APPENDIX J

SPEED AND RELIABILITY OPPORTUNITIES

This document provides an overview of different types of transit speed and reliability treatments, and a list of potential speed and reliability opportunities along each Stream corridor. The document also provides the estimated travel time savings that could be achieved with the potential treatments.

PierceTransit

Stream

4.5 Speed & Reliability Opportunities

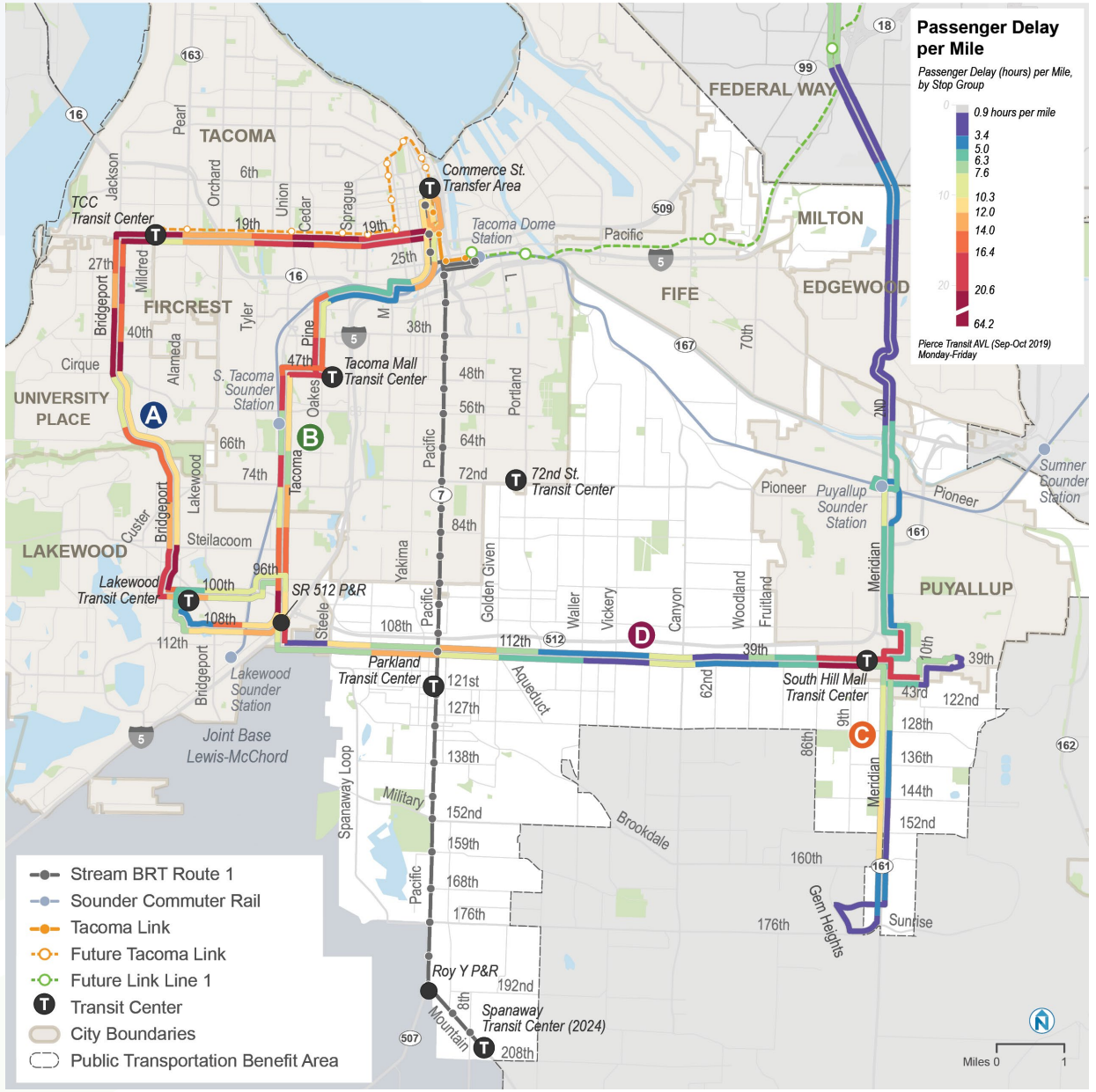
August 24, 2022

Methodology

Methodology

- The team analyzed passenger delay per mile and identified speed and reliability opportunities based on high-delay locations.
- This list of potential speed & reliability locations were shared with the TAC at the 11.18.21 meeting to gather initial feedback.
- The team conducted interviews with each individual jurisdiction after the November meeting to further refine the speed and reliability locations.
- The draft final locations for speed & reliability projects was shared with the TAC at the 1.20.22 meeting.
- Locations were finalized after the meeting.

Passenger Delay per Mile



Speed & Reliability Project Types

- Business Access and Transit Lanes.
- Queue Jump.
- Queue Jump Signal.
- Transit-Only Signal.
- In-Lane stations where feasible.
- Transit Signal Priority at 50% of signals.
- Stop consolidation.

Business Access & Transit (BAT) Lanes

BAT Lanes serve buses and right-turning general purpose traffic.

Queue Jump

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

Image: Google Streetview

Queue Jump Signal

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.

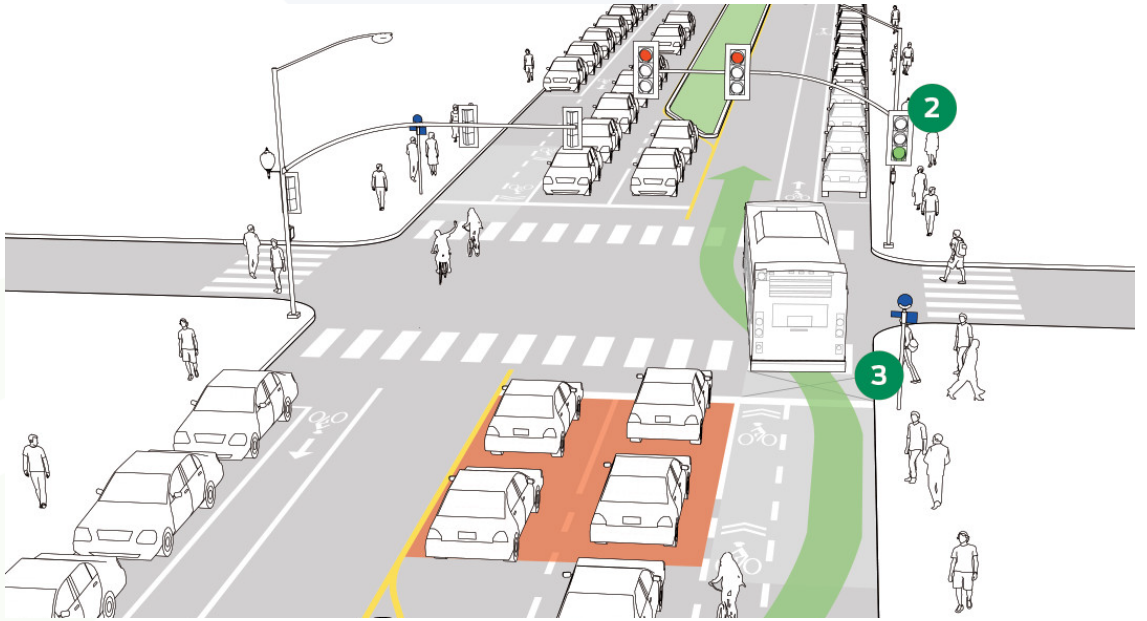


Image: NACTO

Transit-Only Signal

A transit-only signal is a signal for buses only with all other movements held.

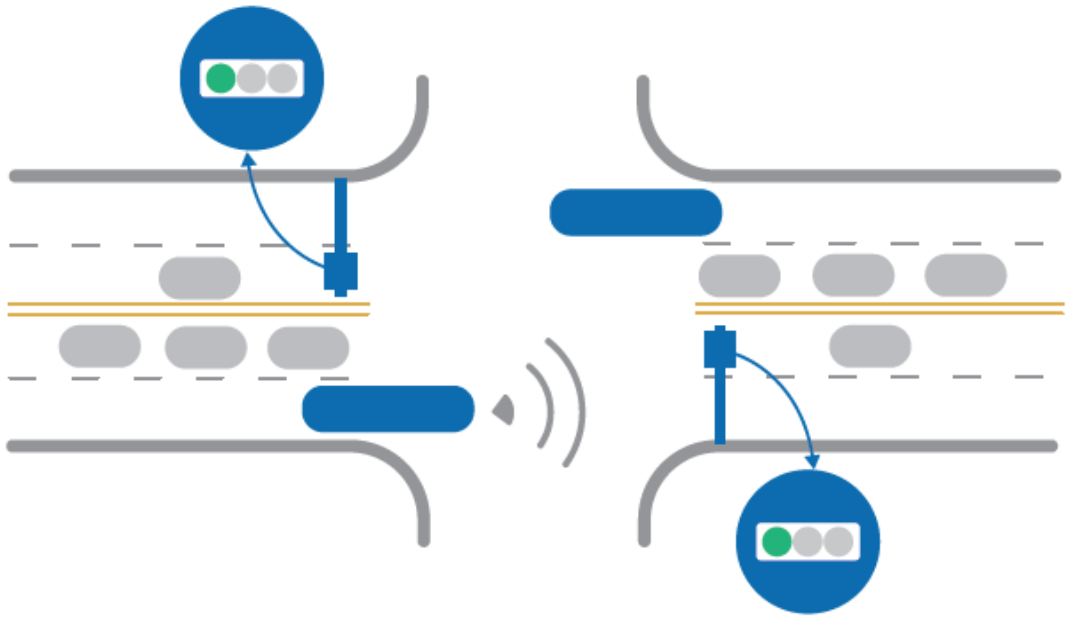
Image: NYC DOT

In-Lane Stops

In-lane stops reduce bus delay by allowing the bus to serve the stop without pulling out of the travel lane. They can also shorten crossing distances for people walking and rolling across the street.

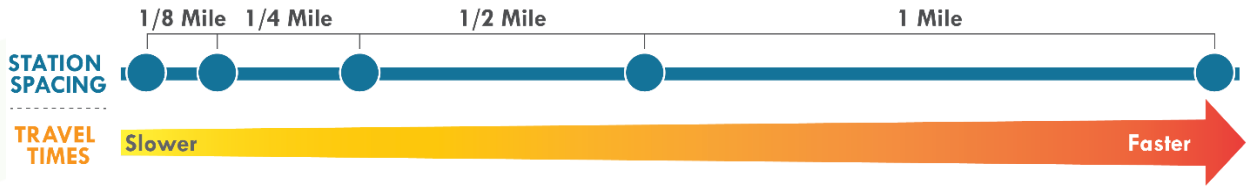
Transit Signal Priority

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



Stop Consolidation

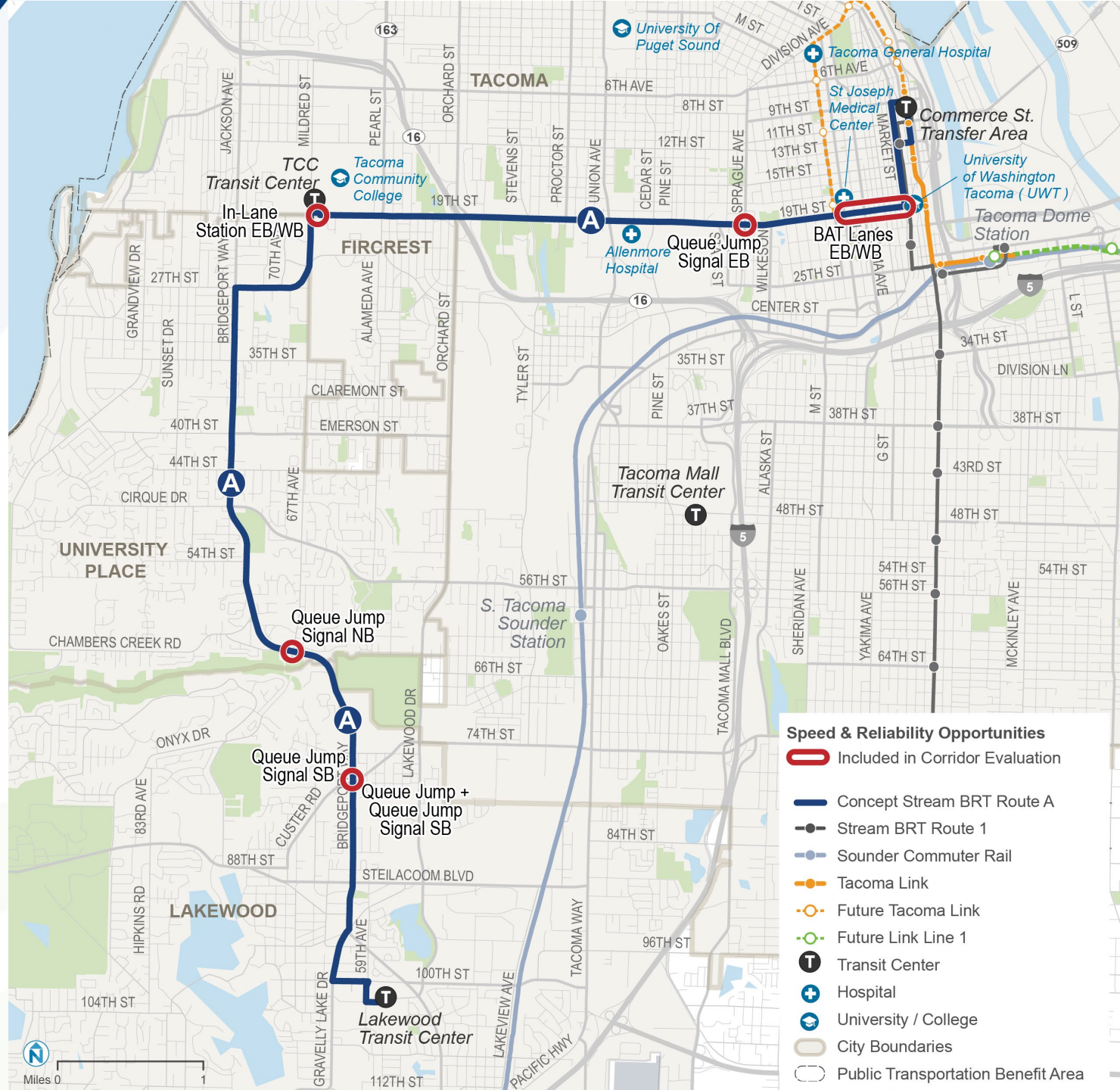
Stop consolidation removes certain stops to improve bus travel time by reducing delay resulting from dwell time, acceleration, deceleration, and merging. Stream standards target half-mile station spacing.



Final Speed & Reliability Opportunities

The maps and tables below show the final locations that were included in the Spring 2022 Corridor Evaluation.

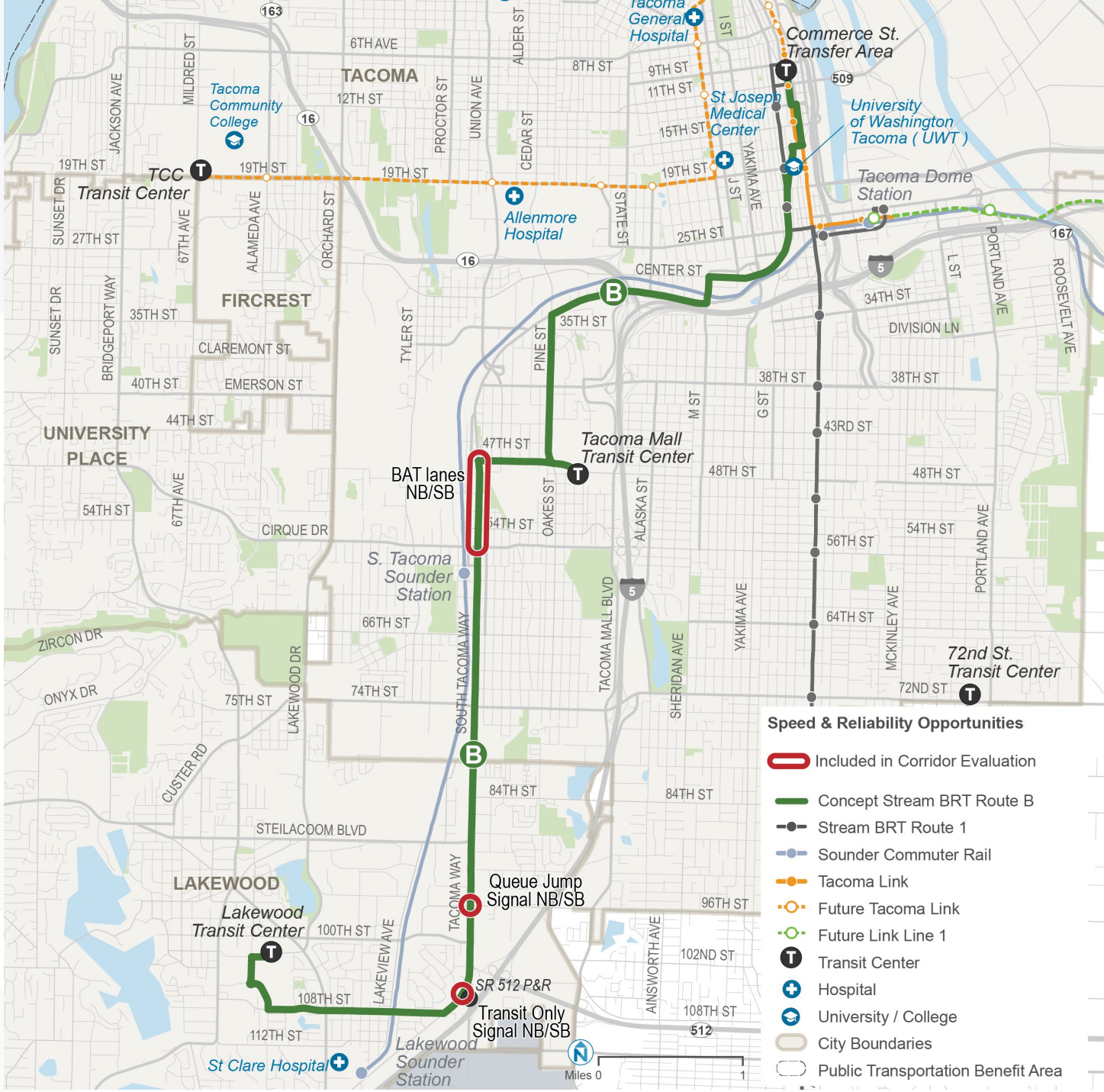
Corridor A


TACOMA
FIRCREST
UNIVERSITY PLACE
LAKEWOOD
University Of Puget Sound
Tacoma General Hospital
St Joseph Medical Center
Commerce St. Transfer Area
University of Washington Tacoma (UWT)
Tacoma Dome Station
TCC Transit Center
Tacoma Community College
In-Lane Station EB/WB
Allenmore Hospital
Queue Jump Signal EB
BAT Lanes EB/WB
Queue Jump Signal NB
Queue Jump Signal SB
Queue Jump + Queue Jump Signal SB
Tacoma Mall Transit Center
S. Tacoma Sounder Station
Lakewood Transit Center
Miles 0
1
Speed & Reliability Opportunities
Included in Corridor Evaluation
Concept Stream BRT Route A
Stream BRT Route 1
Sounder Commuter Rail
Tacoma Link
Future Tacoma Link
Future Link Line 1
Transit Center
Hospital
University / College
City Boundaries
Public Transportation Benefit Area

Corridor A Detail (from Downtown Tacoma to Lakewood)

Location	Direction	Opportunity	Notes/Detail
S 19th Street from Market Street to MLK Jr. Way	EB/WB	BAT lanes EB/WB	Volumes are very low here (note they are from 2003). T-Line does not serve this stretch (joins 19th Street at MLK Jr Way). Med-high delay from Market Street to Yakima Avenue.
S 19th Street & S Sprague Avenue	EB	Queue Jump Signal	Medium bus delay (5/10). Would have to remove the pork chop island and tighten the curb radius.
Tacoma Community College (TCC)	EB/WB	In-Lane Station	TCC and Fircrest support Stream stopping on S 19th Street instead of entering the transit center.
Bridgeport Way W & 67th Avenue W	NB	Queue Jump Signal	Medium bus delay (6/10)
Bridgeport Way W & Custer Road W	SB	Queue Jump Signal	Medium bus delay (6/10)
Bridgeport Way W & Custer Road W	NB	Queue Jump	Medium bus delay (6/10). NB there is a right turn pocket but no receiving lane. Location would need pocket and QJ signal.
Bridgeport Way W & Custer Road W	NB	Queue Jump Signal	Medium bus delay (6/10). NB there is a right turn pocket but no receiving lane. Location would need pocket and QJ signal.

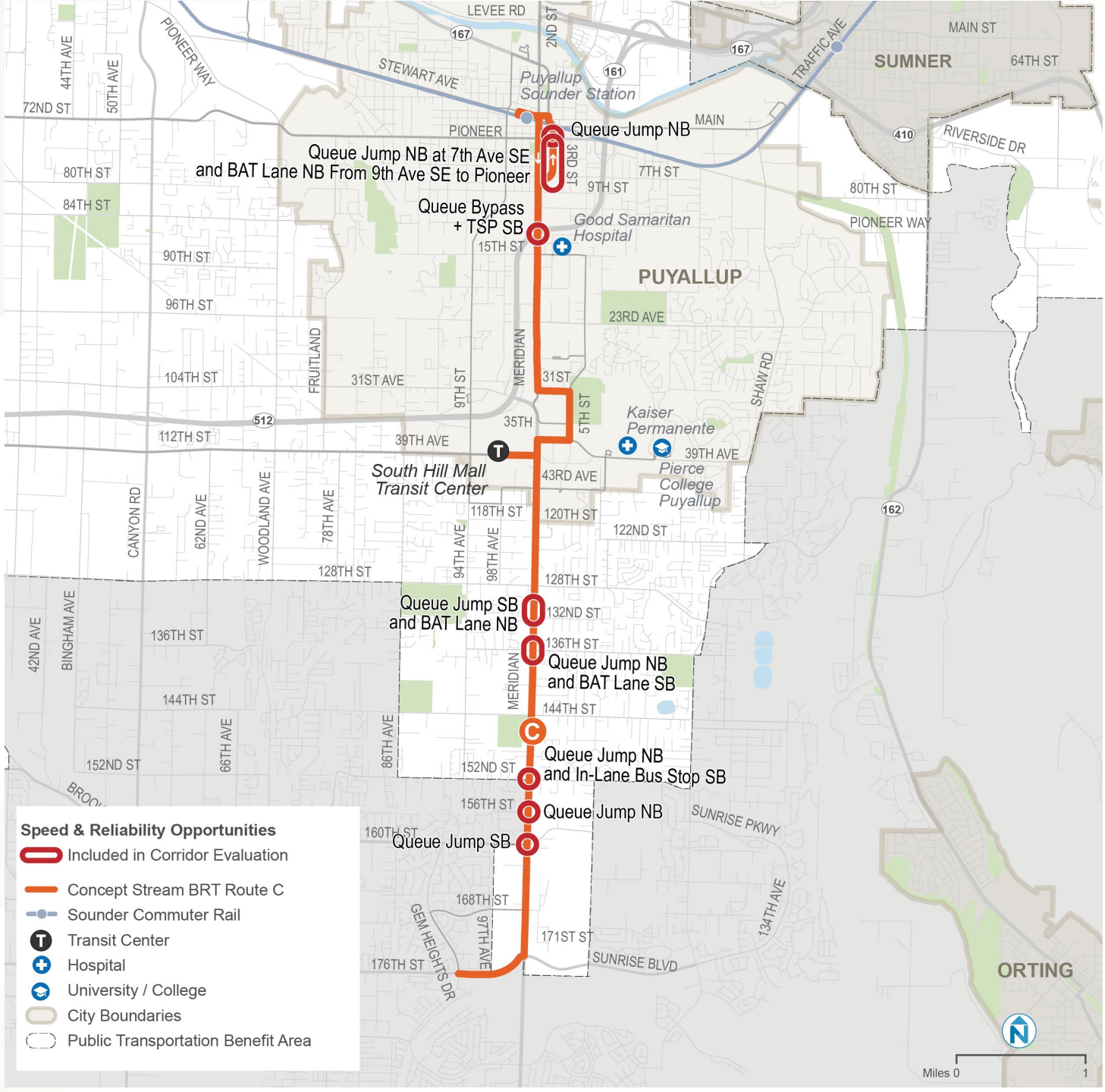
Corridor B


Tacoma General Hospital
Commerce St. Transfer Area
TACOMA
Tacoma Community College
St Joseph Medical Center
University of Washington Tacoma (UWT)
TCC Transit Center
Allenmore Hospital
Tacoma Dome Station
FIRCREST
UNIVERSITY PLACE
Tacoma Mall Transit Center
BAT lanes NB/SB
S. Tacoma Sounder Station
72nd St. Transit Center
LAKEWOOD
Lakewood Transit Center
Queue Jump Signal NB/SB
SR 512 P&R
Transit Only Signal NB/SB
St Clare Hospital
Lakewood Sounder Station
Miles 0
Speed & Reliability Opportunities
Included in Corridor Evaluation
Concept Stream BRT Route B
Stream BRT Route 1
Sounder Commuter Rail
Tacoma Link
Future Tacoma Link
Future Link Line 1
Transit Center
Hospital
University / College
City Boundaries
Public Transportation Benefit Area

Corridor B Detail (Downtown Tacoma to Lakewood)

Location	Direction	Opportunity	Notes/Detail
S Tacoma Way from S 47th Street to S 56th Street	NB/SB	BAT lanes	TAC supported this opportunity. This is a commercial corridor with desired traffic calming. High bus delay (9/10) SB.
S Tacoma Way & 96th Street SW	NB/SB	Queue Jump Signal	High bus delay (8-9/10)
SR-512 Park & Ride	NB/SB	Transit Only Signal	Add a transit only signal to help buses make the EB left turn into the P&R.

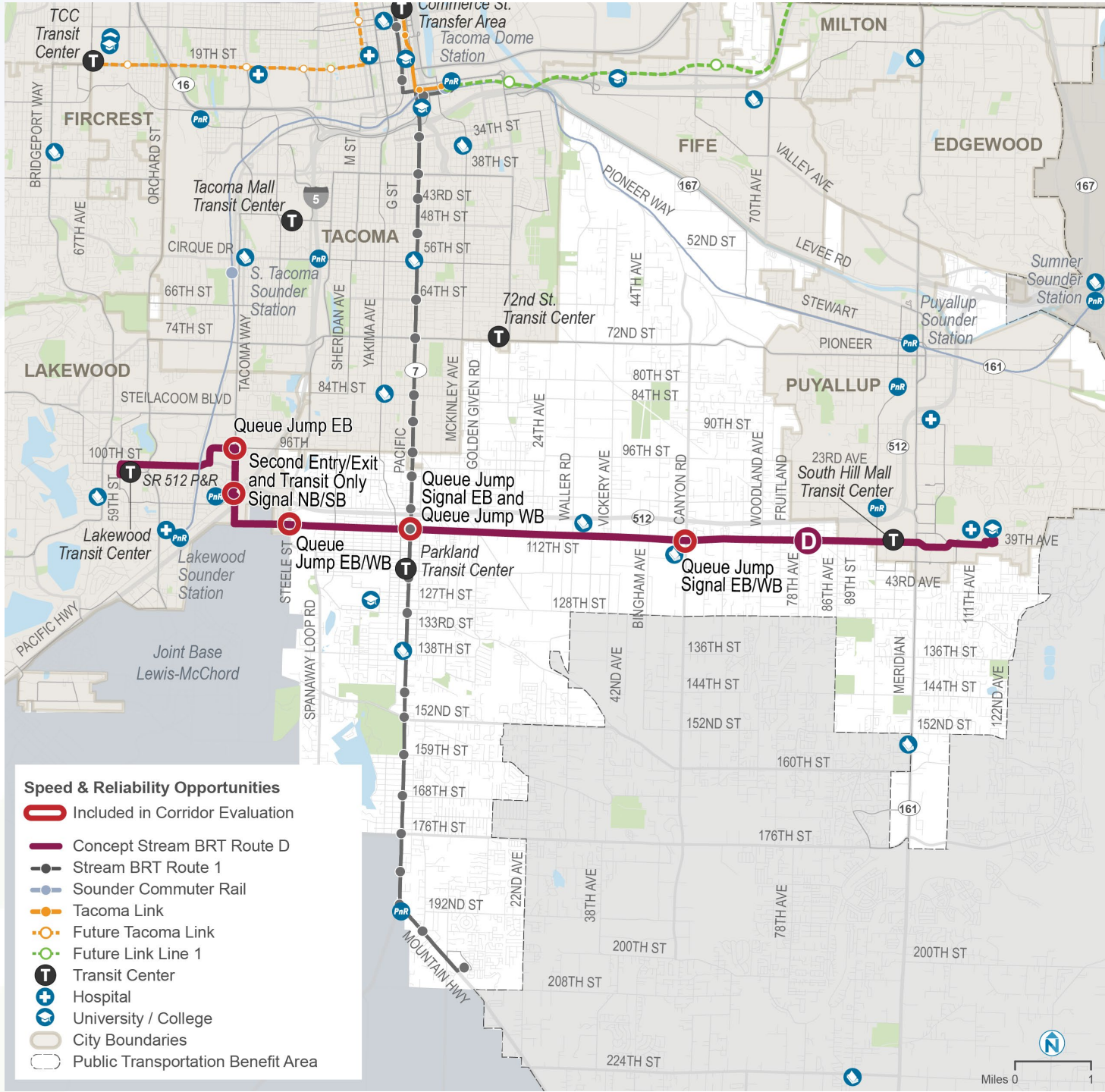
Corridor C


Queue Jump NB
Queue Jump NB at 7th Ave SE and BAT Lane NB From 9th Ave SE to Pioneer
Queue Bypass + TSP SB
Queue Jump SB and BAT Lane NB
Queue Jump NB and BAT Lane SB
Queue Jump NB and In-Lane Bus Stop SB
Queue Jump NB
Queue Jump SB
Puyallup Sounder Station
South Hill Mall Transit Center
Good Samaritan Hospital
Kaiser Permanente
Pierce College Puyallup
PUYALLUP
SUMNER
ORTING
LEVEE RD
STEWART AVE
PIONEER
MAIN
PIONEER WAY
TRAFFIC AVE
RIVERSIDE DR
SHAW RD
MERIDIAN
FRUITLAND
CANYON RD
WOODLAND AVE
BINGHAM AVE
SUNRISE PKWY
SUNRISE BLVD
GEM HEIGHTS DR
Speed & Reliability Opportunities
Included in Corridor Evaluation
Concept Stream BRT Route C
Sounder Commuter Rail
Transit Center
Hospital
University / College
City Boundaries
Public Transportation Benefit Area
Miles 0
1

Corridor C Detail (Puyallup to Sunrise)

Location	Direction	Opportunity	Notes/Detail
3rd Street SE and E Pioneer	NB	Queue Jump	Existing NB right turn pocket.
3rd Street SE from 9th Avenue SE to 7th Avenue SE (Puyallup)	NB	BAT lane and queue jump at 7th Ave SE	Street is a very wide 2-lane cross section. May be able to maintain 2 through lanes and add BAT lane. Additional 500' feet of BAT lane included in total of the next row.
3rd Street SE from 7th Avenue SE to E Pioneer (Puyallup)	NB	BAT or pro-time BAT lane	Remove parking one side to add BAT lane. Most homes in southern section of segment seem to have driveways so removing parking may not be overly contentious. Assume a pro-time lane between 7th Avenue SE & 4th Avenue SE, along the high school and also an existing queue jump at E Pioneer. There's a stretch where it's residential and parking removal may be challenging; this is an additional 700'. Assume 1 queue jump and 1900' of BAT lane in the 9th Avenue SE - E Meeker station segment.
Meridian and SR-512 on/off ramps	SB	Queue bypass + TSP [Can be coded as BAT lane]	Center left turn lane isn't needed in SB direction (no left turns allowed at intersection). Restripe to shift through lanes to the left and leave SB curb lane for bus. SB RT volumes may be high to highway on-ramp so consider bus-only and separate RT phase rather than queue jump (shared with RT). Center transit lane (700 ft, between 10th to SR-512) in the unused part of the two-way center left turn lane with a queue jump signal to help bus get into curb lane.
Meridian from IHOP north to 132nd Street E	NB	BAT lane	Long RT-only lane (600'). Convert to BAT. 600' between 136th Street SE & 132nd Street SE.
Meridian & 132nd Street E	SB	Queue jump	Short right-turn pocket to receiving lane, stop far side of 132nd Street SE. Include in 128th Street SE-132nd Street SE segment. Might be limited effectiveness due to short length and likely heavy right turns, but can assume it.
Meridian & 136th Street E	NB	Queue jump	Queue jump in existing right-turn pocket with receiving lane. Included in 144th Street SE-136th Street SE segment.
Meridian & 136th Street E	SB	BAT Lane	Widen to add right-turn pocket to queue jump with existing receiving lane. Included in 132nd Street -136th Street SE segment. Coded as 400' BAT lane with required widening of 250'. Connects to upstream right-turn pocket. Post Office property.
Meridian & 152nd Street E	NB	Queue jump	Right-turn pocket (short) and receiving lanes exist. Included in 156th Street SE -152nd Street SE segment.
Meridian & 152nd Street E	SB	In lane stop	Close mid-block pullout south of 152nd Street SE. Included in 144th Street SE -152nd Street SE segment.
Meridian approaching 156th Street E	NB	Queue jump	Convert RT lane to long queue jump. Approx. 400' long, but RT volumes may be heavy. Would be 400' BAT lane (signage/markings only) but coded as queue jump given likely high RT volumes.
Meridian approaching 160th Street E	SB	Queue jump	Convert RT lane to long queue jump. Approx. 400' long, but RT volumes may be heavy. Included; coded as queue jump.

Corridor D


TCC Transit Center
Commerce St. Transfer Area
Tacoma Dome Station
MILTON
FIRCREST
FIFE
EDGEWOOD
Tacoma Mall Transit Center
TACOMA
S. Tacoma Sounder Station
72nd St. Transit Center
Sumner Sounder Station
Puyallup Sounder Station
LAKEWOOD
PUYALLUP
Queue Jump EB
Second Entry/Exit and Transit Only Signal NB/SB
SR 512 P&R
Queue Jump Signal EB and Queue Jump WB
Lakewood Transit Center
Lakewood Sounder Station
Queue Jump EB/WB
Parkland Transit Center
Queue Jump Signal EB/WB
South Hill Mall Transit Center
Joint Base Lewis-McChord
Speed & Reliability Opportunities
Included in Corridor Evaluation
Concept Stream BRT Route D
Stream BRT Route 1
Sounder Commuter Rail
Tacoma Link
Future Tacoma Link
Future Link Line 1
Transit Center
Hospital
University / College
City Boundaries
Public Transportation Benefit Area
Miles 0
1

Corridor D Detail (Lakewood to South Hill Mall)

Location	Direction	Opportunity	Notes/Detail
96th Street SW at S Tacoma Way	EB	Queue Jump	Changing through/right turn lane to right turn only. Included; would be only one through lane WB.
SR-512 Park & Ride	NB/SB	Add second Entry/Exit	Highest bus delay (10/10). A second entry/exit could make the bus flow to SR-512 Park & Ride better. In the past there were two entry/exit points, but one was closed.
SR-512 Park & Ride	NB/SB	Transit Only Signal	Add a transit only signal to help buses make the WB right turn into the P&R and the EB left turn out of the P&R. This might simply control movements via adjacent signals.
112th Street S at Steele Street S	EB	Queue Jump	Should be space to accommodate via restriping.
112th Street S at Steele Street S	WB	Queue Jump	Two WB lanes starts at this intersection, so OK to add a receiving lane on the far-side.
112th Street S at Pacific Avenue S	EB	Queue Jump Signal	Shorter Queue Jump for EB. Assume queue jump signal since no receiving lane; could be queue jump depending on future redevelopment of property on NW corner.
112th Street S at Pacific Avenue S	WB	Queue Jump	Shorter Queue Jump for WB.
112th Street S at Canyon Road E	EB/WB	Queue Jump Signal	High bus delay (7-8/10). Both EB and WB Queue Jump. EB Queue Jump could be short. Queue jump signal due to no receiving lanes.

Travel Time Savings

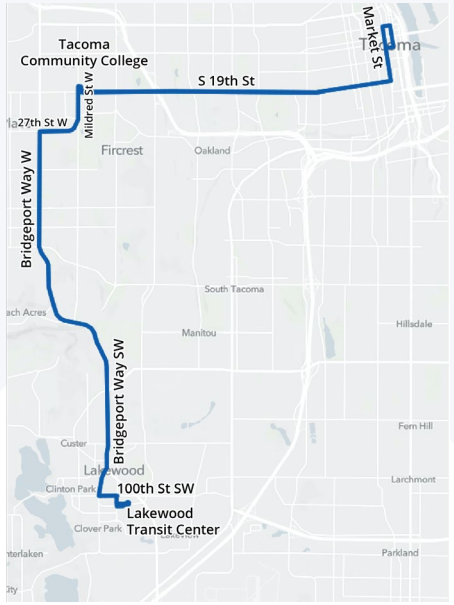
The team used a spreadsheet-based model using peer experience to estimate the travel time savings from transit priority treatments.

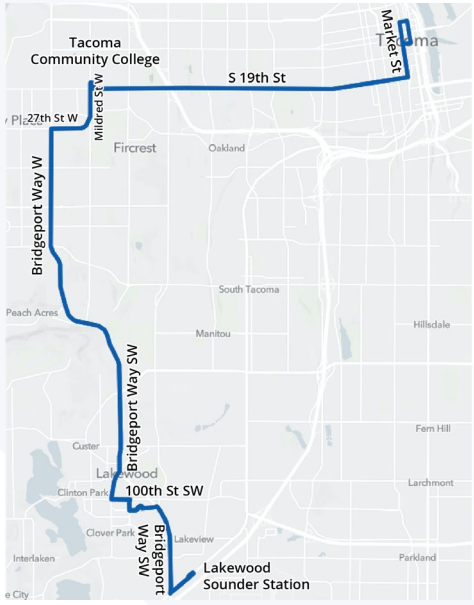
Corridors Evaluated

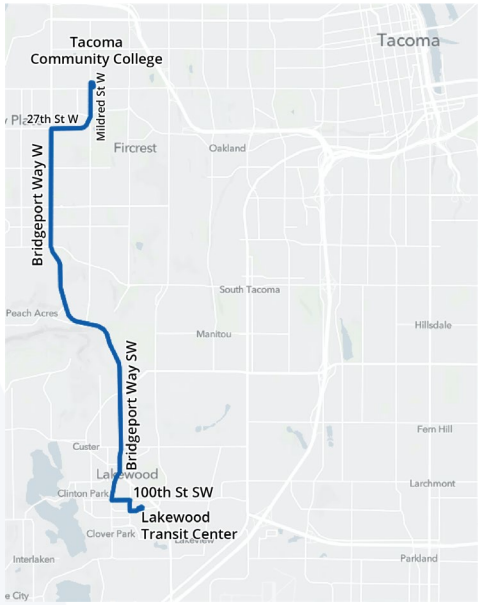
- A: Downtown Tacoma to Lakewood.
- A1: Extension to Sounder.
- A2: Shorter route from TCC to Lakewood.

- B: Downtown Tacoma to Lakewood.
- B1: Via 38th Street.
- B2: Via 48th Street.

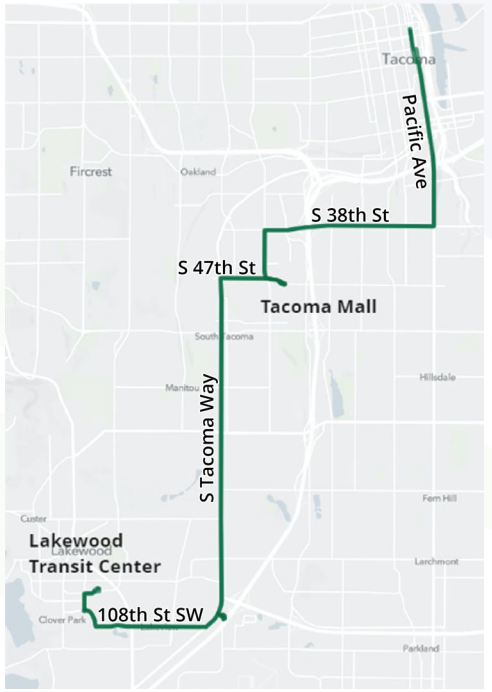
Corridor A

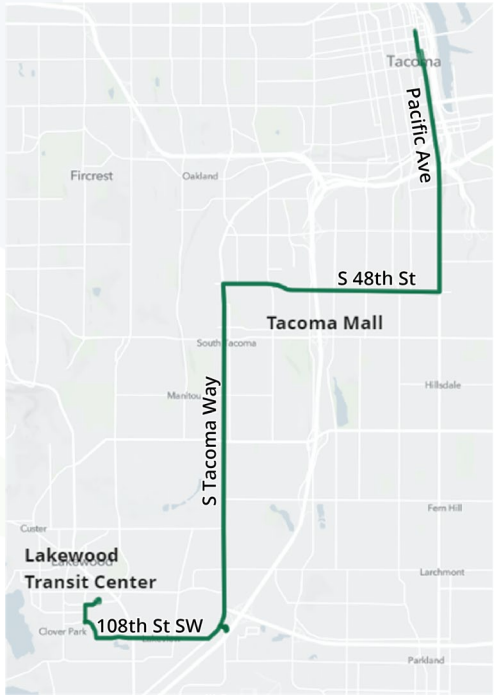




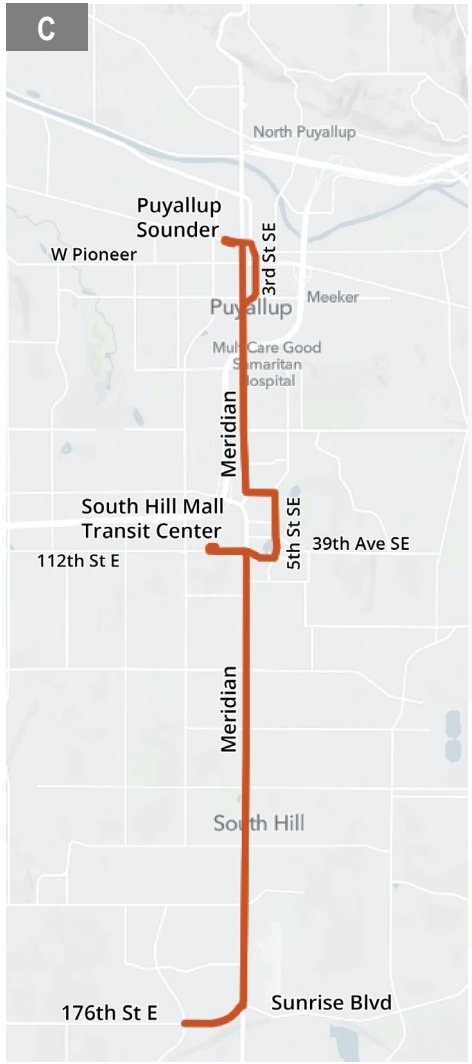


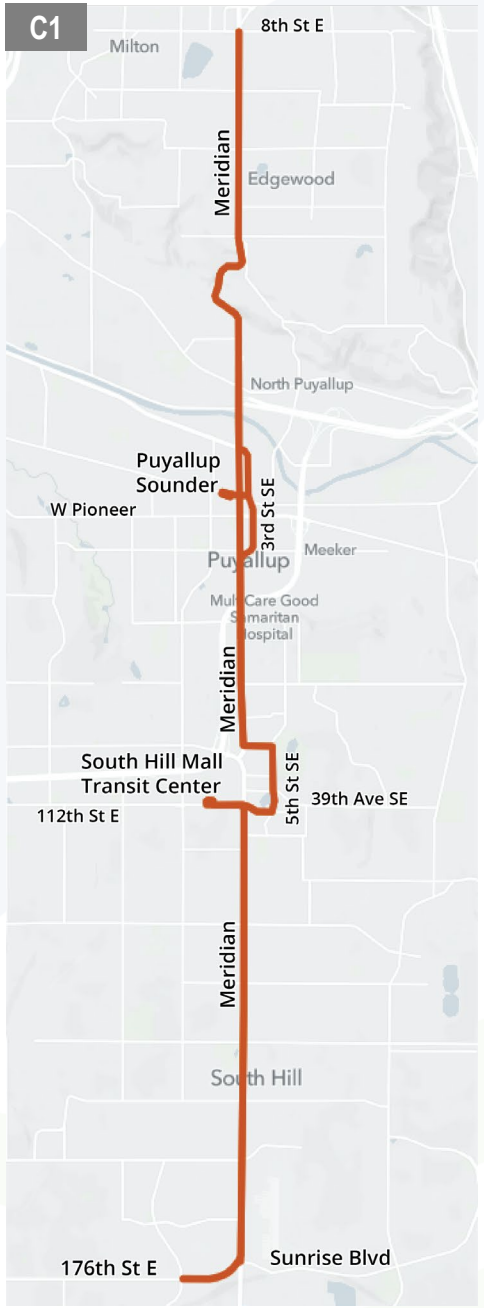
Corridor B

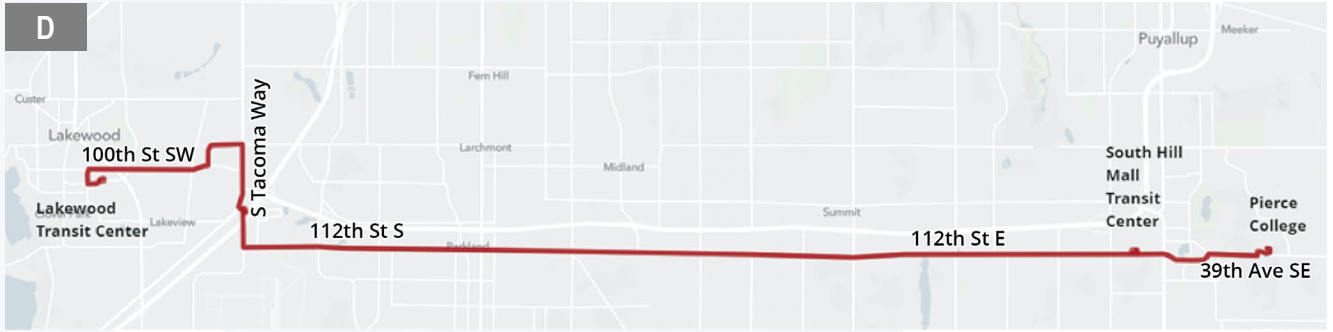


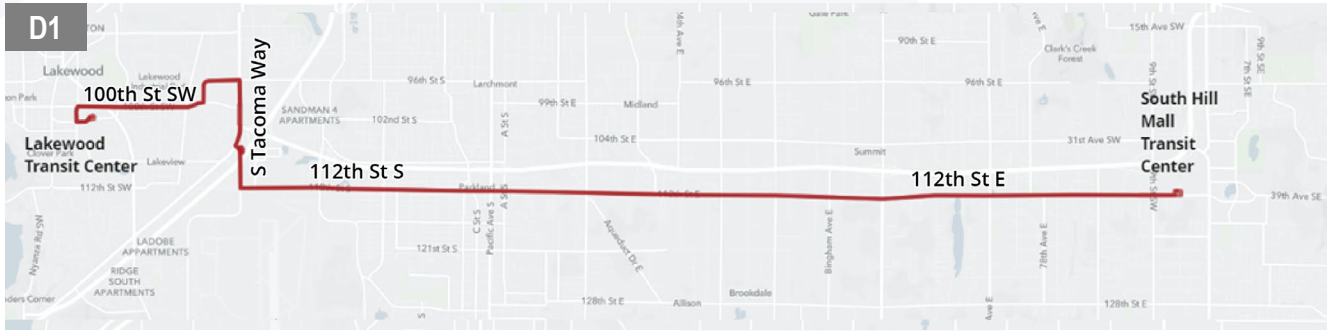


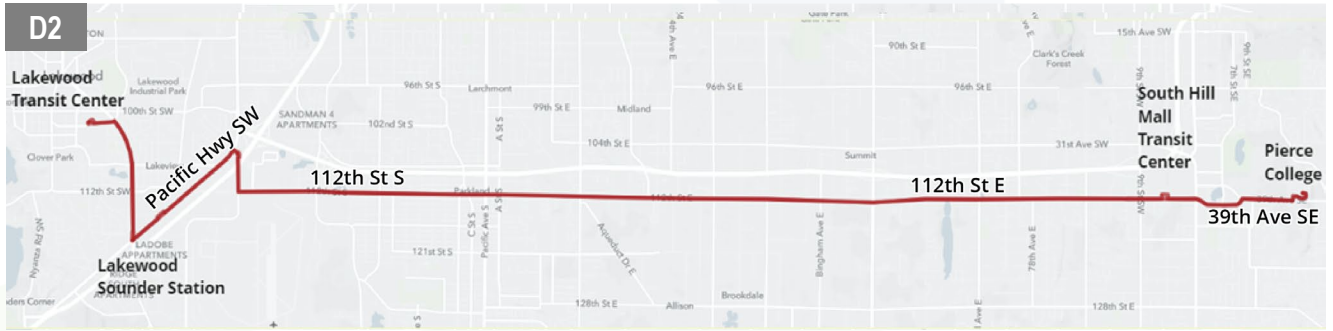
- **C:** Puyallup to Sunrise.
- **C1:** Edgewood to Sunrise.









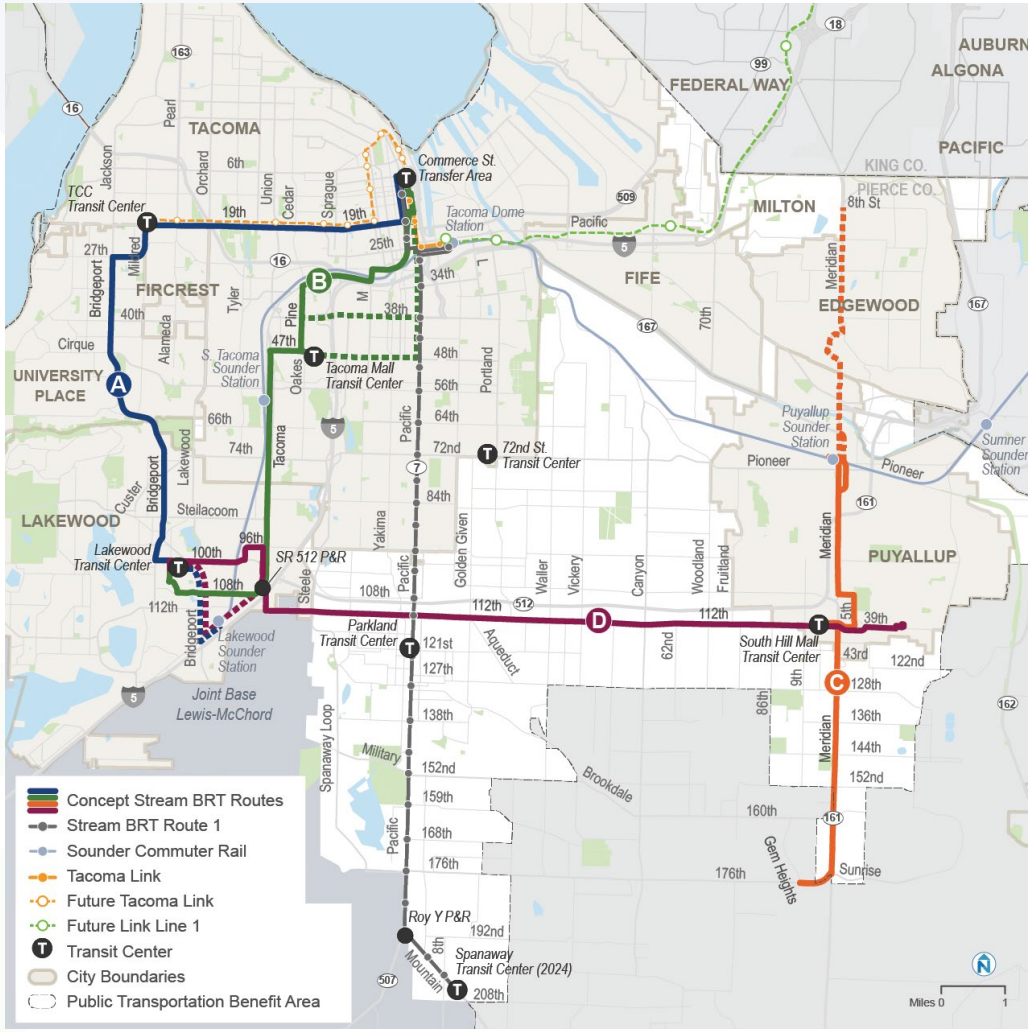


- **D:** Lakewood to Pierce College.
- **D1**: Lakewood to South Hill Mall.
- **D2:** Lakewood, Lakewood Sounder, Pierce College.

Travel Time Savings

Assumptions include transit priority projects from previous slides, TSP at 50% of signals, in-lane stops, and stop consolidation

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%
B	109	-11.9	-10.9%
B1	123	-12.8	-10.4%
B2	109	-10.8	-9.9%
C	93	-11.2	-12.3%
C1	129	-14.0	-10.9%
D	124	-12.6	-10.2%
D1	92	-11.9	-13.0%
D2	126	-11.7	-9.3%

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Stream
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