## Southwest Corridor Plan

# Key Issues: Tualatin

## October 15, 2015

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# Key Issues: Tualatin

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# Tualatin Key Issues: introduction and summary

## Southwest Corridor Plan overview

The Southwest Corridor Plan is a package of transit, roadway, bicycle and pedestrian solutions that can help reduce congestion, improve circulation and enhance quality of life in this corridor. The Southwest Corridor Plan defines investments to help realize the local land use visions adopted by each community in the area. These visions include the City of Portland's *Barbur Concept Plan*, the *Tigard High Capacity Transit Land Use Plan*, *Linking Tualatin* and the *Sherwood Town Center Plan*. A major component of the Southwest Corridor Plan is the analysis and evaluation of both Bus Rapid Transit (BRT) and Light Rail Transit (LRT) travel modes for several potential route alignments to link Central Portland, Southwest Portland, Tigard and Tualatin.

The Plan is being researched and developed by a group of partners including agencies involved in funding, constructing and operating the transportation investments chosen and the jurisdictions in the project area. A steering committee consisting of elected leaders and appointees from these partners is leading the planning process. Past decisions of the Southwest Corridor Steering Committee include:

- In 2013, the committee recommended a Shared Investment Strategy that prioritizes key investments in transit, roadways, active transportation, parks, trails and natural areas.
- In 2014, the committee recommended a narrowed set of high capacity transit design options being considered and directed staff to develop a Preferred Package of transportation investments to support community land use goals.

## Desired outcome: Preferred Package

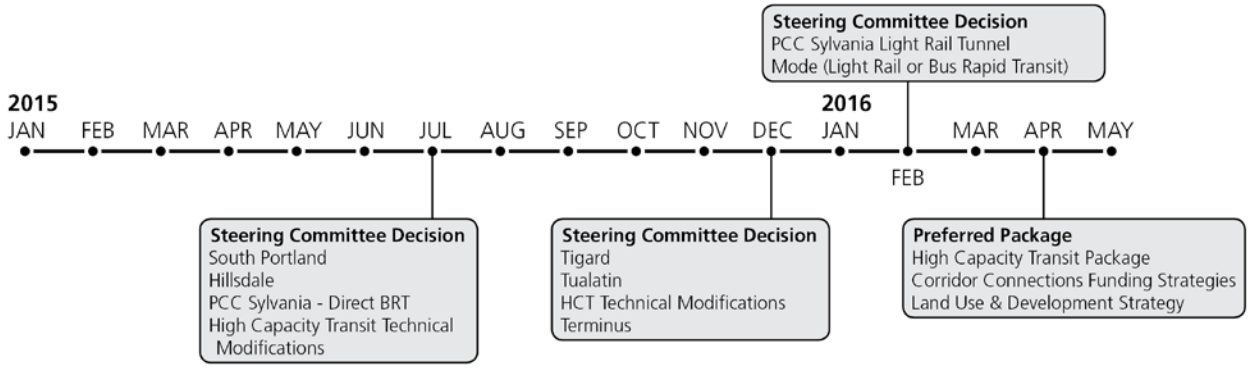
The project partners are working together to develop a Preferred Package by spring 2016 that addresses the needs and aspirations of Southwest Corridor residents and businesses. The Preferred Package will include the following components:

- ***HCT Preferred Alternatives:*** Preferred HCT alignments to study further in a Draft Environmental Impact Statement, including travel 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.

**Southwest Corridor Steering Committee Schedule of Decisions as of October 15, 2015**




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.

## How to use this Key Issues memo

The Southwest Corridor project partners are taking a place-based approach to understanding the key issues related to potential HCT and transportation investments as they relate to local concerns and community aspirations. This Tualatin Key Issues memo is part of a series of memos and technical information on key places throughout the corridor that the public and steering committee can review before giving input and making recommendations on major project decisions.

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

In addition to this report, project staff released a key issues memo on alignment options in Tigard on September 4, 2015, and in October 2015 will release a technical evaluation of HCT alignment options in Tigard and Tualatin. A technical modifications memo on alignment options in Portland's Central Barbur area and reports on travel mode and terminus are also forthcoming. A staff recommendation report that addresses alignment options in Tigard and Tualatin will be available prior to the December 2015 Steering Committee meeting and will include a summary of stakeholder feedback.

The remainder of this document includes:

- a summary of technical information
- a description of the proposed high capacity transit alignments to serve Tualatin, and
- analysis and findings for decision makers and the public to consider.

Appendices contain supplemental information including maps and project lists of Shared Investment Strategy projects involving roadway, bicycle and pedestrian investments being considered for Tualatin, a discussion of general transit mode considerations, and maps highlighting demographic factors in the study area.

## Evaluation factors

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

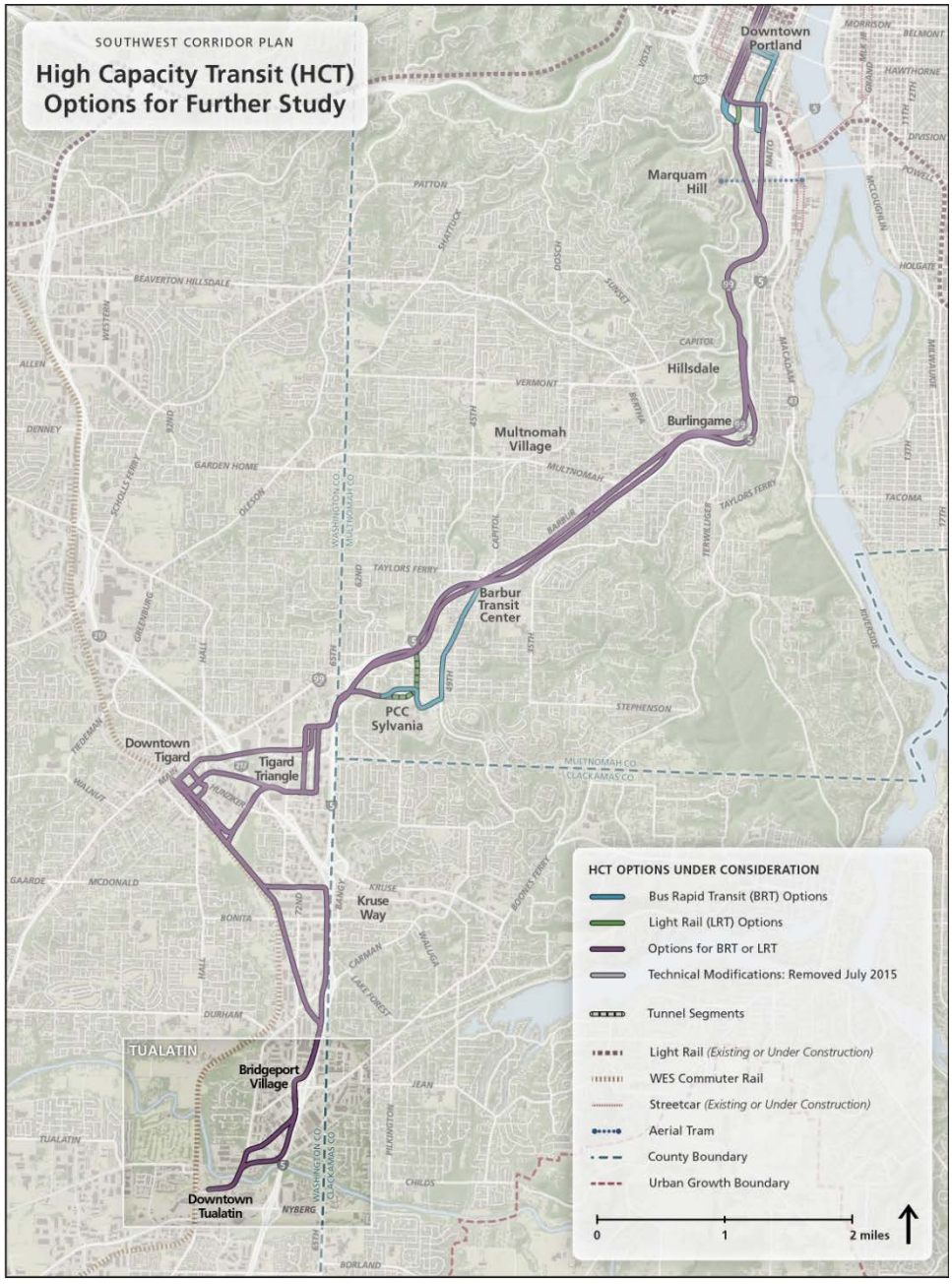
- Transit performance
- Community development
- Mobility
- Capital cost estimates
- Engineering complexity and risk
- Community impacts

# Bridgeport Village to Tualatin Key Issues

Between Bridgeport Village and downtown Tualatin, two HCT alignment options are under consideration. Both options would work for both BRT and LRT:

- Lower Boones Ferry Road
- Adjacent to I-5 and freight rail

Additional options and alternative refinements may materialize as the Plan's analysis, environmental and engineering efforts advance.



## Major decisions in Tualatin

In December 2015 the Southwest Corridor Plan Steering Committee will be asked to make recommendations on where an HCT alignment should terminate and, if a downtown Tualatin terminus is chosen, which proposed HCT alignment between Bridgeport Village and downtown Tualatin will advance to further environmental review through a Draft Environmental Impact Statement (DEIS). This Key Issues memo discusses terminus considerations and focuses on the tradeoffs between the two alignment options currently under consideration so that the public and decision makers can be confident that all options that will enter the DEIS are viable and aligned with project goals.

Other major upcoming decisions which would affect HCT service in Tualatin include:

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

Deliberation and decision making will be driven by how well project elements meet the Southwest Corridor Plan's stated Purpose and Need, including improved mobility and safety for all users and modes of transportation, efficient and reliable transportation choices, wise use of public resources, improved access to key places, and equitable distribution of the benefits and burdens of transportation and land use development. The alignments currently under consideration could adjust in the future as a result of refinements that materialize as the analysis, environmental and engineering efforts advance.

## Tualatin summary

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

| Key considerations | **Evaluation factors** | **Lower Boones Ferry** | **Adjacent to I-5 and freight rail** |
|---|---|---|---|
| **Transit Performance**<br>What are the tradeoffs to consider between the transit performance of the two alignment options? | *Travel time in minutes (PSU to downtown Tualatin)* | – 31 minutes (LRT)<br>– 34 minutes (BRT) | Same |
| | *2035 new transit trips* | – 8,400 (BRT)<br>– 15,700 (LRT) | Same |
| | *2035 line riders* | – 30,800 (BRT)<br>– 43,500 (LRT) | Same |
| | *Mode considerations* | In each direction:<br>– Up to 9 BRT vehicles per hour in the peak to meet demand<br>– At least 4 LRT vehicles per hour in the peak by TriMet policy; demand requires fewer | |
| **Community Development**<br>Can the proposed station locations improve access to pedestrians and bicyclists in a way that will generate meaningful ridership? | *Accessibility* | Both options provide access to downtown Tualatin. Both options would require improvements in bike/ped connectivity to stations. | |
| | *Redevelopment potential* | Redevelopment potential would be identical. | |

| Key considerations | Evaluation factors | Lower Boones Ferry | Adjacent to I-5 and freight rail |
|---|---|---|---|
| **Mobility**<br>Can high capacity transit be designed to minimize negative impacts to auto, freight, bicycle and pedestrian mobility and access?<br>Do the alignment options have differences in the level of mobility benefit or impact? | *Motor vehicle and freight* | – Structures would be designed to not interfere with freight.<br>– Intersections would meet performance targets. | – Would not operate in roadway. No impacts.<br>– Intersections would meet performance targets. |
| | *Pedestrians and bicycles* | No change | |
| | *Safety* | – Addition of roadway median could improve crossing safety. | – Would not operate in roadway. No impacts. |
| | | – Some limits to left turns. | – Would not operate in roadway. No impacts. |
| **Costs**<br>Are the tradeoffs clear between cost and other factors such as reliability, safety, access and community development opportunities?<br>How does cost impact the length of the final HCT alignment? | *Segment capital cost estimates in 2014 dollars* | LRT costs $5 million more.<br>BRT costs pending. | LRT costs $5 million less.<br>BRT costs pending. |
| | *Operating cost* | No notable difference | |
| **Engineering complexity/risk**<br>Complexity and risk add cost to the project and could result in the cost and schedule overruns.<br>What aspects of each alignment add complexity to the project?<br>What aspects of each alignment option present noteworthy risk? | *Risk* | Degree of complexity and risk is considered similar for the two alignment options. | |
| **Community impacts**<br>How would the construction of each alignment impact the area and its residents? | *Comparison of impacts* | – North of river: Roadway expansion resulting in property impacts but no building impacts<br>– South of river: impacts to residential and commercial properties at downtown Tualatin terminus | – North of river: expansion of railroad right-of-way, possibly resulting in building impacts<br>– South of river: same as other option |

## Downtown Tualatin Terminus Considerations

Unlike other places addressed in the Southwest Corridor key issues memo series, the Tualatin area includes a terminus option. Downtown Tualatin is the southernmost terminus option currently under consideration for the Southwest Corridor Plan's HCT system. Analysis of southern terminus factors and options will be addressed in a separate, forthcoming *Terminus Options Memo*. The Southwest Corridor Steering Committee's recommendation on the preferred southern terminus is scheduled for December 2015.

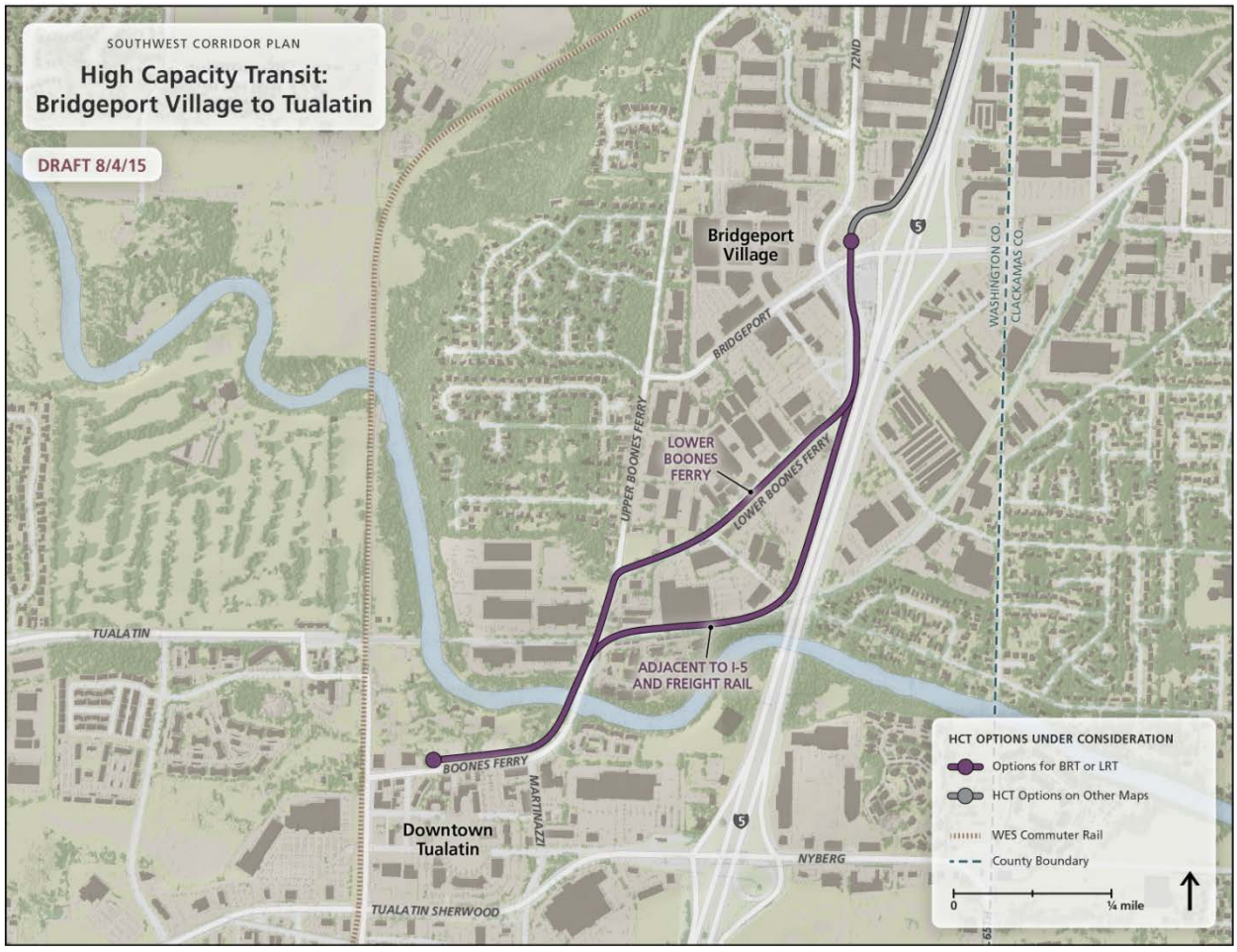
Preliminary analysis suggests that downtown Tualatin would not be an optimal location for a terminus, for reasons including inadequate space and configuration for vehicle turnaround and storage for layover time, lack of space for a park-and-ride or a transit center, high construction cost to reach the location, visual and property impacts from the structure needed to cross the river, and low potential for new transit-oriented development around the station. These factors apply to both light rail and BRT service.

In addition, for light rail the terminus site would require an elevated station in order to allow for a potential extension of HCT service in the future, which would result in substantial visual, property, and cost impacts. Beyond these concerns, reaching downtown Tualatin with light rail in this phase of HCT development may exceed local and federal funding capacities at this time. As a result, in October 2015 the steering committee approved a motion that a light rail terminus in downtown Tualatin is likely infeasible and committed to removing it from further consideration in December unless project staff demonstrates its viability and desirability.

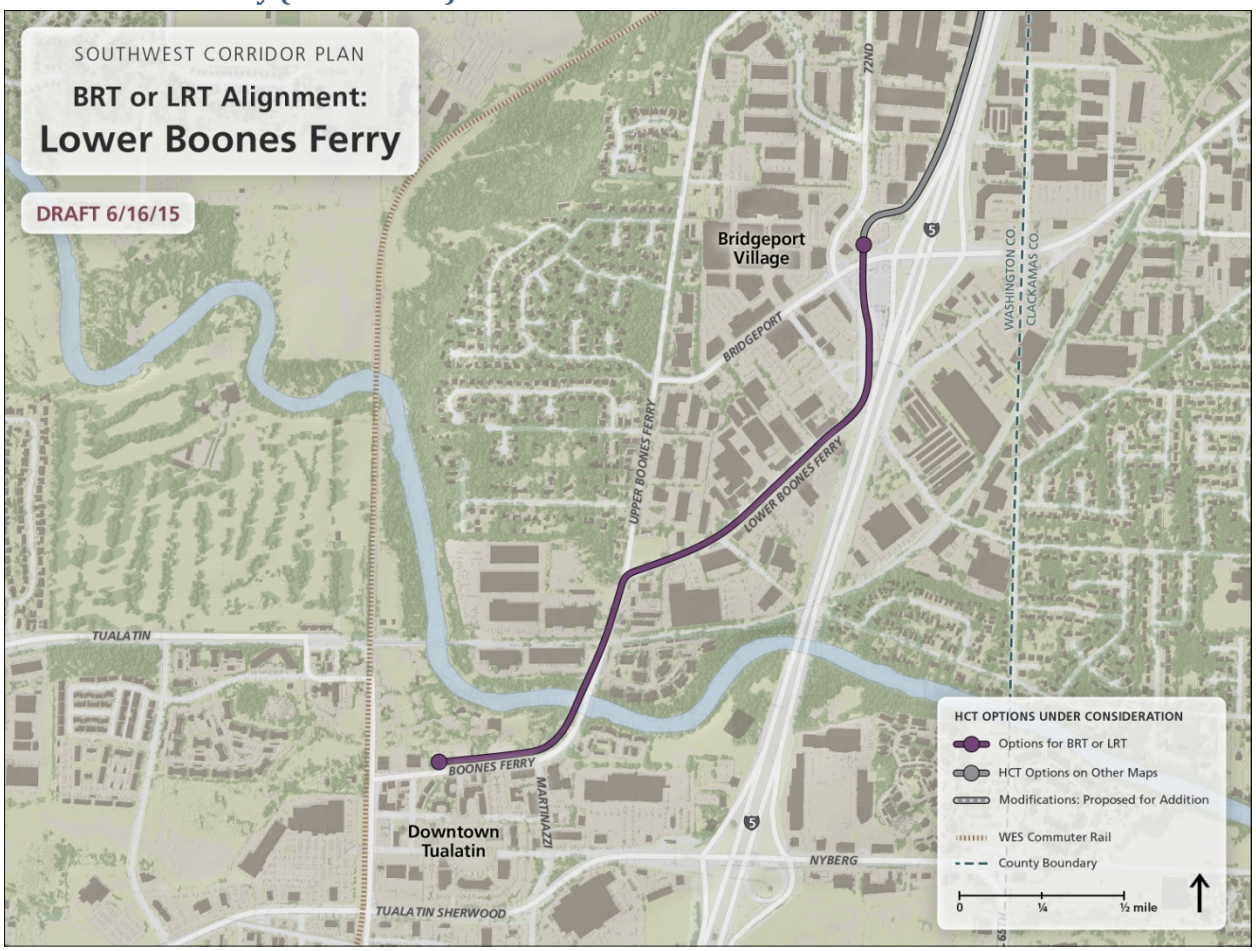
While selection of a terminus other than downtown Tualatin would remove from consideration both HCT options addressed in this document, the Southwest Corridor Plan would continue to consider ways to improve transit connectivity in the southern portion of the corridor. For example, the new 97 local bus line, a product of the Southwest Service Enhancement Plan developed in coordination with the Southwest Corridor Plan, will connect Sherwood and Tualatin with local bus service. If the HCT terminus is not located in downtown Tualatin, line 97 would extend to the selected terminus station to the north. Other transit improvements would also be considered, such as an improved bus hub (details to be determined) in Tualatin to provide a transfer point to the line 97, rerouting of an existing bus line to provide direct service from downtown Tualatin to PCC-Sylvania and improved bus shelters for routes in the Tualatin area. Other bus lines, including lines 76 and 96, will continue to connect Tualatin to Bridgeport Village and locations to the north. In addition, the city of Tualatin would still have an HCT station if the terminus is located at Bridgeport Village, which would also retain the potential for future HCT access to downtown Tualatin.

## Tualatin HCT alignment option descriptions

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

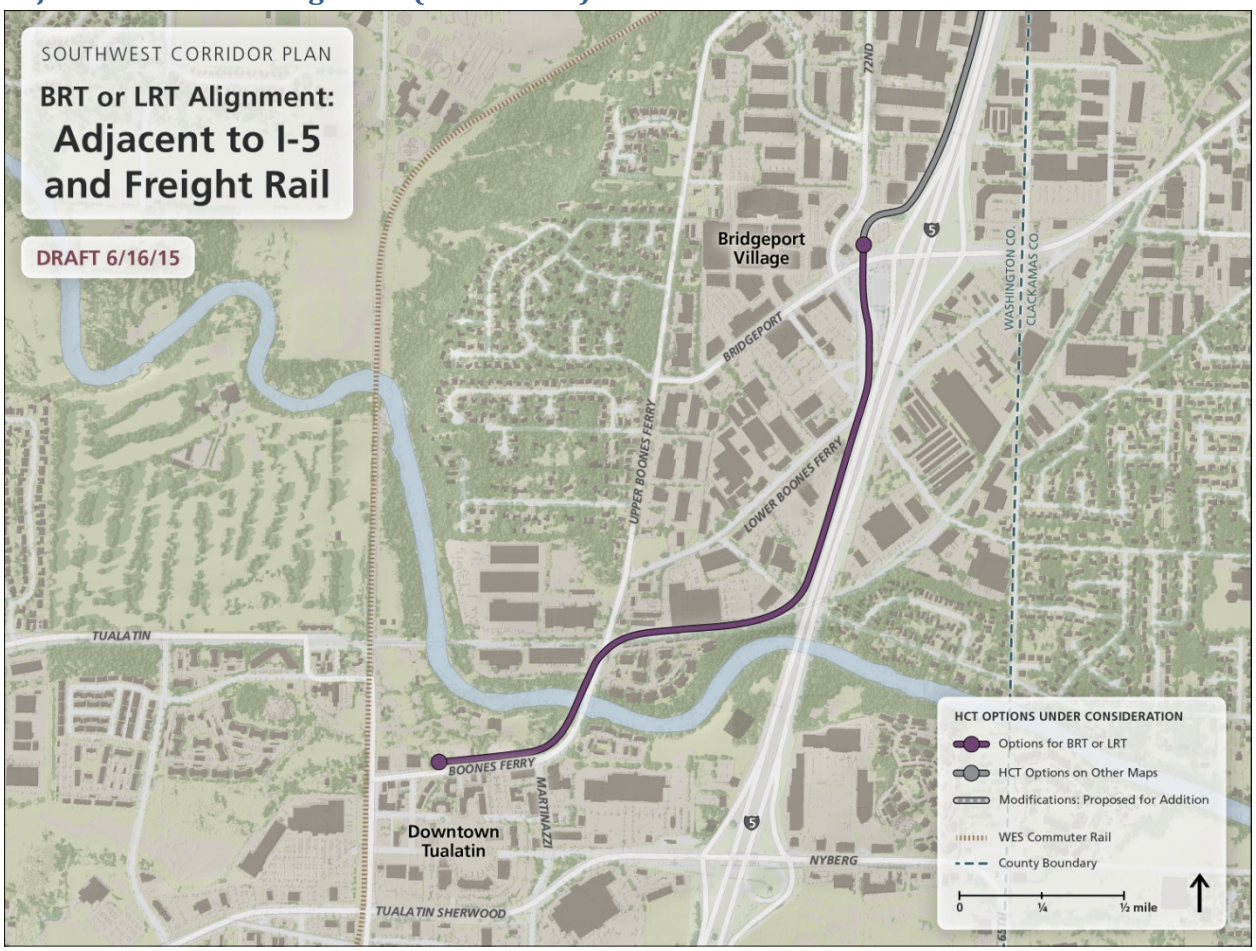


## Lower Boones Ferry (BRT or LRT)




The Lower Boones Ferry center-running option would drop dedicated transit lanes into the center of SW Lower Boones Ferry Road from an elevated station astride Bridgeport Road. Existing vehicle travel lanes would be reconstructed on the outside of the transit lanes and left turn pockets would be provided at regular intervals at new signalized intersections to allow left turns and U-turns. HCT would cross above 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 (BRT or LRT)




The Adjacent to I-5 and Freight Rail alignment option would extend HCT south from an elevated Bridgeport Village station immediately to the west of I-5, then turn west to run alongside the Portland Western freight rail tracks. At Boones Ferry Road, HCT would be grade separated on a new structure crossing above 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.

## Roadway, pedestrian and bicycle projects

Both options include a range of roadway, pedestrian and bicycle improvements to better connect the corridor to the surrounding neighborhoods. The specific improvements would vary depending on the alignment and multi-modal needs. Maps and lists of potential roadway, pedestrian and bicycle projects that would accompany HCT alignments in the Bridgeport Village to downtown Tualatin area are included in **Appendix B**.

# Bridgeport Village to Tualatin analysis and findings

## Transit performance

Key considerations:

- What are the tradeoffs to consider between the transit performance of the two alignment options?

Key findings:

- The two alignment options would have nearly equal travel times and identical station locations, so there is no measurable difference in transit performance.

**All model results at this time should be considered preliminary as refinements of HCT options, traffic analyses and local bus service assumptions will necessitate updated modeling throughout the DEIS process.**

Separate model runs for the two options between under consideration between Bridgeport Village and downtown Tualatin were not performed because the alignments are very similar and have identical station locations, so the projected ridership would be nearly equal. Model runs producing the outputs described below included the Lower Boones Ferry option.

### *Travel time and reliability*

Travel time between downtown Portland and downtown Tualatin would be 31 minutes by LRT or 34 minutes by BRT. BRT travel times could be impacted by its operational frequencies (see mode considerations below). The entire alignment between downtown Tigard and the Tualatin terminus would operate in exclusive right-of-way for either LRT or BRT, so both options would provide similar service reliability. If the adjacent to I-5 and freight rail option is chosen, the entire alignment between downtown Tigard and the Tualatin terminus would be outside of roadways. The Lower Boones Ferry option would feature a center-running HCT alignment in the roadway.

### *Corridor line and system ridership*

Future transit ridership forecasts are largely determined by the speed of the service relative to competing modes and by the numbers of households and jobs it serves. Ridership is expressed in two ways:

- **Line ridership** measures the number of daily riders on the specific HCT line between the terminus and downtown Portland—this includes both new transit riders and those who would ride local buses in a no-build scenario (without the HCT project).
- **Change in system transit trips** measures the growth of total transit system ridership in the entire transit service area with implementation of the proposed project compared to a no-build alternative—this isolates new transit riders only. While shifts of modeled riders from local buses to HCT service indicate benefits from improved accessibility gained with a project, new riders represent shifts in mode, usually from autos to transit, that are more likely to benefit the transportation system as a whole.

All measures are for forecast year 2035. Station ons and offs is another measure of ridership, but does not apply since the alignment options in Tualatin use the same stations.

Average weekday line ridership in 2035 would be 43,500 with LRT or 30,800 with BRT. LRT would attract 15,700 new transit riders and BRT would attract 8,400 new riders. As modeled, the BRT service frequencies would not be sufficient to accommodate demand. With more vehicles in service to meet the demand, both ridership and operating costs would increase.

### *Bridgeport Village to Tualatin mode considerations*

**Appendix C** includes a general discussion of differences between BRT and LRT modes and their corridor-wide impacts. This section addresses issues particular to the Bridgeport Village to downtown Tualatin area.

Because of differences in carrying capacities, more BRT vehicles than LRT vehicles would be needed to carry an equivalent passenger load (see Appendix C). The projected 2035 demand in the northern section of the Southwest Corridor HCT alignment (north from Tigard Transit Center) would require up to 23 BRT vehicles per hour in the peak, while LRT would require 10 vehicles per hour. Between Tigard and Tualatin, projections indicate nine hourly vehicles would be required for BRT and four hourly vehicles for LRT to accommodate peak loads. HCT service could be designed to provide more frequency in the northern portion of the corridor compared to the southern portion to accommodate the peak demand point.

High service frequencies can affect the amount of signal priority permitted to the HCT service and could result in slower travel times for BRT than initially assumed. Even if the alignment were to have less frequent service in the south than in the northern corridor, signal priority reductions anywhere in the alignment would affect travel times and reliability throughout the entire route. Impacts to local traffic would also be more likely with BRT due to the more frequent service.

## Community development

Key considerations:

- Can the proposed station locations improve access to pedestrians and bicyclists in a way that will generate meaningful ridership?

Key findings:

- The options would have the same station locations, so both have the same access and redevelopment potential. Access to the proposed stations from the surrounding land uses will need to be improved to maximize ridership and community development.

### *Accessibility*

The two alignment choices between Bridgeport Village and downtown Tualatin are relatively short and do not have a noticeable difference in terms of access to the HCT line. The alignment choices have the same station locations, so access would be identical.

The Bridgeport Village station is well positioned to access the large existing retail destination, but pedestrian and bike access from the east would be constrained by the interchange at I-5 and SW Bridgeport Road. Although Bridgeport Village offers great ridership potential, consideration should be given to strengthening the connections to properties east of I-5. The pedestrian environment in this area is not inviting and may discourage pedestrian/bike trips from the eastern side of I-5. Such improvements are not included in any identified Shared Investment Strategy (SIS) projects, and therefore should be developed and implemented as part of the Southwest Corridor Plan.

The current location of the downtown Tualatin station is on the north side of SW Boones Ferry Road. This means that the proposed station will not stop in the heart of downtown, but on the outer edge. Particular attention should be paid to enhancing connections from the station to the retail and institutional uses in downtown that would be attractive to system riders. Such improvements are not included in any identified Shared Investment Strategy (SIS) projects, and therefore should be developed and implemented as part of the Southwest Corridor Plan.

### *Redevelopment potential*

Since the station locations are the same between the two options, redevelopment potential would be identical.

### *Support of local land use plans*

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. The alignment options would use the same stations at Bridgeport Village and in downtown Tualatin, and would both support the *Linking Tualatin Plan*, which is intended to create "transit ready places" that would benefit from and support future transit use.

## Mobility

Key considerations:

- Can high capacity transit be designed to minimize negative impacts to auto, freight, bicycle and pedestrian mobility and access?
- Do the alignment options have differences in the level of mobility benefit or impact?

Key findings:

- The Lower Boones Ferry alignment would overlap with a regional freight route and impose limits on left turns into properties, while the adjacent to I-5 and freight rail option avoids these impacts.
- Neither alignment option would result in major mobility impacts for motor vehicles, pedestrians, or bicyclists.

### *Motor vehicle and freight mobility*

The Lower Boones Ferry alignment would run within the center of SW Lower Boones Ferry Road, which is a regional freight connector and local truck route. The transitway and elevated structures would be designed to accommodate freight trucks, including appropriate vertical and horizontal clearances. The

Adjacent to I-5 and freight rail alignment would be completely separated from the Lower Boones Ferry roadway, avoiding all freight route overlap.

The initial traffic analysis analyzed the impact of the transit alignment, but not a potential park and ride; further work is underway to do so. Both alignment options largely avoid traffic interaction due to a separate transitway separate from road lanes, and therefore would result in minimal impacts to motor vehicle traffic. The traffic analysis evaluated whether three critical intersections in the area would meet the regional and statewide motor vehicle mobility target. The analysis considered traffic volumes and patterns both with and without HCT in the year 2035.

The analysis found that these intersections would meet the performance target in 2035 both with and without HCT running on one of the Tualatin alignments (Build and No Build, respectively). Additional work regarding the park and ride at Bridgeport Village is underway. Preliminary findings are that all intersections including the I-205 ramp terminals meet mobility targets for the No Build and Build scenarios, but that the freeway ramp metering results in significant delay and queuing on surface streets. Consideration of the operation of the ramp meters and available vehicle storage will likely need to be resolved with Oregon Department of Transportation, the operator of the ramp metering system.

| | Meets motor vehicle performance target?* | |
|---|---|---|
| *Intersection* | *2035 No-Build* | *2035 Build* |
| Upper Boones Ferry & Lower Boones Ferry | Yes | Yes |
| Martinazzi & Boones Ferry | Yes | Yes |
| Martinazzi & Tualatin-Sherwood | Yes | Yes |

* Within permitted margin of accuracy

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

### *Pedestrians and bicycles*

Neither alignment would result in a real change to the existing walking or bicycling environment. The Lower Boones Ferry alignment would run in the center of Lower Boones Ferry Road, which already has sidewalks and bicycle lanes. This alignment would widen the roadway and replace the sidewalks and bicycle lanes, but would not provide any new facilities.

The Adjacent to I-5 and freight rail alignment would be located away from the roadway, and the existing sidewalks and bicycle lanes would remain.

### *Safety*

The Lower Boones Ferry alignment would be center-running along a portion of Lower Boones Ferry Road. The addition of a raised median would be expected to result in some minor safety benefit to pedestrians and bicyclists crossing the roadway. Traffic analysis will be needed to determine the operational and safety impacts to the signals on Lower Boones Ferry Road of allowing u-turns.

The Adjacent to I-5 and freight rail alignment would be located away from the roadway, which would remain unchanged.

### *Property Access*

The Lower Boones Ferry alignment would be center-running along a portion of Lower Boones Ferry Road, requiring the limiting of left-turn access to adjacent properties. The Adjacent to I-5 and freight rail alignment would be completely separated from traffic except for at-grade street crossings, resulting in no changes to property access.

## Cost Estimates

Key considerations:

- Are the tradeoffs clear between cost and other factors such as reliability, safety, access and community development opportunities?
- How does cost impact the length of the final HCT alignment?

Key findings:

- For LRT, the Lower Boones Ferry option would cost $5M more than the Adjacent to I-5 and freight rail option in 2014 dollars.

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

### *Corridor-wide costs*

Current estimates for an LRT alignment from downtown Portland to Tualatin range from $1.7B to $2.4B.[1] This range includes an option for a light rail tunnel connection to PCC-Sylvania. BRT cost estimates are under development, and should be available in the Evaluation Report to be released in October 2015. The region's funding capacity will impact the final HCT alignment choices and associated projects.

### *Bridgeport Village to Tualatin area costs*

Currently for the Bridgeport Village to Tualatin area, cost estimates are available for LRT options only. BRT cost estimates are under development, and should be available in the Evaluation Report to be released in October 2015. The two options differ by under $5M in 2014 dollars, with the Lower Boones option costing more than the adjacent to I-5 and freight rail option.

### *Operating cost*

Operating costs are influenced in large part by the total travel time along an alignment and the frequency of service provided. Both options would have almost identical travel time and the same service frequency, and as a result no notable difference in operating cost.

[1] These are the latest construction cost estimates, updated since the release of the Tigard Key Issues memo.

## Engineering complexity and risk

Key considerations:

- Complexity and risk add cost to the project and could result in the cost and schedule overruns.
- What aspects of each alignment add complexity to the project?
- What aspects of each alignment option present noteworthy risk?

Key findings:

- Both options are similar in complexity and risk

The two options do not pose significant differences in complexity and risk. Both options include grade changes and curves that would result in slow travel (25 mph). Each option would require construction of elevated or raised structures, which increase engineering complexity and risk. The impact of the complexity and risk on project cost and schedule is unknown at this time. The degree of complexity and risk is considered similar for the two alignment options.

For the Lower Boones Ferry option, the height of the alignment at the Bridgeport Village station over Bridgeport Road and resulting grade of the elevated transit way would limit where the alignment could land in the Lower Boones Ferry roadway.

The adjacent to I-5 and freight rail option would require 3,000 feet of retained fill along I-5 and for the approach to the bridge that would carry HCT over the freight rail, Lower Boones Ferry Road, and the Tualatin River. The design of this option also assumes a 25-foot setback from the existing freight rail, which would require negotiations with the railroad.

## Community impacts

Key considerations:

- How would the construction of each alignment impact the area and its residents?

Key findings:

- The Lower Boones Ferry alignment would impact properties but not buildings north of the Tualatin River.
- The adjacent to I-5 and freight rail alignment would require expansion of the existing railroad right-of-way; buildings that appear in or adjacent to the railroad right-of-way could be impacted.
- South of the Tualatin River, residential and commercial properties would likely be impacted at the downtown terminus.

Since the options under consideration have identical station locations, there is no difference in the access they provide to non-white, non-English speaking, low-income, and senior populations. For the same reason, access to services does not differ between the options.

The options under consideration would have different impacts to adjacent private properties. In many cases, property impacts are limited to only a narrow strip of area needed to widen the roadway and sidewalks. In other cases, temporary construction easements may be all that is needed to allow for

construction of new roadway and sidewalks. In extreme cases, large or complete acquisitions may be necessary when impacts to buildings or other major infrastructure are unavoidable.

### *Lower Boones Ferry*

This alignment would require expansion of the Lower Boones Ferry Road right-of-way, generally resulting in impacts to the frontages of properties, including landscape areas, driveways, and parking. It appears that no buildings would be impacted between Bridgeport Village and the Tualatin River crossing.

Single family, multi-family, and commercial properties around the downtown Tualatin terminus station would be impacted by the alignment, although the details of the impacts cannot be determined until detailed alignment and station designs are prepared. The city-owned parking lot north of Boones Ferry Road would be reconfigured, although it may be possible to avoid or minimize loss of parking spaces. A park and ride facility would not be located at the downtown terminus station. If BRT is selected as the HCT mode, the downtown Tualatin terminus station would impact fewer properties, although property acquisition may still be required, and would not affect the city-owned parking lot.

### *Adjacent to I-5 & Freight Rail*

This alignment would require expansion of the existing railroad right-of-way, generally resulting in impacts to the landscape and parking configuration along the back edge of the properties. Building impacts have yet to be field verified. Some buildings appear to be in the railroad right-of-way, which may require substandard clearances or building impacts.

This alignment would require coordination with ODOT regarding potential future I-5 lane expansion and the P&W Railroad regarding setbacks from the railroad. If P&W requires setbacks greater than 25 feet, substantial building impacts would occur.

South of the Tualatin River and around a downtown terminus station, this option would have the same property impacts as the Lower Boones Ferry option.

# Next steps

This Key Issues Memo formally introduces to decision-makers and the public information relevant to a decision on high capacity transit alignments in Tualatin. Between October and December 2015, project staff will present information on alignments in Tualatin and other Southwest Corridor Plan issues and invite public comment at meetings and online. An updated calendar can be found on our website:

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

Upcoming staff reports and Steering Committee review of Southwest Corridor issues that affect Tualatin include:

**October 2015:** Project staff will release a technical evaluation report that will include assessments of HCT alignment options in Tigard and Tualatin, and a memo on HCT terminus options.

**November 2015:** Project staff will release their recommendations on which HCT alignments in Tigard and Tualatin to further study and which to remove from further consideration. Public input will be solicited on the staff recommendations.

**December 2015:** The Steering Committee is scheduled to make recommendations for public review on which HCT alignment in Tualatin—or neither—to continue studying, as well as the preferred travel mode and terminus. The Steering Committee will also review and discuss the list of corridor connection projects defined in the Shared Investment Strategy and the funding strategy for those projects.

# Appendices

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

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

**December Steering Committee decision:** remaining HCT alignments and terminus

- Key Issue Memos:
  - Tigard – September 4, 2015
  - Tualatin – October 15, 2015
- Technical modifications memo: Central Barbur area – October 15, 2015
- Draft Evaluation Report, Part 2 – October 15, 2015
- HCT terminus options memo – November 2015
- Recommendation Report 2: Tigard, Tualatin, terminus – November 2015

**February Steering Committee decision:** mode and PCC light rail tunnel, SIS projects funding strategy, land use and development strategy

- HCT mode – December 2015
- PCC Sylvania connection options update – December 2015
- Recommendation Report 3: mode, PCC tunnel – January 2015
- Draft funding strategy for Shared Investment Strategy roadway, bike and pedestrian projects – December or January
- Draft land use and development strategy – December or January

# Appendix B: Shared Investment Strategy roadway and active transportation projects

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

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

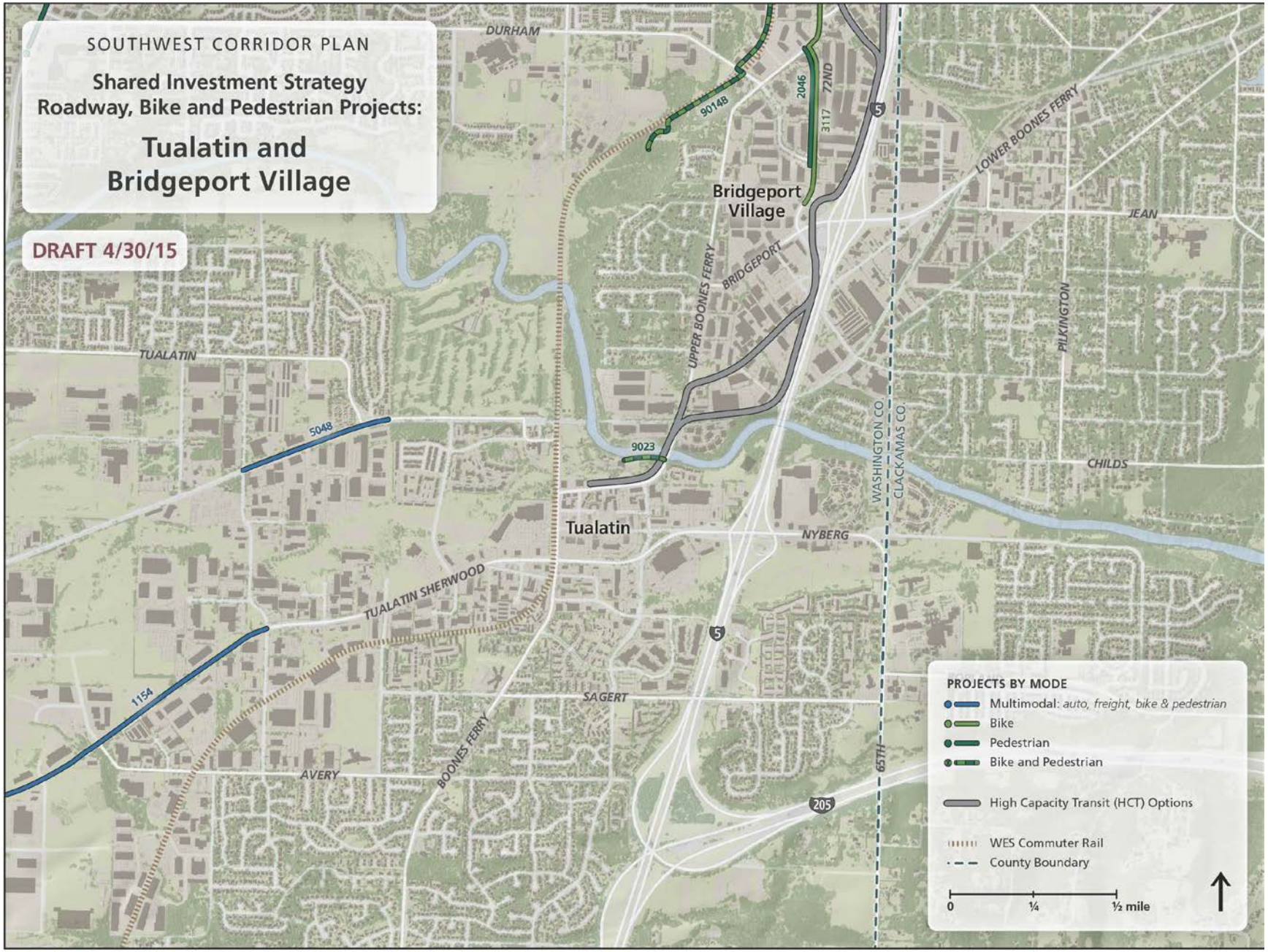
- ***HCT-supportive projects*** are roadway, bikeway and pedestrian projects that were initially identified in the SIS in July 2013, and then were further refined in July 2014 as the HCT alignments were narrowed. These projects either run along the HCT alignment (and would be incorporated into HCT designs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

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

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

The following map and table show both the HCT-supportive and Corridor Connections projects in the Downtown Tualatin and Bridgeport Village area. There are additional SIS projects located elsewhere in Tualatin not shown below.

- The HCT-supportive projects in this area would focus on improving bike and pedestrian access to potential HCT stations and along the HCT alignment.
- The Corridor Connections projects include multimodal improvements to major routes providing connections from the west toward the HCT alignment.


SOUTHWEST CORRIDOR PLAN
Shared Investment Strategy
Roadway, Bike and Pedestrian Projects:
Tualatin and
Bridgeport Village
DRAFT 4/30/15
DURHAM
90148
2046
72ND
3117
5
LOWER BOONES FERRY
Bridgeport
Village
JEAN
UPPER BOONES FERRY
BRIDGEPORT
PILKINGTON
TUALATIN
5048
9023
WASHINGTON CO.
CLACKAMAS CO.
CHILDS
Tualatin
NYBERG
TUALATIN SHERWOOD
5
1154
SAGERT
BOONES FERRY
AVERY
65TH
205
PROJECTS BY MODE
Multimodal: auto, freight, bike & pedestrian
Bike
Pedestrian
Bike and Pedestrian
High Capacity Transit (HCT) Options
WES Commuter Rail
County Boundary
0
¼
½ mile

| Project # Location/ Ownership | Title Description | Cost | Primary Mode | Primary Project Type | Notes |
|---|---|---|---|---|---|
| 1154 Tualatin Sherwood Wash. Co. | Tualatin-Sherwood Rd. widening with ped/bike Widen from 3 to 5 lanes with bike lanes and sidewalks from Langer Parkway to Teton Ave | $$$$ | Multimodal | Corridor Connections | |
| 2046 Tigard | 72nd Avenue sidewalks: Upper Boones Ferry to Durham Install sidewalk on both sides of street from Upper Boones Ferry Road to Durham Road | $ | Pedestrian | HCT Supportive | With HCT to Bridgeport Village: Include |
| 3117 Tigard Tualatin | 72nd Avenue bikeway: 99W to city limits Install bike facilities on both sides of the street from Highway 99W to South City Limits | $ | Bicycle | HCT Supportive | With all HCT options: Include if done through re-striping (conversion from 3-lane to 2-lane with bike lanes |
| 5048 Tualatin | Herman Rd. multimodal improvements: Teton to Tualatin Improve to urban standard from Teton Ave to Tualatin Rd. | $ | Multimodal | Corridor Connections | |
| 9014B Tigard | Fanno Creek Trail - Tualatin River to Tigard St. Complete gaps along the Fanno Creek multiuse path from the Tualatin River to Tigard Library and from Pacific Hwy-99W to Tigard Street | $ | Bicycle / Pedestrian | HCT Supportive | With HCT station at Bonita & 74th: Include from Bonita to Ashford (20%) |
| 9023 Tigard Tualatin | Tualatin River Pathway Develop a continuous multi-use pathway along the Tualatin River from Boones Ferry Road under I-5 to the Tualatin River Greenway and Browns Ferry Park | $$ | Bicycle / Pedestrian | HCT Supportive | With HCT station in Tualatin: Include from Tualatin Senior Center east to existing trail (90%) |

# Appendix C: Corridor-wide mode considerations

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

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

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

## Bus Rapid Transit description

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

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

## Capital costs

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

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

## Operating and maintenance costs

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

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

## Speed, service and ridership

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

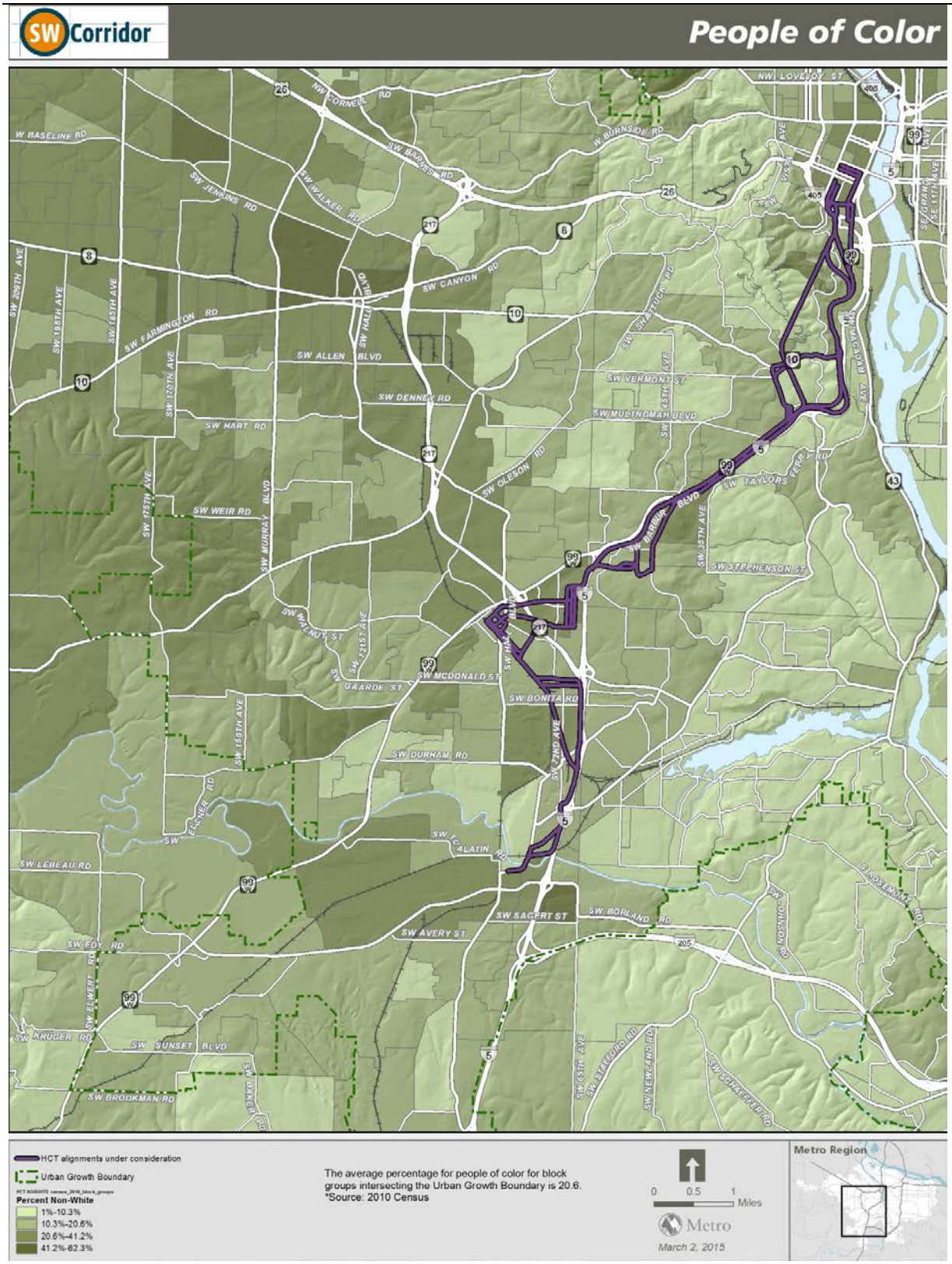
Models indicate that in 2035 the demand for HCT in the Southwest Corridor would require 20 BRT vehicles per hour in the peak, while LRT is assumed to operate with eight vehicles per hour in the peak with enough capacity still available to accommodate ridership growth beyond 2035. For BRT, growth above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

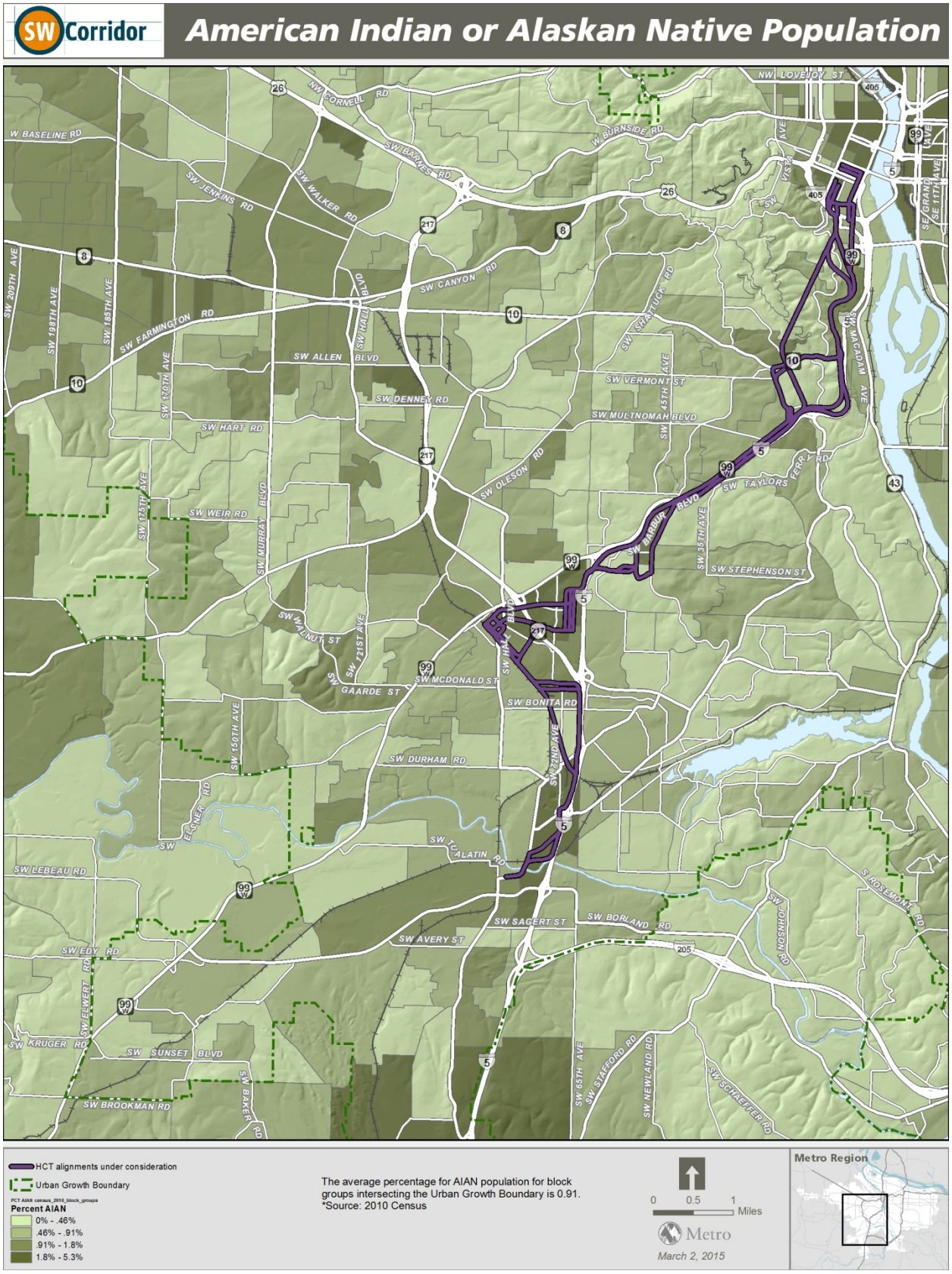
HCT service provides travel time advantages over local buses because of exclusive right of way but also because of longer distances between stations and signal priority at intersections. The high number of hourly vehicles required for BRT can be expected to diminish some of the travel time benefit from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

## Development

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

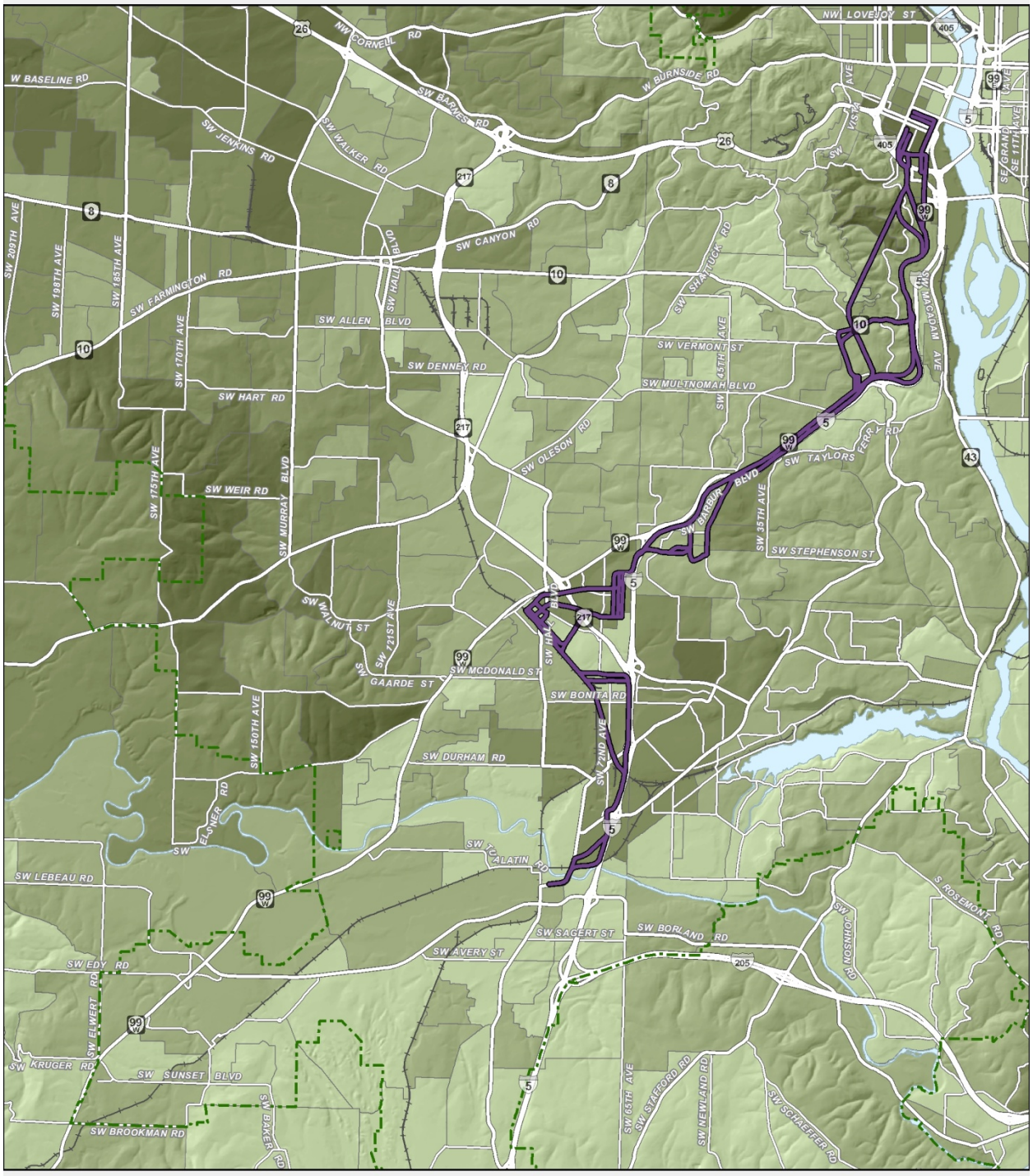
# Appendix D: Demographic maps




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

SW Corridor

# Asian Population




HCT alignments under consideration

Urban Growth Boundary

PCT ASIAN census_2010_block_groups

**Percent Asian**

- 0% - 3.1%
- 3.1% - 6.2%
- 6.2% - 12.3%
- 12.3% - 45.1%

The average percentage for Asian population for block groups intersecting the Urban Growth Boundary is 6.17.
*Source: 2010 Census

0 0.5 1 Miles

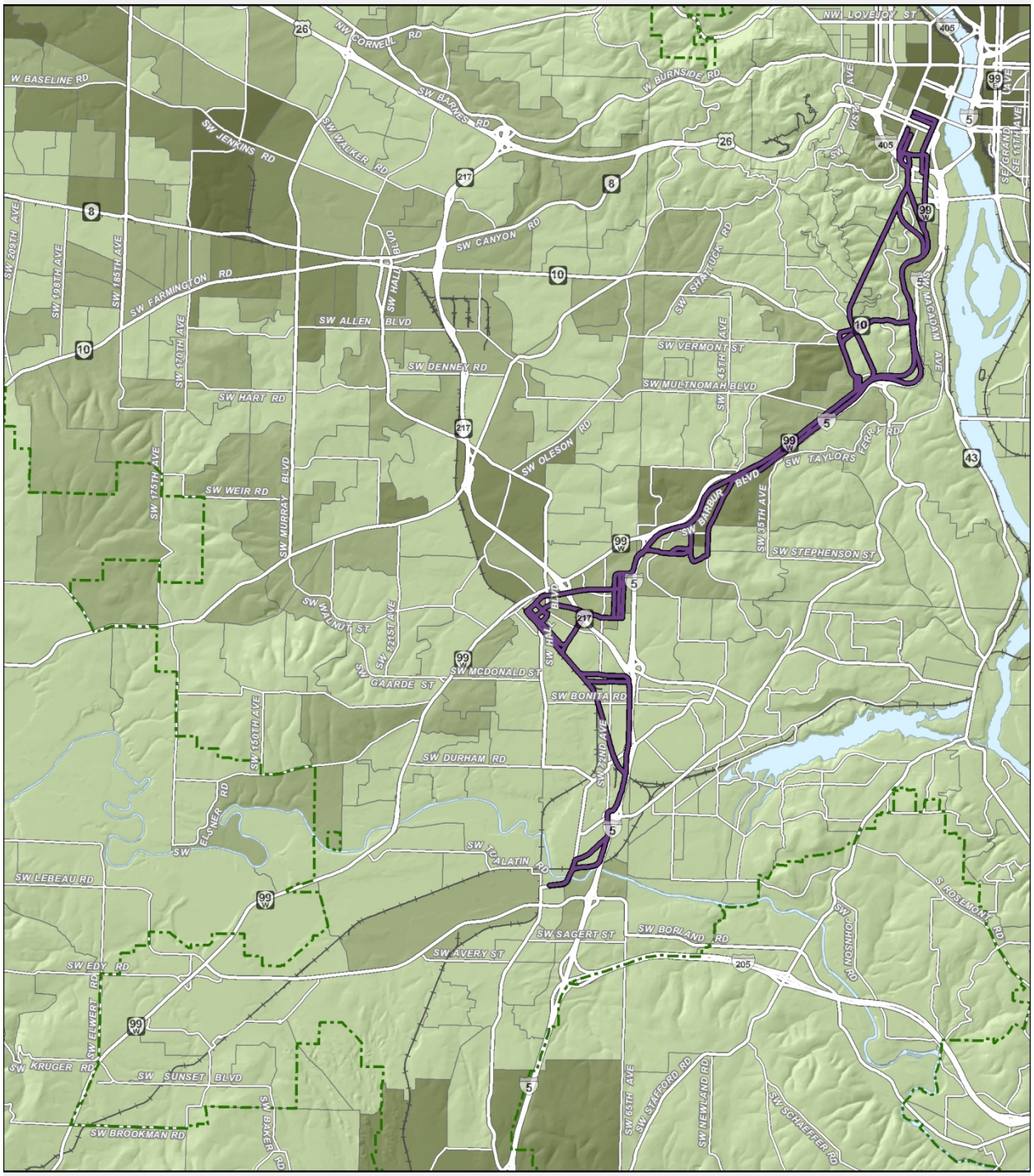
Metro

March 2, 2015

Metro Region

SW Corridor

# Black Population




HCT alignments under consideration

Urban Growth Boundary

PCT BLACK census_2010_block_groups

**Percent Black**

- 0% - 1.9%
- 1.9% - 3.7%
- 3.7% - 7.14%
- 7.14% - 39.8%

The average percentage for Black population for block groups intersecting the Urban Growth Boundary is 3.7.
*Source: 2010 Census

0 0.5 1 Miles

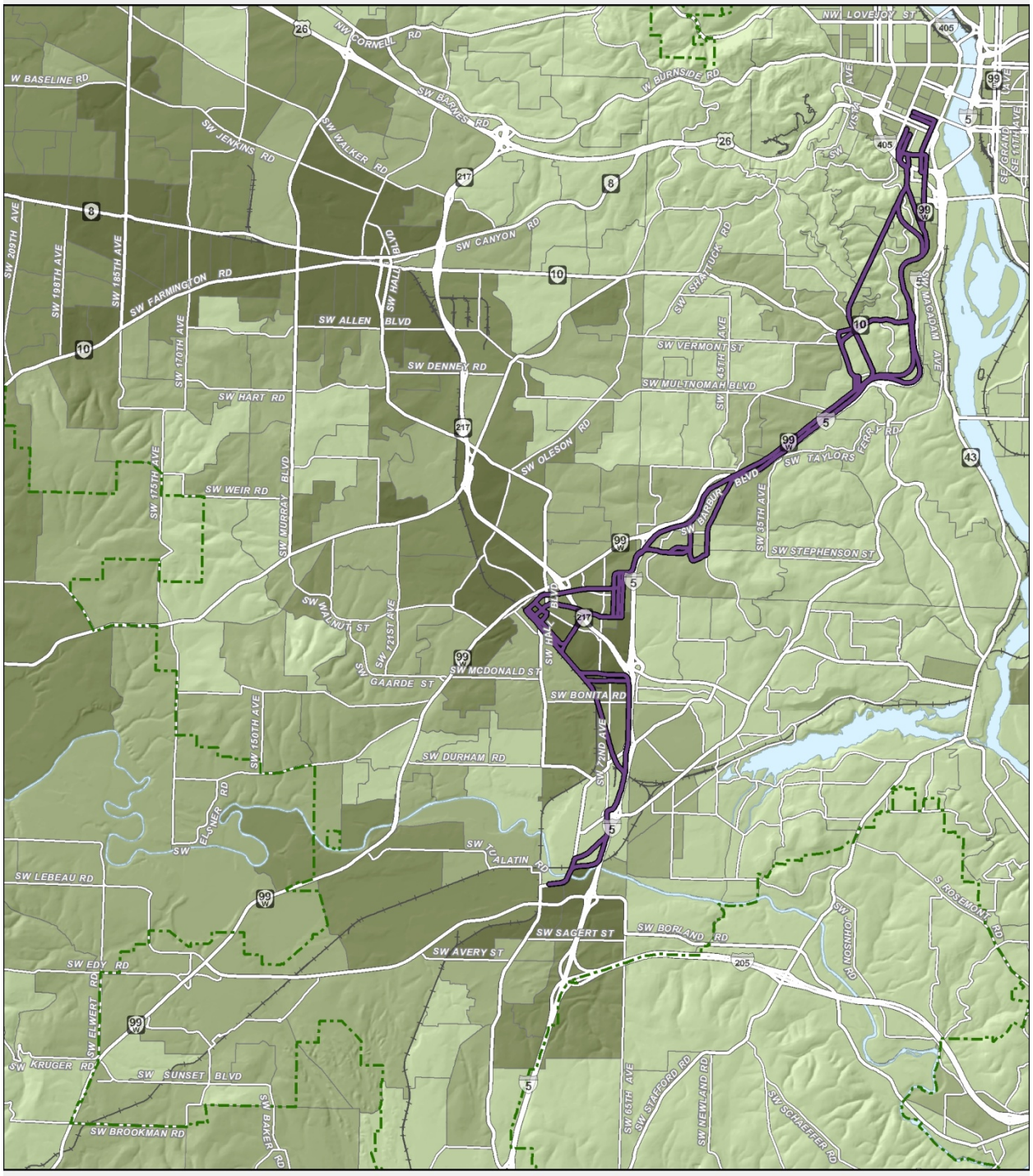
Metro

March 2, 2015

Metro Region

SW Corridor

# Hispanic Population




HCT alignments under consideration

Urban Growth Boundary

PCT Hispanic census_2010_block_groups

**Percent Hispanic**

- 0% - 5.6%
- 5.6% - 11.1%
- 11.1% - 22.3%
- 22.3% - 83%

The average percentage for Hispanic population for block groups intersecting the Urban Growth Boundary is 11.13.
*Source: 2010 Census

0 0.5 1 Miles

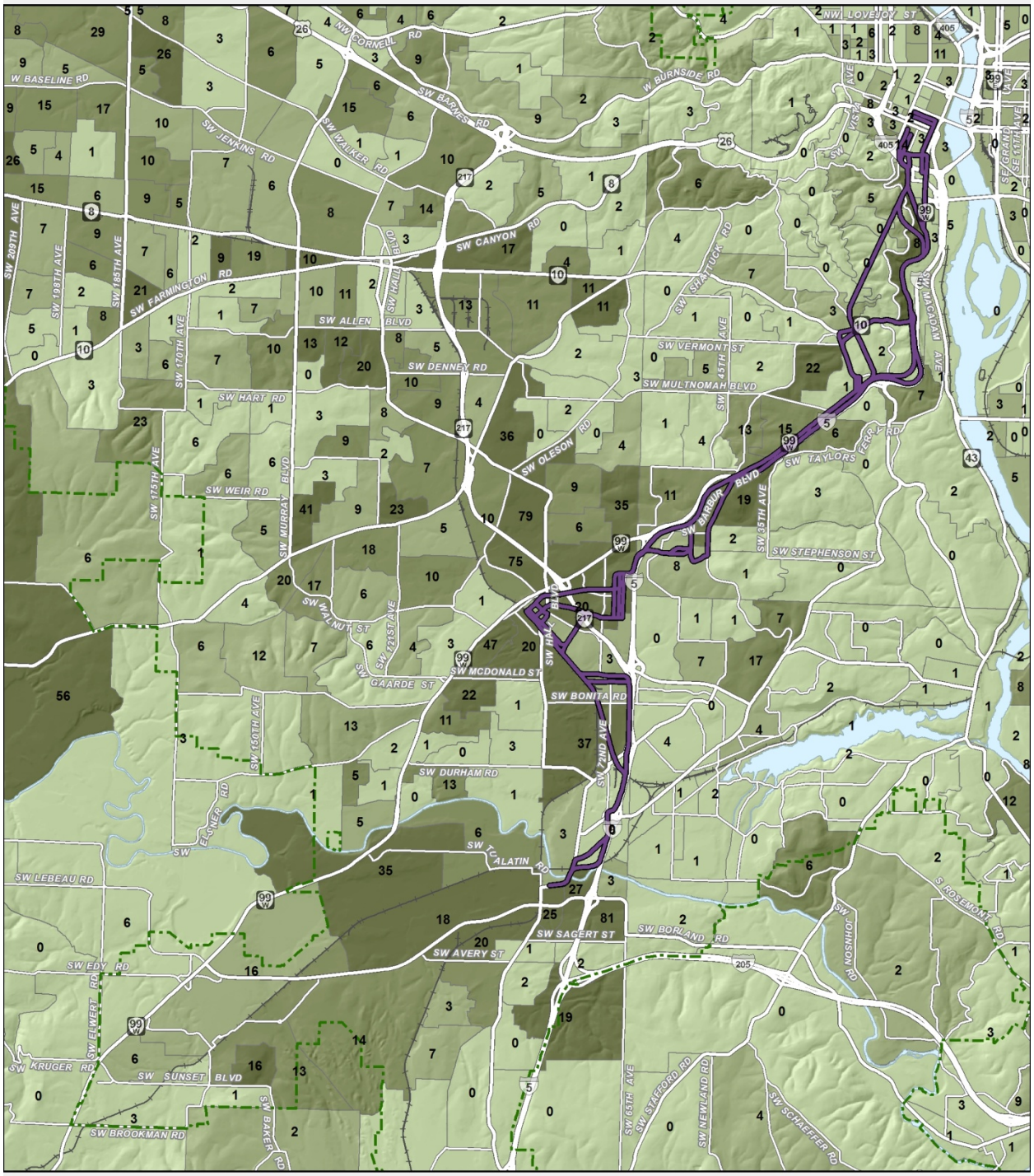
Metro

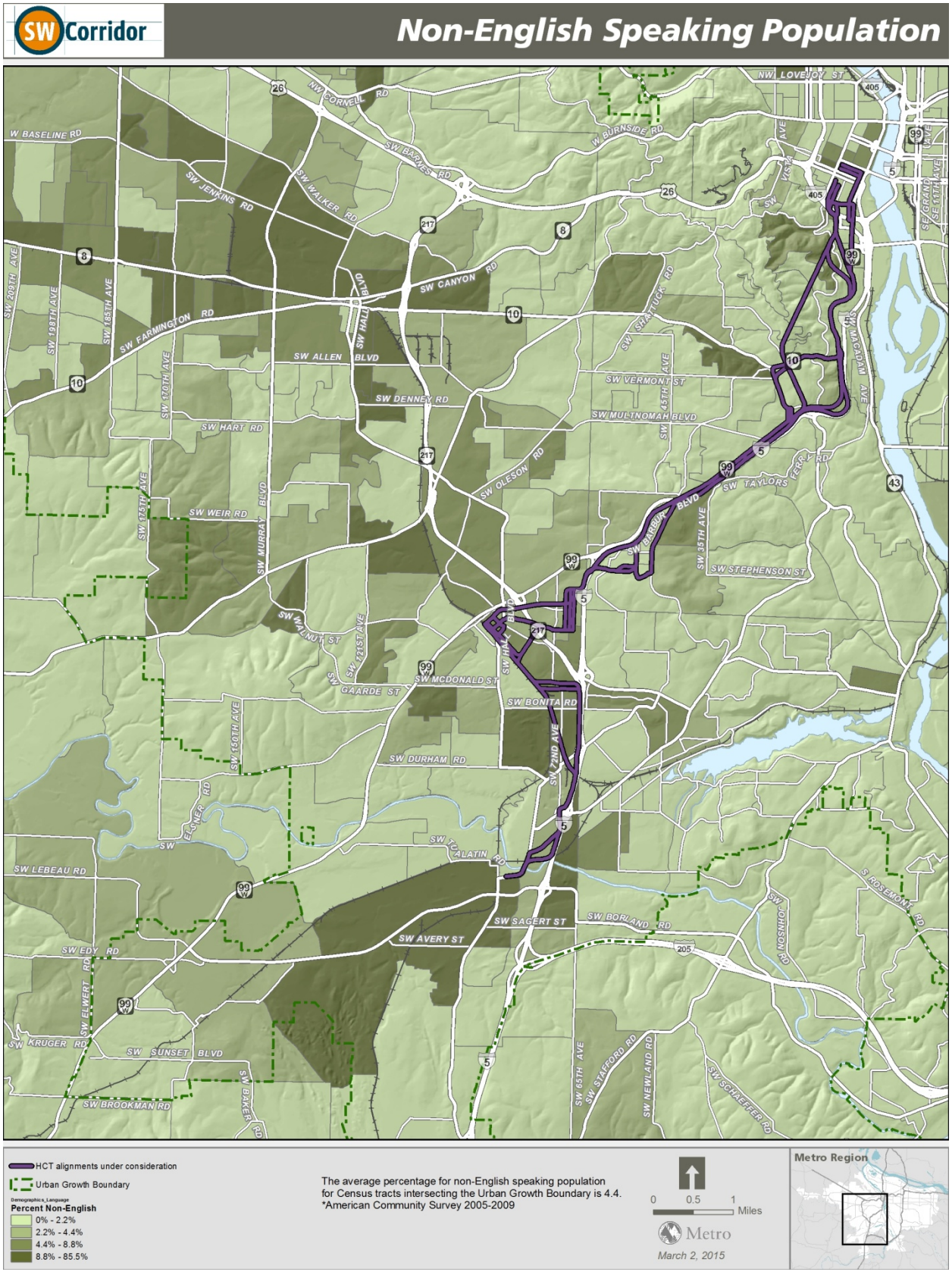
March 2, 2015

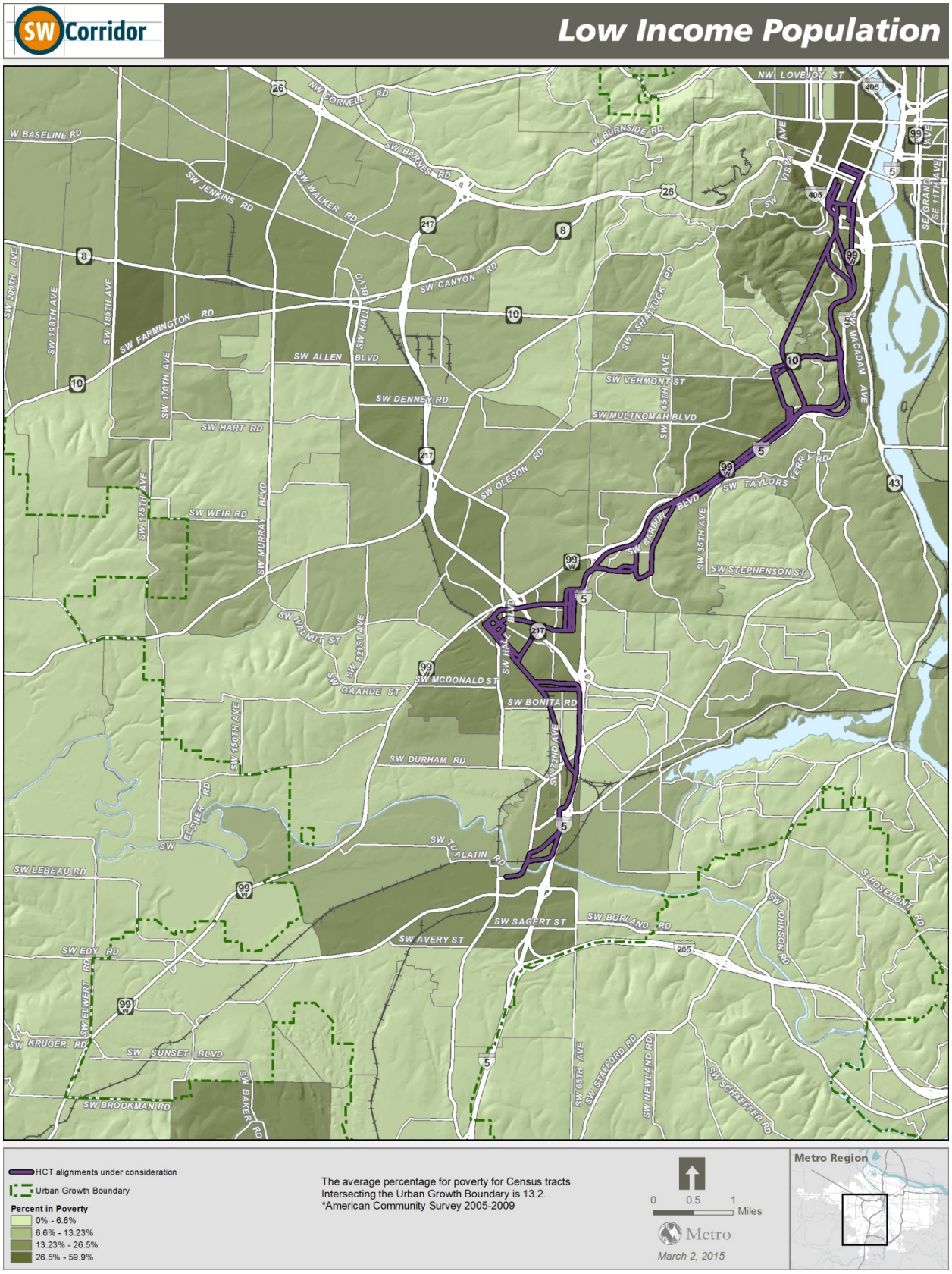
Metro Region

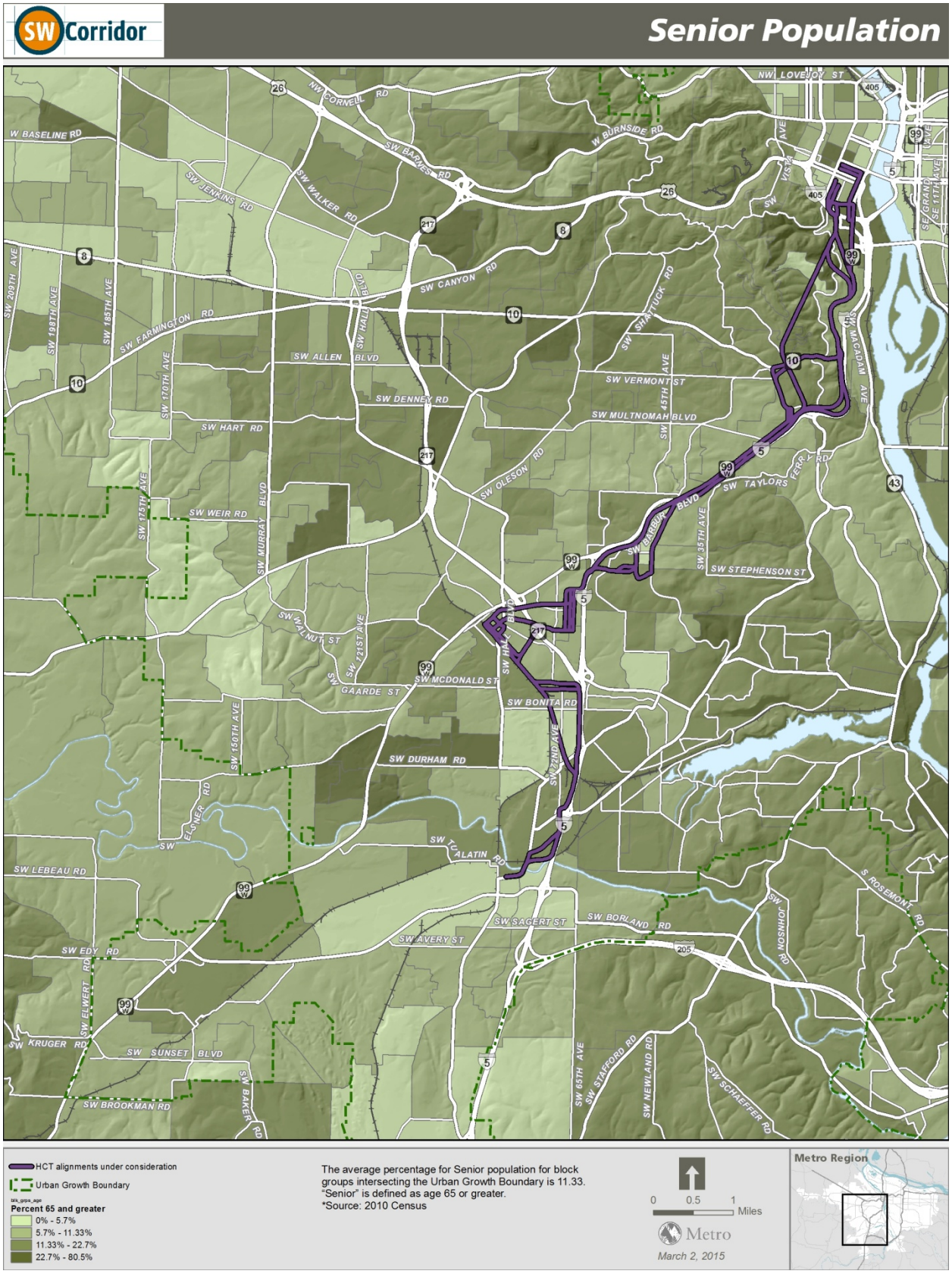
SW Corridor

# Native Hawaiian or Pacific Islander Population




SW Corridor
Non-English Speaking Population
HCT alignments under consideration
Urban Growth Boundary
Demographics_Language
Percent Non-English
0% - 2.2%
2.2% - 4.4%
4.4% - 8.8%
8.8% - 85.5%
The average percentage for non-English speaking population for Census tracts intersecting the Urban Growth Boundary is 4.4.
*American Community Survey 2005-2009
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region


SW Corridor
Low Income Population
HCT alignments under consideration
Urban Growth Boundary
Percent in Poverty
0% - 6.6%
6.6% - 13.23%
13.23% - 26.5%
26.5% - 59.9%
The average percentage for poverty for Census tracts Intersecting the Urban Growth Boundary is 13.2.
*American Community Survey 2005-2009
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region


SW Corridor
Senior Population
W BASELINE RD
NW CORNELL RD
SW BARNES RD
W BURNSIDE RD
NW LOVEJOY ST
SW JENKINS RD
SW WALKER RD
SW 209TH AVE
SW 198TH AVE
SW 185TH AVE
SW FARMINGTON RD
SW CANYON RD
SW HALL BLVD
SW ALLEN BLVD
SW DENNEY RD
SW HART RD
SW 170TH AVE
SW 175TH AVE
SW WEIR RD
SW MURRAY BLVD
SW OLESON RD
SW SHATTUCK RD
SW VERMONT ST
SW 45TH AVE
SW MULTNOMAH BLVD
SW MACADAM AVE
SW TAYLORS FERRY RD
SW BARBUR BLVD
SW 35TH AVE
SW STEPHENSON ST
SW WALNUT ST
SW 121ST AVE
SW GAARDE ST
SW MCDONALD ST
SW BONITA RD
SW DURHAM RD
SW 150TH AVE
SW ELSNER RD
SW TUALATIN RD
SW LEBEAU RD
SW 92ND AVE
S ROSEMONT RD
SW BORLAND RD
SW SAGERT ST
SW AVERY ST
SW NOSNHOF RD
SW EDY RD
SW ELWERT RD
SW KRUGER RD
SW SUNSET BLVD
SW BAKER RD
SW BROOKMAN RD
SW 65TH AVE
SW STAFFORD RD
SW NEWLAND RD
SW SCHAEFFER RD
HCT alignments under consideration
Urban Growth Boundary
blk_grps_age
Percent 65 and greater
0% - 5.7%
5.7% - 11.33%
11.33% - 22.7%
22.7% - 80.5%
The average percentage for Senior population for block groups intersecting the Urban Growth Boundary is 11.33.
"Senior" is defined as age 65 or greater.
*Source: 2010 Census
0 0.5 1 Miles
Metro
March 2, 2015
Metro Region

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