossing of Hall, which is a local truck route.	minimal or no overlap
Ash Avenue	No overlap with state, regional, or local freight routes. Includes at-grade crossing of Hall, which is a local truck route.	minimal or no overlap
Branch service	No overlap with state, regional, or local freight routes. Includes at-grade crossings of Hunziker, which is a regional freight connector, and Hall, which is a local truck route.	minimal or no overlap

LRT and BRT: Southeast Tigard		
	Freight route overlap	*Rating*
Adjacent to freight rail	No overlap with state, regional, or local freight routes. Includes at-grade crossing of 72nd, which is a regional freight connector and local truck route.	minimal or no overlap
Adjacent to I-5	No overlap with state, regional, or local freight routes. Includes at-grade crossing of 72nd, which is a regional freight connector and local truck route.	minimal or no overlap

LRT and BRT: Bridgeport Village to Tualatin		
	Freight route overlap	*Rating*
Lower Boones Ferry Road	Overlaps with Lower Boones Ferry Road, a regional freight connector and local freight route. Parallels but does not overlap Boones Ferry Road, a regional freight connector. No overlap with state freight routes.	some state or regional overlap
Adjacent to I-5 and freight rail	No overlap with state, regional, or local freight routes. Parallels but does not overlap Boones Ferry Road, a regional freight connector.	minimal or no overlap

Traffic

Methodology

Impacts to traffic, both negative and positive, of a high-capacity transit project were considered, including volume-to-capacity (V/C) ratio and vehicle queuing, based on the July 2014 traffic analysis completed for the project. This analysis considered the potential for some mode shift to transit, the use of dedicated transit lanes where appropriate, signal pre-emption by transit, and potential lane configurations intended to optimize traffic performance while minimizing needed right-of-way acquisitions. The analysis looked at key bottleneck or capacity constraint locations in the corridor between Portland and Tualatin. Mitigation will be identified to address negative impacts during the environmental phase of the project.

higher performing → **lower performing**

major opportunity for improvement	some opportunity for improvement	negligible impact	some negative impact	major negative impact
Alignment provides opportunities for improving motor vehicle traffic at key system motor vehicle bottlenecks.	*Alignment provides opportunities for improving motor vehicle traffic at non-bottleneck locations.*	*Alignment results in negligible positive or negative impacts to motor vehicle traffic other than mode shift to transit.*	*Alignment results in minor negative impacts to motor vehicle traffic.*	*Alignment results in significant negative impacts to motor vehicle traffic.*

Results

LRT and BRT: Downtown Tigard		
	Traffic impact	*Rating*
Downtown loop	Includes Beveland overcrossing of OR 217, which relieves adjacent OR 217 interchanges. Alignment turns at Hall & Scoffins, adding congestion, and pushing intersection close to capacity in future year.	some opportunity for improvement
Commercial loop	Includes Beveland overcrossing of OR 217, which relieves adjacent OR 217 interchanges.	major opportunity for improvement
Clinton crossing	Negligible traffic impacts.	negligible impact
Ash Avenue	Negligible traffic impacts.	negligible impact
Branch service	Includes Beveland overcrossing of OR 217, which relieves adjacent OR 217 interchanges.	major opportunity for improvement

LRT and BRT: Southeast Tigard		
	Traffic impact	*Rating*
Adjacent to freight rail	Alignment is completely separated from traffic except for at-grade street crossings.	some negative impact
Adjacent to I-5	Alignment is completely separated from traffic except for at-grade street crossings.	negligible impact

LRT and BRT: Bridgeport Village to Tualatin		
	Traffic impact	*Rating*
Lower Boones Ferry Road	Alignment is largely separated from traffic, other than a short in-street segment of Lower Boones Ferry Road south of Bridgeport Road. Negligible impact on traffic.	negligible impact
Adjacent to I-5 and freight rail	Alignment is completely separated from traffic.	negligible impact

Transportation safety

Methodology

Construction of a project alignment would bring the opportunity to address high-crash locations along that alignment, as any high-capacity transit project will include consideration of safety improvements as appropriate, but would also introduce additional complexity with the introduction of a new mode. As a presumed median-running alignment for in-street segments, Highway Safety Manual principles were used to evaluate safety impacts on each alignment, with consideration of the additional complexity created by the new mode. Safety review is generally qualitative.

higher performing				**lower performing**
major improvement potential	minor improvement potential	negligible impact	minor negative impact	major negative impact
Alignment includes opportunity to address high-severity crashes, no additional complexity.	*Alignment includes opportunity to address high-severity crashes, but introduces additional complexity.*	*Alignment has a negligible effect on high-severity crashes.*	*Alignment increases risk of high-severity crashes.*	*Alignment significantly increases risk of high-severity crashes.*

Results

LRT and BRT: Downtown Tigard		
	Transportation safety	*Rating*
Downtown loop	Includes Beveland overcrossing of OR 217, which would provide a safer route for people biking and walking. Other impacts to street network have negligible safety impact.	minor improvement potential
Commercial loop	Includes Beveland overcrossing of OR 217, which would provide a safer route for people biking and walking. Other impacts to street network have negligible safety impact.	minor improvement potential
Clinton crossing	Includes Clinton overcrossing of OR 217, which would provide a safer route for people biking and walking. Other impacts to street network have negligible safety impact.	minor improvement potential
Ash Avenue	Includes Beveland overcrossing of OR 217, which would provide a safer route for people biking and walking. Other impacts to street network have negligible safety impact.	minor improvement potential
Branch service	Includes Beveland overcrossing of OR 217, which would provide a safer route for people biking and walking. Other impacts to street network have negligible safety impact.	minor improvement potential

LRT and BRT: Southeast Tigard		
	Transportation safety	*Rating*
Adjacent to freight rail	Alignment is completely separated from traffic except for at-grade street crossings.	negligible impact
Adjacent to I-5	Alignment is completely separated from traffic except for at-grade street crossings.	negligible impact

LRT and BRT: Bridgeport Village to Tualatin		
	Transportation safety	*Rating*
Lower Boones Ferry Road	Alignment adds a median along a segment of Lower Boones Ferry Road, reducing likelihood of injury crashes but introduces complexity. Low rate of high-severity crashes along route.	minor improvement potential
Adjacent to I-5 and freight rail	Alignment is completely separated from traffic.	negligible impact

Street connectivity

This measure is an assessment of the potential impacts each alignment would have on street network connectivity, based on the number of roadway, bicycle and pedestrian connections added or eliminated.

higher performing				**lower performing**
## new connections	# new connections	no change	# connections eliminated	## connections eliminated
larger number	**smaller number**		**smaller number**	**larger number**

Results

LRT and BRT: Downtown Tigard		
	Street connectivity	*Rating*
Downtown loop	Includes Beveland overcrossing, Wall and Commercial Street extensions, and one block of new street in downtown Tigard.	4 new connections
Commercial loop	Includes Beveland overcrossing.	3 new connections
Clinton crossing	Includes two blocks of new street in downtown Tigard.	3 new connections
Ash Avenue	Includes Ash Avenue extension to Hall.	3 new connections
Branch service	Includes Beveland overcrossing.	3 new connections

LRT and BRT: Southeast Tigard		
	Street connectivity	*Rating*
Adjacent to freight rail	No changes to street network.	no change
Adjacent to I-5	No changes to street network.	no change

LRT and BRT: Bridgeport Village to Tualatin		
	Street connectivity	*Rating*
Lower Boones Ferry Road	No changes to street network.	no change
Adjacent to I-5 and freight rail	No changes to street network.	no change

Bike

Methodology

The regional bicycle facility network was reviewed and compared to existing bicycle facility gaps. The amount of bicycle facility gaps on both sides of the street filled by the project within each project segment was evaluated, based on the working assumption that an in-street transit alignment would include bicycle facilities on both sides. For example, a five-mile segment could potentially have up to ten miles of bike improvements. While this analysis focused only on gaps, deficiencies should be identified in the subsequent design phases to identify needs and opportunities within the project constraints.

Results

LRT and BRT: Downtown Tigard	
Downtown loop	2.8 miles
Commercial loop	2.4 miles
Clinton crossing	1.9 miles
Ash Avenue	2.1 miles
Branch service	1.9 miles

LRT and BRT: Southeast Tigard	
Adjacent to freight rail	0 miles
Adjacent to I-5	0 miles

LRT and BRT: Bridgeport Village to Tualatin	
Lower Boones Ferry Road	0 miles
Adjacent to I-5 and freight rail	0 miles

Pedestrian

The regional sidewalk and walkway network was reviewed to identify existing sidewalk gaps. The amount of sidewalk gaps on both sides of the street filled by the project within each project segment was evaluated, based on the working assumption that an in-street transit alignment would include sidewalk on both sides. For example, a five-mile segment could potentially have up to ten miles of sidewalk improvements. While this analysis focused only on gaps, deficiencies should be identified in the subsequent design phases to identify needs and opportunities within the project constraints.

Results

LRT and BRT: Downtown Tigard	
Downtown Loop	2.6 miles
Commercial to WES	2.2 miles
Clinton crossing	2.3 miles
Beveland to Ash	2.0 miles
Branch service	1.9 miles

LRT and BRT: Southeast Tigard	
Adjacent to freight rail	0 miles
Adjacent to I-5	0 miles

LRT and BRT: Bridgeport Village to Tualatin	
Lower Boones Ferry Road	0 miles
Adjacent to I-5 and freight rail	0 miles

Cost

	higher performing				lower performing	
Capital cost: segment	$ million	$$ million	$$$ million	$$$$ million	$$$$$ million	*segment*
Operations and maintenance costs	low cost	low to moderate cost	moderate cost	moderate to high cost	high cost	*corridor*

lower cost				higher cost
$	$$	$$$	$$$$	$$$$$

Capital cost

Methodology

Capital costs include all of the costs associated with planning, designing, permitting, securing right of way, constructing civil works associated with the defined alignment, and the vehicles necessary to operate the high capacity transit scenario. The conceptual cost estimates were developed using drawings that were developed to about a three percent level of design and are subject to change as alignments are refined and more detailed designs are completed. All cost estimates provided in this report are in 2014 dollars and do not include financing or escalation costs.

Cost estimates were developed using a three-step process. First, conceptual engineering drawings were used to define the nature of work and facilitate a "take-off" or measurement of the work to establish quantities. Where defined, actual quantities were used (e.g. feet of track, numbers of parking spaces). The second step was to apply initial cost data to the quantities established in step one, and then to develop unit cost and lump sum cost items. The third step was to consolidate these items into major project cost elements. Engineering and administration cost allocations as well as project contingencies are added on in this phase of the estimate.

The assignment of colors in the tables is based on a comparison of the full-corridor alignment cost for each option to the modeling base alignment. For BRT, the full corridor alignment costs range from $880 million to $1.3 billion. For LRT, the full-corridor alignment costs range from $1.8 billion to $2.1 billion for surface alignments, or $$$$ to $$$$ with a tunnel to the PCC Sylvania campus.

Results

LRT: Downtown Tigard	
	Segment capital cost
Downtown loop	$442 million
Commercial loop	*not available*
Clinton crossing	$353 million
Ash Avenue	$355 million
Branch service	$388 million

BRT: Downtown Tigard	
	Segment capital cost
Downtown loop	$252 million
Commercial loop	*not available*
Clinton crossing	*not available*
Ash Avenue	$239 million
Branch service	$246 million

LRT: Southeast Tigard	
	Segment capital cost
Adjacent to freight rail	$233 million
Adjacent to I-5	$238 million

BRT: Southeast Tigard	
	Segment capital cost
Adjacent to freight rail	$155 million
Adjacent to I-5	$167 million

LRT: Bridgeport Village to Tualatin	
	Segment capital cost
Lower Boones Ferry	$261 million
Adj. to I-5 and freight rail	$256 million

BRT: Bridgeport Village to Tualatin	
	Segment capital cost
Lower Boones Ferry	$152 million
Adj. to I-5 and freight rail	$158 million

Operations and maintenance costs

Methodology

This measure is a preliminary estimate of operating costs based on average weekday vehicle hours, which vary depending on travel time and vehicle headways. Actual operating cost estimates will be calculated at a later date.

higher performing				lower performing
low cost	low to moderate cost	moderate cost	moderate to high cost	high cost

Results

LRT and BRT: Downtown Tigard	
	Operations and maintenance costs
Downtown loop	moderate cost
Commercial loop	moderate cost*
Clinton crossing	low cost
Ash Avenue	low to moderate cost
Branch service	high cost

**Estimated based on related model runs*

LRT and BRT: Southeast Tigard	
	Operations and maintenance costs
Adjacent to freight rail	moderate cost
Adjacent to I-5	moderate cost

LRT and BRT: Bridgeport Village to Tualatin	
	Operations and maintenance costs
Lower Boones Ferry	moderate cost
Adj. to I-5 and freight rail	moderate cost

Engineering complexity

	higher performing				**lower performing**	
Construction impacts	low impact	low to moderate impact	moderate impact	moderate to high impact	high impact	*segment*
Engineering risk	low risk	low to moderate risk	moderate risk	moderate to high risk	high risk	*segment*

Construction impacts

This measure is a qualitative assessment of the temporary impacts that will likely occur while the project is in construction and need to phase construction in order to minimize disruption caused by complex engineering activities. Types of impacts could include traffic diversion, changes to property access, noise and vibration impacts.

higher performing → **lower performing**

low impact	low to moderate impact	moderate impact	moderate to high impact	high impact
Includes minor traffic impacts, right-of-way and little noise or vibration impacts for shorter durations		*Traffic diversions and impacts, right of way access impacts and some noise and vibration*		*Includes significant disruptions for long periods include noise and vibration impacts. Could include significant traffic disruptions*

Results

LRT and BRT: Downtown Tigard		
	Construction impacts	*Rating*
Downtown loop	Would construct new street segment between Scoffins and Commercial Streets and re-align intersection at Scoffins, Hunziker St. and Hall Blvd. Would construct new street segments within Tigard Triangle. Would require traffic diversions and access control during construction, including traffic control on OR-217 during bridge construction.	high impact
Commercial loop	Would require traffic diversions and access control during construction, including traffic control on OR-217 during bridge construction. Would construct new street segments within Tigard Triangle.	moderate impact
Clinton crossing	Would require traffic diversions and access control during construction, including traffic control on OR-217 during bridge construction. Could require special wetland and water quality measures.	moderate to high impact
Ash Avenue	Would require traffic diversions and access control during construction, including traffic control on OR-217 during bridge construction. Could require special wetland and water quality measures. Would construct new street segments within Tigard Triangle.	moderate to high impact
Branch service	Would require traffic diversions and access control during construction, including traffic control on OR-217 during bridge construction. Would construct new street segments within Tigard Triangle.	low to moderate impact

LRT and BRT: Southeast Tigard		
	Construction impacts	*Rating*
Adjacent to freight rail	Assumes 25' offset from freight tracks. If offset requirements increased, multiple building impacts could occur. Existing building setbacks need to be field verified, as some buildings appear to be in railroad right-of-way.	moderate impact
Adjacent to I-5	Tunnel under Bonita Rd. and Carmen Dr. would result in traffic diversions and noise and vibration impacts.	moderate to high impact

LRT and BRT: Bridgeport Village to Tualatin		
	Construction impacts	*Rating*
Lower Boones Ferry Road	Construction would result in traffic and access impacts.	moderate to high impact
Adjacent to I-5 and freight rail	May be difficult to construct given proximity of retaining walls to existing buildings. Setbacks from existing buildings need to be field verified. Buildings within railroad right-of-way and 25' setback may require acquisition	moderate impact

Engineering risk

Qualitative assessment of the relative risks associated with construction of special elements of the design options. Engineering risk could be unknown subsurface conditions, difficult structures, or complicated designs.

higher performing				**lower performing**
low risk	low to moderate risk	moderate risk	moderate to high risk	high risk
Includes few engineering complications with few or no unknowns. A surface alignment with no right of way impacts, through an area where traffic is not concern would qualify as having low engineering risks.	*Surface alignments with right-of-way impacts*	*Surface alignment with right-of-way impacts and significant traffic diversion*	*Cut and cover tunnels and long structures*	*Designs include complicated risks where there are many unknowns and difficult technical issues to resolve. Bored tunnels, long structures and significant geological concerns would decrease this rating*

Results

LRT and BRT: Downtown Tigard		
	Engineering risk	*Rating*
Downtown loop	Would require one-way loop and could have significant impacts to streets and circulation downtown. Would require retaining wall and bridge structures at Beveland. Transit bridge assumed to accommodate autos, bikes and pedestrians.	moderate risk
Commercial loop	Would impact access to business along Commercial St. Would require reconstruction and reconfiguration of the Tigard Transit Center. Assumes 25’ offset from freight tracks. If offset requirements increase, multiple building impacts occur. Would require retaining wall and bridge structures at Beveland. Transit bridge assumed to accommodate autos, bikes and pedestrians.	moderate risk
Clinton crossing	Requires 4000’+ structure due to steep roadway grades on 69th and Dartmouth St. Assumed to include auto, bike and pedestrian connection between Dartmouth and Hall Blvd.	high risk
Ash Avenue	Would require bridge from Beveland to Hall (near Knott St.), including bikes, pedestrians and transit. Would cross wetland area and include multiple property impacts in downtown area. Assumed to include separate auto, bike and pedestrian bridge connecting from Beveland to Wall St.	moderate to high risk
Branch service	Assumes 25’ offset from freight tracks. If offset requirements increased, multiple building impacts could occur. Transit bridge assumed to accommodate autos, bikes and pedestrians.	moderate risk

LRT: Southeast Tigard		
	Engineering risk	*Rating*
Adjacent to freight rail	Assumes 25' offset from freight tracks. If offset requirements increased, multiple building impacts could occur. Alignment would require multiple retaining walls and bridge structures.	moderate to high risk
Adjacent to I-5	Alignment would require multiple retaining walls, and tunnels under Bonita Rd. and Carmen Dr.	moderate to high risk

BRT: Southeast Tigard		
	Engineering risk	*Rating*
Adjacent to freight rail	Assumes 25' offset from freight tracks. If offset requirements increased, multiple building impacts could occur. Alignment would require multiple retaining walls and bridge structures. BRT may require less structure than LRT.	moderate risk
Adjacent to I-5	Alignment would require multiple retaining walls, and tunnels under Bonita Rd. and Carmen Dr.	moderate to high risk

LRT and BRT: Bridgeport Village to Tualatin		
	Engineering risk	*Rating*
Lower Boones Ferry Road	Would require reconfiguration of driveway access and would require some retaining walls and a bridge structure.	moderate risk
Adjacent to I-5 and freight rail	Would require multiple retaining walls and a bridge structures. Adjustment of alignment to allow for potential future I-5 expansion could result in additional impacts. Assumes 25' offset from freight tracks. If offset requirements increased, additional building impacts could occur.	moderate to high risk

Community and environmental impacts

	higher performing				**lower performing**	
Property impacts	low impact	low to moderate impact	moderate impact	moderate to high impact	high impact	*segment*
Property access impacts	# driveways *along # mile segment*	## driveways *along # mile segment*	### driveways *along # mile segment*	#### driveways *along # mile segment*	##### driveways *along # mile segment*	*segment*
Property impacts to historically under-represented populations	low impact	low to moderate impact	moderate impact	moderate to high impact	high impact	*segment*
Visual impacts	low *degree of change*	low to moderate *degree of change*	moderate *degree of change*	moderate to high *degree of change*	high *degree of change*	*segment*
Impacts to parks and historic properties	low impact	low to moderate impact	moderate impact	moderate to high impact	high impact	*segment*

smaller number				**larger number**
#	##	###	####	#####

NOTE: *The measures within the community and environmental impacts category represent potential impacts based on a three percent level of design. These potential impacts would be discussed in much more detail during a Draft Environmental Impact Statement and beyond, including opportunities for revising designs and identifying mitigation strategies.*

Property impacts

Methodology

This measure is based on impacts to properties due to temporary construction easements or displacement. Since this is a simplified methodology and because designs are preliminary, results are reported as order of magnitude estimates.

higher performing				lower performing
low impact	low to moderate impact	moderate impact	moderate to high impact	high impact

Results

LRT: Downtown Tigard	
	Property impacts
Downtown loop	high impact
Commercial loop	moderate impact
Clinton crossing	low to moderate impact
Ash Avenue	moderate to high impact
Branch service	low impact

BRT: Downtown Tigard	
	Property impacts
Downtown loop	*not available*
Commercial loop	*not available*
Clinton crossing	*not available*
Ash Avenue	moderate impact
Branch service	low impact

LRT: Southeast Tigard	
	Property impacts
Adjacent to freight rail	moderate impact
Adjacent to I-5	moderate to high impact

BRT: Southeast Tigard	
	Property impacts
Adjacent to freight rail	moderate impact
Adjacent to I-5	moderate to high impact

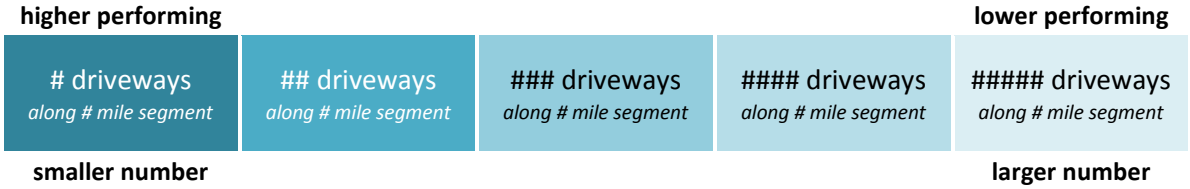
LRT: Bridgeport Village to Tualatin	
	Property impacts
Lower Boones Ferry	moderate impact
Adj. to I-5 and freight rail	moderate impact

BRT: Bridgeport Village to Tualatin	
	Property impacts
Lower Boones Ferry	moderate impact
Adj. to I-5 and freight rail	moderate impact

Property access impacts

Methodology

This measure assesses potential changes to access that might result from a transit alignment on each alignment option were reviewed. A median-running transit alignment would not require driveway closures, but would require re-routing of left turns in some cases. The approximate number of driveways with access changes was identified for each alignment option compared to the length of the segment.



Results

LRT and BRT: Downtown Tigard	
	Property access impacts
Downtown loop	70 driveways *along 2.4 mile segment*
Commercial loop	52 driveways *Along 2.3 mile segment*
Clinton crossing	18 driveways *along 2.1 mile segment*
Ash Avenue	39 driveways *along 2.4 mile segment*
Branch service	37 driveways *along 2.3 mile segment*

LRT and BRT: Southeast Tigard	
	Property access impacts
Adjacent to freight rail	1 driveway *along 1.9 mile segment*
Adjacent to I-5	1 driveway *along 2.3 mile segment*

LRT and BRT: Bridgeport Village to Tualatin	
	Property access impacts
Lower Boones Ferry	3 driveways *along 1.2 mile segment*
Adj. to I-5 and freight rail	0 driveways *along 1.1 mile segment*

Property impacts to historically under-represented populations

Methodology

This measure is based on potential property impacts to historically under-represented populations, focused on areas with rates of limited English proficiency, people of color and low-income above the regional average, based on 2010 census data. The assessment focuses on impacts to residential properties and does not account for commercial property impacts.

Because this assessment is based on 2010 census data at the tract and block level, it does not identify whether the impacted properties are in fact owned or occupied by someone who is of limited English proficiency, low income or person of color. The assessment only identifies if there is an impact in an area where there is a potential for impact to those sensitive populations.

higher performing				**lower performing**
low impact	low to moderate impact	moderate impact	moderate to high impact	high impact
No residential property displacements in areas with above-average people of color, low income, and limited English proficiency.				*Many residential property displacements in areas with above-average people of color, low income, and limited English proficiency.*

Results

LRT and BRT: Downtown Tigard

	Potential residential displacements in areas with above average rates of…			
	low income	limited English proficiency	people of color	*Rating*
Downtown loop	20-25	20-25	15-20	moderate to high impact
Commercial loop	5-10	5-10	1-5	moderate impact
Clinton crossing	5-10	5-10	1-5	moderate impact
Ash Avenue	100-105	100-105	95-100	high impact
Branch service	5-10	5-10	1-5	moderate impact

LRT and BRT: Southeast Tigard				
	Potential residential displacements in areas with above average rates of…			
	low income	limited English proficiency	people of color	*Rating*
Adjacent to freight rail	0	0	0	low impact
Adjacent to I-5	0	0	0	low impact

LRT and BRT: Bridgeport Village to Tualatin				
	Potential residential displacements in areas with above average rates of…			
	low income	limited English proficiency	people of color	*Rating*
Lower Boones Ferry	1-5	0	1-5	low to moderate impact
Adj. to I-5 and freight rail	1-5	0	1-5	low to moderate impact

Visual impacts

Methodology

The results of the built environment are qualitative; the process of avoiding or minimizing the impacts to the built environment has not been completed. If impacts cannot be avoided or minimized, potential mitigation would be discussed as part of the conceptual design and environmental analysis conducted during the NEPA process.

For each design option, there is a potential for **visual impacts or degree of change** created by the physical improvements required by the HCT designs. This qualitative assessment does not reflect the quality or benefit of the change but rather the degree of the change. This assessment of the potential visual impacts is defined as low, moderate or high degree of change. For example, HCT within an existing transportation facility may be a low degree of change. However, introduction of a new transit guideway where a transportation facility does not existing today, may be high degree of change. The table below describes the methodology used in the qualitative assessment of the potential visual impacts.

NOTE: *This is a qualitative assessment. Current designs are not completed at a level detail appropriate for an in-depth technical assessment. The most promising concepts will be designed in a manner to avoid or minimize potential impacts in the next phase of study. Additionally, potential mitigation measures would be evaluated during the NEPA process.*

higher performing				**lower performing**
low *degree of change*	low to moderate *degree of change*	moderate *degree of change*	moderate to high *degree of change*	high *degree of change*
Low displacements of structures or buildings *Limited new structures (e.g. elevated structures, tunnel portals)* *Limited new parking (surface or structured), especially where there is none today* *Minor removal of vegetation (e.g. screening to residential areas)*		*Moderate displacements of structures or buildings* *Moderate new structures (e.g. elevated structures, tunnel portals)* *Moderate new parking (surface or structured), especially where there is none today* *Some removal of vegetation (e.g. screening to residential areas*		*Significant displacements of structures or buildings* *Significant new structures (e.g. elevated structures, tunnel portals)* *Significant new parking (surface or structured), especially where there is none today* *Significant removal of vegetation (e.g. screening to residential areas)*

Results

LRT and BRT: Downtown Tigard		
	Visual impacts	*Rating*
Downtown loop	Would construct new segments of 70th Avenue in the where gaps exist today. BRT or LRT would run in the roadway (separated from auto traffic) in a couplet through the Triangle and looping through downtown. Would include a new structure over OR-217 connecting Beveland Street and Wall Street. Would extend Commercial Street through industrial area to Wall Street. A new street connection would be created parallel to Main Street and Ash Avenue near the Tigard Transit Center.	high *degree of change*
Commercial loop	Would construct new segments of 70th Avenue in the where gaps exist today. BRT or LRT would run in the roadway (separated from auto traffic) in a couplet through the Triangle. Would include a new structure over OR-217 connecting Beveland Street and Wall Street. Would extend Commercial Street through industrial area to Wall Street.	moderate to high *degree of change*
Clinton crossing	LRT or BRT would run ¾ of a mile on an elevated structure from Clinton Street and 70th Avenue in the Tigard Triangle to Hall Boulevard just south of OR-99W, including crossing over OR-217 just south of the interchange with 99W. A new street connection would be created parallel to Main street, connecting Hall Boulevard, Scoffins Avenue, and Commercial Street near the Tigard Transit Center.	high *degree of change*
Ash Avenue	Would construct new segments of 70th Avenue in the where gaps exist today. BRT or LRT would run in the roadway (separated from auto traffic) in a couplet through the Triangle. Would include a new structure over OR-217 between Beveland Street and Hall Boulevard near Knoll Drive. Several multi-family housing structures would be displaced in downtown Tigard.	high *degree of change*
Branch service	Would construct new segments of 70th Avenue in the where gaps exist today. BRT or LRT would run in the roadway (separated from auto traffic) in a couplet through the Triangle. Would include a new structure over OR-217 connecting Beveland Street and Wall Street.	moderate *degree of change*

LRT and BRT: Southeast Tigard		
	Visual impacts	*Rating*
Adjacent to freight rail	BRT or LRT would run adjacent to WES and freight rail tracks. Would not include roadway widening. Two small surface park-and-ride lots would be added.	low *degree of change*
Adjacent to I-5	BRT or LRT would run adjacent to WES and freight rail tracks, between industrial properties, and alongside I-5. Would not include roadway widening. One small surface park-and-ride lot would be added.	low *degree of change*

LRT and BRT: Bridgeport Village to Tualatin		
	Visual impacts	*Rating*
Lower Boones Ferry Road	Existing roadway of Lower Boones Ferry would be widened to include a dedicated transitway. Would include a new structure crossing over Tualatin River parallel to the existing Boones Ferry Road bridge, elevated up to 30 feet higher than the auto bridge.	high *degree of change*
Adjacent to I-5 and freight rail	Would include a new structure crossing over Boones Ferry, freight rail tracks and Tualatin River, elevated up to 30 feet higher than the roadway. Would not include roadway widening.	moderate to high *degree of change*

Natural areas and historic properties

Methodology

For this measure, parks, wetlands and historic properties were identified along each alignment. A low to high impact rating was assigned to each option based on the number, duration and severity of potential impacts. Though some impacts may potentially be avoided or mitigated, changes to the alignment design could result in an increase in other property impacts or add cost to the project. Potential impacts to natural areas and historic properties will be evaluated in more detail in the DEIS, including avoidance or mitigation strategies.

higher performing				lower performing
low impact	low to moderate impact	moderate impact	moderate to high impact	high impact

Results

LRT and BRT: Downtown Tigard		
	Potential impacts to natural areas and historic properties	*Rating*
Downtown loop	No potential historic impacts have been identified. Potential impacts to Potso Dog Park.	low to moderate impact
Commercial loop	No potential historic impacts have been identified. Potential impacts to Potso Dog Park.	low to moderate impact
Clinton crossing	No potential historic impacts have been identified. Potential impacts to the wetland area located between Costco, Walmart and OR-217.	low to moderate impact
Ash Avenue	No potential historic impacts have been identified. Potential impacts to Knez Wetland, which is also a designated park.	moderate impact
Branch service	No potential historic impacts have been identified. Potential impacts to Potso Dog Park.	low to moderate impact

LRT and BRT: Southeast Tigard		
	Potential impacts to natural areas and historic properties	*Rating*
Adjacent to freight rail	No potential impacts to historic properties or natural areas have been identified.	low impact
Adjacent to I-5	No potential impacts to historic properties or natural areas have been identified.	low impact

LRT and BRT: Bridgeport Village to Tualatin		
	Potential impacts to natural areas and historic properties	*Rating*
Lower Boones Ferry Road	No potential historic impacts have been identified. Potential partial impact to Tualatin River Greenway.	low to moderate impact
Adjacent to I-5 and freight rail	No potential historic impacts have been identified. Potential partial impact to Tualatin River Greenway.	low to moderate impact

Appendix A: Project Goals in Relation to Evaluation Criteria

This appendix shows how the evaluation criteria employed in the High Capacity Transit Technical Evaluation Results and Methodology, Part 2, relate to the established goals of the Southwest Corridor project.

Project Goals

The purpose of the Southwest Corridor project is to interconnect Tualatin, Tigard, Southwest Portland and the region's central city through a high capacity transit project and appropriate community investments in a congested corridor to improve mobility and create the conditions that will allow communities in the corridor to achieve their land use vision.

The thirteen goals of the project are:

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

Evaluation Criteria

Potential alignments and other variable components of the HCT line will be evaluated across a variety of criteria, including transit performance, access and development, mobility, cost, engineering complexity, and community and environmental impacts. This document, along with the Key Issue memos, attempts to evaluate the relative performance of the South Portland alignment options against these criteria, using a number of objective measures.

The following table shows how these criteria and measures relate to the project goals. Note that some goals apply to multiple criteria.

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

Note that the purpose, goals, objectives and measures may be refined through the Draft Environmental Impact Statement (DEIS) process.