Pierce Transit Stream BRT System Expansion Study

Final Report

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PierceTransit Stream

Acknowledgments

PIERCE TRANSIT

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Acronyms and Abbreviations

BAT: Business Access and Transit

BRT: Bus Rapid Transit

CIG: Capital Investment Grant

FHWA: Federal Highway Administration

FTA: Federal Transit Administration

HCT: High-Capacity Transit

I-[Number]: Interstate (e.g., I-5 means Interstate 5)

JBLM: Joint Base Lewis-McChord

LEHD: Longitudinal Employer-Household Dynamics

Link: Sound Transit Link light rail

LPA: Locally Preferred Alternative

MPO: Metropolitan Planning Organization

NEPA: National Environmental Policy Act

PSRC: Puget Sound Regional Council

SSES: Stream System Expansion Study

SR [Number]: State Route (e.g., SR 512 means State Route 512)

TAC: Technical Advisory Committee

TCC: Tacoma Community College

TC: Transit Center

TDS: Tacoma Dome Station

TSP: Transit Signal Priority

WA-[Number]: State route in Washington State (e.g., WA-16 means Washington State Route 16)

WSDOT: Washington State Department of Transportation

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The Stream System Expansion Study (SSES) outlines Pierce Transit's strategy and vision for long-term implementation of Bus Rapid Transit (BRT) service within the agency's service area. The study focused on four corridors that were identified for conversion from local bus service to Stream BRT – Pierce Transit's premium brand of transit service. The study establishes implementation recommendations and corridor delivery prioritization.

Stream BRT is different from local bus service. It is faster and more reliable, thanks to stations spaced further apart than bus stops and street design treatments that implement transit priority. It is convenient, with long operating hours, high frequencies and real-time information at stations. Stream BRT is an approach to serve current and long-term transit demands for the region by moving people in a sustainable, cost-effective way. BRT service implementation creates economic opportunities and boosts quality of life for communities.

This SSES report is intended to help Pierce Transit and partner agencies, such as Sound Transit, Washington State Department of Transportation (WSDOT), Pierce County, the cities of Tacoma, Lakewood, University Place, Edgewood and Puyallup and other stakeholders advance Stream BRT planning efforts, deliver mutually beneficial projects and gain Stream BRT implementation support.

The goals of the SSES included:

- Establish a prioritization plan for transitioning four existing transit corridors to Stream BRT service with consideration of geographic and socioeconomic equity, plus current and future transit service needs.
- Establish planning-level corridor definition for four corridors for Stream BRT service conversion.
- Establish future Stream BRT service standards.
- Gain stakeholder and partner agency support for SSES findings and recommendations.

The SSES report provides recommendations on:

- Future Stream BRT service elements by corridor, including alignment, station placement and speed and reliability treatments.
- Implementation prioritization by corridor.
- Next steps for Stream BRT service expansion planning.
- Program funding considerations and implementation timelines.

The SSES report also highlights the work and coordination completed to date by the study team and partner agencies, including:

- Justification on route implementation recommendations, including prioritization methodology used and evaluation results.
- Public engagement and input received.
- Agency coordination input and recommendations used by the study, including a Technical Advisory Committee (TAC) comprising key agency stakeholders.
- Equity considerations.
- Peer agency arterial BRT system case studies.
- Future ridership projections with Stream BRT service expansion.

Summary of Corridor Prioritization Recommendations

The SSES team developed evaluation measures reflecting community values. This was done in partnership with the general public, Pierce Transit staff and transit operators and many stakeholders including input from a TAC with more than twenty members. Upon completion of independent high-level planning analysis of the four corridors, a comparison between corridors was completed. The technical evaluation supported the following implementation priorities:

- Top priority: Corridor B (Lakewood to Tacoma Mall to downtown Tacoma) had the highest corridor prioritization score and is the top priority for implementation.
- Next highest priority: Corridor A (Lakewood to Tacoma via Bridgeport Way and S. 19th Street). Routing length and termini would be determined in partnership with Sound Transit and local agencies at a later date through additional planning.
- Longer term priority: Corridor C and Corridor D would have equal weighting as the next lines for delivery. Prioritization between these lines could be made at a future time based on a refresh of the evaluation criteria to account for future growth and infill development, transit demand and local agency support.

The data-driven evaluation process suggested Corridor B should have the highest implementation priority compared to the other corridors due to several factors including:

- Higher ridership and projected additional boardings if BRT service is implemented.
- Access to high densities of jobs today and in 2040.
- Service to three regional growth centers with significant planned developments.
- Most cost-effective corridor for travel time and reliability improvements per transit rider.
- Addresses social equity considerations by prioritizing transit service improvements for the largest number of transit-reliant people within the study corridors.

Technical results were presented to local agencies and future project partners, with local agencies providing written partnership supporting Stream BRT delivery prioritization for Corridor A and Corridor B.

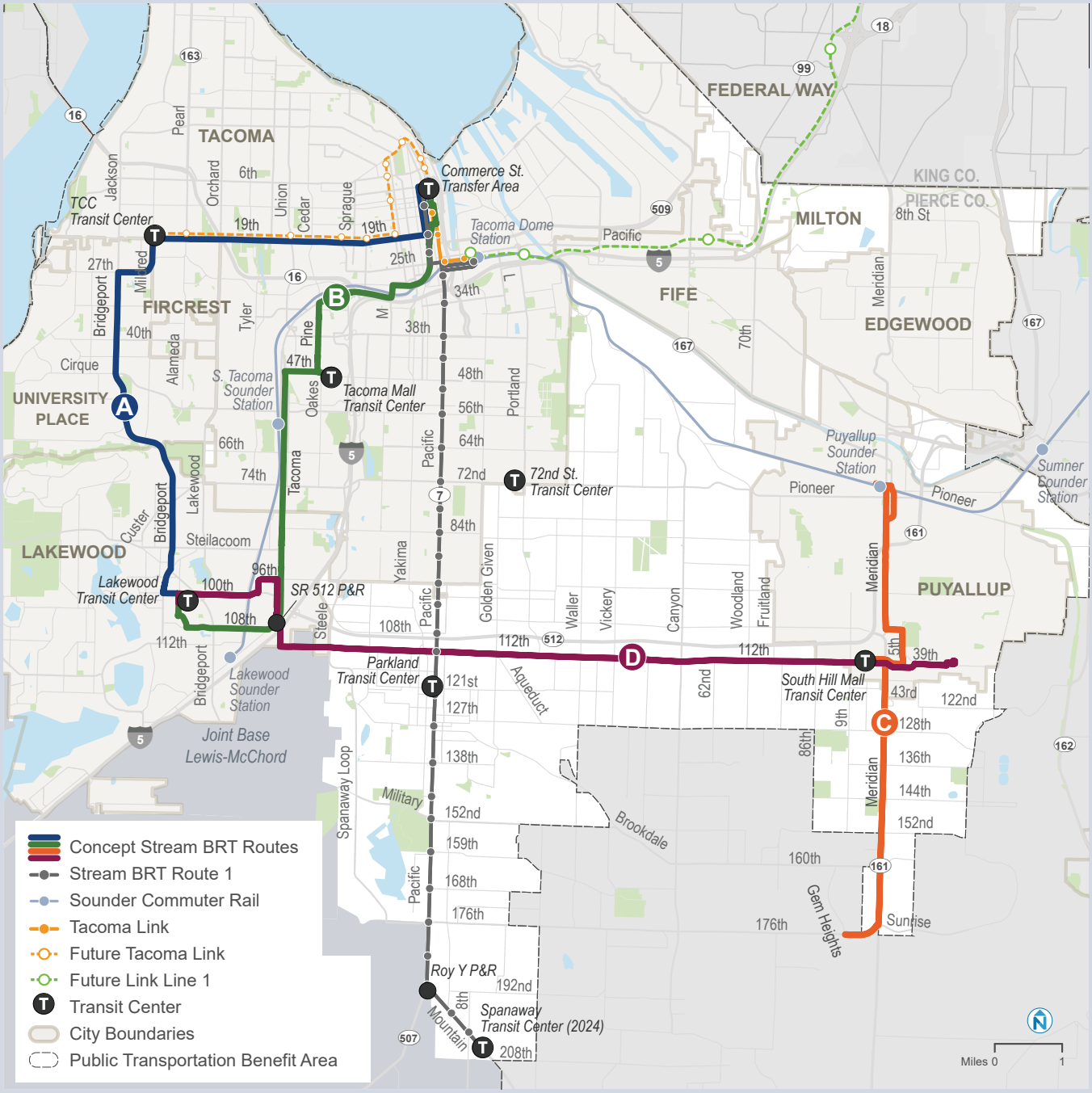
All study work was completed at a very high level and corridor refinement and further detailed planning efforts are needed. Completing further planning and design refinement will build

partnerships with local agencies and move Stream BRT delivery closer to reality.

Delivering a high-performing BRT system is a significant economic and political undertaking, with large capital and operating costs. Obtaining federal funding partnership for BRT service expansion brings additional requirements and political considerations.

Before Pierce Transit can move forward on this project, establishing strong partnerships with municipal bodies is instrumental in ensuring timely and successful project delivery. Pierce Transit leadership has engaged local agency partners to begin building momentum. Additional political relationship building will be needed to ensure delivery of future Stream BRT corridors.

Stream BRT Candidate Corridors



SECTION 1

PROJECT PURPOSE AND NEED

Pierce Transit's Route 4 Bus in Puyallup, Washington

PROJECT OVERVIEW

Communities across the country are transforming their key bus corridors by implementing Bus Rapid Transit. These systems allow more people to ride and provide riders with high-quality service that shortens travel time and can be relied on for many types of trips. Investments in high-quality transit systems are needed to battle the climate crisis, support equity and create interesting, compact, mixed-use places.

PierceTransit

Service area population:	**580,000** people
Number of routes:	**31** routes
Fleet size:	**177** buses
Annual service hours:	**577,000** hours
Annual boardings:	**9.41 million** riders

Source: National Transit Database, 2019 and 2021

Pierce Transit will soon begin construction on its first BRT line, branded as Stream BRT, on Pacific Avenue/SR 7 connecting Downtown Tacoma with the Spanaway Transit Center (TC). Currently operated as Route 1, this corridor has the highest ridership in the system.

PierceTransit Stream

Major capital projects like BRT can take many years from planning to design to opening day. Pierce Transit must start planning the next Stream BRT corridor now.

Pierce Transit initiated the Stream System Expansion Study (SSES) to jump start this process. A previous effort had already identified four corridors for Stream BRT. These corridors were selected because they:

- Have high existing ridership.
- Connect regional growth centers with high numbers of people and jobs.
- Have high potential for future growth.

This study defined how each corridor would operate if it were Stream BRT and evaluated them using an equity-focused set of metrics.

Gaining buy-in from local partners is critical for Stream BRT's success. The evaluation integrated both data as well as agency and community input.

Figure 1 shows the four primary corridors as solid lines and variations that were identified by community members who participated in this project as dashed lines. The four corridors are served by local Pierce Transit routes today:

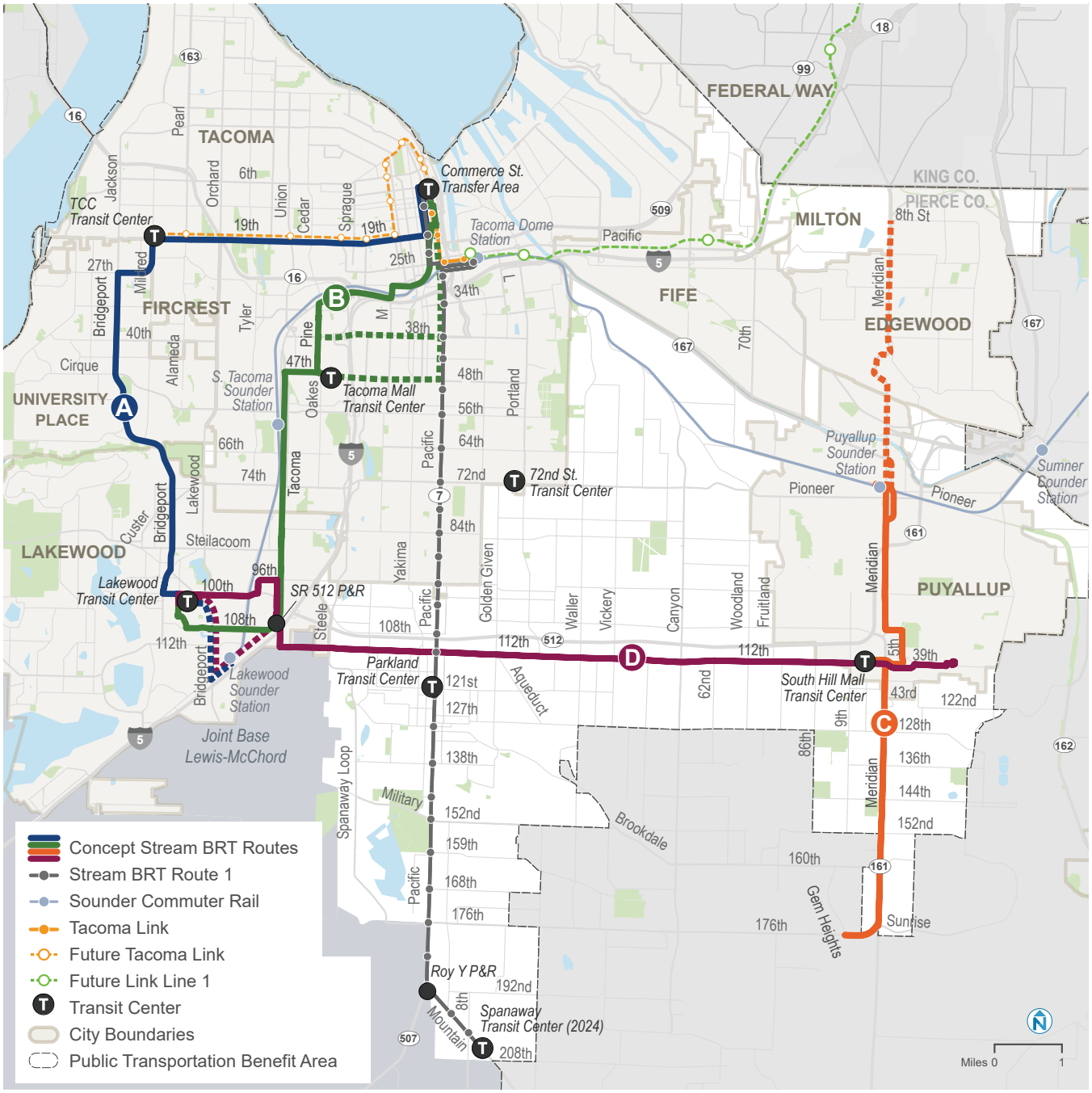
- Corridor A (Route 2)
- Corridor B (Route 3)

- Corridor C (part of Route 402 from Pierce County Airport to downtown Puyallup).
- Corridor D (Route 4).

Corridor B scored highest in terms of the quantitative analysis, but Corridor A also scored well and had strong community support. The results of this study are to advance both Corridors A and B for further refinement as Stream BRT.

Recommendations for building a Stream BRT system and making transit better for the area served by Pierce Transit are detailed in this document.

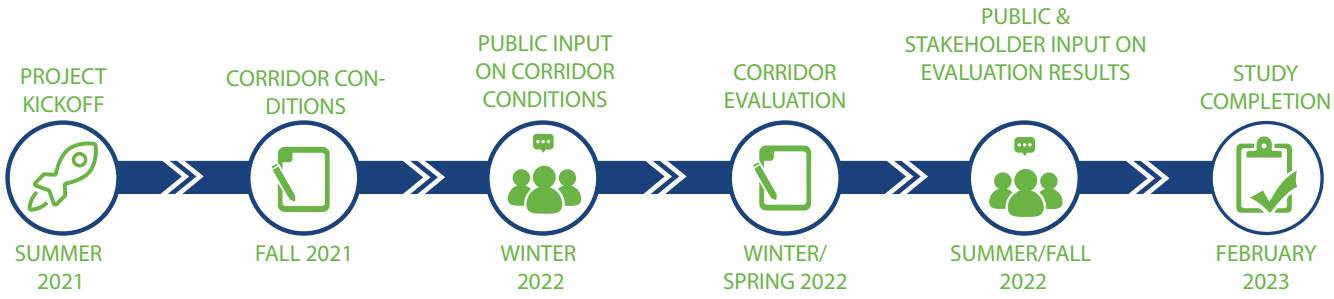
Figure 1: The study examined four primary corridors (solid lines) and variations (dashed lines)



SCOPE AND SCHEDULE

The project was conducted over 16 months (Figure 2) and included a wealth of technical work and community engagement.

Figure 2: Project Schedule



Key elements of the project included:

- Prioritization Framework: An equity-focused list of evaluation criteria to analyze each corridor.
- Service Standards: Standards for how Stream BRT should operate, such as the distance between stations and the target travel time savings compared to local bus.
- Corridor Definition: Detailing how each corridor would look and operate if it were Stream BRT, including the routing or alignment, station placement and transit priority street design features.
- Corridor Evaluation: Running each corridor through the prioritization framework.
- Public Input: Gathering feedback from the public throughout the project.
- Agency and Stakeholder Engagement: Coordination and input from the Technical Advisory Committee as well as ongoing agency briefings.
- Implementation Roadmap: Recommendations at the system and corridor level for Stream BRT rollout on each corridor.

Lane Transit District's EmX BRT in Eugene, Oregon

COMMUNITY ENGAGEMENT

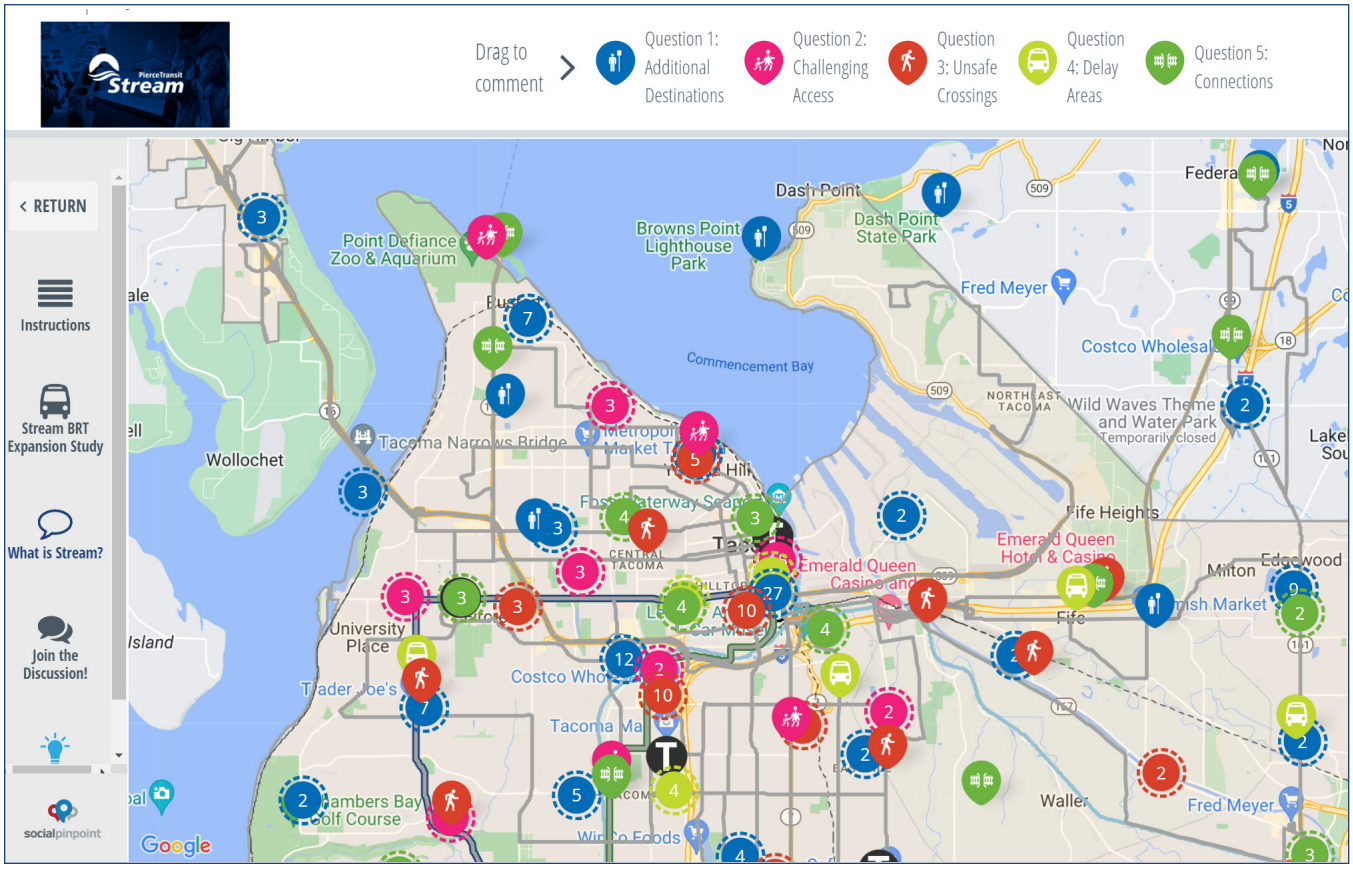
Community input on corridor conditions helped to define the corridors for evaluation. Questions around how the current system operates gathered insights into areas with safety challenges, places where the bus is delayed and destinations people wish they could reach (Figure 3).

An online survey launched in January 2022 and was open for five weeks. The survey yielded 418 responses plus 14 e-mail comments. The survey questions asked:

- **ADDITIONAL DESTINATIONS:** Are there additional destinations this corridor should serve?
- **CHALLENGING ACCESS:** Are there areas along this corridor where you have challenges accessing destinations?
- **UNSAFE CROSSINGS:** Are there areas along this corridor that you currently find difficult or unsafe to cross?
- **DELAY AREAS:** If you ride the bus or drive along this corridor, where do you experience the most delay or congestion?
- **CONNECTIONS:** What other transit services do you wish you could connect to from this corridor?

After the corridors were evaluated, an online open house was held to communicate the results. There were 30 participants, and their feedback generally affirmed and supported the evaluation results. For a full summary of community input, see Appendix E: Survey Summary.

Figure 3: Survey respondents used markers to flag the map and provide comments



PROJECT OVERSIGHT

Partnerships are critical to implementing a major capital project. The SSES effort sought to create and strengthen relationships and ultimately build support for this multi-year effort.

Representatives from across Pierce County and the region were engaged in all technical work and decision-making through participation in a Technical Advisory Committee (TAC). Staff from each jurisdiction, non-profits, WSDOT, Sound Transit, major health care providers and other organizations provided holistic insights into how transit can be implemented in the region.

The TAC supported the process and the findings of this study. The TAC met eight times throughout the project. For a full list of TAC names, see Appendix F: TAC Roster.

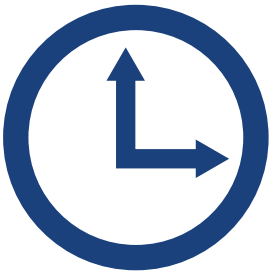
Technical Advisory Committee Roster

- City of Lakewood
- City of Tacoma
- City of Fircrest
- City of Edgewood
- City of University Place
- City of Puyallup
- Pierce County
- Sound Transit
- WSDOT
- Downtown: On the Go!
- Tacoma Community College
- Tacoma Metro Parks
- Tacoma-Pierce County Health Department
- MultiCare Health System

Select Bus BRT in New York City

THE NEED FOR HIGH-QUALITY TRANSIT

The Puget Sound region will grow by 770,000 people[1] and 600,000 jobs[2] by 2040. A significant amount of that growth will be in Pierce County.



Regional and local policies have coalesced around transit as a solution responding to the challenges of growth. Transit is:

- Space-Efficient. Buses move more people in the same amount of space as cars.
- Equitable. Transit ensures people of all income levels can access jobs and services.
- Climate-Friendly. Buses pollute less than cars on a per-passenger basis.
- Supportive of Compact Land Use. Transit reduces the need for elements like surface parking, allowing for development that is more attractive for walking and bicycling.

What is VISION 2050?

VISION 2050 is the region's plan for growth. By 2050, the region's population will reach 5.8 million people. The region's cities, counties, tribes, ports, agencies, businesses and communities have worked together to develop VISION 2050 to prepare for this growth and serve as a guide for sustaining a healthy environment, thriving communities and a strong economy.

Source: Tacoma Housing Authority

Figure 4: James Center North, near S. Mildred and S. 19th streets, is a 7-acre Transit Oriented Development project adding 650 residential units and 30,000 square feet of commercial space

1 Washington State Office of Financial Management. Growth Management Act population projections (2022 projections – middle series).

2 Based on assumed growth from 2017 to 2044 of 930,000 jobs. Assuming straight-line growth of approximately 34,400 new jobs per year, to estimate change from 2022 to 2030. PSRC Vision 2050 Planning Resources.

WHAT IS STREAM BRT?

Stream BRT is Pierce Transit's BRT program, a high-capacity bus system that allows more people to ride and provides riders with high-quality service that shortens travel time and can be relied on for many types of trips. Stream BRT will be Pierce Transit's premium transit service.

Elements of BRT

The Puget Sound Regional Council (PSRC) is the Metropolitan Planning Organization (MPO) for King, Kitsap, Pierce and Snohomish Counties, and defines HCT as:

*"A system of public transportation services within an urbanized region operating principally on **exclusive rights-of-way**… provides a substantially higher level of **passenger capacity, speed**, and **service frequency**."*

BRT is a form of HCT that has gained popularity across the country, being much less cost-intensive than rail transit and flexible to accommodate varying roadway conditions. Some transit services can be implemented using BRT features but at a lower cost, in a form that is often called "BRT lite." More details about this variation of BRT are available in Appendix N.

Systems across the country, as well as near Pierce County, have achieved success building and operating BRT (Figure 5).

Figure 5: Benefits of BRT

BRT System	**King County Metro RapidRide - Seattle, WA**	
	RapidRide is King County's BRT system. There are six lines today with another five in planning and design. Together they form a network of high-frequency, rapid transit services across the county.	
Outcome	RapidRide lines C, D and E achieved: • 87 percent increase in ridership • 11 percent faster travel times	
BRT System	**Community Transit Swift - Snohomish County, WA**	
	Opened in 2008, Swift was Washington State's first BRT service, pioneering high-capacity transit in a suburban context.	
Outcome	The Swift Blue Line achieved: • 35 percent increase in ridership • 30 percent travel time reduction	

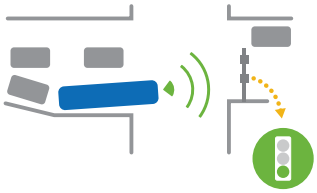
Stream BRT

Pierce Transit recently completed the planning and early design of its first BRT corridor, which will be called Stream Community Line. This route will operate along Pacific Avenue/SR 7, connecting downtown Tacoma, Parkland and Spanaway, which is Pierce Transit's highest-performing corridor. Construction is slated to begin in 2024, and services will begin operating in 2027. Stream Community Line will have a route length of 14.4 miles.

Stream BRT is distinguished from conventional bus services in the following ways (Figures 6 and 7).

Figure 6: Elements of Stream BRT

A FAST
Transit Signal Priority (TSP) extends green time or triggers the green time to start earlier, getting buses through intersections faster. Off-board fare payment speeds up passenger boarding.



B CONNECTED
BRT stations connect to transit centers and other major destinations.

C ACCESSIBLE
Raised platforms and larger vehicles make BRT accessible for those with mobility devices.

D FREQUENT
Buses run every 10-15 minutes, so riders won't need to rely on a schedule.

E EASY
Longer vehicles with multiple doors and raised platforms make it easy to get on and off the bus.

F RELIABLE
Real-time information at stations allow passengers to track bus arrival times.

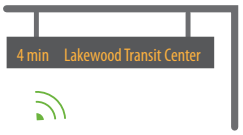
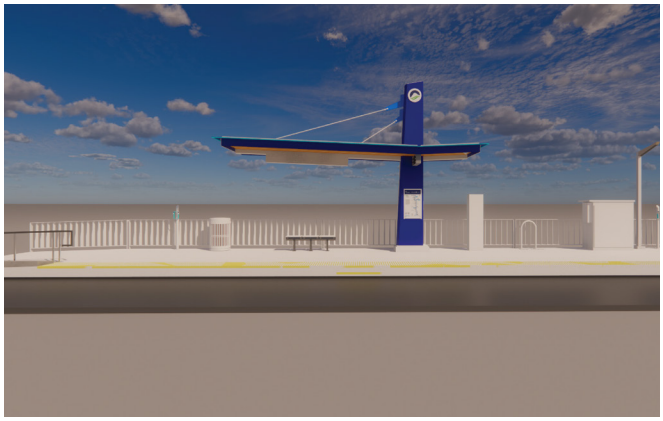


Figure 7: Stream BRT stations will include amenities, such as benches and covered platforms, that make waiting comfortable and easy



Source: Pivot Architecture

EXPANSION OF STREAM BRT

Pierce Transit identified four candidate corridors for future BRT service in its Destination 2040 Update. More than one quarter of residents in the Pierce Transit service area, and half of the jobs, are located within ½-mile of these corridors, which span a range of land uses and densities, including urban, suburban and unincorporated areas of the county.

Long-term, Pierce Transit envisions a network of multiple Stream BRT lines. Expansion of Stream BRT supports and aligns with regional and local policies as described below.

VISION 2050

VISION 2050 puts forth transit as a way to manage and support growth. The plan was authored by PSRC and serves as the regional policy direction for the Central Puget Sound Region. Both VISION 2050 and PSRC's Regional Transportation Plan envision a network of HCT services including light and commuter rail, ferries and BRT. Vision 2050 has a goal for 65 percent of the region's population growth and 75 percent of employment growth to be located in a regional growth center within walking distance of HCT. Stream BRT helps meet that goal.

Sound Transit 3

Stream BRT supports and complements funded regional transit investments. The Sound Transit 3 (ST3) plan adds 62 miles of light rail and implements BRT and other express services throughout the region. Voters approved the plan in November 2016.

Within Pierce County this influx of funding, and broader Sound Transit funding, resulted in several major projects relevant to Stream BRT (Figure 8):

- Link light rail T Line extension from the Theater District in downtown Tacoma to the Hilltop neighborhood to Tacoma Community College (TCC).
- Lakewood and South Tacoma Sounder station access improvements.
- Extension of Link light rail from Federal Way to Tacoma Dome Station.
- Sounder South capacity expansion, adding more service to Tacoma Dome Station.

The Stream BRT candidate corridors connect to many of these transit centers, strengthening the regional transit network.

Figure 8: ST3 Projects in the South Sound

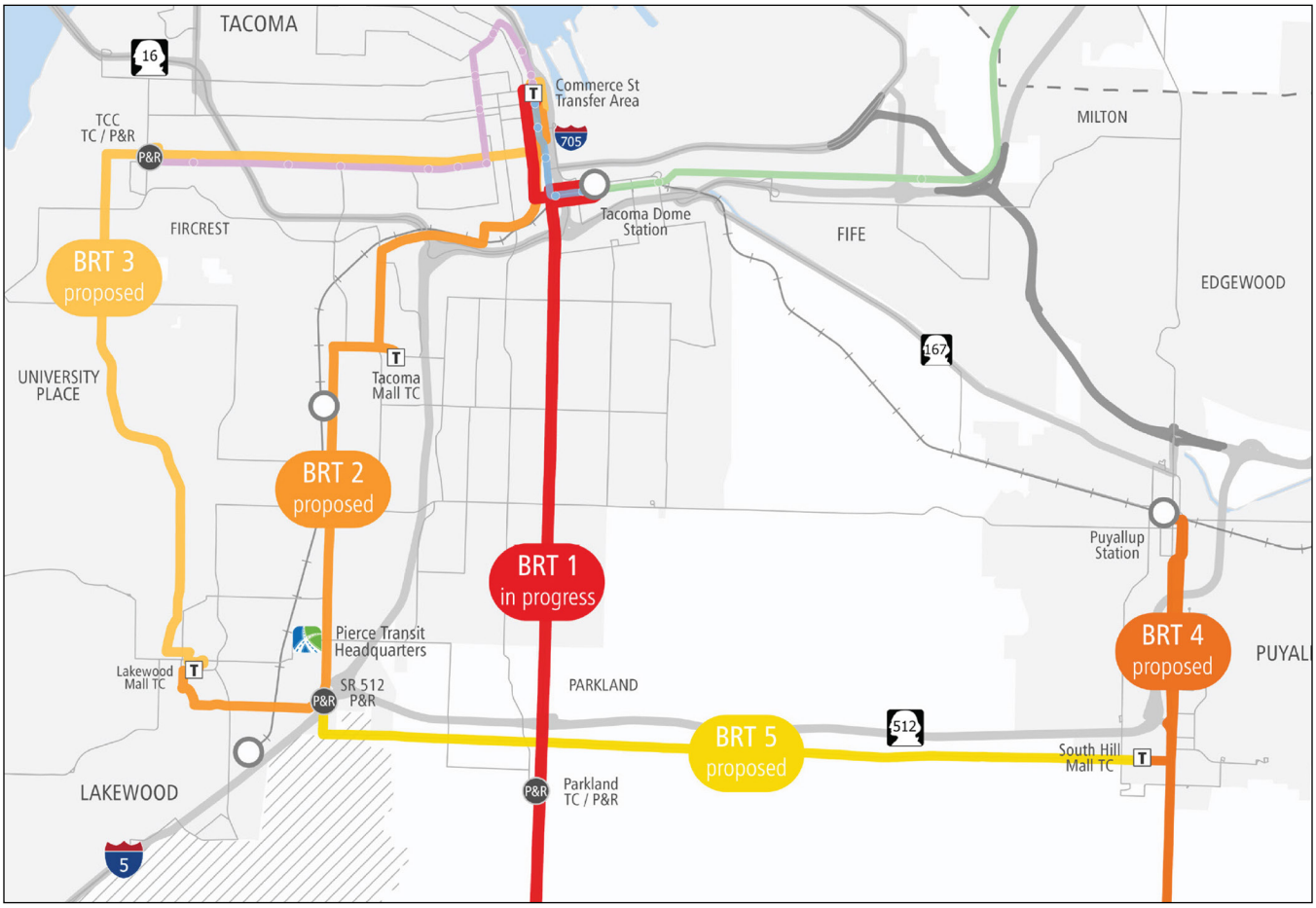
Source: Sound Transit

DESTINATION 2040 UPDATE

The Destination 2040 Update to Pierce Transit's long-range plan (completed in 2020) and its recommendations are coordinated with the regional vision for using transit as a growth management and equity tool. In the Destination 2040 Update, BRT was chosen as the appropriate HCT mode that best meets Pierce Transit's goals.

The plan identified a network of five connected Stream BRT corridors throughout the Pierce Transit service area (Figure 9). These corridors were identified based on criteria such as identified growth centers, connection to Sound Transit expansion projects, existing and planned bicycle and pedestrian access and public input. The work of the Destination 2040 Update was the springboard for the SSES project.

Figure 9: The Destination 2040 Update identified these corridors for Stream BRT



Source: Pierce Transit

NOTABLE LAND USE CHANGES

Regional growth is occurring rapidly along the Stream BRT corridors. Major new development projects and land use code updates will increase density around the study corridors. These developments and code changes provide a strong opportunity to create integrated public transit, housing and employment investments that support high transit ridership and make future Stream BRT service a convenient and attractive choice for more people.

Figure 10: James Center North/Aviva Crossing

Source: Tacoma Housing Authority

Major Developments

A sample of developments within the study area is outlined below.

- **Tacoma's Downtown Brewery District Infill** is adding 200 housing units, 25,000 square feet of retail space and 75,000 square feet of office space in the heart of downtown Tacoma.
- **James Center North/Aviva Crossing** will create a walkable, compact, mixed-use, mixed-income, transit-oriented development along S. 19th Street in Tacoma's west end, with up to 650 housing units and 30,000 square feet of commercial space (Figure 10).

- **Four Corners Redevelopment Planning Area** provides an opportunity to coordinate land use and transportation planning between the cities of Tacoma, Fircrest and University Place around Tacoma Community College and the future terminus of the T Line extension (Figure 11).
- **Lakewood Landing Transit-Oriented Development** presents an opportunity to add hundreds of housing units and a large quantity of commercial space near the Lakewood Sounder train station and adjacent to several of the SSES study corridors.
- **The City of Edgewood** is planning for increased mixed-use density along Meridian Avenue and is anticipating up to 5,000 additional residents by 2050.

Figure 11: University Place Northeast Business District

Source: LRS Architects

Code Updates

Recent planning and code efforts encourage higher density and may increase demand for transit.

- **Fircrest and University Place Form-Based Codes** will support public transit ridership by creating a diverse mix of land uses, excellent walkability and pedestrian connectivity and higher density along portions of S. 19th Street and Bridgeport Way.
- **Home in Tacoma** is a package of changes to Tacoma's zoning, city code and policies to increase housing supply and improve housing affordability and selection. These changes are expected to add up to 40,000 new housing units in Tacoma over the next two decades.
- **Pierce County Zoning Changes** enable increased residential and employment density in unincorporated areas of Pierce County, including some areas of the SSES study corridors. In certain places additional transit-supportive density beyond the base code updates will be unlocked once BRT service is funded or operating.

For more detail on land use changes, see Appendix G: Current and Future Market Summary.

SECTION 2

CORRIDOR DEFINITION

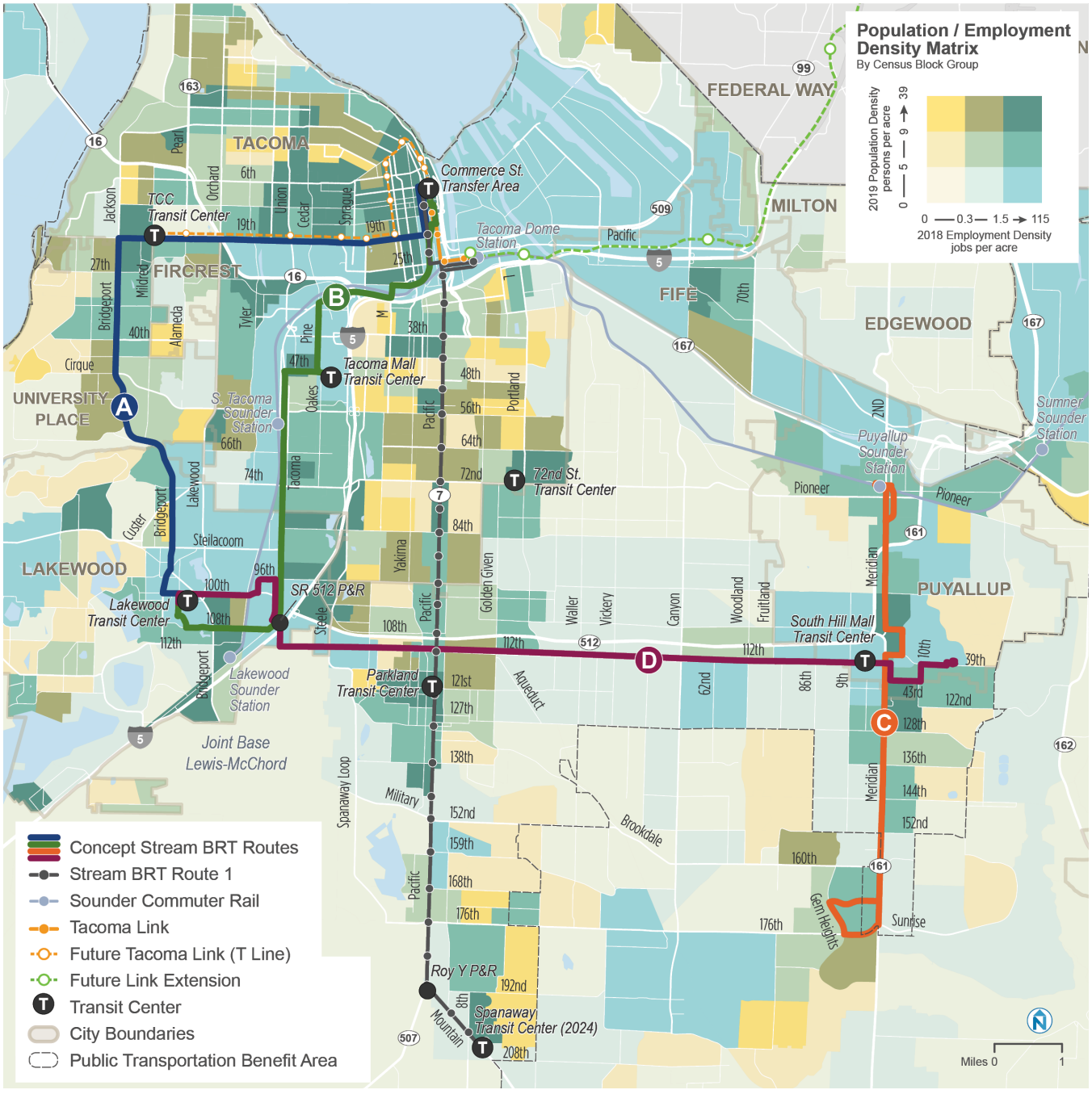

3 DOWNTOWN TACOMA
10122
PierceTransit
Pierce Transit

OUR COMMUNITY

DEMOGRAPHICS SNAPSHOT

Transit exists to get people where they need and want to go. Understanding the market for transit (Figure 12), where people are traveling and areas identified for growth helps to shape the transit system in the South Puget Sound.

Figure 12: Population and Employment Density



Transit succeeds when it serves corridors with a density of people, jobs and destinations. The candidate corridors will reach a significant portion of the area served by Pierce Transit:

- Pierce County 2018 Population: **877,013**
- Pierce Transit service area 2019 Population: **557,047**
- **26 percent** of population (145,230 people) lives within ½-mile of candidate corridors.
- Pierce Transit service area 2018 Jobs: **243,033**
- **49 percent** of jobs (119,154) are within ½-mile of candidate corridors.

The candidate corridors also serve numerous major destinations, including four hospitals, six transit centers, four higher education institutions and 58 schools.

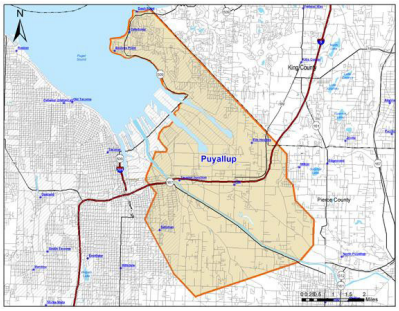
See Appendix A: Community Demographics for additional detail on the people served by Pierce Transit.

STATEMENT ON HISTORIC OPPRESSION

Pierce Transit and the SSES team recognize the historic harms caused to Black people, Indigenous people, and people of color by land and transportation system development. We do so to ensure future decisions create benefits for and with these communities and others. Transportation and land use decisions such as the creation of I-5 and the Port of Tacoma (Figure 13) have had lasting devastating impacts on communities.

For more detail see Appendix A: Community Demographics.

Figure 13: Portions of the Puyallup reservation (yellow) were taken from the Tribe and became the Port of Tacoma



Source: Wikimapia

PROJECTED GROWTH

The region is growing and transit is a way of managing that growth. PSRC projects that by 2040 Pierce County will see a:

- 54 percent increase in jobs to 463,000 total.
- 53 percent increase in households to 466,000 total.

Growth patterns vary by corridor. Overall, corridors A and B are projected to grow the most (Figure 14).

Figure 14: Projected Growth within a Half-Mile of Each Corridor

Employment growth

Corridor	2019 *per acre*	2040 *per acre*	Growth Percentage
A	6.5	10.6	63%
B	7.8	13.2	70%
C	2.6	4.0	51%
D	2.6	3.7	43%

Household growth

Corridor	2019 *per acre*	2040 *per acre*	Growth Percentage
A	3.2	6.6	106%
B	2.9	6.7	129%
C	1.9	2.9	57%
D	1.7	2.4	42%

SERVICE DESIGN STANDARDS

Transit agencies plan, design and operate their services based on adopted service standards. Standards help agencies understand if buses are operating at an acceptable level.

In planning the four corridors, service standards were developed based on best practices, peer agency standards and guidance from planning Stream Community Line. Highlights from four topics are presented here:

- Station Spacing
- Station Locations
- Service Span and Frequency
- Travel Time Savings

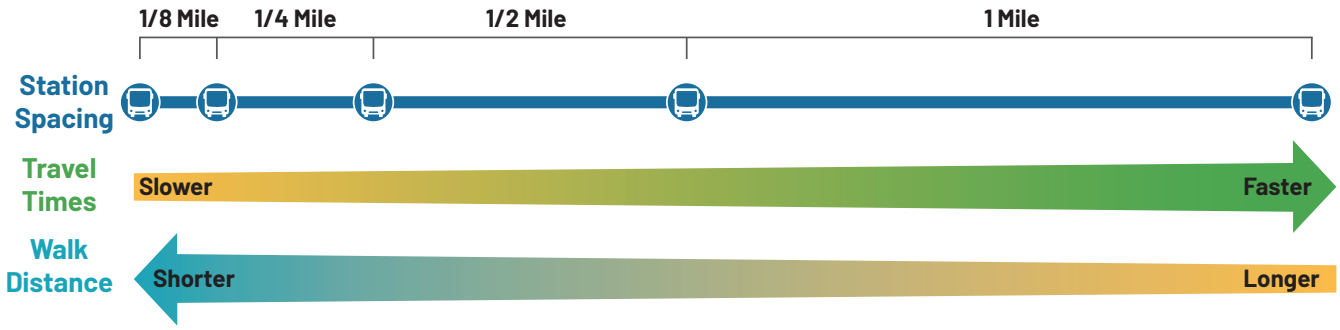
See Appendix C: Program Standards for additional detail.

STATION SPACING

Station spacing is the distance between stations along a transit route in the same direction.

There are benefits and drawbacks to both longer and shorter spacing. Longer spacing means faster travel times. Shorter spacing means less walking between stations and destinations, which is helpful for people with limited mobility. Station placement decisions must balance speed and reliability with convenient access (Figure 15).

Figure 15: Station spacing has a direct impact on travel times



Today, stop spacing is much shorter than the proposed Stream service standard.

- Route 2 / Corridor A: 0.19 mile
- Route 3 / Corridor B: 0.20 mile
- Route 402 / Corridor C: 0.29 mile
- Route 4 / Corridor D: 0.24 mile

Standard

Locate stations every **1/2-mile** on average. The minimum is **1/4-mile**.

Land use and other context factors must be considered in determining final station spacing.

STATION LOCATIONS

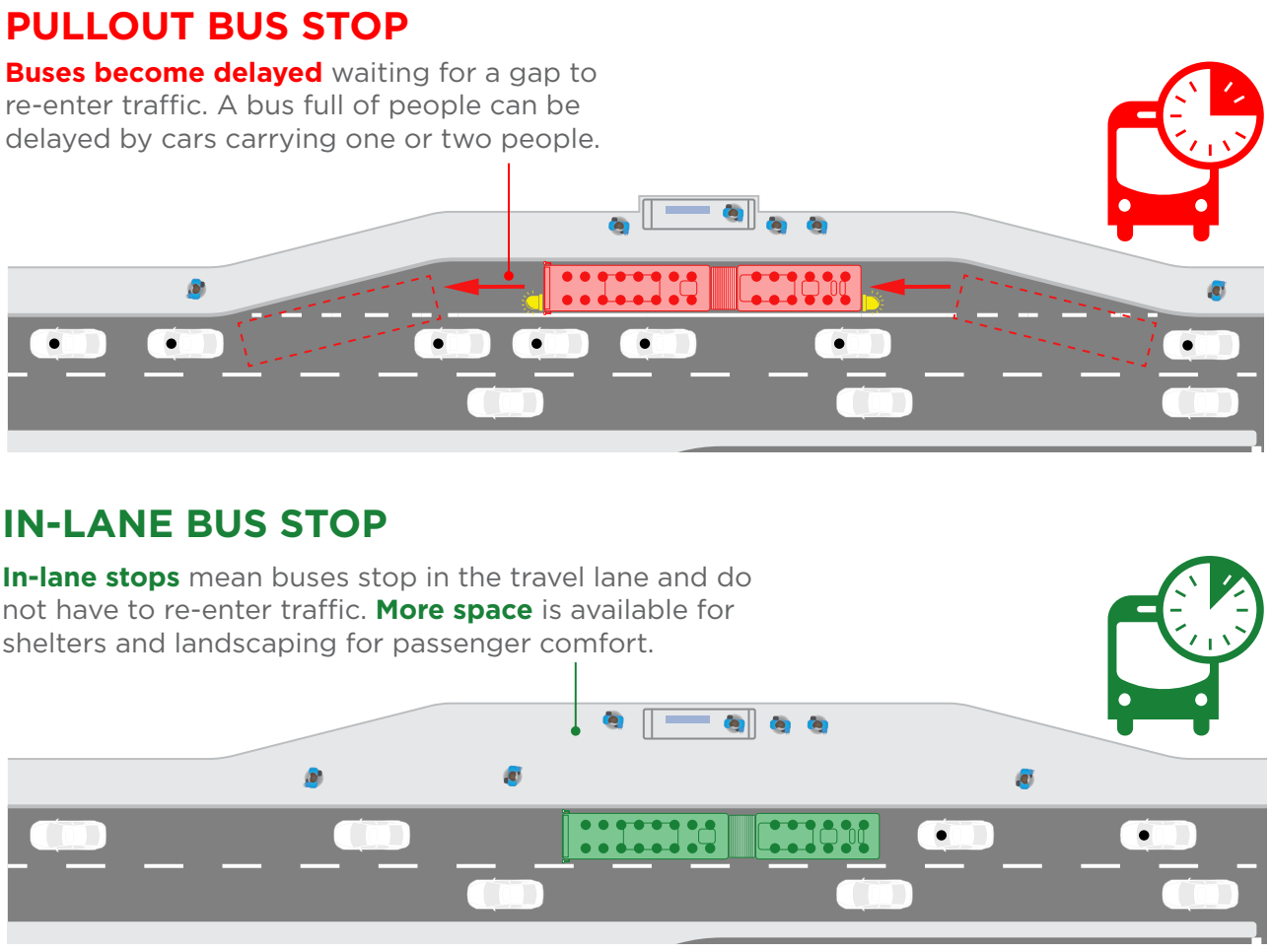
Station location refers to where along a block or intersection the station is sited.

Far-side stops past traffic lights have the greatest benefit for travel times as buses are slowed less by traffic lights. Far-side stops are preferred by most transit agencies.

In-lane stops mean buses can stop in the travel lane to unload and load passengers. This reduces delay because the bus does not have to pull over and then re-enter traffic (Figure 16).

For the SSES study evaluation, Stream BRT service was assumed curbside only, with far-side and in-lane stops.

Figure 16: In-lane stops are best for bus travel times



Standard

Place Stream BRT stations at the **far side of intersections** with in-lane stops.

SERVICE SPAN AND FREQUENCY

Service span refers to the hours that transit service operates in a given day. A longer service span, such as service starting early in the morning or running late in the evening, meets the needs of more riders and increases overall route ridership.

Frequency, or headways, refers to how often a bus arrives. If a bus arrives more frequently, this gives riders flexibility in planning their travel and reduces wait times, especially if passengers have to transfer to another bus or mode of transit.

Span

Standard

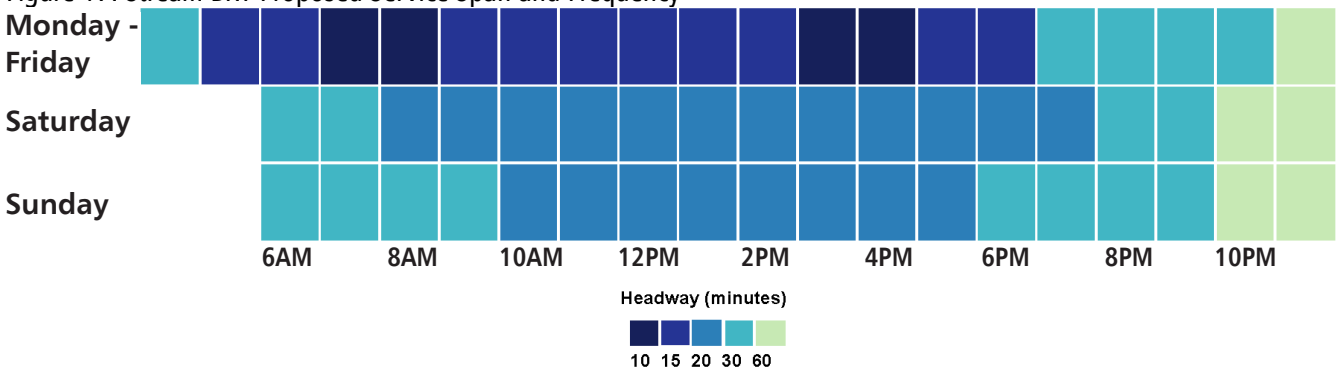
- Provide Stream BRT service 20 hours per weekday (4 a.m.-Midnight).
- Provide Stream BRT service 18 hours per weekend day (6 a.m.-Midnight).

Frequency

Standard

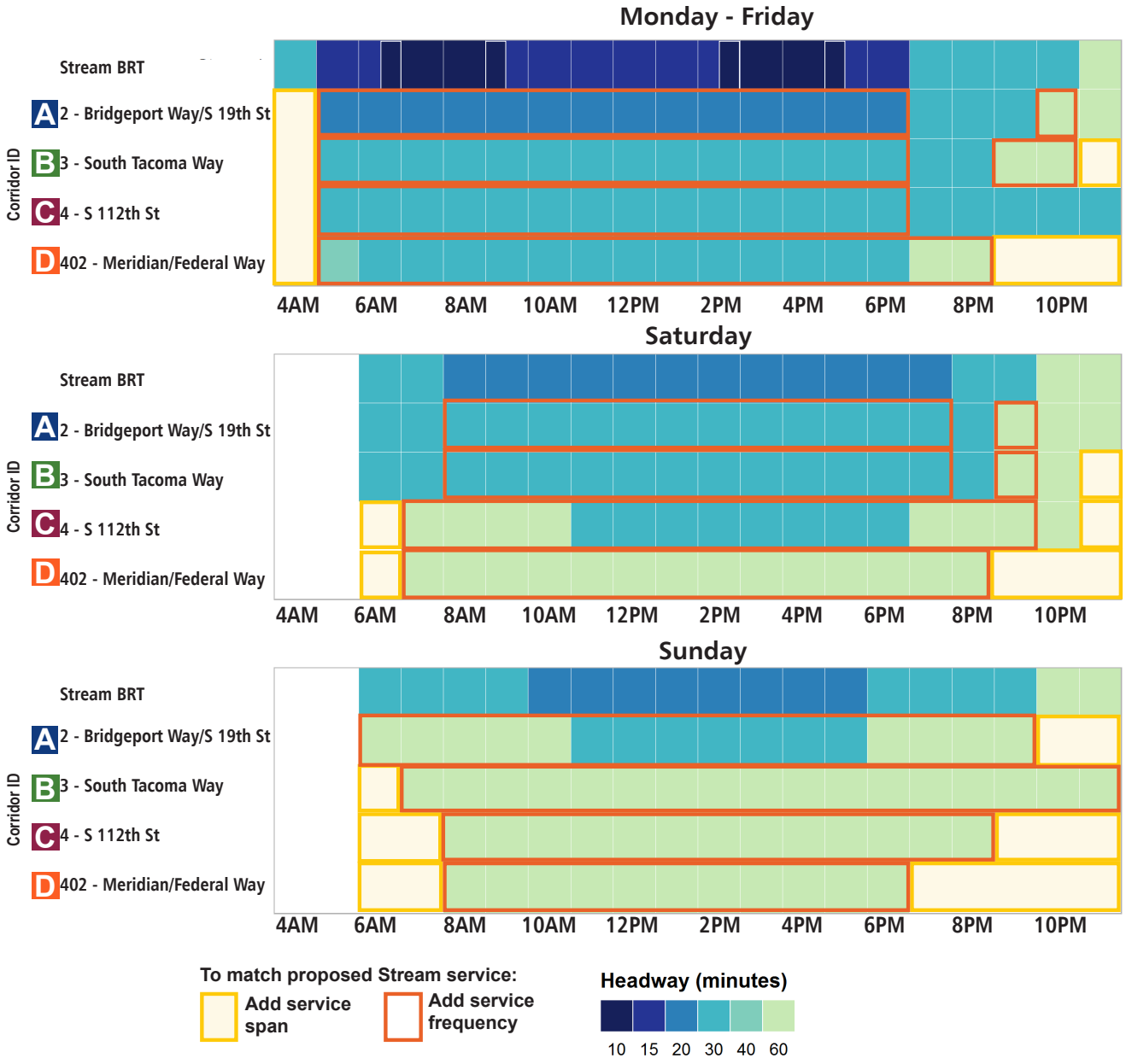
- Peak: 10-minute headways 6:30-9:30 a.m. and 2:30-5:30 p.m.
- Off-Peak: 15-minute headways 5 a.m.-7 p.m. (14 hours per weekday).
- Early morning and evening: 30-minute headways before 5 a.m. and from 7 p.m.-11 p.m.
- Night: 60-minute headways 11 p.m.-12 a.m.
- Weekend: 20- to 30-minute headways 6 a.m.-10 p.m. 60-minute headways 10 p.m.-12 a.m.

Figure 17: Stream BRT Proposed Service Span and Frequency



Overall, significant investments in service will be needed to meet the standard shown in Figure 17. The current span and frequency for the routes operating on the candidate corridors are shown in Figure 18. Route 2 most closely matches the Stream BRT standard.

Figure 18: Existing span and frequency and modifications needed to meet Stream BRT standard



TRAVEL TIME SAVINGS

Transit travel time is the total time it takes a passenger to travel from the stop where they board to the stop where they alight (Figure 19).

The length of time it takes to travel a corridor by bus is made up of two main components:

- Time spent moving with traffic and stopping at traffic lights. This is called "running time."
- Time spent slowing down, stopping for passengers and speeding up again. This is referred to in this document as "boarding time."

Standard

Reduce running time by 20% or more. Evaluate pre- and post-implementation.

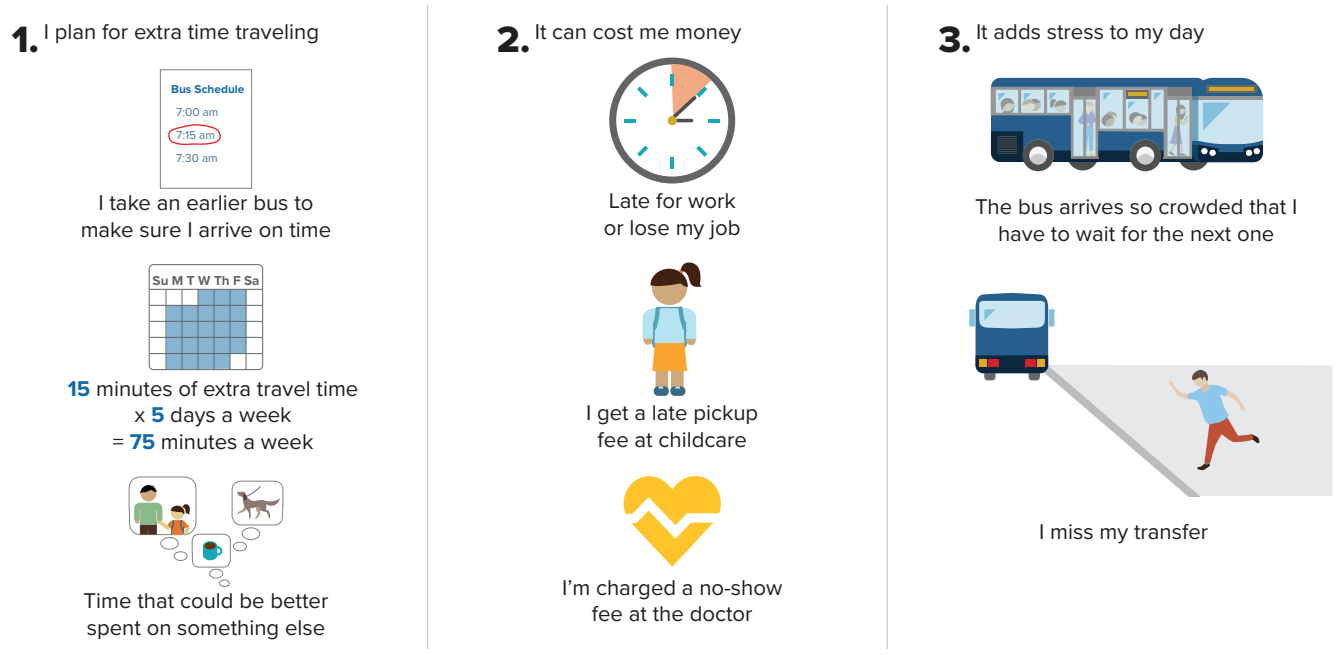
Figure 19: Components of Bus Travel Time

Impacts of Bus Delay

Buses are delayed when it takes longer than average to travel a corridor due to increased running time and increased boarding time. Delay to one bus also affects every person on that bus.

Bus delay hurts existing riders and can deter new riders. It has real impacts on people's lives (Figure 20).

Figure 20: Impacts of Delay on Passengers



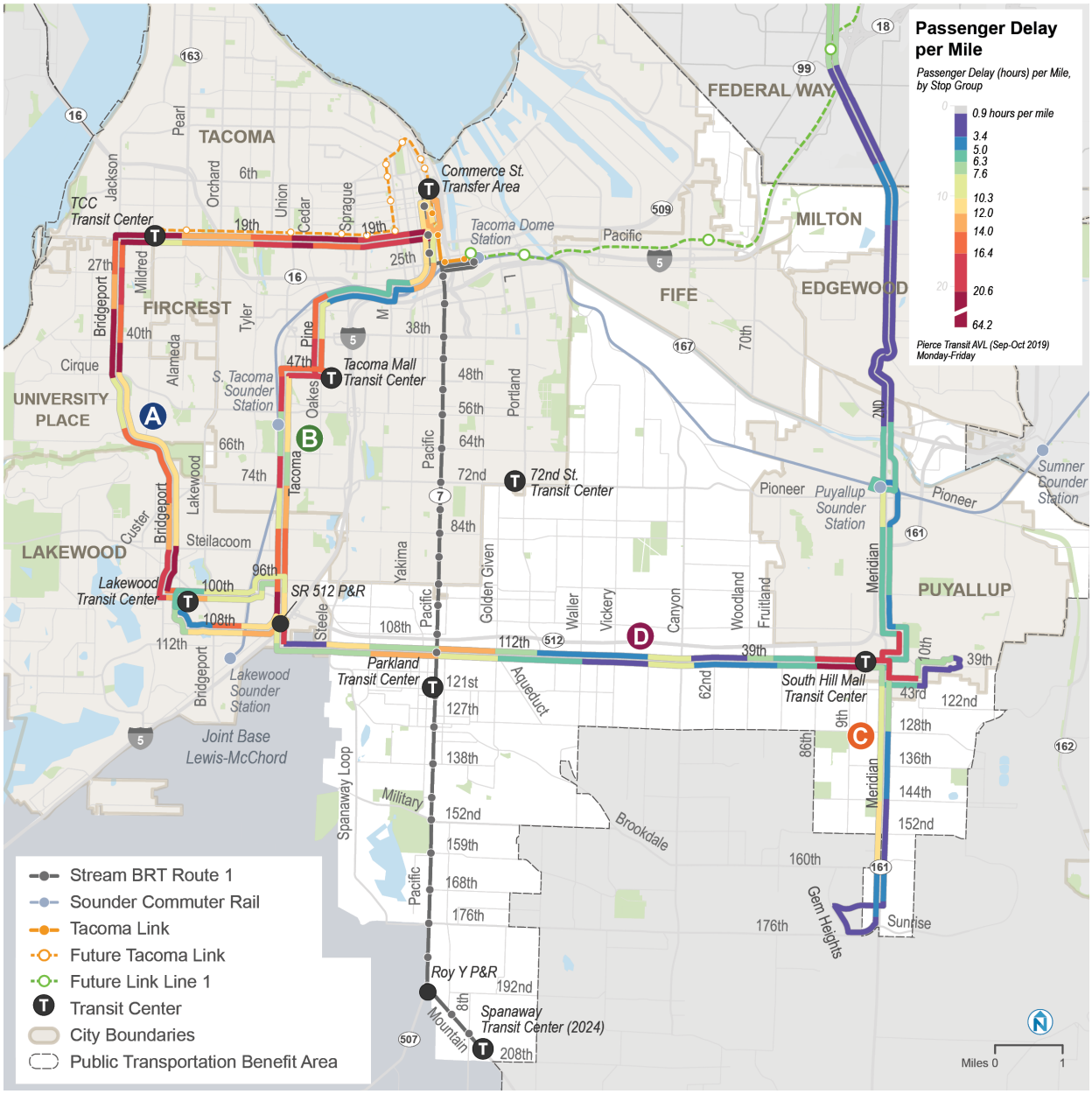
DELAY TODAY

Passenger delay is the combined delay experienced by all people on board. On weekdays, each route experiences the following amounts of passenger delay (Figure 21):

- Route 2: **400 hours (17 hours per mile)**
- Route 3: **262 hours (12 hours per mile)**
- Route 4: **272 hours (10 hours per mile)**
- Route 402: **193 hours (5 hours per mile)**

Passenger delay is concentrated at transit centers like TCC TC and South Hill Mall TC. Corridor A has the highest passenger delay. Corridor C and D have the lowest delay – the main hot spot is at South Hill Mall TC.

Figure 21: Daily Passenger Delay



SPEED AND RELIABILITY TOOLKIT

Making buses faster and more reliable can be achieved through changes to street geometry and operations. Types of treatments under consideration for Stream BRT are summarized here. These treatments were discussed with stakeholders and opportunities for each corridor are listed as projects in the next section.

1- Transit-only signal

Signal for buses only with all other movements held.

2- Transit-only lanes

Transit Lanes can be reserved for buses only or can be shared with right-turning traffic.

3- Queue jump

A short section of exclusive transit lane approaching a signalized intersection, often paired with a far-side receiving lane and/or far-side stop.

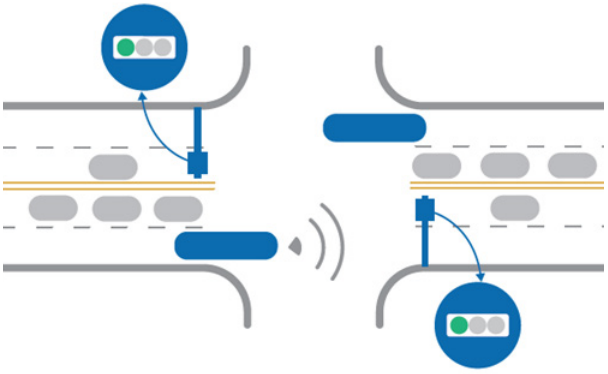
4- Queue jump signal and bypass lane

A queue jump signal is a traffic signal that lets the bus cut ahead of general purpose traffic waiting at the intersection, with no far-side receiving lane.

Source: NACTO

5- Transit Signal Priority (TSP)

Signals equipped with Transit Signal Priority give buses priority movement through intersections. This may include altering timing or phasing or triggering a transit-only phase. Travel time savings for SSES corridor analysis assumed TSP would be installed at 50 percent of intersections on candidate corridors.

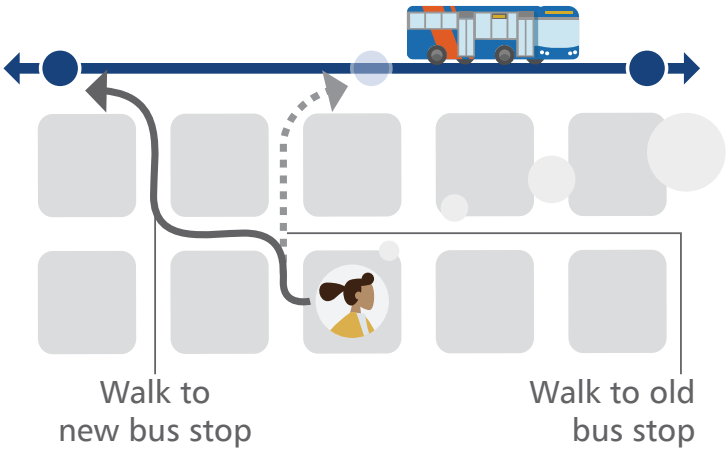


6- In-lane stop

Buses stop in the travel lane, which reduces the time needed to re-enter traffic.

7- Stop consolidation

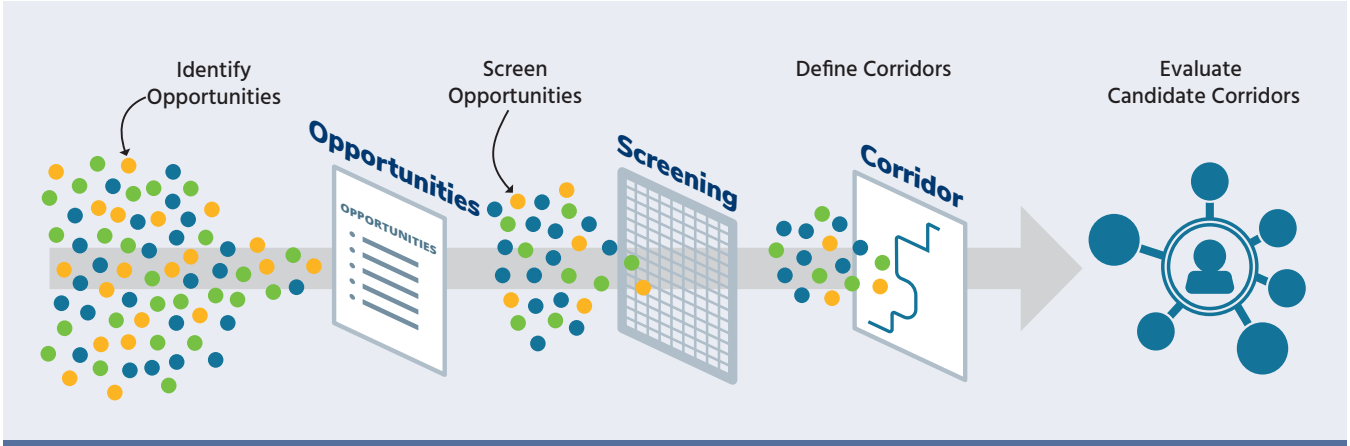
Stop consolidation removes certain stops to improve bus travel time by reducing delay resulting from dwell time at stops, acceleration, deceleration and merging. Stream BRT standards target half-mile station spacing.



With fewer stops, my bus is **faster** and **more reliable**. It takes me one more minute to walk to my new stop.

Commerce Street Station in Downtown Tacoma

CORRIDOR DEFINITION



What does "Corridor Definition" mean?

Corridor definition involves designing each corridor as if it were Stream BRT. This process includes:

- Meeting Stream BRT service standards.
- Identifying station locations.
- Figuring out the routing.
- Identifying projects from the speed and reliability toolkit.
- Calculating how much it will cost to build and operate.

CORRIDORS OVERVIEW

The four corridors that are candidates for Stream BRT are shown in Figure 1 in Section 1.

Through analysis and engagement, options were developed for how to turn each route into Stream BRT. These improvements included ways of making the route faster, serving new destinations and modifying the routing.

See the following appendices for additional detail:

D: Transit Service Analysis

H: Corridor Alignment Screening

I: Conceptual Station Locations

J: Speed and Reliability Opportunities

Defining Corridor C

Corridor C includes a portion of existing Route 402, which runs from the Airport/Sunrise neighborhood at the south end of Meridian to Federal Way Transit Center in King County. For this project, Corridor C was defined as the portion between Edgewood and the Airport. This is the section that would be operated as Stream BRT.

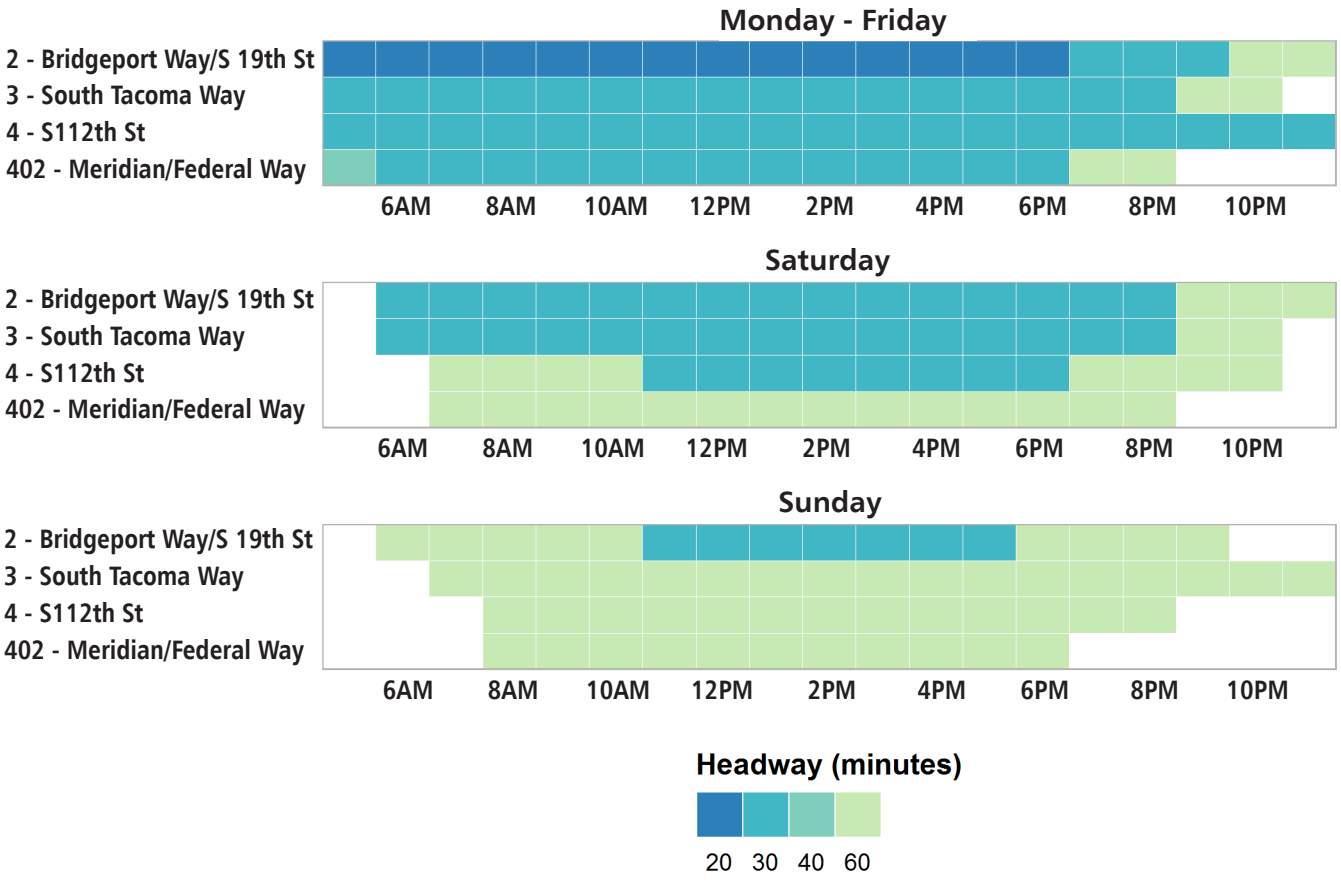
To be inclusive, in this report statistics for both Route 402 today and potential Stream BRT Corridor C are shown.

KEY STATISTICS

Corridors A, B, C and D cover a wide portion of the Pierce Transit service area.

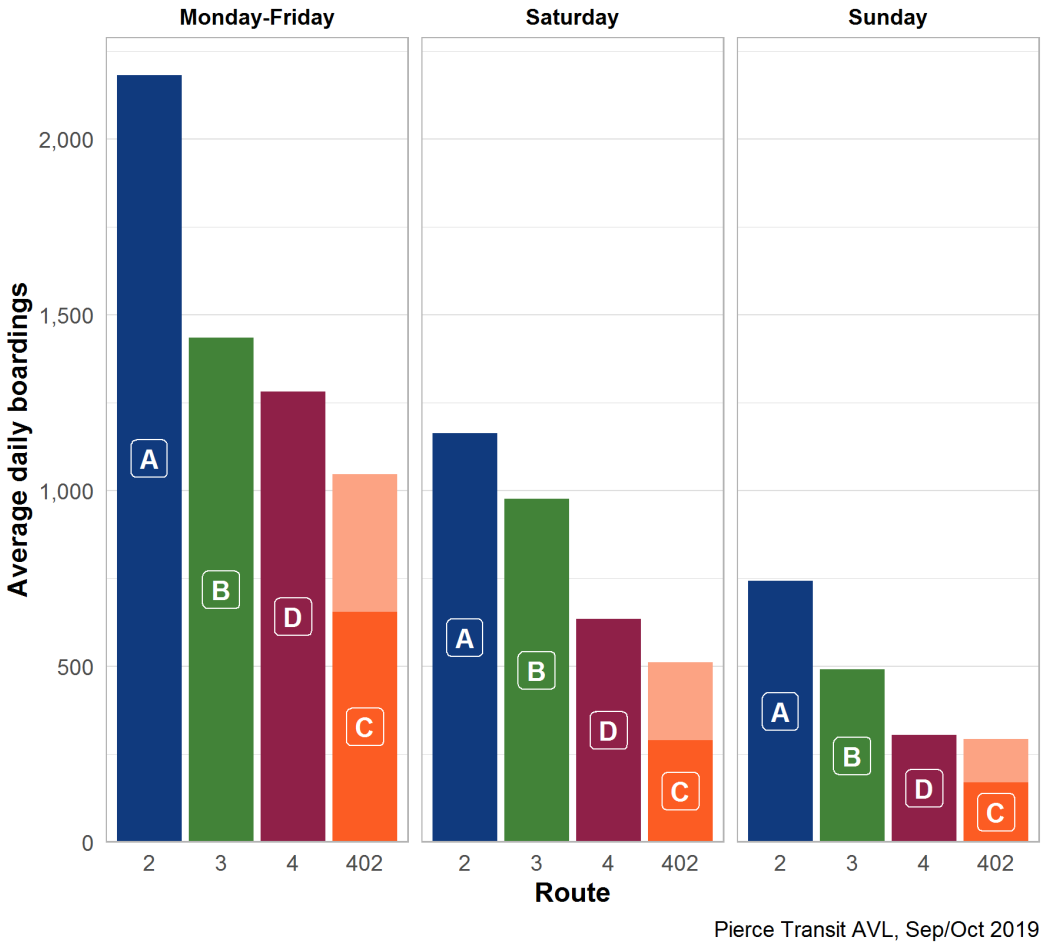
Today, the routes that operate in these corridors run seven days per week, with a range of frequencies, or headways (Figure 22).

Figure 22: Service Hours and Frequency



In terms of overall ridership, Corridor A / Route 2 has the highest of the four corridors (Figure 23).

Figure 23: Average Daily Boardings



The rest of this chapter defines corridors A, B, C, and D – meaning how they would look and operate if they were Stream BRT.

There are three main building blocks of a project like this:

ALIGNMENT AND TERMINI
Where the bus goes and where the route ends.

STATIONS
Where people get on and off the bus.

OPERATING ENVIRONMENT
What does the design of the street look like and how does it accommodate transit.

CORRIDOR A: DOWNTOWN TACOMA TO LAKEWOOD TRANSIT CENTER

Corridor A generally matches existing Route 2. Through stakeholder engagement, two additional variations were identified.

ALIGNMENT

A: Downtown Tacoma to Lakewood Transit Center (Primary Alignment)

Corridor A travels from Downtown Tacoma to TCC via S. 19th Street, south on Bridgeport Way through University Place, and terminates at Lakewood TC (Figure 24). Route 2 has the second-highest ridership in the Pierce Transit system.

A1: Downtown Tacoma to Lakewood Sounder Station

Corridor A1 is the same as Corridor A but after serving Lakewood TC, the corridor extends south on Bridgeport Way then onto Pacific Highway to access the Lakewood Sounder station (Figure 25).

Figure 24: Corridor A

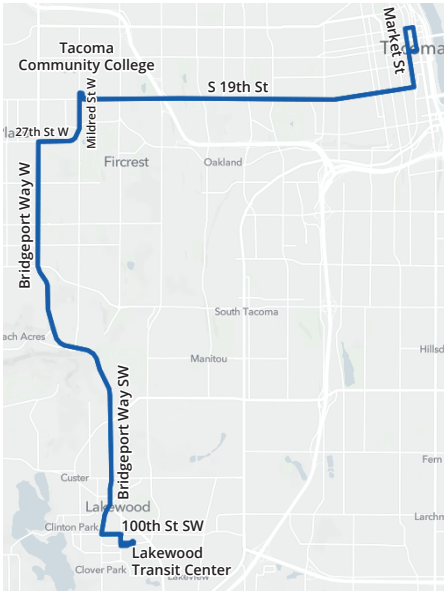
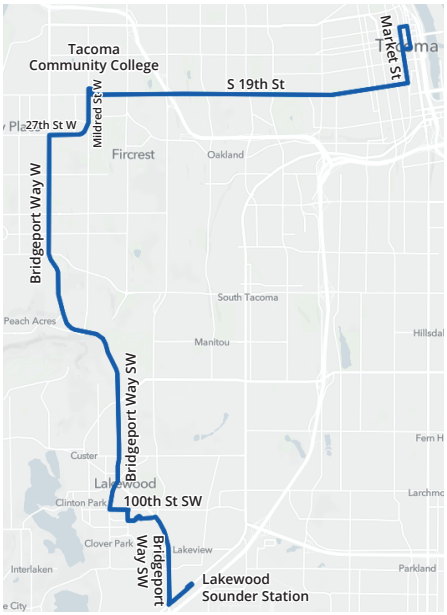


Figure 25: Corridor A1



Route 2

Length:	12.0 miles	Average passenger trip length:	5.4 miles
Average daily boardings	2,180	Total one-way travel time	50-60 minutes

Lane Transit District's EmX BRT in Eugene, Oregon

Route 2 Compared to Corridor A

Today, Route 2 travels on S. 19th Street then turns onto Bridgeport Way (Figure 26).

Major developments are planned in this area. These include:

- **James Center North/Aviva Crossing:** The Tacoma Housing Authority will build a mixed-income development at S. Mildred Street and S. 19th Street including 650 housing units and 30,0000 square feet of commercial space.
- **Four Corners:** The Tacoma, Fircrest and University Place borders touch at S. 19th Street and Mildred Street W, or Four Corners. This area has been identified as an opportunity for redevelopment. Fircrest adopted a form-based code in this section of S. 19th Street, which can lead to walkable, transit-supportive development.
- **Narrows Urban Village:** The redevelopment of Narrows Plaza Bowl in University Place at the southwest corner of Mildred Street W and S. 19th Street will include 274 housing units.

All Corridor A variations are proposed to turn onto Mildred Street W then on 27th Street W to access Bridgeport Way (Figure 27). This modification makes sense for future Stream BRT.

Figure 26: Current Route 2

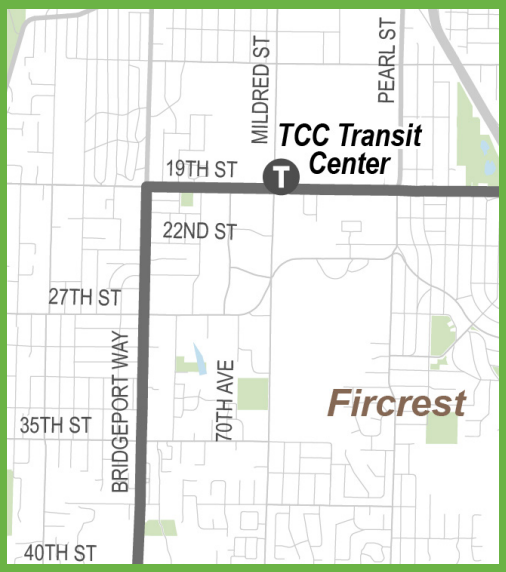
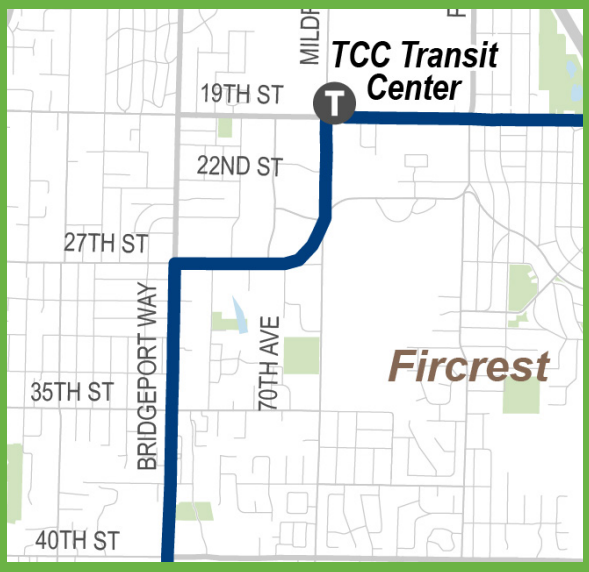


Figure 27: Proposed Alignment



LAKEWOOD SOUNDER STATION

The public and stakeholders emphasized how important this location is for three reasons:

- The station provides **mobility** with connections to Sound Transit rail and buses.
- There are plans to make **station access** easier for walking and bicycling.
- The Lakewood Landing development will bring **high growth** in jobs and residents.

Lakewood station could be added onto three of the Stream candidates – A, B or D.

Mobility:

The Sounder station provides access to the S Line to Seattle. Service is very commuter-oriented, with seven outbound trips in the morning and seven inbound trips in the afternoon. There is one inbound trip from Seattle to Lakewood in the morning.

In addition to rail service, Sound Transit Express routes 592 and 594 also serve Lakewood Sounder station. The public and stakeholders emphasized the importance of the 594 in particular. This route runs every 20-30 minutes from 8:30 a.m. to 10 p.m. with service to Seattle.

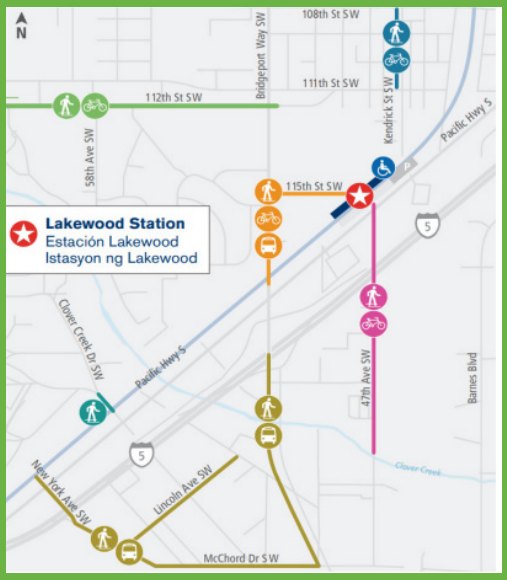
Station Access:

Sound Transit is in the early design phases for several projects that will make it easier to walk and bicycle to the Lakewood Sounder station (Figure 28). Projects include adding sidewalks and crossings, better lighting, micromobility parking (e-bikes, e-scooters) and trail connections.

High Growth:

Lakewood Landing is a 30-acre development that is part of the Lakewood Station District Subarea Plan (Figure 29). The first phase of this development on one-third of the site may add 760 housing units and 87,000 square feet of retail space.

Figure 28: Sound Transit's plans will make it easier to walk or bicycle to the Lakewood Sounder station



Implications for Stream BRT Service:

Today, routes 2 (Corridor A), 3 (Corridor B) and 4 (Corridor D) **do not serve Lakewood Sounder.**

The factors discussed here make a strong case for Stream BRT to serve this location in the future.

Figure 29: Lakewood Subarea Plan Development Rendering

Source: City of Lakewood

The 594 goes to Seattle all day until 10:00 p.m. They do need to reroute all routes in Lakewood to Lakewood Station.

This route should be extended to the SR 512 Park-and-Ride so people in the south end have easier access to the 574 and 594. It would be MUCH easier for us to transfer.

I strongly believe that there needs to be better local transit access to Sounder rail stops.

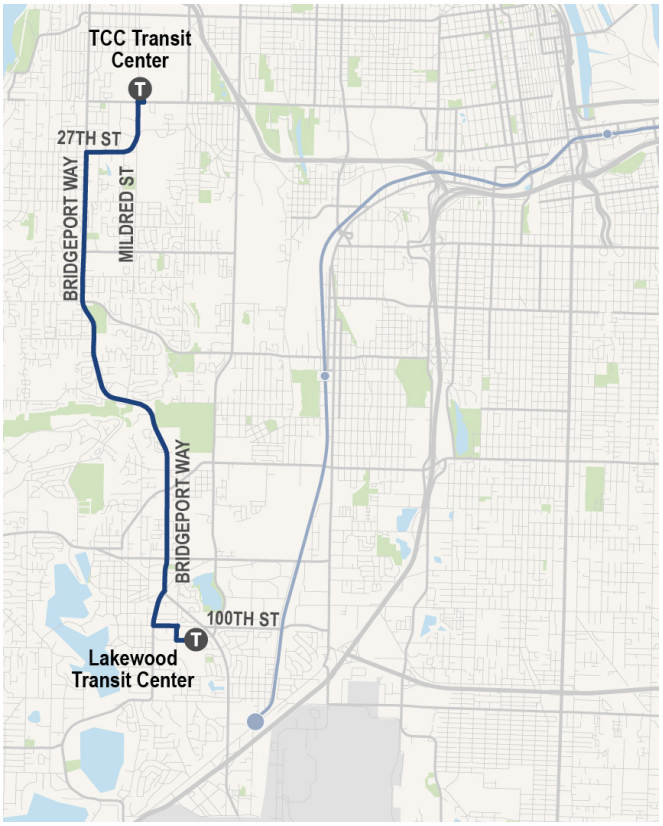
I definitely think there should be [Pierce Transit] buses that stop at this station. Would make it easier for some to catch the train.

All quotes from SSES community survey.

A2: TCC to Lakewood Transit Center

Corridor A2 would be a shorter version of Corridor A. As Stream BRT, A2 would cover the TCC to Lakewood TC portion of Corridor A (Figure 30). This variation avoids potential conflicts with Sound Transit's planned T Line on S. 19th Street.

Figure 30: Corridor A2



Did You Know?

Lakewood TC has the **highest ridership** of all the stops in the Pierce Transit system. Eight Pierce Transit routes serve this location. Before the pandemic, in fall 2019, 1,211 people used this station each weekday.

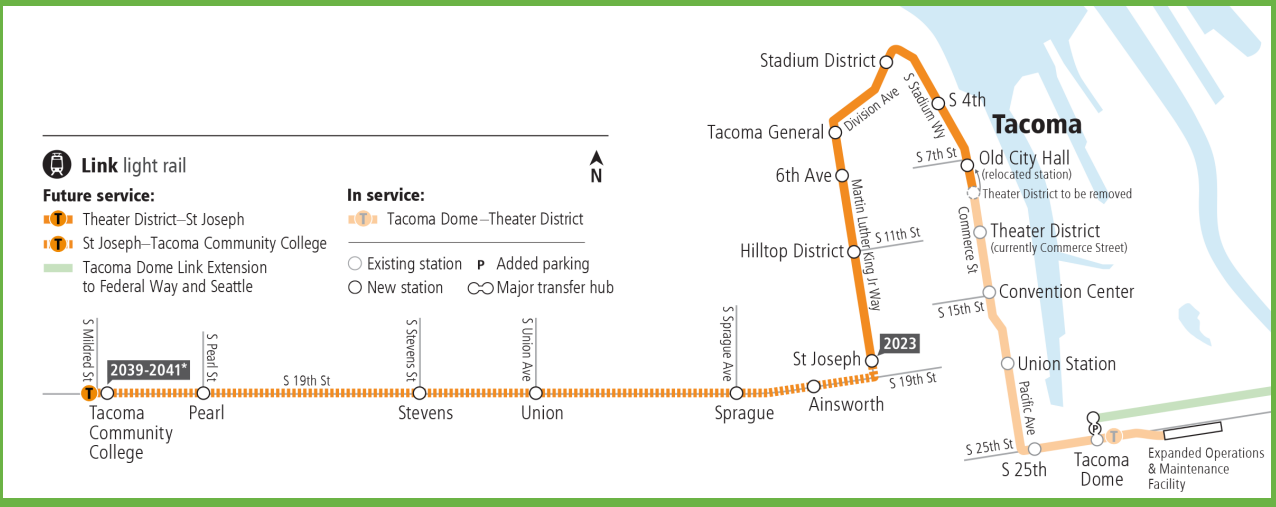
FUTURE STREETCAR ON S. 19TH STREET

Sound Transit is planning to extend the T Line (formerly known as Tacoma Link) from its future terminus at S. 19th Street and Martin Luther King Jr. Way (opening in 2023) to TCC (Figure 31). Planned completion is between 2039 and 2041. The extension will run on S. 19th Street. The project was approved by voters in 2016 and is partially funded.

Corridor A would overlap with the T Line on S. 19th Street. This presents several challenges:

- If both Sound Transit and Pierce Transit provided high-capacity transit services on the S. 19th Street corridor they would compete for ridership. Each line would have fewer riders and lower cost-effectiveness than they would if only one service were on S. 19th Street.
- It may be politically hard to invest so much regional transit service into the same corridor when alternative corridors or routes may deliver a stronger overall transit network.
- The T Line station layouts differ from Stream BRT, so each service would need separate stations. Stream BRT stations would be along the curb but several T Line stations are proposed in the middle of the street.
- Construction on Stream BRT line 2 would likely be between 2025 and 2030. This is close to or just a few years before when T Line construction would begin. Typically the Federal Transit Administration (FTA) funds a large portion of projects like Stream BRT. If Stream BRT infrastructure had to be removed for the T Line, Pierce Transit might have to repay the FTA for construction costs used on Stream BRT.
- Two major construction projects may lead to community construction fatigue, with either overlapping or sequential construction projects in the same street for a long period of time.
- There is strong support from the cities of Tacoma, Fircrest and University Place to implement the T Line extension as quickly as possible. There are concerns that Stream BRT on S. 19th Street could delay the T Line.

Figure 31: Planned T Line Extension to TCC



SERVING THE TILLICUM NEIGHBORHOOD

The Tillicum neighborhood is a fast-growing area around Joint Base Lewis-McChord (JBLM). This neighborhood also has high densities of equity populations.

This area is currently served by Pierce Transit Route 206.

Alignment opportunities were identified at the start of the project for different places Stream BRT routes could terminate.

Two opportunities for serving Tillicum were identified:

- **Springbrook:** After serving Lakewood Transit Center, Stream BRT would continue along Bridgeport Way and terminate just before the security gate to JBLM (Figure 32).
- **Tillicum:** After serving Lakewood Transit Center, Stream BRT would continue along Bridgeport Way, turn onto Pacific Highway, then serve Tillicum via Union Avenue. Stops along Union Avenue would serve both southbound and northbound passengers. Then Stream BRT would use the upgraded interchange at Jackson Avenue to take I-5 northbound back to Lakewood Transit Center (Figure 33).

These opportunities went through a screening process to narrow down which options should go through the evaluation. Screening criteria included population and employment served, operating cost, and projected ridership. This demonstrated each option's cost compared to its benefits.

The Springbrook option would serve high densities of people and jobs, including low-income households. Joint Base Lewis-McChord has a security entrance, so the bus would have to turn around before it reached the gate along Fairway Road to avoid congestion and delays. The only identified turnaround was using narrow residential streets with acute angles - San Francisco Avenue and Addison Street to Bridgeport Way. This operational challenge screened out the Springbrook option.

The Tillicum option adds miles onto the corridor but little additional ridership compared to other Corridor A opportunities. This option scored low on density of people and jobs served, and low on cost-effectiveness. Therefore this option was screened out.

Stream BRT was not recommended at this time. Other opportunities were identified to improve service to the Tillicum neighborhood (see Section 4).

Figure 32: Springbrook Option

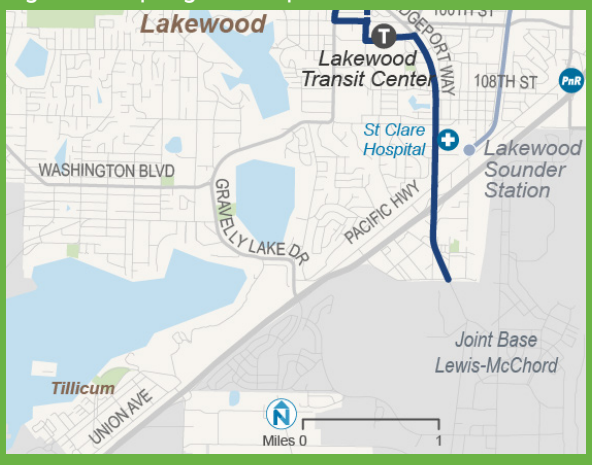
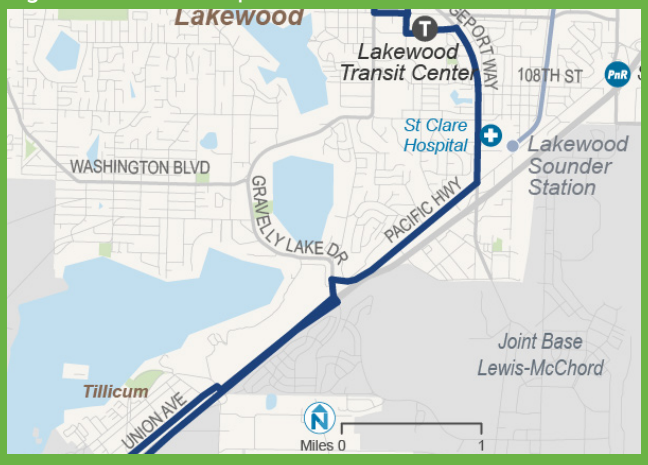


Figure 33: Tillicum Option



STATIONS

Ridership Today

Stops with high ridership are a good starting point to determine station locations. In Fall 2019, pre-COVID pandemic, 2,180 people boarded Route 2 each weekday (Figure 34).

Figure 34: Route 2 Weekday Ridership, Fall 2019

Stop Spacing Today and Future Station Locations

TODAY

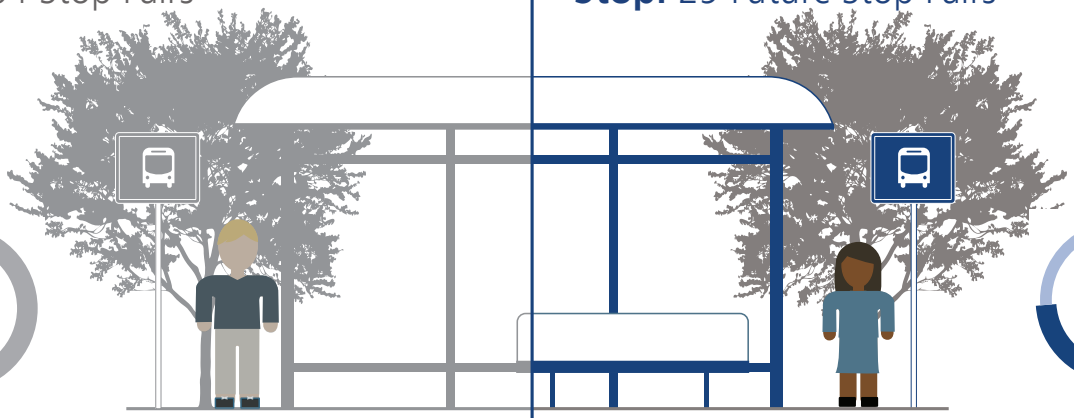
Average Stop Spacing: 0.19 Mile

Stops: 64 Stop Pairs

FUTURE

Average Stop Spacing: 0.43 Mile

Stop: 29 Future Stop Pairs



82%

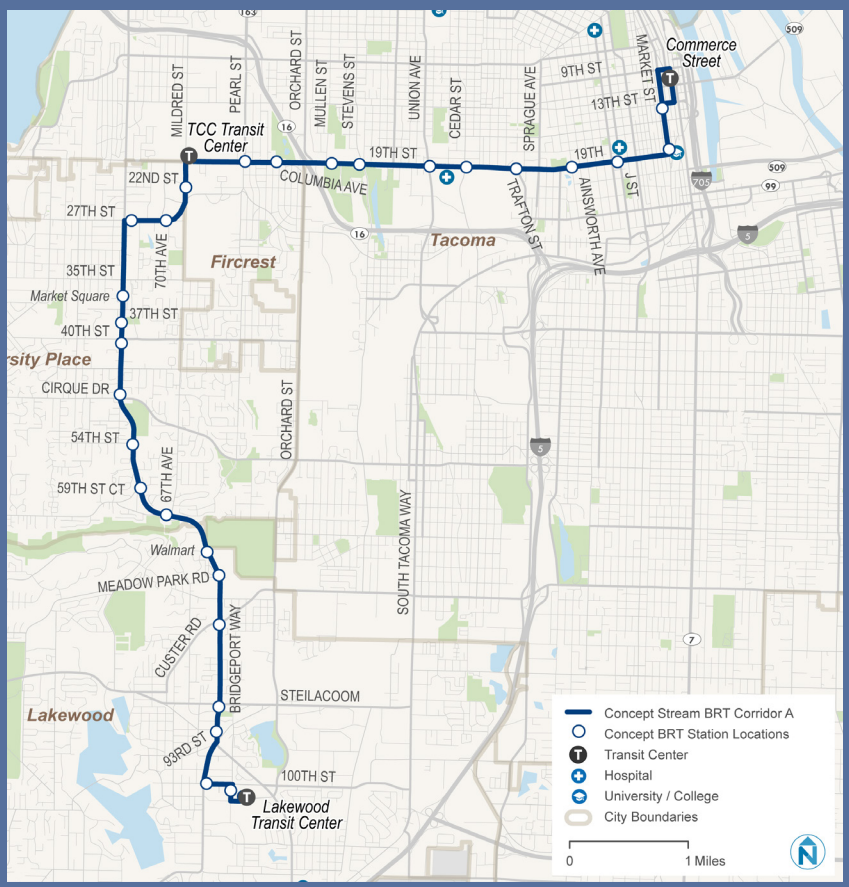
of stops are less than one quarter mile apart

74%

of today's riders would be within one block of a potential station location

Corridor A Station Locations

Potential station locations are based on existing ridership, transfer locations, stakeholder input, and destinations. The map to the right shows potential Stream BRT station locations based on early planning work.



OPERATING ENVIRONMENT

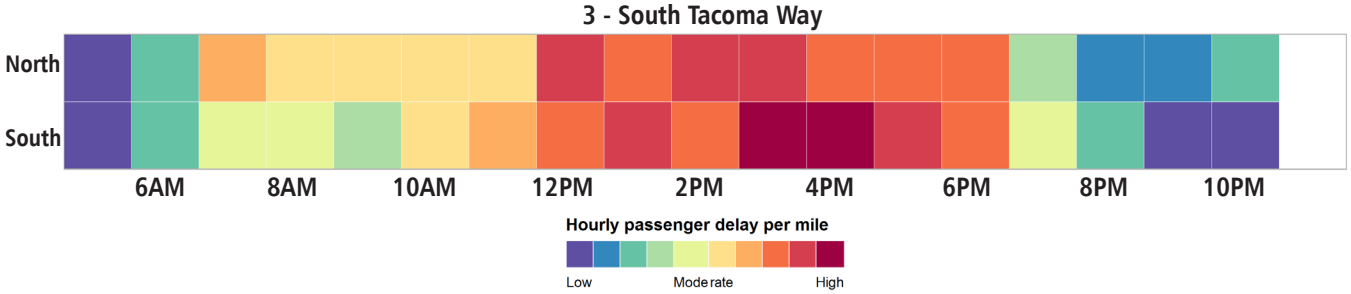
Delay Today

Running Time

In 2019, passengers on Route 2 experienced a cumulative 400 hours of delay each day across the full route. This averages to 17 hours per directional mile across Route 2's 12 miles. This is the highest passenger delay of the four candidate corridors. Delay peaks from 12 p.m. to 6 p.m. but is heavy all day on Route 2 (Figure 35).

Corridor A has the longest continuous segment of high bus delay of the four corridors: in both directions along S. 19th Street between Downtown Tacoma and S. Stevens Street/S. Tyler Street.

Figure 35: Passenger Delay per Mile on Route 2 (Corridor A)



Dwell Time

Dwell time for all four corridors typically ranges from 10-15 percent of the total trip travel time along a route (Figure 36). Dwell time southbound on Corridor A is much higher than the average range.

Figure 36: Dwell Time as a Percentage of Travel Time, Route 2 (Corridor A)

	Monday - Friday	Saturday	Sunday
North to Commerce Street	12.3%	13.9%	16.1%
South to Lakewood TC	14.6%	18.8%	20.4%

Speed & Reliability Opportunities

The following projects were identified as ways of speeding up Corridor A (Figure 37 and Figure 40). These were reviewed with local agencies for feasibility and have staff support to move forward.

See Section 2.2 for a description of speed and reliability treatments.

Figure 37: Corridor A Speed and Reliability Projects

Figure 38: Additional Detail on Project 2

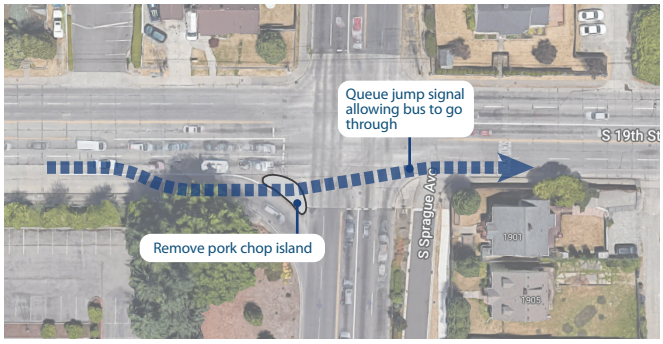


Figure 39: Additional Detail on Project 3

Figure 40: Corridor A Speed and Reliability Project List

Code	Location	Direction	Opportunity	Notes/Detail
1	S. 19th Street from Market Street to Martin Luther King Jr. Way	Eastbound/Westbound	Business Access and Transit lanes eastbound/ westbound	Traffic volumes are low. The T Line will not serve this area (joins S. 19th Street at Martin Luther King Jr. Way). Business Access and Transit lanes address medium-high delay from Market Street to S. Yakima Avenue.
2	S. 19th Street and S. Sprague Avenue	Eastbound	Queue Jump Signal	Allow buses to use right turn lane and provide a signal to get the bus back into the through lane past the intersection. This would require removing the existing pork chop island (Figure 38).
3	Tacoma Community College	Eastbound/Westbound	In-Lane Stations	Tacoma Community College and Fircrest support Stream BRT stopping on S. 19th Street instead of entering the transit center (Figure 39). A new crossing would be needed.
4	Bridgeport Way W and 67th Avenue W	Northbound	Queue Jump Signal	Allow buses to use the existing right turn lane and provide a signal to get the bus back into the through lane past the intersection.
5	Bridgeport Way W and Custer Road W	Northbound/ Southbound	Queue Jump Signal	Allow buses to use the right turn lane in both directions and provide a signal to get the bus back into the through lane past the intersection.
N/A	Entire corridor	Both directions	Transit Signal Priority	Assume Transit Signal Priority at 50 percent of signals.
N/A	Entire corridor	Both directions	Stop consolidation	Assume stops are consolidated from every 0.19 mile to every 0.43 mile.
N/A	Entire corridor	Both directions	In-lane Stations	Assume Stream BRT stops in-lane at all stations.

The speed and reliability projects above can reduce travel times by 9 to 12 percent (Figure 41). This does not meet the Stream BRT standard of 20 percent.

Figure 41: Travel Time Savings Estimates for Corridor A

Corridor	Roundtrip Travel Time (minutes)	Total Travel Time Savings (minutes)	Total Travel Time Savings
A	114	-13.7	-12.0%
A1	134	-14.4	-10.7%
A2	64	-5.9	-9.2%

CORRIDOR B: TACOMA TO LAKEWOOD TRANSIT CENTER

Corridor B matches existing Route 3. Through stakeholder engagement, two additional variations were identified. All three options for Corridor B are described below.

Route 3

Length:	**11.4** miles	Average passenger trip length:	**5.9** miles
Average daily boardings	**1,440**	Total one-way travel time	**50-60** minutes

ALIGNMENT

B: Tacoma to Lakewood Transit Center (Primary Alignment)

Corridor B aligns with existing Route 3. The bus travels from downtown Tacoma along Jefferson Avenue, then turns onto S. Pine Street to access the Tacoma Mall Transit Center (Figure 42). From there, Route 3 travels south on S. Tacoma Way, serves the SR 512 Park-and-Ride near the I-5/SR 512 interchange, then accesses Lakewood TC via 108th Street SW. Route 3 has the third-highest ridership in the Pierce Transit system.

Figure 42: Corridor B

B1: Via S. 38th Street

B1 serves the core of the Lincoln International District by traveling on Pacific Avenue leaving downtown Tacoma then turning onto S. 38th Street. After turning onto S. Pine Street, Corridor B1 follows the same routing as Corridor B to Lakewood Transit Center (Figure 43). Stakeholders noted that S. 38th Street can get congested at the I-5 interchange.

B2: Via S. 48th Street

Corridor B2 serves the edge of the Lincoln International District via S. 48th Street (Figure 44). This routing avoids the I-5 interchange along S. 38th Street and serves the Tacoma Mall Transit Center without out-of-direction travel. The Tacoma Mall TC is the busiest stop along Route 3.

Figure 43: Corridor B1

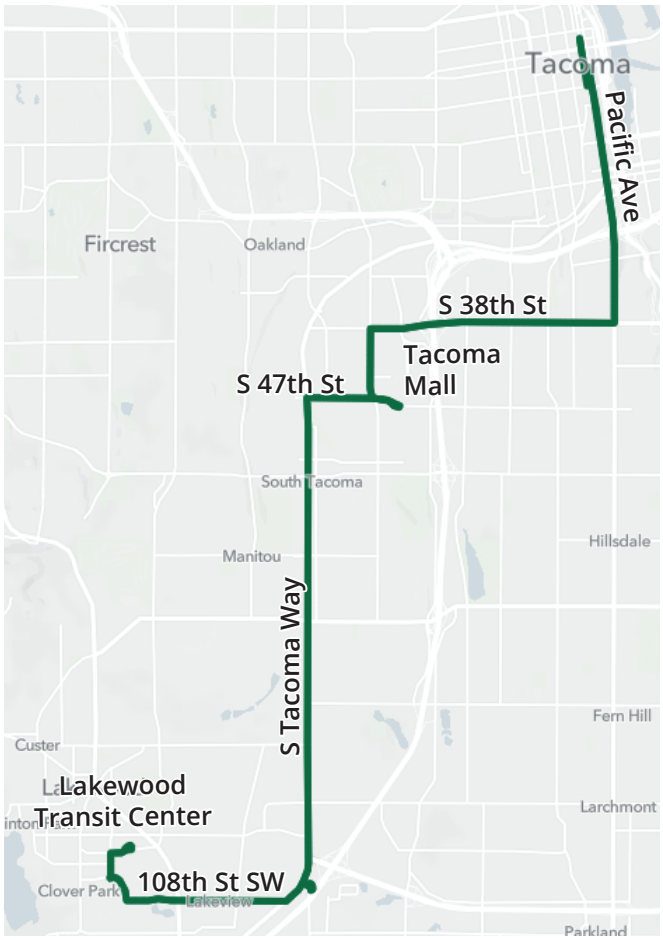
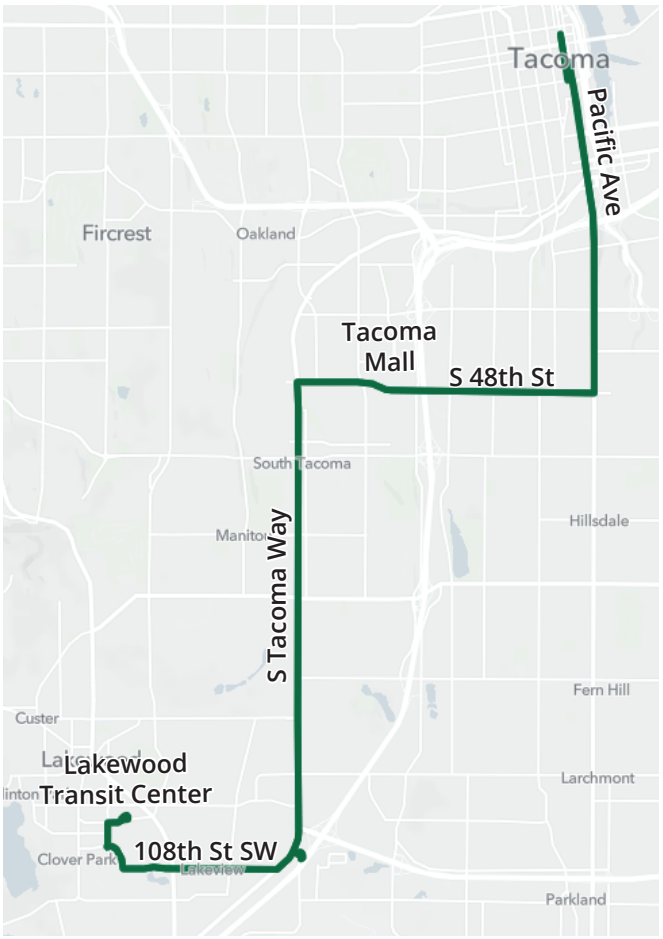


Figure 44: Corridor B2



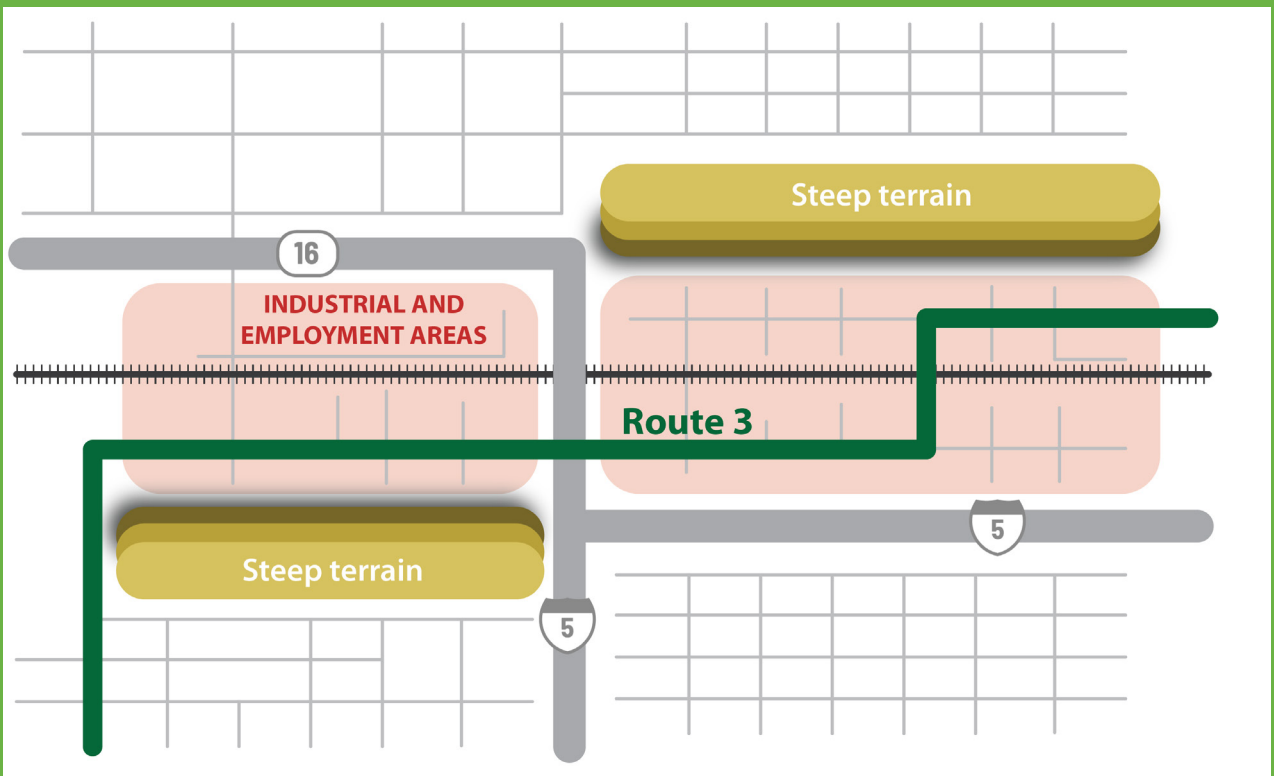
SERVING INDUSTRIAL AND EMPLOYMENT AREAS ALONG S. TACOMA WAY

Route 3 today serves S. Tacoma Way between downtown and South Tacoma. Although this area has a high concentration of employment, the corridor has several characteristics which are not ideal conditions for Stream BRT:

- Connectivity is limited by I-5 and SR 16, the railroad tracks and the steep topography. This constrains the areas that are accessible for passengers, limiting potential ridership.
- The industrial land uses do not generate a lot of demand. BRT is most effective if it serves areas with moderate or high demand that is continuous throughout the day.

Stakeholders mentioned that in the past there were more active land uses (a day care, for example) that generated riders. Transit agencies are constantly evolving to meet changing communities. They must also be cost-effective, and match the type of service provided with the demand generated. A local route or on-demand service may serve S. Tacoma Way more effectively than Stream BRT (Figure 45).

Figure 45: Highways and topography make it hard to walk to Route 3



TACOMA MALL NEIGHBORHOOD SUBAREA PLAN AND FUTURE TRANSIT ACCESS

The Tacoma Mall TC is one of the highest ridership stops in the system. Coordinating redevelopment within the mall subarea with better transit access will be a win-win. The 2018 Tacoma Mall Neighborhood Subarea Plan outlines the vision for the Tacoma Mall Neighborhood to become a compact, urban mixed-use and walkable area. The area is expected to receive a significant portion of Tacoma's future household and employment growth over the next 40 years.

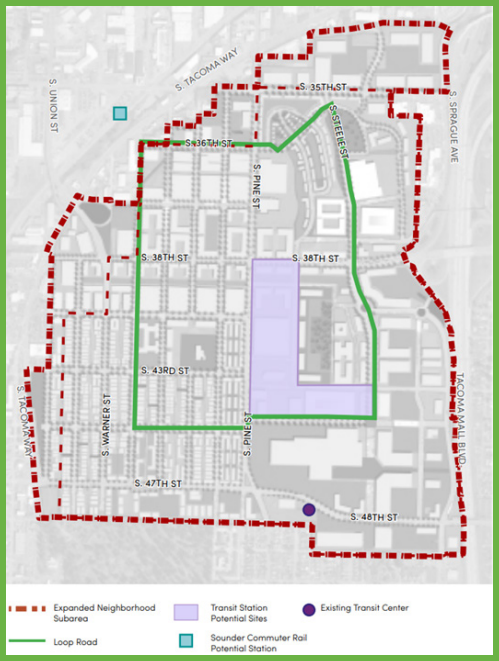
The plan assumes new streets to provide internal access, park space for recreation and quality of life, up-zoning to accommodate a greater intensity of development and urban design standards for consistent urban form.

Today, the Tacoma Mall Transit Center is south of S. 48th Street, meaning passengers heading to the mall must cross the street and walk through the mall parking lot. There is a signal at the mall entrance but no crosswalks. The plan recommends relocating the transit center to a central spot within the redevelopment (Figure 46). This will greatly improve passenger comfort and safety. Improving transit accessibility to the redeveloped mall will be a community asset.

Adjacent to the Tacoma Mall area is the S. 38th Street interchange on I-5. The interchange carries high volumes of traffic and serves as one of the main vehicular access points from the Tacoma Mall area to the rest of the Puget Sound region. If Stream BRT were to travel along S. 38th Street through the interchange, it could get slowed down in congestion.

WSDOT studied this segment of S. 38th Street in 2019 as part of the Tacoma Mall Neighborhood Subarea Plan Study Area. The preferred option to reduce congestion and serve the density adopted in the Tacoma Mall Subarea plan was to add a new off-ramp from I-5 to Tacoma Mall Boulevard. This would allow vehicles to access the mall without using the S. 38th and Steele Streets intersection. The 2018 cost estimate for this option was $18 to $25 million. The City of Tacoma would be the lead in pursuing funding for implementing this project..

Figure 46: Tacoma Mall Subarea Plan with Proposed TC Relocation (purple)



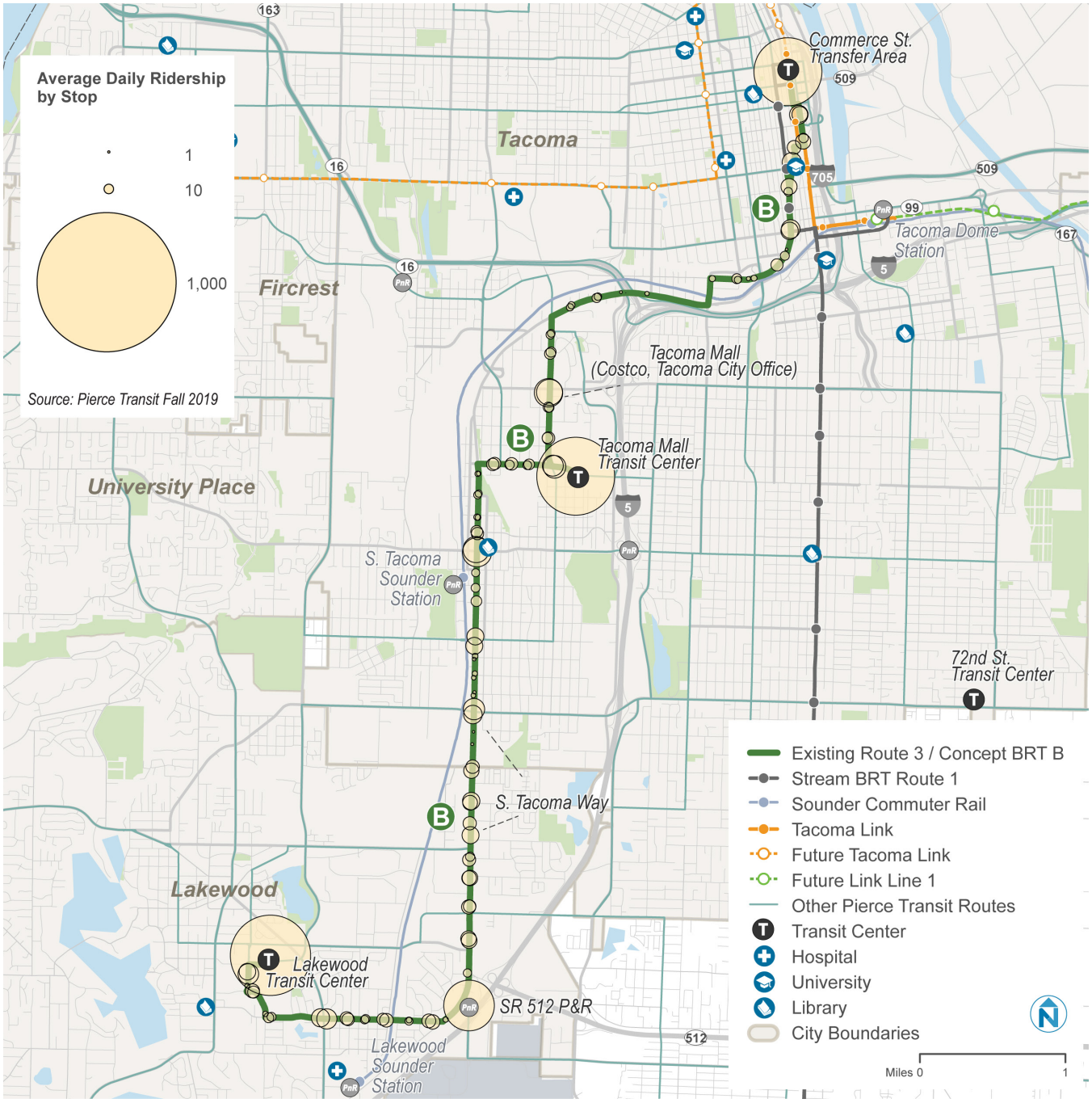
> Should also consider Tacoma Mall Subarea Plan and recommended potential relocation of the transit station as well as any future neighborhood/mixed-use area planning efforts around South Tacoma Mixed-Use Center.

STATIONS

Ridership Today

In 2019, 1,440 people boarded Route 3 each weekday (Figure 47). Ridership is concentrated in Downtown, at Tacoma Mall, and in the southern portion of the S. Tacoma Way corridor. Boardings and alightings per stop are shown below.

Figure 47: Route 3 Weekday Ridership, Fall 2019



Stop Spacing Today and Future Station Locations

TODAY

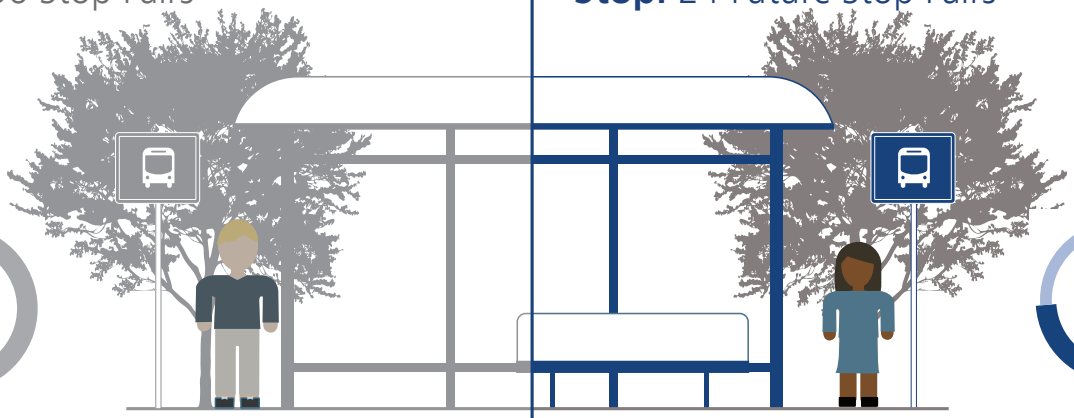
Average Stop Spacing: 0.20 Mile

Stops: 56 Stop Pairs

FUTURE

Average Stop Spacing: 0.46 Mile

Stop: 24 Future Stop Pairs



79%

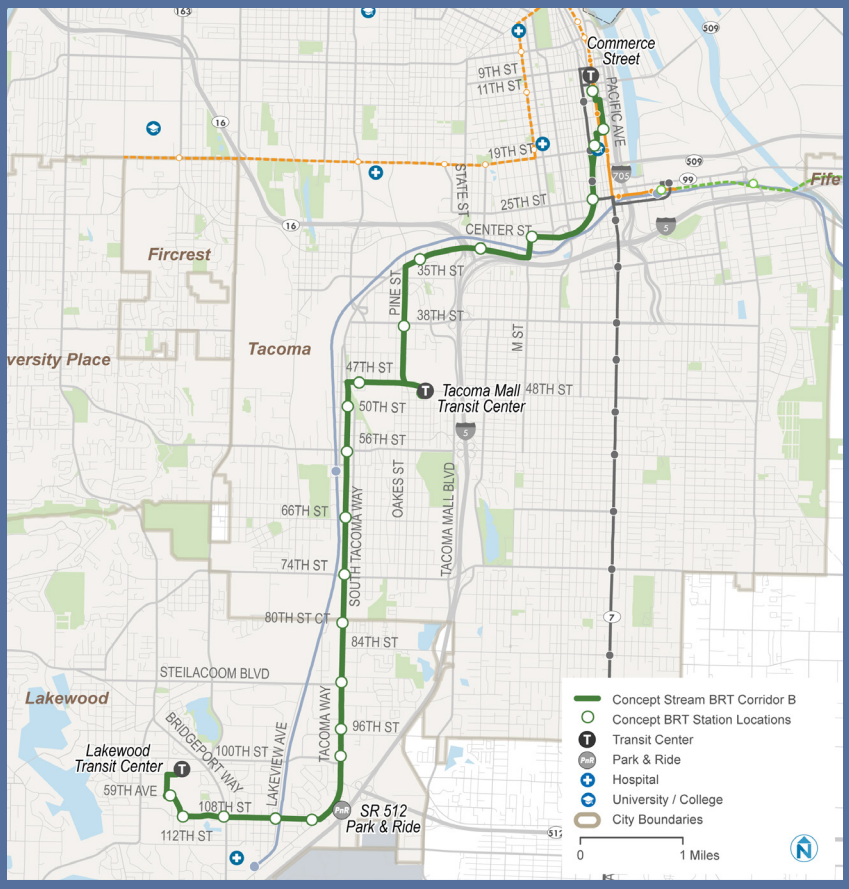
of stops are less than one quarter mile apart

66%

of today's riders would be within one block of a potential station location

Corridor B Station Locations

Based on existing ridership, transfer locations, stakeholder input, and destinations, the following locations were identified as potential Stream BRT station locations. The stations would be located to maximize access to important community centers and services, such as the Asia Pacific Cultural Center at S. 50th Street. Intermodal and regional connectivity is also important, and a station at S. 56th Street would serve the South Tacoma Sounder station.



OPERATING ENVIRONMENT

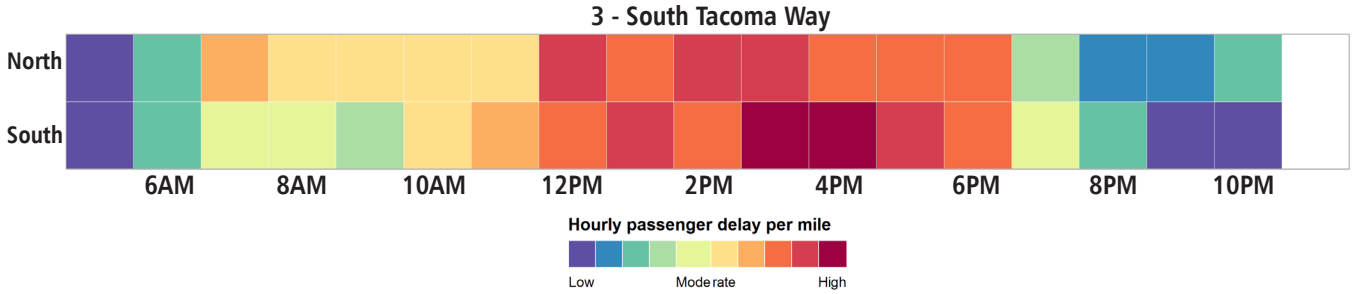
Delay Today

Running Time

In 2019, passengers on Route 3 experienced a cumulative 262 hours of delay each day across the full route. This averages to 12 hours per directional mile across Route 3's 11.4 miles. Delay peaks from noon to 7 p.m. but is relatively high starting at 10 a.m. (Figure 48).

The areas of Corridor B with the highest levels of delay are between S. Tacoma Way and S. Pine Street, and S. Tacoma Way and S. 56th Street. Delay increases at the southern end of the corridor as well, south of Steilacoom Boulevard.

Figure 48: Passenger Delay per Mile on Route 3 (Corridor B)



Dwell Time

Dwell time for all four corridors typically ranges from 10-15 percent of the total trip travel time along a route (Figure 49). Dwell time in both directions of Route 3 falls within this range. Dwell time is lowest on weekdays.

Figure 49: Dwell Time as a Percentage of Travel Time, Route 3 (Corridor B)

	Monday - Friday	Saturday	Sunday
North to Commerce Street	10.7%	14.7%	14.3%
South to Lakewood TC	10.7%	12.6%	13.7%

Speed & Reliability Opportunities

The following projects were identified as ways of speeding up Corridor B (Figure 50 and Figure 52). These were reviewed with local agencies for feasibility and have staff support to move forward. See Section 2.2 for a description of speed and reliability treatments.

Figure 50: Corridor B Speed and Reliability Projects

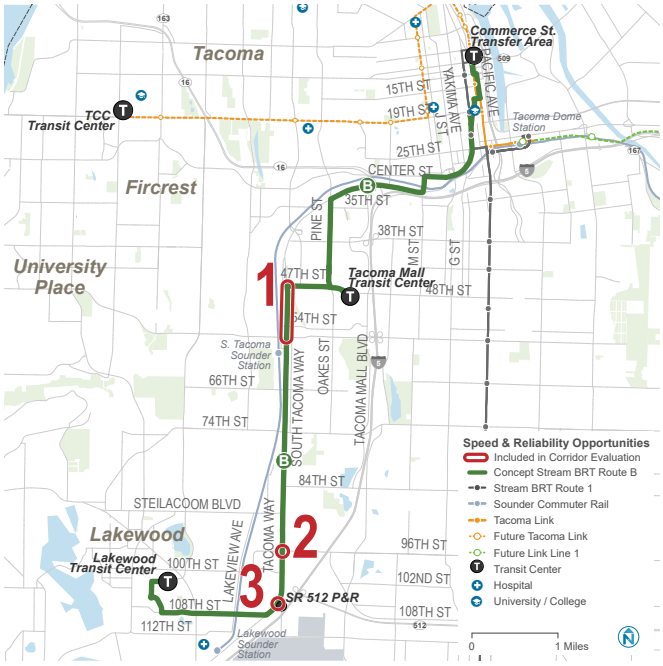


Figure 51: Additional Detail on Project 2

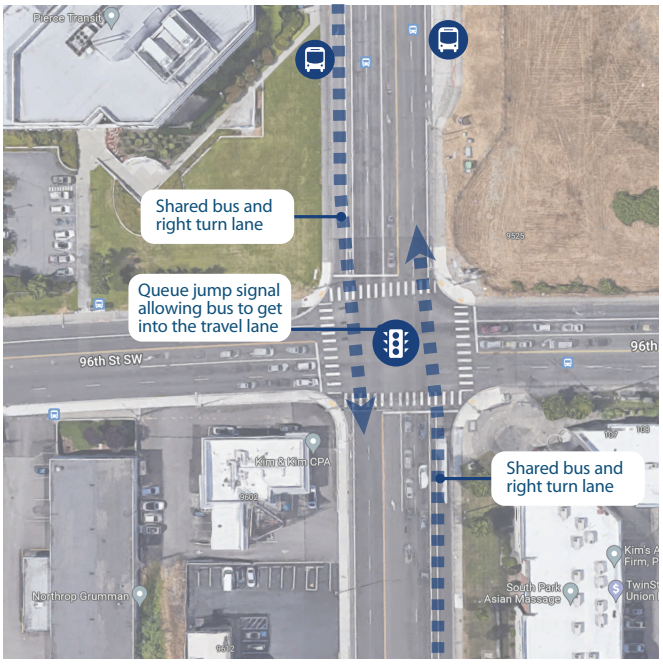


Figure 52: Corridor B Speed and Reliability Project List

Code	Location	Direction	Opportunity	Notes/Detail
1	S. Tacoma Way from S. 47th Street to S. 56th Street	Northbound/ Southbound	BAT lanes	The project's Technical Advisory Committee supported this opportunity, which would convert one lane per direction to Business Access and Transit. The City of Tacoma has already planned traffic calming along this corridor.
2	S. Tacoma Way and 96th Street SW	Northbound/ Southbound	Queue Jump Signal	Allow buses to use existing right turn lanes. A queue jump signal is needed to allow buses to transition across the intersection into the through lane.
3	SR 512 Park-and-Ride	Northbound/ Southbound	Transit Only Signal	Add a transit only signal to help buses make the eastbound left turn into the Park-and-Ride.

The speed and reliability projects can reduce travel times by 9 to 11 percent (Figure 53). This does not meet the Stream BRT standard of 20 percent.

Figure 53: Travel Time Savings Estimates for Corridor B

Corridor	Roundtrip Travel Time (minutes)	Total Travel Time Savings (minutes)	Total Travel Time Savings
B	109	-11.9	-10.9%
B1	123	-12.8	-10.4%
B2	109	-10.8	-9.9%

CORRIDOR C: SUNRISE NEIGHBORHOOD TO PUYALLUP

Corridor C is a portion of existing Route 402. Route 402 goes from the Sunrise neighborhood, through Puyallup, and ends at Federal Way Transit Center in King County. Corridor C is the portion that was evaluated for Stream BRT and goes from the Sunrise neighborhood to Puyallup.

Corridor C

Length:	**8.7** miles	Average passenger trip length:	**3.6** miles
Average daily boardings	**660**	Total one-way travel time	**45-55** minutes

MBTA's Silver Line BRT in Boston

ALIGNMENT

C: Puyallup Station to 176th Street E / Sunrise Boulevard

Corridor C goes from Puyallup Station to 176th Street E/Sunrise Boulevard (Figure 54). Within Puyallup, Corridor C serves the Puyallup Sounder station and travels on N Meridian/S Meridian and 3rd Street SE. Heading south on S. Meridian, Corridor C serves the South Hill Mall Transit Center then continues on S. Meridian to Sunrise Boulevard and 176th Street E.

C1: Edgewood to 176th Street E / Sunrise Boulevard

C1 travels farther north to serve 8th Street E (Figure 55). This serves the growing city of Edgewood.

Figure 54: Corridor C

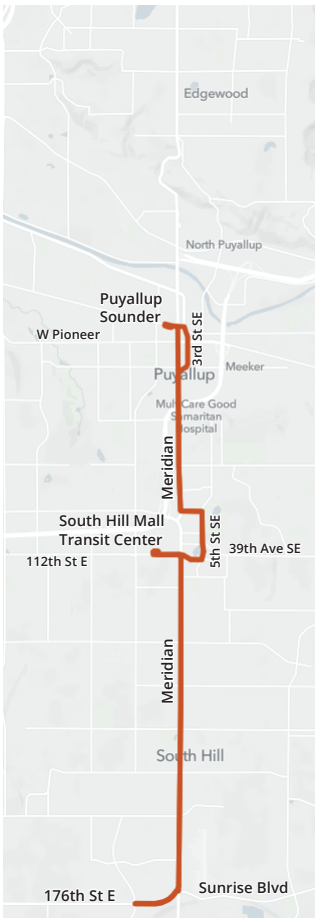


Figure 55: Corridor C1

South Pierce Multimodal Connectivity Study

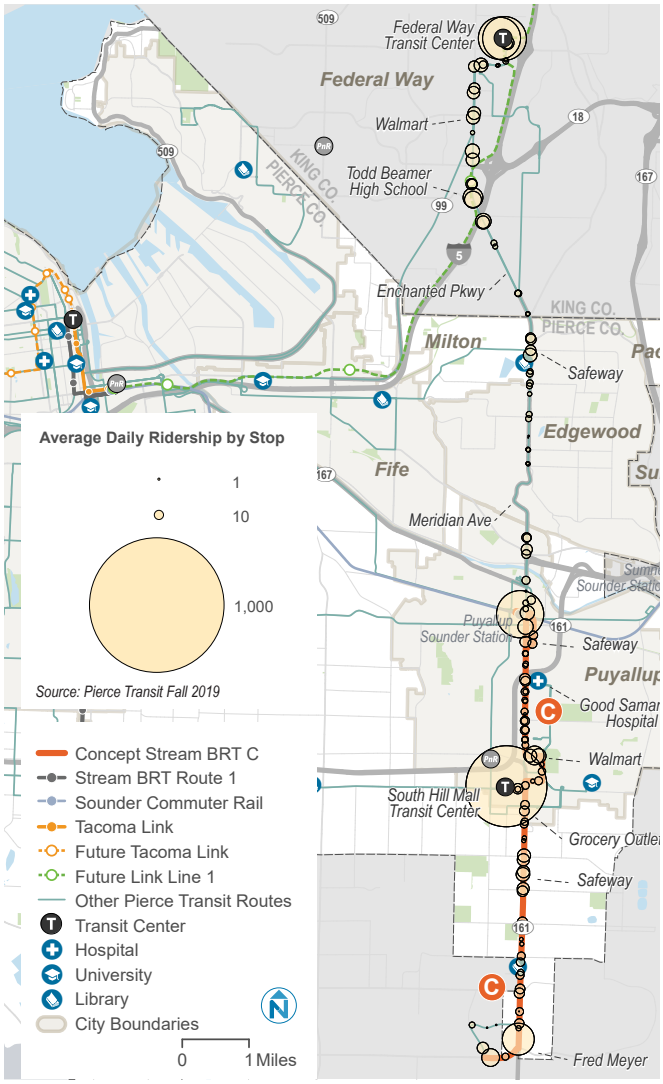
The Southeast Pierce County Mobility Study, led by the Washington State Department of Transportation, is currently evaluating the area between SR 512, SR 507, SR 702 and SR 162. It aims to address key priorities to improve safety and connectivity and reduce delays for all users of transportation facilities. The final product will develop near-, mid- and long-term strategies to address transportation gaps within the study area, focusing on multimodal strategies. The study will be completed in 2023, and opportunities for collaboration and investment by Pierce Transit and Washington State Department of Transportation are expected. In 2022, Piece Transit requested WSDOT evaluate a number of opportunities to improve transit performance as part of this study. Results of this effort will help shape future transit service performance within Corridor C.

STATIONS

Ridership Today

In 2019, 1,047 people boarded Route 402 each weekday (Figure 56). In the portion of Route 402 that is Corridor C, there were 655 boardings per day, or 63 percent of Route 402's ridership. Boardings and alightings per stop are shown below.

Figure 56: Route 402 Weekday Ridership, Fall 2019



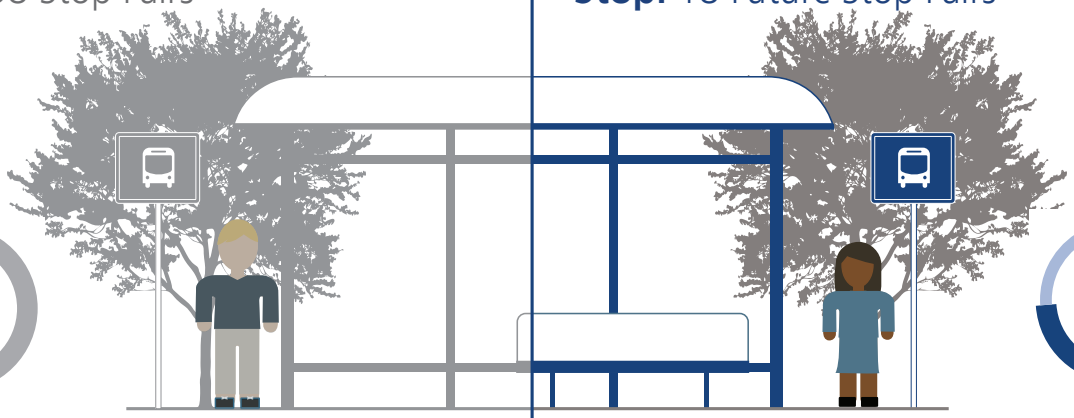
> It should serve out toward Milton and head toward the line that heads to the Federal Way Transit Center so that you can make easy transfers from Tacoma to the light rail to get to the airport. That should help reduce congestion all around the Pierce County area.

Stop Spacing Today and Future Station Locations

TODAY

Average Stop Spacing: 0.24 Mile

Stops: 38 Stop Pairs



59%

of stops are less than one quarter mile apart

FUTURE

Average Stop Spacing: 0.52 Mile

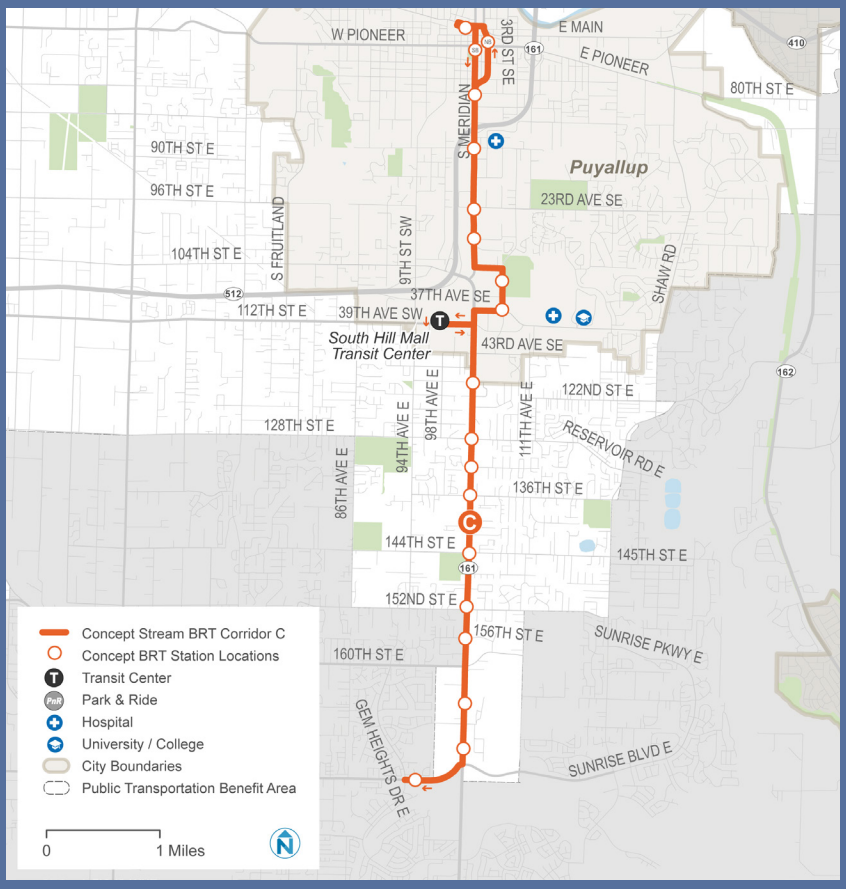
Stop: 18 Future Stop Pairs

73%

of today's riders would be within one block of a potential station location

Corridor C Station Locations

Based on existing ridership, transfer locations, stakeholder input, and destinations, the following locations were identified as potential Stream BRT station locations.



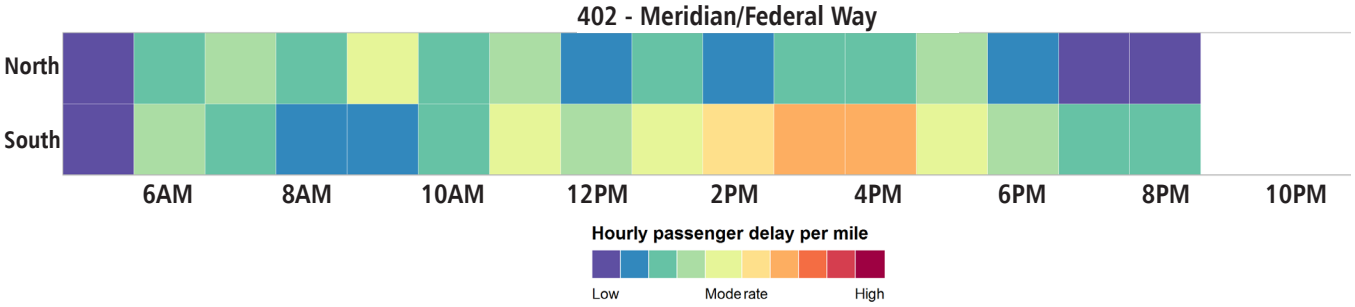
OPERATING ENVIRONMENT

Delay Today

Running Time

Corridor C has the lowest daily passenger delay among the candidate corridors. In 2019, passengers on Route 402 experienced a cumulative 193 hours of delay each day across the full route. This averages to 5 hours per directional mile across Route 402's 8.7 miles. Delay that exists on this corridor is mostly in the southbound direction between 2 p.m. and 5 p.m. (Figure 57). Delay is also concentrated near South Hill Mall Transit Center.

Figure 57: Passenger Delay per Mile on Route 402 (Corridor C)



> Traffic can get ridiculous in this area, to the point it is faster to bike the rest of the way around South Hill.
>
> Meridian is just simply a mess. It would be beneficial to make a dedicated bus lane for this road, however that might not be possible with how developed this road is.

Dwell Time

Overall, Route 402 experiences high dwell times. The average dwell time per stop is 41 seconds, the highest of all four corridors (Figure 58). Particularly on Sundays, dwell time for both northbound and southbound is higher than the average of all candidate corridors.

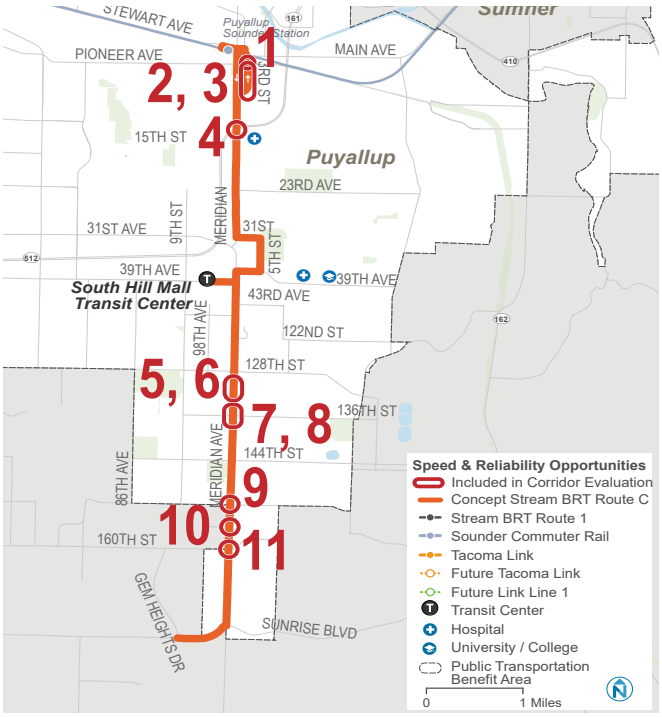
Figure 58: Dwell Time as a Percentage of Travel Time, Route 402 (Corridor C)

	Monday - Friday	Saturday	Sunday
North to Federal Way TC	12.7%	13.5%	16.9%
South to Sunrise Blvd/176th St	14.1%	13.3%	18.1%

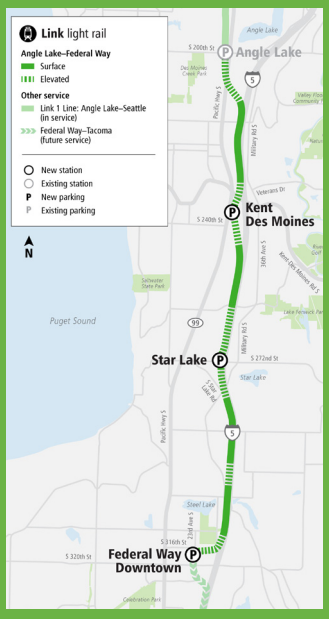
Speed & Reliability Opportunities

The following projects were identified as ways of speeding up Corridor C (Figure 59 and Figure 60). These were reviewed with local agencies for feasibility and have staff support to move forward. See Section 2.2 for a description of speed and reliability treatments.

Figure 59: Corridor C Speed and Reliability Opportunities



> Traffic is really bad, and drivers rarely watch out for pedestrians. Also, the only sidewalks are along Meridian, none from Meridian to the businesses.



FUTURE DEMAND AT FEDERAL WAY

Sound Transit is constructing Link light rail service from Angle Lake to Federal Way to facilitate regional trips between King County and Pierce County. Although current ridership on Corridor C/Route 402 is low compared to the other candidate corridors, this future connection to Link may provide a new market for Route 402.

> Federal Way Transit Center is very key as Sounder riders are left on their own very frequently when trains experience issues.

Figure 60: Corridor C Speed and Reliability Project List

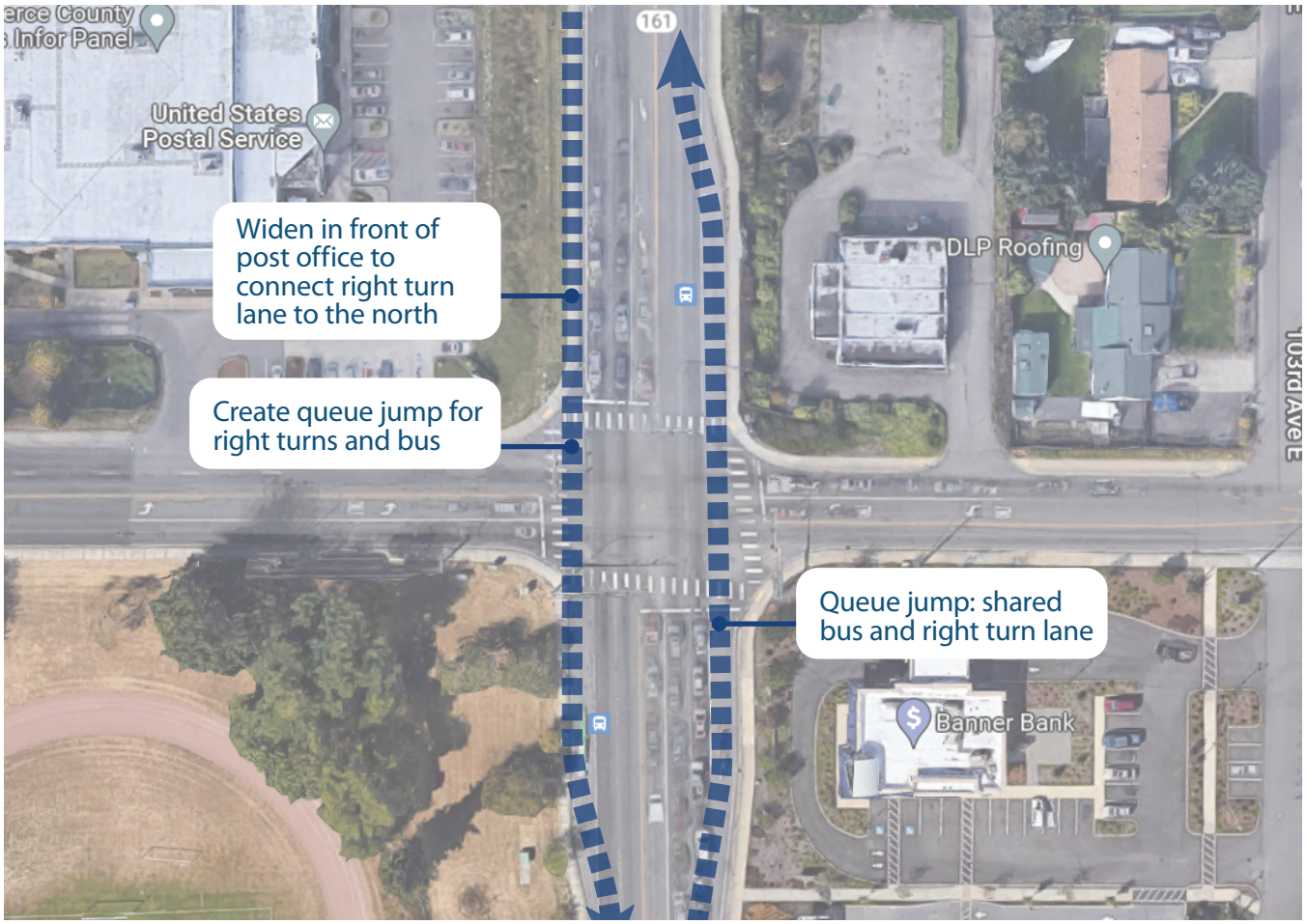
Code	Location	Direction	Opportunity	Notes/Detail
1	3rd Street SE and E. Pioneer	Northbound	Queue Jump	Allow buses to use existing right turn pocket.
2	3rd Street SE from 9th Avenue SE to 7th Avenue SE (Puyallup)	Northbound	Business Access and Transit lane and queue jump at 7th Avenue SE	This area of 3rd Street SE is very wide and may be able to fit two driving lanes plus a Business Access and Transit lane. Allow the bus to use the existing right turn lane at 7th Avenue SE.
3	3rd Street SE from 7th Avenue SE to E. Pioneer (Puyallup)	Northbound	Business Access and Transit or pro-time Business Access and Transit lane	Remove parking on one side to add a Business Access and Transit lane. Most homes in this segment have driveways so removing parking may not impact residents. The lane could also be "pro-time" or just Business Access and Transit during peaks.
4	Meridian and SR 512 on/ off ramps	Southbound	Queue bypass and Transit Signal Priority	Southbound left turns are not allowed. Remove center turn lane and shift lanes over to provide a bus-only lane (queue bypass).
5	Meridian from IHOP to 132nd Street E	Northbound	Business Access and Transit lane with queue jump	Convert 600-foot right turn lane to Business Access and Transit. Include a queue jump at 132nd Street E.
6	Meridian and 132nd Street E	Southbound	Queue jump	Allow buses to use existing right turn pocket southbound.
7	Meridian and 136th Street E	Northbound	Queue jump	Allow buses to use existing northbound right turn lane and receiving lane.
8	Meridian and 136th Street E	Southbound	Business Access and Transit lane	Widen west side of the street to add a queue jump. Pair with existing receiving lane (Figure 62).
9	Meridian and 152nd Street E	Northbound	Queue jump	Allow buses to use existing northbound right turn lane and receiving lane.
10	Meridian approaching 156th Street E	Northbound	Business Access and Transit lane with queue jump	Convert 400-foot right turn lane to Business Access and Transit. Include a queue jump at 156th Street E.
11	Meridian approaching 160th Street E	Southbound	Business Access and Transit lane with queue jump	Convert 400-foot right turn lane to Business Access and Transit. Include a queue jump at 160th Street E.
N/A	Entire corridor	Both directions	Transit Signal Priority	Assume Transit Signal Priority at 50 percent of signals.
N/A	Entire corridor	Both directions	Stop consolidation	Assume stops are consolidated from every 0.24 mile to every 0.52 mile.
N/A	Entire corridor	Both directions	In-lane stations	Assume Stream BRT stops in-lane at all stations.

The speed and reliability projects above can reduce travel times by 10 to 12 percent (Figure 61). This does not meet the Stream BRT standard of 20 percent.

Figure 61: Travel Time Savings Estimates for Corridor C

Corridor	Roundtrip Travel Time (minutes)	Total Travel Time Savings (minutes)	Total Travel Time Savings
C	93	-11.2	-12.3%
C1	129	-14.0	-10.9%

Figure 62: Additional Detail on Project 8



> The ENTIRE LENGTH of Meridian, at least out until 144th St, is more congested than traffic in downtown Seattle where I work. There are just no main roads or freeways in and out of the area, and a massive population, so South Hill is the worst. I think it deserves Rapid Transit next since the other routes have better developed roads to mitigate traffic.

CORRIDOR D: LAKEWOOD TRANSIT CENTER TO PIERCE COLLEGE

Corridor D generally matches existing Route 4. Through stakeholder engagement, two additional variations were identified.

Route 4

Length:	13.5 miles	Average passenger trip length:	6.3 miles
Average daily boardings	1,280	Total one-way travel time	55-70 minutes

Route 4 Compared To Corridor D

Today, after serving South Hill Mall, Route 4 eastbound goes south on Meridian, then east on 43rd Avenue SE to 10th Street SE. Route 4 then turns onto 39th Avenue SE and goes to Pierce College (Figure 63). A more direct route would be to stay on 39th Avenue SE. This modification was assumed for all Corridor D options (Figure 64).

Figure 63: Current Route 4

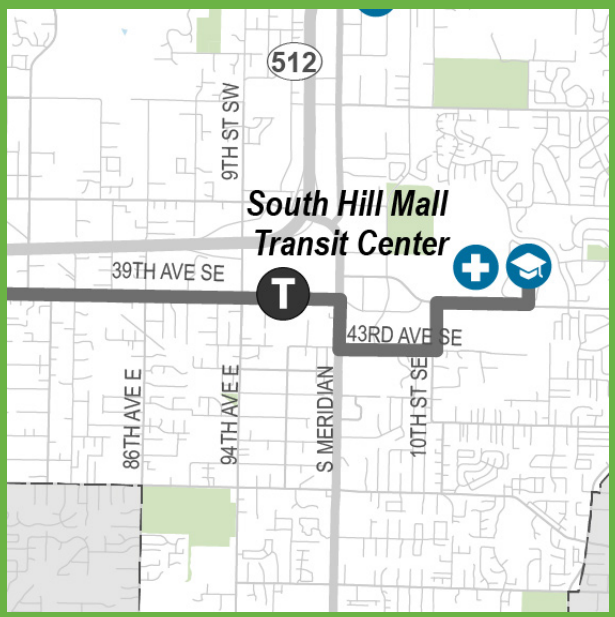
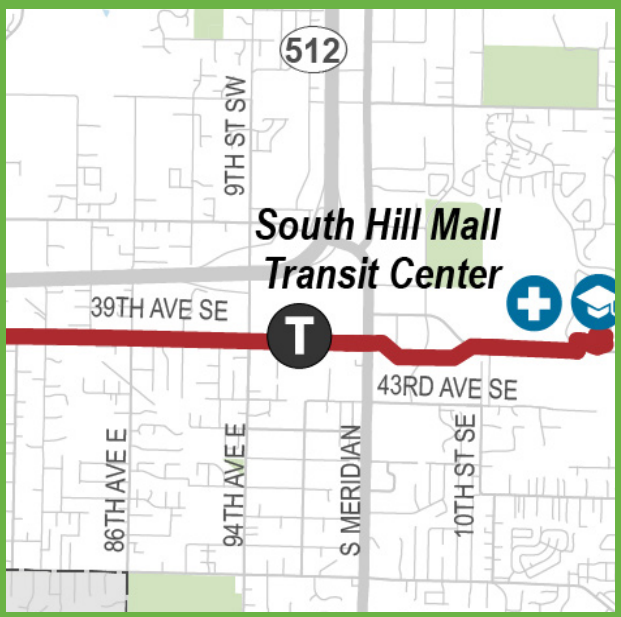


Figure 64: Proposed Alignment on 39th Avenue SE

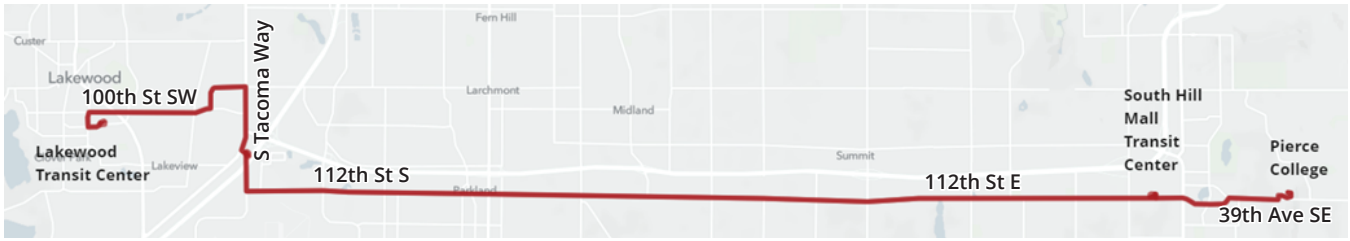


ALIGNMENT

D: Lakewood Transit Center to Pierce College (Primary Alignment)

Corridor D aligns with existing Route 4 (Figure 65). The corridor starts at Lakewood Transit Center then travels on 112th Street to serve South Hill Mall Transit Center and then terminates at Pierce College.

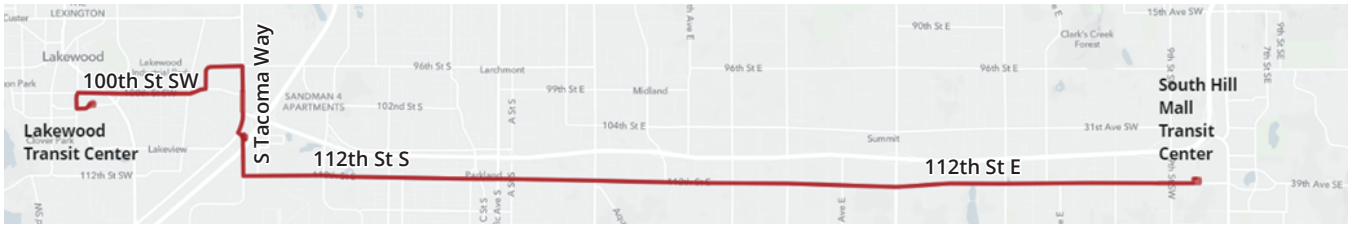
Figure 65: Corridor D



D1: To South Hill Mall

D1 is a shortened version of D. The east end of the route ends at South Hill Mall instead of Pierce College (Figure 66).

Figure 66: Corridor D1



D2: To Lakewood Sounder and Pierce College

Corridor D2 serves the Lakewood Sounder station. See page 2-19 for a discussion on the importance of this destination. Instead of serving S. Tacoma Way and 100th Street SW, Corridor D2 would take Pacific Highway to the Lakewood Sounder station and Bridgeport Way to Lakewood Transit Center (Figure 67).

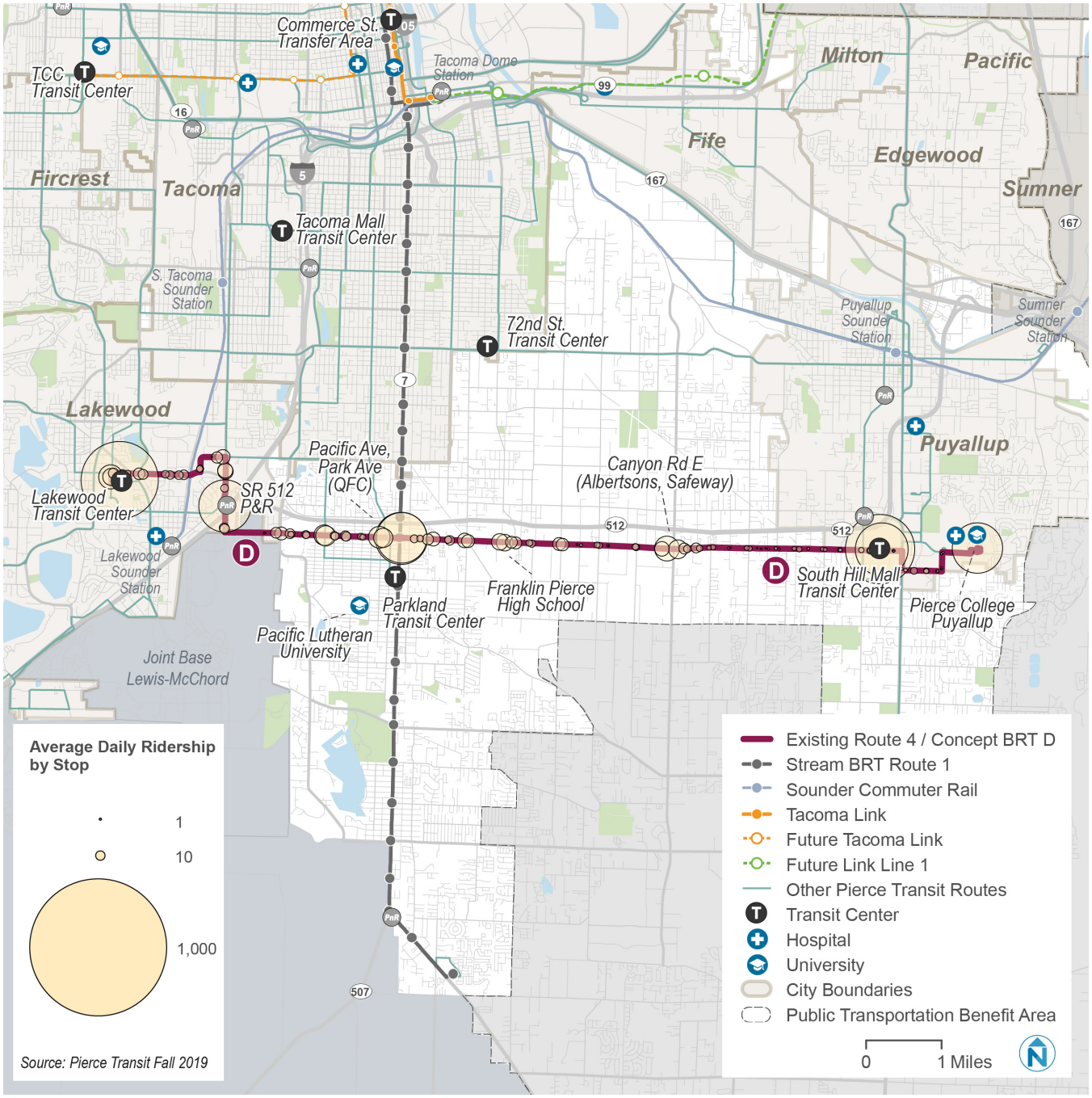
Figure 67: Corridor D2

STATIONS

Ridership Today

In 2019, 1,280 people boarded Route 4 each weekday (Figure 68). Relative to other candidate corridor segments, there is low ridership between Canyon Road and South Hill Mall. The western portion of the route (between Lakewood TC and Waller Road) has the highest concentration of ridership. Boardings and alightings per stop are shown below.

Figure 68: Route 4 Weekday Ridership, Fall 2019



Stop Spacing Today and Future Station Locations

TODAY

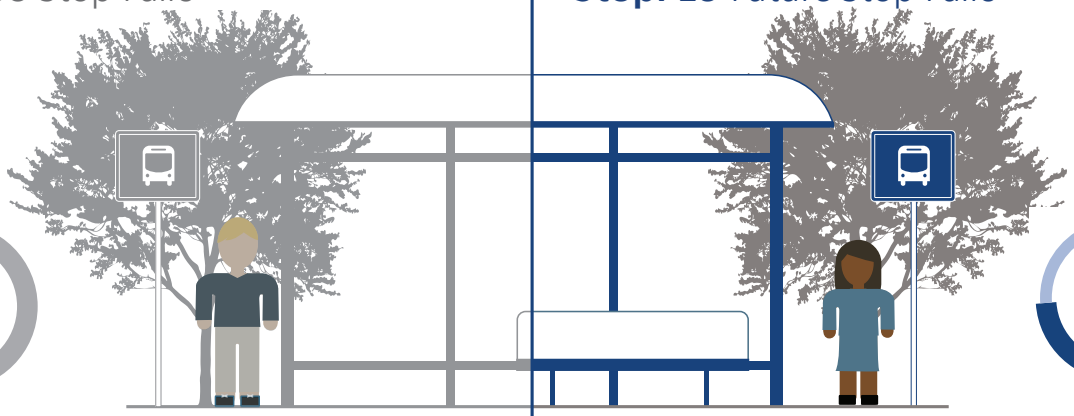
Average Stop Spacing: 0.24 Mile

Stops: 58 Stop Pairs

FUTURE

Average Stop Spacing: 0.58 Mile

Stop: 25 Future Stop Pairs



64%

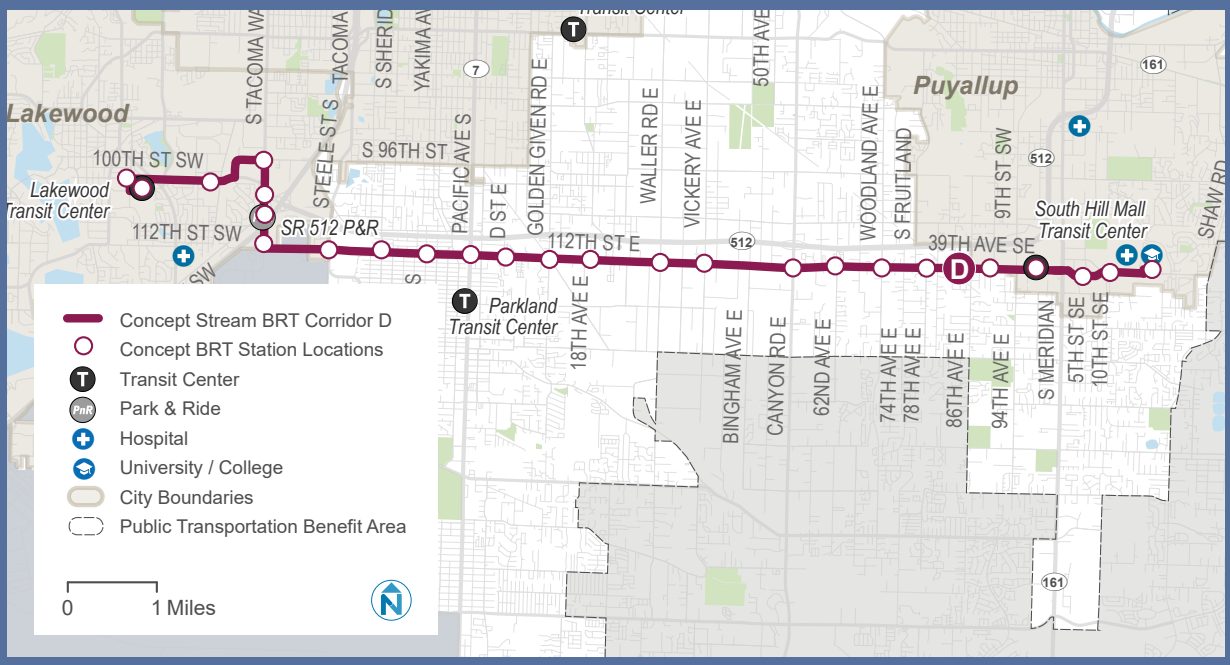
of stops are less than one quarter mile apart

80%

of today's riders would be within one block of a potential station location

Corridor D Station Locations

Based on existing ridership, transfer locations, stakeholder input, and destinations, the following locations were identified as potential Stream BRT station locations.



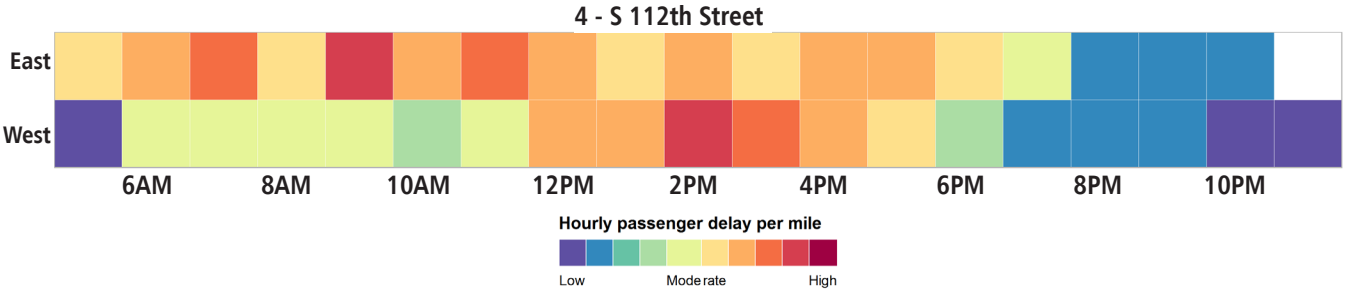
OPERATING ENVIRONMENT

Delay Today

Running Time

In 2019, passengers on Route 4 experienced a cumulative 272 hours of delay each day across the full route. This averages to 10 hours per directional mile across Route 4's 13.5 miles (Figure 69). Corridor D has the lowest amount of delay of the four corridors. The main delay point is at South Hill Mall Transit Center.

Figure 69: Passenger Delay per Mile on Route 4 (Corridor D)



Dwell Time

Dwell time for Corridor D is lower than the other candidate corridors (Figure 70).

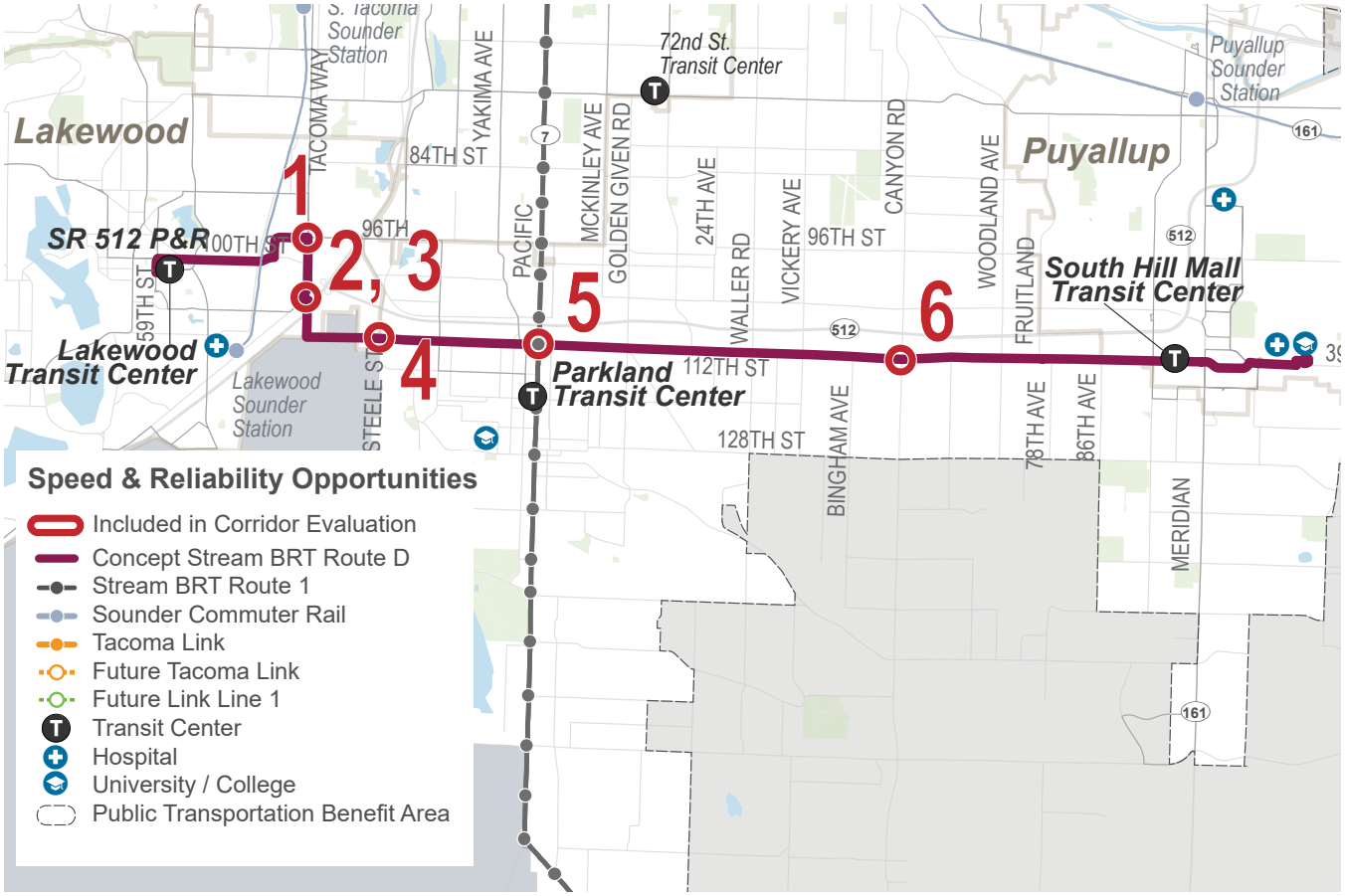
Figure 70: Dwell time as a Percentage of Travel Time, Route 4 (Corridor D)

	Monday - Friday	Saturday	Sunday
East to South Hill Mall TC and Pierce College	14.0%	7.7%	7.2%
West to Lakewood TC	10.6%	8.9%	8.4%

Speed & Reliability Opportunities

The following projects were identified as ways of speeding up Corridor D (Figure 71 and Figure 72). These were reviewed with local agencies for feasibility and have staff support to move forward. See Section 2.2 for a description of speed and reliability treatments.

Figure 71: Corridor D Speed and Reliability Projects

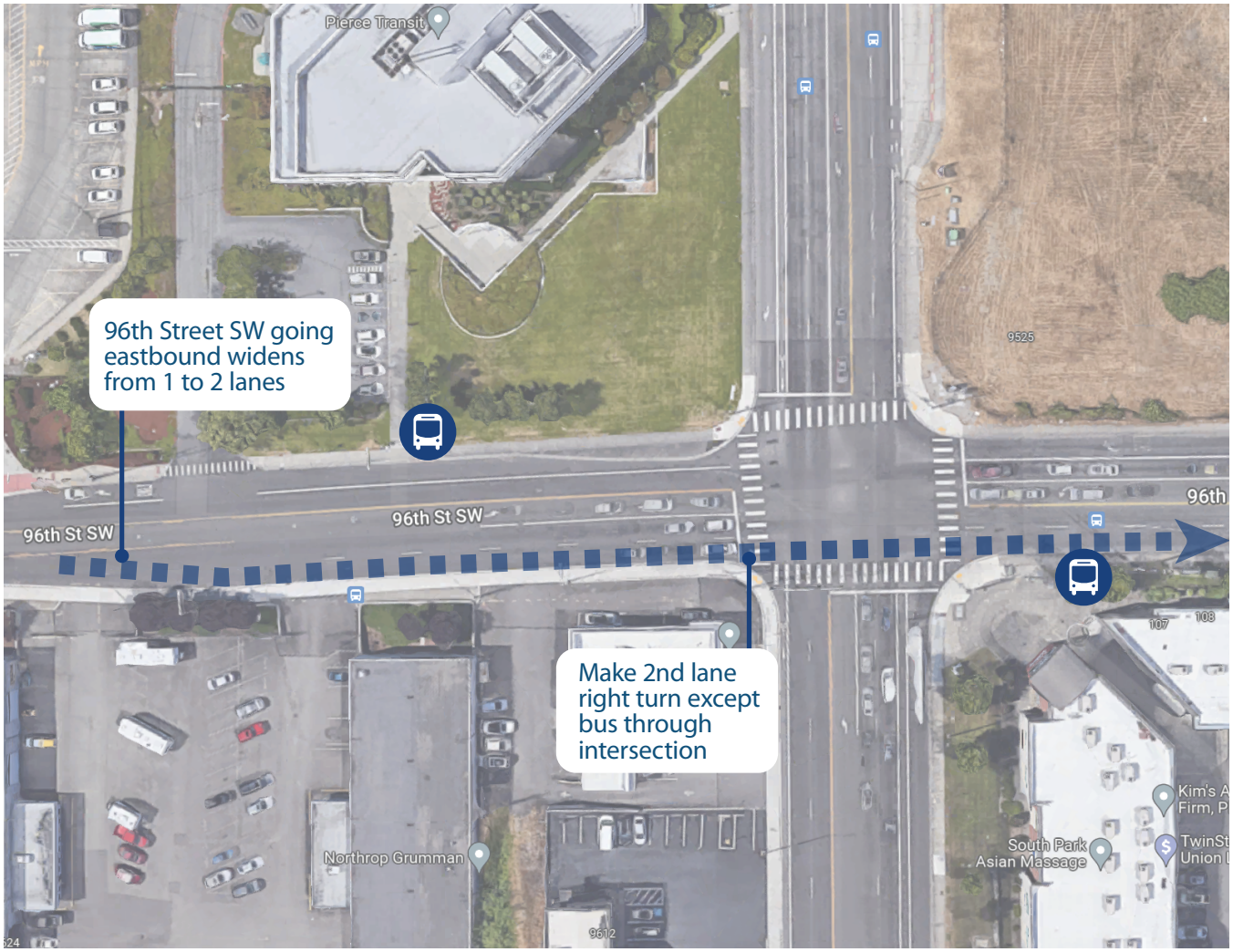


> There are no crosswalks between the light at 5th Street SE and the light at [the intersection of] 39th Street and 10th Street. It would be helpful to have a dedicated crosswalk (with a flashing light, like in downtown Puyallup) between the bus stops on the north and south sides of 6th Street and 43rd Street.
>
> Most congested heading east on SR 512 from 3:00 p.m. until about 7:00 p.m. Early morning traffic on SR 512 heading west to I-5 busy from 5:30 a.m. to around 9:30 a.m.

Figure 72: Corridor D Speed and Reliability Project List

Code	Location	Direction	Opportunity	Notes/Detail
1	96th Street SW at S. Tacoma Way	Eastbound	Queue Jump	96th Street SW goes from one to two lanes approaching S. Tacoma Way. Change added lane from through/right into right turn only except bus (Figure 73).
2	SR 512 Park-and-Ride	Northbound / Southbound	Add second Entry/Exit	A second entry/exit could make the bus flow to SR 512 Park-and-Ride better. In the past there were two entry/exit points, but one was closed (Figure 75).
3	SR 512 Park-and-Ride	Northbound / Southbound	Transit Only Signal	Add a transit only signal to help buses make the westbound right turn into the Park-and-Ride and the eastbound left turn out of the Park-and-Ride (Figure 76).
4	112th Street S at Steele Street S	Eastbound / Westbound	Queue Jump (westbound)	Allow buses to use existing eastbound right turn lane. Add queue jump signal to proceed across the intersection.
			Queue Jump + Queue Jump Signal (eastbound)	Allow buses to use existing westbound right turn lane. 112th Street S expands from one to two lanes at this intersection. Provide a receiving pocket on the west side of the intersection for the bus using the second general purpose lane.
5	112th Street S at Pacific Avenue S	Eastbound / Westbound	Queue Jump Signal	Allow buses to use existing eastbound and westbound right turn lanes. Provide transit signal so buses can proceed across the intersection.
6	112th Street S at Canyon Road E	Eastbound / Westbound	Queue Jump Signal	Allow buses to use existing eastbound and westbound right turn lanes. Provide transit signal so buses can proceed across the intersection.
N/A	Entire corridor	Both directions	Transit Signal Priority	Assume Transit Signal Priority at 50 percent of signals
N/A	Entire corridor	Both directions	Stop consolidation	Assume stops are consolidated from every 0.24 mile to every 0.58 mile.
N/A	Entire corridor	Both directions	In-lane stations	Assume Stream BRT stops in-lane at all stations.

Figure 73: Additional Detail on Project 1



The speed and reliability projects below can reduce travel times by 9 to 13 percent (Figure 74). This does not meet the Stream BRT standard of 20 percent.

Figure 74: Travel Time Savings Estimates for Corridor D

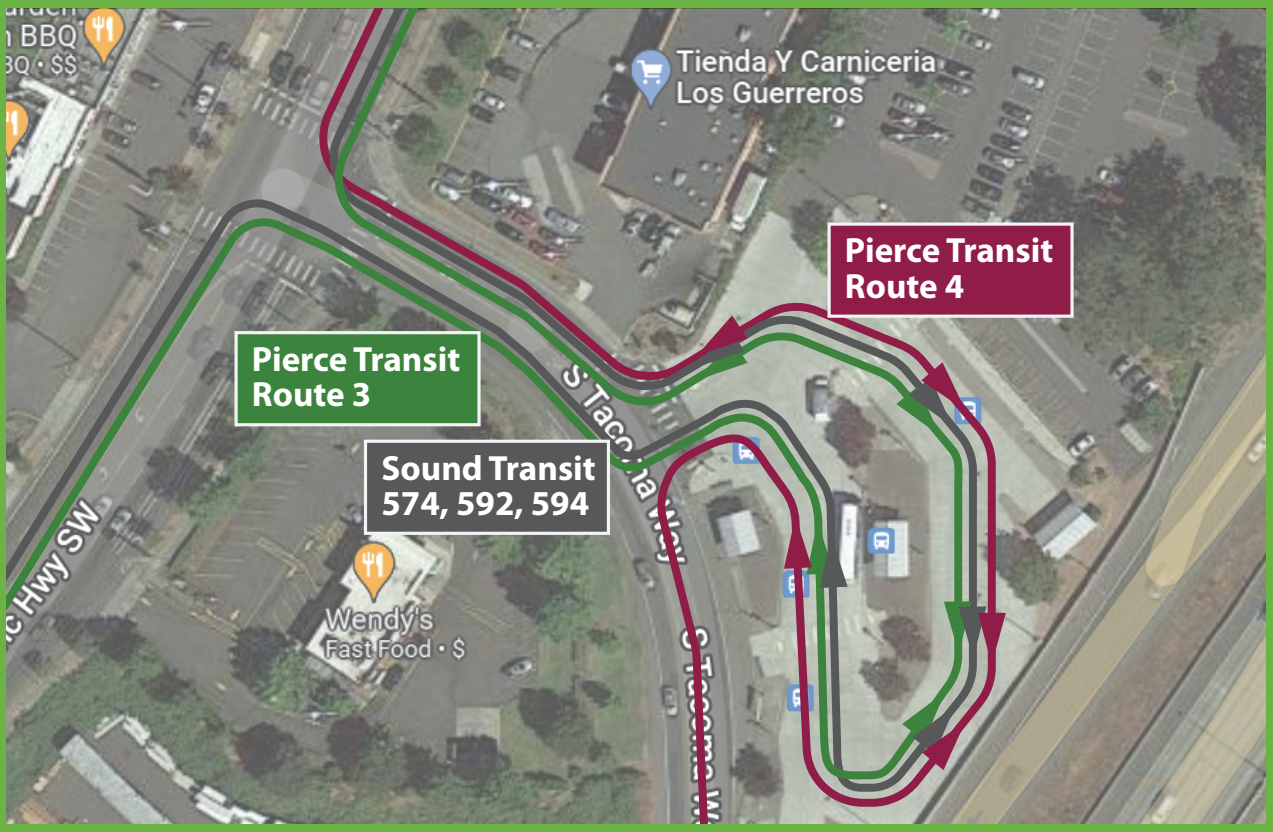
Corridor	Roundtrip Travel Time (minutes)	Total Travel Time Savings (minutes)	Total Travel Time Savings
D	124	-12.6	-10.2%
D1	92	-11.9	-13.0%
D2	126	-11.7	-9.3%

SR 512 PARK-AND-RIDE ACCESS AND CIRCULATION

Several routes serve the SR 512 Park-and-Ride, including service on Sound Transit and Intercity Transit. In Fall 2022, there were approximately 307 bus trips per day at the Park-and-Ride, providing local connections within Pierce County as well as regional connections into Olympia, Lacey, DuPont, Federal Way, Sea-Tac Airport and Seattle.

Two Pierce Transit routes, Route 3 (Corridor B) and Route 4 (Corridor D), serve this location (Figure 75). On an average weekday, approximately 190 people board these routes at this Park-and-Ride.

Figure 75: Additional Detail about Access and Circulation



> During rush hour and long weekends S. Tacoma Way at SR 512 Park-and-Ride is not an area you want a 60-foot bus stuck waiting. At least a 30-minute delay for a car during those times.

The Park-and-Ride has a single access point for buses on S. Tacoma Way, which is shared with access for drivers using the Park-and-Ride. There is no traffic signal at the Park-and-Ride entrance, which is less than 200 feet from the intersection of S. Tacoma Way and Pacific Highway SW. Buses serving this location experience high delay. Route 4 (Corridor D), when traveling eastbound toward South Hill Mall and Pierce College, must turn left to exit the Park-and-Ride (Figure 76).

The interchange between SR 512 and I-5 is located north of the Park-and-Ride. The intersection of S. Tacoma Way and Pacific Highway SW can experience heavy congestion due to freeway-related traffic, and this can impact transit operations into and out of the Park-and-Ride on S. Tacoma Way.

Figure 76: Additional Detail about Access and Circulation

Route 3 (Corridor B) and Sound Transit routes heading south must turn right out of the Park-and-Ride then quickly maneuver into the left turn lane (Figure 77).

Figure 77: Additional Detail about Access and Circulation

Time spent getting between the Park-and-Ride and the previous and following stops typically ranges between approximately 90 and 160 seconds. This variability is caused by vehicle congestion, signal timing at the intersection of S. Tacoma Way and Pacific Highway SW, traffic queues on S. Tacoma Way and operations within the Park-and-Ride itself.

Projects 2 and 3 from Figure 71 and Figure 72 can stabilize travel times.

SECTION 3

CORRIDOR EVALUATION

GCRTA's HealthLine BRT in Cleveland, Ohio

CORRIDOR EVALUATION

The corridor evaluation process used a mix of quantitative and qualitative data to identify which of the four corridors is best suited for Pierce Transit's next Stream BRT line. Five overarching goals were identified along with criteria that measure progress toward those goals. For example, one goal of Stream BRT system expansion is to connect people. A criterion used to measure progress toward this goal is the density of people and jobs that are served by each candidate corridor. A higher density means a corridor is better at meeting the goal of connecting people.

A successful project needs local support. For federal grants that are often used for projects like Stream BRT, measures of local commitment make up half the score used to award funding. Thus the evaluation was made up of two main steps:

- Step 1: Corridor prioritization, using data to measure the strength of each corridor as Stream BRT.
- Step 2: Readiness, meaning engagement with stakeholders to understand local support.

EVALUATION TOOLS

Data used for Step 1 came from these main sources:

- US Census Bureau: This resource provides data on the location and number of people with various demographic characteristics.
- Longitudinal Employer-Household Dynamics (LEHD): Produced by the Census, this tool specifically analyzes the location of jobs by income level.
- Sound Transit Ridership Model: This regional tool was used to project future ridership.
- PSRC Regional Model: This collates planned land use changes from jurisdictions as an input to population and employment projections.
- Local and regional geospatial datasets: Local and regional geospatial datasets were used to supplement national and regional tools.
- Existing Pierce Transit performance data: Used to establish transit delay.

FURTHERING EQUITY

Pierce Transit recognizes that there are disparities in access to transportation. These resulted from a long history of oppressive and discriminatory practices in land use, resource management and economic development. As part of ongoing efforts to mitigate harms dealt to disadvantaged populations, Pierce Transit has committed to prioritizing equity in all of its capital and service delivery projects.

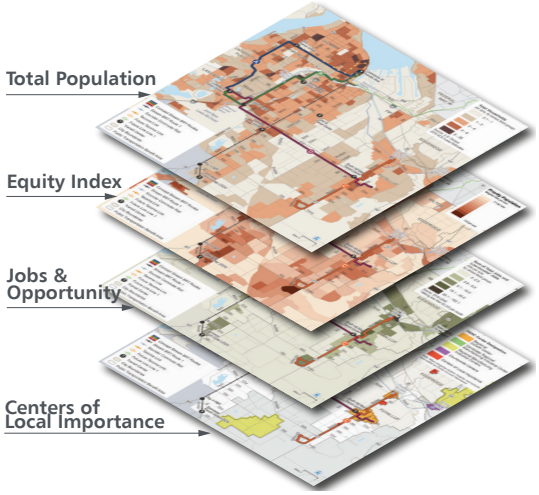
In prioritizing the potential Stream BRT corridors, an equity index was created and used in multiple evaluation criteria (Figure 78). The equity index elevates the needs of populations who have demographic characteristics that often lead them to rely on transit. Key characteristics were:

- People of color
- Low-income households
- Limited English proficiency
- People with disabilities

Information on where people with these characteristics live or work was mapped and used in the evaluation. The City of Tacoma and Pierce County have also created equity indices. Together, this shows regional commitment to overcoming historic oppression.

Through this analysis, **Corridors A and B were found to have the highest concentrations of priority populations.**

Figure 78: Many factors influenced equity analysis



PRIORITIZATION FRAMEWORK

Outcomes for Step 1 were calculated using the framework below. The five main goals are listed on the left, and the criteria used to measure them are listed on the right. See Appendix B: Corridor Prioritization for additional details.

Evaluation Account	Evaluation Criteria
ENHANCE Provide BRT service to the highest demand, highest need corridors in the Pierce Transit service area.	- Future daily boardings. - New transit trips generated. - Future daily boardings in equity locations.
CONNECT Connect residents with jobs, services and other daily activities.	- Population and employment density (2019). - Equity-weighted population and employment density (2019). - Connectivity with future regional transit network (2040).
GROW & PROSPER Provide BRT services to areas with transit supportive land use, areas of growth and locations that support local businesses.	- Future household and employment density (2040). - Percentage change in household and employment density (2019-2040). - Centers of regional and local
SUSTAIN Reduce emissions and promote sustainable travel.	- Reductions in greenhouse gas emissions. - Quality of pedestrian/bicycling network. - Projected increase in proportion of transit use on corridor (2042).
DELIVER Develop BRT projects that are fundable, effective and implementable.	- Cost-effectiveness. - Reduction in passenger travel times. - Federal Transit Administration (FTA) Small Starts grant program funding

STEP 1: CORRIDOR PRIORITIZATION

Scoring for each primary alignment and its variations is shown below, organized by goal area. The values were broken up into categories and assigned a score of 1-5, as shown in this summary table (Figure 79). Refer to Section 2 for descriptions of each corridor. The next several pages highlight one or two criteria per goal area and how each corridor scored.

For more detail see Appendix K: Evaluation Results.

Figure 79: Evaluation

		Enhance			Connect				
Corridor		Future Daily Boardings (2040)	Future Additional Daily Boardings (2019-2040)	Future Daily Boardings in Equity Locations	Population Density (2019)	Employment Density	Density of Equity Populations (2019)	Density of Low-Income Jobs (2019)	Connectivity with Regional Transit Services
A	Downtown Tacoma to Lakewood TC	3	3	4	5	4	4	4	1
A1	Downtown Tacoma to Lakewood Sounder Station	3	3	4	5	3	4	3	4
A2	TCC to Lakewood TC	1	1	5	3	2	4	2	1
B	Downtown Tacoma to Lakewood TC via S. Tacoma Way	4	4	4	3	5	4	5	4
B1	Downtown Tacoma to Lakewood TC via S. 38th St	4	4	4	4	4	4	4	4
B2	Downtown Tacoma to Lakewood TC via S. 48th St	5	5	4	5	4	5	4	4
C	Puyallup Station to Sunrise Blvd	1	1	2	2	1	2	2	5
C1	Edgewood to Sunrise Blvd	1	2	1	1	1	1	1	5
D	Lakewood TC to Pierce College	2	3	3	1	1	3	1	1
D1	Lakewood TC to South Hill Mall	2	3	3	1	1	3	1	1
D2	Lakewood TC to Piece College via Lakewood Sounder Station	2	w3	2	2	1	3	1	4

Scoring

5 Highest
4
3
2
1 Lowest

Note: Categories are based on natural breaks for each criterion.

	Grow & Prosper				Sustain				Deliver			
	Future Population density (2040)	Population Growth (2019-2040)	Future Employ-ment Density (2040)	Employ-ment Growth (2019-2040)	Centers of Local Impor-tance Served	Reduction in Green-house Gas Emissions	Quality of Pedestrian Bicycling Network	Increase in Corridor Transit Mode Share (2042)	Total Capital Cost	Annualized Capital and Operating Cost Per Rider	Reduction in Passenger Travel Times	FTA Small Starts Funding Potential
A	4	3	3	4	4	3	5	3	4	4	4	3
A1	4	3	3	4	4	3	4	3	5	3	3	3
A2	3	2	2	3	3	2	3	2	1	3	1	3
B	4	5	5	5	5	4	4	4	3	5	3	3
B1	4	4	4	5	5	4	5	4	3	5	2	3
B2	5	4	4	5	5	5	5	5	3	5	2	3
C	2	2	1	2	2	1	2	2	2	1	4	2
C1	1	2	1	2	2	2	1	3	4	1	3	2
D	1	1	1	1	1	1	1	1	3	2	2	2
D1	1	1	1	2	1	1	1	1	2	3	5	2
D2	1	1	1	1	2	1	1	1	3	2	1	2

ENHANCE

Provide BRT to the highest need, highest demand corridors in Pierce County.

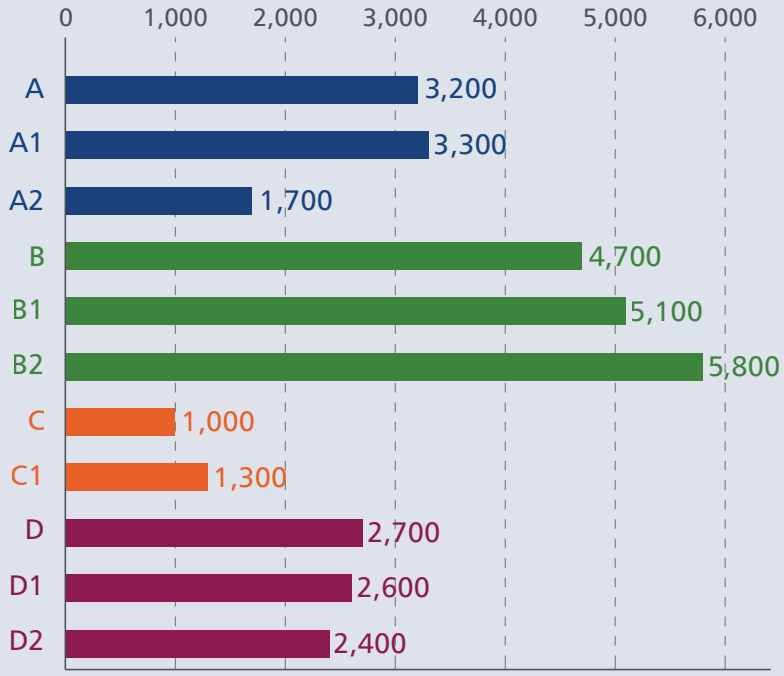
Regions invest in BRT to meet equity and climate goals. This means better serving existing riders with a higher quality of service and attracting new riders. An increase in ridership is typically the most important outcome in a project like BRT.

The Sound Transit Ridership Model was used to project future ridership (see callout below). As shown in Figure 80, Corridor B/B1/B2 would have the highest future ridership per day.

Equity Analysis

Ridership increases in equity areas were calculated using the equity index. This tells where people with equity population characteristics may get the most benefit from BRT investment. For both corridors A and B and their variations, a very high percentage (97-100 percent) of boardings in 2040 would occur in an area with a high equity index.

Figure 80: Future Daily Boardings, 2040



Sound Transit Ridership Model

Ridership projections are one of the most critical parts of this evaluation. Future ridership was used as an input into several other criteria, such as greenhouse gas reduction (see SUSTAIN on the following page).

The Sound Transit Ridership Model is the most efficient tool for transit ridership forecasting in the region. It includes **buildout of the entire ST3 network**, including the T Line extensions to Hilltop and Tacoma Community College.

The model uses PSRC's Regional Model as an input for future land use, population and employment. The PSRC model includes locally adopted land use plans; therefore the ridership projections are based on local growth targets.

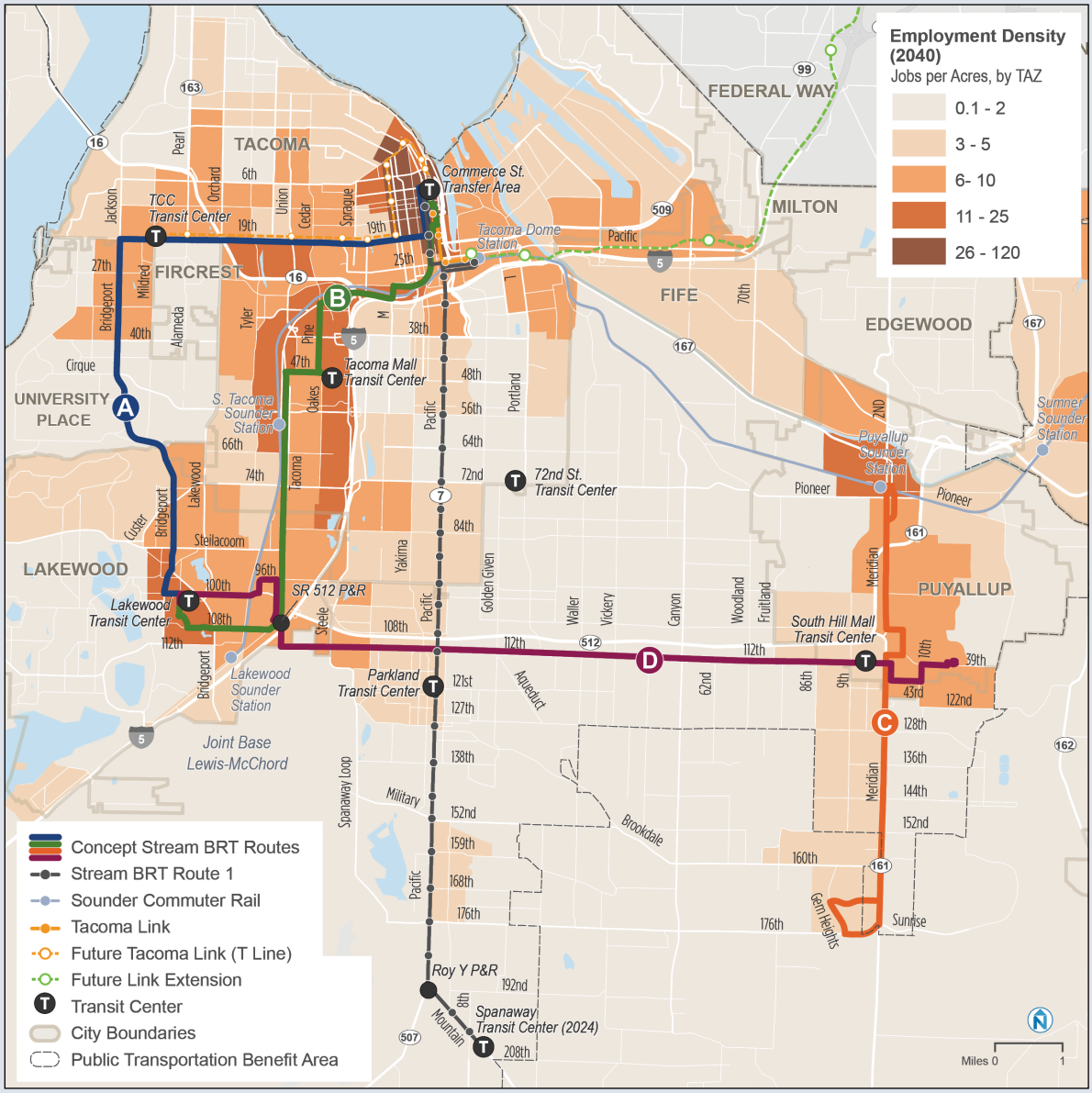
CONNECT

Connect residents with jobs, services and other daily activities.

Transit is set up for success when it connects dense land uses of mixed types. This mix of land uses (such as schools, offices, retail or housing) means there is demand for travel all day, in both directions. The density means there are a lot of people within a short walking distance of the transit route, stop, or station.

The study area is also projected to grow. In 2040, areas with high densities of jobs will include stretches of Corridor A and B, the Lakewood TC area and downtown Puyallup (Figure 81).

Figure 81: Projected Employment Densities in 2040



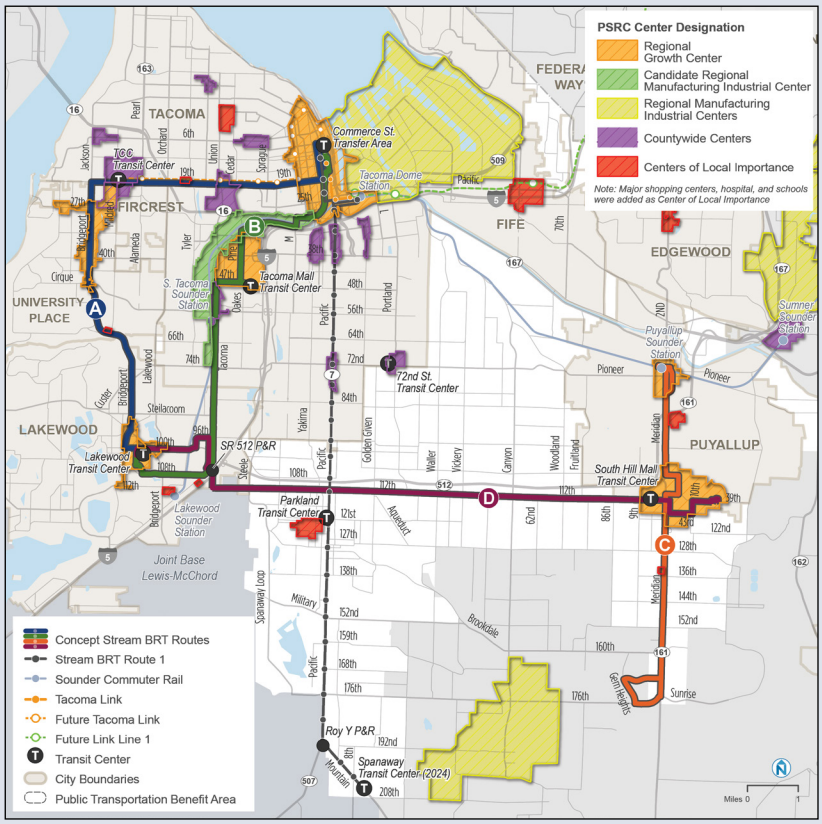
GROW AND PROSPER

Provide BRT services to areas with transit-supportive land uses, areas of growth and locations that support local businesses.

Washington State has strong growth management regulations. Growth is prioritized in areas that already have density, services and infrastructure (Figure 82). PSRC's Vision 2050 long-range plan includes a goal that 65 percent of the region's population growth and 75 percent of employment growth be within walking distance of HCT systems like Stream BRT.

The region and Pierce County created a framework of growth centers with geographic boundaries as a way to ensure development happens where it should. Corridors that serve many growth centers (Figure 82) both support regional goals and have a higher chance of reaching a large market of users. Corridors A/A1 and B/B1/B2 together serve more than 60 centers of regional or local importance. Corridors C/C1 and D/D1/D2 together serve just more than 20.

Figure 82: Regional and Local Growth Centers



Land Use and Potential Growth

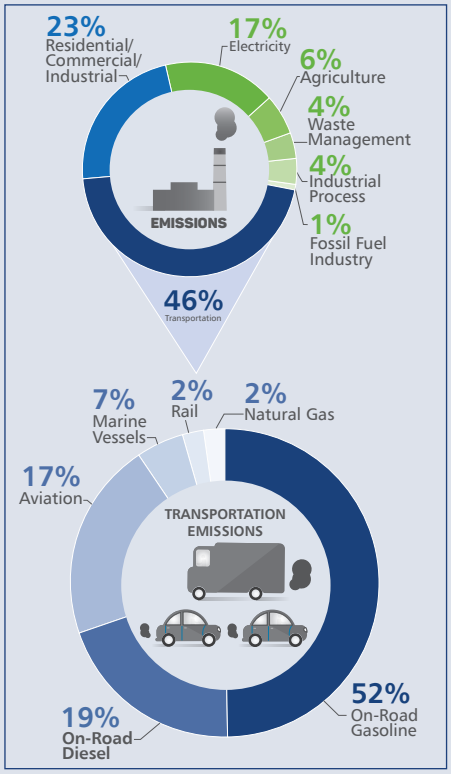
The growth assumptions used in this evaluation were based on PSRC's Regional Model, which currently projects out to 2040. Developments and zoning changes that were not included in the 2040 projections were examined. PSRC's projections include a high level of growth, therefore the conclusion was that the model is still predicting growth in an appropriate range. The assumptions in the PSRC model were examined. The model already assumed high levels of growth that would accommodate recent rezonings. Therefore, the 2040 projections were used in this project.

SUSTAIN

Reduce emissions and promote sustainable travel.

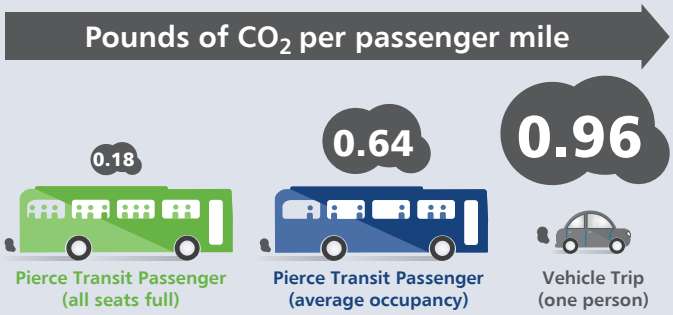
The climate crisis continues to produce extreme weather events, hotter summers and threats to life and property. Greenhouse gases contribute to climate change by trapping heat in the atmosphere, making the planet warmer. The transportation sector makes up nearly half of all greenhouse gas emissions in Washington State (Figure 83). Within the transportation sector, emissions from combustion of fossil fuels (gasoline and diesel) make up 70 percent of greenhouse gases (Figure 83).

Figure 83: Emissions by Sector



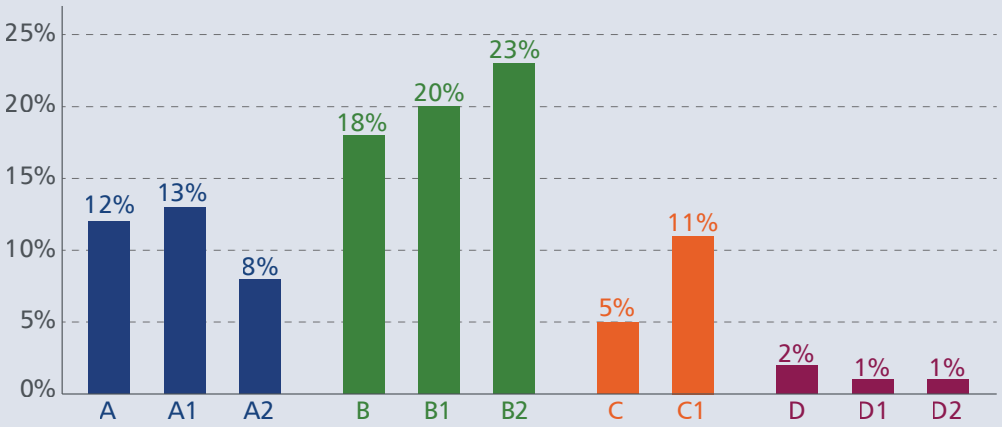
Getting more people on buses will combat the climate crisis. On a per-mile basis, a passenger trip on a bus emits far less than a trip in a car. BRT – with its greater reliability, ease of use, and high frequencies – has been proven to immediately increase transit ridership.

Figure 84: Emissions per Passenger Mile



The Stream BRT candidate corridors were evaluated based on their ability to reduce greenhouse gas emissions and increase transit mode share. As shown in Figure 85, Corridor B and Corridor A have the greatest environmental benefits.

Figure 85: Projected Increase in Transit Mode Share



DELIVER

Develop BRT projects that are fundable, effective and implementable.

The best project for the region will be cost-effective in both federal and state grant funding applications.

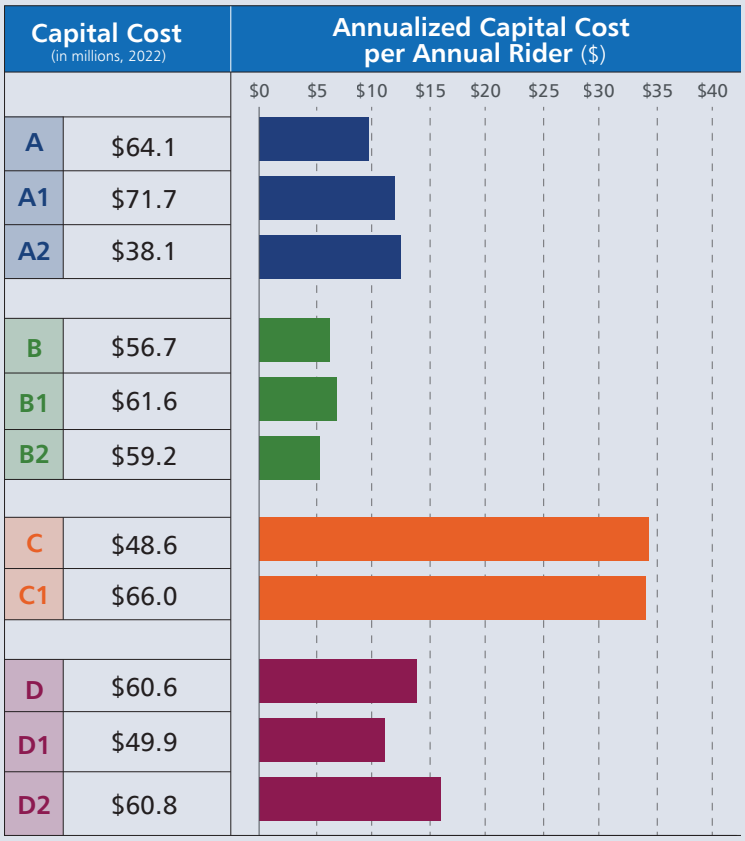
For additional detail see Appendix L: Cost Estimate.

Building a Capital Cost

BRT projects are major capital investments. Like all forms of transportation including streets and sidewalks, design and construction requires funding subsidies.

Pierce Transit cannot build Stream BRT without either federal or state financial support and local contributions. But Pierce Transit also wants to invest in a corridor that is cost-effective, meaning it provides high benefits compared to the cost. The estimated capital costs per corridor range from around $50 million to $70 million, which includes buying new buses. This equals $5 million to $6 million per corridor mile.

Figure 86: Annualized Capital Cost per Rider

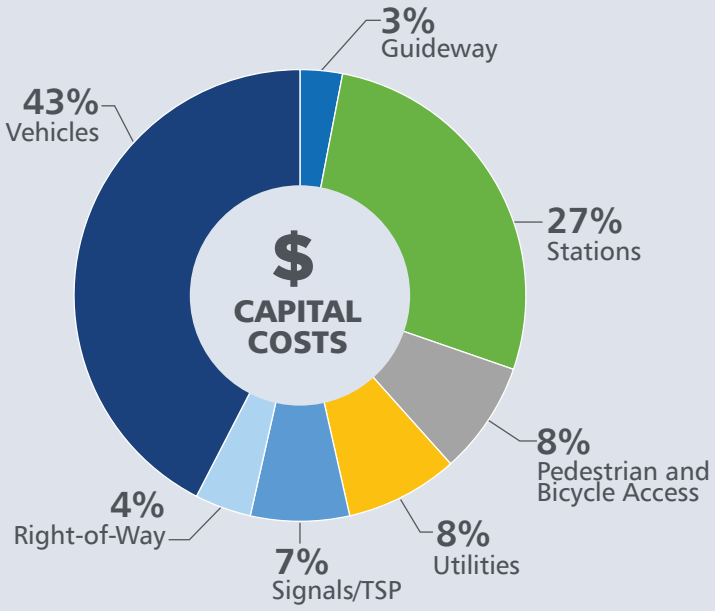


One way to understand the cost-effectiveness of these capital costs is to look at them annualized over the lifetime of the capital investment divided by riders (Figure 86). Corridor C, with its lower ridership projection (Figure 80) has a high cost per rider compared to Corridor B, which has the lowest. Once Stream BRT is built, Pierce Transit must also operate the service. The estimated *net* operating costs range from $6 million to $10.5 million annually, which depends on both the length of each corridor and the level of existing service. This ranges from approximately $500,000 to $1 million per corridor mile. This cost represents the additional funds needed to operate each corridor as Stream BRT instead of local bus.

In terms of what drives the high capital cost of new BRT projects, it is mostly the cost to buy new articulated vehicles and build the stations (Figure 87).

- **Guideway:** This cost is for any paving, channelization of traffic or signage needed. Transit priority treatments in the street, like queue jumps and in-lane stops, are also covered in this category.
- **Stations:** This cost includes a raised platform for level boarding, shelters, real-time arrival and departure information, seating, lighting and other passenger amenities associated with the Stream BRT brand. This category includes concrete bus pads, which provide a stable base at stations and do not buckle over time like asphalt.
- **Pedestrian and Bicycle Access:** Stream BRT investment is an opportunity to bring bike lanes, sidewalks and crossings up to standard so people can safely access transit.
- **Signals:** Intersections are where buses are frequently delayed. Signal upgrades and transit signal priority are included in this cost category, and were assumed at half of the signals on each corridor.
- **Utilities:** Constructing stations and signal upgrades may require work on drainage and electrical utilities.
- **Right-of-Way:** This category covers easements needed during construction as well as any permanent right-of-way needed.
- **Vehicles:** Transit agencies must have enough vehicles not only to operate service, but must also have spare vehicles in case repairs are needed. FTA guidelines call for an agency to maintain an up to 20 percent "spare ratio." This means that if it takes 10 buses to provide 10-minute frequencies, Pierce Transit needs two spare vehicles, so it must purchase 12 total vehicles. Each vehicle is estimated at $1.5 million as of today.

Figure 87: Breakdown of Average Capital Costs per Candidate Corridor by Category



POTENTIAL FOR FEDERAL FUNDING

Like all forms of transportation, transit projects rely on support from the federal government. Stream Community Line, like many BRT lines, received $75.2 million in FY 22 funding from the FTA's Capital Investment Grant (CIG) Small Starts program. Pierce Transit is interested in funding significant portions of future Stream BRT delivery though the FTA. Therefore, a simplified set of criteria used in the CIG program was used to evaluate how well each candidate corridor might compete for FTA funding, against other competing projects.

What is FTA Small Starts?

FTA Small Starts is a type of project within the CIG program. Criteria for FTA Small Starts are:

Stream BRT falls into this project type.

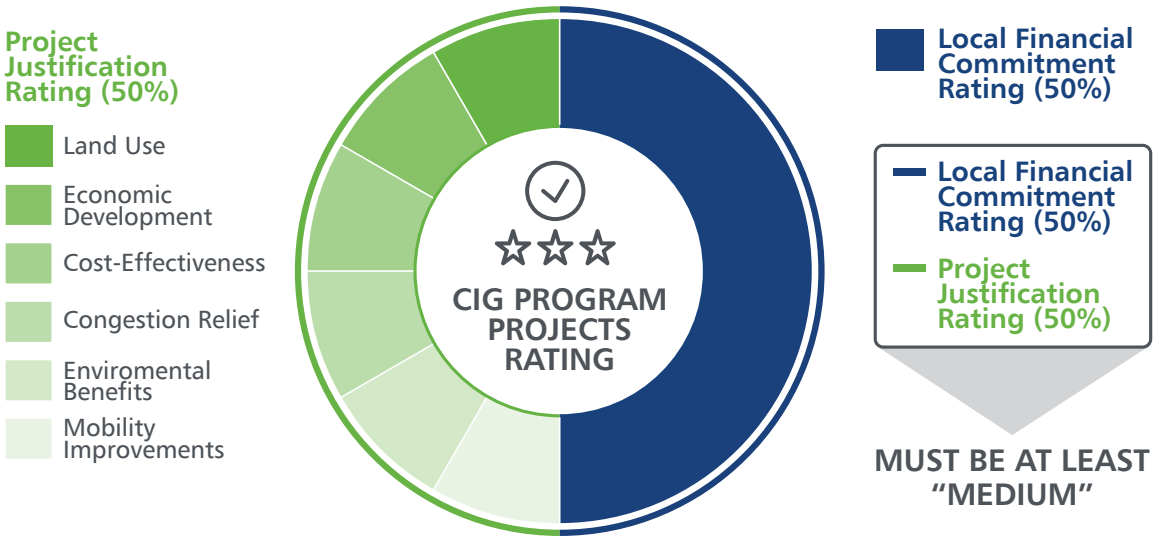
- Capital cost < $400 Million
- Grant request < $150 Million
- Local funds cover a minimum of 20% of total project cost

Similar to the steps used in this study, the FTA CIG evaluation considers two categories (Figure 88) and produces a rating from Low to High:

- Project Justification: This category asks the applicant to demonstrate why the project is valuable using quantitative and qualitative criteria in six categories.
- Local Financial Commitment: This category seeks to understand how ready the applicant is to construct, operate and maintain the project. The applicant must demonstrate that local support and funding are available, and that the agency is in sound financial health.

The FTA rates the project for both categories. The project must earn a Medium rating in both to enter the FTA's project pipeline (a stage referred to as "Project Development"). Please see Appendix M for additional details about FTA funding and corridor ratings.

Figure 88: How Projects are Rated in the CIG Program



CANDIDATE CORRIDOR RATINGS

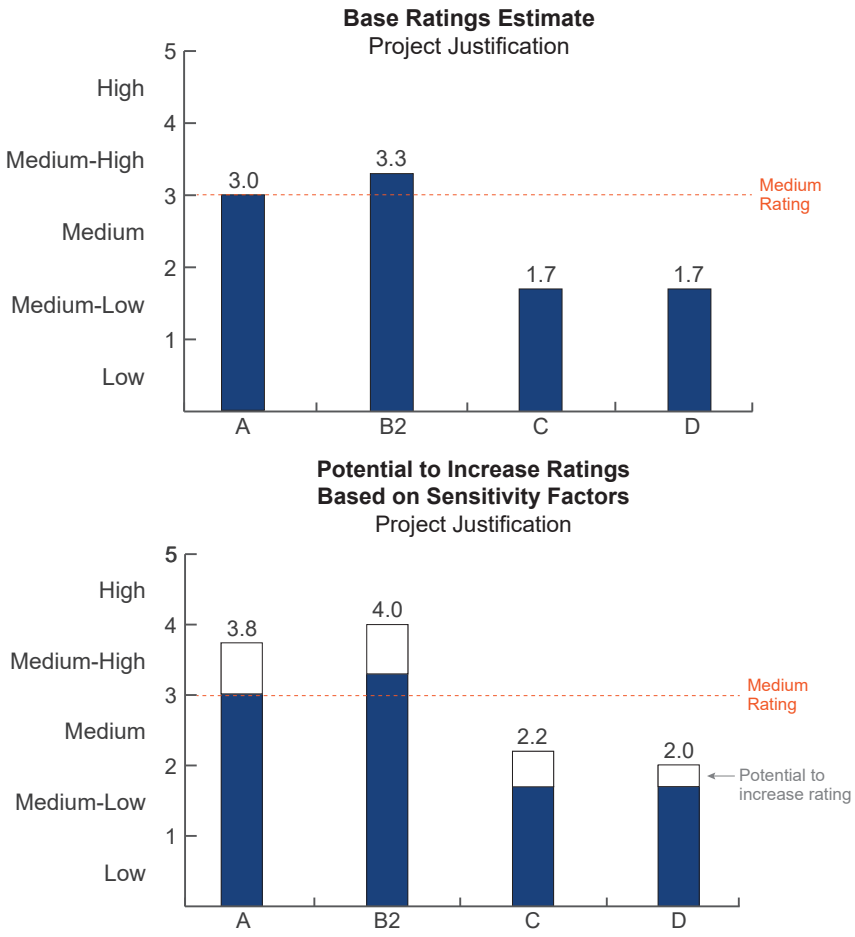
The project justification rating was estimated for the corridor variations that scored highest per corridor – A, B2, C, and D (Figure 89). This shows that only A and B2 would achieve a medium rating, which is the minimum level to be eligible for FTA Small Starts funding.

The local financial commitment rating will ultimately come down to local support which was unknown at the time of this evaluation; therefore it was not evaluated. Note that Stream Community Line achieved a high rating in this category.

This is a very preliminary assessment of the project justification rating. Therefore a second scenario was run through the criteria. The second scenario assumed things that could make a project in each corridor more competitive, such as increased ridership. As shown in Figure 89, this bumps up Corridor B2 to a Medium-High rating and Corridor A to a higher score within the Medium category.

In both scenarios, neither C nor D would achieve a medium rating. Even if they both had a high rating for local commitment, they still need a medium project justification rating to enter Project Development. This suggests that if corridors C and D were to become Stream BRT, the delivery timeline may be much longer than A or B. It also suggests that other options, such as increased frequency or more density, may make service better than Stream BRT. Section 4 of this report provides more detailed recommendations for transit improvements for both corridors outside of Stream BRT.

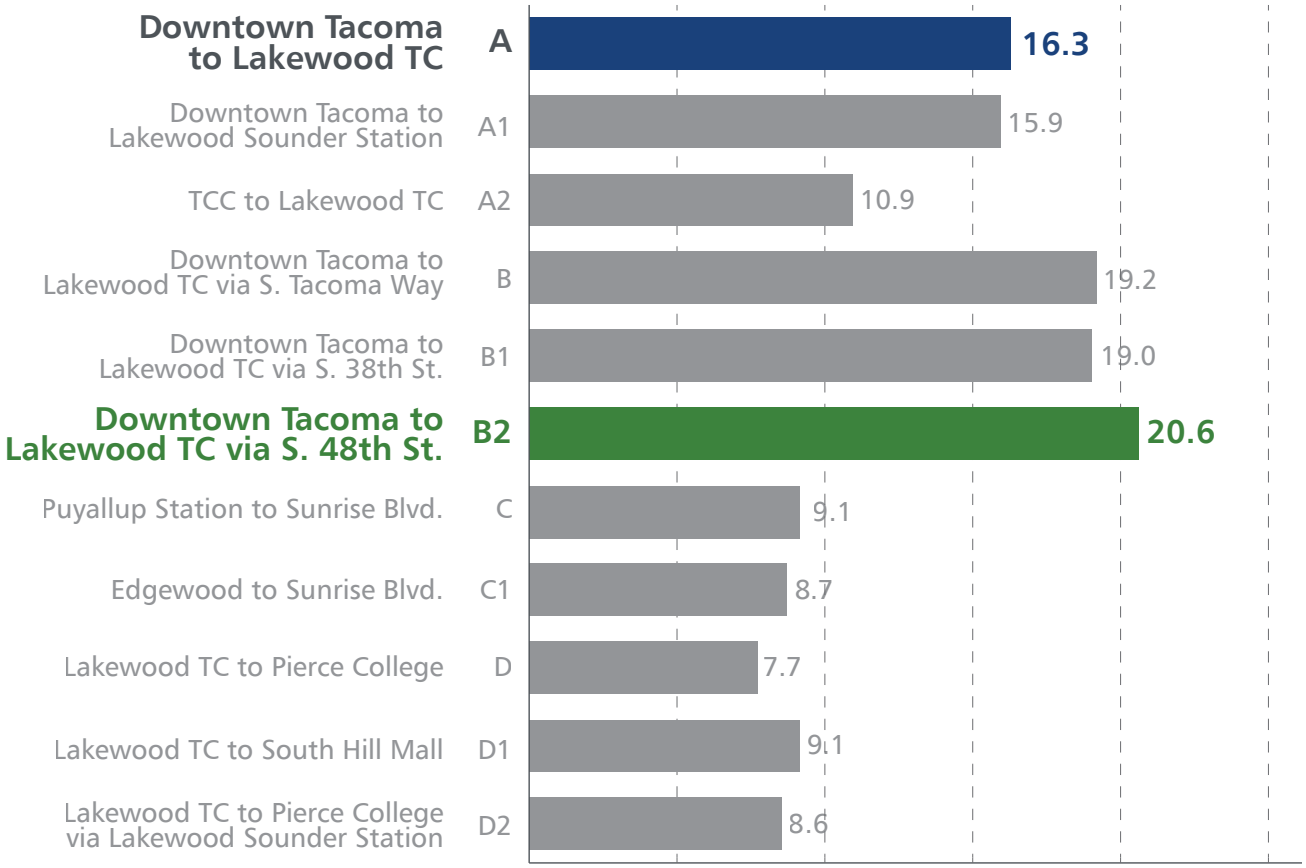
Figure 89: Breakdown of Capital Costs by Category



STEP 2: READINESS

The highest scoring corridors from step 1 were A and B2 (Figure 90). These findings were shared with the TAC and stakeholders through a series of meetings conducted throughout summer 2022 with the goal of understanding local support to move one corridor forward.

Figure 90: Step 1 Summary Scores



Agency Briefings

Pierce Transit gathered feedback about the project outcomes at briefings throughout summer 2022.
See Appendix Q: Letters of Support to see partner support statements.

Pierce County Council	Tacoma Transportation Commission	Tacoma Pedestrian/ Bicycle Advisory Group	Tacoma Planning Commission	Tacoma City Council	Sustainable Tacoma Commission
University Place City Council	Lakewood City Council	Fircrest City Council	Downtown: On the Go!	Pierce Transit Community Transportation Advisory Group (CTAG)	Pierce Transit Board and Executive Team

Letters of support for advancement of Corridor A and Corridor B2 were received from the City of Lakewood, City of University Place, Tacoma Transportation Commission and Tacoma City Council.

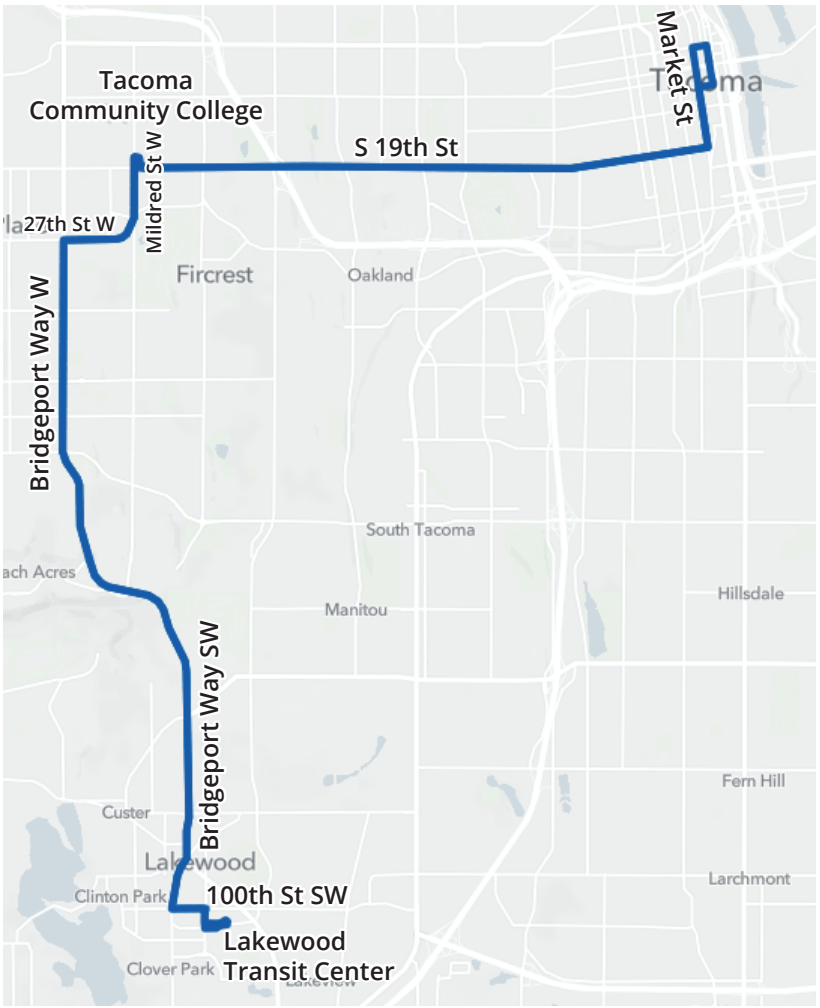
CORRIDOR A

Local support is critical to implementation. In the FTA Small Starts program, for example, local commitment counts for 50 percent of the project's overall score. It demonstrates to funders that the roadway owners and other key partners are committed to the project's success. Construction of Stream BRT will require local dollars, but it will also require utility coordination, design on roadways that Pierce Transit does not own, and approval of numerous permits. "Readiness" means the community is ready to proactively partner to implement this project.

Strengths

- Received strong support from planning partners.
- Serves areas with high equity needs.
- Serves three Regional Growth Centers: Downtown Tacoma, University Place and Lakewood.
- Could directly serve Sounder commuter rail at Tacoma Dome and Lakewood stations.
- Route 2/Corridor A is Pierce Transit's second-highest ridership route.

Figure 91: Corridor A



Challenges/Concerns

- Corridor should be extended to serve Lakewood Sounder station.
- Future T Line streetcar extension on S. 19th Street poses several challenges:
  - Major concerns that investment in BRT could delay streetcar. Streetcar remains the top priority for jurisdictions.
  - Streetcar and BRT have different operating requirements and may not be able to use the same infrastructure.
  - Public construction fatigue if BRT and streetcar are constructed over a multi-year timeline, back to back.
- Corridor A2 from TCC to Lakewood TC avoids S. 19th Street, but performs more poorly than A given its reduced ridership. A2 may not be competitive for federal funding.

CORRIDOR B2

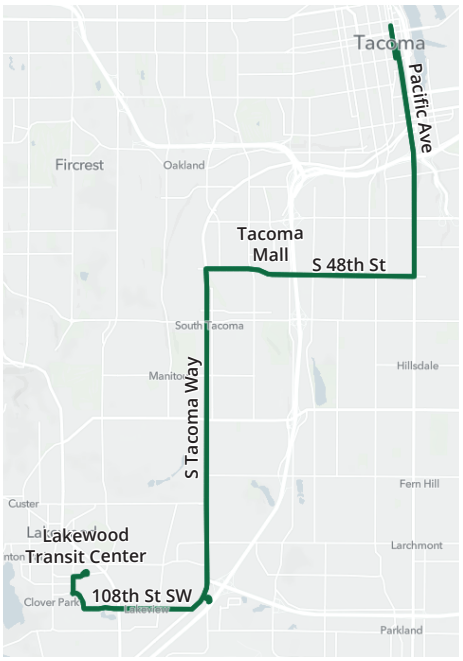
Strengths

- Received strong support from planning partners.
- Serves areas with high equity needs.
- Enthusiasm for corridor to serve the Lincoln International District.
- Strong likelihood of qualifying for grant funding (FTA, Federal Highway Administration (FHWA), WSDOT).
- Serves three Regional Growth Centers: Downtown Tacoma, Tacoma Mall and Lakewood.
- Could directly serve Sounder commuter rail at Tacoma Dome, South Tacoma and Lakewood Stations.

Challenges/Concerns

- Route should be extended to serve the Lakewood Sounder station.
- Some felt B1 (via S. 38th Street) would better serve the Lincoln International District. B1 scored nearly as high as B2. But S. 38th Street is congested at the I-5 interchange, which could delay the bus. WSDOT may change this ramp setup, but it is unclear when.

Figure 92: Corridor B2



RESULTS

In terms of corridor prioritization, corridor B2 scored the highest. Corridor B2 scored high because it had:

- Higher ridership projections.
- Serves high densities of people and jobs.
- Is cost-effective in terms of travel time and reliability treatments per rider.
- Addresses social equity considerations by serving a high density of transit-reliant populations.

The TAC and stakeholders support the SSES process and technical findings.

In terms of readiness, stakeholders supported moving forward corridors A1, A2, B1 and B2.

Corridor A1 serves Lakewood Sounder Station, which was revealed to be an important commuter rail and express bus connection. Corridor A2 did not score high in step 1, but partners felt should be kept in consideration because it removes the conflict with the T Line on S. 19th Street. Corridors B1 and B2 both serve the Lincoln International District and stakeholders agreed this area is a better market for transit than the area served by Corridor B.

Commerce Street Station's "Waterfall," Tacoma

SECTION 4

MOVING FORWARD

Rendering of BRT along Colfax Avenue in Denver, currently in design.

STREAM BRT EXPANSION

The rollout of a BRT network takes many years. This section outlines how Pierce Transit can implement the Stream BRT program in the short- and long-term. The project has also uncovered ideas for immediately improving local fixed-route service for current riders. This section outlines the findings for moving Stream BRT ahead as well as recommendations for the local network.

IMMEDIATE NEXT STEPS (2023)

1. Corridor refinement (Q2 2023 - Q4 2023)

Two corridors emerged from the SSES as strong near-term candidates for Stream BRT:

- Corridor A from downtown Tacoma to Lakewood TC via S. 19th Street and Bridgeport Way.
- Corridor B from downtown Tacoma to Lakewood TC.

Further planning and analysis are needed to advance both corridors and provide Pierce Transit leadership with information needed to identify the agency's highest priority for future Stream implementation.

Resources are available to do additional planning. Pierce Transit received $3 million from the State of Washington through the Move Ahead legislation earmarked for expansion of Stream BRT. This funding will be used in 2023 to support further refinement and evaluation of corridors A and B along with local jurisdictional partners.

Pierce Transit is planning to advance corridor planning by the end of 2023 to a point where the next Stream BRT corridor can be identified (Figure 93).

Two examples of valuable work that could be completed in corridor refinement are determining how Stream Community Line and Stream BRT 2 connect in downtown Tacoma and evaluating the market for travel to TDS and downtown Tacoma (see page 4-4).

Figure 93: Elements to be Determined by Early 2024

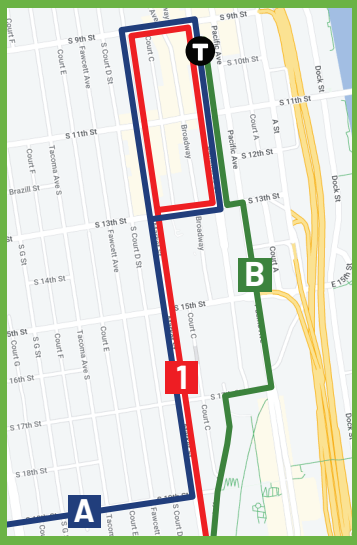
Stream BRT Routing in Downtown Tacoma

Stream Community Line will serve downtown Tacoma along Market Street and Jefferson Avenue. Today, Pierce Transit's local services in downtown are primarily concentrated along Pacific Avenue and Commerce Street. As planning for future Stream BRT corridors advances, a holistic look at how BRT and local services come together will be needed to ensure easy transfers (Figure 94).

For example, if Corridor B mimics existing Route 3, it would run along Jefferson Avenue and Pacific Avenue in downtown Tacoma. But if Stream Community Line uses Jefferson Avenue and Market Street, it may make sense for Corridor B to use the same streets. This provides double the frequency along this stretch and allows for transfers between BRT lines.

Corridor A would follow the same route as Stream Community Line. Given the high frequency of service, stations along Market Street and at Commerce Street may need to accommodate multiple Stream BRT vehicles. These operational needs should be identified early.

Figure 94: Stream BRT Potential Downtown Routing

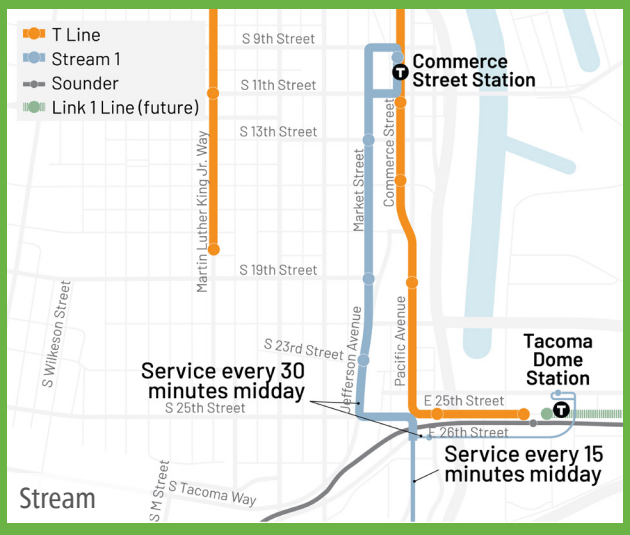


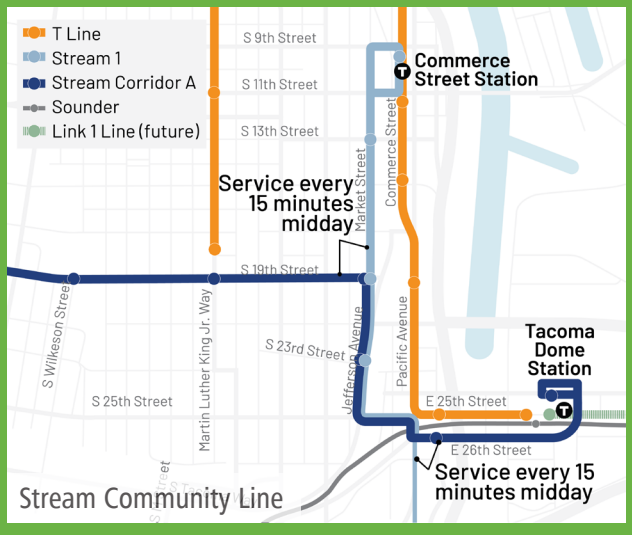
Market for Travel to TDS and Commerce Street

Both Commerce Street Station in downtown Tacoma and Tacoma Dome Station (TDS) are critical destinations. At TDS, passengers can transfer to Pierce Transit routes as well as many regional bus and rail services. Downtown Tacoma has a high density of destinations.

Stream Community Line will alternate trips going to TDS or Commerce Street Station, which results in half the frequency to each terminus. A second Stream BRT (such as Corridor A or Corridor B) could allow for each terminus to be served by one single Stream BRT corridor at a higher frequency. For example, all Stream Community Line trips could end at Commerce Street Station, while Corridor A or B could terminate at TDS. This would ensure Stream BRT standard frequency is met at both termini

Figure 95: Example of Transfer Locations





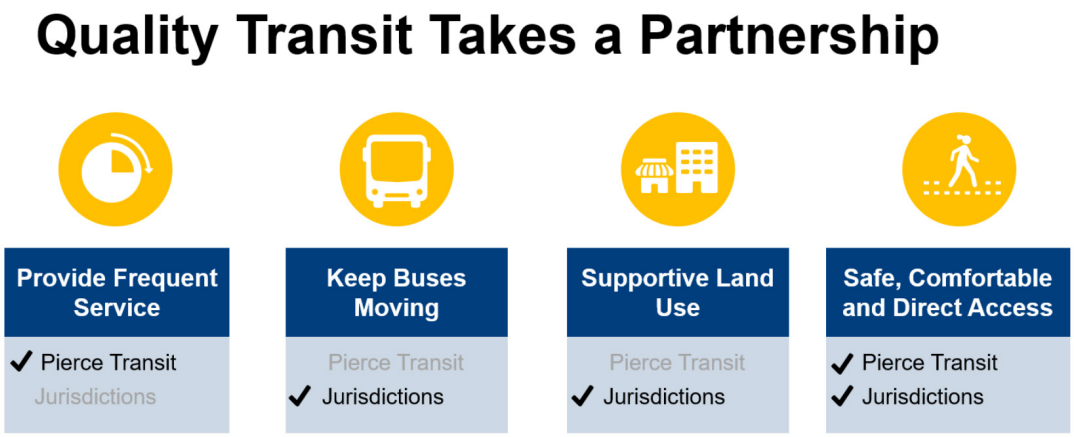
2. Continue building partnerships (2023 - ongoing)

Pierce Transit operates buses, but jurisdictions own the road and control land use decisions (Figure 96). Partnerships are needed between the transit agency and roadway owners to make sure people have access to high-quality transit.

Fast and reliable Stream BRT will attract riders. Transit priority street design features (see *Speed and Reliability Toolkit* on pages 2-11 and 2-12) are used in BRT systems across the country. Ongoing conversations and relationship building between Pierce Transit and roadway owners can ensure these treatments are part of Stream BRT projects. Transit priority treatments can also be implemented to make local bus service more reliable.

Land use and development decisions of local jurisdictions have direct impacts on transit demand. Mixed uses and denser development increase transit usage. A relationship between Pierce Transit and jurisdictions can ensure that future land use patterns ultimately serve more passengers effectively.

Figure 96: High-quality Transit Takes Partnerships



3. Start *Destination 2050* (Q2 2023)

In the long term, the intent is for there to be a network of at least five Stream BRT lines across Pierce Transit's service area.

Pierce Transit will begin work **on an entirely new long-range plan** – *Destination 2050* – in 2023. This plan is an opportunity to elevate more of the current local routes as potential Stream BRT corridors. This planning process will provide the support for continuing to advance corridors into project development, design and implementation.

4. Begin FTA coordination (Q3 2023)

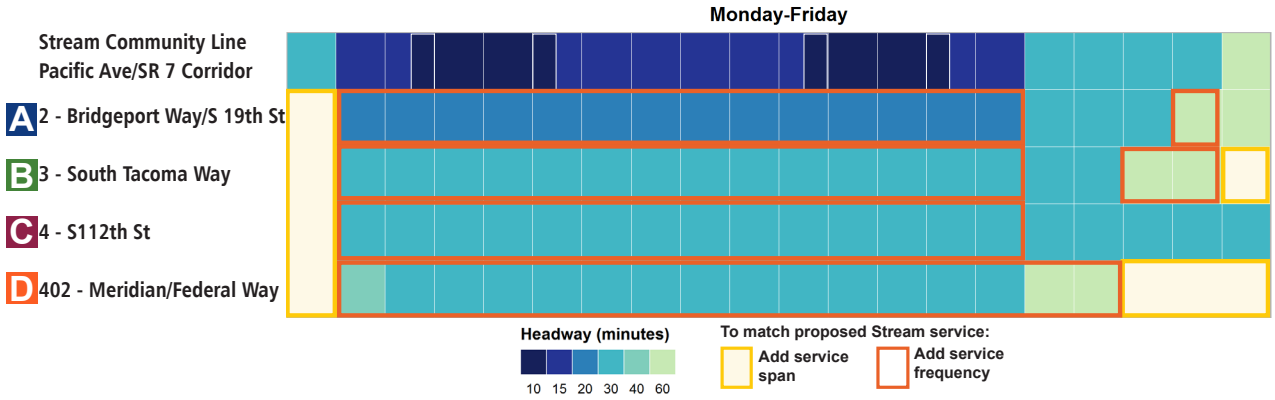
If Stream BRT 2 is funded through the FTA Small Starts program, Pierce Transit will coordinate closely with the FTA for several years. The FTA covers the country in divisions by region; Pierce Transit is covered by Region 10 in Seattle. Early coordination with FTA Region 10 in Seattle will benefit the project so FTA staff are aware of the project scope, schedule and delivery plan as it continues to develop.

5. Continue sharing messaging around Stream BRT benefits (2023 - ongoing)

Stream BRT is a new type of service for Pierce Transit. Outreach and marketing are needed to educate people about this new service and its benefits. Examples of benefits that can be communicated:

- High frequency – Stream BRT will run every 10-15 minutes from 5 a.m. to 7 p.m. This is double the frequency on the current Route 2/Corridor A, for example.
- Longer hours – Stream BRT will run from 4 a.m. to midnight.
- High-quality stations – Lighting, seating, shelters, and real-time information will make Stream BRT stations comfortable for waiting.
- Better accessibility – Upgrades to existing sidewalks and crosswalks in compliance with ADA standards will make sure stations are accessible for all.
- Comfortable vehicles – Stream BRT will be run with low-floor vehicles that make it easier to board. The buses are longer, with room for more passengers, including wheelchairs and bicycles.
- Faster trips – Design and operational features in the street that will give buses priority can reduce travel times for passengers by 7-13 percent.

Figure 97: Investments in Stream BRT add frequency (orange boxes) and hours of service (yellow boxes) to the four candidate corridors



6. Integrate Stream BRT corridors into local comprehensive plans (2023 - ongoing)

Pierce County plus the cities and towns within the study area will begin updating their comprehensive plans in 2023. These lay out future land uses and growth aspirations.

A coordinated land use and transit planning process might entail:

- Calling out the Stream BRT candidate corridors as future BRT or HCT.
- Identifying corridors such as Washington State Routes that are targets for growth and implementing that vision with code allowing higher densities.
- Implementing traditional urban design standards making land uses comfortable for walking (e.g., parking behind buildings, windows facing the street, etc.).
- Engaging with Pierce Transit throughout the comprehensive plan process.

7. Develop a funding plan (Q4 2023)

Pierce Transit will be required to have an adopted project funding plan demonstrating ability to commit funds to begin project development work immediately upon acceptance into the Small Starts program. Pierce Transit will also need to provide an anticipated delivery timeline. This requires that Pierce Transit demonstrate that funds are committed in its Board of Commissioners-approved budget for Project Development activities including National Environmental Policy Act (NEPA) analysis and a 30 percent level of design. These activities are usually 10 percent of the total project cost. Stream BRT 2 will need to be added to the agency's capital improvement or other similar spending plan.

Funding Opportunities

The Bipartisan Infrastructure Law (BIL), as signed by President Biden in November 2021, is the federal transportation funding bill and provides up to $108 billion for public transportation programs and projects through various United States Department of Transportation agencies.

Numerous grant programs are available to continue the design and eventual construction of Stream BRT. Typical programs used for these types of projects are summarized below.

FEDERAL HIGHWAY ADMINISTRATION

- Congestion Mitigation and Air Quality (CMAQ) Improvement Program – Provides funding to state and local governments for projects that help meet the requirements of the Clean Air Act. A percentage of CMAQ funds based on population must be used to target emissions reductions in areas that are not meeting air quality standards.
    - Funds available: $2.53 billion in 2022 to $2.74 billion in 2026.

FEDERAL TRANSIT ADMINISTRATION

- Areas of Persistent Poverty Program – Supports projects that address the transportation challenges faced by areas of persistent poverty and long-term economic distress. Grants are awarded based on Census-defined low-income areas.
    - Maximum grant award will not exceed $850,000 and project timeline should range from 24 to 36 months.
    - Minimum federal share is 90 percent of net total project cost.

- Buses and Bus Facilities Program (Formula and competitive) – Provides funding to states and transit agencies to replace, rehabilitate and purchase buses and related equipment and to construct bus-related facilities.
  - Federal share is 80 percent of net capital project cost.
- Low-No Program – Provides funding for the purchase or lease of zero-emission and low-emission buses or supporting facilities/equipment.
  - Funds available: $1.22 billion in 2023.
  - The federal share is 85 percent for vehicles and 90 percent for facilities or equipment (such as charging infrastructure).
- Capital Investment Grants (CIG) – A discretionary grant program that funds transit capital investments, including heavy rail, commuter rail, light rail, streetcars and BRT.
  - New Starts: Total project cost is greater than $400 million or total grant requested is greater than $150 million. Requires 50 percent of the project alignment to be dedicated to transit (bus or BAT lanes).
  - Small Starts: Total project cost is less than $400 million or total grant requested is less than $150 million.
  - Core Capacity: Project must be located on a corridor that is at or over capacity or will be in ten years.
- Transit-Oriented Development Planning – Provides funding to local communities to integrate land use and transportation planning with a transit capital investment that will seek funding through the CIG Program.

OFFICE OF THE SECRETARY OF TRANSPORTATION

- Rebuilding America's Infrastructure with Sustainability and Equity (RAISE) – Formerly TIGER and then BUILD, RAISE is a discretionary grant program focused on investments in surface transportation infrastructure that will have a significant local or regional impact.
  - Project cost range from $5 million to a maximum of $25 million.

All the above programs are in line with the Justice40 Initiative. Justice40 set a target that 40 percent of the benefits of federal investments should flow to disadvantaged communities that are marginalized, underserved and overburdened by pollution. One of the categories of investment is clean transit.

LOCAL FUNDING

Implementation of BRT projects is possible using only local and state funding sources. One benefit of using only local funds is that project delivery can typically be compressed and less federal coordination is needed. King County and the City of Seattle are jointly delivering BRT service, branded as Metro's H Line RapidRide, using 100 percent local funds. The local funding includes a voter-approved levy with dedicated transit funding.

Recent Small Starts Awards

Of the various funding programs, projects like Stream BRT are often implemented through the CIG program's Small Starts branch. A sampling of recent awards (Figure 98) shows that there is a wide range of cost and percentage of the project funded by the FTA. The lowest award amount was $21.8 million for Central Avenue BRT.

Note that Small Starts – and most grants described in this section – cover just a portion of the project cost. Local funds are still needed to bring the project to reality.

Figure 98: Example of Small Starts Awards from February 2020 to March 2022

Project	Jurisdiction	Total Capital Cost (millions)	CIG Share of Capital Costs	Length	Overall Project Rating
Central Avenue BRT	St. Petersburg, FL	$43.9	49.7%	11 miles	Medium-High
Montana Corridor BRT	El Paso, TX	$49.2	57.4%	16.8 miles	Medium
Mill Plain BRT	Vancouver, WA	$49.9	49.9%	10 miles	Medium High
East-West BRT	Milwaukee, WI	$54.8	74.7%	9.1 miles	Medium
Swift Orange Line BRT	Everett, WA	$81.0	45.9%	11.3 miles	Medium-High
Washington Western BRT	Albany, NY	$81.2	75.0%	8.5 miles	Medium
Ogden-Weber State BRT	Ogden-Weber, UT	$99.7	64.7%	5.3 miles	Medium
Madison Street BRT	Seattle, WA	$133.4	44.9%	2.3 miles	High
IndyGo Purple Line BRT	Indianapolis, IN	$155.0	50.0%	15.2 miles	Medium-High
Pacific Avenue/SR 7 BRT	Tacoma, WA	$170.0	44.2%	14.3 miles	Medium-High
Miami-Dade County South Corridor Rapid Transit	Miami, FL	$299.8	33.4%	20 miles	High

Spotlight: FX Division BRT, TriMet

The Division Transit Project implements BRT along a 15-mile route between Portland and Gresham, Oregon. The project cost $175 million and 50 percent was covered by a CIG Small Starts award. The project was completed in 2022 and features 40 bus stations, 4.5 miles of protected bike lanes, and about 81,000 square feet of new sidewalk. The project also constructed additional signalized pedestrian crossings, raised center medians and lighting improvements. Buses arrive every 12 minutes.

Project features:

- Next-generation TSP at 58 signals gives priority to buses using cellular technology.
- New 60-foot buses powered by renewable diesel with 60 percent more passenger room than prior buses and space for bicycles on-board.
- Bus shelters include integrated lighting, weather protection, TransitTracker, seating and waste receptacles.

FX Division BRT, Portland, Oregon. Source: TriMet

Spotlight: The Vine, C-TRAN

C-TRAN is currently constructing its second BRT line. Branded as The Vine, the route will operate along Mill Plain Boulevard from downtown Vancouver to 184th Avenue. The route is 10 miles long and cost $50 million to design and construct. Service will begin in 2023.

The Vine BRT in Vancouver, Washington

STREAM BRT 2 ROADMAP

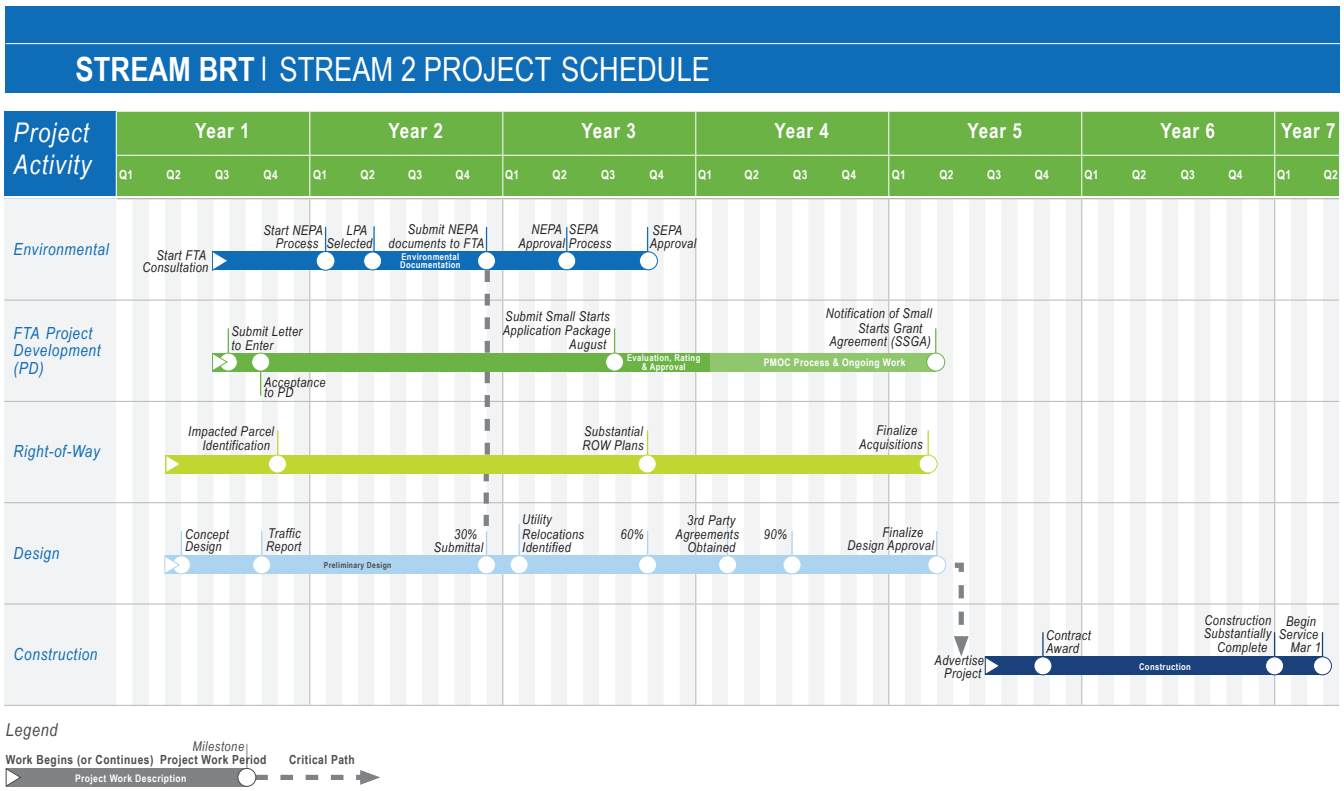
Big Picture Schedule

Pierce Transit leadership will likely pursue FTA Small Starts funding to implement Stream BRT 2.

There are five major phases of work from now until opening day. A sample schedule for how these five phases could be rolled out is shown in Figure 99.

1. Environmental Permitting – 24-30 months
2. FTA Project Development – 36-50 months
3. Right-of-Way – 36-48 months
4. Design – 36-48 months
5. Construction – 18-27 months

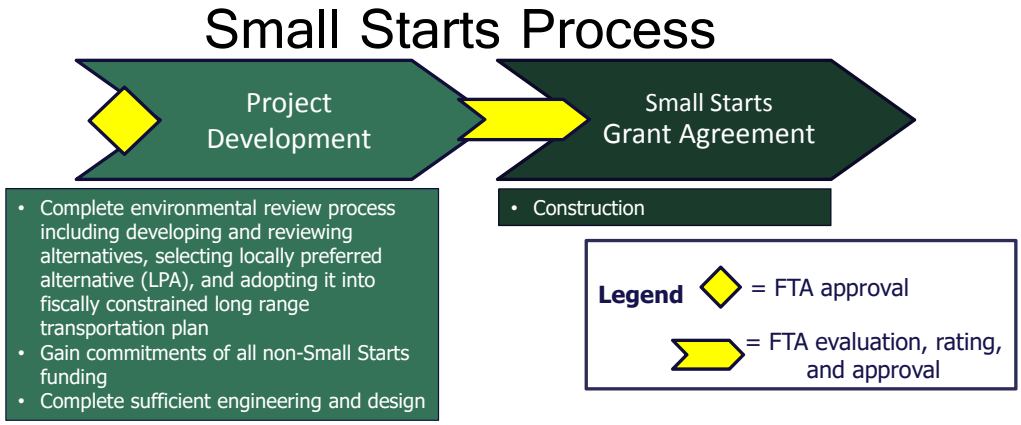
Figure 99: Potential Small Starts Schedule



To view the schedule at a larger scale, see Appendix P.

Key Steps in the Small Starts Process

Entering Project Development is a major step in the Small Starts process.



1. What is needed before entering Project Development?
    a. Agency adoption of a project funding plan and project delivery schedule.
    b. Project scope developed to the point of route termini being clear, project length identified, construction costs estimated and major routing decisions determined. It will be important to have a clear summary of what the project will deliver. A locally preferred alternative (LPA) is not required for entry into Project Development but is advisable and can keep costs down by avoiding evaluation of multiple alternatives in the NEPA process.
    c. Consultation with FTA Region 10 before submittal (not necessary, but highly recommended).
    d. Formal submittal of letter to enter FTA Project Development.
    e. FTA acceptance to Project Development status.
2. What happens after entering Project Development?
    a. Formally adopt an LPA, if not already completed, including alignment, termini and station locations.
    b. Adopt LPA into the PSRC long-range plan.
    c. Advance project design and costing with the goal of completing materials needed for FTA grant application full package.
    d. Complete NEPA environmental review.
    e. Prepare CIG grant application requesting evaluation and rating of the proposed project. These applications require a significant amount of documentation (purpose and need, existing conditions, project benefits, etc.) and are always due at the end of August or early September. The FTA will rate the application. The project must score Medium or higher to qualify for award.
    f. Within three years from entry into Project Development, Pierce Transit must identify 50 percent of non-CIG funds.

Please see Appendix O for a summary of environmental approvals and permits that may be required as part of project development.

CANDIDATE CORRIDOR IMPLEMENTATION

Corridors B and A ranked highest in the data-based prioritization. Both also received support from stakeholders. Below are steps toward readying these corridors for Stream BRT.

Corridor B

Assess Tacoma Mall subarea plan impacts to routing. The Tacoma Mall Subarea Plan adds significant density to the area currently served by Route 3. As plan implementation progresses, the alignment of Route 3 should be modified to optimize access to development. The Subarea Plan recommends a new transit center (Figure 46), which would require adjustments to route alignments that currently serve the Tacoma Mall TC. The plan recommends further study to determine the exact location of the transit center. Alignment and station placement for Stream BRT 2 should consider the location of this transit center.

Further evaluate S. 38th Street versus S. 48th Street. There were two variations on Corridor B – B1 traveled via S. 38th Street and B2 via S. 48th Street (Figure 43 and Figure 44). Both serve the Lincoln International District, which was a high priority for stakeholders. Further analysis of ridership impacts, travel times and Tacoma Mall development is needed to determine which routing should be part of Stream BRT 2.

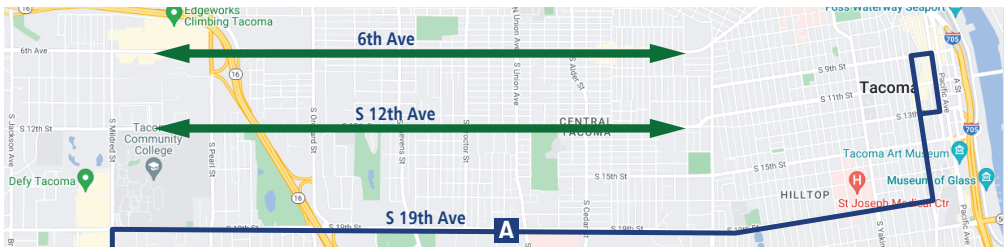
Corridor A

Explore alternatives for S. 19th Street. Corridor A would provide Stream service along S. 19th Street between Downtown Tacoma and TCC. This corridor is also planned for a future extension of Sound Transit's T Line from Martin Luther King Jr. Avenue to TCC. Although the project is not yet fully funded, it has local support and is likely to be implemented in the next two decades. But there are system compatibility and practicality issues with delivery of both T Line and Stream BRT in the same corridor. See "Future Streetcar on S. 19th Street" on page 2-22 for additional detail. To avoid risks to both T Line and Stream BRT, a path forward may include two things:

- **Split Corridor A.** Split this corridor into two - section one from downtown Tacoma to TCC and section two from TCC to Lakewood TC. Section two corresponds to Corridor A2 (see Figure 3). Stream BRT would operate in general purpose traffic lanes.
- **Evaluate other east-west corridors** such as 6th Avenue or S. 12th Street as part of the future Corridor A alignment. This would be advanced in place of S. 19th Street.

This decision will require continued conversations and coordination between Pierce Transit, the City of Tacoma, Sound Transit, FTA and the community to identify a preferred solution.

Figure 100: Stream BRT could be evaluated on corridors parallel to S. 19th Street



SYSTEM OPPORTUNITIES

The following recommendations can be implemented parallel to or in coordination with Stream BRT investments.

MAKE SERVICE BETTER FOR ALL

1. Increase service frequency on local routes

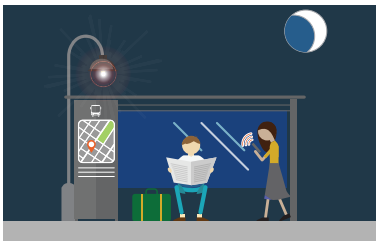
A survey conducted by Pierce Transit for the Destination 2040 Update showed that the top priority for the community (riders and non-riders) is more frequency.

64% of survey respondents want more frequent service.

System-wide, average frequency of Pierce Transit buses is **30 minutes** on weekdays.

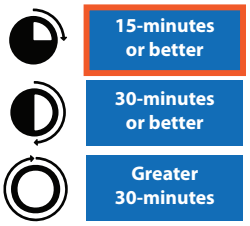
"Run all buses later and more frequently (10 min peak), 20-30 min off peak so people can more easily ride transit as an alternative to driving." – Destination 2040 Update survey response

Figure 101: Frequent buses make service more convenient – a main factor that can get more people to choose the bus



Ability to travel at all times of day

Reduce time waiting



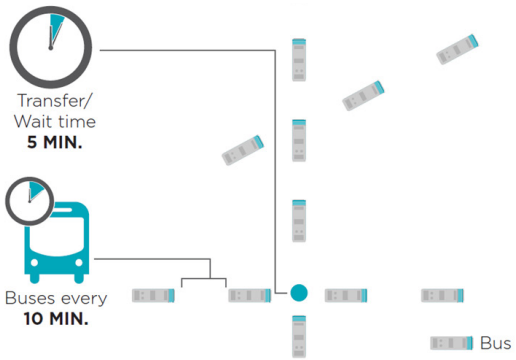
Don't need to look at a schedule

Stream BRT will run every 10-15 minutes during most of the day. But frequency is needed throughout the system. Running higher frequencies on many routes makes transfers easier, which greatly expands what destinations or activities someone can access in a reasonable amount of time.

2. Continue bus stop spacing optimization

Pierce Transit should continue evaluating bus stop spacing to serve the most riders while making service faster and reducing travel times.

Figure 102: Frequent buses mean shorter wait times and transfer times



3. Evaluate in-street transfers

Pierce Transit operates several transit centers and Park-and-Rides along the candidate corridors, including TCC TC, Tacoma Mall TC, SR 512 Park-and-Ride, Lakewood TC and South Hill Mall TC. These transit centers provide transfers between routes and typically have seating and shelters. Transit centers at the end of routes, like Lakewood TC, also serve as layover locations for driver breaks.

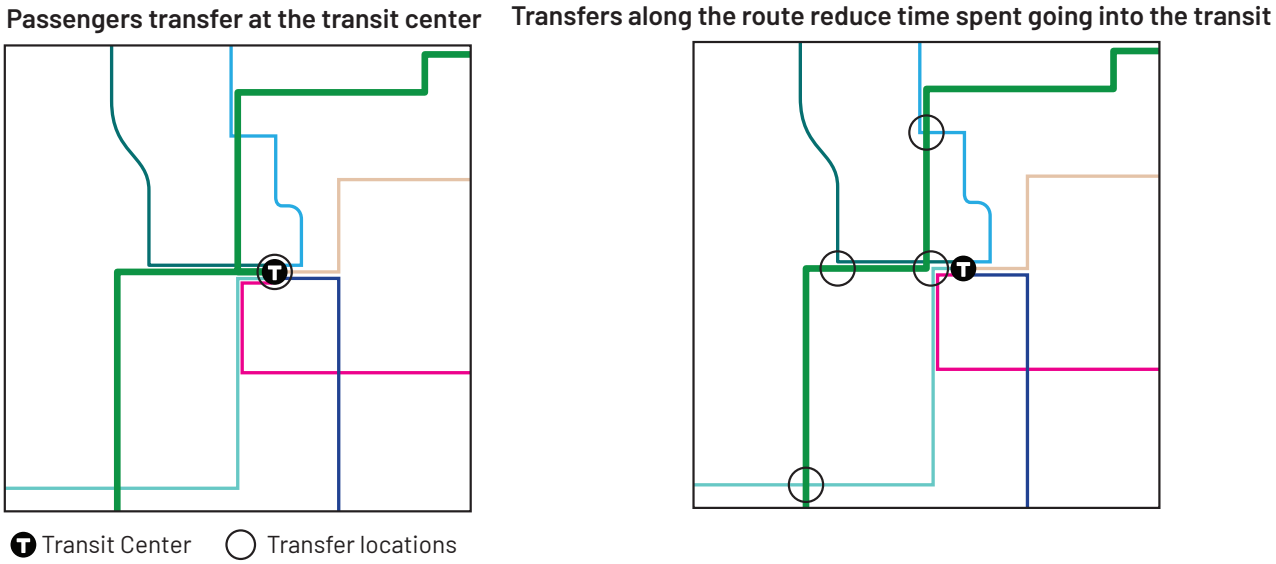
During public outreach, some members of the community said some transit centers take a long time to get into and out of, and require out-of-direction travel to access.

For example, Route 3 traveling south deviates off S. Pine Street to access the Tacoma Mall TC via S. 48th Street. The reason is to have one single, consolidated, off-street place for people to transfer. But this deviation increases travel time and can perpetuate unreliability of service.

TCC TC is another example. Eight routes use the transit center, including Route 2 / Corridor A. Route 2 deviates into the transit center and circulates through it, which adds travel time.

In most instances where these deviations occur, transfers could be made at other locations along the route, like at a nearby intersection. This reduces travel time and creates the feeling of a more direct route to passengers. Figure 103 shows an example of where transfers from Route 3 to other routes could occur if Route 3 did not go into Tacoma Mall TC.

Figure 103: Example of Transfer Locations



4. Modify SR 512 Park-and-Ride

SR 512 Park-and-Ride serves as a Park-and-Ride and transfer location for multiple Pierce Transit and Sound Transit routes. The Park-and-Ride has a single bus entrance, located approximately 200 feet from the intersection of S. Tacoma Way and Pacific Highway. This is a congested area and causes high delays to bus riders. Two potential solutions are to add a second southern entrance, and to add a signal to control the flow of traffic and provide a dedicated phase for buses to enter or exit.

See the callout on pages 2-53 to 2-54 for more details.

> Lots of traffic across multiples lanes. Does not feel safe to cross.
>
> No sidewalks around here even with new developments.

5. Make it safer to get to transit

The community called out many locations where it feels unsafe to access transit due to missing sidewalks, difficult crossings or aggressive driving. These conditions make it challenging for current riders to get to the bus and discourage potential new riders. Pierce Transit and local agencies can partner to develop a list of safety projects on transit corridors to address these issues. Criteria including proximity to a bus stop, ridership or equity can be used to prioritize these improvements.

6. Optimize Route 206

Route 206 connects Lakewood TC and Joint Base Lewis-McChord (JBLM) Madigan Hospital, via Springbrook, Woodbrook and Tillicum neighborhoods. The route serves multiple lower-income neighborhoods. It is the only route in this area and operates every 30 minutes on weekdays and Saturdays, and hourly on Sundays.

Stream BRT service to Tillicum was considered in early planning stages but was discarded due to the high cost compared to low projected ridership. But this area is growing and demonstrates a need for better bus service. In the future, Route 206 may also provide a connection to Stream BRT at Lakewood TC.

Improvements to Route 206 may include increasing frequency to every 20 or 15 minutes on weekdays and to every 30 minutes on Sundays. Timed transfers at Lakewood TC can make service more convenient, as many Route 206 riders transfer.

7. Serve Lakewood Sounder

The Lakewood Sounder Station serves multiple Sound Transit express bus lines and the S Line to Seattle. It is also planned for major developments. See the callout on pages 2-19 and 2-20 for more details.

Community input showed people strongly favor Pierce Transit buses serving this station. Many of the routes that terminate at Lakewood TC, including routes 2, 3 and 4, could be extended along Bridgeport Way to include Lakewood Sounder Station.

The Lakewood Sounder station and SR 512 Park-and-Ride are one mile apart and served by different transit options. Understanding the markets served at each may reveal opportunities for optimizing local and regional connections. Perhaps some routes should be shifted from one location to another, for example.

ROUTE MODIFICATIONS

The following recommendations can make local service on the candidate corridors better, regardless of Stream BRT implementation timeline.

Route 2

Rerouting: Route 2's alignment near TCC TC could be modified to increase access to more residents and jobs (Figure 104). Mildred Street W and 27th Street W both have higher concentrations of housing and employment than the parallel sections of Bridgeport Way and S. 19th Street.

In-street stop at TCC: Move the Route 2 stops from TCC TC to S. 19th Street to speed up service. Add a pedestrian crossing to serve the stops. See Figure 105 and project #3 on page 2-28 for additional detail.

Figure 104: Route 2 Realignment

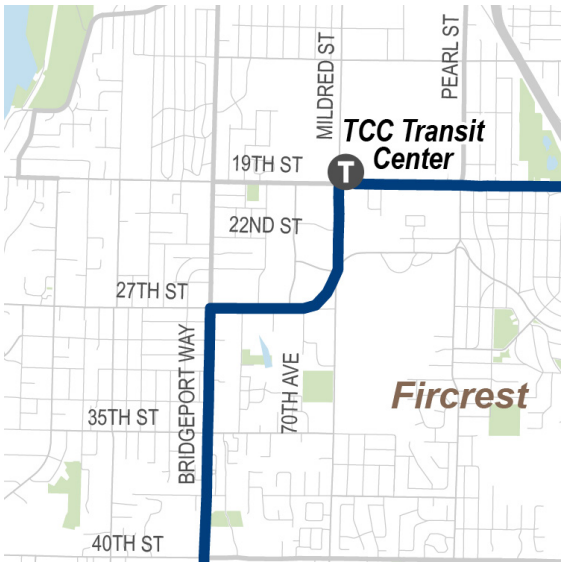
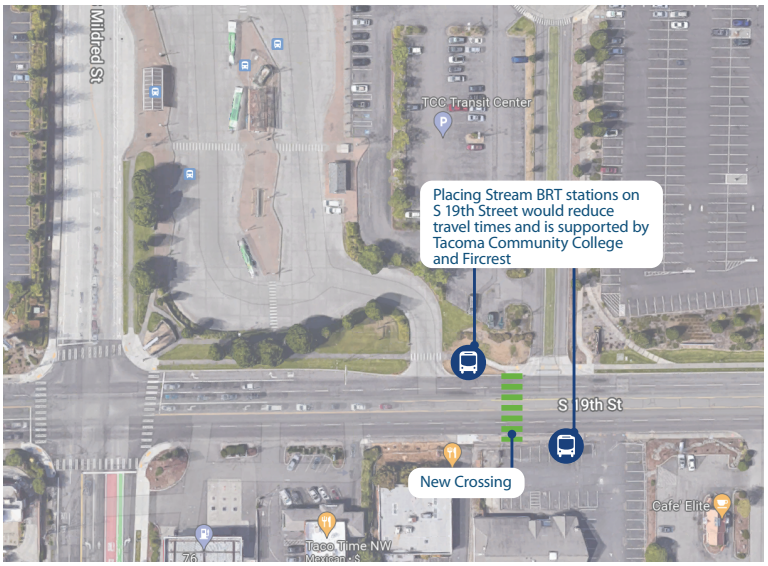


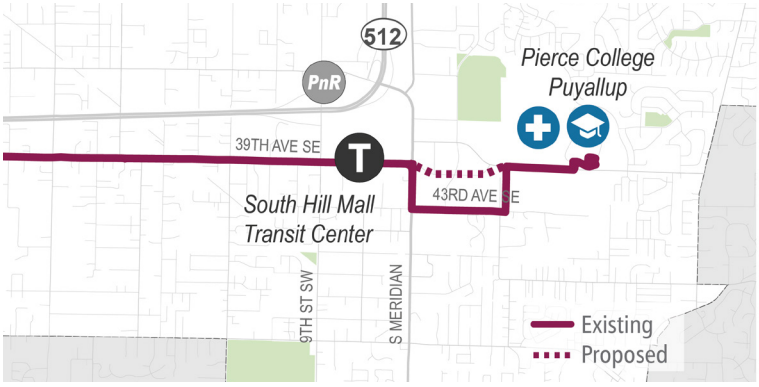
Figure 105: In-street Stop at TCC



Route 4

Rerouting: Between Pierce College and South Hill Mall TC, use 39th Avenue SE instead of 43rd Avenue SE. This is a more direct route (Figure 106).

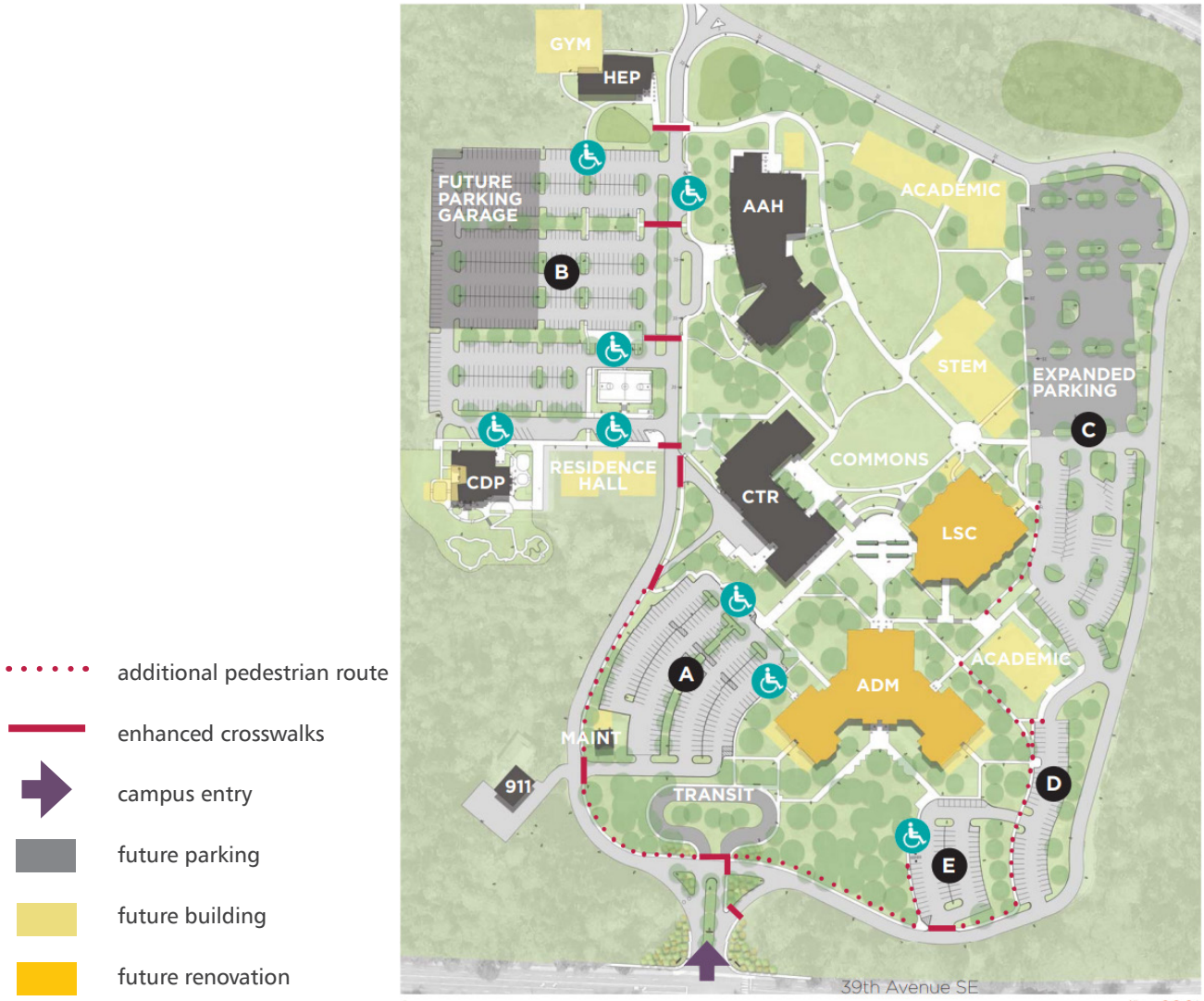
Figure 106: Route 4 Rerouting



Super stop: One of the busiest transfer locations along Route 4 is at Pacific Avenue/SR 7, where passengers can transfer to Route 1. With future Stream Community Line increasing service levels along Pacific Avenue, it is likely that there will be increased transfer activity at this location. Pierce Transit should invest in improved passenger facilities for Route 4 at Pacific Avenue, such as larger shelters, more seating and improved lighting.

Pierce College: Pierce College's master plan includes a recommendation for a new bus loop near the 39th Avenue SE entrance. This facility could reduce complications of operating buses through the Pierce College parking lot and could be implemented prior to Stream BRT. Figure 106 shows the Circulation and Parking recommendations from the plan, including a new transit loop to the southwest of the Administration Building near the 39th Ave SE campus entrance.

Figure 107: Pierce College Puyallup – Circulation and Parking



Route 402

37th Avenue SE rerouting: Reroute Route 4 from 37th Avenue SE to 39th Avenue SE to serve new developments in Puyallup (Figure 108).

Federal Way connection: Route 402 today provides service from 176th Street in Puyallup to Federal Way in King County, operating outside of Pierce County. Sound Transit plans to extend Link from Seattle to Federal Way as part of ST3, which will increase demands upon Federal Way as a regional node. Yet large portions of Route 402 are low-density and may not support Stream BRT service. This corridor may perform well as an express or limited-stop bus service. Further study can be conducted to understand if this service type can meet public needs.

Parallel effort coordination: Pierce Transit and WSDOT should coordinate on the Southeast Pierce County Mobility Study to ensure future investments along South Meridian are coordinated with potential transit investments.

Sound end turnaround: Currently, at the south end of Route 402 buses serve the Gem Heights Drive and 168th Street loop to turn around. This operating pattern provides only one-way service to Fred Meyer, WinCo and Stahl Junior High School. A different turnaround location could make the service more intuitive for passengers (Figure 109).

Figure 108: Route 402 Rerouting

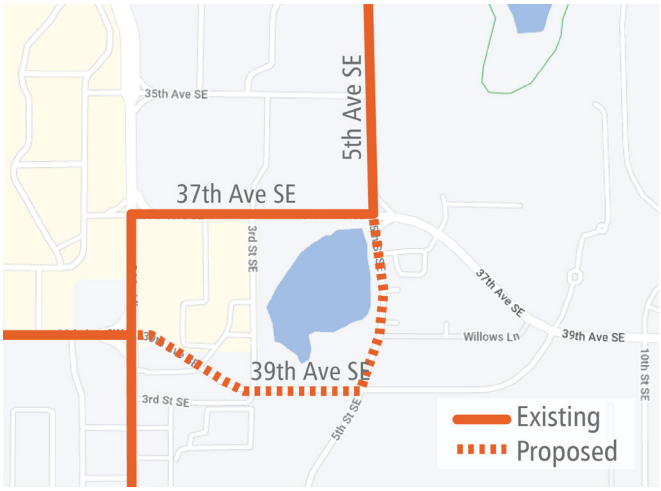


Figure 109: A turnaround location can ensure bi-directional service to major destinations like WinCo and Fred Meyer

CONCLUSION

The SSES findings provide a road map to deliver four additional Stream BRT lines into service and help chart a pathway to implementation. This is a significant undertaking, but will improve quality of life, accessibility and economic opportunities for Pierce Transit riders and the communities the agency serves. The wealth of analysis and the relationship building resulting from this process give a strong foundation for the next phase of work. Critical to the next phase will be implementing Stream Community Line and proving the benefits of fast and reliable transit to existing and future transit riders. The partnerships cultivated in this project will continue to build a broad base of support for high-quality transit.

Geary Rapid BRT, San Francisco