



Powell-Division Transit and Development Project

TRANSIT ALTERNATIVES EVALUATION RESULTS TECHNICAL REPORT

June 2015

Powell-Division Transit and Development Project

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Project website: <http://www.oregonmetro.gov/public-projects/powell-division-transit-and-development-project>

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Executive Summary

This evaluation report provides information to assist in identifying the most promising transit alternative to advance for implementation in the Powell-Division corridor. Evaluation will continue in the next phase of the project. Much of the information in this report pertains to the potential transit route. During the next phase more information will be available that will assist in making decisions on how transit will operate in the corridor. This executive summary provides a brief summary of the alternatives that have been considered, findings on how options perform on the evaluation criteria, and highlights the key pros and cons among the options that are still being considered.

Alternatives considered

On September 29, 2014, the Steering Committee, based on initial screening of a wide range of alternatives and public input, agreed the following were the most promising alternatives for further study:

- **Transit type** —The Steering Committee advanced bus rapid transit options.
- **Route and route options**—The Steering Committee advanced the general route along Powell Boulevard in inner southeast Portland transitioning to Division Street, then eastward to Gresham with route options in Portland and Gresham.

The process and results of the evaluation for the initial screening are available in the *Powell-Division Transit and Development Project Transit Alternatives Screening Report*.

On March 16, 2015, based on results of more detailed evaluation completed since September, the Steering Committee reached consensus on advancing the following options for further study

- **River crossing options**—Tilikum Crossing
- **Portland north/south crossover options**—50th, 52nd and 82nd avenues
- **Service to Mount Hood Community College**
- **Gresham north/south options**—Main/223rd, Cleveland, Hogan

This report also includes evaluation results for the following options that were eliminated March 16, 2015:

- **Portland north/south crossover options**—92nd Avenue
- **Service just to Gresham Transit Center**
- **Gresham north/south options to Mt. Hood Community College**—Kane

The Steering Committee based its decision to eliminate these options on information included in this report and input from the public. Figure ES 1 shows how the options were narrowed between spring 2014 and spring 2015. The narrowing process is described in more detail in Chapter 1. Definition of Alternatives. Figure ES 2 shows the route options evaluated in this report. ES 3 summarizes the results of the evaluation in this report.

Figure ES 1 Route option narrowing

Spring 2014
Range of alternatives

A wide range of potential transit alignments were suggested by project partners and the public.



Summer 2014
Screening

A narrower range of transit alternatives was developed and screened through public engagement and technical analysis.



September 2014
Steering Committee

On September 29, the steering committee reached consensus on advancing the general route of inner Powell Boulevard transitioning to Division Street.



Winter 2014/2015
Evaluation of options

A set of route options in Gresham and Portland were screened through public engagement and technical analysis.



March 2015
Steering Committee

On March 16, the steering committee chose to remove the Ross Island Bridge, the Cesar Chavez and 92nd Ave options in Portland, and the Kane option in Gresham from consideration.



4/15/2015

Figure ES 2 Route options and station locations evaluated in this report

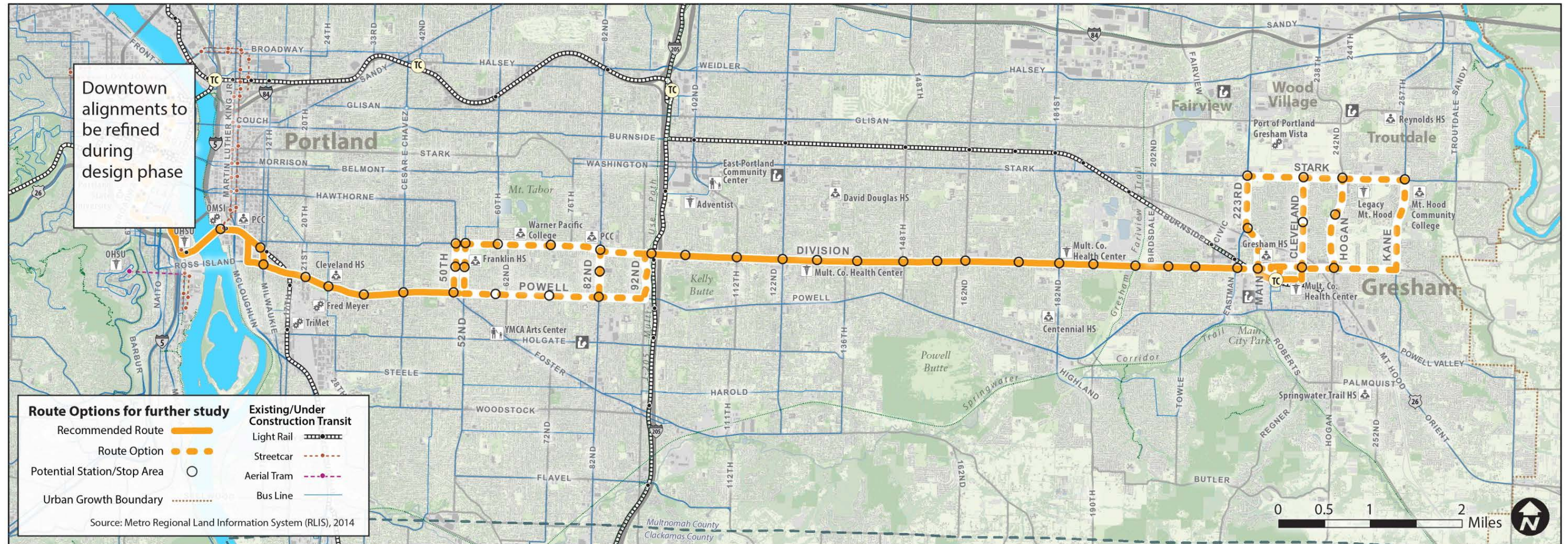


Figure ES 3 Evaluation results matrix

		Goals																		
		Transportation						Well-being						Equity			Efficiency			
		Objectives																		
		Supports transportation policies & plans	Serves current ridership	Serves future ridership	Provides faster transit travel times	Avoids motor vehicle conflicts	Increase person throughput	Supports land use plans and policies	Serves the greatest number of people	Serves the greatest number of jobs	Serves major destinations	Serves community resources & affordable housing	Right-of-way impacts	Supports economic development	Protects or improves environment	Improves HCT access for EJ communities	Distributes negative impacts equitably	Distributes benefits equitably	Maximizes financial resources	Right-of-way cost
TRANSITION STREET OPTIONS																				
50TH																				
	Frequent service plus	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Dedicated busway	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
52ND																				
	Frequent service plus	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Dedicated busway	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
82ND																				
	Frequent service plus	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Dedicated busway	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
92ND																				
	Frequent service plus	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Dedicated busway	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
GRESHAM ROUTE OPTIONS																				
GRESHAM TRANSIT CENTER																				
	Frequent service plus	●	●	○	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Dedicated busway	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
MAIN / 223RD																				
	Frequent service plus	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Dedicated busway	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CLEVELAND TO MHCC																				
	Frequent service plus	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Dedicated busway	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
242ND / HOGAN TO MHCC																				
	Frequent service plus	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Dedicated busway	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
257TH / KANE TO MHCC																				

Evaluation Findings

The evaluation process is based on the goals and objectives adopted by the Powell-Division Transit and Development Project Steering Committee and a draft project purpose and need. Figure ES 3 summarizes the evaluation results. The following sections summarize results of the evaluation and provide pros and cons of the Portland and Gresham route options that were advanced by the Steering Committee on March 16, 2015. Chapter 2 describes the evaluation process and criteria.

In the next phase of the project additional information, including an analysis of traffic impacts and concept design will be developed. This will provide additional information that will be important for decisions on route options, lane configuration, and operational characteristics.

Portland North/South Crossover options

The option on 82nd has the highest level of community support for the transition from Powell to Division and does well on the evaluation measures that have been completed. However, a better understanding of potential traffic and property impacts and costs are needed to fairly evaluate the tradeoffs for 82nd, 50th and 52nd. Cesar Chavez and 92nd options are the least promising options and the Steering Committee has made the decision to eliminate them from further study.

50th Avenue option

Pros of the 50th Avenue option

- Connects to:
 - More current households than other options
 - Key destinations including Portland Community College and the Jade District on Division
 - Greatest number of community resources
 - More commercial and multifamily zoning than 52nd

Cons of the 50th Avenue option

- Does not serve as well:
 - Communities of concern (low income and people of color)
 - Affordable housing
 - Commercial development on 82nd
 - Areas with development potential.

52nd Avenue option

Pros of the 52nd Avenue option

- Connects to:
 - Key destinations including Portland Community College and Jade District businesses on Division.

Cons of the 52nd Avenue option

- Does not serve as well:
 - Communities of concern (low income and people of color)
 - Affordable housing
 - Commercial development on 82nd
 - Areas with development potential.

82nd Avenue option

Pros of the 82nd Avenue option

- Connects to:
 - Future population and employment growth
 - Areas with development potential
 - Jade District businesses on 82nd and PCC Southeast on Division
 - Communities of concern
 - Most affordable housing
- Current travel time is similar to or slightly faster than other options
- Highest ridership on current bus service.

Cons of the 82nd Avenue option

- Day to day traffic variation could reduce transit reliability if the bus travels in mixed traffic
- Expected future traffic volumes and congestion could delay buses in traffic.

Gresham options

The public supports connecting to Mount Hood Community College. Despite the different characteristics of the options serving the college, no clear winner or clear loser is apparent from the evaluation at this point. The pros and cons below point out what the differences are.

Main/223rd to Mt. Hood Community College option

An option on Eastman Parkway and 223rd north of Division was considered a less promising option because it would require out-of-direction travel between the Gresham Transit Center and Mt. Hood Community College, which would increase travel time and cost. At the March 16, 2015 meeting, the Steering Committee agreed to advance an option that would use Main instead of Eastman, which would reduce out of direction travel.

Pros of the Main/223rd to Mt. Hood Community College option

- Connects to:
 - Highest current and future population
 - Existing transit on 223rd
 - Businesses along Stark
 - Development potential at 223rd and Stark

- Most affordable housing
- Provides access to entire southern border of Gresham Vista Business Park and Legacy Mt. Hood Medical Center.

Cons of the Main/223rd to Mt. Hood Community College option

- Longer travel time than the other Gresham options, and requires out-of-direction travel between the Gresham Transit Center and Mt. Hood Community College
- Day to day traffic variation could reduce transit reliability if the bus travels in mixed traffic.

Cleveland to Mt. Hood Community College option

Pros of the Cleveland to Mt. Hood Community College option

- Connects to Gresham Vista Business Park and Legacy Mt. Hood Medical Center
- Less potential traffic delay than other routes
- Provides transit access to residents along Cleveland
- Can use street improvements being done by City project in 2016

Cons of the Cleveland to Mt. Hood Community College option

- Does not serve commercial areas as well as other options
- Less residential density compared to other Gresham options

Hogan to Mt. Hood Community College option

Pros of the Hogan to Mt. Hood Community College option

- Connects to:
 - More current and future jobs than other options
 - Businesses on Hogan
 - Legacy Mt. Hood Medical Center
 - Greatest number of community resources
- Provides transit service to Hogan, which does not currently have transit

Cons of the Hogan to Mt. Hood Community College option

- Day to day traffic variation could reduce transit reliability if the bus travels in mixed traffic
- Expected future traffic volumes and congestion could delay buses in traffic
- Hogan is identified as a route south to Clackamas County, and Hogan/Division/Burnside 'triangle' has high traffic volumes

Introduction

The Powell-Division Transit and Development project will identify, develop, and construct a new high-capacity transit project for the Powell-Division corridor. This report provides information to assist decision makers in identifying the preferred alternative to fund and construct in the Powell-Division corridor.

The Portland Metro Region developed a High Capacity Transit Plan (*Regional High Capacity Transit System Plan*, September 2009) that identified the regional priorities for implementing high capacity transit. The High Capacity Transit Plan identified two top priorities: The Southwest and the Powell-Division Corridors. These priorities set this process in motion for Metro and partners to evaluate how to best improve transit service in the Powell-Division corridor.

This document describes:

- route and transit type options proposed for the corridor
- the process and criteria for developing and evaluating options
- evaluation findings and key trade-offs
- public involvement findings
- next steps

The transit alternative will:

- consist of the route, mode, and route end points recommended by the Steering Committee
- support the project purpose and need statement, goals and objectives and desired outcomes
- will support further decision-making on transit operational characteristics, design, station locations and amenities, and transit service levels
- be forwarded by the Steering Committee to local, state and federal agencies for review, design, approval, construction and operation.

What is a transit alternative?

A transit alternative consists of an alignment or route (where the transit line will travel), mode (the vehicle used, such as a light rail or bus), stations (places to be served by the transit line) and termini (where the line will begin and end) considered.

What is a preferred transit alternative?

The preferred transit alternative identifies the specific mode, alignment, stations, and termini location selected for implementation.

Chapter 1. Definition of Alternatives

This chapter describes the routes and the transit types under consideration. The alternatives evaluated in this report are the result of an initial screening process and a series of decisions made by the Steering Committee. Chapter 2 provides the evaluation process for this report, including the project goals and objectives, evaluation measures, and the purpose and need. Chapter 3 describes the results of the evaluation process.

The project team initially considered a wide range of potential alternatives including streetcar, bus rapid transit (BRT) and light rail. Over the summer of 2014, an initial screening process was conducted. The initial screening process identified the most promising alternatives based on meeting the draft project purpose and need. Alternatives were assessed with a set of initial screening questions to determine which alternatives would address the purpose and need and the adopted project outcomes and goals.

Results of the screen are based on results of the following initial screening questions:

- Does the transit alternative support existing policies and plans, and capital investments, including projects currently under construction?
- Does it serve existing transit riders, including people of color and low-income and limited English populations on Powell and Division?
- Does it link key destinations in the corridor?
- Are the impacts reasonable; is the transit alternative feasible given impacts to residential, business and community resources or parks, wetlands, wildlife habitat, historic sites, utilities and other significant infrastructure?

The results of the initial screen are available in the *Powell-Division Transit and Development Project Transit Alternatives Screening Report*, which is available on the project website at http://www.oregonmetro.gov/sites/default/files/PD_TransitScreening09-15-14.pdf.

Based on the initial screening process on September 29, 2014, the Powell-Division Transit and Development Project Steering Committee reached consensus on the high capacity transit types and routes to study further. The committee recommended the following transit types and routes for further study:

- Frequent Service Plus Bus
- Dedicated Busway
- a route on inner Powell transitioning to Division in southeast Portland.

Figure ES 2 illustrates the general route and the options for crossing between Powell and Division and service in Gresham considered in this report.

There are two general categories of options under consideration:

- transit type options
- route options

Transit type options under consideration, which are described below are:

- Frequent Service Plus
- Dedicated Busway

Route options are described below following the discussion of transit type.

1.1. Transit Type Options

Frequent Service Plus and Dedicated Busway cover a spectrum of bus operational characteristics and design treatments that are often referred to as bus rapid transit. While there are distinct differences between the two transit type options, they share the following characteristics:

- Larger buses with capacity for more passengers
- Larger stations with amenities similar to existing MAX stations, including real-time travel information, ticket machines, security features, ADA accessible platforms and art
- Buses and stations designed for faster boarding
- Service at least every 15 minutes, with more frequent service during the peak commute hours
- Stations spaced farther apart than regular bus stops to improve travel time
- Ability to integrate with the existing local bus system

The preferred alternative may be some combination of Frequent Service Plus and Dedicated Busway.

Additional design will be completed during the project development phase starting in the summer of 2015. The expected outcome of this process is the ability to identify the most appropriate improvements for the entire corridor, including decisions for downtown Portland and downtown Gresham, which are not included in this report.

1.1.1 Frequent Service Plus options

Frequent Service Plus would typically operate in mixed traffic with focused transit priority treatments to improve travel time. Travel time would be improved through a combination of faster boarding, intersection design treatments, and signal priority at stoplights. Where right-of-way is available, Frequent Service Plus bus may travel in an exclusive transit lane. Examples of where right-of-way is available include the Tilikum Crossing and areas that are currently used for parking.

1.1.2 Dedicated Busway options

Dedicated Busway would have significant portions in transit-only lanes separated from general traffic. Travel time would also be improved through faster boarding and signal priority as well as appropriate use of the design treatments discussed below.

1.1.3 Design Treatments

Design treatments considered will differ in response to local conditions and needs and by option, but are mainly components of the Dedicated Busway option. The following are examples of design treatments that will be considered and evaluated if appropriate for each part of the corridor:

- Queue jump lanes: Exclusive lanes at congested signalized intersections that allow buses to bypass the long queues to advance in front of traffic. The lanes may include a special transit phase or may be signed for right turn except bus.
- Median busway: A dedicated bus facility in the median area that could be physically separated from other traffic and with some form of transit priority at locations where it intersects with other traffic.
- Bus lanes: Similar to a median busway, but typically located on the outside of the arterial roadway. Typically, the bus lane is not physically separated from the general traffic lanes. Variations include signed right turn only except bus at intersections and shared use of the lane for business access and right turns; it is commonly known as a business access and transit (BAT) lane.
- Bidirectional lane: An exclusive single lane that allows the BRT vehicle to pass in one direction through a constrained section while a BRT vehicle waits at a station or bypass area until it can be given the green signal to pass through the section in the other direction.
- Reversible lane: A single, exclusive lane that is used in one direction during the morning peak traffic period and the other in the afternoon peak.
- Peak-hour only exclusive lanes: the curbside general purpose lanes or the parking areas are restricted for only BRT vehicle use during morning and afternoon traffic peak periods.

1.2 Route Options

A wide range of route options has been considered for the corridor. Through an initial screening process, preliminary evaluation, and decisions by the Steering Committee, some options have been identified as less promising. The process that led to the options studied in this report is described in more detail below, in Chapter 2, and in the *Powell-Division Transit and Development Project Transit Alternatives Screening Report*, which is available on the project website. Figure ES 1 shows the narrowing of alternatives from between spring 2014 and spring 2015.

1.2.1 Route options evaluated

The route options that are analyzed in detail in this report are:

- **Portland options:** the north/south crossover between Powell and Division
 - 50th Avenue
 - 52nd Avenue
 - 82nd Avenue
 - 92nd Avenue

- **Gresham options:** whether and what route to serve Mt Hood Community College
 - Gresham Transit Center with no service to Mt. Hood Community College
 - Main/223rd
 - Cleveland
 - Hogan
 - Kane

The project will also examine and make decisions on routing options in downtown Portland and downtown Gresham during project development, which is anticipated to start in summer of 2015.

1.2.2 Route options that do not meet the purpose and need

At the September 29, 2014 meeting, the Steering Committee reached consensus on advancing a general route along inner Powell Boulevard in southeast Portland transitioning to Division Street, but did not make decisions on the following:

- Willamette River crossing options: Ross Island Bridge or the Tilikum Crossing
- Portland north/south crossover options: Cesar Chavez Boulevard, 50th, 52nd, 82nd, 92nd, I-205 ramps or 122nd
- Gresham north/south options to serve Mt. Hood Community College: Eastman/223rd, Cleveland, Hogan, or Kane Drive

Project staff evaluated the route options listed above during the initial screening process to determine which, among a wide range of alternatives, would meet the project goals and objectives and the purpose and need. Based on that initial evaluation, the following options would not meet the project goals and objectives and purpose and need:

- Willamette River crossing options: Ross Island Bridge
- Portland north/south crossover: Cesar Chavez Boulevard, I-205 ramps and 122nd
- Gresham north/south options: Eastman/223rd

Willamette River crossing

The Ross Island Bridge was identified as the less promising alternative based on:

- **Travel time reliability:** The Ross Island Bridge option would require mixed-traffic operations, or major modifications to an historic structure. The Tilikum Crossing will provide over a mile of dedicated transit way.

- Current and future population and employment growth: The Ross Island Bridge would not connect to areas with the highest planned population growth, including South Waterfront and the Central Eastside Industrial District.
- Transportation options to major destinations: The Ross Island Bridge does not provide connections to Portland State University, Oregon Health & Science University, Oregon Museum of Science and Industry, and the Central Eastside Industrial District.
- Leveraging infrastructure: The Tilikum crossing option benefits from the new investments in pedestrian and bicycle infrastructure that will provide greater access.

Portland north/south transition

Cesar Chavez, the I-205 ramps and 122nd are less promising for the following reasons:

- Current and future population and employment growth: The crossing options between 50th and 92nd would provide the best connections to current and future employment growth.
- Transportation options to major destinations: Cesar Chavez, the I-205 ramp and 122nd transition options would not connect to key destinations in east Portland. The I-205 and 122nd options would preclude the ability to connect to Portland Community College Southeast.
- Right of way constraints and existing congestion: Cesar Chavez option would have less travel time reliability and greater traffic and right-of-way impacts on Cesar Chavez and Division.

The option on 92nd Avenue was also removed from further study by the Steering Committee at the March 16, 2015 meeting. It was identified as less promising for the following reasons:

- It would not provide service to Portland Community College, which has been identified consistently by the public as key to the success of the project
- It would not serve the future ridership as well as the other options
- It would not serve current and future households as well as other options.

Gresham north/south options

Eastman/223rd was considered to be less promising because it would require out of direction travel from the Gresham Transit Center and is not identified by City of Gresham policy as a future high capacity transit street. However, it would provide better serve than other options to the Gresham Vista Business Park, which is a key destination. At 221 acres, Gresham Vista Business Park is one of a few undeveloped large-lot industrial sites in the Portland metropolitan region. At the March 16, 2015 Steering Committee meeting members reached consensus on advancing an option that would use Main Street instead of Eastman, which would be a shorter route, for further study.

1.3 Station locations

Station locations have been identified for the purpose of analysis based on current land use and ridership. Station locations studied are shown in Figure ES 2. Locations will be refined by the Steering Committee as land use and transportation planning, including input from the public and the Steering Committee, and conceptual design proceeds.

Chapter 2. Evaluation Process

The Steering Committee will select a preferred alternative based on results of a technical evaluation process and input from the public. Information for evaluating the options in this report has been developed based on a working draft purpose and need statement for the project, and the project outcomes and goals adopted by the Steering Committee on June 23, 2014.

Following the initial screening process, the most promising alternatives were evaluated on quantitative and qualitative measures. In order to provide information to evaluate and compare alternatives, the project team developed objectives and measures based on project goals and the working draft purpose and need statement. The purpose and need, project goals, and objectives and measures for each goal are provided in the sections below. Additional information on the methods used to assess the performance on each objective is available in *Powell-Division Transit and Development Project Transit Alternatives Evaluation Methods Report*, a technical report available from Metro.

2.1 Project Purpose and Need

2.1.1 Project Purpose

The purpose of the Powell Division Transit and Development Project is to identify a preferred near-term high capacity transit solution for the corridor that efficiently serves current high ridership demand, is coordinated with related transportation investments and community development, recognizes limited capital and operational funding and supports the following goals:

What is a purpose and need statement?

A purpose and need statement describes what a project will accomplish and why it is needed.

The purpose and need sets the stage for consideration of alternatives. It is good planning practice to define a project's purpose and need. It helps to ensure a common understanding among community members, project staff, and decision-makers of what the project will address and focuses technical work and decision making.

The purpose and need has three parts: the purpose, the need, and the goals and objectives. The purpose and need is the first step in the project development process. It is intended to be used as a guide for the development of alternatives, and to be a fundamental element when developing criteria for selection among alternatives.

The draft Powell-Division Transit and Development Project purpose and need statement is based on the adopted project outcomes and goals, adopted plans and policies, and documented community needs.

The public provided input on the purpose and need statement July 28 through September 19, 2014. The Steering Committee will review and possibly revise the statement prior to confirming it and selecting the preferred transit alternative in the summer of 2015.

The purpose and need will also be used during the federal environmental review process required under the National Environmental Protection Act (NEPA).

- **Transportation:** People have safe and convenient transportation options – including efficient and frequent high capacity transit service that enhances current local transit service – that get them where they want to go and improves the existing system.
- **Well-being:** Future development and transit improvements create safe, healthy neighborhoods and improve access to social, educational, environmental and economic opportunities.
- **Equity:** Future development and transit improvements reduce existing disparities, benefit current residents and businesses and enhance our diverse neighborhoods. There is a commitment to prevent market-driven involuntary displacement of residents and businesses and to equitably distribute the benefits and burdens of change.
- **Efficiency:** A high capacity transit project is efficiently implemented and operated.

2.1.2 Project need

High Capacity Transit service in the corridor can address the following needs:

- **Heavily congested traffic**—Buses operate in heavily congested traffic conditions in both peak and off-peak times, which negatively affect transit travel times and reliability.
- **Transit demand exceeds capacity**—Strong demand for transit service in the corridor in both peak and off-peak times commonly results in standing-room only conditions on buses, and when at capacity buses pass by waiting riders.
- **Projected growth**—Projected growth in population, employment, and transit demand would require very high transit frequencies that would exacerbate the bus bunching and reliability issues already occurring.
- **Access to transit**—Access to transit is problematic in significant portions of the corridor with bicycle and pedestrian gaps along bus routes, major arterials, and many local streets.

Heavily congested traffic

Buses operate in heavily congested traffic conditions, which negatively affects transit travel times and reliability. For line #4 Division in both directions, and for line #9 Powell westbound, it takes 16-17 minutes longer to travel through the corridor in the evening peak compared to off-peak. For #9 Powell eastbound (outbound), a trip through the corridor takes nearly half an hour longer in the evening peak compared to off-peak.

Lines #4 Division and #9 Powell experience less than 90% on-time performance in the following time periods by direction:

- #4 Division inbound: All day;
- #4 Division outbound: AM peak through the evening;
- #9 Powell inbound: AM peak through the evening;
- #9 Powell outbound: AM peak through the evening.

Transit demand exceeds capacity

Strong demand for transit service in the corridor in both peak and off-peak times commonly results in standing-room only conditions on buses, and when at capacity buses pass by waiting riders. Both bus lines experience high daily passenger loads and crowding throughout the corridor. Highest passenger loads occur in the following locations:

- #4 Division westbound – SE 122nd to SE 98th Avenue, SE 76th to SE 60th Avenue, SE Cesar Chavez Boulevard to Hawthorne Bridge
- #4 Division eastbound – Hawthorne Bridge to SE 33rd Avenue, I-205 to SE 138th Avenue
- #9 Powell westbound – SE Powell Garage Drive (near I-205), SE 9th Avenue to SE 43rd
- #9 Powell eastbound – Ross Island Bridge to SE 28th Place.

Line #4 Division eastbound buses experience near- or over-capacity conditions in the PM peak period both in inner SE Portland and east of I-205. Line #9 Powell is over capacity in the westbound direction during the AM peak in inner SE Portland.

Projected growth

Projected growth in population, employment, and transit demand would require very high transit frequencies that would exacerbate the bus bunching and reliability issues that are already occurring. As population and employment in the region and corridor are projected to increase, transit ridership on Powell and Division bus lines is expected to grow significantly. Year 2035 average weekday ridership demand is projected to be 17,400 for #4 Division and 13,300 for #9 Powell in the corridor east of the Willamette River. The combined 30,700 daily ridership represents a greater than 70% increase over the approximately 17,700 daily trips on the two bus lines in the corridor today.

The 2035 Regional Transportation Plan (RTP) includes assumptions for future transit service frequencies in the corridor. The RTP assumes more frequent service compared to today's headways for lines #4 Division and #9 Powell, however, ridership projections indicate that the assumed level of service would be insufficient to meet demand on both bus lines. See table 2.1.2.1 below.

Table 2.1.2.1 2035 average weekday headways and peak loads

Bus Line	Assumed Peak Headway	Assumed Off-peak Headway	1 Hour Peak Load ¹	Peak Hourly Bus Capacity ²	Headway Meets Demand?	Peak Headway to Meet Demand
#4 Division						
<i>West of SE 92nd:</i>	5	12	576 ³	660	yes	5.45
<i>East of SE 92nd:</i>	10	15	364 ⁴	330	no	8.57
#9 Powell	10	15	445 ⁵	330	no	6.67

¹ PM peak hour, peak direction peak load point

² hourly frequency multiplied by single bus capacity (55)

³ east of SE 12th Ave.

⁴ east of SE 92nd Ave.

⁵ east of SE 26th Ave.

For the #4 Division, the assumed headways would provide sufficient capacity to accommodate the PM peak load for the line near SE 12th Avenue. However, east of SE 92nd Avenue, where the line is assumed to operate less frequently, headways would need to be improved to 8.5 minutes (7 buses per hour) instead of the modeled 15 minutes (4 buses per hour) in the peak to accommodate the peak load near SE 92nd Avenue. The #9 Powell would also require more frequent service to meet the projected peak load near SE 26th Avenue. The assumed 10 minute headway (6 buses per hour) would need to be improved to better than 7 minutes (9 buses per hour) to carry all passengers.

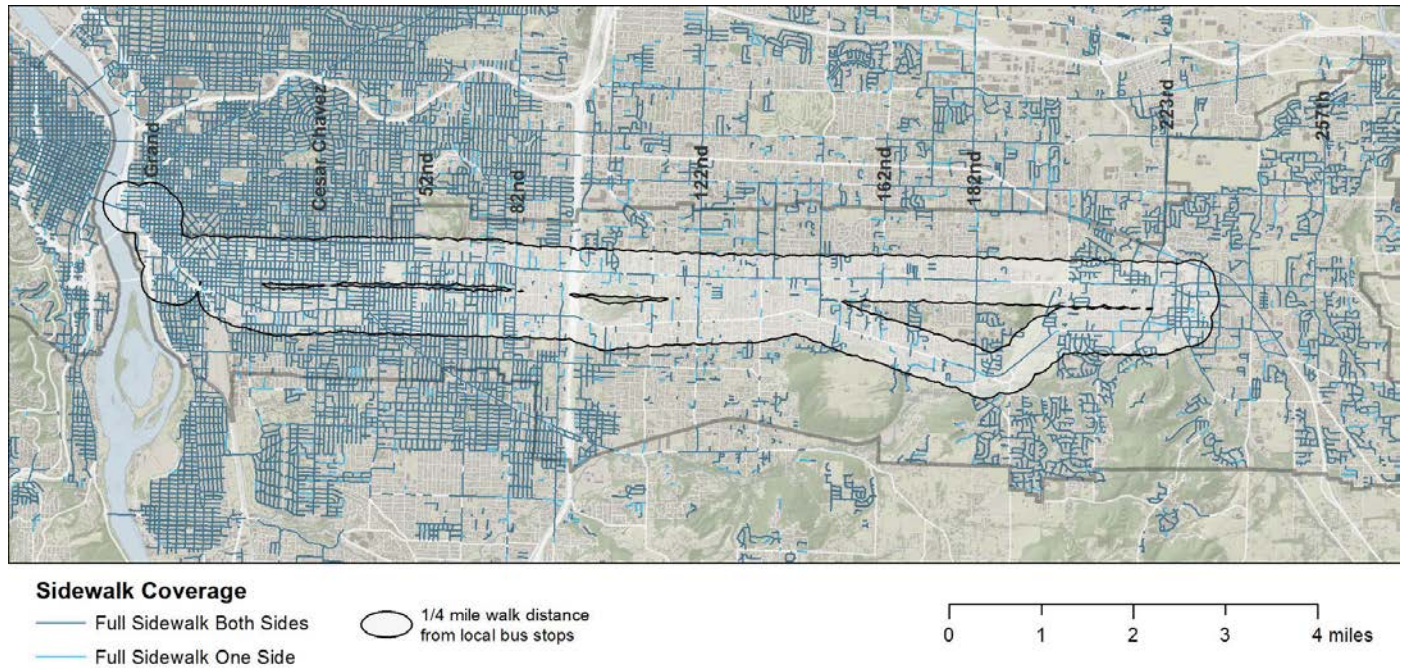
Access to transit

Access to transit is problematic in significant portions of the corridor with gaps and deficiencies in the pedestrian network along bus routes, major arterials and many local streets. Full sidewalk coverage is one of the most important aspects of high quality transit access. The adequacy of pedestrian facilities varies greatly throughout the corridor, ranging from dense areas with full sidewalk coverage to more suburban areas with no sidewalks and many cul-de-sacs. Sidewalk coverage is relatively high west of I-205, both on Powell Boulevard and Division Street, as well as within the local street network. Between I-205 and downtown Gresham, Division Street has few major sidewalk gaps with the exception of the segment between 182nd Avenue and Birdsdale Avenue, while Powell Boulevard has only a handful of short sidewalk segments through the entire stretch from I-205 to the Gresham city boundary. In this area, many local streets surrounding Powell Boulevard and Division Street lack sidewalks. In addition, long sections of Division east of I-205 lack safe crossing opportunities.

Bicycling in the corridor has similar issues with gaps and deficiencies in many areas in the network along major arterials and a sparsely connected local network east of I-205. Many people access transit via cycling and having safe, comfortable routes to do so is an important aspect of the overall transportation system.

There is a wide range in the quality and the types of bicycle facilities in this corridor. West of I-205 and north of Powell Boulevard, there are many comfortable neighborhood routes to get to downtown Portland, however, east of I-205, direct routes are few and far between. This leaves Division Street as the only east-west bicycle throughway for a viable network. Division currently has bike lanes east of SE 60th Avenue; east of I-205 there is a plan to restripe and upgrade the bike lanes with a buffer for a more comfortable bikeway. North and south routes east of I-205 are also very deficient.

Figure 2.1.2.1 Sidewalk coverage within one quarter mile of bus stops on Division and 9 Powell



Source: Metro Research Center

2.2 Project goals, objectives and evaluation measures

The project goals adopted by the Steering Committee are:

Transportation: People have safe and convenient transportation options – including efficient and frequent high capacity transit service that enhances current local transit service – that get them where they want to go and improves the existing system.

Well-being: Future development and transit improvements create safe, healthy neighborhoods and improve access to social, educational, environmental and economic opportunities.

Equity: Future development and transit improvements reduce existing disparities, benefit current residents and businesses and enhance our diverse neighborhoods. There is a commitment to prevent market-driven involuntary displacement of residents and businesses and to equitably distribute the benefits and burdens of change.

Efficiency: A high capacity transit project is efficiently implemented and operated.

Based on the adopted goals, the project team developed the objectives and measures shown below in table 2.2.1. Some of the evaluation measures are not completed or will be updated because additional design, traffic analysis and modeling will be completed in order to thoroughly evaluate the options. These measures will be completed or updated in the next phase of the project. However, a lot of information has been developed that will inform the future design analysis. Information will be provided during project development starting in summer of 2015.

Table 2.2.1 Project goals, objectives and evaluation measures

Transportation: People have safe and convenient transportation options—including efficient and frequent high capacity transit service that enhances current local transit service—that get them where they want to go and improves the existing system.

Objective	Measure
Supports transportation plans and policies	Consistent with transportation policies and plans
Serves current transit ridership	Ridership based on current count information
Serves future transit ridership	Projected system and project ridership (2035)
Provides faster transit service	Transit travel times
Avoids, where possible, conflicts between high capacity transit and motor vehicle mobility*	Congestion and geometric constraints that restrict the ability to accommodate high capacity transit and motor vehicle mobility
Increases number of people able to move in and through the corridor**	Projected person throughput (in autos and transit) at intersections

Well-being: Future development and transit improvements create safe, healthy neighborhoods and improve access to social, educational, environmental, and economic opportunities.

Objective	Measure
Supports land use plans and policies	Consistent with land use plans and policies
Serves the greatest number of people in the corridor	Current and future (2035) number of households within ½ mile of stations
Serves the greatest number of jobs in the corridor	Current and future (2035) employment within ½ mile of stations
Serves major destinations in the corridor	2040 centers, neighborhood prosperity initiative and urban renewal areas, enterprise zones and college campuses within ½ mile of stations
Serves community resources and affordable housing	Community resources, including schools, medical facilities, libraries, parks, and grocery stores; and affordable housing within ½ mile of stations
Minimizes property impacts, including homes, businesses and community resources**	Potential right-of-way impacts to residential and business properties and community resources
Supports economic development	Ratio of land value to the value of improvements on commercial or multifamily zoned parcels
Protects or improves the natural environment*	Potential impacts to wetlands, floodplains or high value habitat

Equity: Future development and transit improvements reduce existing disparities, benefit current residents and businesses and enhance our diverse neighborhoods. There is a commitment to prevent market-driven involuntary displacement of residents and businesses and to equitably distribute the benefits and burdens of change.

Objective	Measure
Improves access to high capacity transit for people of color and low-income and limit English proficiency populations	Low-income, people of color, and limited English populations within ½ mile of station
Distributes negative impacts equitably**	Number of <ul style="list-style-type: none"> • residential properties and business properties community resources • environmental resources within area of potential impacts in areas with low-income, people of color, and limited English populations compared to corridor
Distributes benefits equitably	Benefits in areas with low-income, people of color, and limited English populations compared to corridor. Benefits are derived from: <ul style="list-style-type: none"> • current ridership on existing transit lines • serving the greatest number of jobs • serving community resources

Efficiency: A high capacity transit project is efficiently implemented and operated.

Objective	Measure
Maximizes financial resources*	Annual operating cost per total annual trips
Minimizes cost of property impacts**	Estimated cost range of residential and business properties within area of impact
Minimizes impacts to parks, recreation areas, and historic sites*	Number of parks, recreation area, and historic sites within 25' of existing right-of-way
Cost**	Relative capital cost magnitude

*To be updated during project development

**To be completed during project development

2.3 Evaluation tools

The following tools are used in evaluation:

- Geographical Information Systems (GIS)
- Travel demand modeling
- Traffic analysis
- Concept design

Each of these is described briefly below. Most evaluation results are quantitative; some are qualitative.

2.3.1 Geographical Information System

A geographic information system (GIS) is computer technology used to store, visualize, analyze, and interpret spatial data. Geographic features, both natural and cultural, are associated with a table of attributes which includes their size and position on the earth's surface as well as a variety of qualitative and quantitative information, for example jurisdiction names or population counts. Using GIS, this information can be used to create maps, examine spatial relationships and perform analyses. GIS is used in the transit planning process to compare the route options across various measures such as demographics, destinations served, and potential impacts to property and natural areas.

2.3.2 Transit Travel Demand Modeling

Travel demand models use data to predict transportation choices such as trip frequency, trip origins and destinations, types or modes of transportation and travel by time of day. Planners and policy makers use these models to analyze the effects of transportation infrastructure improvements on travel behavior considering factors such as increased population and employment, and changes in transit service, development patterns, and transportation policies.

Metro's travel demand model takes into consideration the actual choices made by residents in our region with information collected from surveys. Metro's last survey, the *Household Travel Behavior Study*, tracked 6,000 households to understand how factors such as age, income, children, car ownership, and transportation infrastructure characteristics affect travel choices. Data input into the transportation model includes population and employment, both current and forecast, in a way that is consistent with local comprehensive plans as well as roadways and transit routes. More information on Metro's travel demand model is available on Metro's website at

<http://www.oregonmetro.gov/transportation-research-and-modeling-services>.

In addition, in some cases, analysis is based on model results combined with information on projected auto travel times, household and employment numbers, and the accessibility of major destinations.

2.3.3 Traffic analysis

The purpose of the traffic analysis is to analyze traffic conditions and identify potential operational issues and traffic impacts and identify ways to alleviate them. The analysis is intended to support the

evaluation of route and transit type options, as well as document fatal flaws for both traffic and non-traffic impacts, and define concepts for more detailed study in the next phase.

Traffic analysis tools include traffic simulation models and analytical/deterministic tools. Traffic simulation models, which simulate the movement of individual vehicles are based on car-following and land-changing theories. They estimate the impacts of changes in lane configuration, signal timing and turning movements. Simulation tools are effective in evaluating the dynamic evolution of traffic congestion problems on transportation systems. Analytical/deterministic tools implement the procedures of the Highway Capacity Manual. These tools quickly predict capacity, density, speed, delay, and queuing. Analytical/deterministic tools are good for analyzing the performance of isolated or small-scale transportation facilities.

2.3.4 Design

Preliminary cross-section and operational design concepts are developed by project engineers. The designs are used to estimate and evaluate travel time, which affects ridership, traffic and right-of-way impacts, and costs. Concept design will continue in the project development phase and provide additional information.

2.4 Evaluation scoring

The tools and the measures for each objective are used to evaluate and score the options on a five point scale from +2 to -2. Results of the analysis are scored as illustrated below in Figure 2.4.1. and shown in Figure ES 3 Evaluation results matrix. Number scores are included for each objective in Chapter 3 Evaluation Findings.

Figure 2.4.1 Scoring in report and matrix

More promising	2	●
	1	◐
	0	◑
	-1	◒
Less promising	-2	○

In general, options are compared only with the competing options; that is, Portland options are scored compared the other Portland options. Also generally, the option that would be most promising based on an evaluation measure is scored as such with a 2. Scores for the remaining options are based on how they compare. If there is a large difference between Portland and Gresham options, the score may reflect that to provide a better understand of the magnitude of difference between the two. For

instance, employment and forecast employment growth is far greater in Gresham than Portland, therefore the top score is 1 for Portland options and 2 for Gresham options.

Scores are an ordinal ranking of results, however, if the difference between two options is relatively small, the two are ranked the same. If the difference is relatively large on the other hand, there may be a two point difference between options. This is done to provide an accurate picture of where there are or are not meaningful differences. This effort is intended to provide the most accurate assessment for comparing the strengths and weakness of the options from a technical perspective.

2.5 Evaluating route options

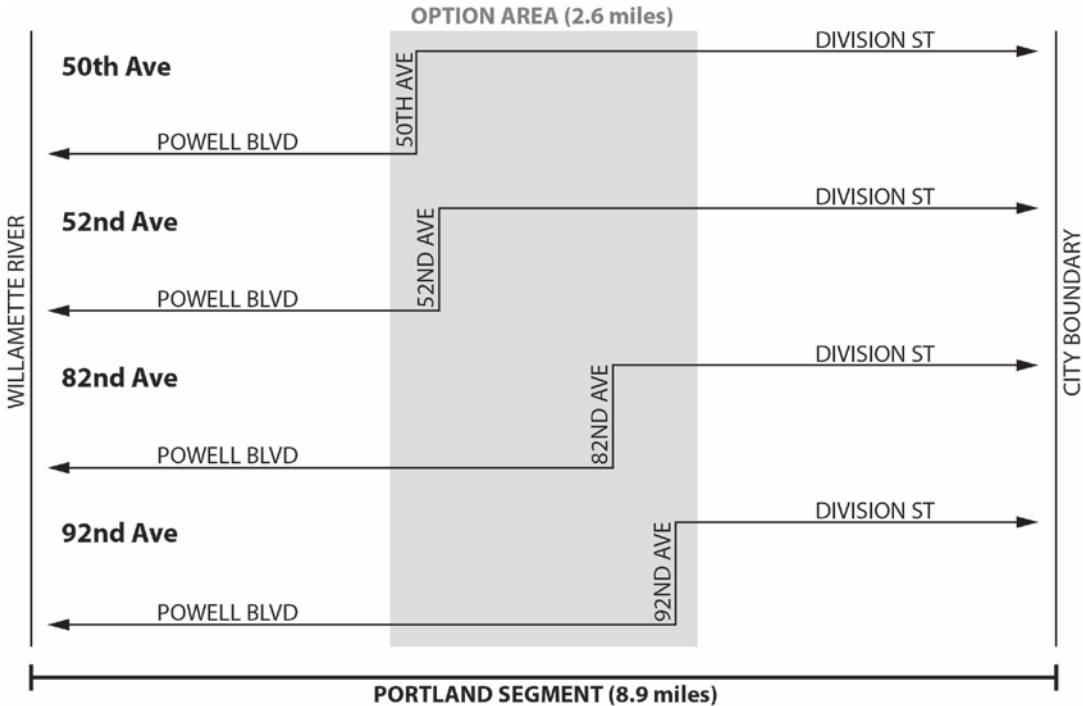
Some measures are only appropriate for evaluating the route options, not the transit type options. For instance, the current and future employment within one half mile of stations is the same for Frequent Service Plus and Dedicated Busway options because station locations evaluated are the same for both. Therefore, in this case, the results are the same for both transit type options for each route option.

There are route options in Portland and Gresham. The Portland segment is from the Willamette River to the Portland city limit, however, data focuses on the Portland **option area** between SE 50th and Powell and SE 92nd and Division. The Gresham segment is from the city boundary to the potential terminus at Mt. Hood Community College at 257th and Stark Street and data is reported for this area.

2.5.1 Portland route options

Four route options in Portland are evaluated. Results are provided for both the entire Portland route and for option areas between 50th and 92nd for each option. Route options and the option area are shown in figure 2.5.1.1. The entire Portland segment is approximately 8.9 miles. The option area segments are approximately 2.6 miles. Data is reported for both the entire Portland segment and the route option area. This offers the ability to add the Portland and Gresham data and to also have focused data to better understand the differences among the Portland options.

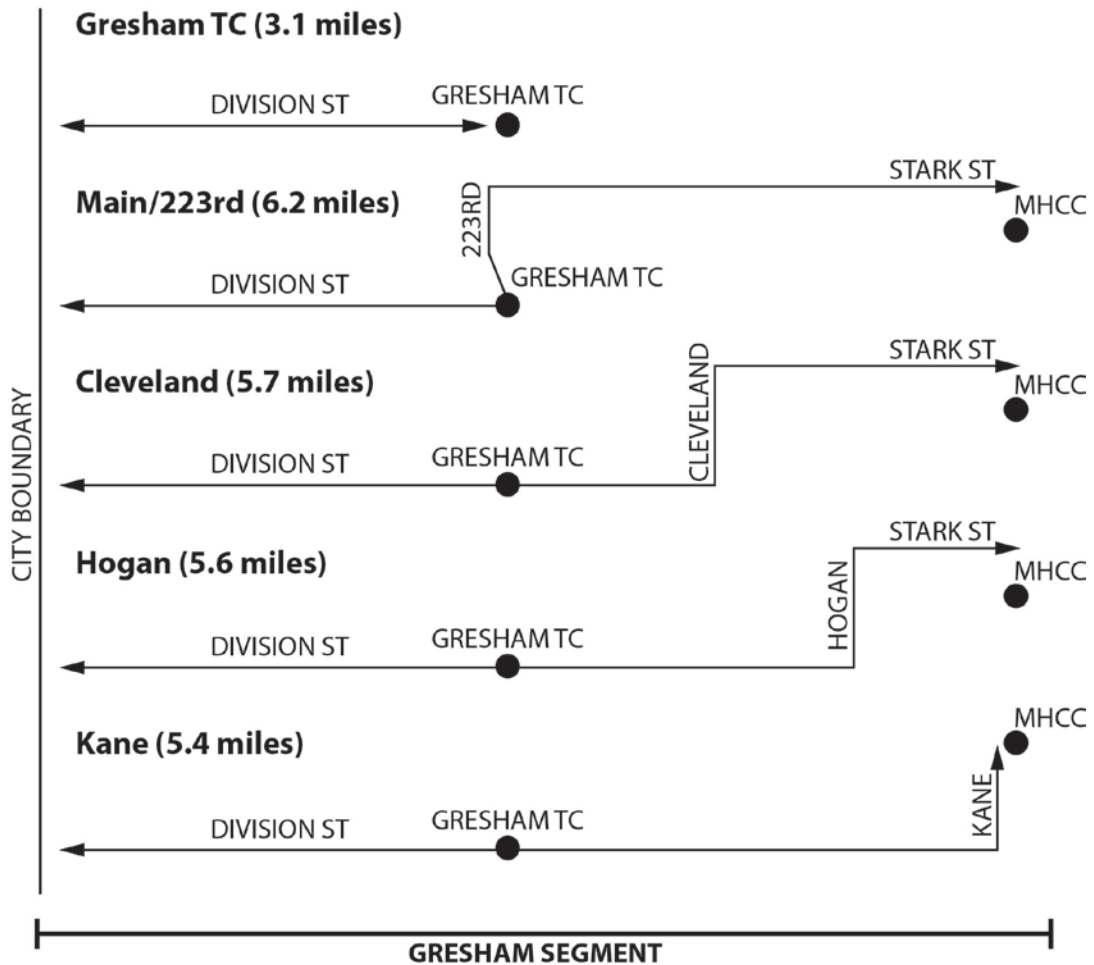
Figure 2.5.1.1 Portland segment and option areas



2.5.2 Gresham route options

There are five route options in Gresham as shown in figure 2.5.2.1. The Gresham Transit Center option, from the city boundary to the Transit Center is approximately 3.1 miles. The options to Mt. Hood Community College add approximately 2 ¼ to 2 ½ miles depending on the option. Data is reported for the entire length of the segment, from the city boundary to the terminus for the Gresham options.

Figure 2.5.2 1 Gresham options



2.6 Evaluating transit type options

Dedicated Busway and Frequent Service Plus options will be evaluated in more detail during the next phase, project development. The existing cross-section, which includes right-of way width and the lane, sidewalk, and bike lane configuration for each segment of the corridor will be analyzed to understand the potential trade-offs of the two transit types in various segments of the corridor based on the same project goals.

2.7 Public involvement

A successful outcome is dependent upon engaging and understanding the perspective of people who live or use services in the area. Information from engagement activities has and will continue to inform project decision-making.

2.7.1 Public engagement findings

This section describes what we have learned from the public over the course of the project so far.

2013 to March 2014

- There is broad support for the Powell-Division Transit and Development Project.
- People support the implementation of a high capacity transit line in the near-term and believe that, at a minimum, the project should improve access to transit and the transit experience of riders of the #4 Division and #9 Powell buses.
- A new high capacity transit line must complement the overall transit network and create access to other transit connections, including potential new north/south service.
- The process should consider different transit types equally.
- The project should complement the desired outcomes identified in existing community plans, such as East Portland in Motion and the Outer Powell Conceptual Design Plan.
- Safety improvements are needed that would make it easier to access transit and generally walk, bike and cross streets.
- Positive changes associated with the project are welcome, but these changes should improve conditions for current residents by preserving the things people value, such as quiet residential areas, and not displace residents.

March to June 2014

- Transit would be easier for people to use and/or the likelihood that they would use transit would increase if it were more frequent, if trips were quicker, and if it regularly arrived on-schedule. Other factors that were important, but to a lesser degree, include more room on buses, better access to transit and a more comfortable place to wait at transit stops.
- Riders of bus lines #4 Division and #9 Powell state that current service meets their needs but point to improvements that include greater frequency and reliability, more buses resulting in less crowded conditions and longer operating hours.
- Existing bus service could be improved by increasing frequency of existing lines, adding more service on weekends, and adding new north/south service for better connections to jobs, schools and services.
- A bus alternative is more favorably viewed than light rail.
- Issues of gentrification and displacement will be an important consideration through the life of the project and beyond.
- Safety and security both on-board and around the station areas are important to address.

June to September 2014

- People have a strong preference that enhanced transit connect destinations between Downtown Portland and Gresham on a combination of Powell Blvd and Division St. Important destinations include Portland State University, Portland Community College Southeast Center and Mount Hood Community College. The preferred route uses the Tilikum Crossing and runs east along Powell Blvd to 82nd Ave, north on 82nd, and east on Division St to Gresham.
- People recognize the four transit type options considered for the corridor have positive features and tradeoffs, but the public is more inclined to eliminate rail options for the corridor rather than bus options.
- People want enhanced transit to provide a discernibly quicker, more reliable trip.
- Equally important is ensuring that all uses—motor vehicles, freight, pedestrians, bicycles—are balanced, as Powell and Division must continue to serve as important east/west travel routes.
- Cost is important and people favor lower cost alternatives that can provide discernible benefits to transit riders.
- Improvements in the corridor, both the transit route and type, should improve access for current and future riders and connect them to important destinations in the corridor, including other transit.
- There is also strong interest in maintaining bus service on #4 Division and #9 Powell bus lines and in reallocating any service savings from enhanced transit to improve bus service in the corridor.

September 2014 to March 2015

- **River crossing options** - People who weighed in overwhelmingly support using the Tilikum Crossing.
- **Portland north/south crossover options** - People who weighed in overwhelmingly supported using 82nd Ave. People who weighed in thought the less promising options included Cesar Chavez Blvd, 50th, 52nd and 92nd avenues.
- **Gresham north/south options** - People overwhelmingly support connecting to Mt Hood Community College. While fewer people weighed in on the Gresham options, those who did support Hogan Rd and, to a lesser extent, Kane Dr. People thought Powell Blvd south of downtown and Eastman Pkwy were less promising.
- People see the transit project as a means to advance desired community outcomes, including:
 - mixed income neighborhoods
 - intentional affordable housing
 - safer, more welcoming streets and community spaces
 - more jobs in the corridor
 - supporting communities of color
 - protecting existing small businesses especially ethnic businesses at the heart of communities

- People want safer, more comfortable transportation that includes:
 - safe sidewalks, crossings, bike facilities
 - continued or improved mobility for all road users
 - faster, more reliable transit
 - better access to transit
- There are places that could be made safer, more welcoming, healthy and better connected, which could present opportunities for business development and community building.

2.7.2 Public involvement activities

Engagement activities consisted of in-person and online opportunities, and targeted outreach for communities of color, people with lower incomes and people who speak languages other than English. The following principles guide engagement strategies, activities and materials.

- *Use a person-first lens:* Relate to people the way they relate to the world, not through a project lens.
- *Make it easy for people to participate:* Meet people where they are and capitalize on opportunities for coordinated engagement.
- *Be clear:* Be clear about decisions, how input is a part of decision-making, who is making the decisions and when/what to expect as a result.

The project established and regularly evaluated the level of success related to the following engagement goals.

- Goal 1: Communicate complete, accurate, understandable and timely information
- Goal 2: Gather input by providing meaningful opportunities to participate
- Goal 3: Provide timely public notice of opportunities to participate
- Goal 4: Facilitate the involvement of low income populations, communities of color and people with limited English proficiency

There was broad-reaching public engagement over the course of the project. Informational briefings were provided to:

- standing committees, such as the Gresham Public Safety Committee
- neighborhood associations
- business organizations, such as the Historic Downtown Gresham Business Association and the Portland Business Alliance
- advocacy organizations, such as Elders in Action
- city councils

Chapter 2. Evaluation Process

Project-sponsored events and opportunities included:

- talk with staff sessions
- transportation work group meetings
- safety and security work group meeting
- developers roundtable
- equity work group meeting
- bus rapid transit 101 session
- youth engagement
- Latino, Chinese, Vietnamese, Russian, Tongan, Bhutanese and Native American engagement
- business canvassing by youth leaders
- hands on workshops and open houses

The project participated in other events, including:

- community events, such as the Division Midway Harvest Festival and Jade District roll out
- related projects' engagement events, such as the Outer Powell transportation safety project open house and the Portland SE quadrant open house

Chapter 3: Evaluation Findings

This chapter provides the evaluation results and scores and briefly describes measures and methodology. It is organized by the four project goals:

- Transportation
- Well-being
- Equity
- Efficiency

3.1 Transportation Goal

The transportation goal is that people have safe and efficient transportation options – including efficient and frequent high capacity transit service that enhances current local transit service – that get them where they want to go and improves the existing system. This can be measured by how well the proposed improvement supports the existing plans and policies; serves current and future ridership; and provides faster service; while minimizing conflicts with other modes. Findings on these measures are discussed below.

3.1.1 Supports transportation plans and policies

This measure is a qualitative assessment of the degree to which route options are consistent with local, regional, and state transportation policies. Evaluation scores are shown in the table below.

Table 3.1.1.1 Scores for supporting transportation plans and policies

	Option	Score
Portland options	50th	1
	52nd	1
	82nd	2
	92nd	0
Gresham options	Gresham TC	2
	Main/223rd	2
	Cleveland	0
	Hogan	1
	Kane	2

Portland

Though the currently adopted Portland transportation system plan does not designate Powell as a Major Transit Priority Street east of 50th, the Comprehensive Plan update currently underway identifies it as a high capacity transit route. It also designates 82nd as the high capacity transit route. The plan has designations to accommodate freight on Powell, including Major Truck Street (Willamette River to Gresham). Major Truck Streets link to Regional Truckways and are intended to serve as principal routes

for trucks within a Transportation District. Southeast Portland and Far Southeast Portland are Transportation Districts.

Within Portland Powell Blvd is US 26, a US highway owned by the Oregon Department of Transportation (ODOT); 82nd Avenue is OR 213. Both are part of the National Highway System and designated as a truck routes Per ORS 366.215, “No Reduction of Vehicle-Carrying Capacity,” any proposed decrease in vehicle carrying capacity on US 26 (removal of a travel lane or other reductions of the “hole-in-the-air” needed to accommodate legal loads and annual permitted over-dimension loads) would require review and approval from a Stakeholder Forum (including affected jurisdictions and motor carriers) and the Oregon Transportation Commission (OTC). Any increase in roadway capacity would trigger requirements to provide bike facilities.

Gresham

The Gresham 2035 Transportation System Plan Public Transit System Plan supports the findings of the East Metro Connections Plan, which recommends bus rapid transit on Division, and identifies a high capacity transit connection to Mt. Hood Community College via the Powell-Division corridor as a future need. Division Street, Hogan Road and Kane Drive are designated as High Capacity Planned Corridors; 223rd and Stark are designated as a standard service transit streets. Cleveland is not designated as a transit street.

Kane Road, Hogan Road and 223rd Avenue between Burnside and Stark are designated as Freight Road Connectors. Hogan/242nd is identified as a connection to Clackamas County that will require improvements with additional roadway capacity to address future growth along this corridor, particularly south of Powell.

3.1.2 Serves current transit ridership

This objective evaluates the route options, but not transit type. Current ridership is based on TriMet 2013 passenger count data that provide average weekly weekday counts of the number of riders getting on and off—ons and offs—as well as lift use at stops served by buses currently operating along the potential route and route options. This data illustrates where current riders would be served by improved transit service.

Data is reported for the following primary east/west lines:

- #4 Division
- #9 Powell
- #20 Burnside/Stark

Data is also reported for the lines that cross through the corridor on the north/south streets of the route options. These include:

- #14 Hawthorne on 50th Avenue
- #71 60th/122nd Ave on 52nd Avenue
- #72 Killingsworth/82nd on 82nd Avenue
- #21 Sandy Blvd/223rd on 223rd Avenue
- #80 Kane/Troutdale Rd. and #81 Kane/257th on Kane Road.

It is important to note that this data does not provide information on trip origin and destination and therefore introduces some uncertainty when used to compare route options. For example, a person boarding the #9 Powell bus could have a destination that may or may not be served by the route option choices. The data does however provide information on where the most stop activity is occurring, that is, where people are boarding and deboarding.

Data for the buses on the crossing options, such as the #72 Killingsworth/82nd, introduce additional uncertainty as to whether a rider has a trip that would be served by the route option because these routes currently simply travel through the corridor. However, the count data does indicate there is either an origin, a destination, or a transfer along a route option. Another issue is that the bus lines provide different service frequencies and operating hours. This issue is offset somewhat because the amount of service provided reflects the need for service. Because of the uncertainty these issues introduce, the differences in total numbers are fairly large before there is a break between scores for this measure.

Portland

Table 3.1.2.1 below provides the number of ons and offs and the lift use for each line serving Portland route options and the evaluation scores. The data is shown for the Portland segment as a whole and broken down for the segments inside and outside of the option area between 50th and 92nd avenues. Table 3.1.2.2 shows totals for just the #4 and #9, the primary bus lines serving the corridor.

Table 3.1.2.1 Portland options: average weekly weekday ons and offs, lift use and scores

	Option area only (50th - 92nd)						Outside option areas (12 th -50 th and 92 nd to Gresham)		Portland alignment totals		Score	
	East/west lines		South/north lines				#4 & #9	Lifts	Ons + Offs	Lifts		
	#4	#9	#14	#71	#72	Total						Lifts
50th	3,331	218	1,048			4,597	546	9,174	1,628	13,771	2,174	1
52nd	3,201	714		1,015		4,930	550	9,174	1,628	14,104	2,178	1
82nd	1,906	2,968			2,955	7,829	1,109	9,174	1,628	17,003	2,737	2
92nd	130	3,536				3,666	499	9,174	1,628	12,840	2,127	0

Source: TriMet 2013 Passenger Census

Table 3.1.2.2 Portland options: average weekly weekday ons and offs for #4 Division and #9 Powell between 50th and 92nd

	Option area		
	#4	#9	total
50th	3,331	218	3,549
52nd	3,201	714	3,915
82nd	1,906	2,968	4,874
92nd	130	3,536	3,666

Source: TriMet 2013 Passenger Census

The option that crosses from Powell to Division on SE 82nd Avenue has the highest total ons and offs by large margins whether counting only the #4 and #9 lines or when the north/south lines are included. The #72 has very high counts on SE 82nd Avenue between Powell and Division, with nearly three times as many ons and offs as the other north/south options. This indicates that people have origins or destinations along SE 82nd or are transferring to or from the #4 or #9. Lift use is also highest on the 82nd Avenue option and does not vary substantially among the other options.

Figure 3.1.2.1 illustrates the Portland option area stop locations and number of ons and offs in the option area between 50th and 92nd avenues. Figures 3.1.2.2 and 3.1.2.3 compare total current ridership for each option for the #4 and #9 and the north/south respectively.

Figure 3.1.2.1 Portland options: option area on and off counts for each route option

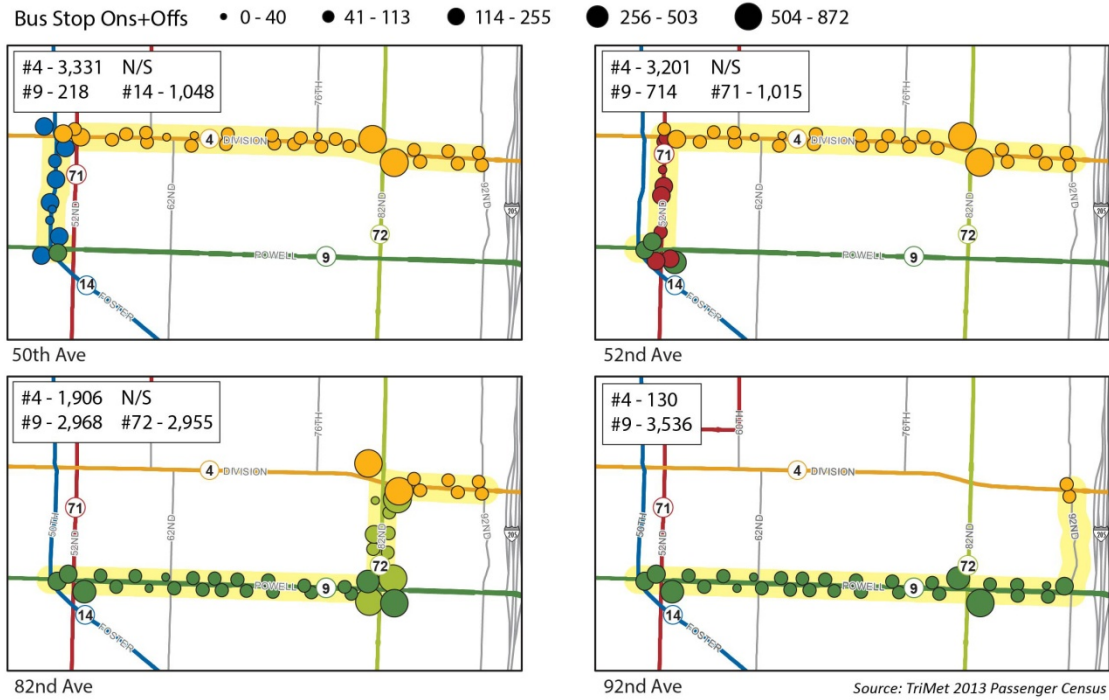


Figure 3.1.2.2 Portland options: #4 and #9 ons and offs between SE 50th and SE 92nd

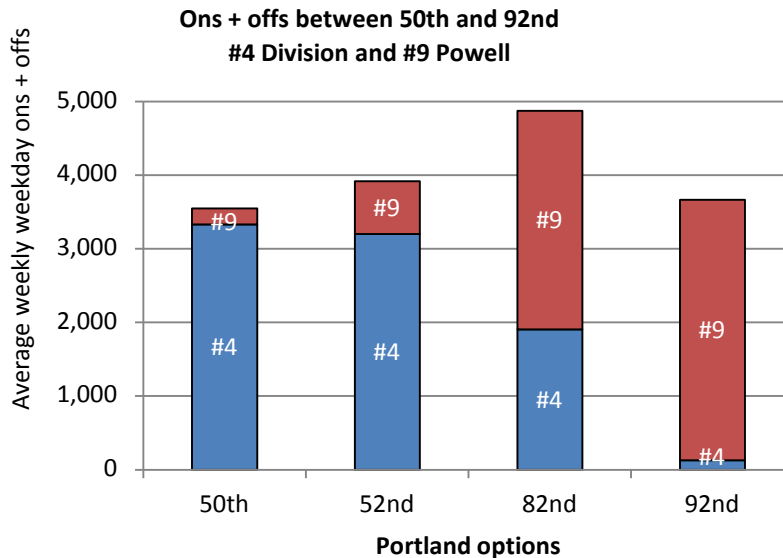
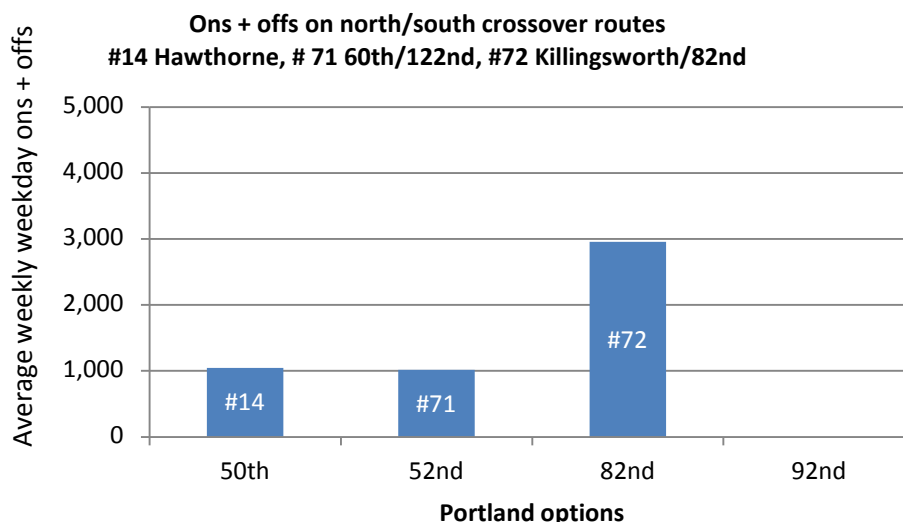


Figure 3.1.2.3 Portland options: south/north ons and offs between Powell and Division



Source: TriMet 2013 Passenger Census

Note: Graphs maintain a consistent scale for Portland and Gresham options for each measure.

Gresham

Table 3.1.2.3 below provides the number of ons, offs and lift use for each line serving the route options in Gresham. The data is shown for the segment from the city limit to the Gresham Transit Center and for the area east of the Transit Center. Where the counts are the same for options, the bus route is the same for all options.

Table 3.1.2.3 Gresham options: average weekly weekday ons and offs and lift use and scores

	Gresham city limit to TC		Gresham option East of Gresham TC to Stark and Kane				Gresham option totals		Score		
	#4	Lifts	#20	#21	#80	#81	Total ons + offs	Lifts		Ons + offs	Lifts
Gresham TC	2,451	327							2,451	327	0
Main/223rd	2,451	327	2,098	169			2,267	348	4,718	675	2
Cleveland	2,451	327	1,998		104	74	2,176	376	4,627	703	2
Hogan	2,451	327	2,080		104	74	2,258	439	4,709	766	2
Kane	2,451	327	1,940		160	114	2,214	481	4,665	808	2

Source: TriMet 2013 Passenger Census

The options that provide service to Mt. Hood Community College (MHCC) have over 2000 more average weekly ons and offs and between 348 and 481 more lift uses than the option terminating at the Gresham Transit Center. There is very little difference among the options that serve Mt. Hood Community College; the difference between the options with the highest and lowest number of ons and

offs is only 82. North/south bus service is currently provided on 223rd and Kane. Lines #81 and #80, currently provide service on Kane and #21 Sandy Blvd/223rd serves 223rd and Eastman. There is not significant additional ridership on these lines. Hogan and Cleveland do not have service currently.

Figures 3.1.2.4 through 3.1.2.6 below illustrate the Gresham stop locations and the total number of ons and offs for each bus line for each option.

Figure 3.1.2.4 Gresham options: on and off counts for each route option and bus line

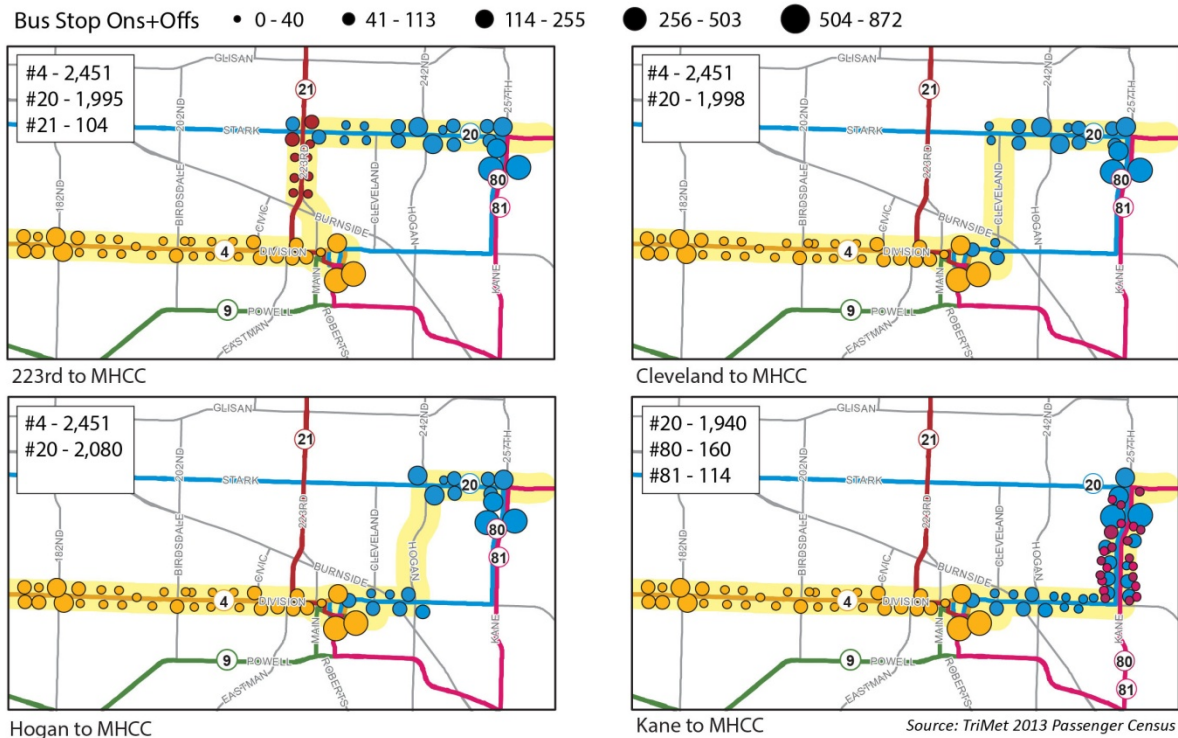
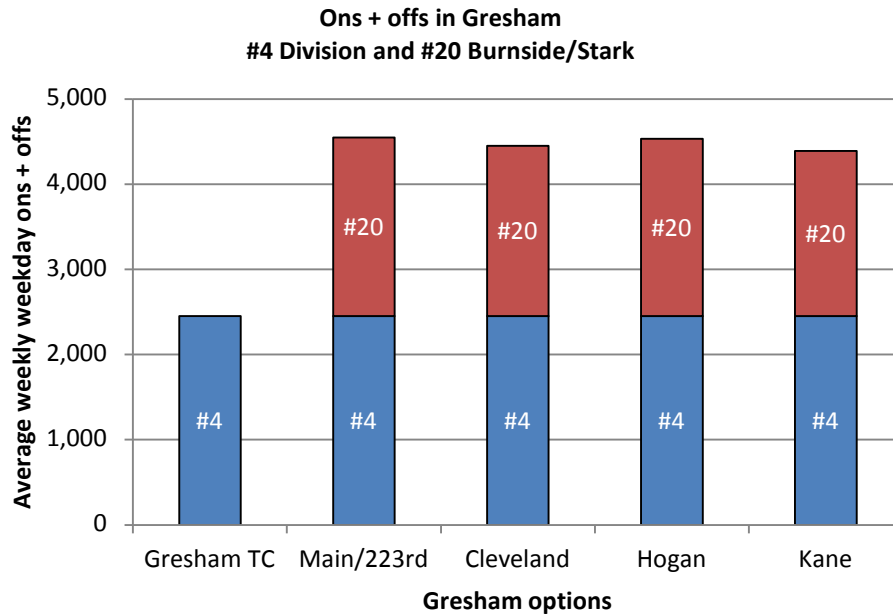
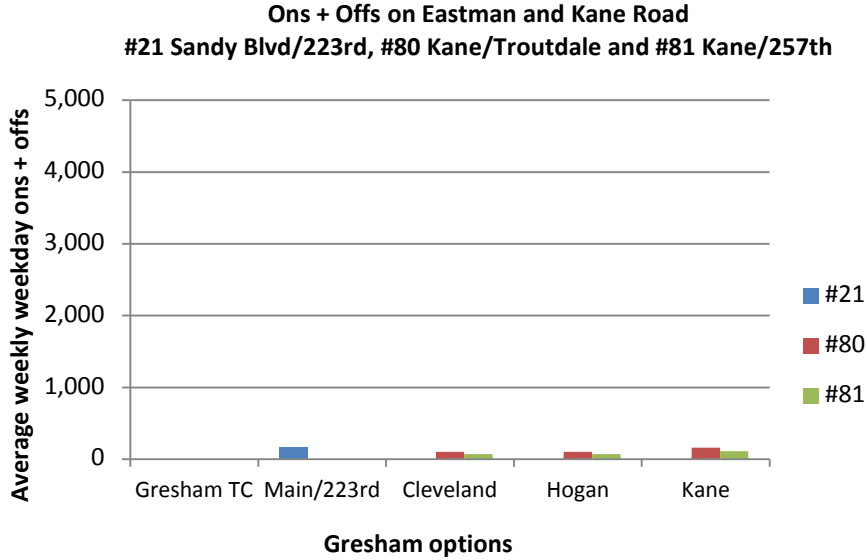


Figure 3.1.2.5 Gresham options: #4 and #20 ons and offs on Division and Stark



Source: TriMet 2013 Passenger Census

Figure 3.1.2.6 Gresham options: south/north ons and offs between Division and Stark



Source: TriMet 2013 Passenger Census

Note: Graphs maintain a consistent scale for Portland and Gresham options for each objective.

3.1.3 Serves future transit ridership

This evaluation used the regional travel demand model. Table 3.1.3.1 below shows the combinations of transit type and route options modeled. Two Dedicated Busway model configuration options were run. One has the highest level of dedicated right-of-way and operational efficiencies considered feasible. The other is low level of improvements, with modest amounts of dedicated right-of-way and other improvements. The Dedicated Busway runs both used the 82nd and Kane options. The results of these runs are compared to results of the Frequent Service Plus runs to make generalized assumptions about how other options would perform. Additional model runs will be completed as additional information is developed regarding design and traffic operations in the next phase of the project.

Table 3.1.3.1 Transit travel demand model runs

Transit type	Portland option	Gresham option
Frequent Service Plus	82 nd	Kane
Frequent Service Plus	82 nd	Main/223 rd
Frequent Service Plus	52 nd	Kane
Frequent Service Plus	82 nd	Gresham TC
Frequent Service Plus	82 nd	Cleveland
Frequent Service Plus	82 nd	Hogan
Dedicated Busway with less exclusive right-of-way	82 nd	Kane
Dedicated Busway with most exclusive right-of-way	82 nd	Kane

Future transit ridership projections are largely determined by the speed of the service relative to competing modes and by the numbers of people and jobs it serves. Ridership is expressed in two ways: 1) line ridership measures the number of daily riders on the specific high capacity transit line between the terminus and the Willamette River; and 2) change in system transit trips, or new riders, measures the growth of total system ridership with implementation of the proposed project compared to a no-build alternative where no new high capacity transit project is assumed. Results are for forecast year 2035. Scores, shown in table 3.1.3.2, are based on model results and an assessment of projected auto travel times, households, and employment, and accessibility to Portland Community College.

Table 3.1.3.2 Scores for serving future ridership

	Option	Score		Score
Portland	50th		Gresham	Gresham TC
	Frequent Service Plus	-1	Frequent Service Plus	-2
	Dedicated Busway	0	Dedicated Busway	-1
	52nd		Main/233rd	
	Frequent Service Plus	0	Frequent Service Plus	-1
	Dedicated Busway	1	Dedicated Busway	0
	82nd		Cleveland	
	Frequent Service Plus	1	Frequent Service Plus	-1
	Dedicated Busway	2	Dedicated Busway	0
	92nd		Hogan	
	Frequent Service Plus	-2	Frequent Service Plus	0
	Dedicated Busway	-1	Dedicated Busway	1
			Kane	
			Frequent Service Plus	1
		Dedicated Busway	2	

Source: Metro

Portland Frequent Service Plus options

A transition at 82nd Avenue would result in the highest ridership, with 28,400 line riders, or 370 more than the 52nd Avenue option, and 520 more new system transit trips. A route transitioning on 50th Avenue would have the same households and employment accessibility as a route on 52nd Avenue by virtue of identical connections to transportation analysis zones on the two transition streets in the model. Since the travel time on 50th Avenue would be slower, a route transitioning on 50th Avenue would have lower projected ridership. A transition at 82nd Avenue would result in the highest ridership, with 28,400 line riders, or 370 more than the 52nd Avenue option, and 520 more new system transit trips.

Line and system ridership and evaluation scores are shown in table 3.1.3.3. below. Ridership is higher for the Dedicated Busway option because it would be faster and therefore a more attractive option.

Table 3.1.3.3 Portland Frequent Service Plus options: future line and system ridership and scores

Option	Line ridership	System ridership increase	Scores
50th	<28,030 ¹	<5,730 ¹	-1
52nd	28,030	5,730	0
82nd	28,400	6,250	1
92nd	<28,000 ²	<5,000 ²	-2

Source: Metro Research Center

¹ Estimate based on projected auto travel time

Gresham Frequent Service Plus options

Assumptions made about existing transit service for modeling affect results for the Gresham options. The option on Kane would present an opportunity to shorten duplicative local bus routing to lower system operating costs compared to the other Gresham route options, while the Hogan and Cleveland options would provide additional service to new areas. The Main/223rd option would operate on a route with existing service that could not easily be shortened. These differences affect the projections for line ridership and system transit trips. With the Kane option, the modeling assumes that the #20 line would terminate at Mt. Hood Community College instead of continuing to Gresham Transit Center as it does today, since otherwise it would travel the same route on Kane as the new transit line. This would reduce operating costs and increase line ridership since the new line would be the only choice for riders between Mt. Hood Community College and Gresham Transit Center. Line ridership for the Kane option would be 28,400 average weekday riders, 800 more than the Hogan option, 1,300 more than the Cleveland option, and 1,500 more than the Main/223rd option.

With the Main/223rd, Hogan and Cleveland options, the #20 bus line is assumed to continue to be routed on Kane as it is today between Mt. Hood Community College and Gresham Transit Center. The Cleveland and Hogan options would serve new ridership areas along Cleveland Avenue and Hogan Road, which do not currently have transit service. While these would incur higher system operating costs compared to the Kane option, they would result in higher system transit ridership because of the expanded service area. The Hogan option would increase system transit trips by 280 trips over the Main/223rd option, by 330 trips over the Cleveland option, by 700 trips over the Kane option, and by 1,450 over the Gresham Transit Center option.

To summarize these tradeoffs, the Kane option could allow service of the #20 line to be shortened to terminate at Mt. Hood Community College instead of at Gresham Transit Center, which would reduce total system operating costs and increase line ridership. A route on either Cleveland Avenue or Hogan would serve new areas, which would increase system transit trips but cost more to operate. A route on Main/223rd would duplicate the service on 223rd provided currently by the #21-Sandy Blvd/223rd between the Gresham Transit Center and the Parkrose Transit Center.

Table 3.1.3.4 Gresham Frequent Service Plus options: future line and system ridership and scores

Option	System ridership		Scores
	Line ridership	increase	
Gresham TC	24,310	5,470	-2
Main/223rd	26,900	6,650	-1
Cleveland	27,100	6,600	-1
Hogan	27,600	6,900	0
Kane	<28,400 ¹	6,200 ¹	1

¹ Based on terminating #20 at MHCC

Source: Metro

The Hogan Road option would have higher ridership than the other options other than Kane; the Main/223rd option would have slightly less ridership than the Cleveland option. Because it would be the shortest option, a route terminating at Gresham Transit Center would result in the lowest ridership but incur the lowest costs. The Gresham Transit Center option would have between about 2,600 and 4,100 fewer line riders compared to the options serving Mt. Hood Community College.

Dedicated Busway options

As expected, the Dedicated Busway with the most dedicated right of way and operational improvement would result in a significant increase in line riders and system trips. The Dedicated Busway with less right of way and fewer operational improvements, however, would yield results similar to the Frequent Service Plus, despite a faster overall travel time. This is because as the route is currently configured the Dedicated Busway option is not able to connect with transfers to and from lines #17 Holgate/Broadway and #19 Woodstock/Glisan. This issue may be resolved with further design, or by rerouting connecting buses. More information is needed before any decisions can be made on transit type options based on ridership.

Table 3.1.3.5 Dedicated Busway and Frequent Service Plus ridership with 82nd and Kane route assumption

Option	Line ridership	System ridership increase
Frequent Service Plus	28,400	6,250
Dedicated Busway (low)	28,300	5,960
Dedicated Busway (high)	35,400	8,930

Source: Metro

Note: Route options are 82nd Avenue in Portland, Kane Road in Gresham

3.1.4 Provides faster transit service

This objective evaluates both transit type and route options.

Projected PM peak outbound times are assessed based on the model results described above and projected auto travel times where transit model runs are not available. Scores are shown in table

3.1.4.1.

Table 3.1.4.1 Scores for travel times

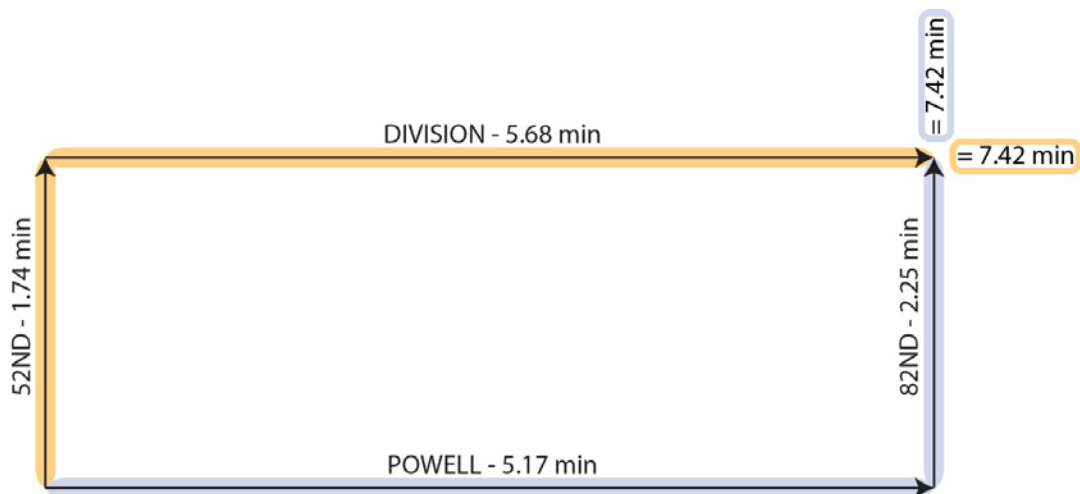
Option	Score	Option	Score
Portland 50th		Gresham Gresham TC	
Frequent Service Plus	-1	Frequent Service Plus	-2
Dedicated Busway	0	Dedicated Busway	-1
52nd		Main/233rd	
Frequent Service Plus	1	Frequent Service Plus	-1
Dedicated Busway	2	Dedicated Busway	0
82nd		Cleveland	
Frequent Service Plus	1	Frequent Service Plus	0
Dedicated Busway	2	Dedicated Busway	1
92nd		Hogan	
Frequent Service Plus	0	Frequent Service Plus	0
Dedicated Busway	1	Dedicated Busway	1
		Kane	
		Frequent Service Plus	1
		Dedicated Busway	2

Source: Metro

Portland Frequent Service Plus options

The options on 52nd and 82nd result in identical travel times in the model as shown in figure 3.1.4.1. below.

Figure 3.1.4.1 Travel times for 52nd and 82nd options



While travel on the 82nd Avenue segment between Powell and Division would be ½ minute slower than travel on the equivalent 52nd Avenue segment, between 52nd and 82nd the 82nd option would be ½ minute faster traveling on SE Powell Boulevard than the 52nd option would be traveling on Division Street.

Judging by projected auto travel times, a Frequent Service Plus route transitioning on SE 92nd Avenue would be approximately 5 seconds slower than options on 52nd Avenue or 82nd Avenue. The option transitioning on 50th Avenue would be over 10 seconds slower than an option transitioning on 52nd or 82nd.

Table 3.1.4.2 Portland Frequent Service Plus: 2035 travel time between Powell/52nd and Division/82 and scores

Option	Transit travel time (minutes)	Auto travel time (minutes)	Score
50th	9.6 ¹	6.51	-1
52nd	9.4	6.36	1
82nd	9.4	6.34	1
92nd	9.5 ¹	6.43	0

¹ Estimate based on projected auto travel time

Source: Metro

Gresham

The transit travel times reported are for between the Gresham Transit Center and Mt. Hood Community College. The Kane Drive option would provide the best travel time at 7 ½ minutes. The Main/233rd option would provide the slowest travel time, 2 ¾ minutes longer than Kane and over 1 ½ minutes longer than Hogan. The Cleveland Avenue option would take about 50 seconds longer than the Kane option, and the Hogan option would take about 70 seconds longer than the Kane option. Since a Gresham Transit Center terminus option would require a transfer to slower local bus service, it's ranked as the slowest option.

Table 3.1.4.3 Gresham frequent service options: 2035 average weekday travel time between Gresham Transit Center and Mt. Hood Community College and scores

Option	Transit travel time (min)	Score
Gresham TC	N/A ¹	-2
Main/233rd	10.2	-1
Cleveland	8.4	0
Hogan	8.7	0
Kane	7.7	1

¹Score based on need to transfer at Gresham Transit Center

Source: Metro

Dedicated Busway options

As discussed above, two runs have been completed to assess the performance of Dedicated Busway: a high proportion of travel in dedicated right of way (high) and a low proportion (low). Both runs' routes assume the 82nd Avenue transition and Kane to Mt. Hood Community College. The runs do not reflect any decisions on where dedicated transit lanes would be constructed. The low proportion run's dedicated right of way was defined by identifying areas deemed critical to avoid significant congestion. The high proportion run included those areas plus locations where dedicated lanes appear more feasible given existing roadway and right of way widths. Neither of these runs reflect any project decisions regarding dedicated right of way locations; a great deal of analysis and project partner conversations must take place before any such decisions will be made. The runs were intended only to provide bookends to provide information about potential benefits of dedicated right of way in comparison to model runs without dedicated right of way.

Table 3.1.4.3 Travel times (minutes) via 82nd Kane options

Option	PSU to Mt Hood CC	Powell/52 to Division/82	Gresham TC to Mt Hood CC
Frequent Service Plus	63	9.4	7.5
Dedicated Busway (low)	62	5.6	7.0
Dedicated Busway (high)	52	4.1	6.4

3.1.5 Avoids, where possible, conflicts between high capacity transit and motor vehicle mobility

The purpose of the traffic analysis is to understand traffic conditions and identify potential operational issues and traffic impacts and identify ways to alleviate them. The analysis can help to determine the feasibility of various concepts based on traffic delay and conflicts. Traffic analysis will continue in the next phase to inform the design concepts. Table 3.1.5.1 provides scores for each option based on preliminary analysis of feasibility and potential for conflicts.

Table 3.1.5.1 Motor vehicle conflict scores

Option	Score	Option	Score
Portland		Gresham	
50th		Gresham TC	
Frequent Service Plus	-1	Frequent Service Plus	0
Dedicated Busway	-2	Dedicated Busway	1
52nd		Main/233rd	
Frequent Service Plus	-1	Frequent Service Plus	0
Dedicated Busway	-2	Dedicated Busway	1
82nd		Cleveland	
Frequent Service Plus	0	Frequent Service Plus	0
Dedicated Busway	2	Dedicated Busway	1
92nd		Hogan	
Frequent Service Plus	1	Frequent Service Plus	0
Dedicated Busway	2	Dedicated Busway	1
		Kane	
		Frequent Service Plus	0
		Dedicated Busway	1

Source: Metro

Portland

Options on 50th and 52nd would incur notable delay along Division between 50th and 60th, partially associated with activity at Atkinson Elementary and Franklin High Schools, and some delay turning from Powell. Design solutions to address this delay are not considered feasible due to constraints of right-of-way and the built environment.

The 82nd Avenue option would incur some delay along 82nd during peak hours, and turning from Powell and from Division. Design solutions to address this delay may be feasible with right-of-way acquisition without significant impacts to the built environment.

The 92nd Avenue option would incur some minor delay along Powell at 82nd during peak hours, and turning from Powell and from Division. Design solutions to address this delay may be feasible with right-of-way acquisition without significant impacts to the built environment.

Gresham

An option on Main/223rd would incur some delay along Division near Eastman, and on Main crossing Burnside. Design solutions to address this delay may be feasible with signal re-timing or right-of-way acquisition without significant impacts to the built environment.

An option on Cleveland would incur some delay along Division near Eastman, and on Cleveland crossing Burnside. Design solutions to address this delay may be feasible with signal re-timing or right-of-way acquisition without significant impacts to the built environment.

A Hogan option would incur some delay along Division near Eastman and along Division near Burnside and Hogan. Design solutions to address this delay may be feasible with signal re-timing or right-of-way acquisition without significant impacts to the built environment.

A Kane option would incur some delay along Division near Eastman and along Division near Burnside and Hogan. Design solutions to address this delay may be feasible with signal re-timing or right-of-way acquisition without significant impacts to the built environment.

3.1.6 Increases number of people able to move in and through the corridor

This objective will be completed in the next phase. This information will be used to help understand a range of transportation benefits and impacts. It can help understand the effect of removing auto travel lanes to add transit or bike lanes.

3.2 Well-being Goal

The well-being goal is that future development and transit improvements create safe, healthy neighborhoods and improve access to social, educational, environmental, and economic opportunities. This goal can be measured by the number of people and jobs in the corridor that are served now and in the future; by the connections to major land uses, community resources, commercial destinations; and by the potential economic development, while minimizing impacts to homes, businesses, community resources and the natural environment.

3.2.1 Supports land use plans and policies

This measure is a qualitative assessment of the degree to which route options are consistent with local, regional, and state land use plans and policies. Evaluation scores are shown in the table below.

Table 3.2.1.1 Scores for supporting land use plans and policies

	Option	Score
Portland options	50th	0
	52nd	0
	82nd	2
	92nd	0
Gresham options	Gresham TC	2
	Main/223rd	2
	Cleveland	1
	Hogan	2
	Kane	2

Portland

The 82nd option is consistent with Portland’s draft Comprehensive Plan update; Powell is designated as a high capacity transit street west of 82nd and Division is east of 82nd.

Gresham

Gresham supports the findings from the East Metro Connections Plan that call for the addition of Bus Rapid Transit in the Powell/Division corridor, extending from Portland Central City to Mt. Hood Community College via Gresham Transit Center. The Main/223rd option serves the downtown residential area east of the Civic District and the community Commercial and Corridor Mixed Use areas along Stark. Hogan serves a significant amount of Gresham’s highest density residential zoning.

3.2.2 Serves the greatest number of people in the corridor

This objective evaluates the route options. Current (2010) and forecast (2035) estimates from Metro’s Research Center are used to calculate the number of households within one half mile of stations for each route option. The number within one quarter mile was also calculated.

There are not large differences among either the Portland or Gresham options for either 2010 or 2035 estimated number of households other than the option that would terminate at the Gresham Transit Center. Scores and household data are shown in table 3.2.2.1 below. In order to include both 2010 and 2035 numbers in the scores, the scores are based on the of the average for 2010 and 2035 within a half mile.

Table 3.2.2.1 Households within one half mile and one quarter of stations and scores 2010-2035

Option		2010		2035		Average	Score
		Quarter mile		Half mile			
Portland options	50th	3,694	5,369	10,002	14,214	12,108	1
	52nd	3,612	5,264	9,694	13,834	11,764	0
	82nd	3,905	6,066	9,951	14,806	12,379	2
	92nd	3,599	5,595	9,597	14,179	11,888	0
Gresham options	Gresham TC	2,743	4,714	6,083	9,990	8,037	-1
	Main/223rd	4,534	7,179	10,886	15,746	13,316	2
	Cleveland	4,696	7,424	10,613	15,470	13,041	0
	Hogan	4,911	7,778	10,763	15,610	13,186	1
	Kane	5,185	8,112	10,916	15,838	13,377	2

Source: Metro Research Center

Portland

As shown in table 3.2.2.1 above, the option on 82nd Avenue would serve the greatest number of future (2035) households, about 600 more than the 50th and 92nd options. The option on 50th would serve the greatest number of current (2010) households by a small margin.

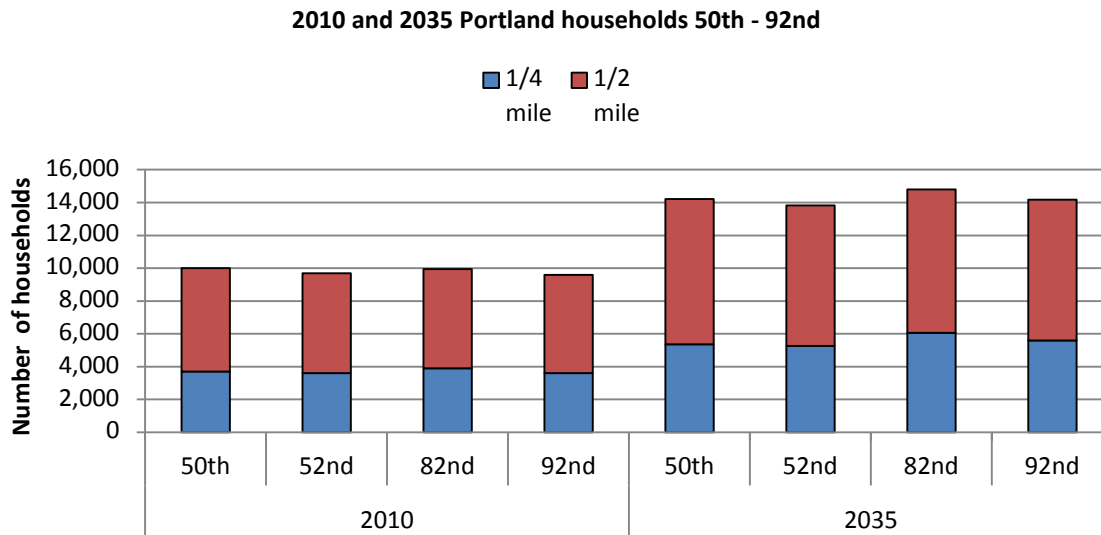
Table 3.2.2.2 provides the number of households served along the entire Portland segment from the Willamette River to the city limit.

Table 3.2.2.2 Portland segment: households within one half mile and one quarter of stations

	Quarter Mile		Half Mile	
	2010	2035	2010	2035
50th	11,135	26,807	26,807	16,603
52nd	11,053	26,594	26,594	16,498
82nd	11,346	26,876	26,876	17,300
92nd	11,041	26,509	26,509	16,830

Source: Metro Research Center

Figure 3.2.2.1 Portland: 2010 and 2035 estimated number of households within one quarter and one half mile of stations



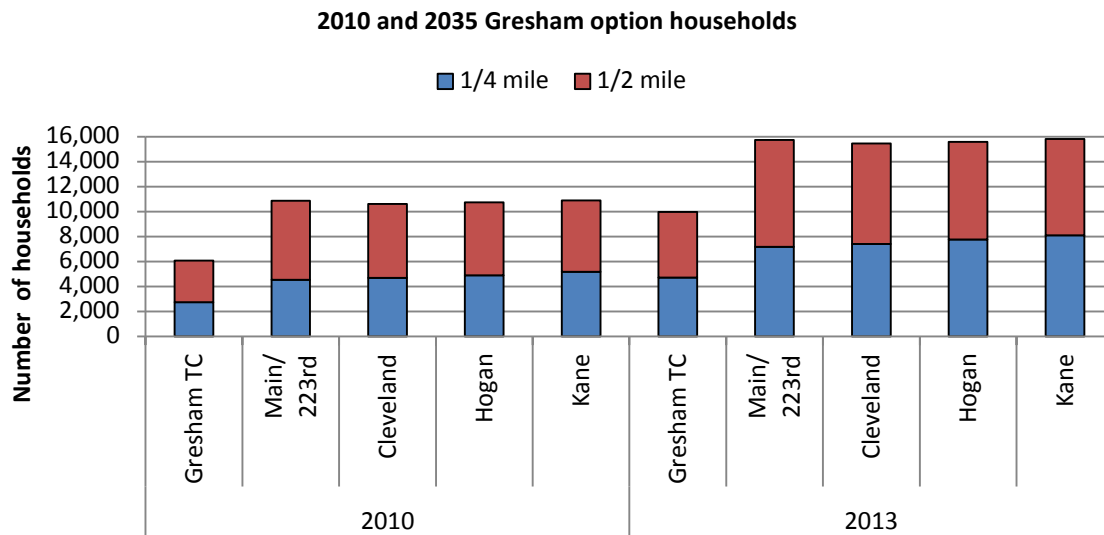
Source: Metro Research Center

Note: Graphs maintain a consistent scale for Portland and Gresham options for each measure.

Gresham

The differences among the options that serve Mt. Hood Community College are small. The Main/223rd option would serve the most estimated current households and second most future households; the Kane option would serve slightly more estimated future households. Service terminating at the Gresham Transit Center would serve far fewer households.

Figure 3.2.2.2 Gresham options: 2010 and 2035 estimated number of households within one half mile of stations



Source: Metro Research Center

Note: Graphs maintain a consistent scale for Portland and Gresham options for each measure.

3.2.3 Serves the greatest number of jobs in the corridor

This objective evaluates the route options and the methodology is the same as for the objective above using employment data rather than household. Current (2010) and forecast (2035) estimates from Metro's Research Center are used to calculate the number of jobs within one half mile of stations for each route option. The number within one quarter mile was also calculated in order to estimate a more localized effect.

Both 2010 employment and 2035 employment growth estimates are greater in Gresham than in Portland along the route options. This is a reflection of the opportunities and planning for employment growth in Gresham, including the large Gresham Vista Business Park site, which would be served by the 223rd/Main, Cleveland and Hogan options. Scores and employment data are shown in table 3.2.3.1 below. Scores are based on the average of the 2010 and 2035 numbers.

Table 3.2.3.1 Jobs within one half mile and one quarter of stations within options areas and scores 2010-2035

Option	2010		2035		Average		Score
	Quarter mile		Half mile				
	2010	2035	2010	2035			
Portland options	50th	2,024	2,701	6,059	8,002	7,030	0
	52nd	1,999	2,674	5,853	7,767	6,810	0
	82nd	2,589	3,465	6,390	8,679	7,534	1
	92nd	2,451	3,374	6,544	8,869	7,706	1
Gresham options	Gresham TC	3,716	6,417	7,569	13,640	10,604	-1
	Main/223rd	6,402	11,861	12,294	23,189	17,741	1
	Cleveland	6,354	11,953	12,542	24,016	18,279	2
	Hogan	7,016	13,180	12,768	24,237	18,502	2
	Kane	6,489	10,895	12,227	22,104	17,166	0

Source: Metro Research Center

Portland

There is not a large variation among the Portland options. Alignments on SE 92nd Avenue and 82nd would serve slightly more jobs based on both 2010 and 2035 estimates. An alignment on SE 52nd Avenue would serve the fewest jobs for both years.

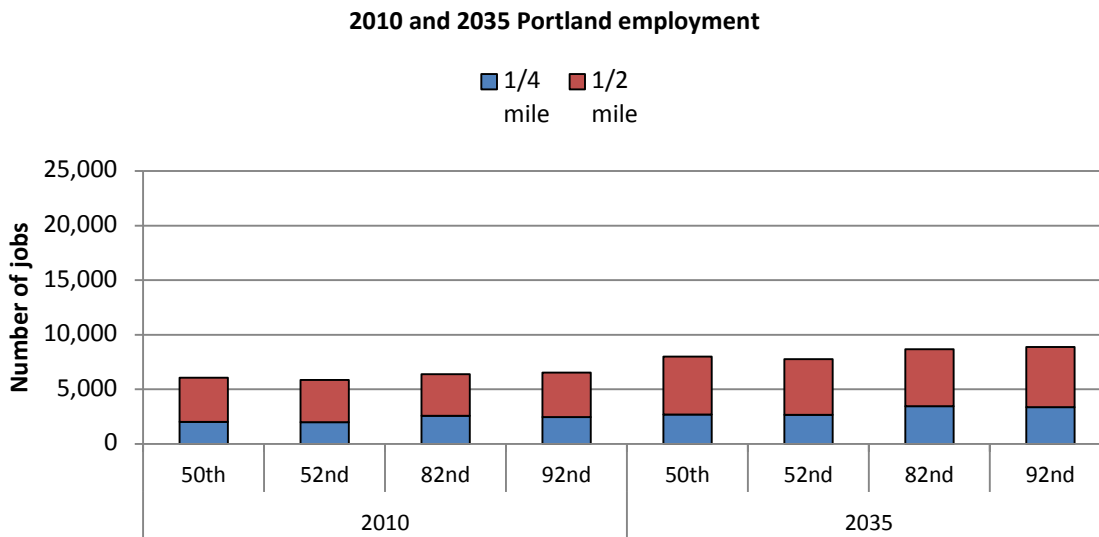
Table 3.2.3.2 provides the estimated number of jobs along the entire Portland segment.

Table 3.2.3.2 Portland segment: Estimate of jobs within one half mile and one quarter mile buffer of stations for the Portland segment

	Quarter Mile		Half Mile	
	2010	2035	2010	2035
50th	11,653	24,831	24,831	15,742
52nd	11,628	24,673	24,673	15,714
82nd	12,217	25,222	25,222	16,505
92nd	12,079	25,300	25,300	16,414

Source: Metro Research Center

Figure 3.2.3.1 Portland options: 2010 and 2035 estimated number of jobs



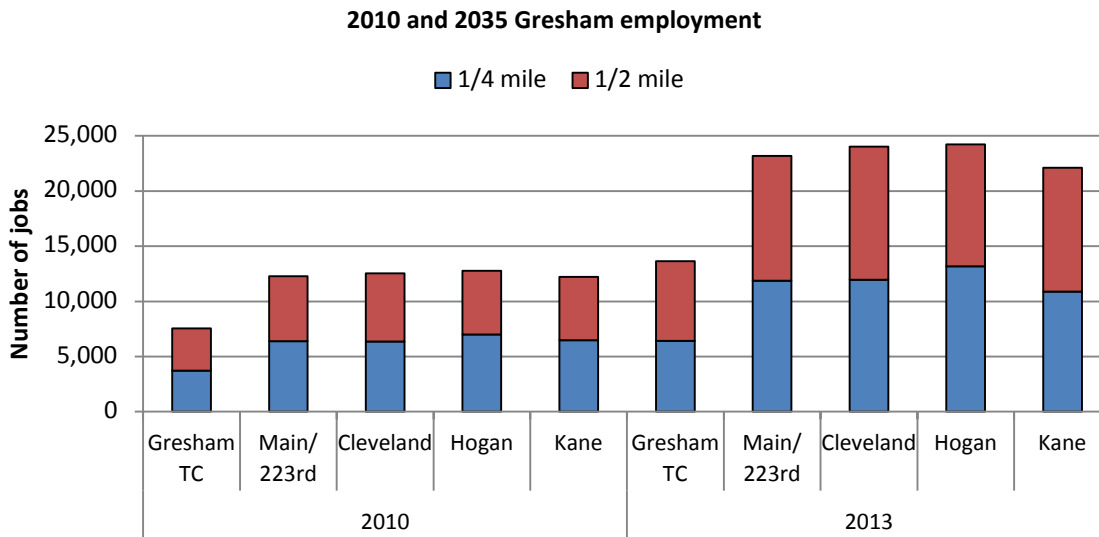
Source: Metro Research Center

Note: Graphs maintain a consistent scale for Portland and Gresham options for each measure.

Gresham

In Gresham, both 2010 and 2035 employment estimates indicate the greatest number of jobs would be served by a Hogan route option, followed closely by Main/223rd and Cleveland options. Service terminating at the Gresham Transit Center would serve the fewest jobs.

Figure 3.2.3.2 Gresham options: 2010 and 2035 estimated number of jobs



Source: Metro Research Center

Note: Graphs maintain a consistent scale for Portland and Gresham options for each measure.

3.2.4 Serves major destinations in the corridor

This objective evaluates the route options. The major destinations within the option areas included for the purposes of this measure are:

- Metro 2040 centers
 - Downtown Gresham
- College campuses
 - Portland Community College Southeast Center
 - Mt. Hood Community College
- Neighborhood Prosperity Initiatives (NPI)
 - Jade District
- Portland urban renewal areas
 - Lents
- Gresham enterprise zones
 - Gresham Vista Business Park

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In addition, all options serve the following major destinations, which are not within an option area:

- Portland central city
- Portland State University
- Central Eastside Industrial Area
- Division-Midway NPI
- Enterprise zone at Division and Birdsdales

Figure 3.2.4.1 Major destinations in the Powell-Division corridor



Source: Metro Research Center

The table below illustrates the relative quality of the access each option is expected to be able to provide to each of the major destinations indicated by the number of Xs.

Table 3.2.4.1 Service to major destinations provided by options and scores

		Jade							Total	Score
Option		PCC SE	District NPI	Lents URA	Downtown Gresham	MHCC	Gresham Vista			
Portland options	50th	X	X	X				4	2	
	52nd	X	X	X				4	2	
	82nd	X	XX	X				4	2	
	92nd		X	X				2	0	
Gresham options	Gresham TC				X			1	-1	
	Main/223rd				X	X	XX	4	2	
	Cleveland				X	X	XX	4	2	
	Hogan				X	X	X	3	1	
	Kane				X	X		2	0	

Source: Metro Research Center

Note: Two Xs indicates better service than one X.

Portland

In Portland, the route options along 50th, 52nd and 82nd avenues serve all of the major destinations including Portland Community College, the Jade District Neighborhood Prosperity Initiative, and the Lents urban renewal area. The 82nd Avenue option could serve stations at Powell, Division and between Powell and Division providing better access to the Jade District. The option along 92nd Avenue does not serve Portland Community College, which has been identified as a very important destination by the project Steering Committee and the public.

Gresham

All of the options serve downtown Gresham and all except the Gresham Transit Center option serve Mt. Hood Community College. The Main/223rd and Cleveland options serve the Gresham Vista Business Park better than the Hogan option. The Kane option would not serve Gresham Vista Business Park.

3.2.5 Serves community resources and affordable housing

This objective evaluates the route options. Community resources include schools, medical facilities, public and social services, faith-based institutions, libraries, grocery stores and farmers markets, and financial institutions within one half mile of station locations. Community resources are based on those defined in the Coalition for a Livable Future Regional Equity Atlas 2.0 and parks data from the Metro Research Center. Affordable housing includes regulated housing units data maintained by the Metro Research Center. For a more detailed description of community resources and affordable housing see the *Powell-Division Transit and Development Project Transit Alternatives Evaluation Methods Report*.

The options all serve a large amount of regulated affordable housing. There are over 600 affordable housing units within one half mile of all Gresham options and over 400 within one half mile of the 82nd and 92nd options. The Main/223rd option serves the most affordable housing among the Gresham options, 809 units. The number of and variation in the number of other community resources served is not as great as for affordable housing.

Table 3.2.5.1 Community resources within one half and one quarter mile of stations and scores

	Option	Affordable housing		Community resources		Score
		¼ mile	½ mile	¼ mile	½ mile	
Portland options	50th	135	163	57	91	0
	52nd	65	143	56	87	0
	82nd	454	547	43	89	2
	92nd	440	539	36	82	2
Portland outside option area		574	988	89	265	
Gresham options	Gresham TC	159	637	44	95	0
	Main/223rd	291	809	66	137	2
	Cleveland	393	721	73	133	1
	Hogan	393	721	80	140	1
	Kane	411	739	76	132	1

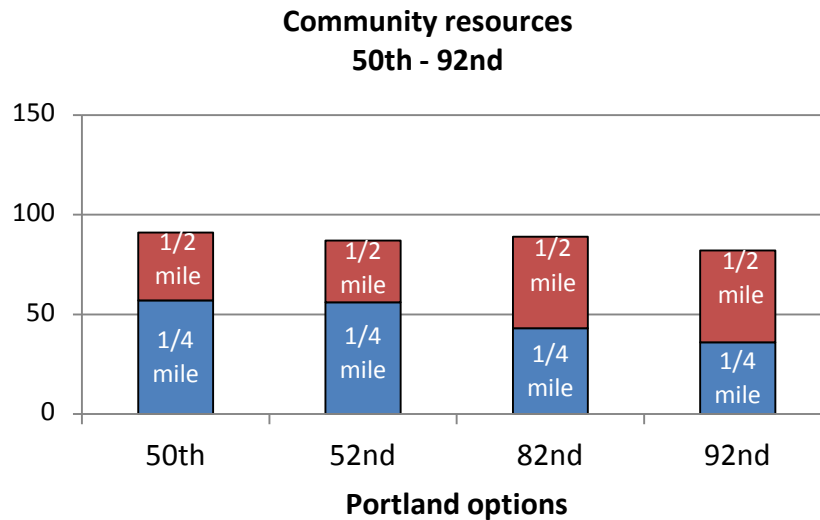
Sources: Coalition for a Livable: *Future Regional Equity Atlas 2.0*
 Metro Research Center

Portland

Both the SE 82nd and SE 92nd avenue options serve a much higher number of affordable housing units than the 50th and 52nd avenue options. The option on SE 82nd Avenue serves the most affordable housing; all options serve near the same number of community resources, but the 92nd option serves the fewest. There are well over 400 affordable housing units within one quarter mile of both the 82nd and 92nd avenue options.

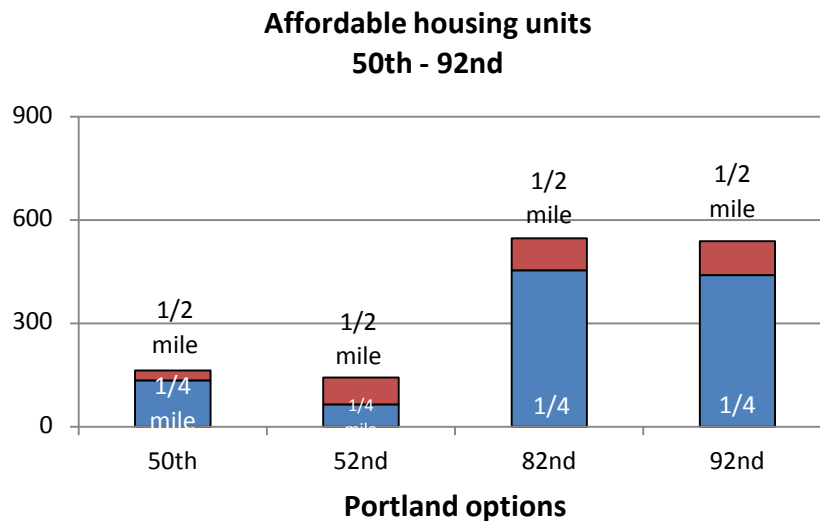
There are also 988 additional regulated affordable housing units and 265 community resources and commercial destinations within one half mile the remaining portions of the Portland segment.

Figure 3.2.5.1 Portland options: community resources within one half mile and one quarter mile of stations



Sources: Coalition for a Livable Future Regional Equity Atlas
Metro Research Center

Figure 3.2.5.2 Portland options: affordable housing units within one half mile and one quarter mile of stations

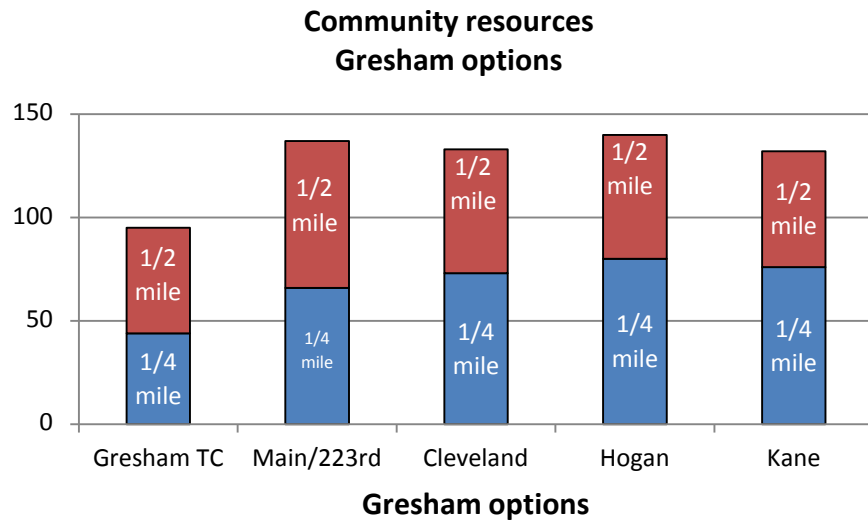


Sources: Coalition for a Livable Future Regional Equity Atlas
Metro Research Center

Gresham

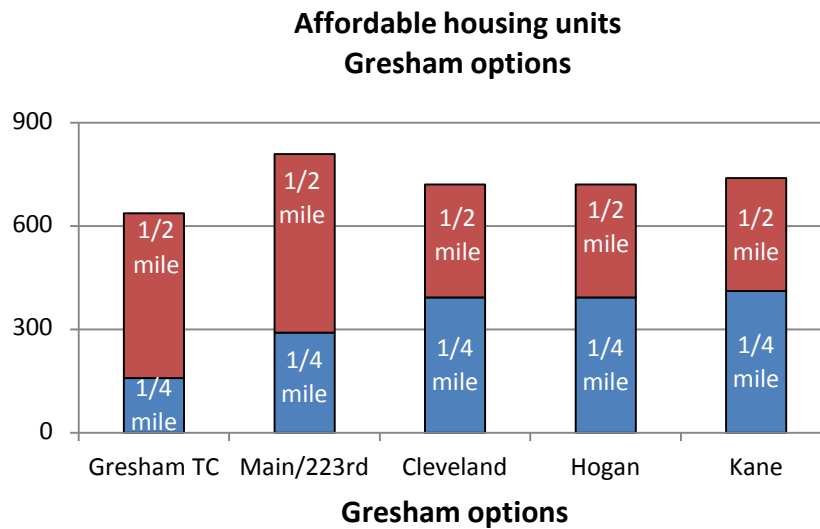
The Hogan option serves the greatest number of community resources; the Main/223rd option serves the most affordable housing within one half mile, but the Hogan, Cleveland and Kane options all serve more units within one quarter mile. The Gresham Transit Center, though it serves the fewest, serves 637 affordable housing units, although most are over a quarter mile from the Transit Center.

Figure 3.2.5.3 Gresham options: community resources within one half mile and one quarter mile of stations



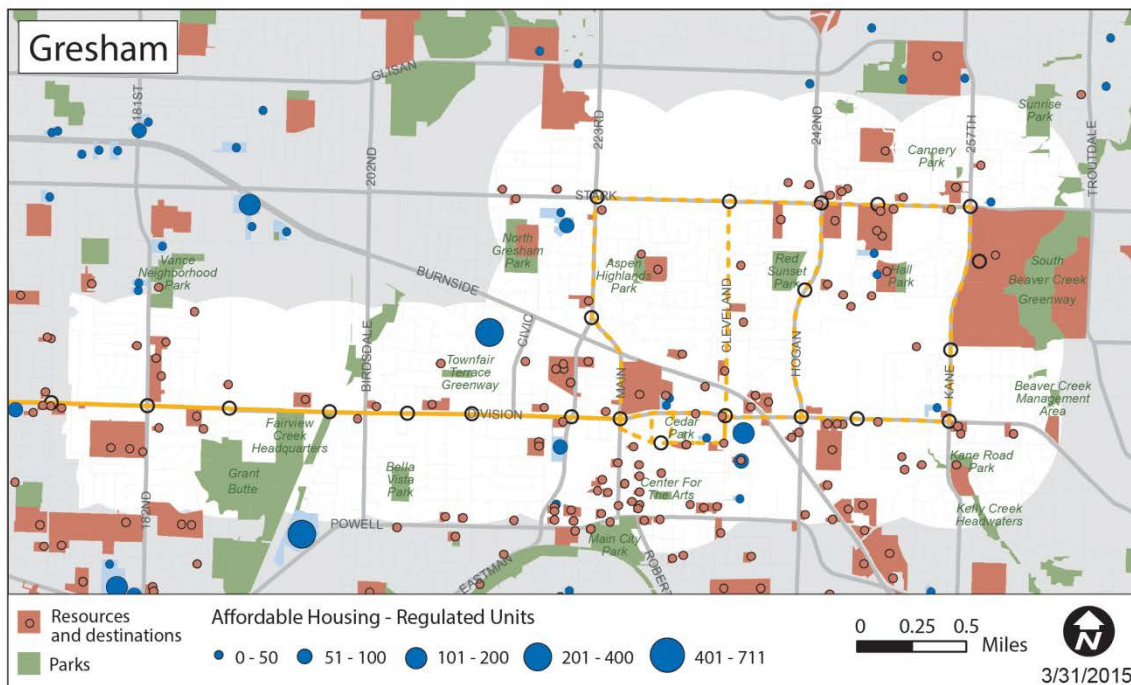
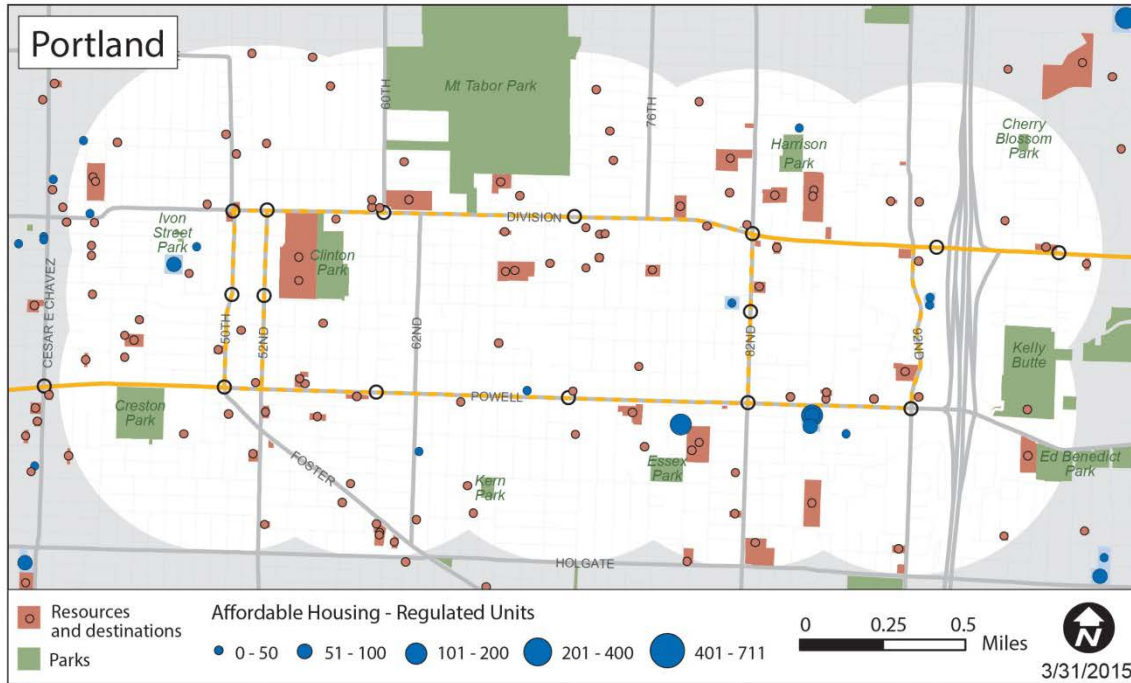
Sources: Coalition for a Livable Future Regional Equity Atlas
Metro Research Center

Figure 3.2.5.4 Gresham options: affordable housing within one half mile and one quarter mile of stations



Sources: Coalition for a Livable Future Regional Equity Atlas
Metro Research Center

Figure 3.2.5.5 Community resources and destinations in Powell-Division option areas



Sources: Coalition for a Livable Future Regional Equity Atlas
 Metro Research Center

3.2.6 Minimizes property impacts, including homes, business and community resources

This objective will be completed with updated information in the next phase when additional concept design has been completed. As part of this analysis, residential and commercial properties and community resources identified in the Regional Equity Atlas that are within 25 feet of existing right-of-way have been inventoried. This information will be used in concept design to avoid or minimize impacts. Additional concept design will allow a more accurate determination of whether right-of-way will be required. No or very little additional right-of-way is expected to be required for either Frequent Service Plus or Dedicated Busway. The Frequent Service Plus options are not anticipated to have any property impacts; the Dedicated Busway option will be designed to avoid or minimize impacts.

Scores are based on the assumption of no impacts for Frequent Service Plus. The Steering Committee agreed not to consider Kane and 92nd options further so Dedicated Busway for these options will not be evaluated.

Table 3.2.6.1 Evaluation scores for property impacts

	Option	Score		Score
Portland	50th		Gresham	Gresham TC
	Frequent Service Plus	2	Frequent Service Plus	2
	Dedicated Busway	*	Dedicated Busway	*
	52nd		Main/233rd	
	Frequent Service Plus	2	Frequent Service Plus	2
	Dedicated Busway	*	Dedicated Busway	*
	82nd		Cleveland	
	Frequent Service Plus	2	Frequent Service Plus	2
	Dedicated Busway	*	Dedicated Busway	*
	92nd		Hogan	
	Frequent Service Plus	2	Frequent Service Plus	2
	Dedicated Busway		Dedicated Busway	*
			Kane	
			Frequent Service Plus	2
			Dedicated Busway	

*Evaluated in the next phase

Source: Metro Research Center

3.2.7 Supports economic development

This objective evaluates the route options. To evaluate route options for their economic development potential, parcels with multifamily or commercial zoning that are currently underutilized were identified. Sites are defined as underutilized if the value of improvements on the parcel is less than the land value.

Table 3.2.7.1 below shows the amount of land considered redevelopable and the score for each option.

Table 3.2.7.1 Acres of redevelopable land with commercial or multifamily zoning and scores

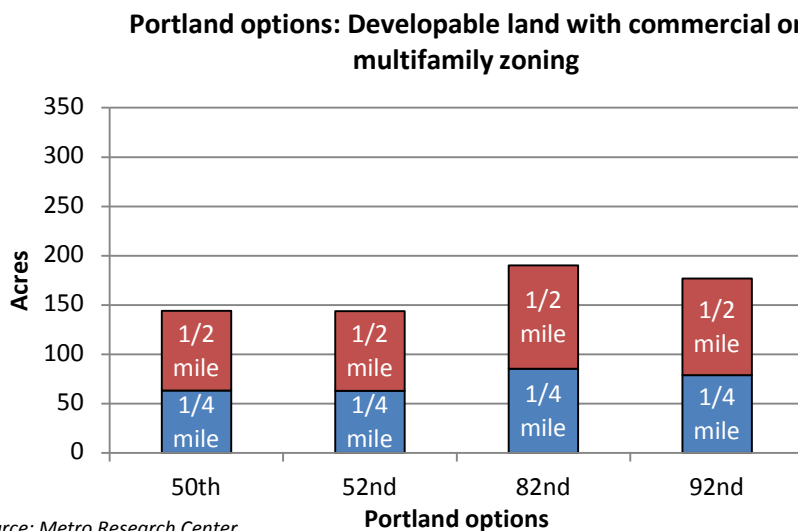
	Option	¼ mile	½ mile	Score
Portland options	50th	63.5	144.0	0
	52nd	63.1	143.7	0
	82nd	85.3	190.3	2
	92nd	78.9	176.9	1
Portland outside option area		151.1	224.0	
Gresham options	Gresham TC	78.8	181.5	-1
	Main/223rd	155.6	324.3	2
	Cleveland	127.1	273.8	1
	Hogan	144.8	279.0	1
	Kane	131.3	260.9	0

Source: Metro Research Center

Portland

Of the Portland route options, the alignment along 82nd Avenue offers the greatest economic development opportunity because it would serve several vacant and underutilized commercial parcels in the Jade District along 82nd Avenue. The 92nd Avenue option also scores well because of its ability to serve large and underutilized commercial parcels near the intersection of 92nd Avenue and Powell Boulevard. Route options on 50th or 52nd avenues offer less economic development opportunity because there are few vacant and underutilized commercial or multifamily zoned parcels along either 50th or 52nd avenues.

Figure 3.2.7.1 Portland: acres of redevelopable land with commercial or multifamily zoning

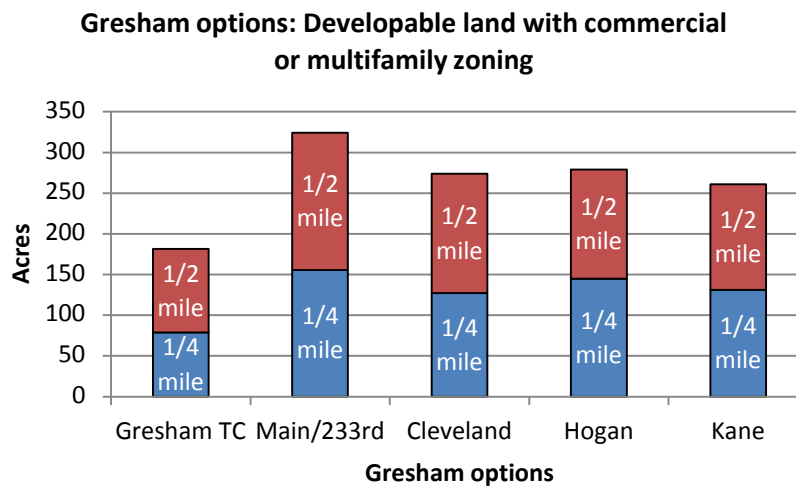


Source: Metro Research Center

Gresham

Of the Gresham route options, alignments that serve Mt Hood Community College on Stark score higher because they serve vacant lands associated with Legacy Mt Hood Medical Center, a shopping center with redevelopment potential at Hogan Drive, and vacant portions of Gresham Vista Business Park. The Main/223rd option scores highest because it captures the longest stretch of commercial land along Stark Street, including the western portions of Gresham Vista Business Park which border 223rd Avenue. Of the other options that serve Mt. Hood Community College, the Hogan Drive and Cleveland Avenue alignments score similarly while the Kane Avenue alignment scores lower because it does not directly serve Gresham Vista Business Park.

Figure 3.2.7.2 Gresham: acres of redevelopable land with commercial or multifamily zoning



Source: Metro Research Center

3.2.8 Protects or improves the natural environment

This objective will be completed with updated information in the next phase when additional concept design is completed. Metro Research Center data for wetlands, floodplains and high value habitat is used to calculate the acreage for each of these resources within 25 feet of existing right-of-way. These are not potential impacts, but an inventory. This information will be used in concept design to avoid or minimize impacts. No or very little additional right-of-way is expected to be required for either Frequent Service Plus or Dedicated Busway.

Table 3.2.8.1 provides scores for each route and transit type option based on the potential for impacting these resources. Figure 3.2.8.1 illustrates each of the natural resource areas within 25 feet of existing right-of-way.

Table 3.2.8.1 Estimated potential for natural resource impacts in acres and scores

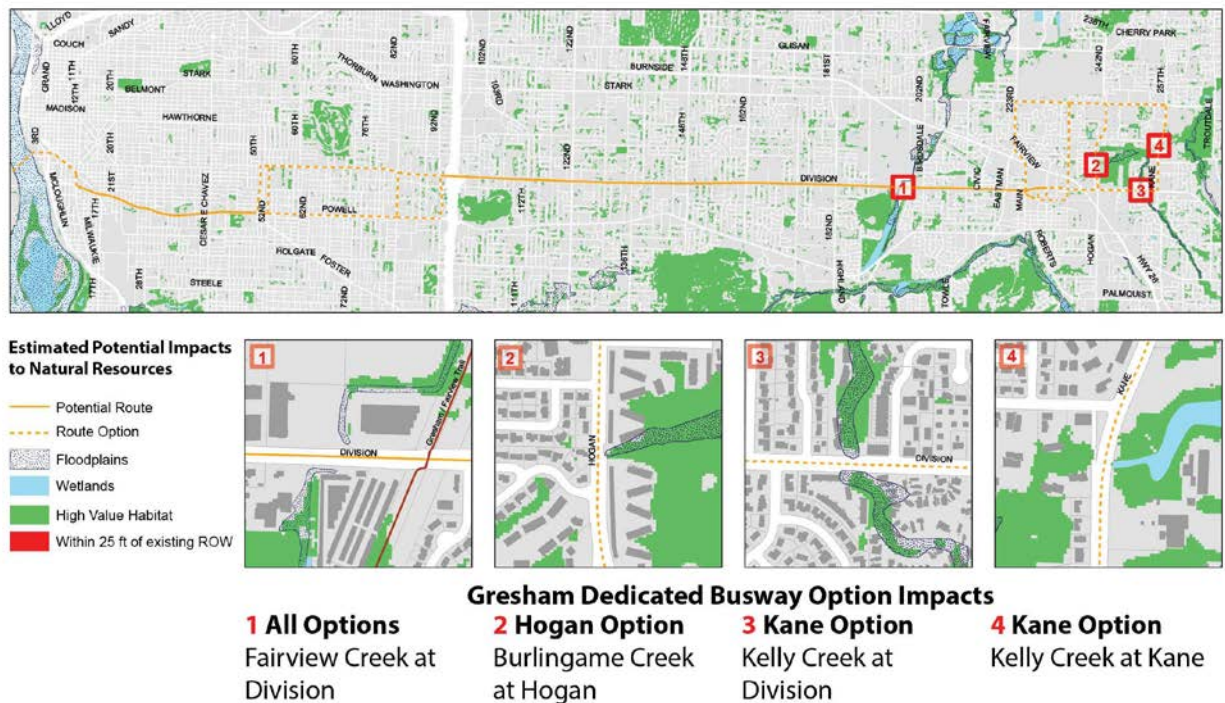
Portland Option	Score	Gresham Option	Score
50th		Gresham TC	
Frequent Service Plus	2	Frequent Service Plus	2
Dedicated Busway	2	Dedicated Busway	1
52nd		Main/233rd	
Frequent Service Plus	2	Frequent Service Plus	2
Dedicated Busway	2	Dedicated Busway	1
82nd		Cleveland	
Frequent Service Plus	2	Frequent Service Plus	2
Dedicated Busway	2	Dedicated Busway	1
92nd		Hogan	
Frequent Service Plus	2	Frequent Service Plus	2
Dedicated Busway	2	Dedicated Busway	0
		Kane	
		Frequent Service Plus	2
		Dedicated Busway	-1

Sources:

Metro Research Center

The Intertwine: Regional Conservation Strategy (2013)

Figure 3.2.8.1 Natural resources within 25 feet of existing right-of-way



Sources:

Metro Research Center

The Intertwine: Regional Conservation Strategy (2013)

3.3 Equity Goal

The purpose of the equity goal is to ensure that future development and transit improvements reduce existing disparities, benefit current residents and businesses and enhance our diverse neighborhoods. There is a commitment to prevent market-driven displacement of residents and businesses and to equitably distribute the benefits and burdens of change. This is measured by access to high-capacity transit for people of color and low-income and limited English proficiency populations, and assessing the distribution of benefits and impacts to these communities.

Two objectives are used to evaluate the distribution of benefits and impacts, one that evaluates negative impacts and one that evaluates benefits. Each of these equity objectives incorporates an equity evaluation of other objectives used to evaluate the project.

See the *Powell-Division Transit and Development Project Transit Alternatives Methods Report* for detailed information on definitions, data and data sources, and methodology.

3.3.1 Improves access to high capacity transit for people of color and low-income and limited English proficiency populations

This objective evaluates the route options. Population estimates are calculated for each of the communities of concern, which are people of color, and low-income and limited English proficiency

populations, within one half mile of stations for each route option. The estimated population of each of the communities of concern and scores are shown in table 3.3.1.1 below.

Table 3.3.1.1 Estimated number of the populations of concern within one half mile of station in option area and scores

	Option	Limited English	Low Income	People of color	Score
Portland options	50th	2,370	7,875	4,927	1
	52nd	2,329	7,699	4,896	1
	82nd	3,019	9,224	6,804	2
	92nd	3,236	9,530	6,410	2
Gresham options	Gresham TC	1,969	7,046	5,896	0
	Main/223 rd	3,043	11,443	8,616	2
	Cleveland	3,012	11,395	9,471	2
	Hogan	3,112	11,706	9,489	2
	Kane	3,099	11,250	9,127	2

Source: Metro Research Center

U.S. Census Bureau:

Low income and Limited English: 2014 American Community Survey

People of color: 2010 Census

Portland

In Portland, the 82nd Avenue and 92nd Avenue options have the highest populations of the communities of concern and the differences are small. The 82nd Avenue option has a slightly higher population of people of color while the 92nd Avenue option has slightly higher low-income and limited English proficiency populations.

Table 3.3.1.2 Estimated number of the populations of concern within one half mile of stations in the Portland segment Willamette River to Gresham

Option	Limited English	Low-income	People of color
50th	9,017	26,624	19,984
52nd	8,987	26,491	19,909
82nd	9,680	28,028	21,440
92nd	9,869	28,273	21,635

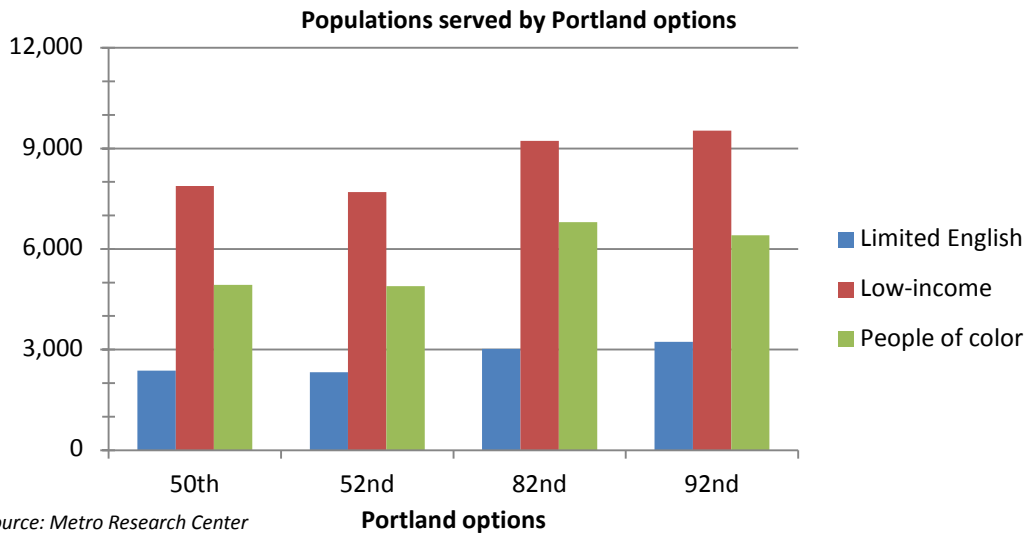
Sources: Metro Research Center

U.S. Census Bureau:

Low income and Limited English: 2014 American Community Survey

People of color: 2010 Census

Figure 3.3.1.1 Portland options: communities of concern within one half mile of station

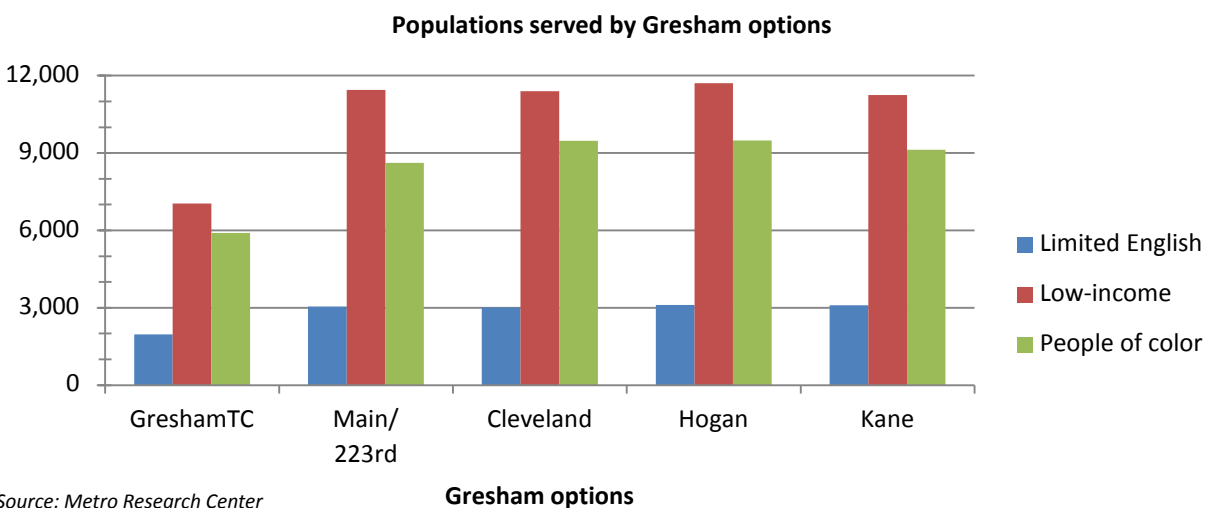


Source: Metro Research Center
 U.S. Census Bureau:
 Low income and Limited English: 2014 American Community Survey
 People of color: 2010 Census

Gresham

In Gresham, the Hogan option would serve slightly more of all three communities of concern, but the differences among the options that serve Mt. Hood Community College are small. The Main/223rd option would serve fewer people of color than other options, and Cleveland would serve fewer low-income and limited English proficiency populations. The route option terminating at Gresham Transit Center would serve a smaller number of all of the populations of concern.

Figure 3.3.1.2 Gresham options: communities of concern within one half mile of station



Source: Metro Research Center
 U.S. Census Bureau:
 Low income and Limited English: 2014 American Community Survey
 People of color: 2010 Census

3.3.2 Distributes negative impacts equitably

This objective will be updated in the next phase of the project. As mentioned above, there are two equity objectives for evaluating the distribution of negative and positive impacts, one that evaluates negative impacts, and one that evaluates benefits. Each of these equity objectives incorporates an equity evaluation of other objectives to evaluate the project.

This evaluation considers how the impacts in equity areas compare to the impacts for the total option. Areas with a population of people of color or low-income or limited English populations above the regional average are considered areas of concern for equity (equity areas) and each population is considered separately. Equity areas are shown in figure 3.3.2.1 below. Areas with above the regional average and areas that are twice the regional average are shown; both are considered equity areas.

The objectives included for the evaluation of the distribution of negative impacts are:

- Minimizes property impacts, including land, homes, businesses, and community resources
- Protects or improves the natural environment.

Though the evaluation is not complete for property impacts, there is a commitment to build the project with no property impacts to homes or businesses or natural resources, including wetlands, floodplains or high value habitat. A preliminary evaluation has been completed for impacts to natural resources, which identifies areas within 25 feet of existing right-of-way for Dedicated Busway, and no property impacts for Frequent Service Plus. It will be updated when additional design is completed in the next phase.

Table 3.3.2.1 below summarizes equity scores based on the potential for following:

- property impacts for Frequent Service Plus
- property impacts to community resources for Frequent Service Plus
- natural resource impacts for Frequent Service Plus and Dedicated Busway

Scores are provided for natural resources, but because property impacts are not yet available for Dedicated Busway, only Frequent Service Plus is given a summary score. Additional information on the natural resource impacts is provided below.

Table 3.3.2.1 Equity summary scores for potential negative impacts

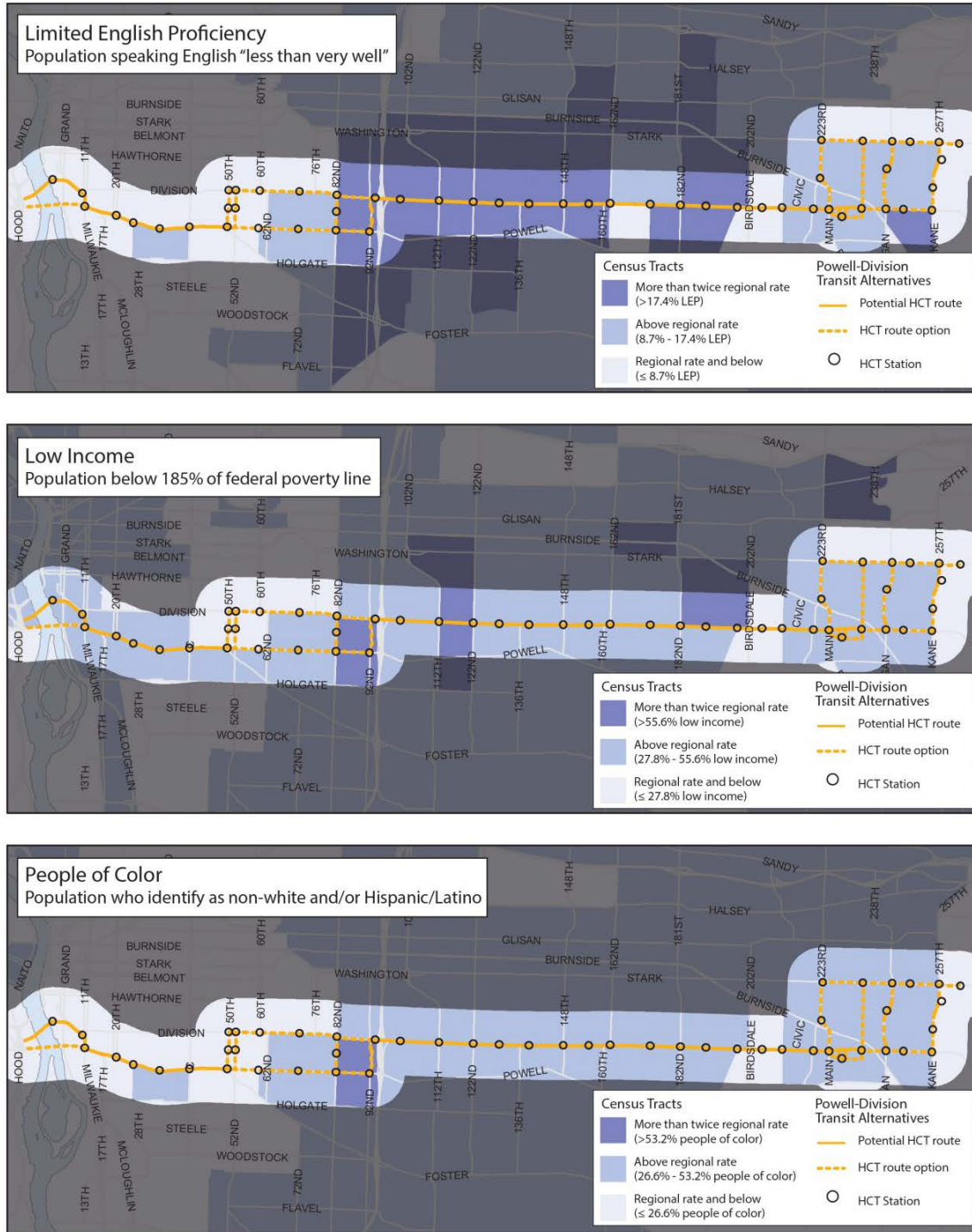
	Option	Homes and businesses	Community resources	Natural resources	Summary Score
Portland options	50th				
	Frequent Service Plus	2	2	2	2
	Dedicated Busway	—	—	2	—
	52nd				
	Frequent Service Plus	2	2	2	2
	Dedicated Busway	—	—	2	—
	82nd				
	Frequent Service Plus	2	2	2	2
	Dedicated Busway	—	—	2	—
	92nd				
	Frequent Service Plus	2	2	2	2
	Dedicated Busway	—	—	2	—
Gresham options	Gresham TC				
	Frequent Service Plus	2	2	2	2
	Dedicated Busway	—	—	1	—
	Main/223rd				
	Frequent Service Plus	2	2	2	2
	Dedicated Busway	—	—	1	—
	Cleveland				
	Frequent Service Plus	2	2	2	2
	Dedicated Busway	—	—	1	—
	Hogan				
	Frequent Service Plus	2	2	2	2
	Dedicated Busway	—	—	0	—
	Kane				
	Frequent Service Plus	2	2	2	2
Dedicated Busway	—	—	-1	—	

Sources: Metro Research Center

Property and community resource impacts include land and buildings.

The Intertwine: Regional Conservation Strategy (2013)

Figure 3.3.2.1 Equity communities of concern (equity areas) in the Powell-Division corridor



3/30/2015

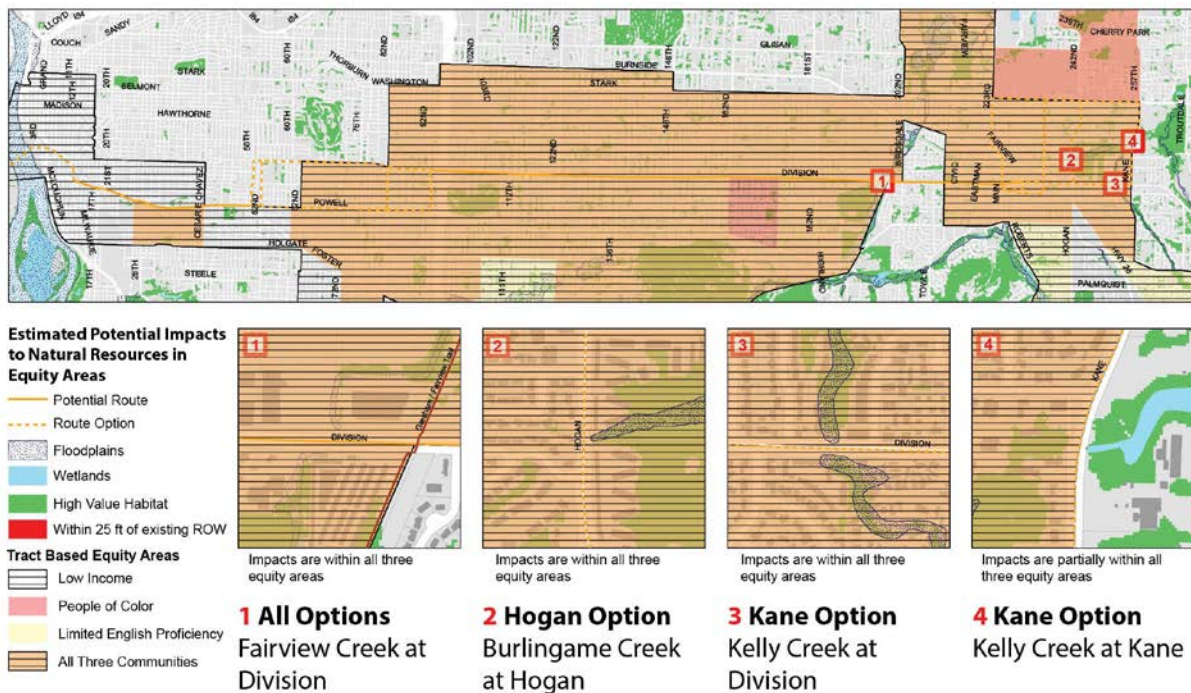
Source: Metro Research Center
 U.S. Census Bureau:
 Low income and Limited English: 2014 American Community Survey
 People of color: 2010 Census

Natural resource impacts in equity areas

This objective will be updated in the next phase when additional concept design is completed. Metro Research Center data for wetlands, floodplains and high value habitat is used to calculate the acreage for each of these resources within 25 feet of existing right-of-way within equity areas. These are not potential impacts, but an inventory. This information will be used in concept design to avoid or minimize impacts. No or very little additional right-of-way is expected to be required for either Frequent Service Plus or Dedicated Busway.

As shown in figure 3.3.2.2 below, all three populations of concern are within a small part of the 25 foot buffer, however these areas are very small and very likely will be avoided. Table 3.3.2.2 shows information available at this time. Scores are preliminary.

Figure 3.3.2.2 Natural resource impacts in equity areas.



Sources: Metro Research Center
 The Intertwine: Regional Conservation Strategy (2013)
 U.S. Census Bureau:
 Low income and Limited English: 2014 American Community Survey
 People of color: 2010 Census

Table 3.3.2.2 Estimated area of potential total natural resource impacts in equity areas in acres

	Option	Limited English	Low Income	People of color	Score
Portland options	50th				
	Frequent Service Plus	0	0	0	2
	Dedicated Busway	0	0	0	2
	52nd				
	Frequent Service Plus	0	0	0	2
	Dedicated Busway	0	0	0	2
	82nd				
	Frequent Service Plus	0	0	0	2
	Dedicated Busway	0	0	0	2
	92nd				
	Frequent Service Plus	0	0	0	2
	Dedicated Busway	0	0	0	2
Gresham options	Gresham TC				
	Frequent Service Plus	0	0	0	2
	Dedicated Busway	.02	.02	.02	1
	Main/223rd				
	Frequent Service Plus	0	0	0	2
	Dedicated Busway	.02	.02	.02	1
	Cleveland				
	Frequent Service Plus	0	0	0	2
	Dedicated Busway	.02	.02	.02	1
	Hogan				
	Frequent Service Plus	0	0	0	2
	Dedicated Busway	.06	.06	.06	0
Kane					
Frequent Service Plus	0	0	0	2	
Dedicated Busway	0.22	0.22	0.22	-1	

Sources: Metro Research Center

The Intertwine: Regional Conservation Strategy (2013)

Portland

No natural resources have been identified within 25' of existing right-of-way in the Portland segment and no impacts are anticipated.

Gresham

The amount of natural resources for the Dedicated Busway option in equity areas in Gresham is minor and it is anticipated that all impacts will be avoided. If they could not be avoided the project would be designed to minimize impacts, and there would be mitigation for any impacts that could not be avoided. All Dedicated Busway options in Gresham have a small amount of wetland within 25 feet adjacent to Fairview Creek in equity areas. The Hogan option and Kane have small areas of natural resources within 25 feet. Though not all natural resources for Kane are within an equity area, they are adjacent. As discussed above, these are an inventory and are not estimated impacts.

3.3.3 Distributes benefits equitably

The objectives used to evaluate the equitable distribution of benefits are:

- Connects to areas with currently high ridership
- Serves the greatest number of jobs
- Serves community resources

These objectives evaluate the route options. Among the Portland options, the 82nd Avenue option has the highest ridership and serves the greatest number of community resources and affordable housing. The option on 92nd serves the greatest number of jobs, however ridership is lowest. The 50th and 52nd options provide the least benefit to communities of concern.

The results for Gresham options differ more for each of the objectives. An alignment on Kane would provide the most benefit overall, however an alignment on Hogan would serve more employment in the corridor.

Table 3.3.3.1 summarizes the scores on each of the objectives for equity. Additional information on each of the three objectives is provided below.

Table 3.3.3.1 Equity benefits summary scores

	Option	Current Ridership	Employment	Community Resources	Benefits Score
Portland options	50th	-1	1	-1	-1
	52nd	-1	1	-1	-1
	82nd	2	2	2	2
	92nd	1	2	1	1
Gresham options	Gresham TC	2	2	2	2
	Main/223 rd	2	2	2	2
	Cleveland	2	2	2	1
	Hogan	2	2	2	1
	Kane	1	2	2	0

Serves current ridership

This objective evaluates the route options. Current ridership is based on TriMet 2013 passenger census data that provides average weekly weekday counts of the number of riders getting on and off—ons and offs—as well as lift use at stops served by buses currently operating along the potential route options. This data illustrates where current riders would be served by improved transit service.

Data is reported for the following primary lines:

- #4 Division
- #9 Powell
- #20 Burnside/Stark

Data is also reported and for the lines that cross through the corridor on the north/south streets of the route options. These include:

- #14 Hawthorne on 50th Avenue
- #71 60th/122nd Ave on 52nd Avenue
- #72 Killingsworth/82nd on 82nd Avenue
- #80 Kane/Troutdale Rd. and #81 Kane/257th on Kane Road.

Benefits to communities of concern are calculated by comparing the density of ons and offs in equity areas of each population compared to the entire option area. Calculating the density equalizes the results so the differences among the size of areas does not affect results. See the *Powell-Division Transit and Development Project Transit Alternatives Methods Report* for detailed information on definitions, data and data sources, and methodology.

Portland

As illustrated in table 3.3.3.2 and figure 3.3.3.1 below, the 82nd Avenue option has the most ons and offs per acre in the equity areas for all communities of concern and when compared to the entire option area. The opposite is the case for 50th and 52nd avenue options where there are more ons and offs in the entire option area than in the equity areas.

Table 3.3.3.2 Portland options: ons and offs per acre in equity areas and option areas

Option	Limited English	Low Income	People of color	Entire option area	Score
50th	1.72	1.67	1.72	2.18	-1
52nd	1.71	1.76	1.71	2.39	-1
82nd	5.02	4.51	5.02	3.77	2
92nd	1.95	1.85	1.95	1.78	1

Sources: Metro Research Center

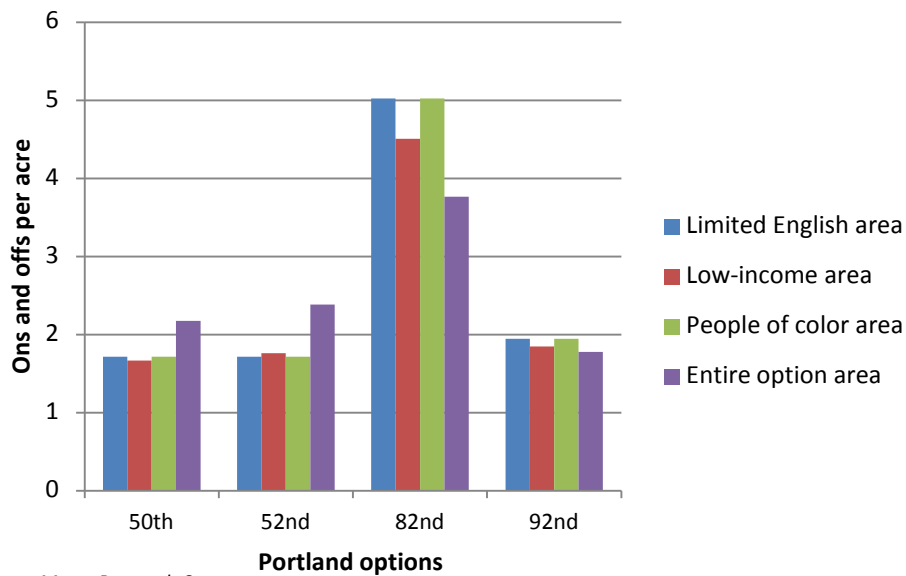
U.S. Census Bureau:

Low income and Limited English: 2014 American Community Survey

People of color: 2010 Census

TriMet: 2013 Passenger Census Data

Figure 3.3.3.1 Portland options: ons and offs per acre in equity areas compared to option areas



Source: Metro Research Center

U.S. Census Bureau:

Low income and Limited English: 2014 American Community Survey

People of color: 2010 Census

Gresham

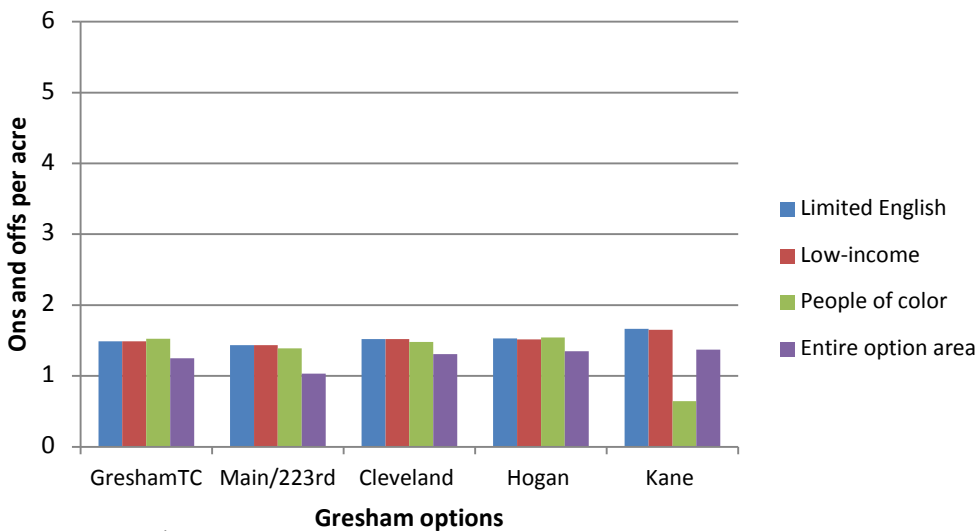
Gresham options all score well on this evaluation measure. Other than the Kane option, which has lower ridership in equity areas for people of color, all have higher current ridership in all equity areas compared to the entire option area.

Table 3.3.3.3 Gresham options: ons and offs per acre in equity areas and option areas

Option	Limited English	Low Income	People of color	Entire option area	Score
Gresham TC	1.49	1.49	1.52	1.25	2
Main/223 rd	1.43	1.43	1.39	1.23	2
Cleveland	1.52	1.52	1.48	1.31	2
Hogan	1.53	1.52	1.54	1.35	2
Kane	1.66	1.65	0.64	1.37	1

Sources: Metro Research Center
 U.S. Census Bureau:
 Low income and Limited English: 2014 American Community Survey
 People of color: 2010 Census
 TriMet: 2013 Passenger Census Data

Figure 3.3.3.2 Gresham options: ons and offs per acre in equity areas compared to option areas



Source: Metro Research Center
 U.S. Census Bureau:
 Low income and Limited English: 2014 American Community Survey
 People of color: 2010 Census

Serves the greatest number of jobs in the corridor

The number of jobs held by people with low incomes or people of color is estimated for each route option based on US Census Longitudinal Employer-Household Dynamics (LEHD) Workplace Area Characteristics data for 2010. The demographic categories associated with this data are limited; job numbers are available only for low income and people of color, not for communities with limited English

proficiency. Job numbers are not available for race and ethnicity in combination, so while in other sections of the equity analysis people of color are defined as persons identifying as a race other than white and/or as Hispanic, for this analysis race and ethnicity are reported separately. Detailed information on data, definitions and methodology is available in the *Powell-Division Transit and Development Project Transit Alternatives Evaluation Methods Report*.

Portland

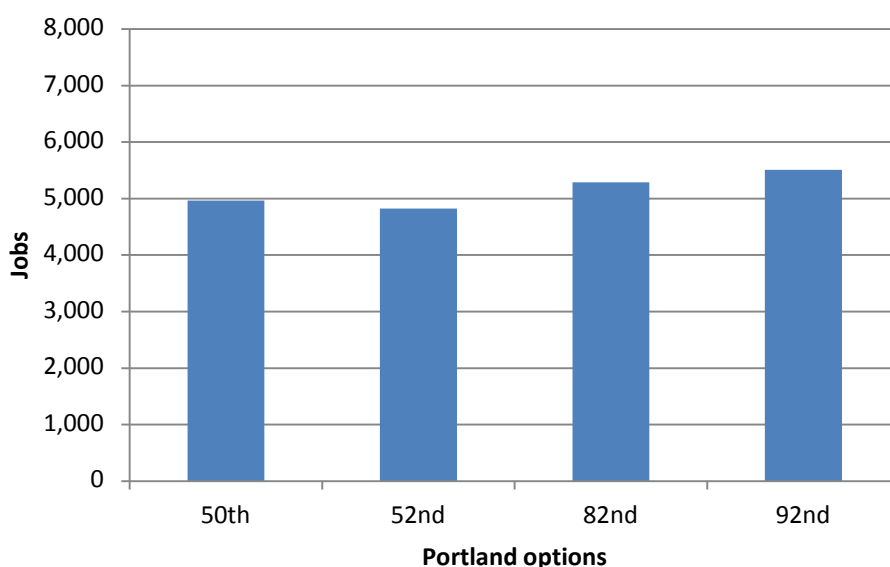
About three quarters of all jobs in the Portland option areas are in the two lowest income brackets reported by the LEHD. The 82nd and 92nd Avenue options serve more jobs held by workers who are low income, people of color or Hispanic than 50th and 52nd Avenue options. The 92nd Avenue option serves the highest numbers by a small margin, but when the job numbers are compared as a percentage of the total jobs, the 82nd Avenue option serves a higher proportion of jobs held by low income workers and the two options have the same proportion of jobs held by people of color.

Table 3.3.3.4 Portland options: Jobs held by people of color, Hispanics and low-income workers

Option	Total jobs	Low Income	Non-White	Hispanic	Percent Low Income	Percent Non-White	Percent Hispanic	Score
50th	6,570	4,967	1,088	502	75.6%	16.6%	7.6%	1
52nd	6,383	4,824	1,065	491	75.6%	16.7%	7.7%	1
82nd	6,821	5,287	1,213	578	77.5%	17.8%	8.5%	2
92nd	7,169	5,511	1,276	613	76.9%	17.8%	8.5%	2

Source: US Census Longitudinal Employer-Household Dynamics Workplace Area Characteristics (2010)

Figure 3.3.3.3 Portland options: number of jobs held by low income workers in option areas



Source: US Census Longitudinal Employer-Household Dynamics Workplace Area Characteristics (2010)

Figure 3.3.3.4 Portland options: jobs held by people of color and Hispanic workers in option areas

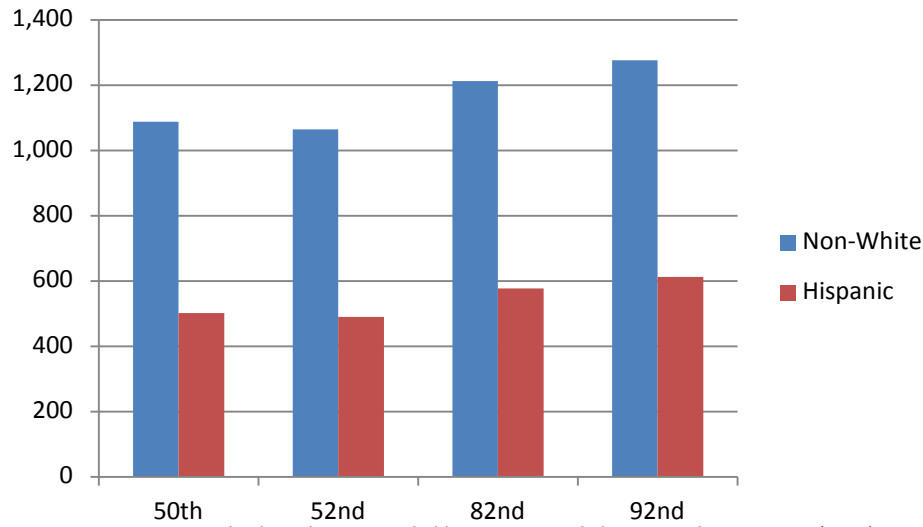


Table 3.3.3.5 Portland options: Equity employment totals for entire Portland segment

Option	Low Income	Non-White	Hispanic
50th	19,124	3,617	1,996
52nd	19,013	3,599	1,989
82nd	19,484	3,749	2,077
92nd	19,679	3,805	2,108

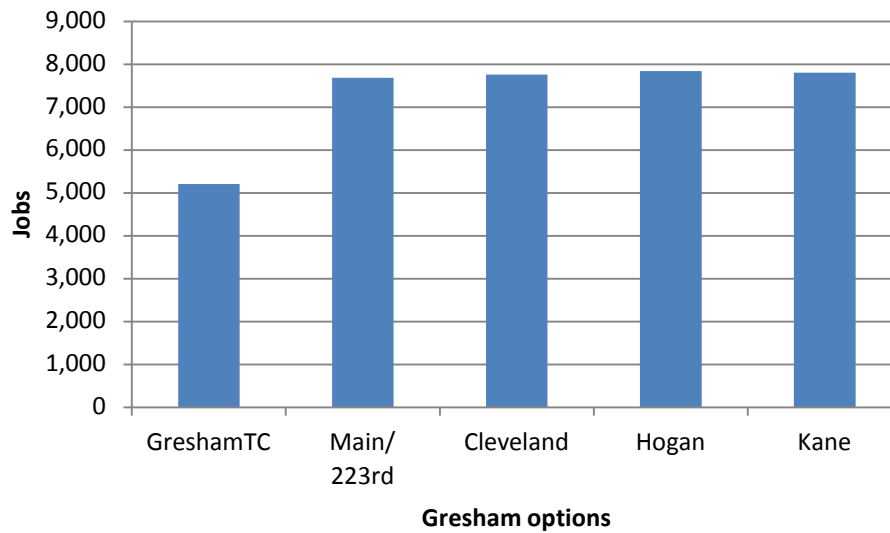
Gresham

There is little difference among options that continue to Mt. Hood Community College in serving the jobs held by low income workers, people of color, or Hispanics, and while the Gresham Transit Center option has lower numbers because of its shorter length, as a percent of total jobs there are slightly more jobs held by people of color and Hispanics, and the same proportion of jobs held by low income workers.

Table 3.3.3.6 Gresham options: Jobs held by people of color, Hispanics and low-income workers

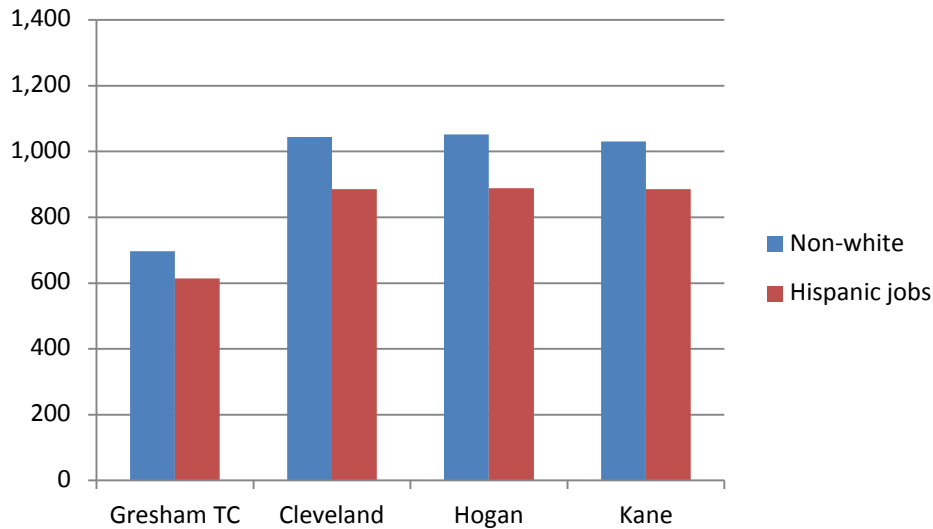
Option	Total jobs	Low Income	Non-White	Hispanic	Percent Low Income	Percent Non-White	Percent Hispanic	Score
Gresham TC	7,679	5,209	696	614	67.8%	9.1%	8.0%	1
Main/223 rd	11,545	7,687	1,057	880	66.6%	9.2%	7.6%	2
Cleveland	11,539	7,763	1,044	886	67.3%	9.0%	7.7%	2
Hogan	11,650	7,845	1,052	889	67.3%	9.0%	7.6%	2
Kane	11,503	7,809	1,031	885	67.9%	9.0%	7.7%	2

Figure 3.3.3.5 Gresham options: jobs held by low income workers



Source: US Census Longitudinal Employer-Household Dynamics Workplace Area Characteristics (2010)

Figure 3.3.3.6 Gresham options: jobs held by people of color and Hispanic workers



Serves community resources

This objective evaluates the route options. Benefits are calculated by comparing the density of the community resources defined in the Coalition for a Livable Future Regional Equity Atlas and regulated affordable housing units compared to the entire option areas. Detailed information on data, definitions and methodology is available in the *Powell-Division Transit and Development Project Transit Alternatives Evaluation Methods Report*.

Portland

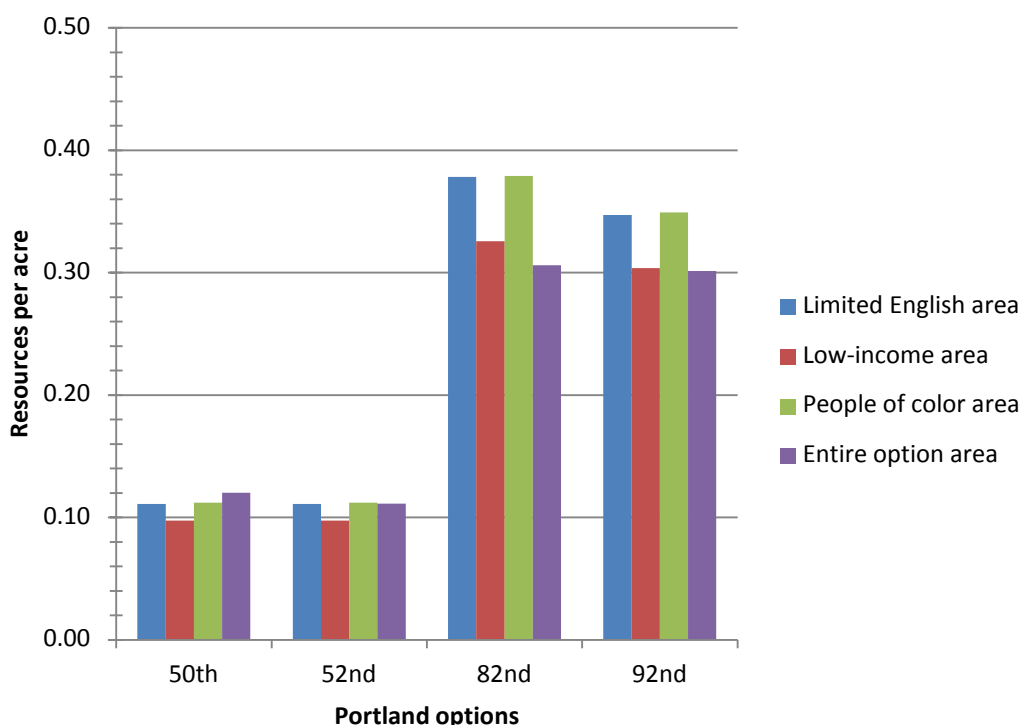
There are more community resources and regulated affordable housing units in equity areas with the 82nd and 92nd options compared to the option areas; there are less with the 50th and 52nd options, as illustrated in table 3.3.3.7 and figure 3.3.3.7 below.

Table 3.3.3.7 Portland options: community resources and affordable housing per acre in equity areas and option areas

Option	Limited English	Low Income	People of color	Entire option area	Score
50th	0.11	0.10	0.11	0.12	-1
52nd	0.11	0.10	0.11	0.11	-1
82nd	0.38	0.33	0.38	0.31	2
92nd	0.35	0.30	0.35	0.30	1

Sources: Metro Research Center
 U.S. Census Bureau:
 Low income and Limited English: 2014 American Community Survey
 People of color: 2010 Census
 Coalition for a Livable Future : Regional Equity Atlas

Figure 3.3.3.7 Portland options: community resources and affordable housing per acre in equity areas and option areas



Sources: Metro Research Center
Coalition for a Livable Future:
Regional Equity Atlas

Gresham options

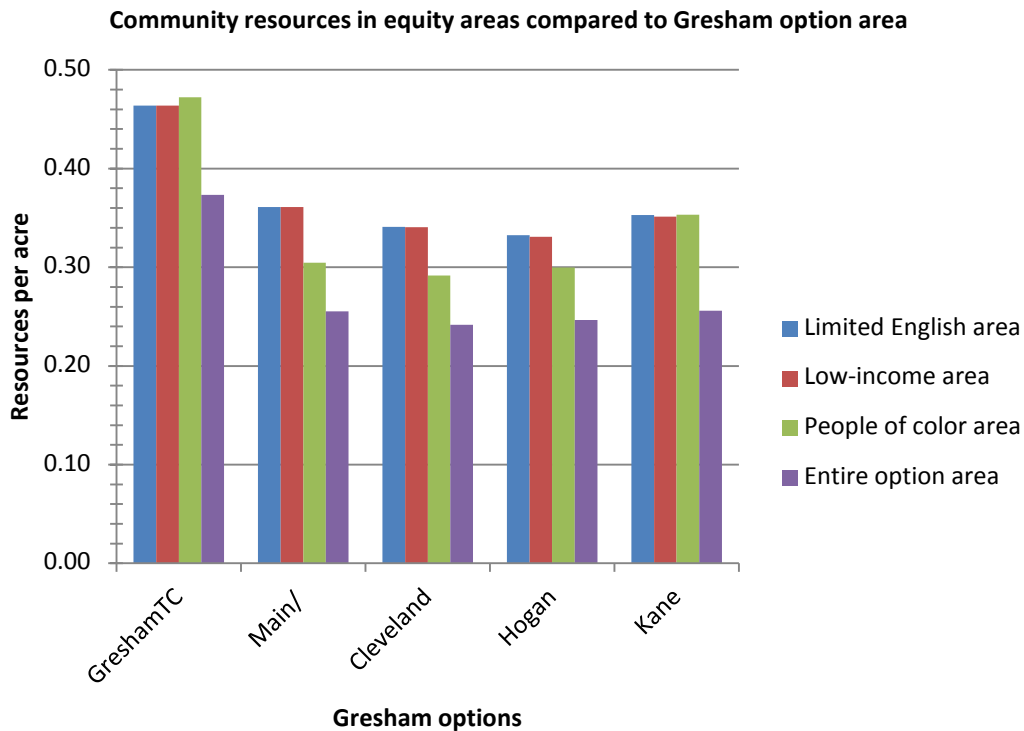
The Gresham Transit Center has more community resources and regulated affordable housing units in equity areas compared to the option areas, as illustrated in table 3.3.3.8 and figure 3.3.3.8 below. However, all options have more community resources within the equity areas compared to the entire option area.

Table 3.3.3.8 Gresham options: community resources and affordable housing per acre in equity areas and option areas

Option	Limited English	Low Income	People of color	Entire option area	Score
Gresham TC	0.46	0.46	0.47	0.37	2
Main/ 223rd	0.36	0.36	0.30	0.26	2
Cleveland	0.34	0.34	0.29	0.24	2
Hogan	0.33	0.33	0.30	0.25	2
Kane	0.35	0.35	0.35	0.26	2

Sources: Regional Equity Atlas 2.0
Metro Research Center
U.S. Census Bureau:
Low income and Limited English: 2014 American Community Survey
People of color: 2010 Census

Figure 3.3.3.8 Gresham options: community resources and affordable housing per acre in equity areas and option areas



Sources: Metro Research Center
Coalition for a Livable Future:
Regional Equity Atlas

3.4 Efficiency Goal

The purpose of the efficiency is to ensure the high capacity transit project is efficiently implemented and operated. This can be measured with capital and operating cost, and by impacts to property and to regulated resources such as parks and recreation areas and historic resources.

3.4.1 Maximizes financial resources

This objective is evaluated using riders per vehicle hour, a proxy for cost effectiveness. It is based on peak demand, daily demand, operating frequencies, route distance and transit vehicle capacity. The measure should be used to compare modeled alternatives and cannot be compared to existing TriMet bus operational measures as the travel demand model's definition and calculation of vehicle operating hours are not directly comparable with TriMet's.

All model runs assumed 7.5 minutes peak headways and 15 minute off-peak headways. Resulting peak demand indicates that all Frequent Service Plus routes would require 6 minutes peak headways (service frequency) to carry peak-period, peak direction riders. The high range Dedicated Busway would require

3.5 minute headways to carry peak demand, and the low-range Dedicated Busway would require 5.5 minute peak headways.

Since most routes have similar lengths, and since all routes' frequencies were adjusted to accommodate peak demand, daily riders per vehicle hour are similar except for the Main/223rd option. While it carries a similar number of riders as the other Gresham options, it's longer distance results in slightly higher vehicle hours, and slightly fewer riders per hour.

The Dedicated Busway (high range) option, while carrying significantly more riders than Frequent Service Plus options, requires higher frequencies and therefore more daily vehicle hours to accommodate the additional riders. As a result, daily riders per vehicle hour are similar to the Frequent Service Plus options.

Table 3.4.1 Riders per hour

Option	Daily Vehicle Hours	Daily Line Riders	Daily Riders/Vehicle Hour	Score
Portland options	50 th (not modeled)			
	52 nd	207	28,030	135
	82 nd	207	28,400	137
	92 nd (not modeled)			
Gresham options	Gresham TC	181	24,310	134
	Main/223rd	215	26,900	125
	Cleveland	209	27,100	130
	Hogan	210	27,600	131
	Kane	207	28,400	137
Dedicated Busway	High Range	230	35,400	135
	Low Range	210	28,300	135
				1

Source: Metro Research Center

3.4.2 Minimizes cost of property impacts

This objective evaluates route and transit type options. It is based on cross sections and right of way requirements and mitigation costs. This objective will be completed with draft concept design in the next phase.

3.4.3 Minimizes impacts to parks, recreation areas and historic sites.

This objective will be updated in the next phase when additional concept design is completed. Data from the State Historic Preservation Office is used to identify historic resources and data from the Metro Research Center and The Intertwine, a regional coalition of public, private and nonprofit organizations

engaged in natural resources issues is used to identify parks and recreation areas. The parks, recreation areas and historic resources within 25 feet of existing right-of-way are inventoried. These are not potential impacts, but an inventory. This information will be used in concept design to avoid or minimize impacts. With Frequent Service Plus there is expected to be little or no additional right-of-way required; the Dedicated Busway option will be designed to avoid or minimize impacts.

Impacts to parks, recreation areas and historic resources trigger an array of issues including community concerns, and complex, time-consuming government regulations. Therefore, avoiding these types of impacts saves time and money, leading to a more cost effective project.

Tables 3.4.3.1 and 3.4.3.2 below show the number of each resource within 25 feet and scores for each route and transit type option.

Table 3.4.3.1 Portland options: Estimated number of impacts to parks and recreational areas and historic sites

Portland options	Option	Total			Score
		Parks and recreation areas	Historic sites		
Portland options	50th				
	Frequent Service Plus	0	0	0	2
	Dedicated Busway	5	1	6	0
	52nd				
	Frequent Service Plus	0	0	0	2
	Dedicated Busway	5	1	6	0
	82nd				
	Frequent Service Plus	0	0	0	2
	Dedicated Busway	1	0	1	1
	92nd				
	Frequent Service Plus	0	0	0	2
	Dedicated Busway	1	0	1	1

Sources:
 Metro Research Center
 State Historic Preservation Office

Table 3.4.3.2 Gresham options: Estimated number of impacts to parks and recreational areas and historic sites

Option			Total	Score
	Parks and recreation areas	Historic sites		
Gresham options				
Gresham TC				
Frequent Service Plus	0	0	0	2
Dedicated Busway	5	0	5	1
Main/223rd				
Frequent Service Plus	0	0	0	2
Dedicated Busway	4	0	4	0
Cleveland				
Frequent Service Plus	0	0	0	2
Dedicated Busway	7	0	7	-1
Hogan				
Frequent Service Plus	0	0	0	2
Dedicated Busway	6	0	6	-1
Kane				
Frequent Service Plus	0	0	0	2
Dedicated Busway	10	0	10	-2

Sources:
 Metro Research Center
 State Historic Preservation Office

3.4.4 Capital Cost

Cost estimates are useful for comparing the cost magnitude of the project options, and are planning level estimates based on current level of design. Cost estimates will be developed and refined as additional information becomes available with additional design in the next phase.