



Adopted April 11, 2016

Copies of the Pierce Transit Destination 2040 Plan can be found at:

www.piercetransit.org/destination-2040

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APPENDIX A. Service Hierarchy

Pierce Transit Fixed Route Hierarchy

Trunk Route: Fixed route services that are designed to serve Pierce County’s urbanized areas. Trunk routes are characterized by their frequency – at least every 15 minutes on weekdays – and directness, operating along arterial streets.

Urban Route: Fixed route services that serve moderate density suburban neighborhoods. Suburban routes operate at least every 30 minutes on weekdays and make use of transit centers to facilitate passenger connections.

Suburban Route: Fixed route services that are designed to operate in suburban neighborhoods that have lower ridership potential. Suburban routes typically operate every thirty or sixty minutes and may not operate on nights and weekends. Suburban routes typically radiate out of transit centers.

Local: Fixed route bus service which travels within the local service area and makes regular and frequent stops. Pierce Transit’s local service area extends north to Browns Point and Fife, and west to University Place.

Express: A segment of fixed route service that operates between major commuting centers without intermediate stops. This service is designed to be faster and more direct than local fixed route service. Total express is made up of all services operated for Sound Transit including Seattle Express, Sea-Tac, University of Washington, Puyallup, and other express services funded by Pierce Transit including service to Olympia, the Gig Harbor Peninsula, and South Hill.

Source: *PT Speak – Common Terms and Definitions in Use at Pierce Transit* (May 2008)

PSRC Fixed Route Hierarchy

Core Transit Service: Light rail, bus rapid transit, and high frequency local buses are considered core transit services. Core services are generally routed to or through areas with higher density population and/or employment. By providing frequent and efficient service to areas with higher densities and mixed uses, core services are expected to draw high ridership. Typically running all day, core service is intended to operate at a high frequency and at the higher speeds to the extent practical. (Local Core bus transit service improvement examples in T2040 for Pierce Transit: SR 7 from Roy Y to Downtown Tacoma Bus Rapid Transit; SR 161 from 176th Street E to Puyallup Bus Rapid Transit; 112th Avenue Bus, 6th Avenue Bus)

Community Connector Transit Service: Transit routed between or through areas that are not dense enough to warrant core service but that the operator is required or has chosen to serve for policy reasons. Because of the (suburban) land use pattern it serves, it is less likely to draw large numbers of people. Typically running through much (but not all) of the day, it tends to be lower frequency but can operate at higher or lower speeds depending on individual routes. Community Connector routes may evolve into core service when transit demand and land use changes warrant it.

Specialized Transit Service: Transit routed to serve very specific users at specific times, such as peak period commutes from park-and-ride lots to employment centers. Running only at specific times, it is generally high speed and express, and is typically designed to carry high volumes of passengers. Specialized services are generally seen as complementary to core service; however, where possible, reducing duplicative service is encouraged.

Figure 31. Annual Transit Service Increase by Type of Service in the Constrained Plan: 2006 thru 2040		
Type	Peak	Off-Peak
Core	2.3%	2.1%
Connector	1.1%	0.5%
Specialized	2.0%	0.1%
Total	2.1%	1.8%

Source: *Puget Sound Regional Council - Transportation 2040* (May 2010) – Pages 65-68

APPENDIX B. Service Performance Standards

Pierce Transit Performance Measures & Standards Route Design Guidelines

Revised & Updated December 2015

Appendix B Performance Measures & Standards

As an integral part of the agency's Long Range Plan, Destination 2040, Pierce Transit has reevaluated and updated its System Performance Measures & Service Guidelines for 2015 and beyond. These measures and guidelines were last updated in October 2011 when annual fixed route service hours averaged just below 500,000 or approximately 12 percent greater than today. As service hours are restored over time, Pierce Transit must be able to easily but accurately demonstrate that the routes are meeting or exceeding their targets. The other two service types – SHUTTLE (paratransit) and Vanpool (commuter alternative) – will also be required to adhere to new metrics.

In their March 2009 "Best Practices in Transit Service Planning" guidebook, the USF Center for Urban Transportation Research has noted, "The provision of cost efficient and effective bus transit service is the basic premise upon which transit service is developed and the goal that all public transportation agencies strive to achieve. To attain this goal, public transit agencies must design their services around clear and defined principles, as well as a process to monitor the results achieved and to respond accordingly. This requires service design standards, an effective performance measurement system, and a systematic and continuous service evaluation methodology."

The purpose of creating and adopting performance measures are further defined by the USDOT below.¹

1. To clarify the definition of goals – Performance measures are a tool that is used in converting broad goals into measurable objectives.
2. To monitor or track performance over time – Metrics are used to track performance on a regular basis (e.g., monthly, yearly).
3. As a reference for target setting – Metrics are used as the basis for selecting a target that is intended to be achieved.
4. As a basis for supporting policy and investment decisions by comparing alternative options – Metrics are used as a basis for comparing alternative investments or policies in order to make decisions.
5. To assess the effectiveness of policies and strategies – Metrics are what enable measurements to assess whether projects and strategies have worked to further their goals.

In selecting the 30 new performance measures for Pierce Transit that would best support the agency's performance analysis, the Transit Development team considered the following key questions:

- Does it represent a key concern of the agency? (e.g., is it listed in the 2015-2020 Strategic Plan or annual Transit Development Plan?)
- Is the measure clear?
- Are data available for calculating the measure? (e.g., regularly reported in the NTD)
- Can it be forecasted?
- Does it measure something the agency and its investments can influence?
- Is the measure meaningful for the types of services we offer or the geographic area we cover?
- Is it truly "measuring what matters" to the public as well?

The spectrum between high level goals and clearly defined targets is depicted below.



¹ Source: *Performance Based Planning and Programming Guidebook*, U.S. Department of Transportation – Federal Highway Administration Report #FHWA-HEP-13-041 (September 2013)

Pierce Transit Performance Measures & Standards Route Design Guidelines

In a review of both peer transit agencies' performance measures and USDOT recommendations, Pierce Transit has elected to begin collecting and reviewing data for the following 30 performance measures under ten different categories:

Category	#	Measure
Service Supplied	1	Annual Service Hours
Service Supplied	2	Annual Vehicle Revenue Hours
Service Supplied	3	Annual Service Miles
Service Supplied	4	Annual Vehicle Revenue Miles
Service Supplied	5	Percentage of Time Points Departing On Time
Service Consumed	6	Annual Unlinked Passenger Trips (Boardings)
Service Consumed	7	Missed Vehicle Trips
Service Consumed	8	Boardings per Capita
Service Consumed	9	Peak Load Factor (also measured as Average Passenger Load ¹)
Service Effectiveness	10	Unlinked Passenger Trips per Vehicle Revenue Hour
Service Effectiveness	11	Unlinked Passenger Trips per Vehicle Revenue Mile
Service Effectiveness	12	Operating Expense per Unlinked Passenger Trip (Cost per Passenger)
Service Efficiency	13	Operating Expense per Vehicle Revenue Hour
Service Efficiency	14	Operating Expense per Vehicle Revenue Mile
Finance	15	Annual Operating Expenses
Finance	16	Annual Capital Expenses
Finance	17	Annual Farebox Revenues
Cost Effectiveness	18	Farebox Recovery Ratio
Human Capital	19	Employee Engagement Rate
Human Capital	20	Voluntary Employee Turnover Ratio (Percent to Total Turnover)
Safety	21	Number of Preventable Accidents per 100,000 Service Miles
Safety	22	New or Reopened On-the Job Injury Claims Filed
Passenger Amenities	23	Percentage of Benches and Shelters in Urban versus Suburban Areas
Passenger Amenities	24	Transit Accessible Park-and-Ride Spaces Provided
Passenger Amenities	25	Transit Accessible Park-and-Ride Utilization
Customer Satisfaction	26	Number of Complaints
Customer Satisfaction	27	Number of Compliments
Customer Satisfaction	28	Overall Satisfaction Index (Percentage)*
Customer Satisfaction	29	Perception of Personal Safety and Security at Stations, Shelters, and Stops*
Customer Satisfaction	30	Perception of Personal Safety and Security On Board Vehicles*

Note: Bold font indicates a measure reported in annual NTD transit agency profiles (Pierce Transit is under ID Number 0003). Definitions of each measure are provided on pages 15-17.

*From most recent 2010 and 2014 survey results combined.

Once adopted as part of the Long Range Plan, Destination 2040, the agency will continuously monitor all performance measures from calendar year 2015 through 2020. It should be noted however that these performance measures will be reevaluated as part of the Pierce Transit Long Range Plan update scheduled for 2020. In the interim, additional guidance could still be forthcoming as part of the Puget Sound Regional Council's update to their Long Range Plan, Transportation 2040, to begin in 2016 for adoption in 2017, or from the USDOT under the new transportation authorization bill signed by President Barack Obama on December, 4, 2015, the FAST Act.

System Performance Measures

MONITORING TOOLS

Each Pierce Transit service will be monitored, with performance tracked and reported periodically. The following performance measures will be tracked and maintained for each service mode or agency wide, as outlined below.

**Pierce Transit
Performance Measures & Standards
Route Design Guidelines**

	Fixed Route	SHUTTLE	Vanpool	Agency Wide
1. Annual Service Hours	Yes	Yes	No	No
2. Annual Vehicle Revenue Hours	Yes	Yes	Yes	Yes
3. Annual Service Miles	Yes	Yes	Yes	Yes
4. Annual Vehicle Revenue Miles	Yes	Yes	Yes	Yes
5. Percentage of Time Points Departing On Time	Yes	Yes	No	No
6. Annual Unlinked Passenger Trips (Boardings)	Yes	Yes	Yes	Yes
7. Missed Vehicle Trips (Number of Service Interruptions ²)	Yes	Yes	Yes	Yes
8. Boardings per Capita	Yes	No	No	No
9. Peak Load Factor (Average Passenger Load)	Yes	No	No	No
10. Unlinked Passenger Trips per Vehicle Revenue Hour	Yes	Yes	Yes	Yes
11. Unlinked Passenger Trips per Vehicle Revenue Mile	Yes	Yes	Yes	Yes
12. Operating Expense per Unlinked Passenger Trip (Cost per Passenger)	Yes	Yes	Yes	Yes
13. Operating Expense per Vehicle Revenue Hour	Yes	Yes	Yes	Yes
14. Operating Expense per Vehicle Revenue Mile	Yes	Yes	Yes	Yes
15. Annual Operating Expenses	Yes	Yes	Yes	Yes
16. Annual Capital Expenses	Yes	Yes	Yes	Yes
17. Annual Farebox Revenues	Yes	Yes	Yes	Yes
18. Farebox Recovery Ratio	Yes	Yes	Yes	Yes
19. Employee Engagement Rate	---	---	---	Yes
20. Voluntary Employee Turnover Ratio (Percent to Total Turnover)	---	---	---	Yes
21. Number of Preventable Accidents per 100,000 Miles of Service	Yes	Yes	Yes	Yes
22. New or Reopened On-the-Job Injury Claims Filed	---	---	---	---
23. Percentage of Benches and Shelters in Urban versus Suburban Areas	No	No	No	Yes
24. Transit Accessible Park-and-Ride Spaces Provided	No	No	No	Yes
25. Transit Accessible Park-and- Ride Utilization	No	No	No	Yes
26. Number of Complaints	Yes	Yes	Yes	Yes
27. Number of Compliments	Yes	Yes	Yes	Yes
28. Overall Satisfaction Index (Percentage)	---	---	---	Yes
29. Perception of Personal Safety and Security at Stations, Shelters, and Stops	---	---	---	Yes
30. Perception of Personal Safety and Security On Board Vehicles	---	---	---	Yes

² Per 100,000 miles

**Pierce Transit
Performance Measures & Standards
Route Design Guidelines**

SYSTEM PERFORMANCE TARGETS AND STANDARDS

Pierce Transit utilizes performance targets as one method of assessing progress towards adopted goals. Recognizing that numerous factors affect our ability to achieve these goals, performance measures should be considered the first step in assessing our objectives. Further research may be needed over time, in order to understand what factors are affecting system wide operating results.

Each year Pierce Transit will evaluate the following performance targets either by mode or system-wide:

	Fixed Routes	SHUTTLE	Vanpool	Agency Wide
Annual Service Hours per Capita	>0.7	N/A	N/A	N/A
Annual Boardings per Capita	>20	N/A	N/A	N/A
Farebox Recovery	20%	2%	100% ⁽¹⁾	15%
Boardings per Service Hour	>23	>2.5	N/A	N/A
Operating Cost per Vehicle Service Hour	<\$150 ⁽²⁾	<\$150 ⁽²⁾	N/A	N/A
Percent of Timepoints Departing on Time	>85%	N/A	N/A	N/A
Complaints per 1,000 Riders				<1
Compliments per 1,000 Riders	N/A	N/A	N/A	>1
Service Interruptions per 100,000 Miles of Service	<5	<7	<7	N/A
Overall Customer Satisfaction Index	>75% ⁽³⁾	4 ⁽⁴⁾		

(1) Direct Vanpool operating costs only.

(2) Fully allocated 2015 dollars.

(3) *Rating of excellent or good. Survey will be administered every 2-3 years. The goal is to show improvement from the last survey.

(4) Based on a scale of 1-5, with 1 being "unsatisfactory" and 5 being "outstanding."

Note: These performance targets exclude regional fixed route services operated under contract with Sound Transit.

Fixed Route Standards

Service Development Guideline

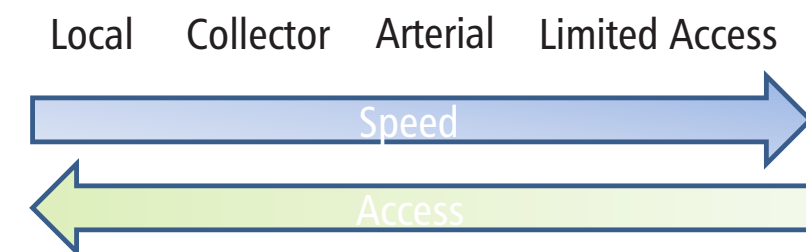
INTEGRATION WITH THE COMMUNITY

Pierce Transit will design services and facilities in areas appropriate to its land use characteristics and shall coordinate with local jurisdictions, so land use and development plans can more readily accommodate the integration of public transportation services.

Service Development Standard

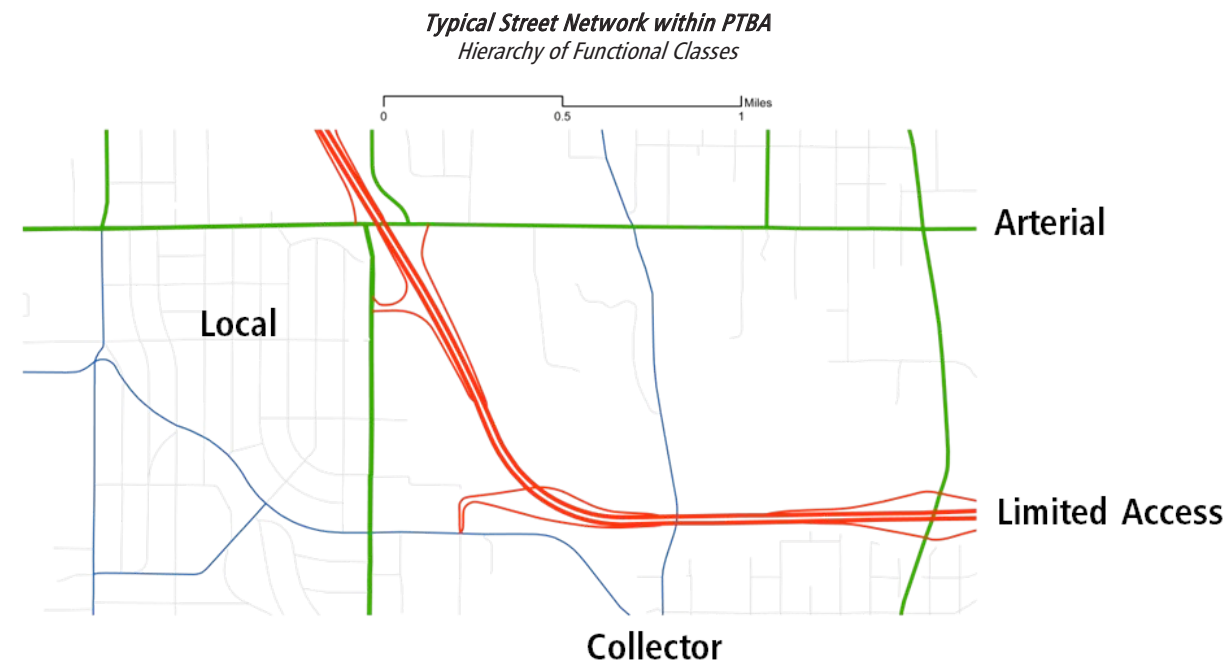
TRANSIT OPERATING ENVIRONMENT

Transit services should operate on streets constructed to at least a functional classification of "collector" or higher intensity.



**Pierce Transit
Performance Measures & Standards
Route Design Guidelines**

- Local Streets are low speed in nature, have a high level of intersection density, and are typically the most truncated in nature. Local streets are designed to feed into Collector streets. They most frequently serve residential land uses and are the most hospitable to non-motorized users.
- Collector streets tend to have moderate speed limits (30-35 mph). They are more truncated than arterial streets but less truncated than local streets. Intersection densities are moderate. They are typically designed to feed traffic to arterials.
- Arterial streets have the lowest intersection density, highest speed limits (up to 45mph), and the lowest degree of truncation for roadways on which non-motorized traffic is permitted. They are the most likely functional class to serve commercial retail centers and are often spaced at one-mile intervals.
- Limited-Access roadways have the highest speed limits (up to 60 mph within the PTBA) and completely grade-separated intersections. Pedestrians and cyclists are prohibited. Transit is only suitable for express-type service.



Source: Open Street Maps

ROUTE DESIGN

Transit routes will be designed to provide an attractive and viable alternative to automobiles for regional travel.

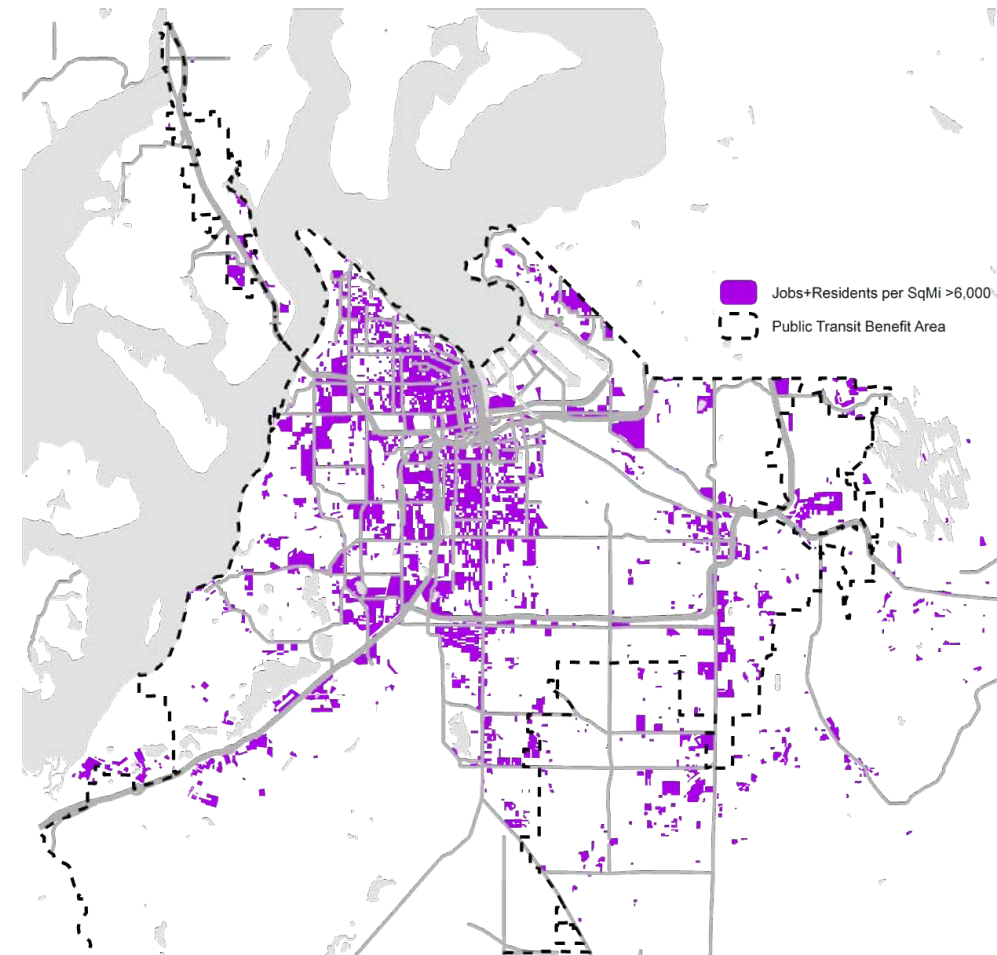
Service design standards are intended to provide general guidelines for new routes and major redesign efforts. There may be times when local operating conditions will make it advisable to alter these design standards.

ROUTE SPACING

Bus routes should be spaced approximately one-half mile apart in the urban core (i.e., areas where the combined residential and employment densities exceed 6,000/square mile). Bus routes should be spaced no closer than one mile apart in less densely populated sections of the service area.

**Pierce Transit
Performance Measures & Standards
Route Design Guidelines**

*Where Density Warrants Half-Mile Route Spacing
Pierce County Census Blocks Greater than 6,000 Jobs+Residents/Square Mile:*



Source: 2010 Decennial Census, 2011 LEHD Workplaces (US Census Bureau)

ROUTE DIRECTNESS

Route directness is defined as the ratio of travel distance via transit to the most direct travel distance via automobile. Routes should not be more than 20 percent longer in distance than a comparable trip by car. Deviations of routes should not exceed 8 minutes per round trip and should be based on averaging at least 10 additional customers per trip for such route deviation.

ROUTE DUPLICATION

When more than one route operates along the same street, vehicles should not operate at the same times except on approaches to or from a transit center.

Pierce Transit Performance Measures & Standards Route Design Guidelines

ONE WAY LOOPS

One way loops should not be used on regular weekday operational routes except as necessary at route terminals for the purpose of turning buses around.

ROUTE ANCHORS

When possible, terminal points of each end of a route should be located at major activity centers to ensure passenger traffic in both directions of operation. At least one end of each route shall have a clear "destination" orientation.

CORRESPONDENCE OF SERVICE LEVELS AND TRAVEL PATTERNS

Service frequency and times of operation should correspond to business hours, school class or shift change times, and other factors affecting travel patterns and rider demand.

URBAN SERVICES AREA

The urban core of Pierce County will be designated the Urban Services Area. Generally composed of neighborhoods with a combined residential and employment density exceeding 6,000 persons per square mile, this area will be served by intensive and high quality public transportation services.

Trunk routes will operate along a grid of major roadways within the Urban Services Area. Trunk routes provide high quality and frequent service that is specifically designed to provide a realistic alternative to private auto use for local trips.

TRANSIT CENTERS

Transit centers will be constructed at locations which permit the operation of a timed transfer system, and which permit convenient access to major passenger destinations. Generally, trunk routes will bypass transit centers unless the center is directly along the line of travel. Trunk routes may not operate on a timed transfer basis.

Appropriate roadway and development improvements in the vicinity of transit centers shall include:

- Sidewalks and roadway crossings to provide pedestrian access from all area neighborhoods
- Roadway improvements, such as HOV lanes and improvements, that permit unimpeded travel for transit vehicles along routes of access and egress to the transit center
- Provision of bicycle facilities that link the transit center with surrounding neighborhoods
- Street lighting that illuminates pedestrian approaches to the transit center
- Encouragement of major new retail and office construction (i.e., high-rise construction is especially appropriate when undertaken in the vicinity of transit centers)
- Location of new retail and office construction so that pedestrian access from the transit center does not require walking through parking lots to reach a building

Generally, transit services provided at transit centers is of sufficient quality that a significant percentage of the employees at any business located within walking distance of the transit center can utilize transit for their commute. Accordingly, it is appropriate to lower the number of employee-related parking spaces provided, which are often mandated in such developments.

TYPES OF ROUTES - Routes will be classified according to their function: Trunk, Urban, Suburban, Community Connector, and Express

Pierce Transit Performance Measures & Standards Route Design Guidelines

TRUNK ROUTES³

These are major routes that serve high volume corridors within the Urban Services Area and immediately adjacent suburban neighborhoods. They carry the most passengers, with the highest productivity of any local route:

- Peak Hour Frequencies – 10-30 minutes
- Midday Frequencies – 15-30 minutes
- Saturday Frequencies – 30 minutes or less
- Sunday Frequencies – 30 minutes or less
- Evening Frequencies (before 9:00 p.m.) – 30 minutes or less
- Night Frequencies (after 9:00 p.m.) – 60 minutes or less
- Bus Stop Spacing Approximately $\frac{1}{8}$ – $\frac{1}{4}$ mile for local service
- Bus Stop Spacing Approximately $\frac{1}{2}$ mile for limited stop service
- Densities Served – Residential + Employment > 6,000 per square mile

Given their high visibility and importance, trunk routes will feature state-of-the-art customer information, enhanced passenger amenities, and may feature specially branded vehicles that are dedicated to these routes alone.

Appropriate roadway and site development improvements:

- Sidewalks
- Construction of bus pullouts where warranted
- Minimization or elimination of driveways
- Street lighting that illuminates bus stops
- Provision of pedestrian crossing facilities immediately adjacent to bus; top locations
- Providing improved bus stops at significant transfer locations. These stops may include upgraded shelter facilities, illumination, real time schedule information and intersection improvements that facilitate walking between bus stops for transferring passengers
- Placement of bus shelters at significant bus stops
- Encouragement of major new retail and office construction. High-rise construction is only appropriate when undertaken along Trunk bus routes or at a transit center
- Location of new retail and office construction so that pedestrian access does not require walking through parking lots to reach a building entrance (i.e., little or no building setback)
- Planned convenient walk access between bus stops and major developments
- Bus stops shall comply with the Americans with Disabilities Act of 1990 (ADA) design standards

URBAN ROUTES⁴

These are significant routes that serve arterial streets within urban areas. They carry large passenger volumes and maintain productivity at or above the system's average.

- Peak Hour Frequencies – 30 minutes or less
- Midday Frequencies – 30-60 minutes
- Saturday Frequencies – 30-60 minutes
- Sunday Frequencies – 60 minutes or less
- Evening Frequencies (before 9:00 p.m.) – 60 minutes or less
- Night Frequencies (after 9:00 p.m.) – 60 minutes or less
- Bus Stop Spacing – $\frac{1}{8}$ to $\frac{1}{4}$ mile
- Densities Served – Residential + Employment > 4,000 per square mile

³ Revised and updated May 2015.

⁴ Revised and updated May 2015.

Pierce Transit Performance Measures & Standards Route Design Guidelines

Appropriate roadway and site development improvements:

- Sidewalks
- Construction of bus pullouts where warranted
- Minimization or elimination of driveways
- Street lighting that illuminates bus stops
- Provision of pedestrian crossing facilities immediately adjacent to bus stop locations
- Placement of bus shelters at transfer locations and at significant bus stops
- Because urban routes generally do not provide frequent enough service to accommodate the needs of most commuters, intensive new retail and office construction should be discouraged. When it does take place, new commercial development should be street-oriented so that pedestrian access does not require walking through large parking lots to reach a building entrance (i.e., locating parking lots behind new construction)
- Planned convenient walking access between bus stops and major developments
- Bus stops shall comply with the Americans with Disabilities Act of 1990 (ADA) design standards

SUBURBAN ROUTES⁵

These are minor routes that serve suburban neighborhoods. Passenger volumes and productivity tend to be low. Still, they provide a vital means for residents of outlying neighborhoods to access more frequent services operating in the region's urban core. They do not, however, provide frequent enough service to attract significant numbers of commute trips that originate in other portions of the urban area.

- Peak Hour Frequencies – 60 minutes or less
- Midday Frequencies – 60 minutes or less
- Saturday Frequencies – As justified by demand
- Sunday Frequencies – As justified by demand
- Evening Frequencies (before 9:00 p.m.) – 60 minutes or less
- Night Frequencies (after 9:00 p.m.) – Typically, service will not operate
- Bus Stop Spacing – As needed; ¼ mile where development occurs; less frequent in undeveloped neighborhoods
- Densities Served – Residential + Employment > 1,800 per square mile
- Appropriate roadway and site development improvements:
- Sidewalks in areas where development has occurred
- Placement of bus shelters at transfer locations and at significant bus stops
- New office and retail construction designed to attract people who are not residents of the immediate area should be discouraged
- Placement of signal beacons and/or illumination to aid passenger visibility at night

COMMUNITY CONNECTOR ROUTES⁶

These are shorter, local area-focused routes which prioritize accessibility over mobility are therefore less direct. They typically provide feeder service from transit centers or park-and-ride lots to smaller business districts in communities with highly truncated street networks. They can include fixed-route, deviated-route, or other service types in order to accommodate lower density land uses.

- Frequencies and Span – Based on demand; *ad-hoc* in determination
- Bus Stop Spacing – Dependent on adjacent land use
- Densities Served – Residential + Employment > 1,800 per square mile

⁵Revised and updated May 2015.

⁶Revised and updated May 2015.

Pierce Transit Performance Measures & Standards Route Design Guidelines

Appropriate roadway and site development improvements:

- Greater tolerance toward local street operation
- Preference toward sidewalks in areas where development exists

EXPRESS ROUTES (*)

These are routes that connect transit centers or park and ride lots with major transit destinations. They allow travel to these distant locations in times that compare to automobiles.

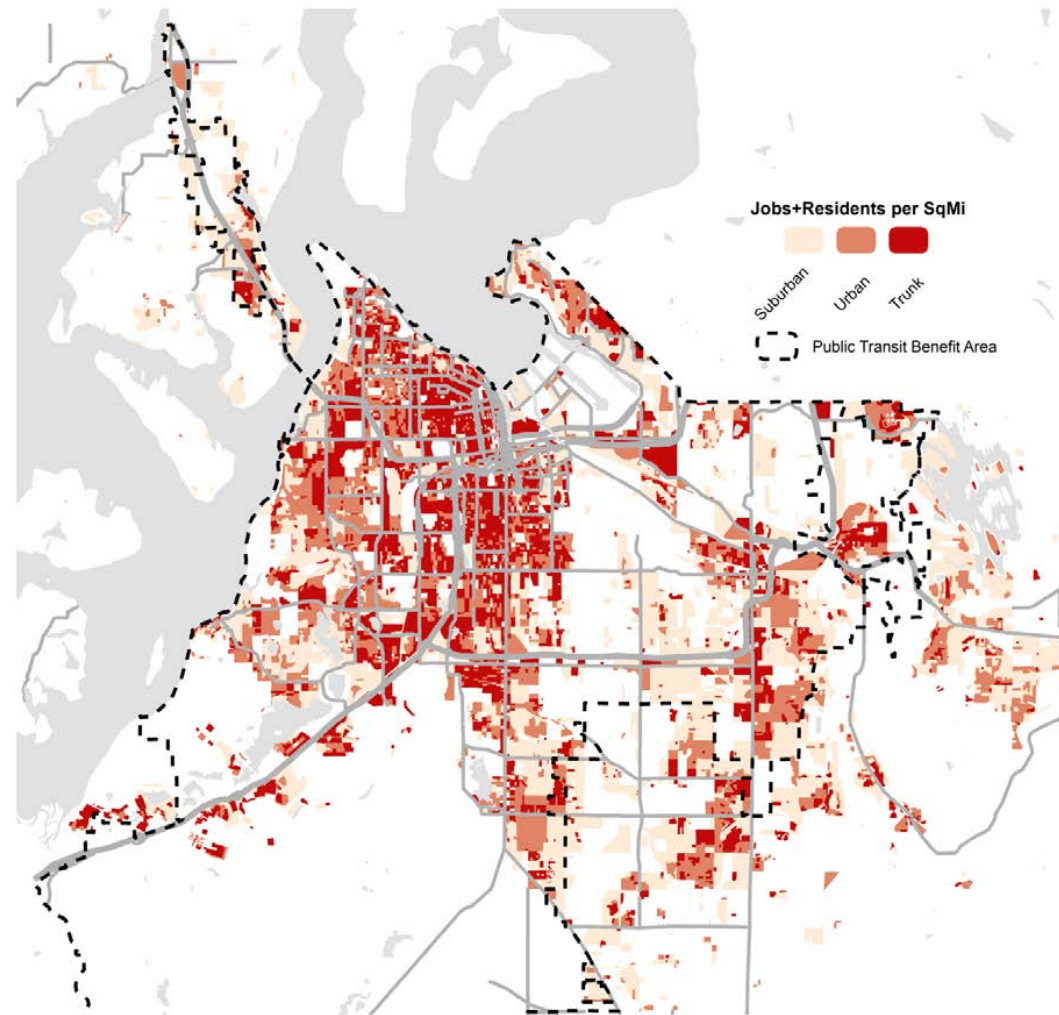
- Peak Hour Frequencies – 30 minutes or less
- Midday Frequencies – May operate only during commute periods
- Needed Market – Before an employer, or group of employers, can sustain express services a significant pool of employees, who share a similar work shift, must be located at one work location. Generally, express services are only appropriate after the total workforce at a site exceeds 5,000 persons. Vanpools are often an effective means of testing market potential before fixed route services are initiated
- Bus Stop Spacing – Generally only at transit centers and park-and-ride lots along the route

Appropriate roadway and site development improvements:

- These facilities will benefit from transit-friendly improvements adjacent to the facilities they serve
- Bus stops should be located as close to the employment site as possible
- Transit riders should not be asked to walk through a parking lot to reach the building's entrance

**Pierce Transit
Performance Measures & Standards
Route Design Guidelines**

*Which Level of Density Warrants Which Type of Service?
Pierce County Census Blocks Densities in Relation to Route Classification Thresholds:*



Source: 2010 Decennial Census, 2011 LEHD Workplaces (US Census Bureau)

Hours of Operation - These are general guidelines and may be adjusted to meet the needs of specific operating conditions.

	Weekdays	Saturdays	Sundays
Trunk Routes	4:30 a.m. - 11:45 p.m.	6:00 a.m. - 11:00 p.m.	7:00 a.m. - 9:30 p.m.
Urban Routes	6:15 a.m. - 10:15 p.m.	7:45 a.m. - 9:15 p.m.	8:45 a.m. - 5:30 p.m.
Suburban Routes	5:15 a.m. - 7:15 p.m.	As justified by demand	As justified by demand
Community Connector	As justified by demand	As justified by demand	As justified by demand
Express	Peak Period ⁷	No Service	No Service

⁷ Defined as 6:00 a.m. to 8:00 a.m. and again from 3:00 p.m. to 6:00 p.m.

**Pierce Transit
Performance Measures & Standards
Route Design Guidelines**

NEW BUS ROUTES

New bus routes will be intensively monitored during their first three years of operation. While established performance standards will be used for this evaluation, other factors, such as ridership growth trends and future anticipated development, will also be considered.

ROUTE EVALUATIONS

Pierce Transit will develop and monitor service performance measures to assure optimal productivity levels for public transportation services. Separate performance standards will be established for each type of route being operated by Pierce Transit. Routes will be determined to be operating at an "E" (Exceeds), "S" (Satisfactory), "M" (Marginal) or "U" (Unsatisfactory) level of performance. Routes operating at "E" level will be considered for headway improvements. Routes that are determined to be marginal or unsatisfactory will be considered for headway reductions, operation at policy headways, redesign or even elimination, as appropriate. Trunk, Urban, Suburban, and Community Connector routes will be evaluated on the basis of the number of total passengers carried per vehicle service hour, total passengers per revenue mile, and the percentage of route operating costs recovered from passenger revenues. Express routes will be evaluated on the basis of the number of total passengers carried per vehicle service hour, average passengers carried per trip, and the percentage of route operating costs recovered from passenger revenues.

PERFORMANCE STANDARDS FOR LOCAL SERVICES

	Passengers per Service Hour	Passengers per Revenue Mile	Farebox Recovery
Trunk Routes			
Exceeds	>35	>4.0	>25%
Satisfactory	26-35	2.1-3.9	19-25%
Marginal	20-25	1.7-2.0	14-18%
Unsatisfactory	<20	<1.7	<14%
Urban Routes			
Exceeds	>30	>2.5	>22%
Satisfactory	21-30	1.7-2.4	15-22%
Marginal	15-20	1.3-1.6	11-14%
Unsatisfactory	<15	<1.3	<11%
Suburban Routes			
Exceeds	>30	>2.5	>22%
Satisfactory	16-30	1.3-2.5	12-22%
Marginal	10-15	0.7-1.3	7-11%
Unsatisfactory	<10	<0.7	<7%
Community Connectors			
Exceeds	>20	>1.5	>20%
Satisfactory	15-20	1.1-1.5	11-20%
Marginal	10-15	0.5-1.0	5-10%
Unsatisfactory	<10	<0.5	<5%

PERFORMANCE STANDARDS FOR EXPRESS SERVICES

	Passengers per Service Hour	Passengers per Trip	Farebox Recovery
Regional Express Routes			
Exceeds	>30	>30	>30%
Satisfactory	21-30	26-30	26-30%
Marginal	15-20	20-25	15-25%
Unsatisfactory	<15	<20	<15%

**Pierce Transit
Performance Measures & Standards
Route Design Guidelines**

EVALUATION OF INDIVIDUAL TRIPS

Individual peak hour, midday, night, and weekend trips will be evaluated using the number of passengers they carry per hour as the service standard for the time period during which they operate. Generally, Pierce Transit will evaluate trips operated during a time period as a group. When a series of trips does not meet the minimum or maximum limits, they will be considered for augmentation, modification, or even elimination, as appropriate.

PERFORMANCE STANDARDS FOR INDIVIDUAL TRIPS

Acceptable number of Total Passengers Carried per Vehicle Revenue Hour for individual trips:

	<u>Minimum</u>	<u>Maximum</u>
<u>Trunk Routes</u>		
Peak	20.0	50.0
Midday	15.0	40.0
Night	10.0	40.0
Weekends	15.0	40.0
<u>Urban Routes</u>		
Peak	15.0	50.0
Midday	10.0	40.0
Night	10.0	40.0
Weekends	10.0	40.0
<u>Suburban Routes</u>		
Peak	10.0	30.0
Midday	10.0	20.0
Night	10.0	20.0
Weekends	10.0	20.0
<u>Community Connector Routes</u>		
Peak	10.0	30.0
Midday	10.0	20.0
Night	10.0	20.0
Weekends	10.0	20.0
<u>Express Services</u>		
Peak	20.0	50.0
Midday	15.0	40.0
Night	10.0	40.0
Weekends	10.0	40.0

VEHICLE ASSIGNMENTS

Appropriately sized vehicles will be designated for each work assignment.

**Pierce Transit
Performance Measures & Standards
Route Design Guidelines**

VEHICLE SIZES

Pierce Transit will operate three different vehicle sizes. Generally, the smallest vehicle capable of carrying the expected load will be dispatched on each piece of work.

<u>Vehicle Type</u>	<u>Seats</u>	<u>Maximum Desirable Load</u>
Cutaway Vans	16	24
Mid-size Coaches (30 ft.)	25	37
Full-size Coaches (40 ft.)	36-43	54-64

OVERCROWDING

Overcrowding conditions should be minimized.

ROUTE LOADING STANDARDS

The maximum loadings for individual trips, as a percentage of available seat capacity on fixed route service

<u>Period</u>	<u>Local</u>	<u>Express</u>
Peak Hour	150%	125%
Peak Period	100%	100%
Off-Peak	100%	100%

SHUTTLE Service Standards

PROGRAM ELIGIBILITY

Pierce Transit has adopted a separate set of program eligibility standards, which are available upon request.

SERVICE DELIVERY STANDARDS

SHUTTLE services shall meet or exceed the requirements of the Americans with Disabilities Act of 1990 (ADA).

Vanpool Service Standards

SERVICE DESIGN

The Vanpool program is an integral part of Pierce Transit's mix of public transportation services. Vanpools offer a distinct alternative to single-occupant automobile travel and are especially suited to longer distance commute trips to major worksites.

MEETING CUSTOMER DEMAND

Pierce Transit will work to meet the demand for Vanpool vehicles without maintaining a fleet in excess of actual need. The agency's goal is to have vehicles available when a new group of 5-15 riders is ready to form.

Pierce Transit Performance Measures & Standards Route Design Guidelines

PERFORMANCE MEASURES DEFINED

1. Service Hour – A Service Hour equates to one hour that an individual transit vehicle is on the road. For a transit system, service hours measure the number of transit vehicle hours that are provided across all routes in the system. Service hours include deadheading, revenue hours, and recovery hours.
2. Vehicle Revenue Hour - The hours that vehicles are scheduled to or actually travel while in revenue service. Vehicle revenue hours include layover/recovery time. Vehicle revenue hours exclude deadheading; operator training; vehicle maintenance testing. (NTD)
3. Service Mile – Any mile a vehicle is on the road including deadheading, but not including training miles or road test miles from Maintenance. While Pierce Transit generally uses the term “service mile,” vehicle service mile, platform mile, and vehicle platform mile are also used in some places to refer to this same statistic.
4. Vehicle Revenue Mile - The miles that vehicles are scheduled to or actually travel while in revenue service. Vehicle revenue miles include layover/recovery time. Vehicle revenue miles exclude deadheading; operator training; vehicle maintenance testing. (NTD)
5. Time Point - A location on a fixed bus route that has a scheduled time of arrival and/or departure.
6. Unlinked Passenger Trip (Also see PM 10 below) – One passenger making a one-way trip from origin to destination. (TCRP)
7. Missed Vehicle Trip (i.e., Service Interruption) – For fixed route, any trip that does not operate before the next scheduled trip. For demand-responsive transit, it is a trip that is scheduled and booked but for which the transit vehicle does not show up (i.e., a measure of reliability). (TCRP)
8. Boardings per Capita (i.e., the number of transit trips per capita of the service area population) – Calculated by dividing *Service Area Population* by *Annual Unlinked Trips*.
9. Peak Load Factor (i.e., Average Passenger Load) – The average number of passengers aboard a vehicle for its entire time in revenue service, including late night and off-peak hour service as well as rush hour service; calculated by dividing *Passenger Miles* by *Vehicle Revenue Miles*.
10. Unlinked Passenger Trip (Also see PM 6 above) – The boarding of one transit vehicle in revenue service. Also a trip made in a single transit vehicle.
11. (Same definitions applicable to PMs 4 and 6 above.)
12. Operating Expense per Unlinked Passenger Trip (i.e., Cost per Passenger) – The sum of all recurring costs (e.g., labor, fuel) that can be associated with the operation and maintenance of the system during the period under consideration. Operating costs usually exclude such fixed costs as depreciation on plant and equipment, interest paid for loans on capital equipment, and property taxes on capital items. Calculated by dividing *Operating Expenses* (by mode) by *Annual Unlinked Trips* (by that same mode). (TCRP)
13. Operating Expense per Vehicle Revenue Hour – Calculated by dividing *Operating Expenses* (by mode) by *Vehicle Revenue Hours* (by that same mode). (TCRP)
14. Operating Expense per Vehicle Revenue Mile – Calculated by dividing *Operating Expenses* (by mode) by *Vehicle Revenue Miles* (by that same mode). (TCRP)
15. Operating Expenses – The total of all expenses associated with operation of an individual mode by a given operator. Operating expenses include distributions of “joint expenses” to individual modes, and exclude “reconciling items” such as interest expenses and depreciation. (Not to be confused with “vehicle operations expense.”) (TCRP)
16. Capital Expenses - The expenses related to the purchase of equipment. Equipment means an article of non-expendable tangible personal property having a useful life of more than one year and an acquisition cost which equals the lesser of: The capitalization level established by the government unit for financial statement purposes –or– \$5,000. Capital expenses do not include operating expenses that are eligible to use capital funds. (NTD)
17. Farebox Revenues – The passenger payments for rides, including cash, farecards, tickets, tokens, pass receipts, and transfer and zone charges, but excluding charter revenue. (TCRP)
18. Farebox Recovery Ratio – The ratio of fare revenues to direct operating expenses. Calculated by dividing *the total fare revenues* by *total operating costs*. (TCRP); This ratio indicates how much the passenger provides toward the total cost of operating a particular transit service (e.g., fixed route, vanpool, or paratransit).
19. Employee Engagement – Defined as “Emotional connection an employee feels toward his or her employment organization, which tends to influence his or her behaviors and level of effort in work related activities. The more engagement an employee has with his or her company, the more effort they put forth. Employee engagement also involves the nature of the job itself - if the employee feels mentally stimulated; the trust and communication between

Pierce Transit Performance Measures & Standards Route Design Guidelines

- employees and management; ability of an employee to see how their own work contributes to the overall company performance; the opportunity of growth within the organization; and the level of pride an employee has about working or being associated with the company.” (Retrieved from *BusinessDictionary.com* at <http://www.businessdictionary.com/definition/employee-engagement.html>)
20. Voluntary Employee Turnover – Ratio calculated by *the total number of annual separations initiated by the employee* (e.g., to take another job, for personal reasons, to move out of the area, because of a medical or health-related issue, voluntary in lieu of discharge) divided by *the grand total of annual separations*. Other reasons include an involuntary separation, a layoff, or death.
 21. Preventable Accident – One in which the employee failed to do everything reasonable and within his or her power to avoid the accident.
 22. On-the-Job Injury – Legally defined by RCW 51.08.100 as “A sudden and tangible happening, of a traumatic nature, producing an immediate or prompt result, and occurring from without, and such physical conditions as result there from. Most injuries involve a relatively straightforward assortment of bumps, bruises, lacerations, strains, etc.”
 23. Urban Service - Areas where the combined residential and employment densities exceed 4,000 per square mile; Suburban Service – Areas where the combined residential and employment densities exceed 1,800 per square mile but are under 4,000.
 24. Transit Accessible Park-and Ride Space – Defined as “a short-term or all day parking space provided for the specified use of a transit patron, adjacent to or on the same premises of a local or regional transit service.”
 25. Transit Accessible Park-and-Ride Utilization – Measured by the number of available spaces occupied on a daily, weekly, or monthly basis. Note that counts are typically taken on the second or third Wednesdays of each month. This minimizes the effects of compressed work week commuters who typically do not drive on Mondays or Fridays.
 26. Complaint – An expression of pain, dissatisfaction, or resentment. A cause or reason for complaining; a grievance. (AHD)
 27. Compliment – An expression of praise, admiration, or congratulation. (AHD)
 28. Satisfaction Index – The percentage of Pierce Transit patrons surveyed in 2010 or 2014 who indicated they were either “very satisfied” or “somewhat satisfied” with their overall transit experience. (The other response options were “neutral,” “somewhat dissatisfied,” or “very dissatisfied.”)
 29. Perception of Personal Safety and Security at Stations, Shelters, and Stops – Including but not limited to: accidents and injuries; reported security incidents; visibility and lighting; portion of transit equipment vandalized or in a state of disrepair; official (agency) responsiveness to perceived risks; availability of emergency phones and security alert systems. (TRB)
 30. Perception of Personal Safety On Board Vehicles - The absence of perceived threats of an accident, assault, theft, or abuse. (TRB)

Sources

Internal or from *PT Speak: Common Internal Agency Terms and Definitions* (2008), unless otherwise indicated.
AHD – The American Heritage Dictionary of the English Language: Fifth Edition (2011)
NTD – National Transit Data Base Glossary website. Retrieved from <http://www.ntdprogram.gov/ntdprogram/Glossary.htm>
TCRP – Transit Cooperative Research Program Report 165: Transit Capacity and Quality of Service Manual – Third Edition (2013)
TRB – Transportation Research Board, Public Transit Level of Service tables (2013). Retrieved from Victoria Transport Policy Institute website <http://www.vtpi.org/tdm/tdm129.htm>

APPENDIX C. Future Service Scenarios Development Methodology

A key component of *Destination 2040*, Pierce Transit's Long Range Plan, was to internally develop and analyze three hypothetical fixed route transit network scenarios for incremental growth and one for another potential "worse case" reduction in services beyond the agency's control. These four future scenarios (listed below from the largest network to the smallest) will be further used to determine directly related capital improvement projects or infrastructure that would also be required in tandem over both the middle and long term horizons. The various service scenarios evaluated current conditions (i.e., the Baseline scenario) against future population and employment projections for Pierce County, Washington, as well as considering buildable lands, household densities, employment densities, major activity or industrial centers, and any other criteria or data known to generate transit ridership and related demand.

The biggest expense at most transit agencies is labor; vehicles go nowhere without a structure of people to operate and maintain them. Seventy percent of Pierce Transit's operating expenses are funded through sales taxes, so the health of the local economy is the most important variable in determining how much transit service can be put out on the street. In developing a long range plan, Pierce Transit evaluated a series of hypothetical economic scenarios, and then shaped their service structure around these scenarios. These consisted of:

- *Aspirational Growth Scenario (Vision)*: Based on high growth in transit service hours, expanded or new routes, and unlimited or non-constrained funding availability. Identifies long-term agency priorities in years 11 thru 25 (Horizon Years 2025-2040). Also known as "The Vision" with growth at 3.0% annually and to approximately 700,000 annual service hours by 2030 and 900,000 annual service hours by 2040.
- *Rapid Growth Scenario (Baseline Plus)*: Based on maintaining or upgrading the assets and facilities we have today, while still returning to the agency's historically highest levels of service/service hours whenever feasible. Fiscally constrained to target approximately 650,000 annual service hours by 2030 at 2.5% average annual growth.
- *Incremental Growth Scenario (Per PSRC's Transportation 2040 goals)*: Identifies 6-year TIP capital project candidates and agency priorities (2015-2020) plus 10-year/Mid-Term Implementation Strategies (2020-2025). As prescribed by *Transportation 2040*, fiscally constrained to grow at 2.0% annually to approximately 600,000 service hours by 2030 and approximately 730,000 service hours by 2040.
 - *Current Conditions (Baseline)*: Per the 2015 budget and six-year plan, fiscally constrained but with no growth in annual service hours forecast beyond an increase to 454,000 in 2016. Could also be considered a "No Action" scenario.
- *Core Services Only Scenario (Baseline Minus)*: Identifies what routes would be reduced or discontinued entirely if local revenues, state funding, and/or federal funding were temporarily suspended or dramatically cut. Still fiscally constrained but immediately reduced by 30% to approximately 300,000 annual service hours. Also known as the "worse case" scenario.

With the service hour estimates in place, the next step in the process was to determine the *where* (routing), *when* (daily hours of operation), and *how* (headway/frequency).

Before developing a vision of what future Pierce Transit service should look like, it is important to determine the agency's service goals. As a public agency, Pierce Transit we must strive to serve the *entire* public, but the needs of the public are not homogenous. An 18-year old may demand service later in the night, and may think that late night service is more important than the distance they must walk to begin their journey. For an elderly or disabled rider, walking even one block may be struggle. For a commuter, peak hour service is the most important focus. Considering this, to which type of rider should our service be optimized? Pierce Transit attempts to better understand the diversity of needs and desires of its customers through a comprehensive survey which was last conducted in 2014. The most requested changes to Pierce Transit services remain more frequent service (22%), later service (18%), and weekend service (10%). Staying on schedule emerged as a new issue in 2014 as one-in-ten riders (9%) mentioned it compared to none in the previous two surveys of 2007 and 2010.

Other factors in shaping a network

In creating a comprehensive transit network, the issue of access is of critical importance. A bus route that makes no stops between its beginning and end points would be highly mobile (i.e., fast), but would be of limited benefit to the communities it ran through. Likewise, a road network that forces an increasing travel time creates an impediment to efficient service. A passenger riding transit always begins and ends his or her journey by some other mode; walking, bicycling, or driving. Building parking facilities is expensive and not particularly equitable; transit vehicles offer limited capacity for bicycle storage. For these reasons and many others, walking is the primary mode of transit access (cite PT customer survey for exact breakdown).

Numerous studies indicate that the furthest most riders are willing to walk to access transit is about ½ mile (approximately 10 minutes) for a work trip, and about ¼ mile (approximately 5 minutes) for other trip types. This phenomenon drives the importance of local street design. In a dense, grid-type street network, intersection density is high and there are multiple paths that can be taken to travel from one part of the network to another. Therefore, the area that can be served within a ½ or ¼ mile of a transit stop is also high. Urban development trends over the past half-century have favored a different network design, one in which streets are given various functional classes (e.g., local, collector, arterial) and feed traffic progressively from minor to major roadways. Interconnectivity between local streets is minimized on most local streets, primarily to discourage through drivers. The cost of this truncated local street network comes in the form of increased travel distances. For example, imagine a scenario in which a resident living on a cul-de-sac wishes to visit his backyard neighbor who lives on a separate cul-de-sac. A journey that might involve a few hundred feet in a grid network may require over a mile in a neighborhood served by cul-de-sacs and meandering local and collector streets that eventually flow into an arterial roadway. This illustrates one challenge in serving suburban development areas with fixed-route service.

In the Public Transit Benefit Area (PTBA), there are many considerations in determining what fixed route service should constitute. Transit has no need without people to ride it, and people are not evenly distributed throughout a region. As a rule of thumb, density (i.e., the number of people and jobs in a given area) is a very good predictor of transit ridership, and it is not evenly distributed in Pierce County.

- Goal: Create a network than is understandable and serves the most passengers with a minimal amount of travel time.

Technology Caveat: Sometimes, disruptive technologies come along and completely change the way things are done. Generally, disruptive technologies are a good thing for industries which recognize that change is coming at an early stage and adjust accordingly. Just as fields are now plowed with tractors instead of mules, digital photography has supplanted one-hour photo labs, and watching the latest blockbuster at home does not require the rental of a VHS cassette, automation may find its way into the transit industry as well. Numerous automakers are actively developing technologies which automate the task of driving. Just as some metro systems today operate using driverless vehicles, such as Miami's *Metromover*, it is not inconceivable that by the year 2040 it could be possible to operate driverless buses on city streets. Given that labor is the largest operating cost of a transit agency, such a move could significantly reduce the costs of hourly operation and allow for significant improvements in service under a given budget.

Other technologies that already exist today will undoubtedly change the nature of fixed route transit operations. Just as two-way communication via smartphone has enabled the rise of ride-sharing services like Lyft and Uber, the same technology may enable dynamic routing of transit vehicles in a similar manner.

Unforeseen social attitudes like the declining interest in automobile ownership, neighborhood preferences, and shopping behavior could also radically impact the demand and funding for transit by the year 2040.

Current Conditions Scenario (Baseline)

Owing to a modest increase in service, only minor changes occur to existing routes and schedules. Slight route adjustments are made to complement the Tacoma Link Extension in the Hilltop neighborhood of Tacoma.

Incremental Growth Scenario (Per the PSRC's Transportation 2040 Long Range Plan)

In this 2.0% annual growth scenario, the existing 2014 Pierce Transit route structure remains mostly un-modified, with only minor changes occurring to expand the span and frequency of major routes, especially trunk routes. Most weekend and evening service is restored, and some mid-day and evening frequencies are improved. Some route deviations with insufficient ridership to justify schedule impacts are eliminated. Annual service hours are approximately 725,000 by 2040.

Rapid Growth Scenario (Baseline Plus)

This scenario is formed as a hybrid of the Incremental and Aspirational growth scenarios to reflect the difference in service hours at a 2.5% annual growth rate. Annual service hours exceed approximately 820,000 by 2040.

Aspirational Growth Scenario (The "Vision")

In accordance with the above guidelines, a backbone transit network was created for the South Sound region which connected the major transit, population, and employment centers via arterial corridors in a hybrid of hub-and-spoke and grid-based model. This backbone served as the basis for the high-frequency routes (15 minutes or less). Next, using 2010 Census data for Jobs+Residents at the block level and 2040 PSRC density forecasts at the forecast analysis zone level, routing for local, express, arterial, and urban routes was refined. Peak Hour-only services were

extended to major employment and population centers beyond the current PTBA boundary, in order to model their effectiveness. Local routes in denser urban and suburban areas see major improvements to both service span and frequency. Attention was also paid to the Pierce County Buildable Lands report, which highlights where development is likely to occur based on permit status, proximity to supporting infrastructure, current improvement values, and zoning. Sound Transit's "spine" light rail transit (LRT) corridor is presumed to be extended south to DuPont from Federal Way, with major stations including Fife, Tacoma Dome, Tacoma Mall, and Joint-Base Lewis-McChord. Thus, added emphasis was placed on servicing these future LRT stations. Since an alternatives analysis has not yet been performed by Sound Transit, it was presumed that the LRT corridor would primarily follow the west side (southbound side) of Interstate Highway 5.

Core Service Only Scenario (Baseline Minus)

Under this "worst case" scenario, service for the most productive routes is retained. Service for less productive routes is reduced to peak-hour only or eliminated completely in order to meet the threshold of 300,000 service hours.

Hypothetical Route Planning

Fixed-route service span, headways, and routing were established by taking into account the following factors, in descending order:

Pierce Transit service development guidelines (i.e., "What Makes a Good Bus Route?") come from the following planning criteria and based on nationally recognized best practices:

1. Operate on principal arterial or collector streets.
2. Space routes half a mile in urban cores (where Jobs + Residents = Density and is greater than 6,000 per square mile) and every mile for less dense areas.
3. Make routes as direct as possible; travel distance should be no more than 20% longer when compared to car trip. Deviations should not exceed 8 minutes per round trip and should gain at least 10 additional riders per trip.
4. No more than one route per arterial.
5. One-way loops should not be used except for turning around buses.
6. Service hours should match demand.

Types of Routes:

	Peak Period Headways (Minutes)	Mid-Day Headways (Minutes)	Bus Stop Spacing	Densities Served Pop+Job/sq.mi.
Arterial	15 or less	30 or less	1/4 mile	>6,000
Urban	30 or less	30 or less	1/4 mile	>4,000
Suburban	60 or less	60 or less	As needed	>1,800
Express	30 or less	60 or less	As needed	N/A

Methodology for Planning Routes

- A. 1. Identify where transit is suitable and needed. In accordance with municipal long range transportation plans where possible, transit priority corridors are selected. The suitability for transit is based on:
 1. Existing density for employment and population density through the US Census Bureau
 2. The location of transit dependent populations
 3. Potential for development through Pierce County's Buildable Lands report
 4. PSRC's future land use (Population and Jobs) forecasts,
 5. The existing and future street network. Corridors which maximize continuity and minimize turning movements are preferred
 6. Existence of specific trip generators, such as schools, hospitals, and major employment centers, and retail centers.
- B. Leverage existing and future transit investments by continuing a hybrid network design of hub-and-spoke and grid-based models.
 1. Transit centers form hubs upon which multiple routes converge. They facilitate comfortable transfers and provide a convenient location for operators to meet their rest requirements. Therefore, the future network envisions the retention of existing Pierce Transit centers.
 2. Disadvantages of the hub-and-spoke model include deviation from intended direction of travel, forced mid-route layovers, and transfer penalties which make some passenger trips longer in duration than with a grid-based system. A high-frequency route structure which adheres to the existing street grid eases on-street transfers and enables passengers to reach a greater number of destinations. High frequency on connecting routes and prioritizing amenities where transfers can be made is essential in practical grid-based networks. On-street connections which involve a 5-minute average wait under a shelter are far more tolerable to passengers than an uncovered half-hour (or longer) wait.
 3. Sound Transit plans to make significant investments within Pierce County in the coming decades, including extension of the Link Light Rail "spine" south to DuPont via Tacoma Mall, Tacoma Link extensions to Martin Luther King Jr. Blvd. (aka the "medical mile") and Tacoma Community College, plus high capacity transit along State Route 7. As primarily a local transit provider, Pierce Transit will serve as a passenger feeder to maximize the travel shed of stations serving as regional travel gateways.
- C. Balance geographic equity with demand.
 1. Density is a strong predictor of ridership. In order to provide the greatest good to the greatest number of passengers, the corridors of higher density should receive more frequent service than those of lower density.
 2. At the same time, the route network should still facilitate access to as much area within the PTBA as practical.
 3. Routes should be anchored by major destinations, preferably at both ends.
- D. General layout (derived from PT Guidelines)
 1. Space routes half a mile in urban cores (where Jobs + Residents = Density and is greater than 6,000 per square mile), then every mile for less dense areas.

2. Make routes as direct as possible; travel distance should be no more than 20% longer when compared to car trip.
3. One-way loops should not be used except for turning around buses.

Pierce Transit Fixed Route Hierarchy

Trunk Route: Fixed route services that are designed to serve Pierce County's urbanized areas. Trunk routes are characterized by their frequency – at least every 15 minutes on weekdays – and directness, operating along arterial streets.

Urban Route: Fixed route services that serve moderate density suburban neighborhoods. Suburban routes operate at least every 30 minutes on weekdays and make use of transit centers to facilitate passenger connections.

Suburban Route: Fixed route services that are designed to operate in suburban neighborhoods that have lower ridership potential. Suburban routes typically operate every thirty or sixty minutes and may not operate on nights and weekends. Suburban routes typically radiate out of transit centers.

Local: Fixed route bus service which travels within the local service area and makes regular and frequent stops. Pierce Transit's local service area extends north to Browns Point and Fife, and west to University Place.

Express: A segment of fixed route service that operates between major commuting centers without intermediate stops. This service is designed to be faster and more direct than local fixed route service. Total express is made up of all services operated for Sound Transit including Seattle Express, Sea-Tac Airport, University of Washington, Puyallup, and other express services funded by Pierce Transit including service to Olympia, the Gig Harbor Peninsula, and South Hill.

Source: PT Speak – Common Terms and Definitions in Use at Pierce Transit (May 2008)

Puget Sound Regional Council Fixed Route Hierarchy

Core Transit Service: Light rail, bus rapid transit, and high frequency local buses are considered core transit services. Core services are generally routed to or through areas with higher density population and/or employment. By providing frequent and efficient service to areas with higher densities and mixed uses, core services are expected to draw high ridership. Typically running all day, core service is intended to operate at a high frequency and at the higher speeds to the extent practical. (Local Core bus transit service improvement examples in T2040 for Pierce Transit: SR 7 from Roy Y to Downtown Tacoma Bus Rapid Transit; SR 161 from 176th Street E to Puyallup Bus Rapid Transit; 112th Avenue Bus, 6th Avenue Bus)

Community Connector Transit Service: Transit routed between or through areas that are not dense enough to warrant core service but that the operator is required or has chosen to serve for policy reasons. Because of the (suburban) land use pattern it serves, it is less likely to draw large numbers of people. Typically running through much (but not all) of the day, it tends to be lower frequency but can operate at higher or lower speeds depending on individual routes. Community Connector routes may evolve into core service when transit demand and land use changes warrant it.

Specialized Transit Service: Transit routed to serve very specific users at specific times, such as peak period commutes from park-and-ride lots to employment centers. Running only at specific times, it is generally high speed and express, and is typically designed to carry high volumes of passengers. Specialized services are generally seen as complementary to core service; however, where possible, reducing duplicative service is encouraged.

Type	Peak	Off-Peak
Core	2.3%	2.1%
Connector	1.1%	0.5%
Specialized	2.0%	0.1%
Total	2.1%	1.8%

Source: Puget Sound Regional Council - Transportation 2040 (May 2010) – Pages 65-68

Data Sources

- PSRC: 2013 Land Use Baseline, Central Puget Sound Region - Maintenance Release 1 (MR1) Update
Description: This report breaks the Puget Sound region into sub-areas called Forecast Analysis Zones (derived from census geography roughly the size of several census tracts) and applies projections to changes in population and employment. As such, the dataset was used to determine growth within and surrounding the Pierce Transit Benefit Area.
- US Census Bureau 2010 Decennial DP01 Table (SF2_SF2DP1), field HD01_S001 (Total Population)
Description: Census block-level counts of population
- US Census Bureau Longitudinal Employment Household Dynamics 2011 Q1 (All Workers→Jobs)
Description: Census block-level counts of workplace locations. Derived via IRS anonymized reporting.
- Sound Transit Long-Range Plan Final Supplemental Environmental Impact Statement
Description: This document served as a general guide to determine where fixed-guideway infrastructure (such as light rail stations) was most likely to be placed in and near the PTBA.
- Pierce County 2014 Buildable Lands Report
Description: The County collaborated with incorporated municipalities to create an index of parcels most likely to see an increase in land use intensity by 2030 based on zoning, improvement to land value ratios, and proximity to support infrastructure.
- Service Hours Calculation: In order to determine how many hours would be required to serve each route and period of day, the following parameters need to be set or calculated:
 [RteMiles]= Total length of route being driven for a given direction, in miles
 [NumDrctns]=The number of directions of travel. Most routes travel in two directions, but express some only travel in one direction during peak hours.
 [speed]=The estimated average speed of the route, in miles per hour. The default local speed takes a conservative 12 mph.
 [early_am]=Time period between 5am to 7am; 2-hour span
 [peak_am]=Time period between 7am to 9am; 2-hour span
 [midday]=Time period between 9am to 3pm; 6-hour span
 [peak_pm]=Time period between 3pm to 6pm; 3-hour span
 [evening]=Time period between 6pm to 10pm; 4-hour span

[saturday]=Time period between 8am to 10pm; 14-hour span

[sunday]=Time period between 8am to 8pm; 12-hour span

[span]=Number of hours in time period

[2014 Total Service Hours] / [2014 Total Revenue Hours]= Total hours divided by hours in revenue service ; = 1.41. Allows for an estimate of recovery and deadhead time.

The following calculation creates a service hour estimate for estimate for each time period:

$$([2014 \text{ Total Service Hours}] / [2014 \text{ Total Revenue Hours}]) * ([\# \text{ Day Type Days in Year}]) * ([\text{RteMiles}] * [\text{NumDrctns}] / [\text{speed}] / ([\text{Time Period Headway Minutes}] / 60) * [\text{Number of Hours in Time Period}])$$

The periods are added to create route and system-wide totals.

- Peak Pull Calculation: Number of buses required during peak period of day uses similar methods to the service hour calculation. Important for planning base capacity improvements and vehicle procurement.
 $(60 / [\text{peak_am}] * [\text{NumDrctns}] * [\text{RteMiles}] / [\text{speed}]) * [2014 \text{ Total Service Hours}] / [2014 \text{ Total Revenue Hours}]$

APPENDIX D. PTBA Boundary Process

Public Transportation Improvement Conference of 2011 Revision of the Public Transportation Benefit Area in 2012

A Public Transportation Improvement Conference (PTIC) as outlined by RCW 36.57A.020 was convened by resolution of the Pierce Transit Board of Commission on November 14, 2011. The Conference membership was comprised of one elected official from each jurisdiction within Pierce County and the Pierce County Council. The purpose of this conference was to consider changing the current boundaries of the Pierce Transit Public Transportation Benefit Area (PTBA). Each jurisdiction was given the choice to stay in the PTBA or withdraw from the PTBA.

On March 8, 2012 the PTIC held a public hearing on the preliminary delineation (see figure below) that was put forward on January 23, 2012. After hearing testimony from over a dozen citizens the Conference convened a special meeting to deliberate the map. A motion to approve the preliminary delineation as put forward to public hearing was passed unanimously by the Conference. Five cities, Bonney Lake, Buckley, DuPont, Orting, and Sumner chose to leave the PTBA along with Pierce County removing a large portion of Unincorporated Pierce County.

Each city remaining in the approved delineation had 60 days from the passage of said map as a final opportunity to withdraw. That deadline was May 7, 2012; no action was taken by any of the 13 jurisdictions.

The approved delineation and the new composition of the Board of Commissioners became effective on May 8, 2012.

Taxing authority in the areas that were removed ended in October of 2012. The financial impact in 2010 dollars was a loss of approximately \$7.5 million annually.

Washington State Legislature

RCW 36.57A.140

Annexation of additional area.

(1) An election to authorize the annexation of territory contiguous to a public transportation benefit area may be called within the area to be annexed pursuant to resolution or petition in the following manner:

(a) By resolution of a public transportation benefit area authority when it determines that the best interests and general welfare of the public transportation benefit area would be served. The authority shall consider the question of areas to be annexed to the public transportation benefit area at least once every two years.

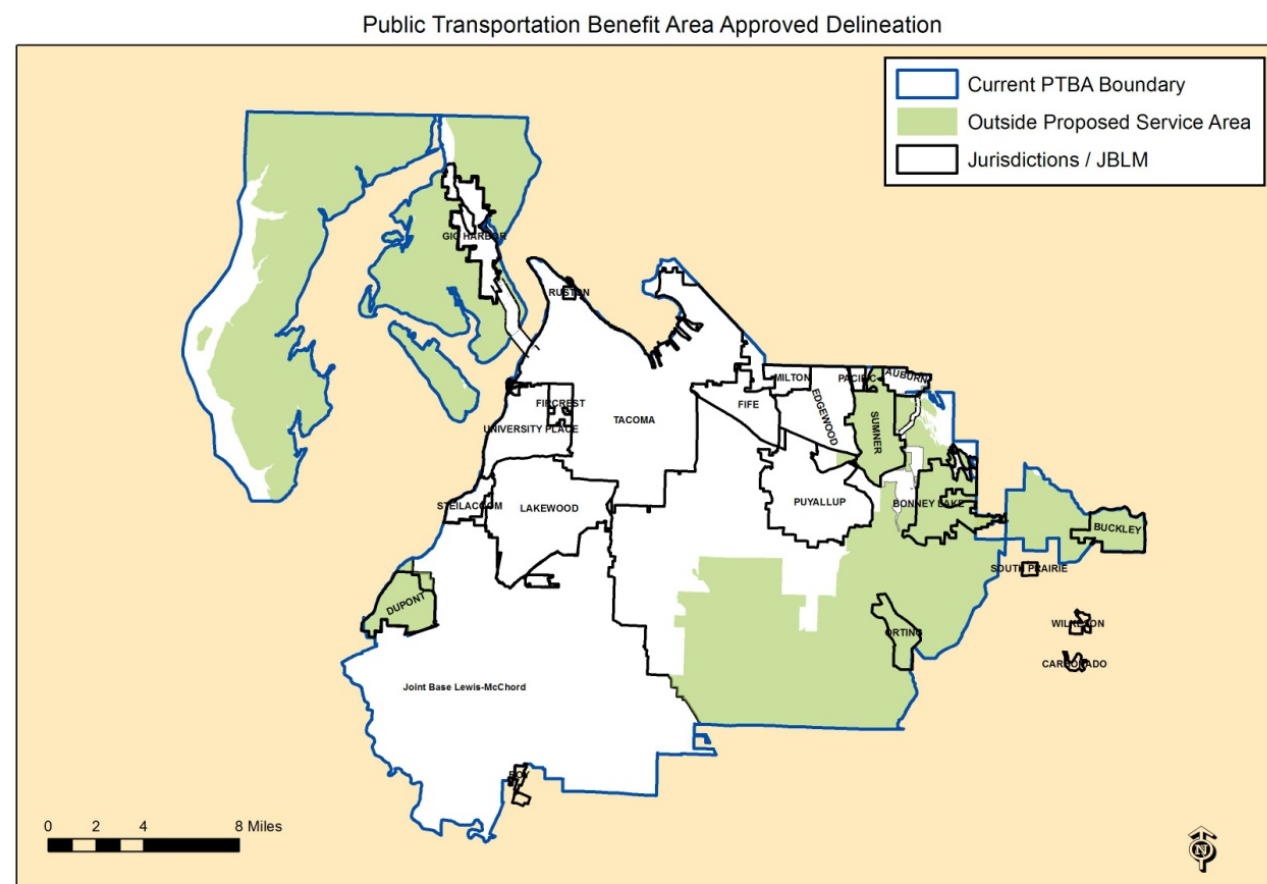
(b) By petition calling for such an election signed by at least four percent of the qualified voters residing within the area to be annexed and filed with the auditor of the county wherein the largest portion of the public transportation benefit area is located, and notice thereof shall be given to the authority. Upon receipt of such a petition, the auditor shall examine it and certify to the sufficiency of the signatures thereon.

(c) By resolution of a public transportation benefit area authority upon request of any city for annexation thereto.

(2) If the area proposed to be annexed is located within another county, the petition or resolution for annexation as set forth in subsection (1) of this section must be approved by the legislative authority of the county if the area is unincorporated or by the legislative authority of the city or town if the area is incorporated. Any annexation under this subsection must involve contiguous areas.

(3) The resolution or petition shall describe the boundaries of the area to be annexed. It shall require that there also be submitted to the electorate of the territory sought to be annexed a proposition authorizing the inclusion of the area within the public transportation benefit area and authorizing the imposition of such taxes authorized by law to be collected by the authority.

[1991 c 318 § 17; 1983 c 65 § 5; 1975 1st ex.s. c 270 § 24.]



Approved by Conference March 8, 2012

This map was developed by Pierce Transit by request of the Public Transportation Improvement Conference. It is provided for reference only and is not intended to show map scale accuracy or all inclusive map features.

The Pierce County Council had 30 days from the passage of the approved delineation to object to the map. April 9, 2012 was the County Council's deadline for objection; no action was taken by the County.

APPENDIX E. Future Service Hour Scenarios

Appendix E - Pierce Transit Annual Service Hours: 2004-2015 (Plus 2016 Estimate)			
Actual Year	Service Hours	Hours Differential	Percent Change
2004	603,454	-	-
2005	580,073	(23,381)	-3.9%
2006	601,655	21,582	3.7%
2007	629,591	27,936	4.6%
2008	660,657	31,066	4.9%
2009	642,555	(18,102)	-2.7%
2010	618,566	(23,989)	-3.7%
2011	498,856	(119,710)	-19.4%
2012	416,746	(82,110)	-16.5%
2013	416,911	165	0.0%
2014	427,716	10,805	2.6%
2015	442,542	14,826	3.5%

Initial 8-Year Average:
604,426 Service Hours

Previous 4-Year Average:
425,979 Service Hours

Various Growth Scenarios for Long Range Planning/Designing Future Transit Network/PSRC Modeling

Using 2014 as Base Year	Pierce Transit Budgeted		PSRC Constrained		Pierce Transit Destination 2040 Unconstrained	
	At No Growth <i>Current (Baseline)</i>	At 2.0% Annual Growth <i>Incremental (Per T2040)</i>	At 2.5% Annual Growth <i>Rapid (Baseline Plus)</i>	At 2.75% Annual Growth	At 3.0% Annual Growth <i>Aspirational (Vision)</i>	Scenario ID No.
Horizon Year	Service Hours	Service Hours	Service Hours	Service Hours	Service Hours	Service Hours
2016	454,000	451,393	453,606	454,712	455,818	455,818
2017		460,421	464,946	467,216	469,493	469,493
2018		469,629	476,569	480,065	483,578	483,578
2019		479,022	488,484	493,267	498,085	498,085
2020		488,602	500,696	506,832	513,027	513,027
2021		498,374	513,213	520,769	528,418	528,418
2022		508,342	526,043	535,091	544,271	544,271
2023		518,508	539,194	549,806	560,599	560,599
2024		528,879	552,674	564,925	577,417	577,417
2025		539,456	566,491	580,461	594,739	594,739
2026		550,245	580,653	596,423	612,582	612,582
2027		561,250	595,170	610,049	629,678	629,678
2028		572,475	610,049	625,300	646,994	646,994
2029		583,925	625,300	640,933	664,786	669,384
2030		595,603	607,515	656,956	683,068	710,150
2031		619,666	619,666	673,380	701,852	731,454
2032		632,059	632,059	690,214	721,153	753,398
2033		644,700	644,700	707,470	740,985	776,000
2034		657,594	657,594	725,157	761,362	799,280
2035		670,746	670,746	743,286	782,299	823,258
2036		684,161	684,161	761,868	803,813	847,956
2037		697,844	697,844	780,914	825,917	873,395
2038		711,801	711,801	800,437	848,630	899,597
2039		726,037	726,037	820,448	871,967	926,585
Starting Hours	442,542	442,542	442,542	442,542	442,542	442,542
Ending Hours	454,000	726,788	821,297	872,870	927,544	927,544
Difference	11,458	284,246	378,755	430,328	485,002	485,002
Total Growth	0.0%	64.2%	85.6%	97.2%	109.6%	109.6%

Future Scenario Names and Definitions

- ① **Core Service Only Scenario** (Baseline Minus): Identifies which routes would be reduced or discontinued entirely if local revenues, state funding, and/or federal funding were temporarily suspended or dramatically cut. Also known as the "worst case scenario." Still fiscally constrained but immediately reduced by 30% to approximately 300,000 annual service hours. (Note: Scenario not depicted in the service hours matrix above.)
- ② **Baseline** (Current Conditions): Per the 2015 budget and six-year plan, no growth in service hours is forecasted beyond 454,000 in 2016. Could also be considered a "No Action" scenario.
- ③ **Incremental Growth Scenario** (Per Transportation 2040): Identifies 6-year TIP capital project candidates and agency priorities (2015-2020) plus 10-year/Mid-Term Implementation Strategies (2020-2030). Per the PSRC's Transportation 2040 goals, fiscally constrained to grow at 2.0% annually to target approximately 600,000 service hours by 2030, increasing to over 725,000 by 2040.
- ④ **Rapid Growth Scenario** (Baseline Plus): Based on maintaining or upgrading the assets and facilities we have today, while still returning to the agency's historically highest levels of service/service hours whenever feasible. Targets approximately 650,000 annual service hours by 2030 and over 820,000 by 2040 at 2.5% average annual growth.
- ⑤ **Aspirational Growth Scenario** (The Vision): Based on high growth in transit service hours, expanded or new routes, and unlimited or non-constrained funding availability. Identifies long-term agency priorities in years 11 thru 25 (Horizon Years 2025-2040). Also known as "The Vision" with growth at 3.0% annually and targeting almost 700,000 annual service hours by 2030 and over 925,000 by 2040.

APPENDIX F. Existing and Future Fixed Route Origins, Destinations, and Frequencies

Appendix F - Pierce Transit - Destination 2040 Long Range Plan - Existing & Proposed Future Fixed Route Origins, Destinations, and Frequencies

Existing Route	Proposed Route	PT Fixed Route Service Type	PSRC Fixed Route Service Type	Name	Origin	Destination	Weekday AM Peak Period Frequencies (Headways) by Scenario					Aspirational Growth (The Vision) - Beyond the PTBA
							⑥ Core Only (Baseline Minus)	① Current Conditions (Baseline)	② Incremental Growth (per Transportation 2040)	③ Rapid Growth (Baseline Plus)	④A Aspirational Growth (The Vision) - Within the PTBA	
1		Trunk	Core	6th Avenue-Pacific Avenue	Tacoma Community College	Mountain Hwy (SR 7) at 8th Avenue E - Walmart	20	15	15	10	30	30
2	1L	Limited	Core	6th Avenue-Pacific Avenue	Tacoma Community College	Mountain Hwy (SR 7) at 8th Avenue E - Walmart					15	15
	2L	Limited	Core	S. 19th Street-Bridgeport Way	Downtown Tacoma	Lakewood Transit Center	30	20	15	15	30	30
3		Trunk	Core	Lakewood-Downtown Tacoma	Downtown Tacoma	Lakewood Transit Center					15	15
4		Trunk	Core	Lakewood-Puyallup	Lakewood Transit Center	Lakewood Transit Center	30	30	20	20	15	15
10		Urban	Community Connector	Pearl Street	Tacoma Community College Transit Center	Point Defiance	60	30	30	30		
11		Urban	Community Connector	Point Defiance	Downtown Tacoma	Point Defiance		60	30	20	30	30
13		Urban	Community Connector	N. 30th Street	Tacoma Dome Station	Proctor		60	30	20		
14		Urban	Community Connector	Proctor District	Proctor	Downtown Tacoma (Commerce Street)		60	30	30	30	30
15		Express	Specialized	Point Defiance Express	Point Defiance	Point Defiance					30	30
16		Urban	Core	Downtown Tacoma-Tacoma Community College	Tacoma Dome Station	Tacoma Community College Transit Center	60	60	30	20	15	15
28		Urban	Community Connector	S. 12th Street	Downtown Tacoma	Tacoma Community College Transit Center		60	30	30		
41		Urban	Community Connector	Portland Avenue	Downtown Tacoma (Commerce Street)	72nd Street Transit Center	60	30	30	20	30	30
42		Urban	Community Connector	McKinley Avenue	Downtown Tacoma (Commerce Street)	72nd Street Transit Center		60	30	30	30	30
45		Urban	Community Connector	Yakima Avenue	Downtown Tacoma	Parkland Transit Center		60	30	30	30	30
48		Urban	Core	Sheridan-S. M Street	Downtown Tacoma	Lakewood Transit Center	60	30	30	20	15	15
51		Urban	Community Connector	Union Avenue	Proctor District	Lakewood Transit Center		60	30	30	20	20
52		Urban	Core	Tacoma Community College - Tacoma Mall	Tacoma Community College Transit Center	Tacoma Mall Transit Center	60	30	30	30	20	20
53		Urban	Community Connector	University Place-Tacoma Mall	University Place	Tacoma Mall Transit Center	60	60	30	30	30	30
54		Urban	Core	38th Street	Tacoma Mall Transit Center	E. 56th Street and Portland Avenue		60	30	30	20	20
55		Urban	Community Connector	Tacoma Mall - Parkland	Tacoma Mall Transit Center	Parkland Transit Center	60	30	30	30		
56		Urban	Community Connector	56th Street	Tacoma Mall Transit Center	72nd Street Transit Center		60	30	30		
57		Urban	Community Connector	Tacoma Mall	Downtown Tacoma (Commerce Street)	Tacoma Mall Transit Center	30	30	30	20		
58		Urban	Community Connector	Proctor - Tacoma Mall	Proctor District	Tacoma Mall Transit Center					30	30
59		Urban	Community Connector	University Place-Downtown Tacoma	University Place	Downtown Tacoma (Commerce Street)					30	30
62		Suburban	Community Connector	Northwest Tacoma	Northwest Tacoma	Pacific Highway and S. 348th Street		60	60	60	60	60
100		Suburban	Community Connector	Gig Harbor	Tacoma Community College Transit Center	Purdy Park & Ride	60	60	30	30	30	30
101		Seasonal	Community Connector	Gig Harbor Trolley	Historic Downtown Waterfront District	Uptown Shopping District						
102		Express	Specialized	Gig Harbor-Tacoma Express	Purdy Park & Ride/Kimball Drive Park & Ride	Downtown Tacoma		30	30	30	30	30
103		Suburban	Community Connector	West Gig Harbor	Olympic Village	Borgen Boulevard					30	60
202		Urban	Community Connector	72nd Street	72nd Street Transit Center	Lakewood Transit Center	30	30	30	30	20	20
206	206A	Urban	Community Connector	Pacific Highway-Tillicum-Madigan Hospital	Lakewood Transit Center	Tillicum/Madigan Hospital (JBLM)	45	30	20	20	30	30
206B*		Suburban	Community Connector	DuPont-Lakewood via Madigan-Tillicum	Lakewood Transit Center	DuPont						60
210		Urban	Community Connector	Point Defiance-Lakewood Transit Center	Point Defiance Ferry Terminal	Lakewood Transit Center					30	30
212		Urban	Community Connector	Stellacoom	Pierce College at Fort Steilacoom	Lakewood Transit Center	30	30	20	20	30	30
214		Urban	Community Connector	Washington	Pierce College at Fort Steilacoom	Lakewood Transit Center	30	30	30	30	30	30
240		Suburban	Community Connector	Lakewood-Orting	Lakewood Transit Center	Orting						60
300		Trunk	Core	South Tacoma Way	Tacoma Mall	McChord Commissary	60	30	20	20	15	15
400		Express	Community Connector	Puyallup to Downtown Tacoma	Downtown Tacoma	South Hill Mall Transit Center	30	30	30	20	20	20
402		Trunk	Core	Meridian	Federal Way Transit Center	171st Street and S. Meridian Avenue (WA 161)	60	60	20	20	10	10
403		Suburban	Community Connector	South Hill-Bonney Lake	South Hill	Bonney Lake						60
404		Suburban	Community Connector	South Hill-Frederickson	South Hill Mall (Puyallup)	Frederickson Manufacturing/Industrial Center					30	30
409		Suburban	Community Connector	Puyallup-72nd Street Transit Center	72nd Street Transit Center	29th Street NE and 5th Avenue NE (Puyallup)		60	30	30	30	30
425		Suburban	Specialized	Puyallup Community Connector	South Hill Mall (Loop)	Downtown Puyallup		60	30	30	30	30
491		Suburban	Community Connector	Puyallup Souder Station	Puyallup Souder Station	South Hill Mall Transit Center					30	60
495		Urban	Community Connector	Puyallup Souder Station	Puyallup Souder Station	South Hill Mall Transit Center		30	30	30	30	30
496		Suburban	Community Connector	Puyallup - Frederickson	Puyallup	Frederickson Manufacturing/Industrial Center						60
497		Suburban	Community Connector	Lakeland Hills	Lakeland Hills	Auburn Souder Station		30	30	30		
498		Suburban	Community Connector	Fife-Auburn	Fife LRT Station (Emerald Queen Casino area)	Auburn Souder Station						30
499		Suburban	Community Connector	Fife-Frederickson	Fife LRT Station (Emerald Queen Casino area)	Frederickson Manufacturing/Industrial Center						60
500		Trunk	Core	Federal Way	Downtown Tacoma	Federal Way Transit Center	60	60	20	20	15	15
501		Urban	Community Connector	Milton-Federal Way	Downtown Tacoma	Federal Way Transit Center via Milton	60	60	30	30		

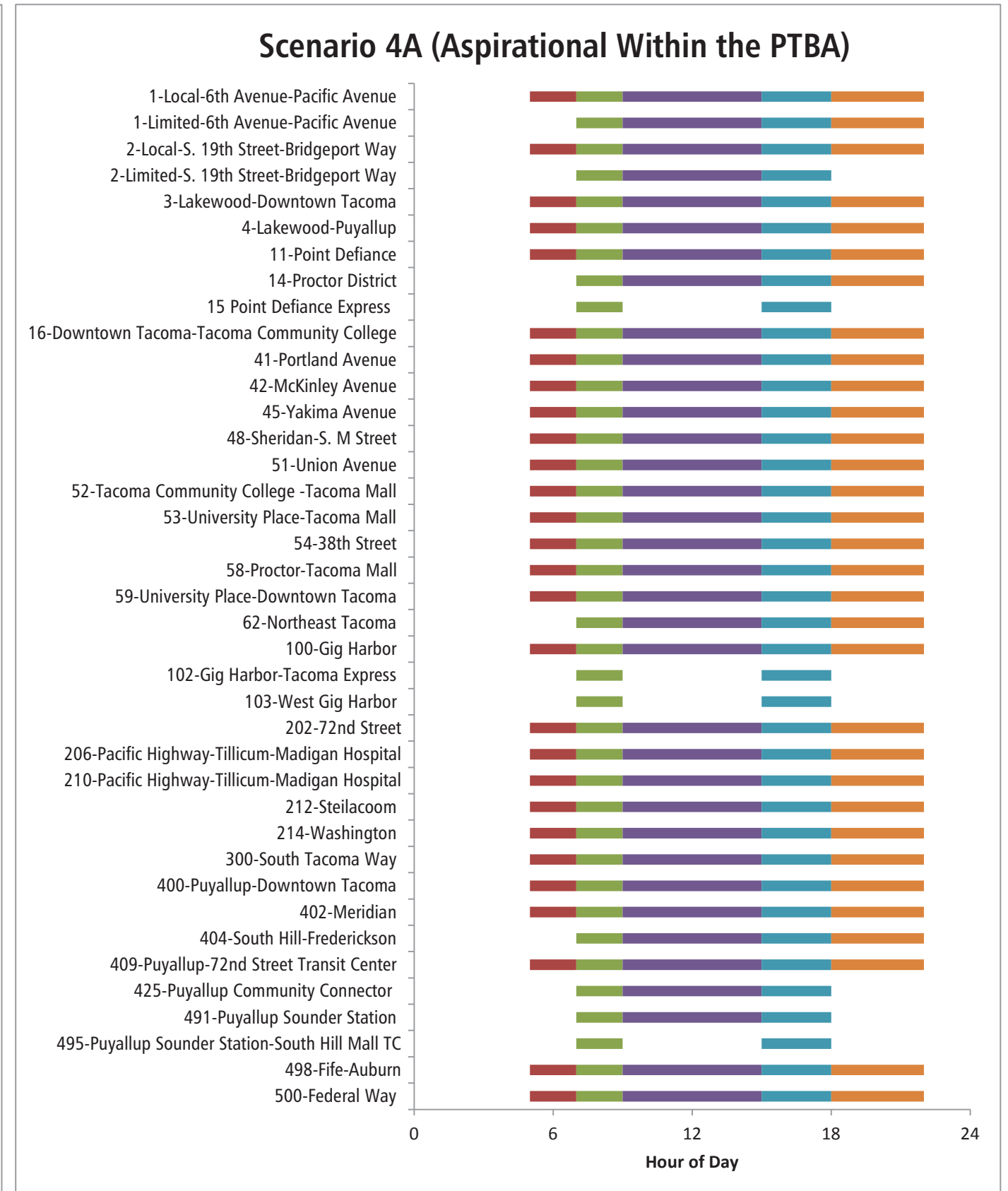
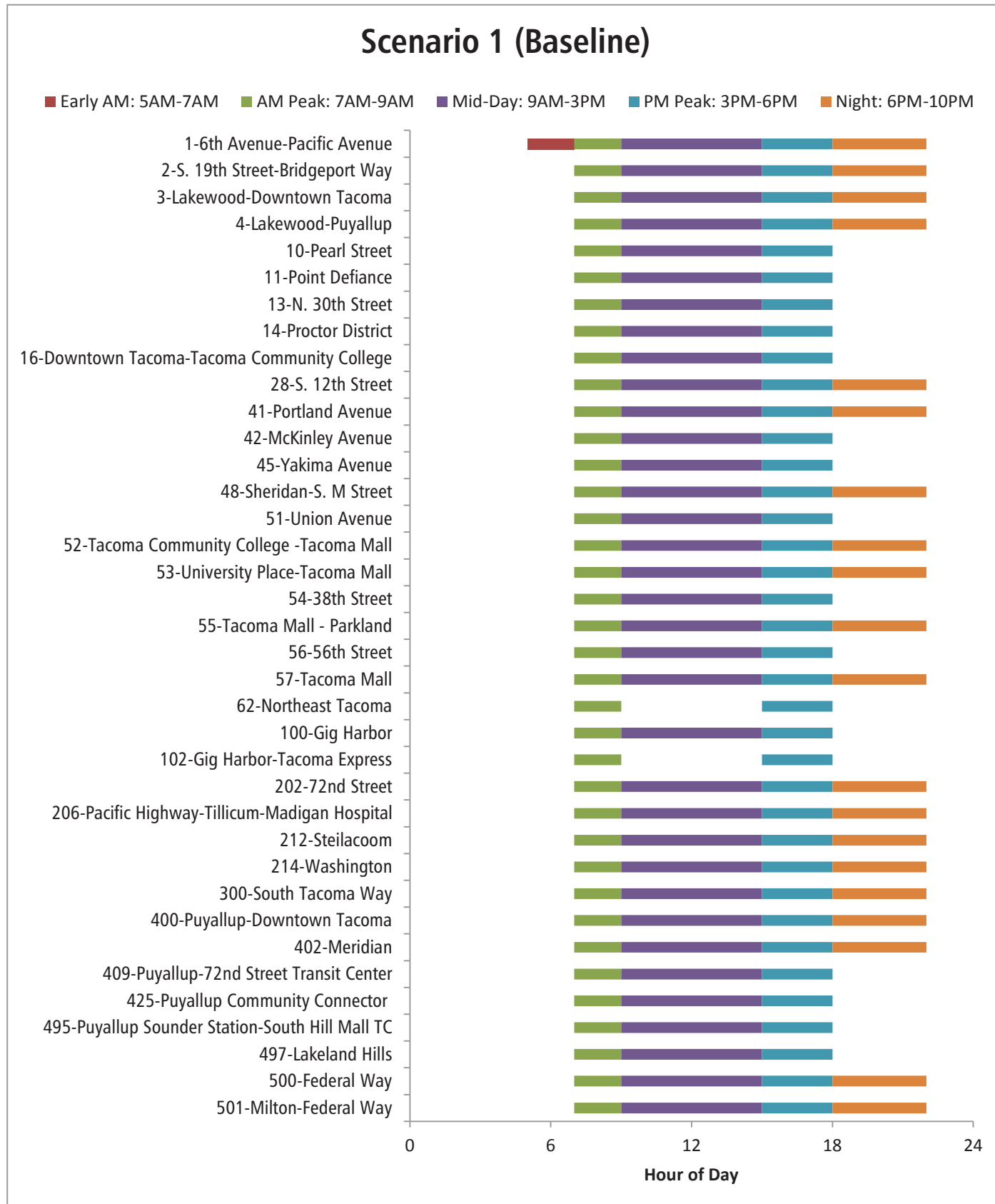
Note: Some existing routes' origins or destinations could be changed in a future scenario.

*For Route 206B, half of Route 206 trips continue west of Madigan Hospital to serve DuPont.

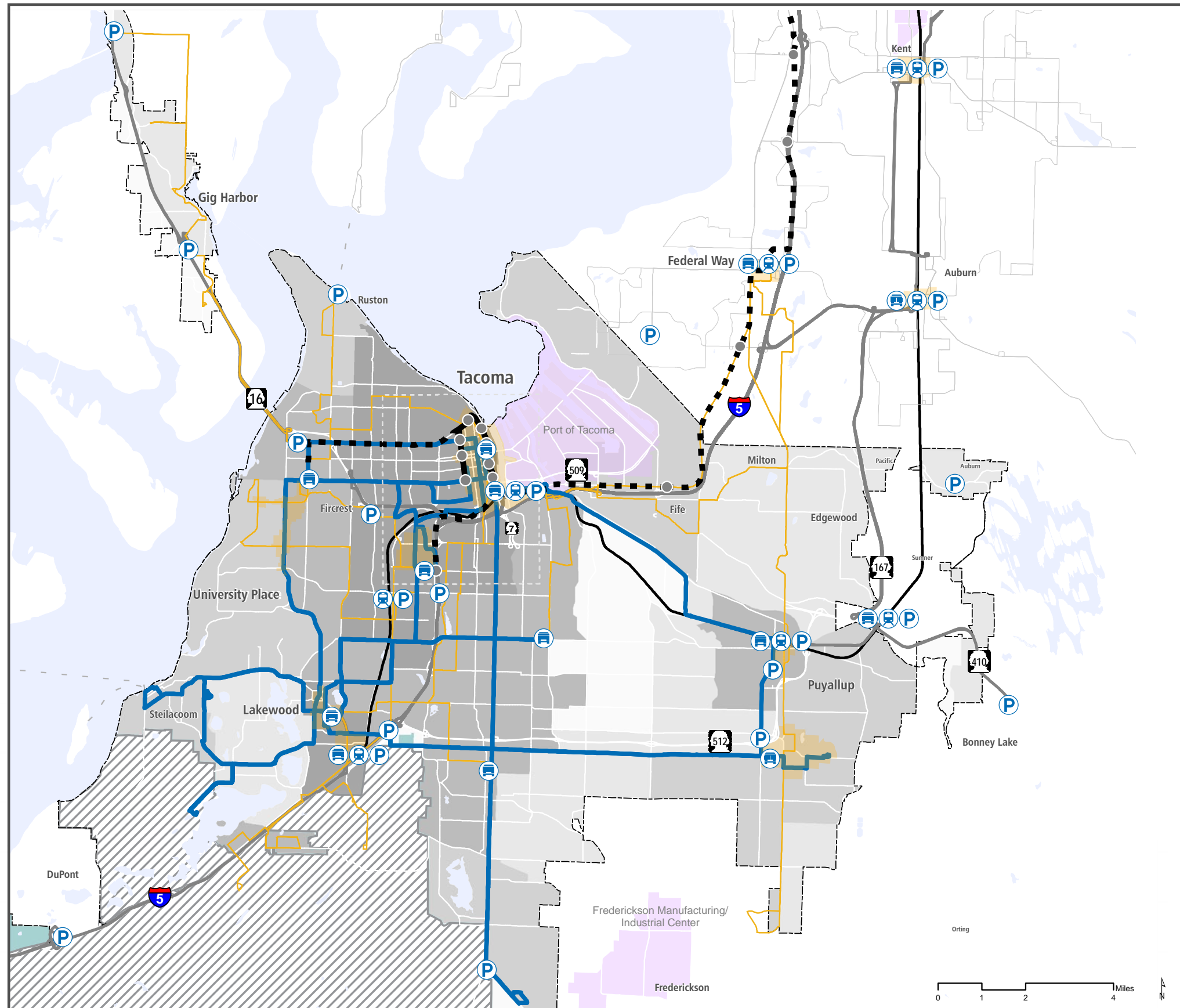
15-minute Headway	0	1	2	1	8
10-minute Headway	0	0	0	1	1
High Frequency Routes	0	1	2	2	9

APPENDIX G. Baseline and Aspirational 4A Scenario Service Spans Comparison

Approximate Weekday Service Spans by Route



APPENDIX H. Core Services Only Scenario



2040 PIERCE TRANSIT ROUTES

AM Peak Period Frequency (Minutes)

- ▬ 0 - 15
- ▬ 16 - 30
- ▬ 31 - 60
- Enhanced Bus/HCT/BRT

2040 POPULATION & EMPLOYMENT DENSITY

(Residents + Jobs) / Square Mile

- 2,000 or Fewer
- 2,001 to 4,000
- 4,001 to 6,000
- 6,001 to 8,000
- More than 8,000

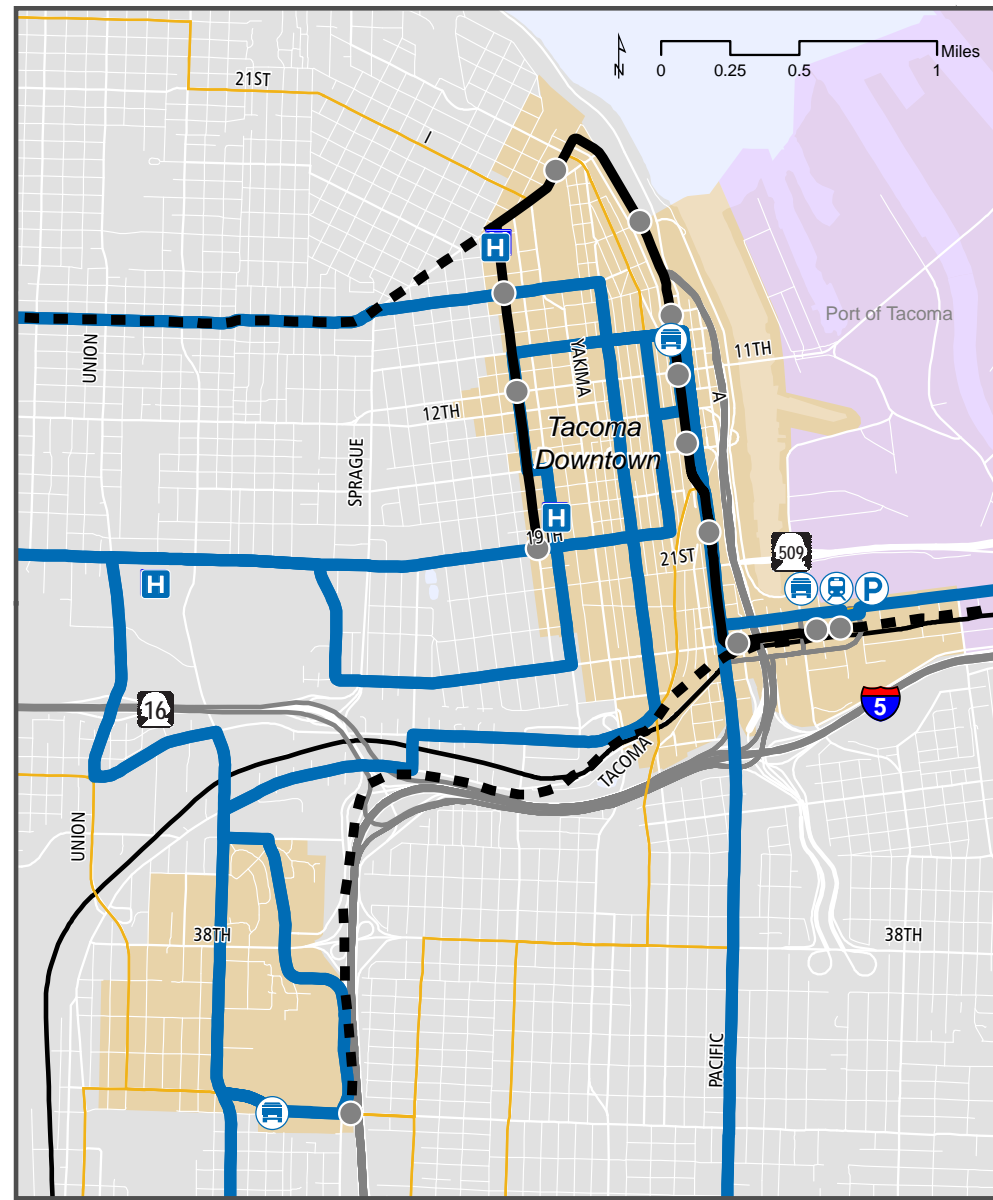
- Existing/Proposed Sound Transit Light Rail Station
- ▬ Sound Transit Light Rail
- ▬ Sound Transit Commuter Rail
- ▬ Proposed Sound Transit Light Rail
- ▬ Sound Transit Bus
- ▬ King County Metro Bus
- Public Transportation Benefit Area Boundary
- Urban Center
- Manufacturing / Industrial Center
- Hospital

Sources: Pierce Transit, Sound Transit, King County Metro, Puget Sound Regional Council, Pierce County

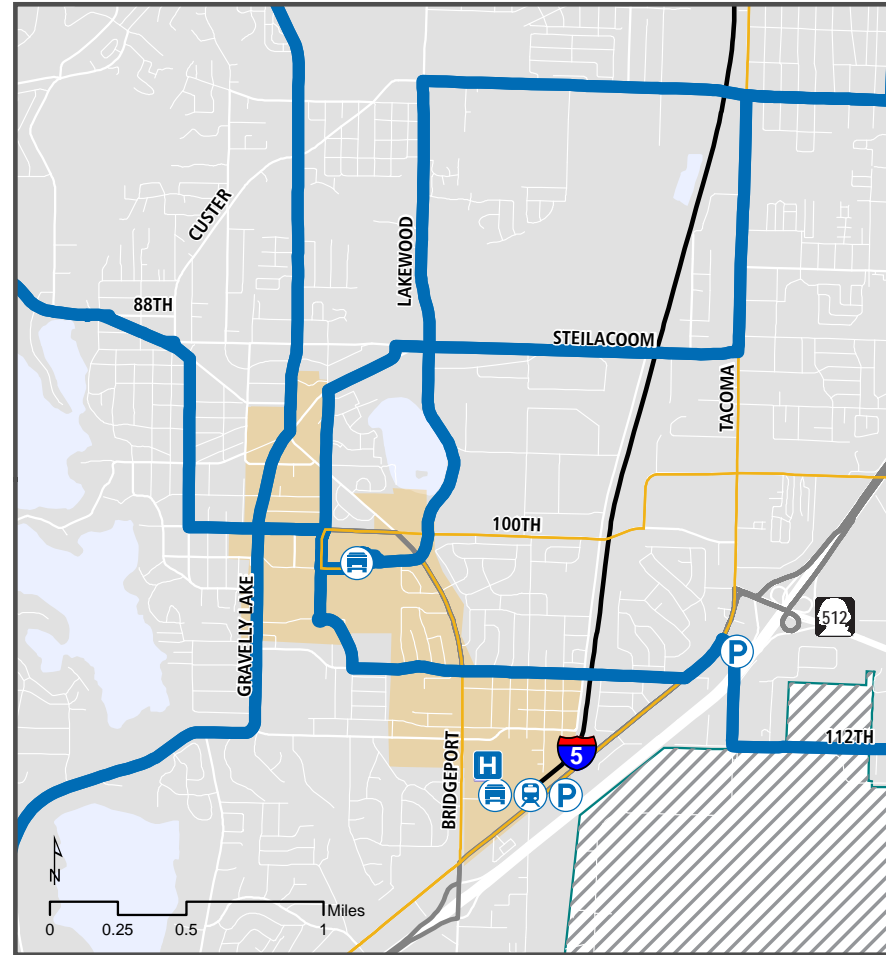
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Core Service Only Scenario
(Baseline Minus)

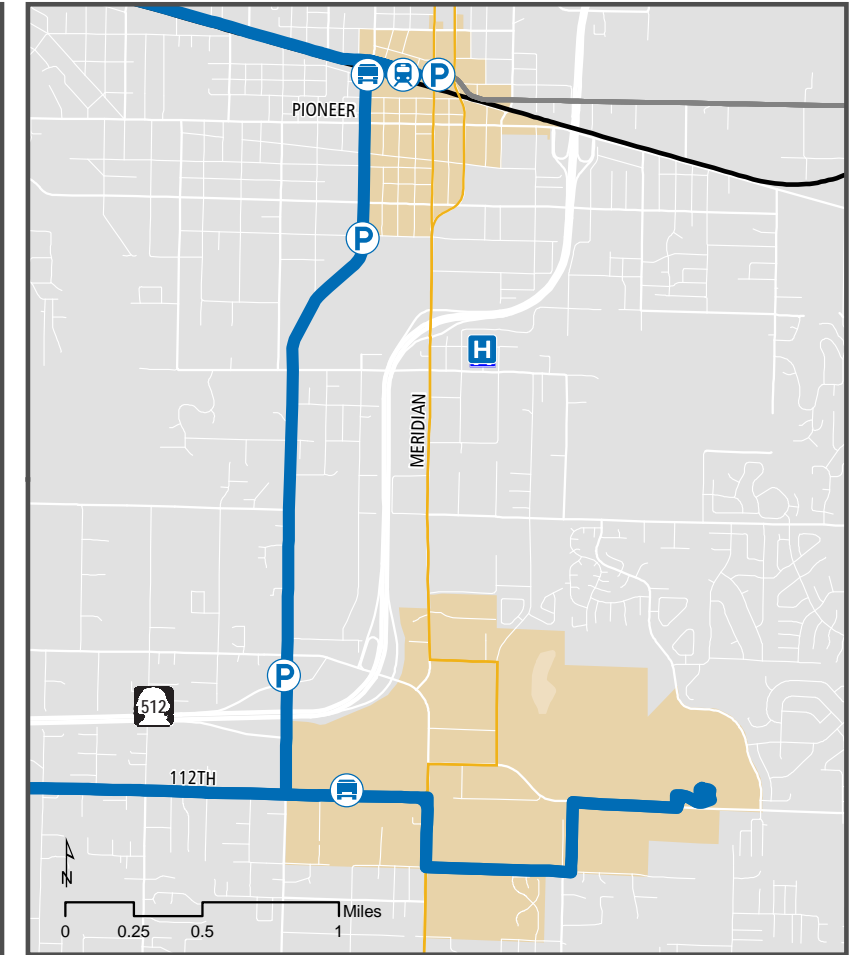
*Reduction to 300,000
Annual Service Hours*



TACOMA



LAKWOOD



PUYALLUP-SOUTH HILL

Scenario O: Core Services Only (Baseline Minus):

Identifies what routes would be reduced or discontinued entirely if local revenues, state funding, and/or federal funding were temporarily suspended or dramatically cut. A more likely implementation of this scenario would be short-term and temporary, such as a natural disaster or other unforeseen incident that forced the agency to immediately reduce services to only the core routes. Also known as the “worst case scenario.” Still fiscally constrained but immediately reduced by 30% to approximately 300,000 annual service hours.

APPENDIX I. PSRC Modeling Results & Analysis

PIERCE TRANSIT LONG RANGE PLAN

TRAVEL FORECASTING METHODOLOGY AND RESULTS

Prepared by:



October 2015

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TRAVEL FORECASTING METHODOLOGY AND RESULTS

Background

By 2040 we are expecting almost 4.9 million people and 2.9 million jobs to be located within the Central Puget Sound Region. Of this, approximately 1.1 million people and 500,000 jobs are forecasted for Pierce County, 20 percent of the region's total people and jobs. These residents are forecasted to take over 22 million trips per day in 2040 with almost 5 million of those daily trips occurring in Pierce County. To accommodate this growth and still maintain the region's environment and quality of life, a robust transportation system with a variety of travel options is necessary. Pierce Transit's Long Range Plan is focused on delivering the transit component of this vision for the people of Pierce County.

Travel Demand Forecasting Model

The travel forecasting tool used for the Pierce Transit Long Range Plan is PSRC's 4K Travel Demand Model Version 4.0.3. Documentation and validation of this model platform is available at <http://www.psrc.org/data/models/trip-based-travel-model/>. PSRC's 4K Travel Demand model is a state of the practice trip based model. The main steps of the model are described briefly below.

Trip Generation

The trip generation model is the first of the four primary model components identified in the four-step modeling process. The trip generation model estimates the number of trips produced and attracted to each of the zones in the model system. The trips produced are estimated from households and their socioeconomic characteristics. The trips attracted are estimated from employment categorized by type.

Trip Distribution

The trip distribution model is the second of the four primary model components identified as part of the four-step modeling process. The trip distribution models estimate the number of trips from each zone to each other zone. The trips are estimated as a function of the travel time and cost from one zone to another.

Mode Choice

The mode choice model is the third stage of the four-step travel demand modeling process. Trips from the trip generation model are linked in trip distribution, creating zone-to-zone person-trip movements. These trips are then apportioned to the available travel modes through the application of the mode choice model. Mode choice models are used in the analysis of policy-oriented transportation planning scenarios and in examining the effects of various policy measures. A wide range of transportation policies can be evaluated through the application of the behavioral-based mode choice models.

Trip Assignment

The trip assignment model is the last of the four primary model components identified as part of the four-step modeling process. The trip assignment model estimates the volume on each link in the transportation system for both highway and transit modes. In addition, the trip assignment model generates specific performance measures, such as the congested speed or travel time on a highway link or the boardings and alightings on a transit route. Trip assignment is performed separately for each mode (auto and transit) and time period (am peak, midday, pm peak, evening, and night).

TRAVEL FORECASTING METHODOLOGY AND RESULTS

Transportation Network Assumptions

Transportation project assumptions are based on the Transportation 2040 Adopted Plan. Key transportation projects that are assumed in Transportation 2040 include:

- Sound Transit Link Light Rail between Tacoma and Everett
- SR 167 and SR 509 Gateway Program
- I-5 JBLM Corridor Improvements
- I-5 Tacoma Area HOV Improvements
- Transit Service Hour increases of 2% per year for all operators other than Pierce Transit

Transportation 2040 also assumes dynamic tolling of all freeway lanes by the year 2040. Tolling assumptions work to both provide financing for transportation investments as well as to reduce greenhouse gas emissions. For a full project list, please visit:

<http://www.psrc.org/transportation/t2040/projects-and-approval/>

In addition to the projects assumed in Transportation 2040, the Pierce Transit Long Range Plan analysis was run assuming an extension of light rail to Tacoma Mall. This assumption was made to be consistent with current project assumptions in Sound Transit 3.

Land Use Assumptions

The Land Use assumptions for this modeling effort are based on the "Land Use Vision Data Release 0.0" from May of 2015. This set of land use forecasts is the basis for the modeling for the Transportation Futures work program and is consistent with the region's long range policy goals as contained in "Vision 2040." As shown below, the region is expected to add approximately 1.2 million people by 2040 and almost 1.1 million jobs.

Demographic	2010	2040	Percent Increase
People	3,690,900	4,872,400	32%
Households	1,454,700	2,102,400	45%
Jobs	1,865,400	2,983,000	60%

TRAVEL FORECASTING METHODOLOGY AND RESULTS

Scenarios

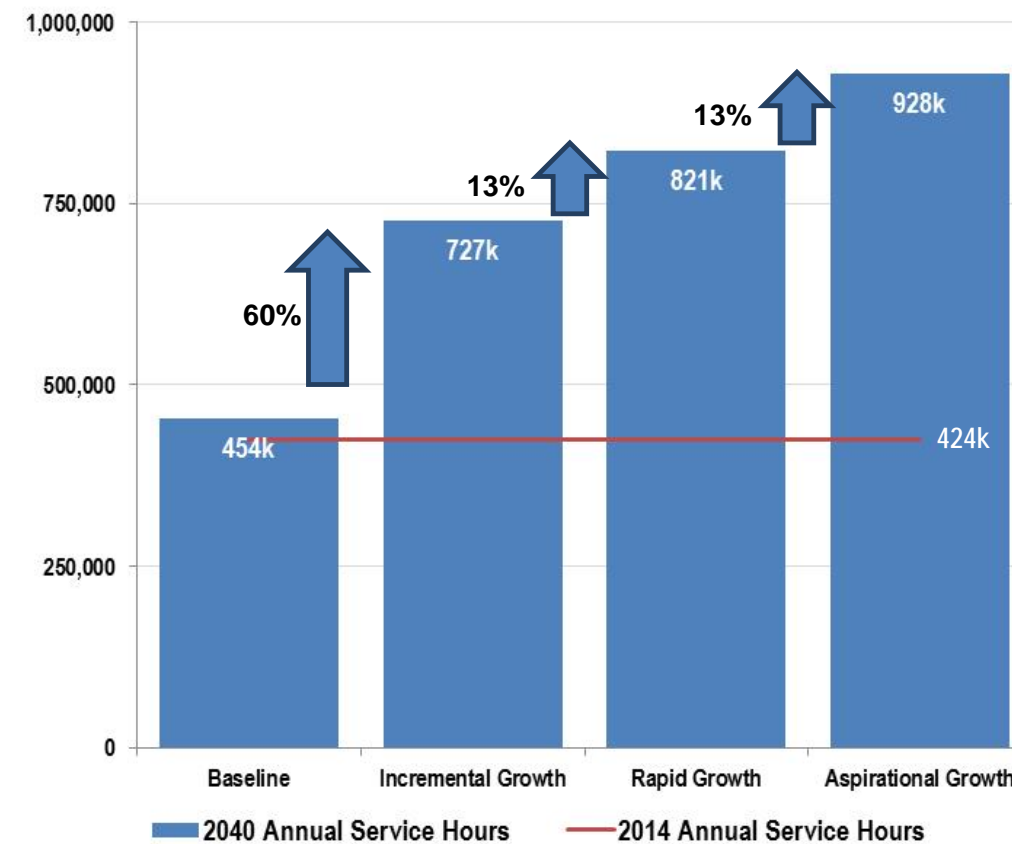
Four (4) different scenarios (including a baseline) were run through the region’s travel demand model to estimate the overall level of ridership potential of each scenario. The scenarios include:

- **Baseline** – 2014 existing route structure with minor changes in headways
- **Incremental Growth Scenario** – Based on 6-year TIP capital project candidates and agency priorities (2015-2020) plus 10-year/Mid-Term Implementation Strategies (2020-2030).
- **Rapid Growth Scenario** – Based on maintaining or upgrading the assets and facilities Pierce Transit has today, while still returning to the agency’s historically highest levels of service/service hours whenever feasible.
- **Aspirational Growth Scenario**– Based on high growth in transit service hours, expanded or new routes, and unlimited or non-constrained funding availability. Identifies long-term agency priorities in years 11 thru 25 (Horizon Years 2025-2040).

TRAVEL FORECASTING METHODOLOGY AND RESULTS

Service Hours by Scenario

The service hours provided by scenario for all Pierce Transit Routes are shown below. In 2014, there averaged approximately 424k annual service for all Pierce Transit Routes. By 2040 this is expected to grow to over 454k hours in the baseline scenario. Each scenario added more service with the largest amount included in the Aspirational Growth Scenario. In this scenario, the total service hours doubled over the Baseline.



The peak and midday headways assumed for each route by scenario in the Pierce Transit Long Range Plan are shown in the table below. The number of routes is constant between the Baseline, Incremental Growth and Rapid Growth scenarios with the differences being in the frequency of the service being provided for each route. The Aspirational Growth Scenario includes frequency changes as well as route additions and changes over the Baseline scenario.

TRAVEL FORECASTING METHODOLOGY AND RESULTS

Route	Baseline Scenario		Incremental Growth Scenario		Rapid Growth Scenario		Aspirational Growth Scenario	
	AM Peak Headways	Midday Headways	AM Peak Headways	Midday Headways	AM Peak Headways	Midday Headways	AM Peak Headways	Midday Headways
1	15	20	15	15	10	15	30	30
1L	-	-	-	-	-	-	15	30
2	20	30	15	20	15	20	30	30
2L	-	-	-	-	-	-	15	30
3	30	30	20	30	20	30	15	20
4	30	30	20	30	20	30	15	20
10	30	60	30	30	30	30	-	-
11	60	60	30	30	20	30	30	30
13	60	60	30	60	25	30	-	-
14	60	60	30	60	30	30	30	30
15	-	-	-	-	-	-	30	-
16	60	60	30	30	20	30	15	30
28	60	60	30	30	30	30	-	-
41	30	60	30	30	20	30	30	30
42	60	60	30	30	30	30	30	30
45	60	60	30	30	30	30	30	30
48	30	60	30	30	20	30	15	30
51	60	60	30	30	30	30	20	30
52	30	60	30	30	30	30	20	30
53	60	60	30	30	30	30	30	30
54	60	60	30	30	30	30	20	30
55	30	30	30	30	30	30	-	-
56	60	60	30	30	30	30	-	-
57	30	30	30	30	20	30	-	-
58	-	-	-	-	-	-	30	30
59	-	-	-	-	-	-	30	30
62	60	-	60	-	60	-	30	60
100	60	60	30	30	30	30	30	30
102	30	-	30	-	30	-	30	-
103	-	-	-	-	-	-	30	-
202	30	30	30	30	30	30	20	30
206	30	45	20	30	20	30	30	30
210	-	-	-	-	-	-	30	30
212	30	30	20	30	20	30	30	30
214	30	30	30	30	30	30	30	60
300	30	30	20	30	20	30	15	20
400	30	60	30	30	20	30	20	20
402	60	60	20	30	20	30	10	15
404	-	-	-	-	-	-	30	60
409	60	60	30	30	30	30	30	60
425	60	60	30	30	30	30	30	60
491	-	-	-	-	-	-	30	60
496	-	-	-	-	-	-	-	-
497	30	-	30	-	30	-	-	-
498	-	-	-	-	-	-	30	60
500	60	60	20	30	20	30	15	20
501	60	90	30	30	30	30	-	-

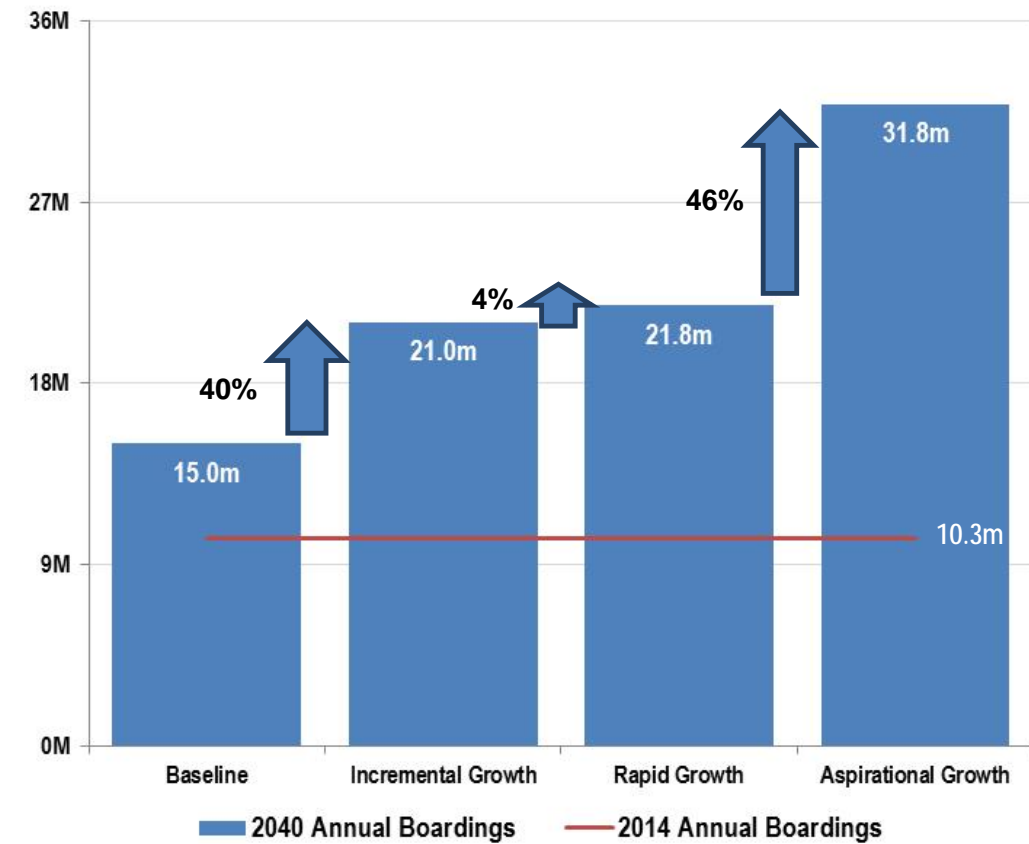
Note: Bold Routes are new routes

TRAVEL FORECASTING METHODOLOGY AND RESULTS

Boardings by Scenario

The figure below shows the total annual boardings by scenario for all Pierce Transit Routes. The Aspirational Growth Scenario more than doubled the 2040 Baseline Scenario and is more than three times the 2014 Annual Boardings of 10.3 million.

The frequency increase between the Baseline and Incremental Growth Scenario resulted in a 40% increase in annual boardings. The difference between the Incremental Growth and Rapid Growth scenarios was noticeably smaller. The main reason for the modest change between the Incremental Growth and Rapid Growth scenarios is the fairly small changes in frequency on multiple routes that the travel demand forecasting model did not pick up as significantly as it did between the Baseline and Incremental Growth Scenarios.



Route level daily boardings by scenario are provided in the table below.

TRAVEL FORECASTING METHODOLOGY AND RESULTS

Route	Daily Boardings for Horizon Year 2040			
	Baseline Scenario	Incremental Growth Scenario	Rapid Growth Scenario	Aspirational Growth Scenario
1	8,900	9,500	10,400	4,500
1L	-	-	-	10,800
2	3,900	4,700	4,700	3,400
2L	-	-	-	5,800
3	3,500	4,100	3,900	5,000
4	4,400	4,900	5,000	8,700
10	800	1,100	1,000	-
11	700	1,300	1,500	1,300
13	300	600	900	-
14	200	500	600	1,100
15	-	-	-	400
16	600	1,400	1,500	3,800
28	100	300	300	-
41	1,200	1,700	2,300	2,400
42	400	1,100	800	1,100
45	100	600	500	700
48	1,200	1,500	2,000	2,600
51	1,200	2,000	2,000	3,100
52	800	1,200	1,100	1,400
53	1,500	3,200	3,200	2,300
54	300	600	700	1,600
55	1,000	1,200	1,100	-
56	400	1,100	1,100	-
57	1,100	1,100	1,600	-
58	-	-	-	700
59	-	-	-	1,100
62	300	700	700	1,000
100	1,000	1,500	1,500	2,200
102	800	900	900	1,000
103	-	-	-	300
202	1,700	1,400	1,400	2,100
206	1,100	1,400	1,400	1,400
210	-	-	-	2,800
212	1,600	1,900	2,000	2,000
214	1,100	1,200	1,200	1,100
300	2,200	2,900	2,900	5,100
400	1,700	1,600	2,000	3,200
402	2,400	5,000	5,000	11,200
404	-	-	-	1,200
409	500	900	900	1,400
425	500	800	800	1,200
491	-	-	-	500
496	-	-	-	-
497	100	200	200	-
498	-	-	-	1,200
500	900	3,200	3,300	5,900
501	1,400	2,900	3,000	-
Total	49,900	70,200	73,400	106,600

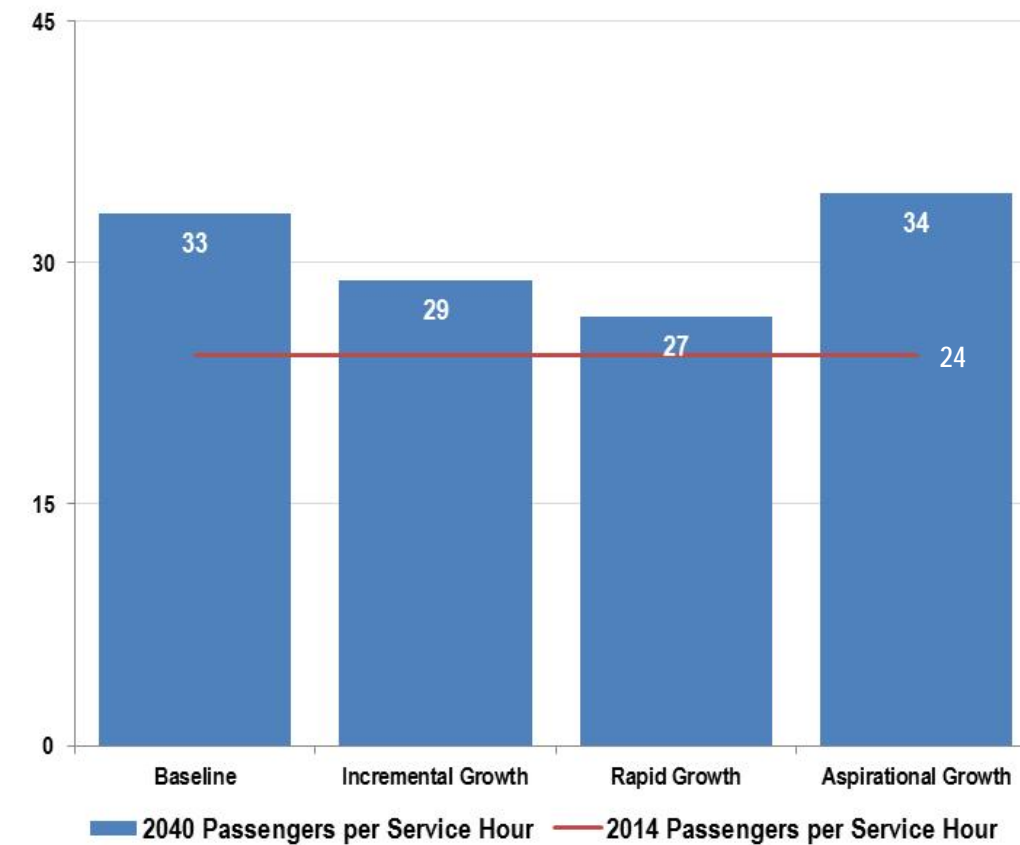
Note: Bold Routes are new routes

TRAVEL FORECASTING METHODOLOGY AND RESULTS

Passengers per Service Hour by Scenario

The figure below shows the total passengers per service hour provided by scenario for all Pierce Transit Routes. The Aspirational Growth Scenario has the highest overall ridership of all the scenarios tested but it also shows the greatest number of passengers per service hour provided as well. All scenarios tested carry more people per hour than the existing system.

The 1 and 2 Limited in the Aspirational Growth Scenario carry the highest number of passengers per hour provided than any route in all scenarios. This high level of efficiency shows the strength of these particular routes for BRT type service in the travel demand model.



Route level passengers per service hour by scenario are provided in the table below.

TRAVEL FORECASTING METHODOLOGY AND RESULTS

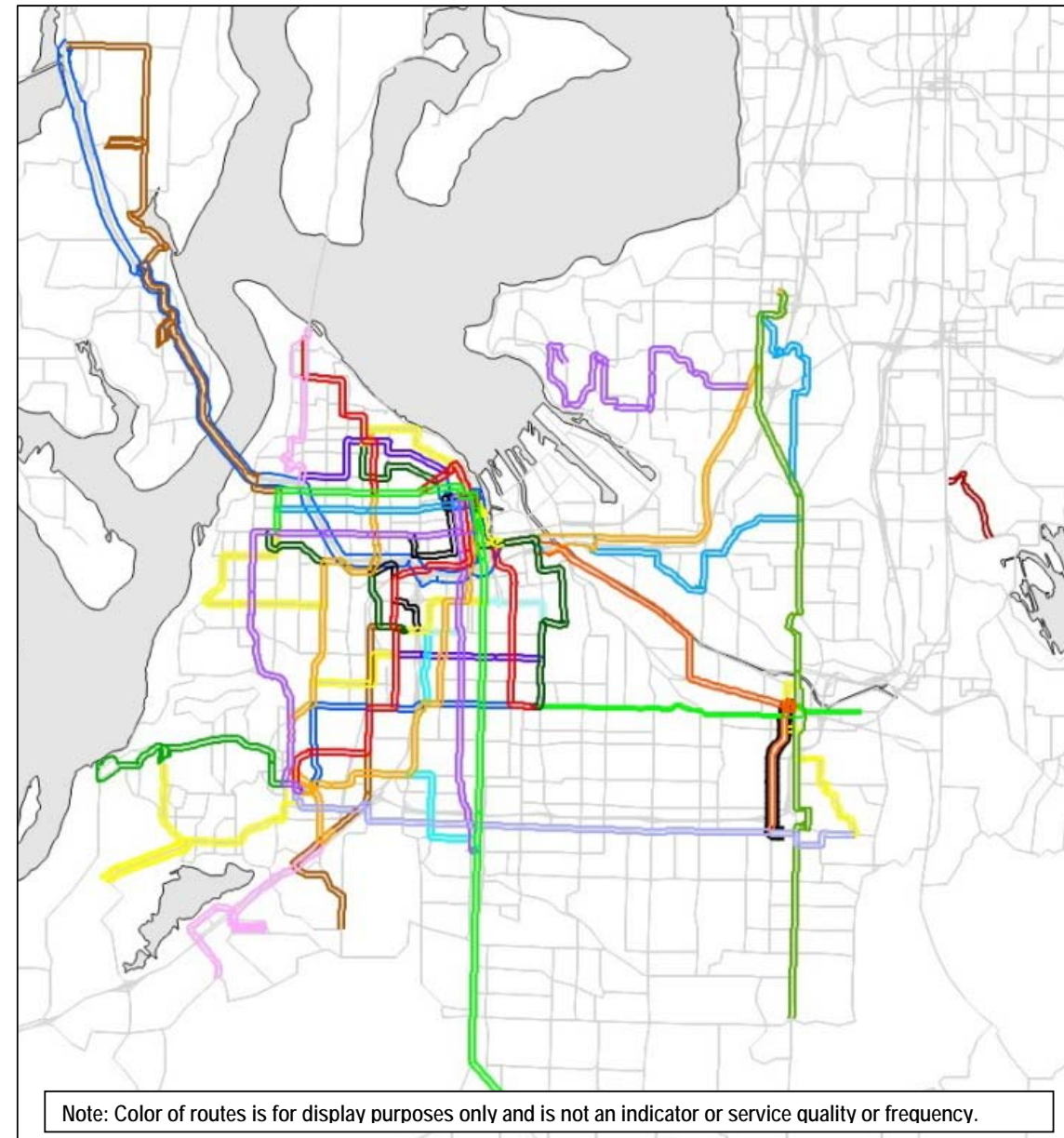
Route	Passengers per Service Hour for Horizon Year 2040			
	Baseline Scenario	Incremental Growth Scenario	Rapid Growth Scenario	Aspirational Growth Scenario
1	41	36	31	23
1L	-	-	-	80
2	38	31	29	24
2L	-	-	-	105
3	43	40	38	37
4	51	41	39	57
10	33	32	26	-
11	30	24	22	17
13	22	21	24	-
14	14	16	16	13
15	-	-	-	92
16	29	30	28	46
28	5	9	9	-
41	36	36	37	26
42	24	33	24	22
45	4	11	9	10
48	25	22	22	25
51	34	25	25	23
52	35	37	31	19
53	24	31	31	47
54	21	18	21	27
55	25	26	22	-
56	26	32	32	-
57	25	20	24	-
58	-	-	-	18
59	-	-	-	16
62	32	75	75	18
100	32	21	17	26
102	31	34	34	83
103	-	-	-	22
202	35	27	24	31
206	24	17	16	18
210	-	-	-	28
212	38	35	33	30
214	20	19	18	20
300	40	43	39	50
400	28	19	17	50
402	34	35	28	53
404	-	-	-	16
409	20	18	14	49
425	24	17	17	79
491	-	-	-	24
496	-	-	-	-
497	9	19	19	-
498	-	-	-	12
500	19	31	28	41
501	28	27	28	-
Total	33	29	27	34

Note: Bold Routes are new routes

TRAVEL FORECASTING METHODOLOGY AND RESULTS

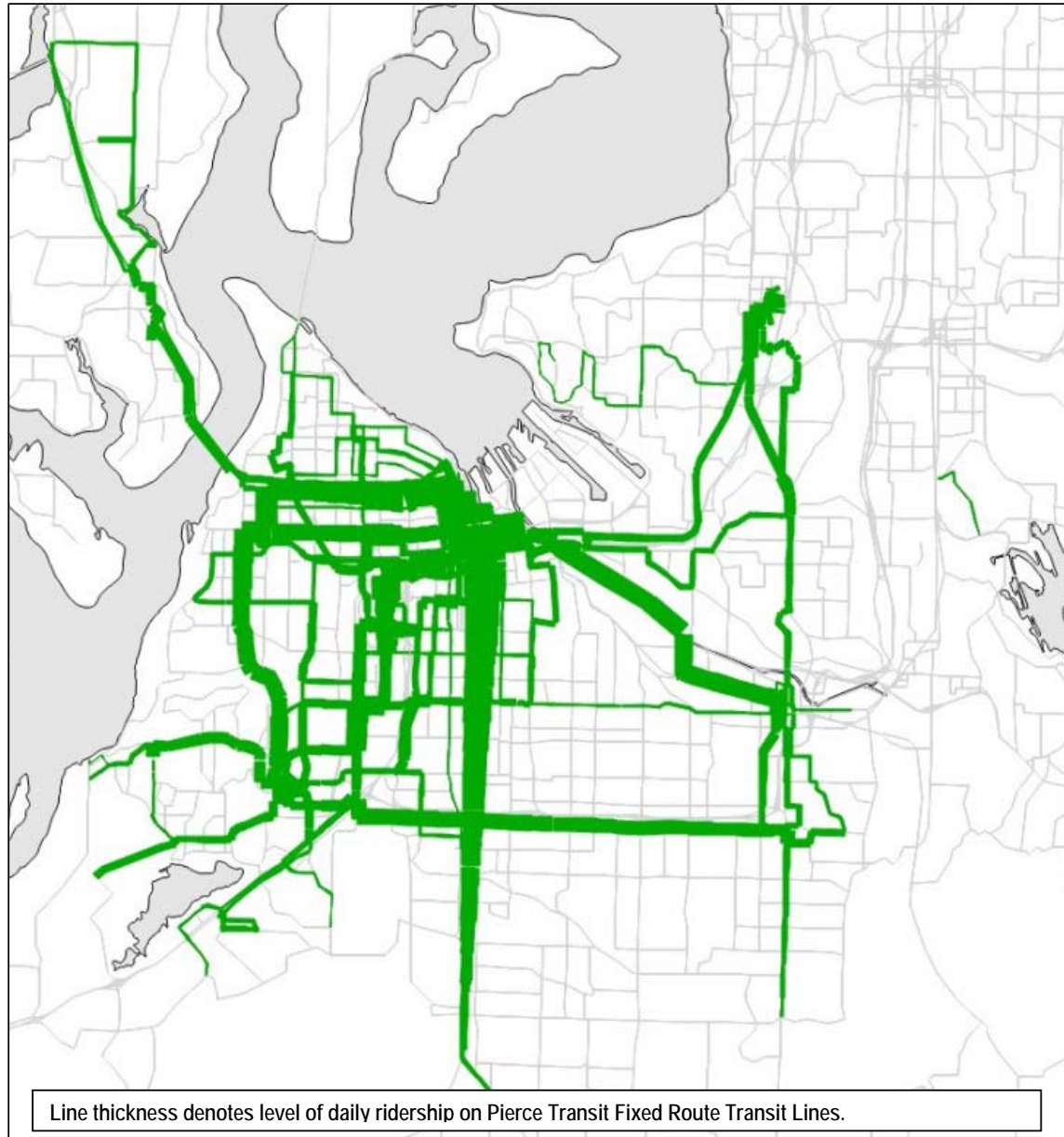
Baseline Scenario Results

The Baseline Scenario is the comparison point for all scenarios that were modeled for the Long Range Plan (LRP). Overall there are 37 total peak routes in the Baseline Scenario and 33 routes that operate outside the peak. The Peak periods are 6-9am and 3-6pm. The average daily boardings for the Baseline Scenario are approximately 50,000. The routes with the greatest ridership potential are the 1, 2, 3, 4 and 402.



2040 Baseline Annual Service Hours: 454k
2040 Baseline Routes: Peak: 37, Off Peak: 33

TRAVEL FORECASTING METHODOLOGY AND RESULTS

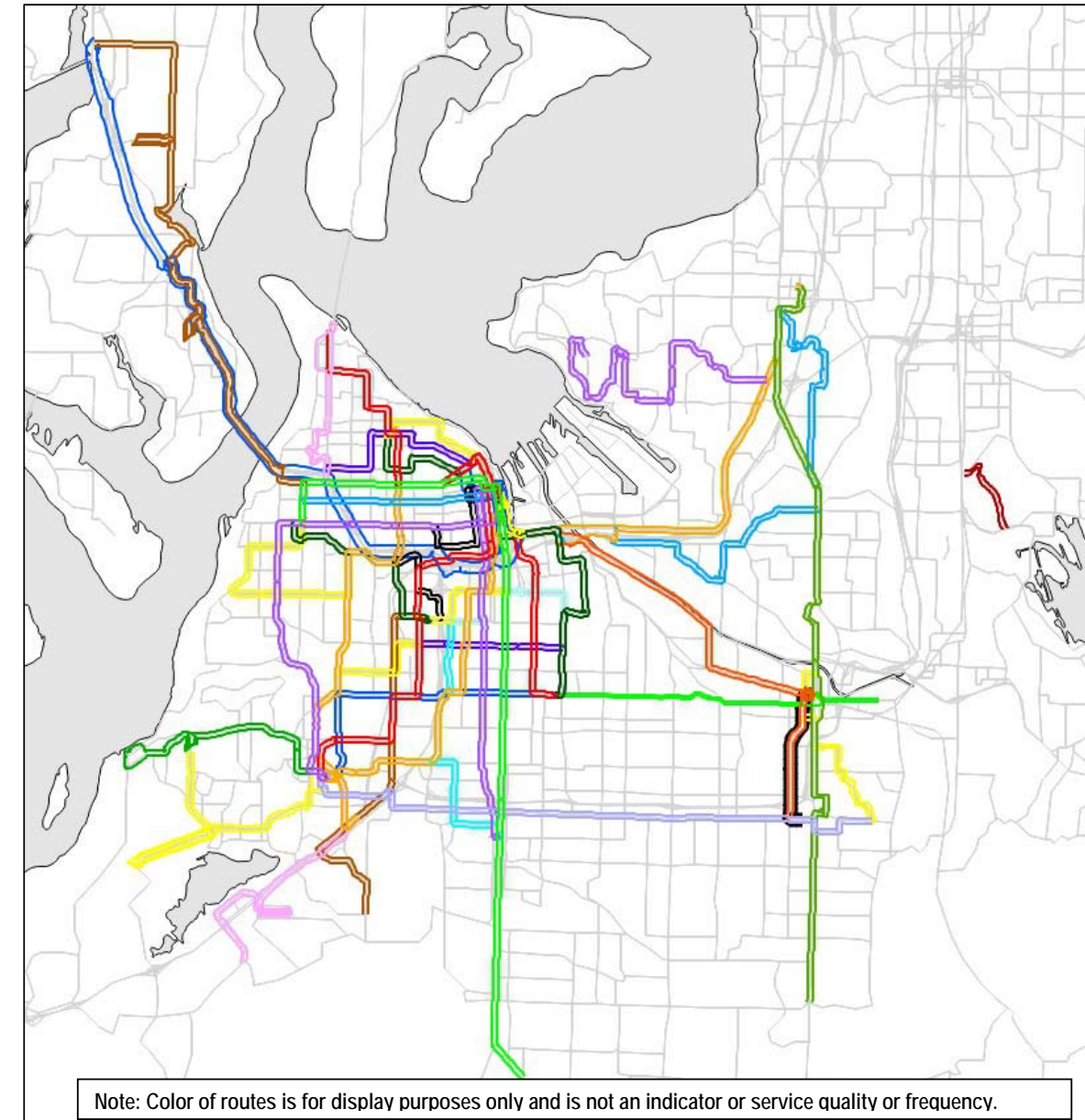


2014 Base Year Daily Boardings: 34,500
2040 Baseline Daily Boardings: 50,000

TRAVEL FORECASTING METHODOLOGY AND RESULTS

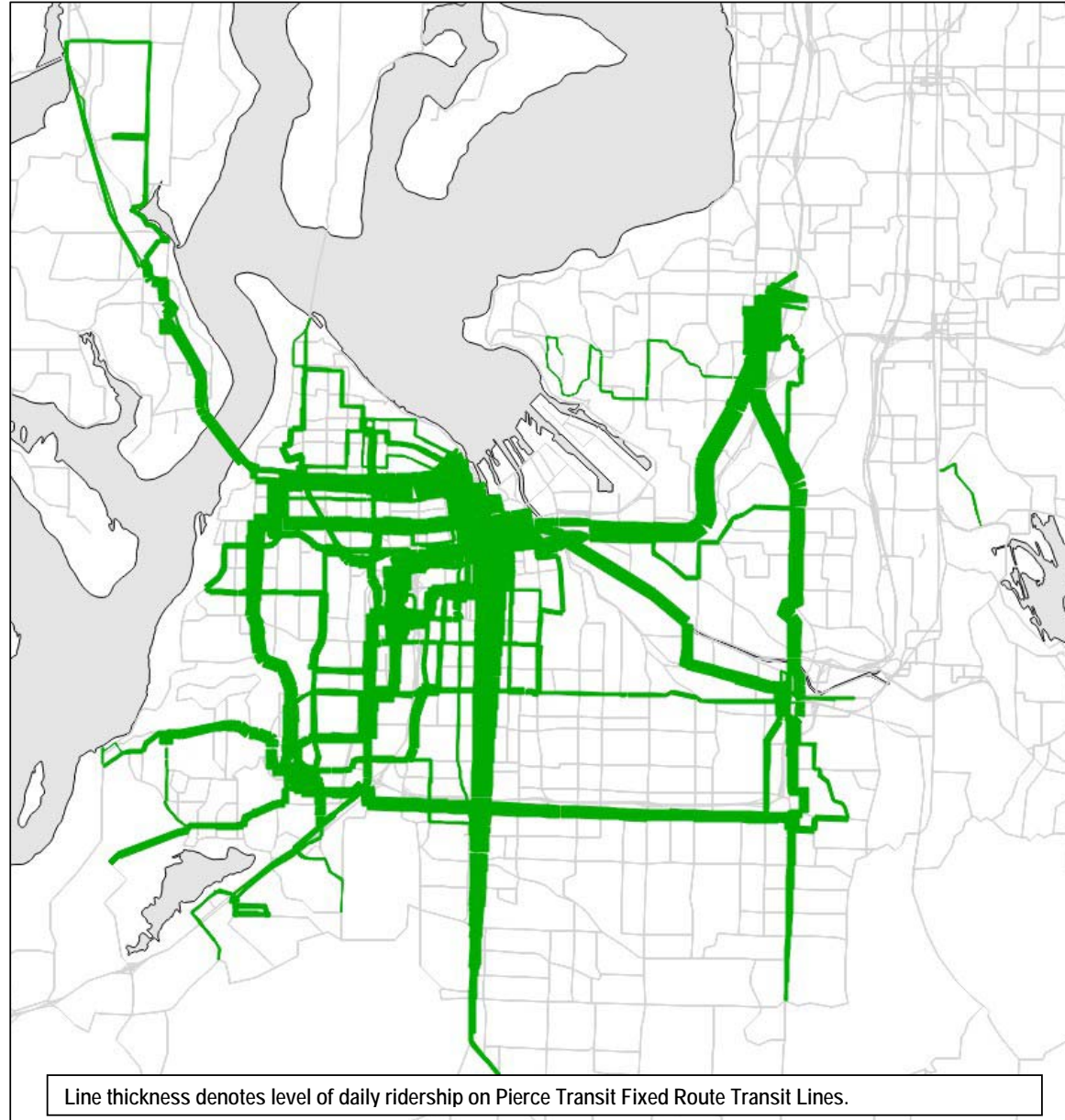
Incremental Growth Scenario Results

The Incremental Growth Scenario uses the same routes as the Baseline but increases frequency in both peak and off peak periods. There are over 56% more service hours than the Baseline in this scenario. The average daily boardings for the Incremental Scenario are approximately 70,000. The routes with the greatest ridership potential are still include the 1, 2, 3, 4 and 400, but Routes 53, 402, 500 and 501 also increase fairly significantly with the increased level of service.



2040 Incremental Growth Annual Service Hours: 727k
2040 Incremental Growth Routes: Peak: 37, Off Peak: 33

TRAVEL FORECASTING METHODOLOGY AND RESULTS



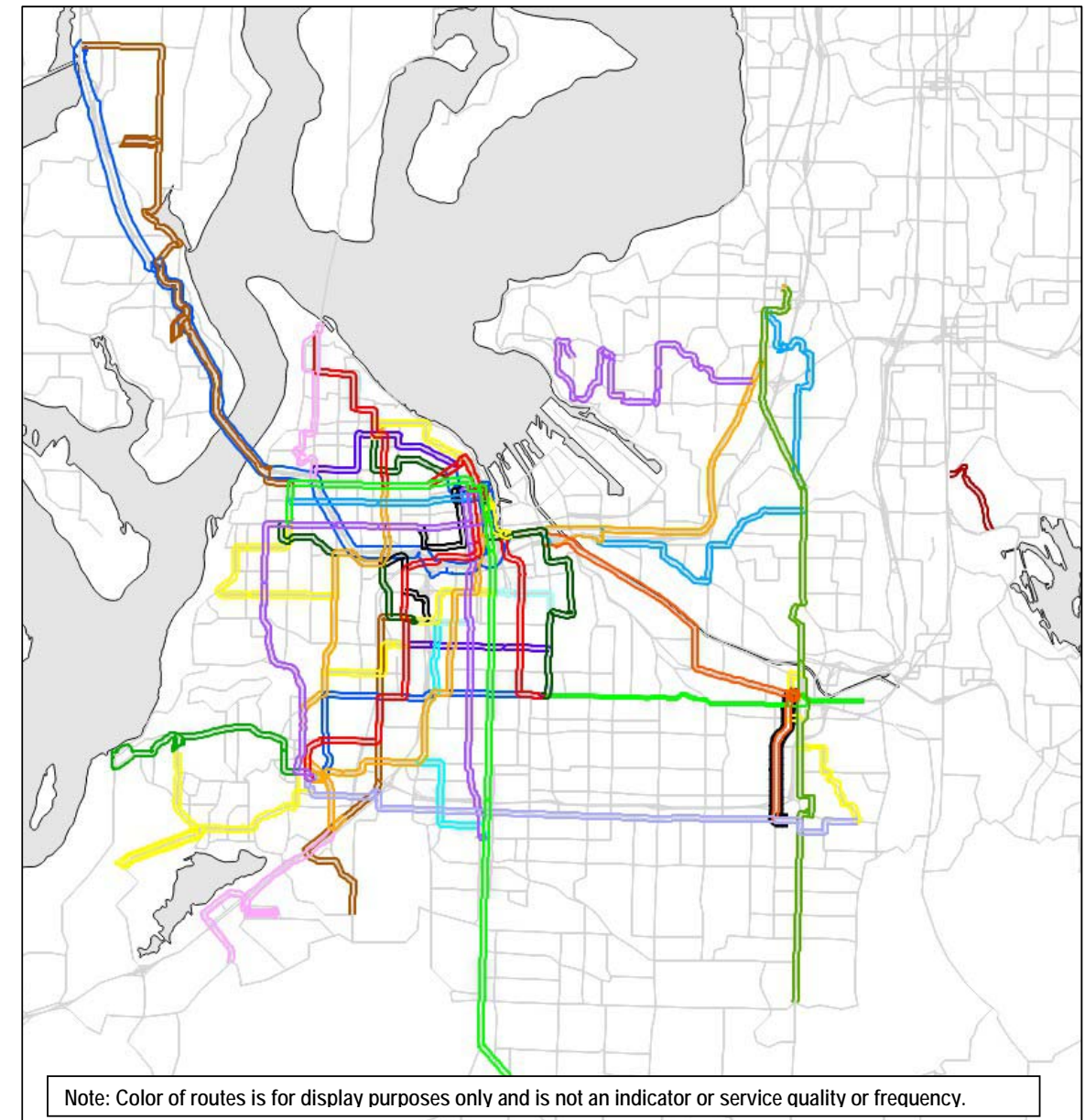
2014 Base Year Daily Boardings: 34,500

2040 Incremental Growth Daily Boardings: 70,000

TRAVEL FORECASTING METHODOLOGY AND RESULTS

Rapid Growth Scenario Results

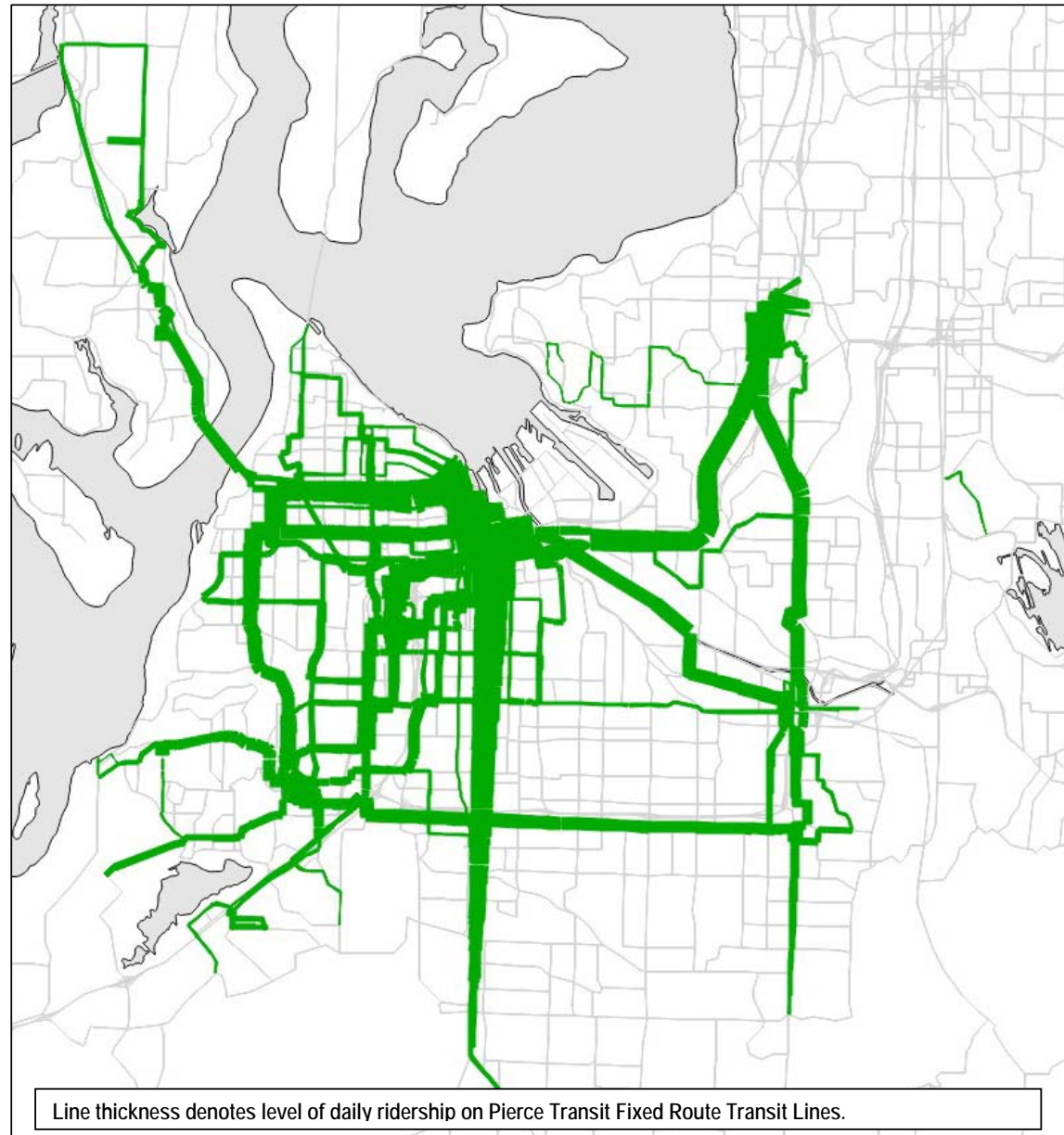
The Rapid Growth Scenario uses the same routes as the Incremental Growth Scenario but further increases frequency. There are over 76% more service hours than the Baseline in this scenario. The average daily boardings for the Rapid Scenario are approximately 74,000. The main reason for the modest change between the Incremental and Rapid Growth Scenarios is the fairly small changes in frequency on multiple routes that the travel demand forecasting model did not pick up as significantly as it did between the Baseline and Incremental Scenarios. For example, going from 60 minute to 30 minute frequency on Route 16 almost tripled route ridership in the Incremental Scenario but further increases to 20 minute service had minimal change in the model for this route. The same routes show up with the greatest ridership potential: The 1, 2, 3, 4, 53, 400, 402, 500.



2040 Rapid Growth Annual Service Hours: 821k

2040 Rapid Growth Routes: Peak: 37, Off Peak: 33

TRAVEL FORECASTING METHODOLOGY AND RESULTS

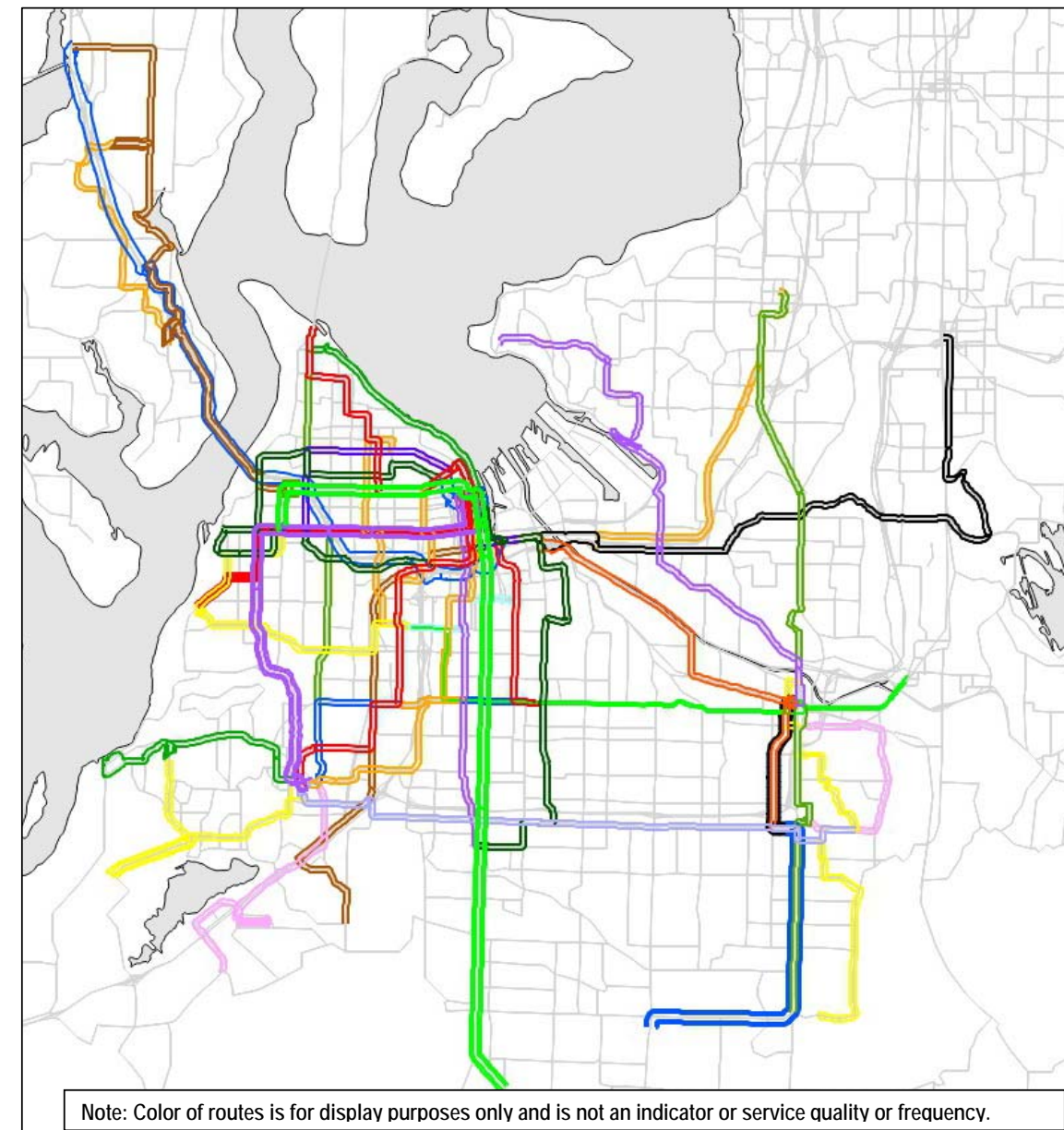


2014 Base Year Daily Boardings: 34,500
2040 Rapid Growth Daily Boardings: 74,000

TRAVEL FORECASTING METHODOLOGY AND RESULTS

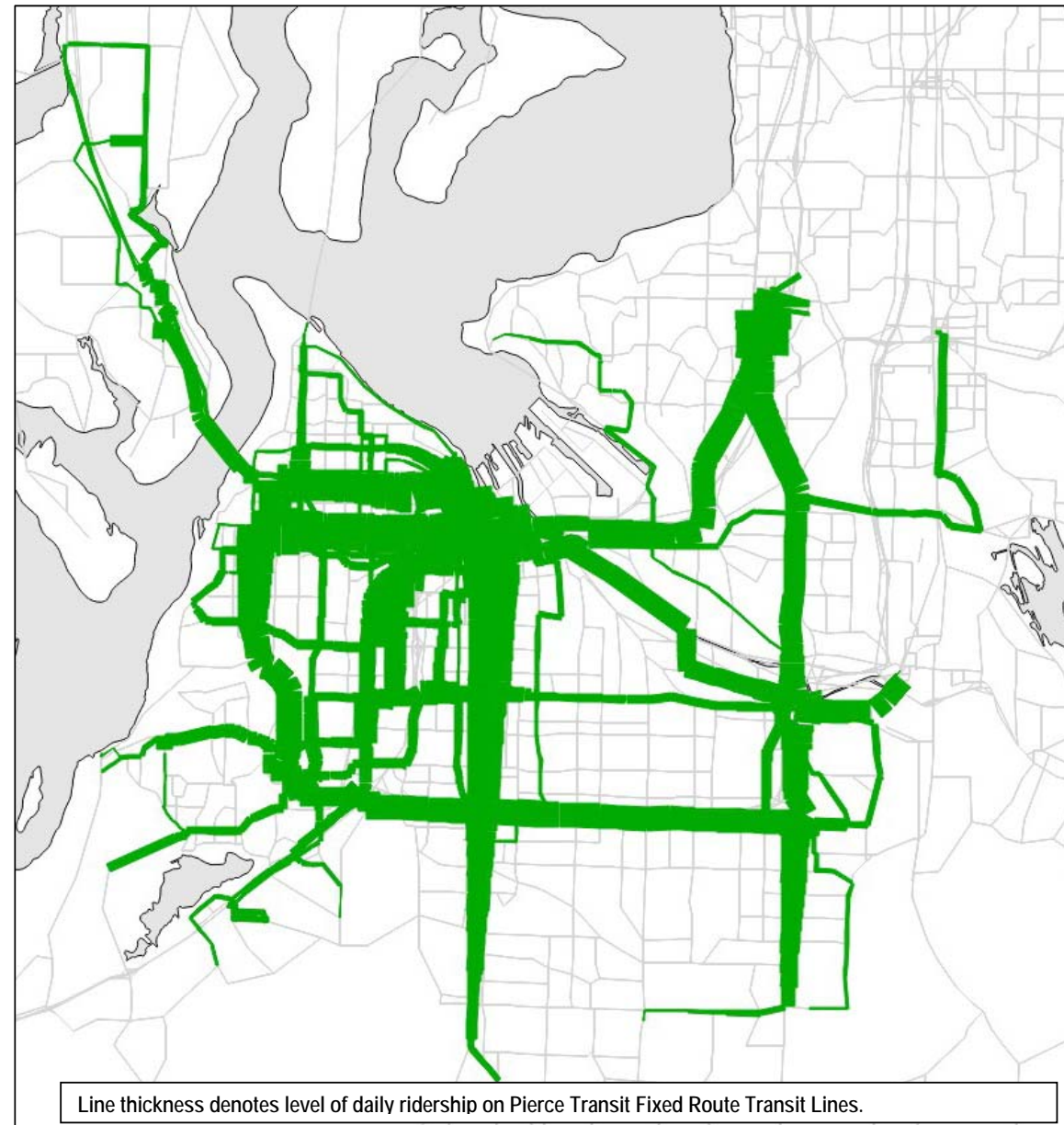
Aspirational Growth Scenario Results

The Aspirational Growth Scenario adds new routes and increases frequency. There are 98% more service hours than the Baseline in this scenario. The average daily boardings for the Aspirational Growth Scenario are approximately 107,000, more than double the Baseline scenario. Transit flows from Puyallup and South Hill as well as ridership along the newly designed Route 1 and 2 Limited increase ridership significantly. The new Limited 1 and 2 routes operate similar to Bus Rapid Transit in terms of their operations and performance in the travel forecasting model.



2040 Aspirational Growth Annual Service Hours: 928k
2040 Aspirational Growth Routes: Peak: 39, Off Peak: 35

TRAVEL FORECASTING METHODOLOGY AND RESULTS



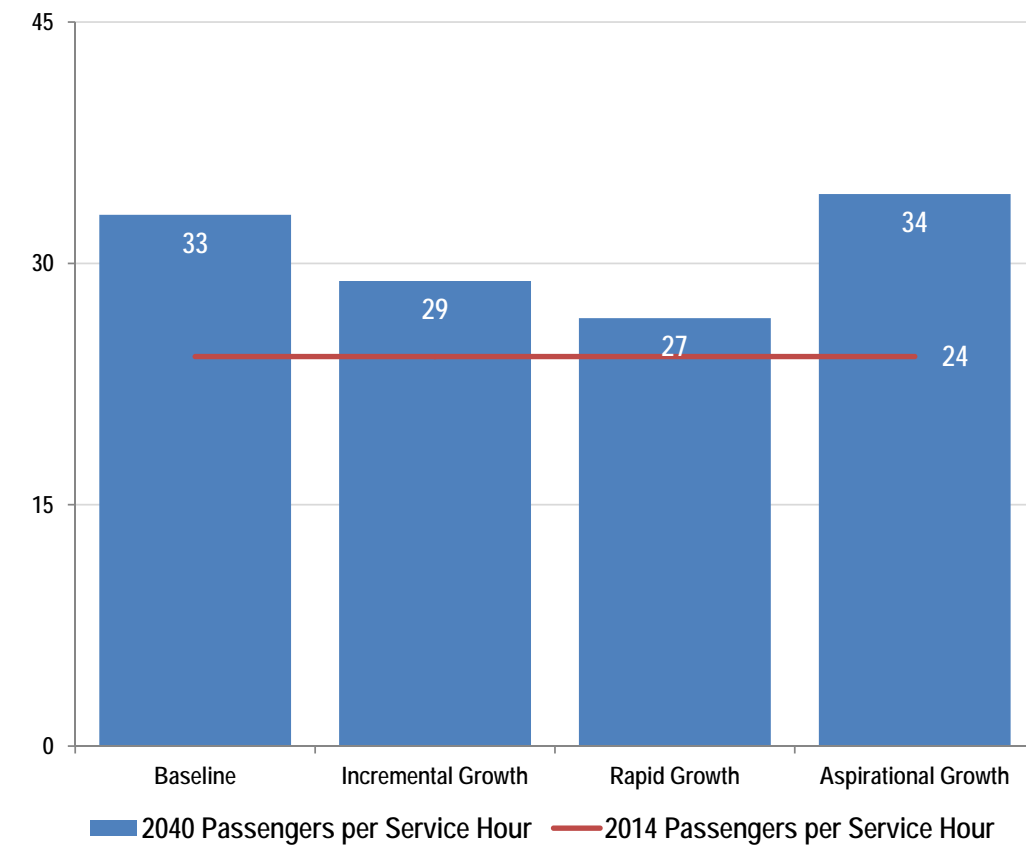
2014 Base Year Daily Boardings: 34,500

2040 Aspirational Growth Daily Boardings: 107,000

TRAVEL FORECASTING METHODOLOGY AND RESULTS

Summary

The figure below shows the overall ridership per service hour provided. In general, the Incremental Growth and Rapid Growth Scenarios increase overall ridership but do not do so at a level beyond the addition in service which results on average in fewer passengers per service hour than the Baseline. In the Aspirational Growth Scenario, not only is the overall ridership increased significantly but the number of passengers per service hour provided all exceed the 2040 Baseline Scenario. All scenarios increase the number of passengers per hour provided than is currently observed in the Pierce Transit Fixed Route Network. This increase is reflective of both the increased transit service provided in the Growth scenarios but also reflects the growth in the transit market in Pierce County as the Population and Employment in the region increases in the Horizon Year 2040.



APPENDIX J. Pierce County Housing, Population & Employment Targets by Municipality

Pierce County Population Targets by Municipality

Municipality	2010 Census Estimate	Adopted Population Target	Percent Change
Auburn	7,419	7,590	2.3%
Bonney Lake	17,374	21,640	24.6%
Buckley	4,354	7,500	72.3%
Carbonado	610	800	31.1%
DuPont	8,199	11,900	45.1%
Eatonville	2,758	3,120	13.1%
Edgewood	9,387	13,700	45.9%
Fife	9,173	9,425	2.7%
Fircrest	6,497	6,950	7.0%
Gig Harbor	7,126	10,500	47.3%
Lakewood	58,163	72,000	23.8%
Milton	6,137	5,750	-6.3%
Orting	6,746	8,000	18.6%
Pacific	92	0	-100.0%
Puyallup	37,022	50,000	35.1%
Roy	793	1,070	34.9%
Ruston	749	1,450	93.6%
South Prairie	434	750	72.8%
Steilacoom	5,985	6,830	14.1%
Sumner	9,451	11,970	26.7%
Tacoma	198,397	281,300	41.8%
University Place	31,144	39,540	27.0%
Wilkeson	477	570	19.5%
Municipal Total	428,487	572,355	33.6%
PTBA Total	377,291	505,035	33.9%
Non-PTBA Total	51,196	67,320	31.5%
Countywide Total	795,225	1,014,972	27.6%

Source: Pierce County Council Ordinance N (Shown in 2015 Comp Plan update)

Grey shading indicates a city or town not served by Pierce Transit (i.e., outside the PTBA).










Pierce County Housing & Employment Targets by Municipality

Municipality	2010 Housing Units	2030 Housing Target	Percent Change	2010 Employment	2030 Employment Target	Percent Change
Auburn	3,146	3,634	15.5%	590	834	41.4%
Bonney Lake	6,394	8,498	32.9%	4,505	5,448	20.9%
Buckley	1,669	2,930	75.6%	2,089	3,033	45.2%
Carbonado	218	298	36.7%	52	68	30.8%
DuPont	3,241	5,291	63.3%	2,937	9,078	209.1%
Eatonville	1,059	1,353	27.8%	905	2,335	158.0%
Edgewood	3,801	6,003	57.9%	1,352	3,094	128.8%
Fife	3,895	4,457	14.4%	12,504	19,300	54.4%
Fircrest	2,847	3,351	17.7%	1,369	1,544	12.8%
Gig Harbor	3,560	5,431	52.6%	9,155	9,954	8.7%
Lakewood	26,548	34,284	29.1%	25,259	38,336	51.8%
Milton	2,724	2,779	2.0%	1,855	2,337	26.0%
Orting	2,361	3,121	32.2%	1,134	2,370	109.0%
Pacific	45	0	-100.0%	2,071	6,505	214.1%
Puyallup	16,171	22,611	39.8%	22,208	34,267	54.3%
Roy	326	487	49.4%	158	342	116.5%
Ruston	430	775	80.2%	141	494	250.4%
South Prairie	174	281	61.5%	66	307	365.2%
Steilacoom	2,793	3,385	21.2%	659	788	19.6%
Sumner	4,279	5,743	34.2%	9,825	20,135	104.9%
Tacoma	85,786	129,030	50.4%	104,399	176,930	69.5%
University Place	13,573	18,698	37.8%	6,074	9,593	57.9%
Wilkeson	175	238	36.0%	63	13	-79.4%
Unincorporated Urban Pierce County*	72,091	99,563	38.1%	36,336	65,893	81.3%
Totals	257,306	362,241	40.8%	245,706	412,998	68.1%
*Excluding Joint-Base Lewis McChord						
Within PTBA	165,319	234,438	41.8%	187,636	303,976	62.0%
Outside PTBA	19,896	28,240	41.9%	21,734	43,129	98.4%

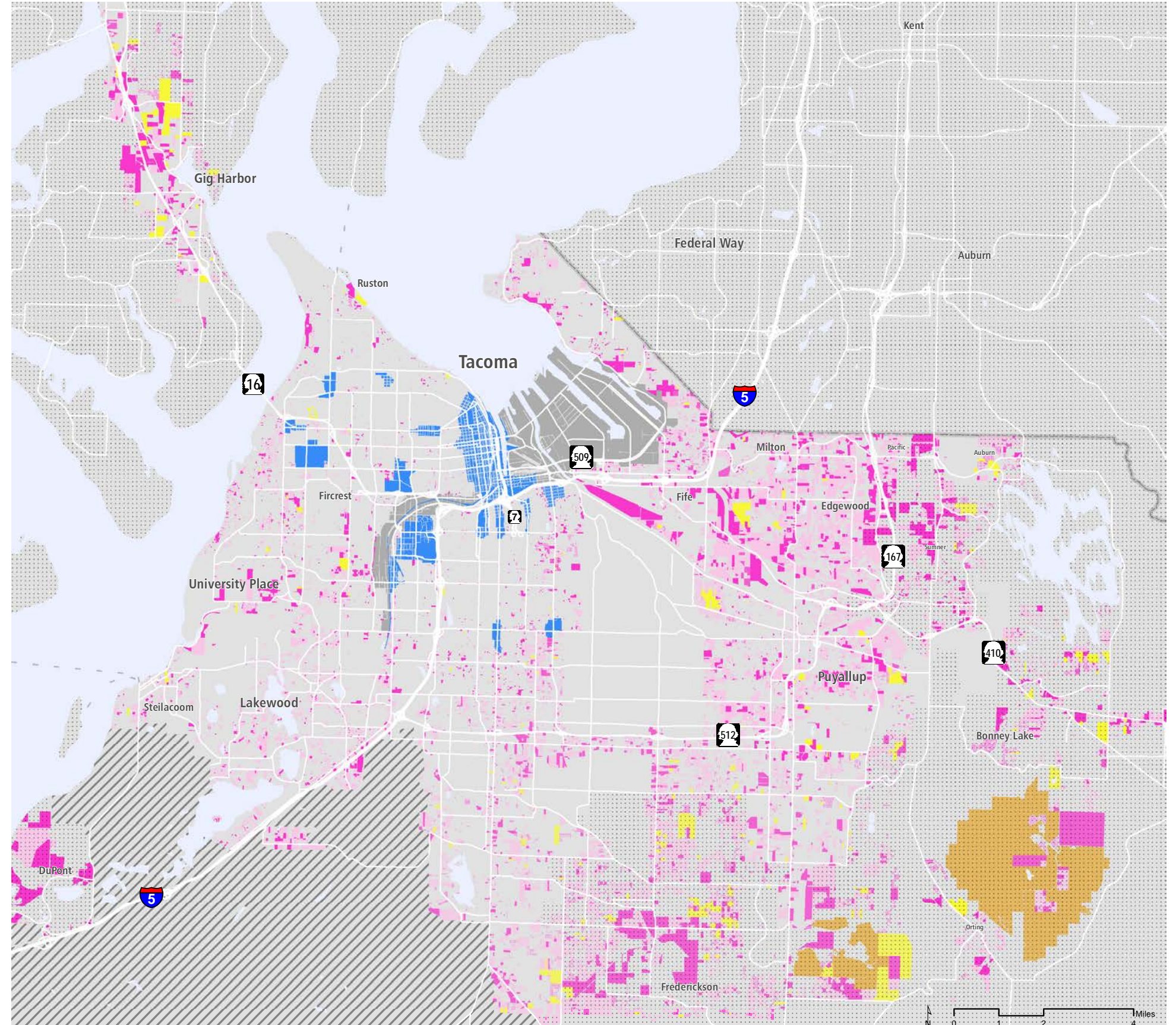
Source: Pierce County Buildable Lands Report 2014

APPENDIX K. Buildable Lands Inventory

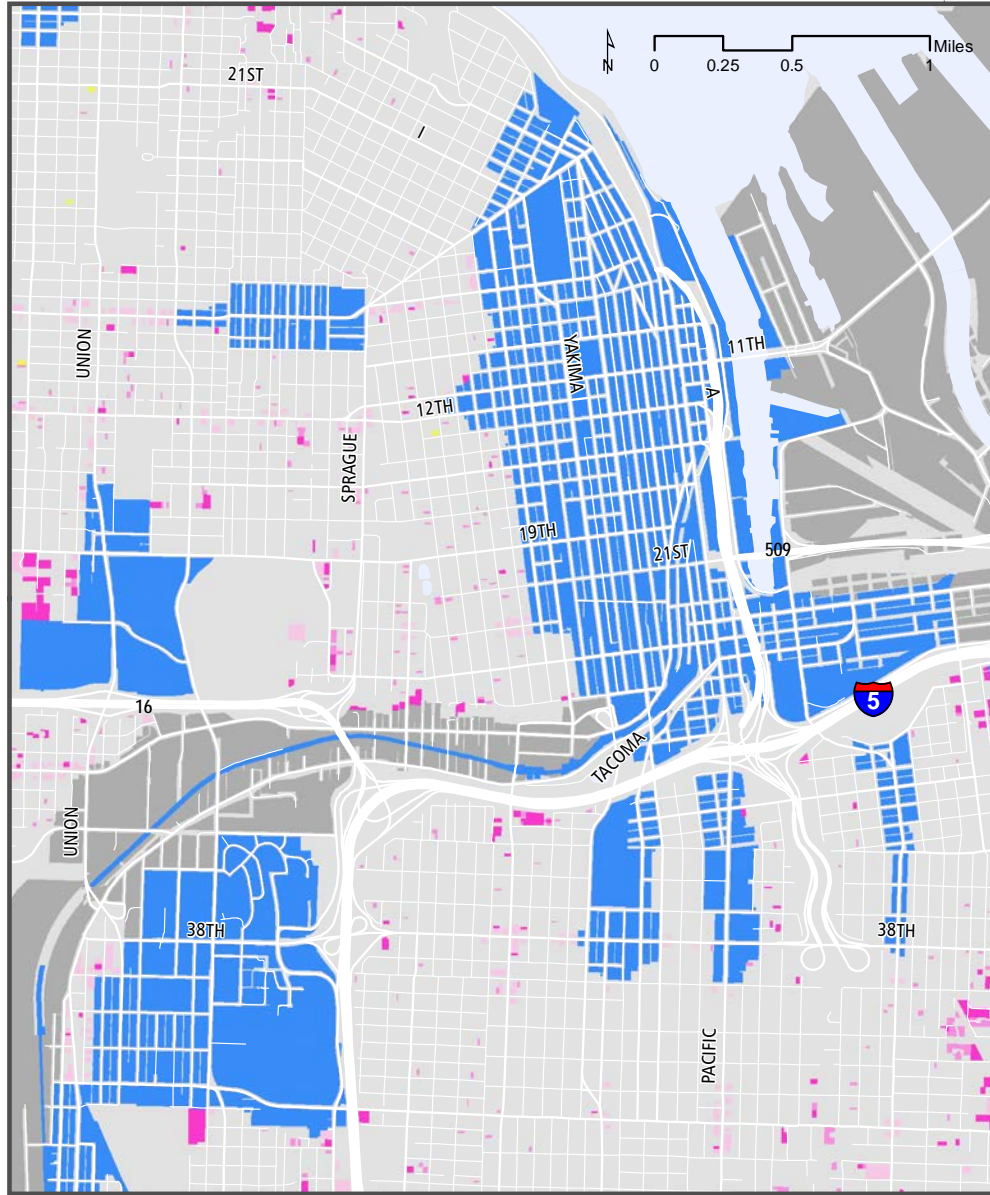
Pierce County Buildable Lands

-  Mixed Industrial Center
-  Mixed Use Center
-  Major Projects
-  Pipeline Access
-  Underutilized
-  Vacant Single Unit
-  Vacant
-  JBLM
-  Outside of Public Transportation Benefit Area (PTBA)

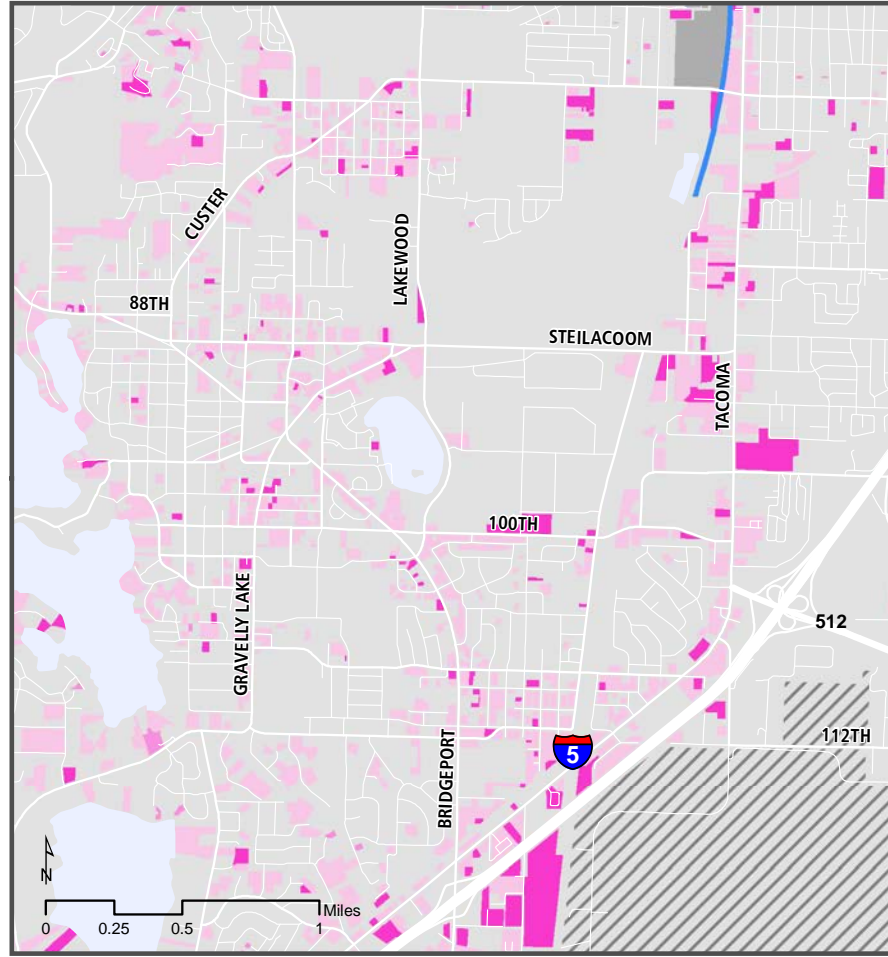
Buildable Lands are identified via the methodologies described in the Pierce County 2014 Buildable Lands report. The report takes in to account a variety of factors (including parcel size, improvement/land value ratio, zoning, access to existing infrastructure) in order to identify which lands are most suitable for future development. Note that lands considered buildable do not necessarily imply a great level of employment or residential density over existing levels.



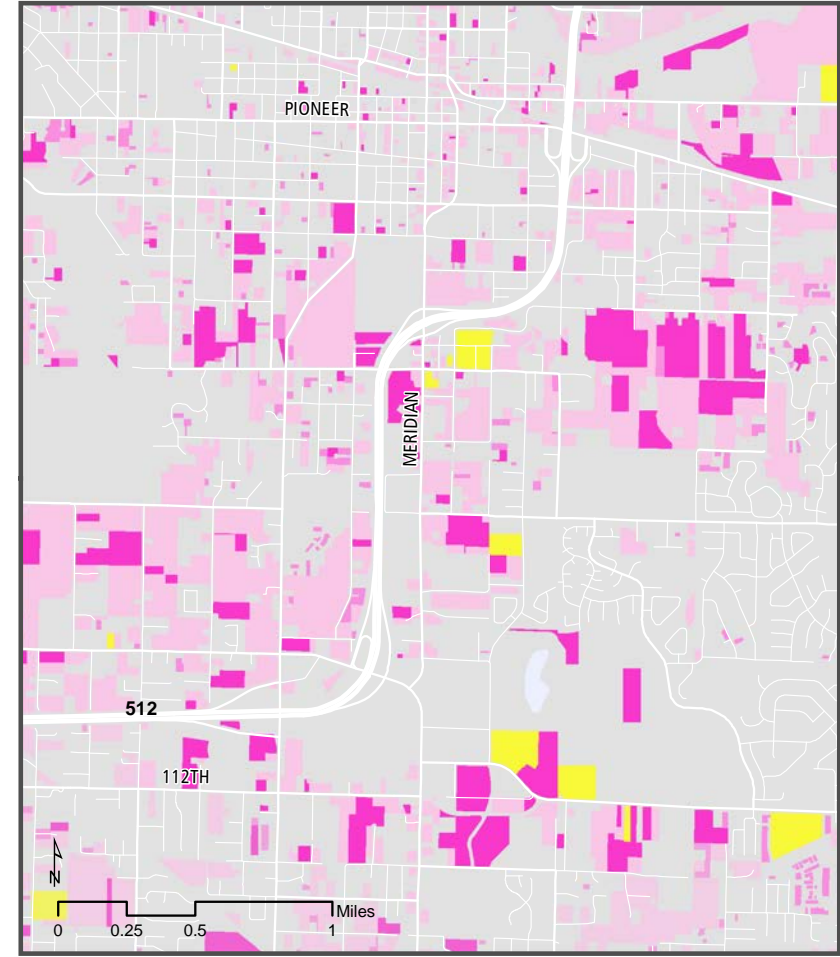
Source: Pierce County, Pierce Transit



TACOMA



LAKWOOD



PUYALLUP-SOUTH HILL

APPENDIX L. Unfunded/Unprogrammed (Vision) Projects

Proposal ID #	Category	Project Name/Description/Location	Purpose of Project	Total Project Amount (Capital Cost) in \$1,000s	Project identified in 2015 Transit Development Plan?	Project identified in PSRC Transportation 2040?	T2040 ID #	T2040 Fiscally Constrained or Vision?
Studies & Internal Policies								
274	Study	Traffic Signal Prioritization (TSP): Analysis of Existing Corridors plus Identification of New Corridors for Expansion	Study to reevaluate existing TSP corridors for timing adjustments, range settings, and to account for changes in traffic patterns and transit route modifications. Additionally, the project will give Pierce Transit the opportunity to investigate other corridors where we could reduce transit delay and increase system efficiency through the use of TSP.	\$100	Yes	No	N/A	Not Required (Exempt)
	Study	Pacific Avenue/Mountain Highway (SR 7) Corridor: Downtown Tacoma to Spanway - High Capacity Transit Feasibility Study to NEPA Document	To be determined: Based on project's Purpose & Need statement from RFP and scope of work.	\$2,000	Yes	Yes	5320	Not Required (Exempt)
	Study	Facilities Energy & Resource Assessment and Related Upgrades	To continue to improve the efficiency and resource utilization of aging capital facilities by replacing out of date technology with newer and more efficient components or systems. The project would save money as fewer resources, such as water and electricity, would be used at these sites. There's an added security benefit when lighting is upgraded as newer, more efficient lights generally provide better and wider visibility. The project also addresses the agency's climate action strategies and commitment to green technologies.	\$100	Yes	No	N/A	Not Required (Exempt)
Headquarters Infrastructure								
	Infrastructure	Building 5: Vanpool Carport (Protective Waiting Area)	This project would fund, design, engineer and construct a carport large enough to accommodate two Vanpool vehicles parked side by side with enough roof overhang to allow Vanpool occupants to switch vehicles and drivers in an area semi-protected by the weather.	\$87	No	No	N/A	N/A
	Infrastructure	Pierce Transit 2030 Base Master Plan Implementation (From 2016 update and related needs or upgrades determination)	This is a phased strategy to provide adequate capacity for Maintenance and Operations at the existing Pierce Transit headquarters as service grows over time. The 2016 Plan update will incorporate the extensive radio communications needs, plus consider modifications that would be required with various types of fleet vehicles (e.g., double-decker buses or articulated coaches), as shown in the next row.	\$25,000	Yes	No	N/A	N/A

Proposal ID #	Category	Project Name/Description/Location	Purpose of Project	Total Project Amount (Capital Cost) in \$1,000s	Project identified in 2015 Transit Development Plan?	Project identified in PSRC Transportation 2040?	T2040 ID #	T2040 Fiscally Constrained or Vision?
Offsite Infrastructure								
259	Infrastructure	Pacific Avenue/Mountain Highway (SR 7) at 8th Avenue East: New Park-and-Ride Lot and Bus Turnaround Facility with Passenger Shelters and Boarding Zones, Operator Comfort Station, and Added Security (Needs \$682,500 for PE/Design in 2015 for construction in 2016)	Replaces a Route 1 bus pullout at the southern boundary of the service area in Spanaway currently operating over capacity with a new 350-space Park-and-Ride lot. Would also be built to accommodate HCT/Express/BRT service in the future.	\$10,000	Yes	No	N/A	N/A
	Infrastructure	Pacific Avenue/Mountain Highway (SR 7) Corridor: Downtown Tacoma to Spanway - High Capacity Transit Project Development/Pre-construction Costs	To be determined: Based on preferred alternative and required corridor infrastructure improvements (e.g., bus pull outs, additional ROW, BAT lanes) plus customer-facing enhancements (e.g., shelters or stations, real-time bus arrival displays, off-board ORCA readers)	\$8,000	Yes	Yes	5320	Constrained
209	Infrastructure	Puyallup Avenue Intermodal Improvements (per City of Tacoma South Downton Subarea Plan) - Addition of Transit Supportive Elements and Access Improvements to Portland Avenue, Puyallup Avenue, and I-5 (Current Traffic Conditions Analysis and Transit Treatment Operational Analysis) - Phase I (Options Analysis/Traffic Study) & Phase 2 (Implementation)	Analyze multiple surface transportation and transit supportive elements that would increase bus access and circulation in the Tacoma Dome Station area utilized by 520 bus trips serving approximately 3,400 passengers per weekday.	\$6,800	Yes	No	N/A	N/A
Offsite Infrastructure								
	Infrastructure	Repair, Resurface, Re-stripe Park-and-Ride Lots and Transit Centers	Customer-facing improvements at Tacoma Community College TC, 72nd Street & Portland Avenue TC, Kimball and Purdy Park-and-Rides (Gig Harbor), Narrows Park-and-Ride (Tacoma), Parkland TC, Roy Y (Spanaway) Park-and-Ride	\$2,000	No	No	N/A	N/A
272	Infrastructure	Transit Center Shelters Refurbishment	This project would refurbish the large, original shelters at our oldest transit centers. This renovation project provides an opportunity to further improve Transit Centers, address issues raised by the public to improve public perception and provide a better Pierce Transit experience to a significant number of our riders.	\$1,016	No	No	N/A	N/A
	Infrastructure	Real-Time Next Bus Arrival Information Signs at Select Transit Centers, Park-and-Ride Lots, and Sounder Stations	Would install 21 signs initially at Tacoma Dome Station, Lakewood Towne Center, South Hill Mall, Tacoma Community College, Tacoma Mall, Kimball Drive, SR 512/S. Tacoma Way. Sounder Stations: Lakewood, Puyallup, and South Tacoma.	\$1,628	No	No	N/A	N/A
	Infrastructure	Transit Signal Priority (TSP) Update of Technology and Equipment	Evaluate and implement an upgrade to TSP using the latest available GPS technology that communicates with the existing AVL and APC equipment to actively initiate TSP calls on routes to improve both schedule adherence and throughput on transit corridors	\$1,200	Yes	No	N/A	N/A
47	Preliminary Engineering/Design	New Transit Oriented Development at "Air Spares" Property Adjacent to Tacoma Dome Station	Develop conceptual plans for the site, begin coordination with City of Tacoma and neighboring stakeholders, complete environmental clearance, conduct geotechnical, legal, and financial analyses, obtain appraisals, and release an RFP to potential developers and business interests.	\$300	Yes	No	N/A	Not Required (Exempt)

Proposal ID #	Category	Project Name/Description/Location	Purpose of Project	Total Project Amount (Capital Cost) in \$1,000s	Project identified in 2015 Transit Development Plan?	Project identified in PSRC Transportation 2040?	T2040 ID #	T2040 Fiscally Constrained or Vision?
Equipment, IT Infrastructure/Software								
	Equipment	Tacoma Dome Station: Automatic License Plate Reader System (ALPR)	To effectively monitor the vehicle traffic, and to assist in the identification and documentation of all vehicles entering the garages, we need to deploy an Automatic License Plate Reader system (ALPR). This system, connected to a state database, will allow us to quickly identify previously stolen vehicles entering the garages to be dropped off, or used in the act of stealing another vehicle. This system can also be used to monitor the proper usage of the garages (e.g., restrict to single-day or short-term parking).	\$103	No	No	N/A	N/A
262	Equipment	Radio Shop Equipment	To ensure operational readiness, the radio communication links of the organization need to be continually monitored and maintained. DiagnostiX is a stand-alone, non-intrusive, over-the-air monitoring asset, developed to assist the radio service shop by constantly monitoring Pierce Transit radios while they are operating in the field, ensuring operational readiness. By pre-identifying radio operational problems the organization will experience a higher level of system performance and reduced maintenance costs. This expenditure will purchase three units (one for the P25 Prime Site, One for Top Hat IR site, and one spare to cover annual calibration service). Life Expectancy is 10 years.	\$631	No	No	N/A	N/A
261	Software	Portfolio Management Software	A portfolio and project management tool will allow all key information from projects across Pierce Transit to be stored in a single place, which will improve communication, tracking and reporting. Executives and project stakeholders will have better access to real-time project and portfolio status, as well as improved information regarding the strategic value, costs and deliverables of proposed initiatives. A portfolio tool will allow resource managers to predict the resource needs in the foreseeable future, and allocate resources appropriately.	\$130	No	No	N/A	N/A
	Equipment	Physical Protection System Integration - Phase 1	Assess our current PPS structure and find a solution that provides us with an easy to use platform that can integrate most - if not all - of our security systems (e.g., fixed CCTV, Limited Access, Emergency Warning System [EWS], Intrusion Detection Systems [IDS], CCTV on buses, new Master Key Control system) into one user interface for our security staff to monitor and operate at the Tacoma Dome Station. By having one central location and software to monitor and operate each system, the user can manipulate multiple systems effectively and with ease.	\$875	No	No	N/A	N/A

Proposal ID #	Category	Project Name/Description/Location	Purpose of Project	Total Project Amount (Capital Cost) in \$1,000s	Project identified in 2015 Transit Development Plan?	Project identified in PSRC Transportation 2040?	T2040 ID #	T2040 Fiscally Constrained or Vision?
Equipment, IT Infrastructure/Software								
248	Equipment	Critical Infrastructure (Radio) Physical Security Upgrade - Phase 2	The Radio Site Security system will provide video surveillance and recording at remote radio sites. The system allows remote viewing of live or archived video stored at the edge via secure client sessions. Each site will have two fixed mount IP cameras (covering gate/access road and main door) and one PTZ (pan, tilt, zoom) camera to provide a birds-eye view and situational awareness with 30 days of video storage and playback capability to allow investigation of recorded events from the remote radio sites. Each will have infrared-capable camera for better night vision recognition.	\$3,866	No	No	N/A	N/A
	Equipment	SHUTTLE (Paratransit) Scheduling System Replacement	Replace the Adept System with a Paratransit Scheduling & Dispatch and Eligibility & Suspension System that meets Agency requirements and also has a proven working interface with our CAD/AVL System. Our current SHUTTLE software does not meet Agency needs, and there continues to be issues with it communicating effectively with our CAD/AVL System.	\$964	No	No	N/A	N/A
213	Software	Business Intelligence Systems Replacement	The addition of a business Intelligence System would allow data mining, exec dashboards, cross system reporting and increase timely management decision making ability.	\$1,600	No	No	N/A	N/A
Grand Total				\$66,400				

