



Pacific Avenue || SR 7 Corridor

HIGH CAPACITY TRANSIT

FEASIBILITY STUDY

First/Last Mile Access Improvements Technical Report – Task 8.5

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Final

Prepared for:



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Acronyms & Abbreviations

ADA	Americans with Disability Act
BRT	Bus Rapid Transit
HCT	High Capacity Transit
PDP	Project Development Plan
PLU	Pacific Lutheran University
PM	Project Manager
PMP	Project Management Plan
PS2	ProjectSolve ²
PT	Pierce Transit

1 INTRODUCTION

Pierce Transit is the lead agency for the Pacific Avenue/SR 7 Corridor High Capacity Transit Feasibility Study. The focus of the study is to evaluate potential high-capacity transit (HCT) improvements along much of Pierce Transit's existing Route 1 corridor between downtown Tacoma and Spanaway. The feasibility study includes a detailed review of existing and future conditions, identification of the project Purpose and Need, mode selection, alternatives development and evaluation, selection of the Locally Preferred Alternative (LPA), environmental analysis (both National Environmental Policy Act [NEPA] and State Environmental Policy Act [SEPA]), a funding plan, as well as the completion of the Federal Transit Administration (FTA) Small Starts funding submittal.

The HCT Feasibility Study began in February 2017, with the intent of selecting a Locally Preferred Alternative (LPA) for the Corridor by spring 2018. Out of the identification of the project purpose and need, project goals were developed to provide criteria for the evaluation of the HCT modes. The first screening included a mode evaluation. The findings of the first screening concluded that bus rapid transit (BRT) best meets the study goals, scoring higher than existing Route 1 service, enhanced bus, streetcar, and light rail transit options. The alternatives analysis evaluated the BRT configuration options, including curbside and median concepts, to determine the design that provides the best transit service and economic development opportunity benefit, while being cost-effective and minimizing potential impacts to property along the corridor.

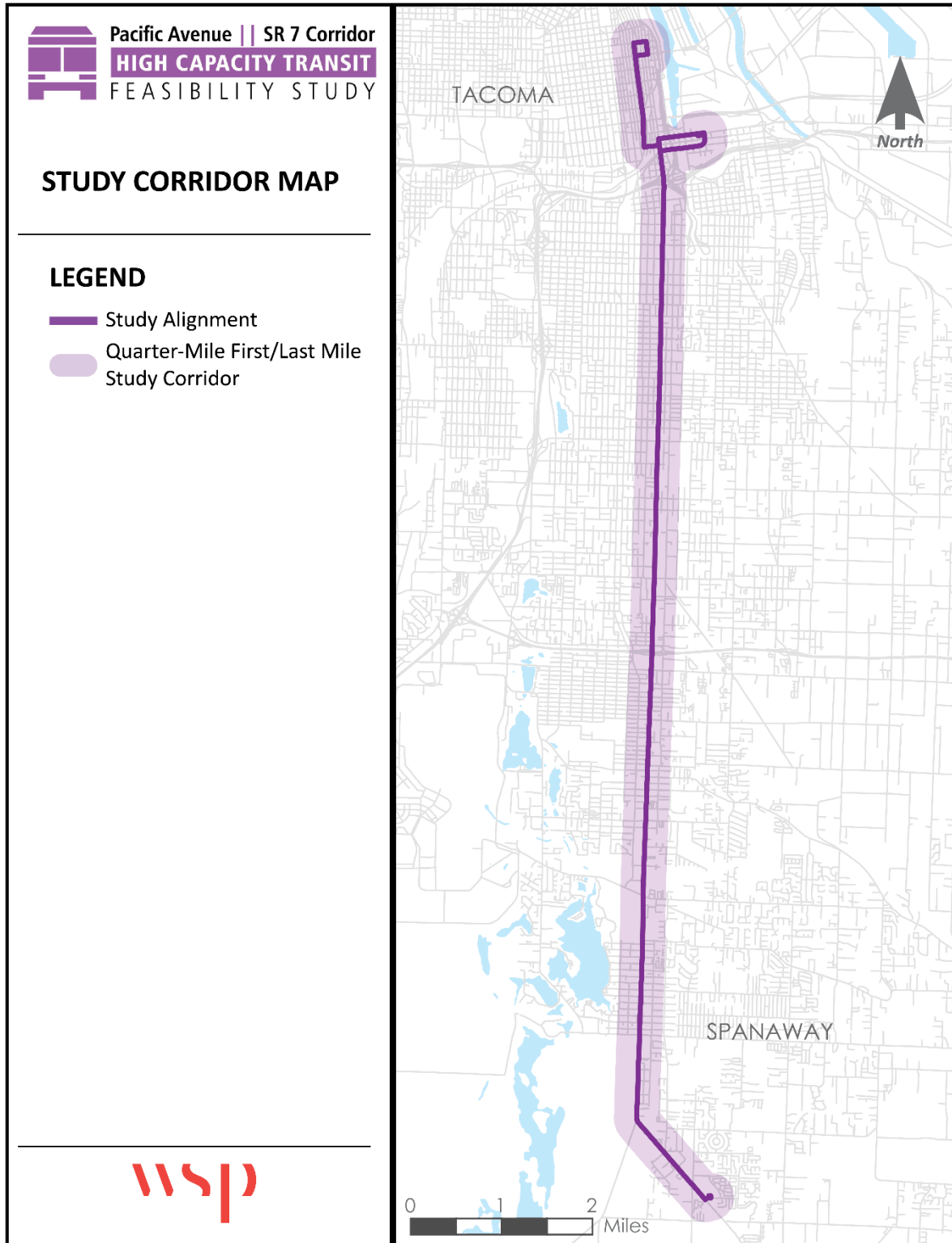
The HCT Feasibility Study included a second screening process of the BRT design alternatives to inform and select a locally preferred alternative (LPA). An essential aspect of every transit trip is the ability to get to and from the transit stop or station. Therefore, an assessment of potential infrastructure improvements and other options to facilitate first mile/last mile access to the transit stations proposed in the BRT design alternatives was included as part of the project definition and development process. This technical report presents the results of an evaluation of the corridor and the various aspects of access to and from the proposed stations. Access improvement recommendations are not currently ranked or prioritized but rather should serve as a guide to Pierce Transit to engage with its partner agencies on how to further enhance access to the Pacific Avenue/SR 7 BRT route.

2 PROJECT BACKGROUND

2.1 CORRIDOR DESCRIPTION

The Pacific Avenue S/SR7 HCT Study Corridor is a 14-mile segment of Pacific Avenue S/SR 7 between the Commerce Street Transfer Center in Downtown Tacoma and 204th Street E in Spanaway, entirely within Pierce County (Figure 1). The Corridor is currently served by the majority Route 1, one of Pierce Transit's four trunk routes. This is the highest ridership route in the system, carrying almost 1.7 million passengers in 2016, nearly 20 percent of Pierce Transit's fixed route ridership. Pierce Transit's Destination 2040 Long Range Plan, Sound Transit's ST3 Plan, and Puget Sound Regional Council's (PSRC) Transportation 2040 Long Range Plan all identify this Corridor for potential HCT service.

Figure 1: Study Corridor and Alignment



3 METHODS

The Purpose and Need Statement, prepared and adopted as a previous study task, identified a series of goals for the Pacific Avenue S/SR 7 HCT project. A qualitative analysis was conducted to examine potential infrastructure improvements and other options to facilitate access to transit stops along the BRT corridor and determine what specific access improvements are being recommended.

Potential access issues were evaluated using Geographic Information Systems (GIS) and Google Maps and included the following datasets¹:

- Proposed station locations
- Proposed signals
- Crash counts
- Existing marked crossings or signals
- Speed limits
- Sidewalks
- Designated bike ways
- Current land use and zoning
- Population density
- Job density
- Percent of households with no vehicle

The corridor was then visually assessed, both from aerials and via Google Street View to further identify issues not captured in the data, including identifying areas with no sidewalks and speed limits over 25mph. Areas with a higher number of documented bicycle and pedestrian crashes were also scrutinized more closely. All crash data referenced in this report are from Washington Department of Transportation for 2012-2016.

Purpose Statement

The purpose of the Pacific Avenue/SR 7 HCT project is to establish a north/south HCT link in the heart of Pierce County and serve Pierce Transit's busiest transit corridor. The project will:

- Increase transit ridership through enhanced transit service
- Deliver cost-effective service that provides capacity to meet future demand
- Improve multi-modal access and connectivity
- Support a regional vision for the community as documented in land use and transportation plans
- Enhance safety and security for transit patrons and public health overall
- Support existing economic activity and be a catalyst for sustainable economic growth and corridor redevelopment
- Promote environmental stewardship and sustainability

¹ Data were acquired via the following sources: Proposed station locations – PT BRT concept designs, Proposed signals – PT HCT concept designs, Crash counts – Washington Department of Transportation, Existing marked crossings or signals – Pierce County “Traffic Signals and Beacons” GIS shapefile, Speed limits – Pierce County “Mobility Data” GIS shapefile, Sidewalks – Aerial assessment via Google Maps, Designated bike ways – Puget Sound Regional Council “2018 Bicycle Facilities Dataset” GIS shapefile, Current land use and zoning – City of Tacoma “Land Use and Zoning” GIS shapefile and Pierce County “Zoning and Land Use Designations” GIS shapefile, Population density – ACS 2015 5-year B01003 dataset, Job Density – U.S. Census OnTheMap, Percent of households with no vehicle – ACS 2015 5-year B08201 dataset

Because existing sidewalk data were unavailable for the City of Tacoma or Pierce County, a visual assessment of sidewalks was done utilizing high quality aerial photographs within a ¼ mile buffer of the proposed routing. If a sidewalk was not connected from end block to end block on at least one side of the street, the street segment was labeled as having deficient sidewalk access since it does not meet current Americans with Disabilities Act (ADA) standards.

Finally, the BRT design concepts that have been developed include infrastructure improvements that would facilitate access to stations, such as sidewalk infill or new or enhanced pedestrian crossings. The proposed recommendations from this analysis were compared to the most current BRT design alternatives to ensure that recommendations were complementary to those concept designs. Therefore, these recommendations should be considered in addition to the improvements included in the design alternatives. While Pierce Transit’s HCT Project will be responsible primarily for improvements immediately adjacent to the stations, and potentially within a one-quarter mile buffer of proposed stations, it is still of value to identify overall access improvements beyond these limits because other agencies could potentially implement them if Pierce Transit does not.

The following metrics (Table 3-1) were used to aid in the identification of transit access improvement areas within the study area. For safety concerns, the areas in proximity to proposed stations with “high” and “very high” rankings across these metrics were used to prioritize improvements. The maps below indicate some of the access concerns at each of the selected project areas.

Table 3-1. First/Last Mile Metrics and Thresholds

Pierce Transit SR 7 First/Last Mile Data Thresholds				
	Low	Medium	High	Very High
Speed Limits	< 10 MPH	11-25 MPH	26-30 MPH	> 31 MPH
Bike/Pedestrian Crashes	0	1	2	> 3
Average Daily Traffic	<6,125	6,126 – 16,175	16,176 – 36,175	>36,176
Available Right-of-Way	< 60 ft	60ft-80 ft	80ft-100 ft	>100 ft
Population Density	< 6 per acre	7-11 per acre	12-19 per acre	> 20 per acre
Job Density	< 2 per acre	3-11 per acre	12-29 per acre	> 30 per acre

Figure 2: North Corridor Access Concerns

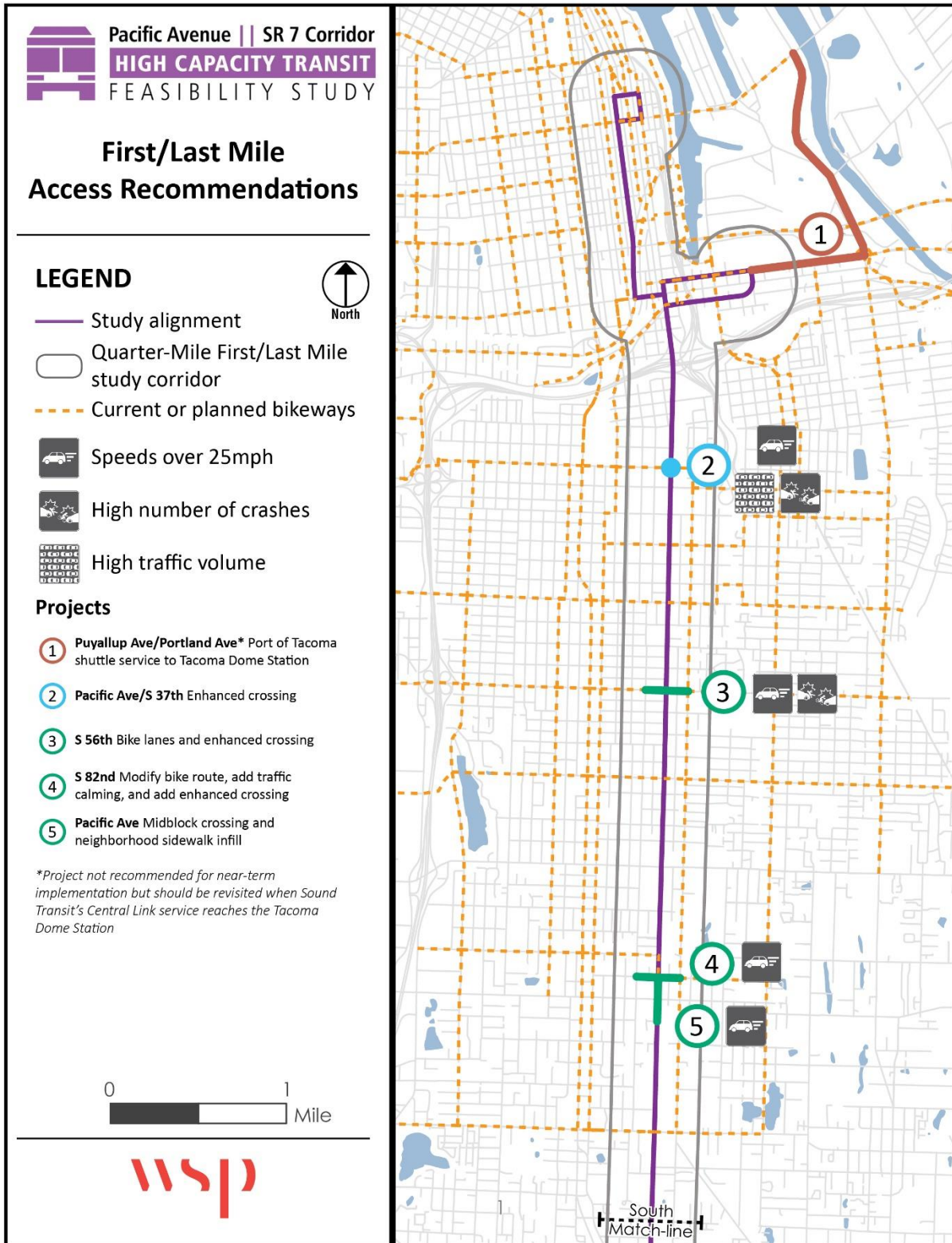
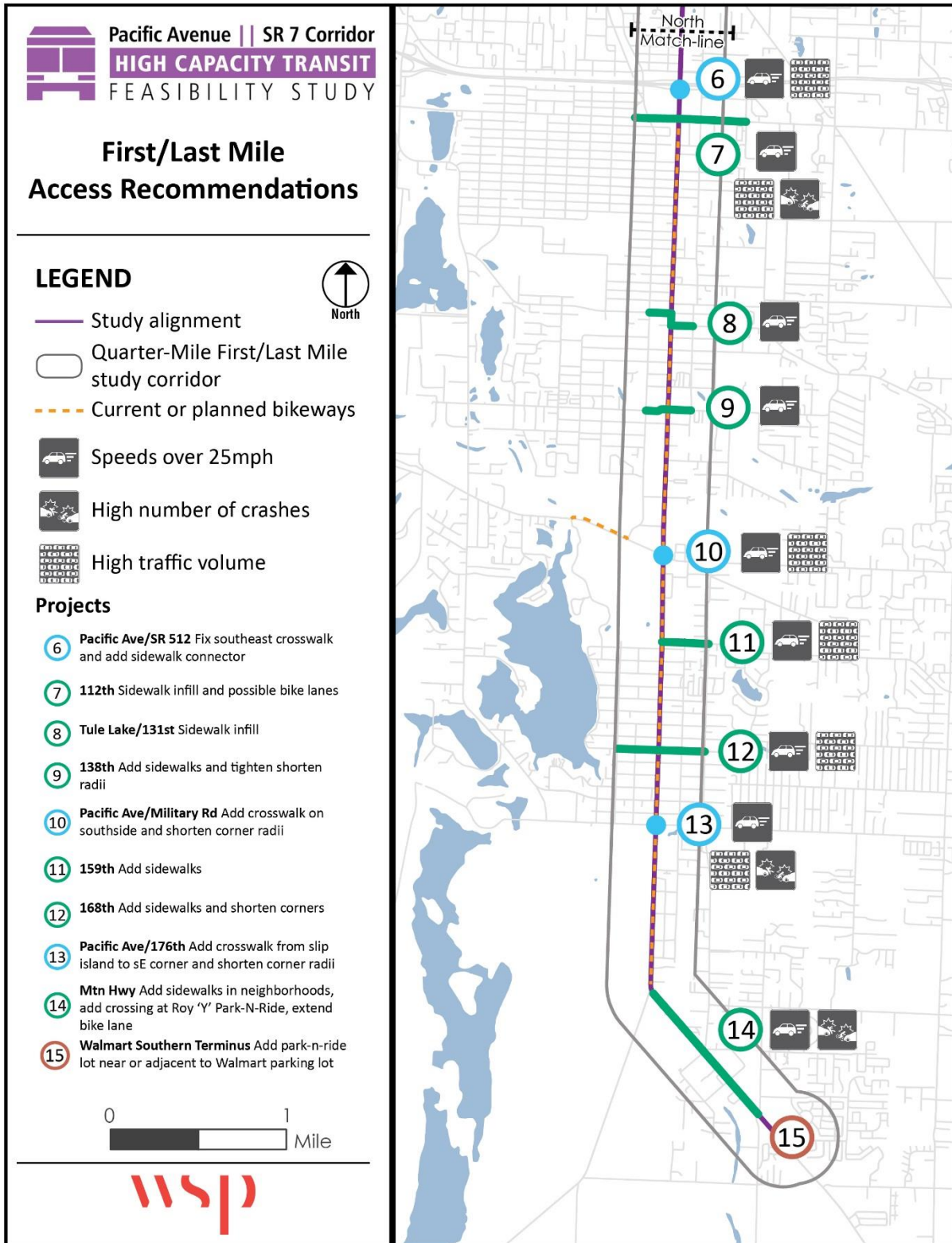


Figure 3: South Corridor Access Concerns



4 CRITICAL ISSUES

The Pacific Avenue/SR 7 study corridor between downtown Tacoma and unincorporated Pierce County/Spanaway varies widely in its land uses, including areas with high density mixed use, residential, commercial, and industrial uses. There is also variation on accessibility throughout the corridor.

Within the downtown Tacoma area, the route is accessible by well-connected and maintained sidewalks, shorter block lengths, and bicycle lanes as well as other transit connections (including the Tacoma Link streetcar, Sounder and Amtrak rail, and regional express bus service). Much of the downtown area and the area near the I-5 and I-705 highways and ramps, has sidewalks, marked and signalized pedestrian crossings, ADA amenities, and slower posted traffic speeds, making the corridors in downtown Tacoma generally accessible for people walking as well as those with limited mobility. However, areas outside of the downtown core and Tacoma Dome area present many mobility challenges. The critical issues identified within the Pacific Avenue/SR 7 corridor include:

- Lack of sidewalks or gaps in the sidewalk network
- Lack of designated bike routes
- Lack of marked or physically separated bicycle facilities
- Lack of marked and/or ADA-compliant pedestrian crossings, both midblock and at intersections
- High motor vehicle travel speeds
- Difficult pedestrian crossing over SR 512

4.1 LACK OF SIDEWALKS AND GAPS IN THE SIDEWALK NETWORK

A visual assessment of sidewalks within a quarter-mile of the corridor indicates that sidewalks are generally present in the downtown Tacoma area and in the northern portion of corridor. However, from approximately S 64th Street southward, the sidewalk infrastructure degrades in quality and frequency.

Along Pacific Avenue/SR 7 there are noticeable gaps where pedestrians must walk alongside faster moving traffic (posted speed limits of 35 mph) with no dedicated pedestrian space, requiring pedestrians to walk in the shoulder or in gravel or dirt patches on the side of the roadway. South of SR 512, sidewalks are essentially non-existent in the surrounding neighborhoods and are oftentimes located along roadways with higher speeds. The lack of sidewalk infrastructure in these areas presents a significant barrier for riders from the surrounding neighborhoods to access the proposed BRT service, as well as making it difficult for nearby residents to safely walk to access other important goods, services and amenities along the Pacific Avenue corridor.

4.2 LACK OF BICYCLE FACILITIES

While the City of Tacoma has designated bike routes, most do not have dedicated bicycle infrastructure, such as lane striping or physical separation from traffic. There is a “bicycle boulevard” on A Street in Tacoma which routes through residential and lower volume streets between S 37th Street and 96th Street E. Currently this bikeway or bicycle boulevard designation does not include associated bicycle infrastructure or amenities. There are a few traffic circles and speed humps, and there are no traffic signals at busy intersections or bikeway signage to alert drivers or bicyclists that the roadway is a shared facility. The vision of the City of Tacoma’s transportation plan includes the implementation of a more comprehensive bicycle network, including A Street, as well as a higher quality protected bicycle facility on 64th Street which would connect to a protected bicycle facility on Yakima Avenue/Thompson Avenue that

runs parallel to Pacific Avenue. Neither of these bikeway infrastructure projects have been included in the City of Tacoma's immediate Six-Year Comprehensive Transportation Improvement Program adopted June 27, 2017.

Outside of the city of Tacoma, Pierce County has no designated bicycle network GIS data and there does not appear to be any officially designated bicycle routes in the surrounding neighborhoods. There is a small segment of striped bike lane along Pacific Avenue between 112th Street E and Mountain Highway, however the facility has poor signage and it is located on narrow roadway shoulders with no physical separation from high speed vehicles or trucks. An additional multiuse path exists on Military Road S for approximately 1,500 feet, but it does not connect to the Pacific Avenue bike lane and does not appear to link any services or neighborhoods.

4.3 LACK OF SAFE CROSSINGS

Pacific Avenue/SR 7 is a high-volume corridor with high motor vehicle speeds and multiple travel lanes. Signalized intersections or mid-block crossings provide the safest means to cross the busy arterial. Currently, most major intersections have marked and signalized crossings; however, there are many local streets that do not. For example, transit patrons using the bus stop between S 72nd Street and S 76th Street might have a difficult time crossing the street comfortably. The stop is located between intersections near a large shopping center that includes a Fred Meyer store, as well as residences and a rehabilitation center. The existing infrastructure at the bus stop requires pedestrians to walk to either adjacent intersection and back again to safely cross. This is inconvenient and can present a hardship for transit dependent riders, particularly those with disabilities who use transit to access the amenities nearby. Other areas along the corridor also lack adequate crossings, with some intersections only providing marked/signaled crossings on three sides of the intersection which forces some pedestrians to make three crossings instead of just one to get to their destination.

The BRT alternatives propose to add several new or upgraded traffic signals as well as pedestrian signals that will help alleviate some of these issues. The Washington State Department of Transportation (WSDOT) is also proposing several new or upgraded signals, outside of this project, that will also help alleviate some of these issues.

4.4 HIGHER SPEED CORRIDORS

Higher speed corridors, which are defined as any road with posted speeds greater than 25 mph, are prevalent throughout the corridor, including Pacific Avenue between E 34th Street and the south end of study area in Spanaway. In addition, there are 24 other arterials that intersect Pacific Avenue that carry higher speed traffic.² These corridors make for a higher-stress environment for bicyclists who ride on the street, and for pedestrians in areas that lack sidewalks. Of those 24 intersecting, higher-speed corridors, 10 either lack sidewalks or have large gaps in the sidewalk network, forcing pedestrians onto the same grade level shoulder as the higher speed vehicular traffic.

4.5 CROSSING SR 512

The SR 512 interchange poses a unique issue for the Pacific Avenue/SR 7 corridor. While BRT stations are proposed on both the north and south sides of SR 512, there are sidewalk gaps at the northbound and

² This does not include grade separated crossings or limited access highways

southbound approaches to the interchange. Additionally, while the overpass features sidewalks on both sides, they are relatively narrow and lack any buffer between pedestrians and motor vehicles. The ramp at the southbound Pacific Avenue to westbound SR 512 movement is particularly concerning from a pedestrian safety perspective. The crosswalk across this ramp is striped at an oblique angle to the roadway making visibility difficult between the higher-speed motor vehicle movement and crossing pedestrians.

The area also poses challenges for bicyclists. There is a bike lane along northbound Pacific Avenue that terminates prior to the intersection at 112th (there are no facilities from that point north). Cyclists traveling northbound are required to weave in and out of the shoulder around the intersection to the overpass where the lack of shoulder would force a cyclist to either ride in the travel lane or along the narrow sidewalk.

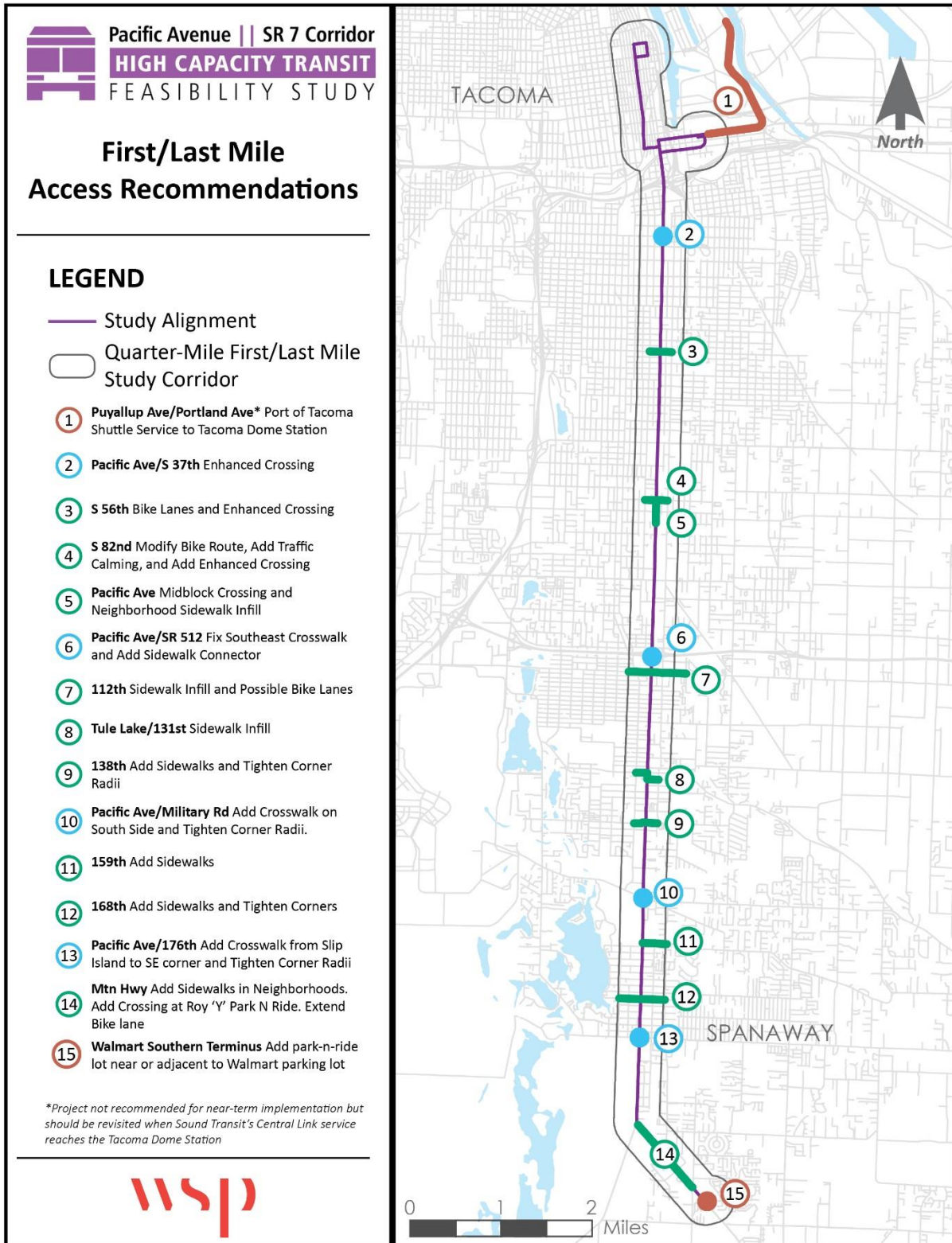
5 CONCEPTS FOR PEDESTRIAN ACCESS IMPROVEMENTS

Based on the data and observation of existing conditions for people walking the proposed BRT corridor, a list of projects was developed to improve access to transit in the areas deemed as having the highest need. These projects offer solutions for getting people to, from and around the proposed stations, as well as connecting them to destinations and services, including other transit services. The proposed first/last mile access improvements are organized from north to south. High level “order of magnitude” costs have been identified for the improvements, and are indicated in ranges as shown in Table 5-1 for each improvement.

Table 5-1. Order of Magnitude Cost Ranges for Access Improvements

Cost Range	Rating Symbol
<\$500,000	\$
\$500,000-\$1,000,000	\$\$
\$1,000,000-\$1,500,000	\$\$\$
>\$1,500,000	\$\$\$\$

Figure 4: Potential Transit Access Projects Along the Corridor



5.1 PACIFIC AVENUE/S 37TH INTERSECTION STREET CROSSING

A high number of crashes (2012-2016) were reported by WSDOT at the intersection of Pacific Avenue and S 37th Street. As of 2014, a median crossing island has been installed with a rapid flashing beacon that alerts drivers to a pedestrian or bicyclist crossing. However, there is only a crosswalk on the north side of the intersection, which may require pedestrians to cross three times to cross Pacific Avenue on the south side. Enhancements (see Figure 5) could include a pedestrian-only signal or a pedestrian-hybrid beacon³, including actuation buttons for pedestrians and cyclists, which would allow users to cross more visibly. The assessment summary is shown in Table 5-2.

Figure 5: Pacific Avenue at S 37th Street

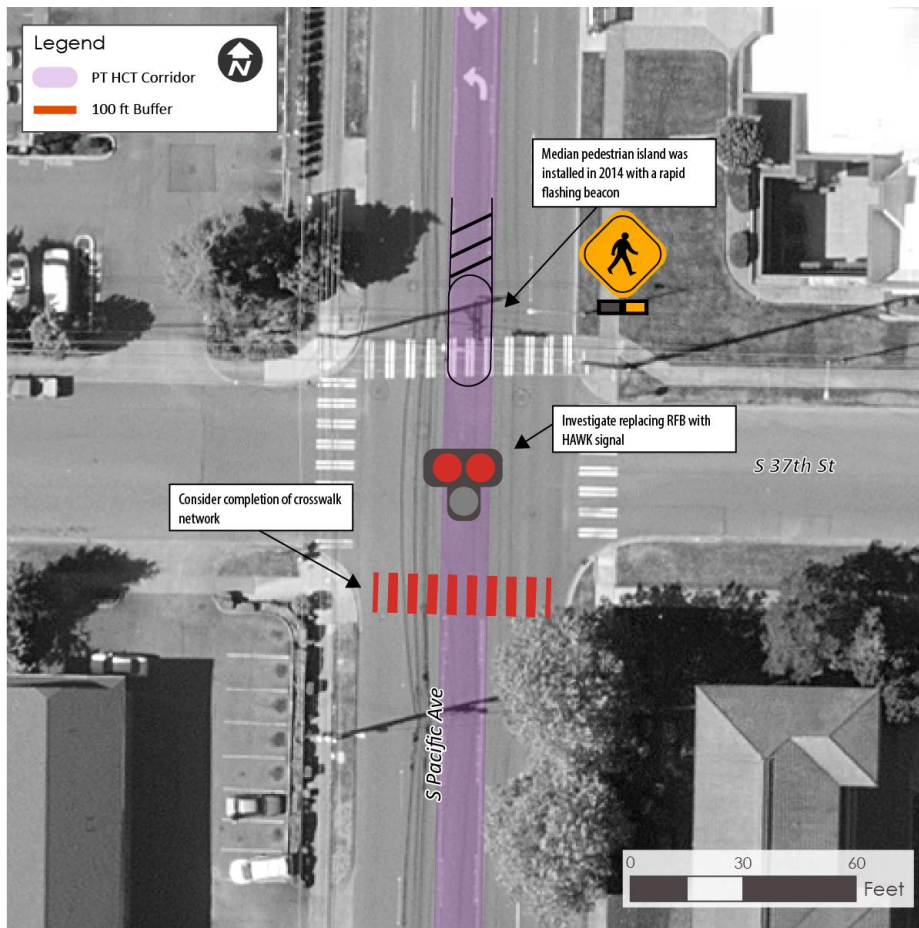


Table 5-2. Pedestrian Access Improvement Summary Assessment – Pacific Avenue/S 37th Street

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Pedestrian	High amount of pedestrian crashes.	Enhance current rapid flashing beacon crossing.	New median island already installed (2014).	\$

³ A Pedestrian Hybrid Beacon (PHB), also known as a HAWK beacon (High-Intensity Activated crossWalk beacon), is a traffic control device used to stop road traffic and allow pedestrians to cross safely.

5.2 S 56TH STREET – A STREET TO D STREET

For pedestrians using the proposed 56th Street BRT station, the intersection of S 56th Street and Pacific Avenue would benefit from a marked crosswalk along the west side to match the other three crosswalks. Additional ADA amenities are suggested on three of the four corners as they currently lack curb cuts and tactile paving to meet ADA standards as shown in Figure 6. Additionally, due to the higher speeds on 56th Street, providing bike lanes to connect to adjacent parallel streets, in particular the A Street bicycle boulevard, would enhance the safety and convenience of bicycle access to the BRT station. The assessment summary for these improvements is documented in Table 5-3 and Table 5-4.

Figure 6: Pacific Avenue at S 56th Street

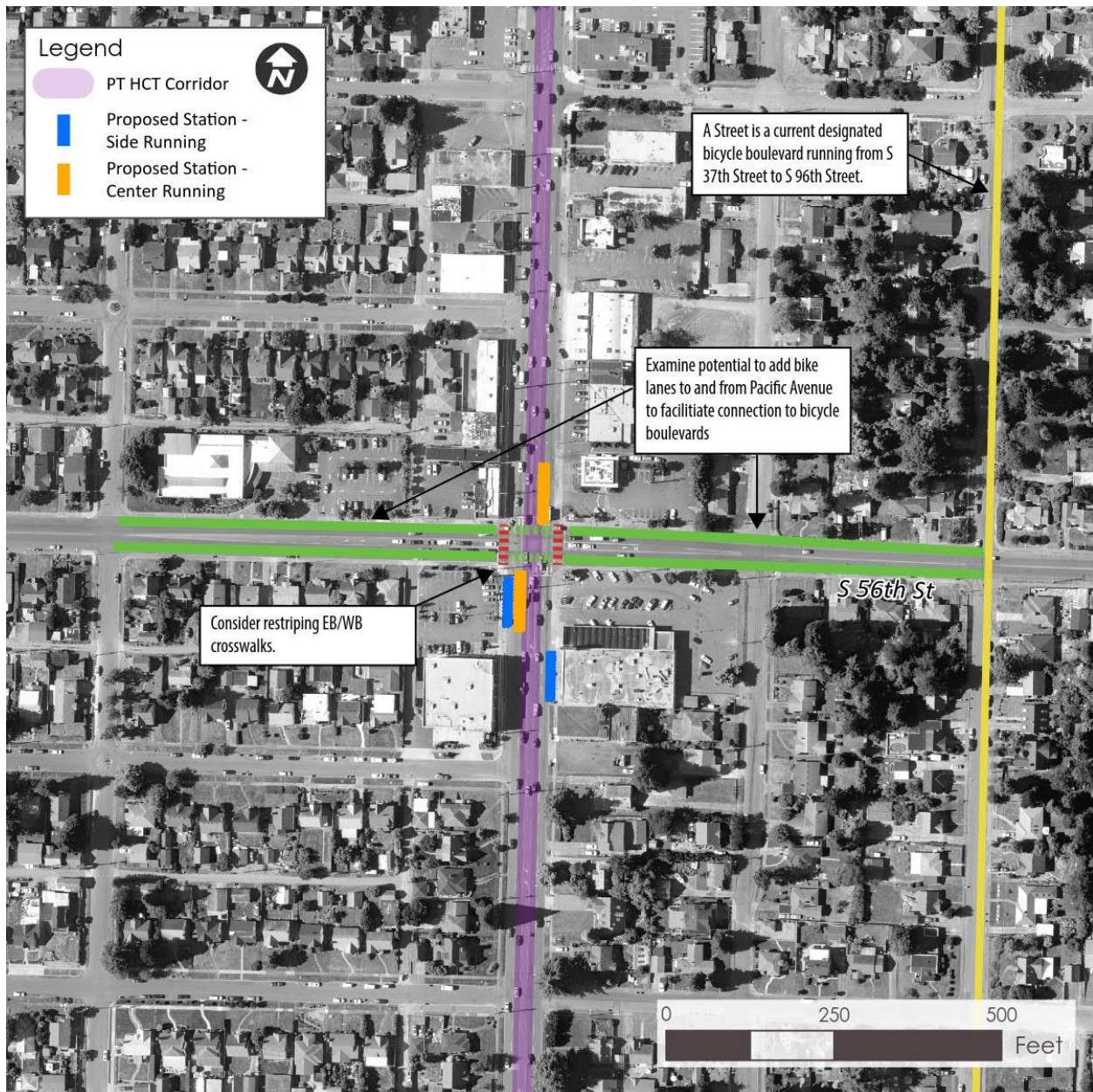


Table 5-3. Pedestrian Access Improvement Summary Assessment – S 56th Street

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Pedestrian	High amount of pedestrian crashes.	Enhance current rapid flashing beacon crossing.	New median island already installed (2014).	\$

Table 5-4. Pedestrian and Bicycle Access Improvement Summary Assessment – S 56th Street

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Bicycle and pedestrian	High speeds and high amount of bike/pedestrian crashes.	Striped or buffered bike lane along S 56 th Street. Safe crossing at Pacific Avenue/S 56 th Street intersection.	Narrow ROW east of A Street.	\$

5.3 PACIFIC AVENUE – S 80TH STREET TO S 86TH STREET

Pacific Avenue between S 80th Street and S 86th Street had a high number of bicycle and pedestrian crashes reported between 2012 and 2016. With the exception of one intersection, this commercial district segment lacks crosswalks, requiring pedestrians to cross five lanes of traffic without any markings. While there is a marked crosswalk and signal at S 84th Street (the large cross-street arterial in this section), elsewhere there are no facilities or amenities to facilitate bicycle and pedestrian crossing movements. The construction of a crosswalk with a median island or refuge with a rapid flashing beacon or a HAWK signal on S 82nd Avenue is a potential solution (see Figure 7). The assessment summary for these improvements is documented in Table 5-5.

This segment would also benefit from an additional midblock crossing, including rapid flashing beacons, at S 80th Street or S 86th Street. The surrounding residential streets also lack sidewalks making the trip to the proposed station at S 84th Street difficult. Some potential infill sidewalk improvements are shown in Figure 8. The assessment summary for these improvements is documented in Table 5-6.

Table 5-5. Pedestrian and Bicycle Access Improvement Summary Assessment – S 80th to S 86th Streets

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Bicycle and pedestrian	Lack of sidewalks. Official bike route along Pacific Avenue.	Change bike route slightly. Add traffic calming along S 82 nd Avenue. Add safe crossing at S 82 nd Avenue. (See Table 5-7)	Pacific Avenue is not very amenable to bicycle lanes in this area.	\$

Table 5-6. Pedestrian Access Improvement Summary Assessment – S 80th to S 86th Streets

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Pedestrian	High number of bike/pedestrian crashes. High speeds. Sidewalk/crossing gaps in surrounding areas.	Add midblock crossing along this stretch of the corridor. Sidewalk infill in surrounding neighborhood. (See Table 5-8)	None	\$

Figure 7: Pacific Avenue at S 82nd Street

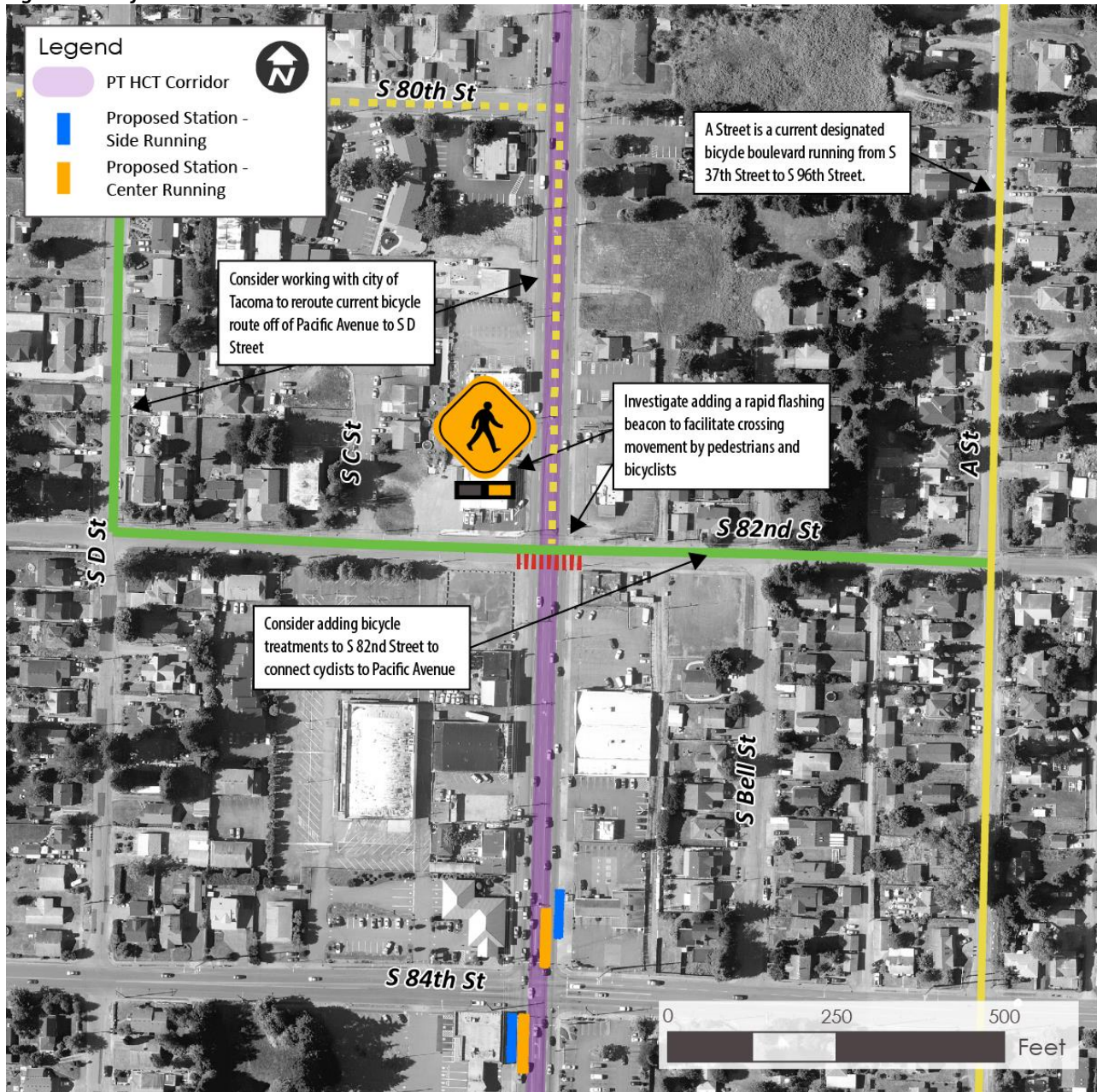


Figure 8: Pacific Avenue at 84th Street



5.4 PACIFIC AVENUE – S 96TH STREET TO 112TH STREET S

The BRT alternatives propose sidewalk infill between S 96th Avenue and SR 512. No additional improvements are identified.

5.5 PACIFIC AVENUE/STATE ROUTE 512

The Pacific Avenue overpass over SR 512 features sidewalks on both sides. However, the sidewalk exists only on the structure itself and most of the connecting links on both sides of the overpass lack sidewalks. Additionally, the roadway geometry and striping at the southbound SR 7 to westbound SR 512 ramp, and the northbound SR 7 to eastbound SR 512 ramp encourage high motor vehicle speeds and reduce visibility between motorists and crossing pedestrians. It is recommended that the gaps in the surrounding sidewalk network are filled as shown in Figure 9, and that the sidewalks on the overpass

itself are widened if possible. Additionally, reducing the curb radii at the SR 512 on-ramp intersections with SR 7 would slow traffic and help improve pedestrian mobility and safety at this interchange. If this is not incorporated into the Pacific Avenue/SR 7 BRT Project, as this is a relatively expensive treatment, then other funding options should be investigated for implementing this recommendation. The assessment summary for these improvements is documented in Table 5-7.

Figure 9: Pacific Avenue at State Route 512

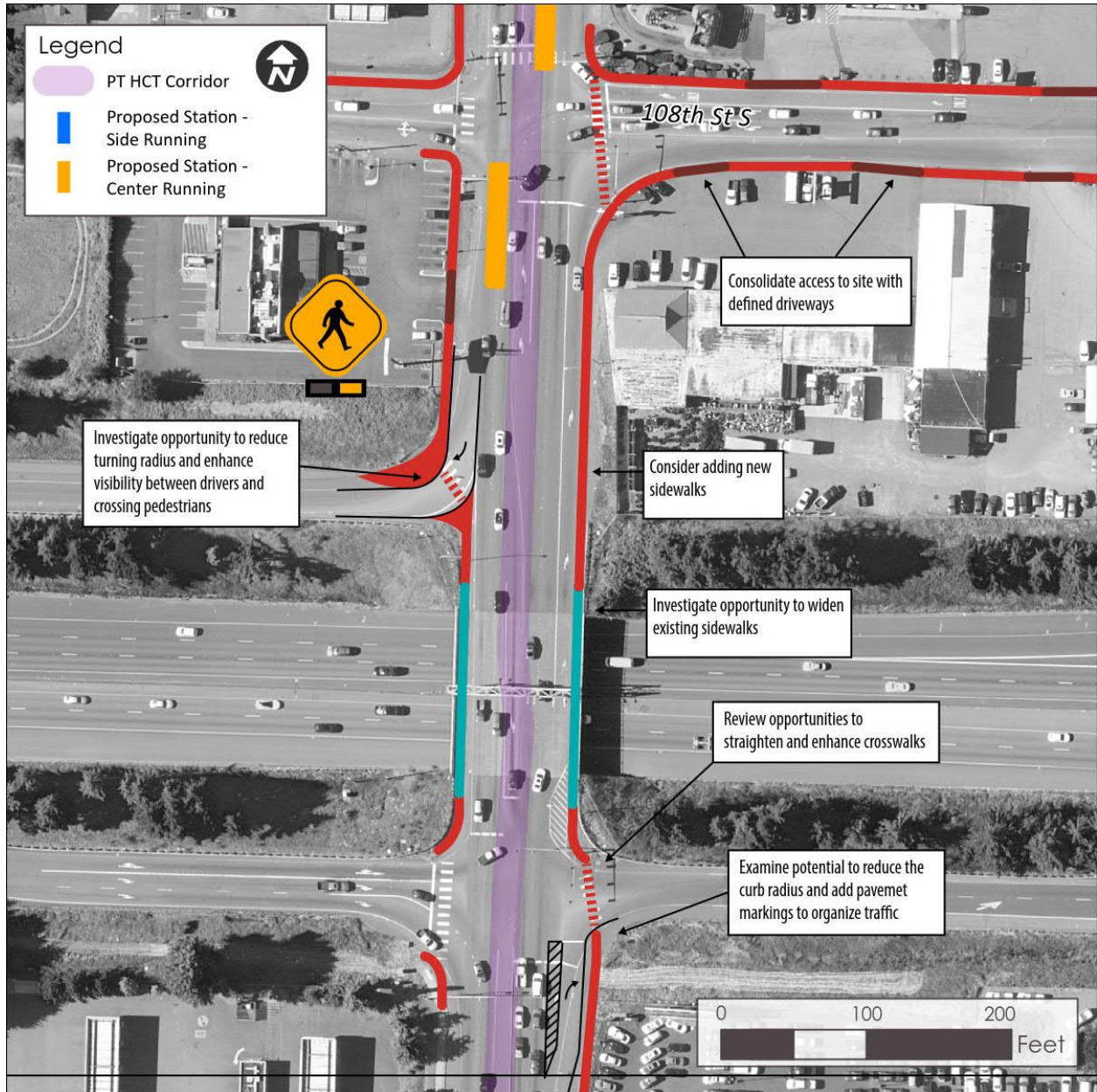


Table 5-7. Pedestrian Access Improvement Summary Assessment – State Route 512

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Pedestrian	Area around interchange lacks sidewalk, narrow sidewalks on interchange, large curb radii at SB-WB and NB-EB ramp approaches	Tighten corner radii, shorten crosswalks, add sidewalks	Acquiring ROW might be difficult due to auto center nearby.	\$\$\$\$

5.6 112TH STREET S – D STREET TO PARK AVENUE S

112th Street S is an arterial that intersects Pacific Avenue just south of the SR 512 overcrossing. The area features commercial land uses nearby, including a grocery store in the northwest corner and a large church to the east. However, 112th Street S has many sidewalk gaps. Filling the gaps between C Street S and 7th Avenue E (a three-quarter mile stretch) would create a continuous sidewalk providing better walk access connections to the proposed BRT service. Additionally, 112th Street S could be a potential bike corridor if Pierce County determines a need to connect the Pacific Avenue S striped bike lane with the City of Tacoma’s bicycle network at S 96th Street by way of Park Avenue S. The assessment summary for these improvements is documented in Table 5-8.

Table 5-8. Pedestrian and Bicycle Access Improvement Summary Assessment –112th Street

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Bicycle and pedestrian	High number of bike/pedestrian crashes at intersection. No sidewalks along 112 th with high speeds. Lack of sidewalk network overall.	Build out sidewalks 7 th Avenue E to A Street. Complete sidewalk gap from Pacific Avenue to C Street S. Possibly add buffered bicycle lanes.	Acquiring ROW might be difficult due to auto center nearby.	\$\$\$\$

5.7 TULE LAKE ROAD/131ST STREET S – A STREET TO C STREET

Pacific Avenue at Tule Lake Road S is proposed to have an BRT station; however, the current nearest cross streets (Tule Lake Road and 131st Street S) do not have sidewalks to facilitate pedestrian movement from nearby neighborhoods to Pacific Avenue and the proposed station. Moreover, both Tule Lake Road S and 131st Street S are higher speed roads making the trip potentially unsafe for pedestrians. It is recommended that sidewalks be constructed along 131st Street east of Pacific Avenue to A Street, and to the west of Pacific Avenue along Tule Lake Road to C Street S to allow for residents to walk from their neighborhood streets with lower speeds (though still no sidewalks) to their primary intersecting arterials that would bring them to the proposed BRT station (see Figure 11). The assessment summary for these improvements is documented in Table 5-9.

Figure 10: Pacific Avenue at 112 Street S



Figure 11: Pacific Avenue at Tule Lake Road S

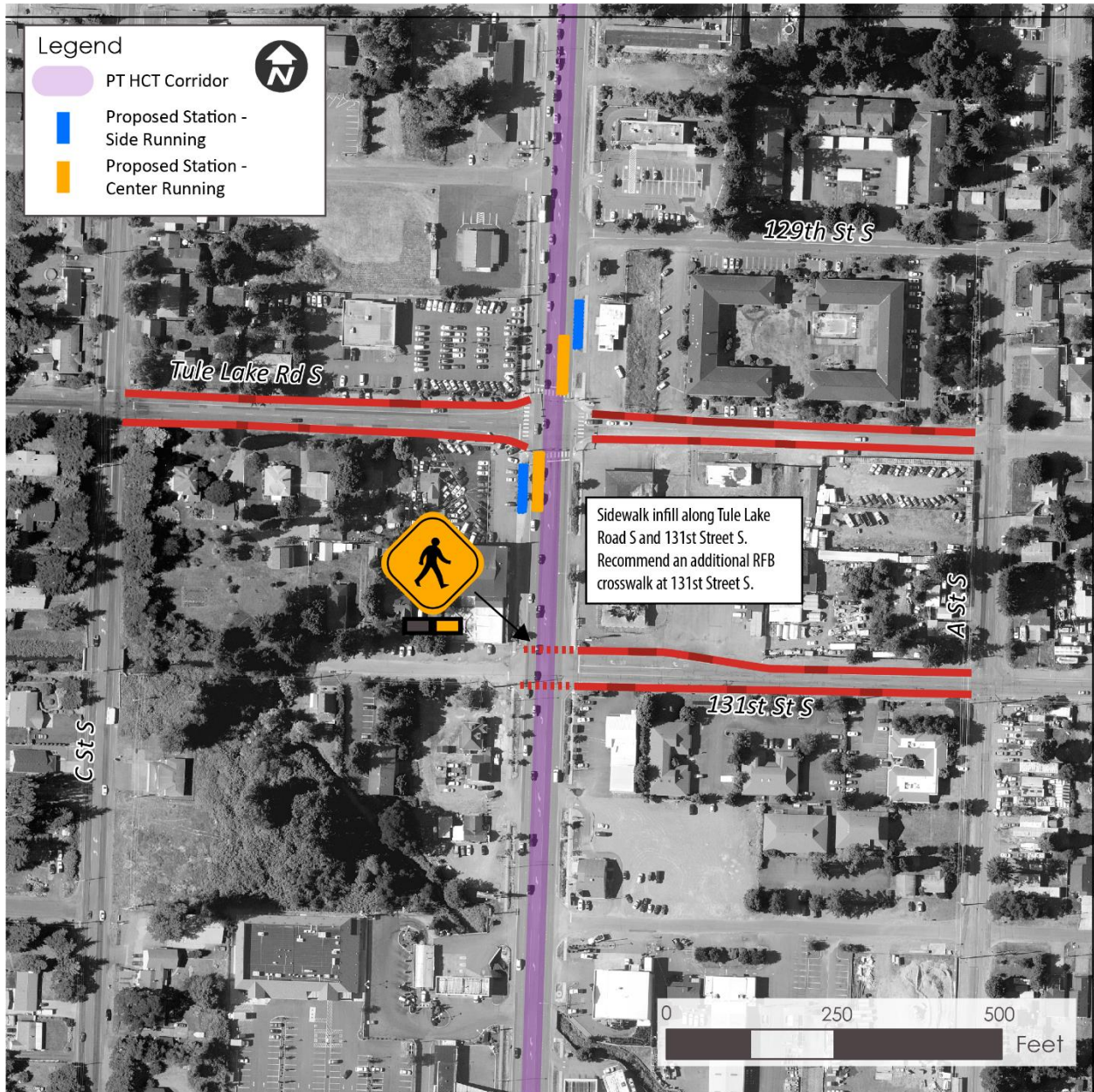


Table 5-9. Pedestrian Access Improvement Summary Assessment – Tule Road and 131st Street

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Pedestrian	No sidewalks along road with higher motor vehicle speeds. Bike/pedestrian crash history. Sidewalk network gap.	Add sidewalks on Tule Rd from Park Avenue to Pacific Avenue, and along 131 st Street from B Street to Pacific Avenue. Add protected pedestrian crossing at 131 st St S (RRFB)	Acquiring ROW might be difficult due to auto center nearby.	\$\$\$

5.8 138TH STREET S – C STREET TO A STREET

138th Street S, which does not have sidewalks, provides a primary road linkage to a proposed BRT station on Pacific Avenue. Vehicular speeds on this road are relatively high, creating an unfavorable environment for pedestrians. Additionally, the west side of 138th Street S contains an S-curve that limits visibility of pedestrians walking along that section of road. It is recommended that sidewalks be added along this stretch of road between 2nd Avenue Ct E and Park Avenue S, as shown in Figure 12. Furthermore, the corners at the Pacific Avenue intersection are not well designed for pedestrians. The existing large curb radius lengthens pedestrian crossing distances and encourages higher speed turns. Reducing curb radii would mitigate both issues. The assessment summary for these improvements is documented in Table 5-10.

Figure 12: Pacific Avenue at 138th Street S

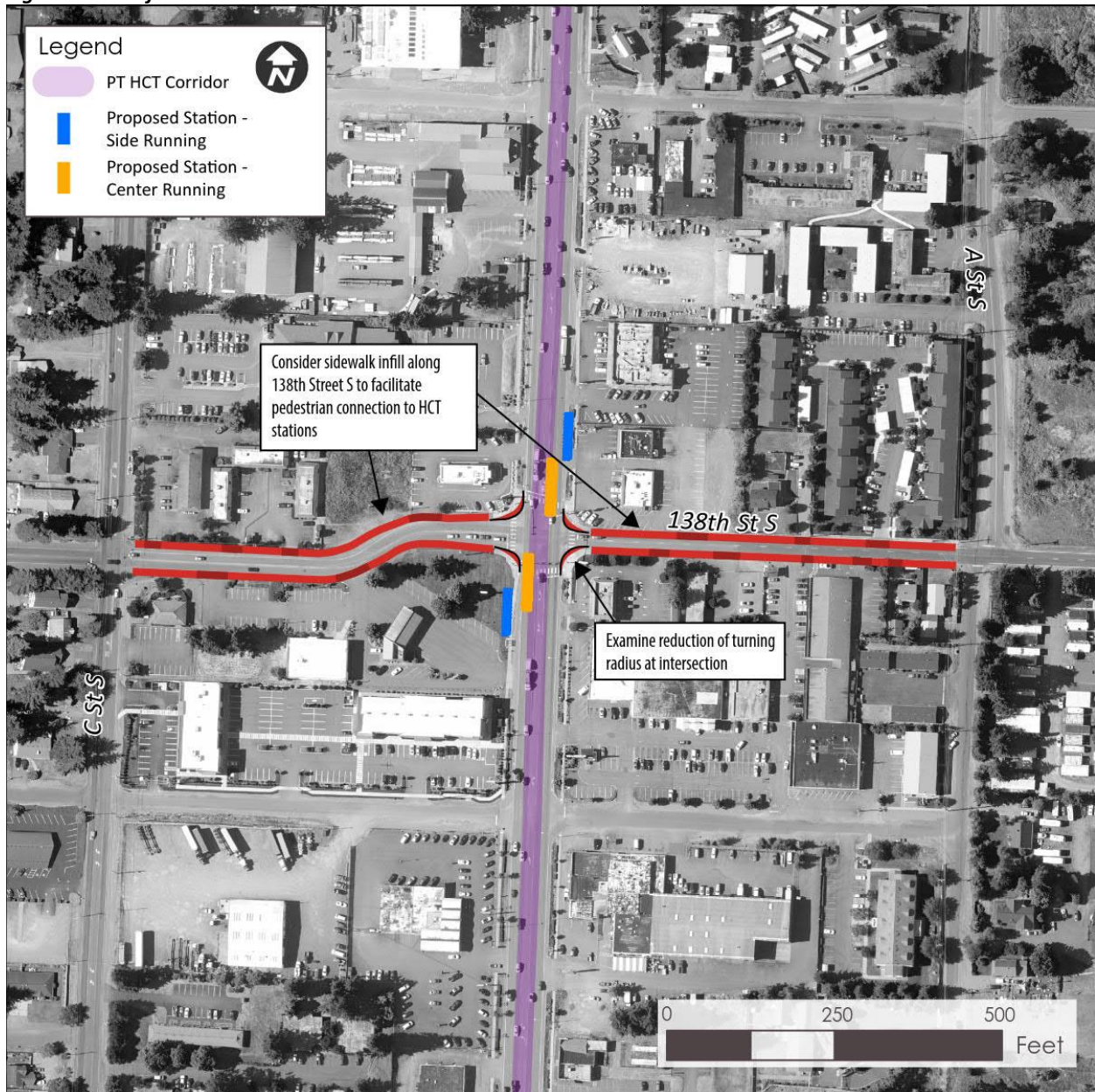


Table 5-10. Pedestrian Access Improvement Summary Assessment – 138th Street

Access Mode	Problem	Potential Improvement	Implementation Challenge	Cost Estimate
Pedestrian	No sidewalks along higher speed road. Intersection encourages high speed turns.	Add sidewalks from 2 nd Ave to Park Ave. Tighten corner radii at each corner of the Pacific Avenue /138 th Street S intersection.	None	\$\$\$\$

5.9 PACIFIC AVENUE/ MILITARY ROAD S INTERSECTION

The Pacific Avenue/Military Road intersection does not have a crosswalk on the south side, thus limiting pedestrian access to three crossings. A new crosswalk and pedestrian signal added to the south side of this intersection would allow pedestrians to access this corner of the intersection with only a single crossing rather than three crossings (Figure 13). There is a large shopping center with a grocery store and other amenities on the southeast corner. Additionally, the large radii on the southeast and northwest corners allow for faster turning movement speeds by vehicles. These corners could be tightened to shorten the crosswalk distance and encourage drivers to slow down before turning. The assessment summary for these improvements is documented in Table 5-11.

Figure 13: Pacific Avenue at Military Road S

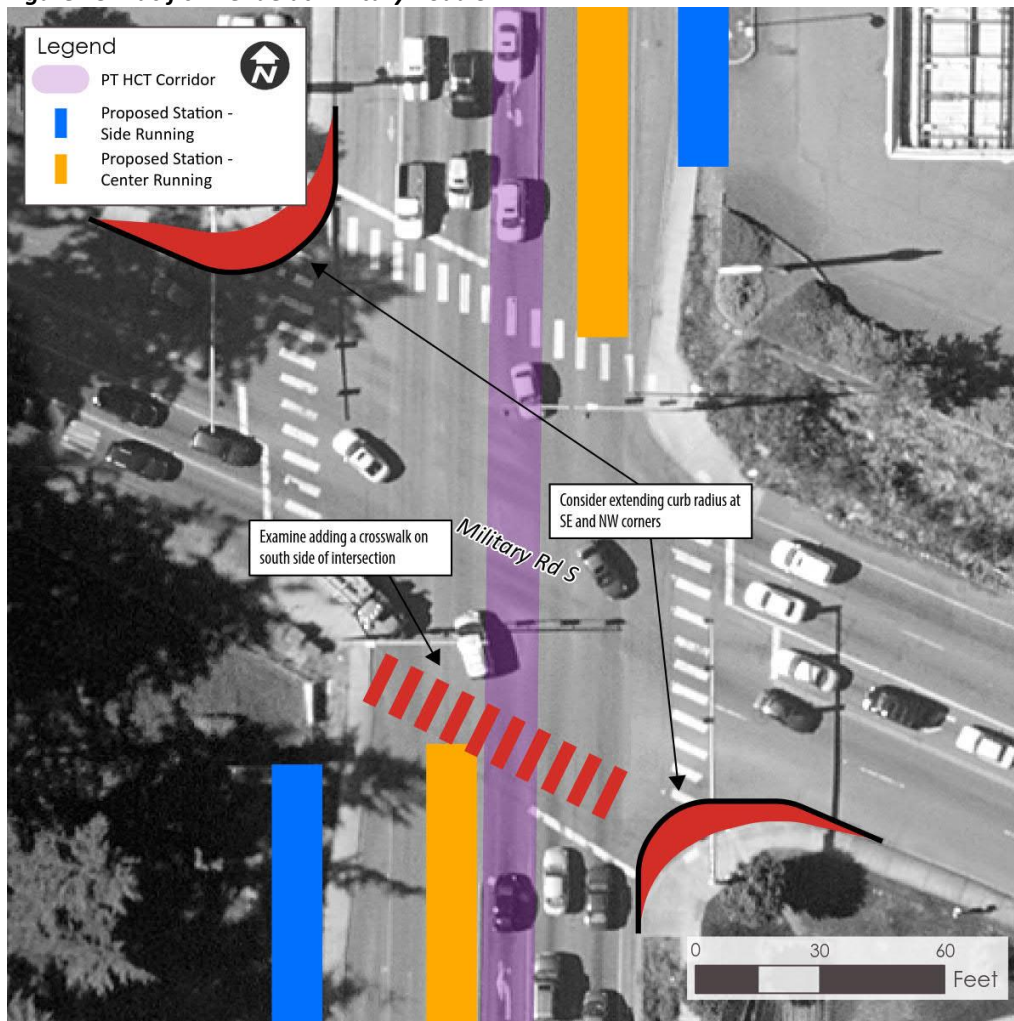


Table 5-11. Pedestrian Access Improvement Summary Assessment – Military Road

Access Mode	Problem	Potential Solutions	Implementation Challenge	Cost Estimate
Pedestrian	Lack of marked crossing on the south side of Pacific Avenue.	Add signalized crosswalk on south side of intersection. Tighten corner radii in northwest and southeast corners.	None	\$

5.10 159th Street S – Pacific Avenue S to B Street

159th Street S currently does not have sidewalks connecting the surrounding neighborhood to Pacific Avenue and the proposed BRT station. Furthermore, 159th Street S is a higher speed road making the walk to Pacific Avenue on the shoulder potentially unsafe. The construction of a new sidewalk from B Street (where sidewalks currently do exist) to Pacific Avenue would provide connectivity to the pedestrian network (Figure 14). Not only would it give residents a walkable path to the BRT station, it would also add linkage to the nearby Safeway/Rite Aid shopping center. The assessment summary for these improvements is documented in Table 5-12.

Figure 14: 159th Street S from Pacific Avenue S to B Street



Table 5-12. Pedestrian Access Improvement Summary Assessment – 159th Street

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Pedestrian	Higher speeds with no sidewalks. No marked crossing on south side of 159 th at Pacific Avenue.	Add sidewalks along 159 th Street S from B Street to Pacific Avenue.	None	\$\$\$

5.11 168TH STREET S – PARK AVENUE S TO B STREET

168th Street S is lacking in consistent sidewalk linkages to Pacific Avenue, requiring pedestrians to walk alongside a narrow shoulder to the proposed BRT station as well as nearby amenities such as the Post Office. Adding sidewalks between B Street and Park Avenue would address this issue (Figure 15). Further safety enhancements may be necessary due to the high number of bicycle and pedestrian crashes at this intersection. One possibility is the corner radii at each of the four corners could be rebuilt and tightened to ensure that turning vehicles speeds are reduced and pedestrians have shorter crossing distances. The assessment summary for these improvements is documented in Table 5-13).

Figure 15: Pacific Avenue at 168th St S

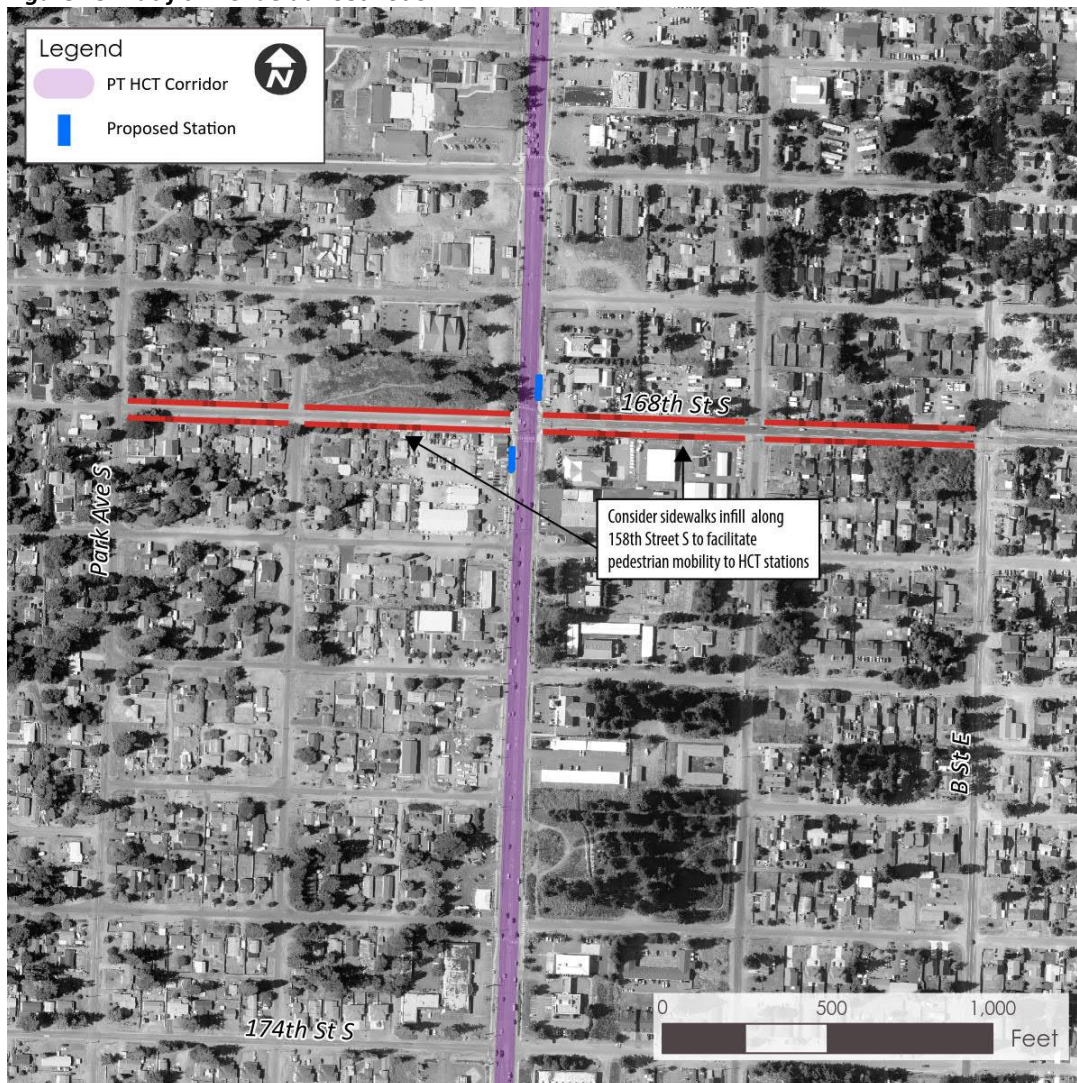


Table 5-13. Pedestrian Access Improvement Summary Assessment – 168th Street

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Pedestrian	Complete lack of sidewalk network in surrounding neighborhood. Higher amount of bike/pedestrian crashes.	Add sidewalks from B Street to Park Avenue S. Rebuild intersection corners to have tighter corner radii.	None	\$\$\$\$

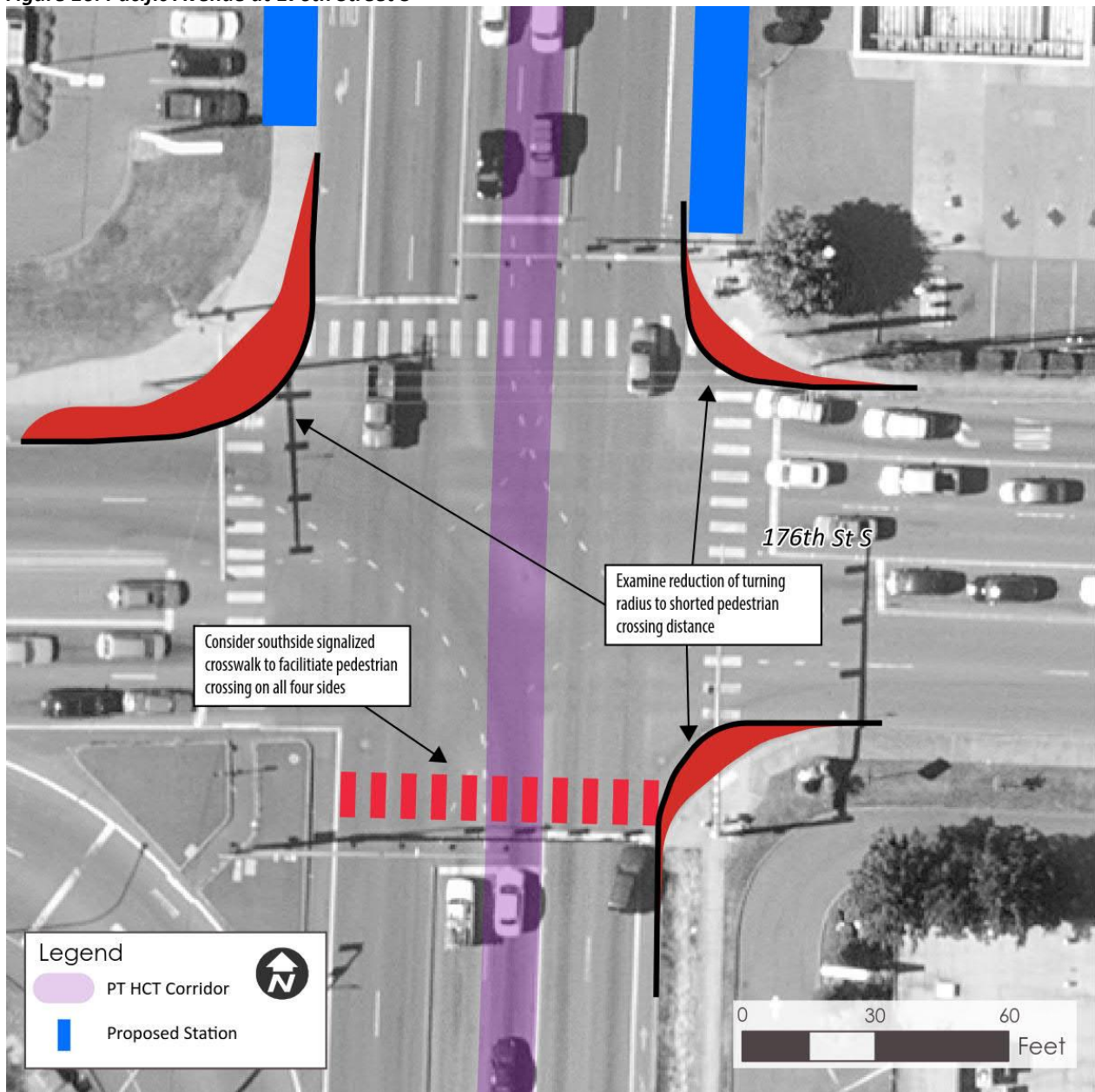
5.12 PACIFIC AVENUE/176TH STREET S INTERSECTION

Pacific Avenue S and 176th Street S is an uncomfortable intersection for both bicyclists and pedestrians. 176th Street is a high-volume arterial that connects to SR 704. A new crosswalk could be added to the south side of the street allowing transit riders to connect to the large shopping center in the southeast as well as to the shopping center to the northeast (see Figure 16). The corner curb radii in the northwest, northeast, and southeast corners can be further tightened to reduce vehicle speeds when turning and shorten the distance of the pedestrian crossing. The assessment summary for these improvements is documented in Table 5-14.

Table 5-14. Pedestrian and Bicycle Access Improvement Summary Assessment – 176th Street

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Bicycle and pedestrian	Lack of sidewalk and crossing on southern end of the intersection. Slip lane could pose comfortability issues. Lack of appropriate bicycle connection through intersection.	Provide marked crossing from slip lane to southeast corner. Tighten corner radii on NW, NE, and SE corners. Southbound bicycle lane improvements.	Signal timing issues for cyclists and adding the crosswalk.	\$\$

Figure 16: Pacific Avenue at 176th Street S



5.13 MOUNTAIN HWY E – STATE ROUTE 507 TO 8TH AVENUE E

The final segment of the corridor, along Mountain Highway between SR 507 and 8th Avenue E poses many BRT stations mobility issues for both bicyclists and pedestrians – including the low density of land uses and rural characteristics that reduce the overall walkability of the area.

No sidewalks exist along either Mountain Hwy or in any of the nearby neighborhoods. This project is identifying potential sidewalk infill near stations rather than addressing overall network issues (Figure 17). However, the 40-mph speed limit and narrow shoulders in this corridor expose pedestrians to potentially dangerous motor vehicle traffic; likely resulting in many would-be transit users experiencing discomfort with the beginning and end of each trip. Sidewalks would help mitigate these concerns and connect some of the higher density housing in the area (including along 8th Avenue E to 192nd Street E).

Additionally, access to and from the Roy “Y” Park-and-Ride could be improved with the addition of a new crosswalk at the northbound approach to the intersection. The assessment summary for these improvements is documented in Table 5-15.

Figure 17: Mountain Highway E from State Route 507 to 8th Avenue E

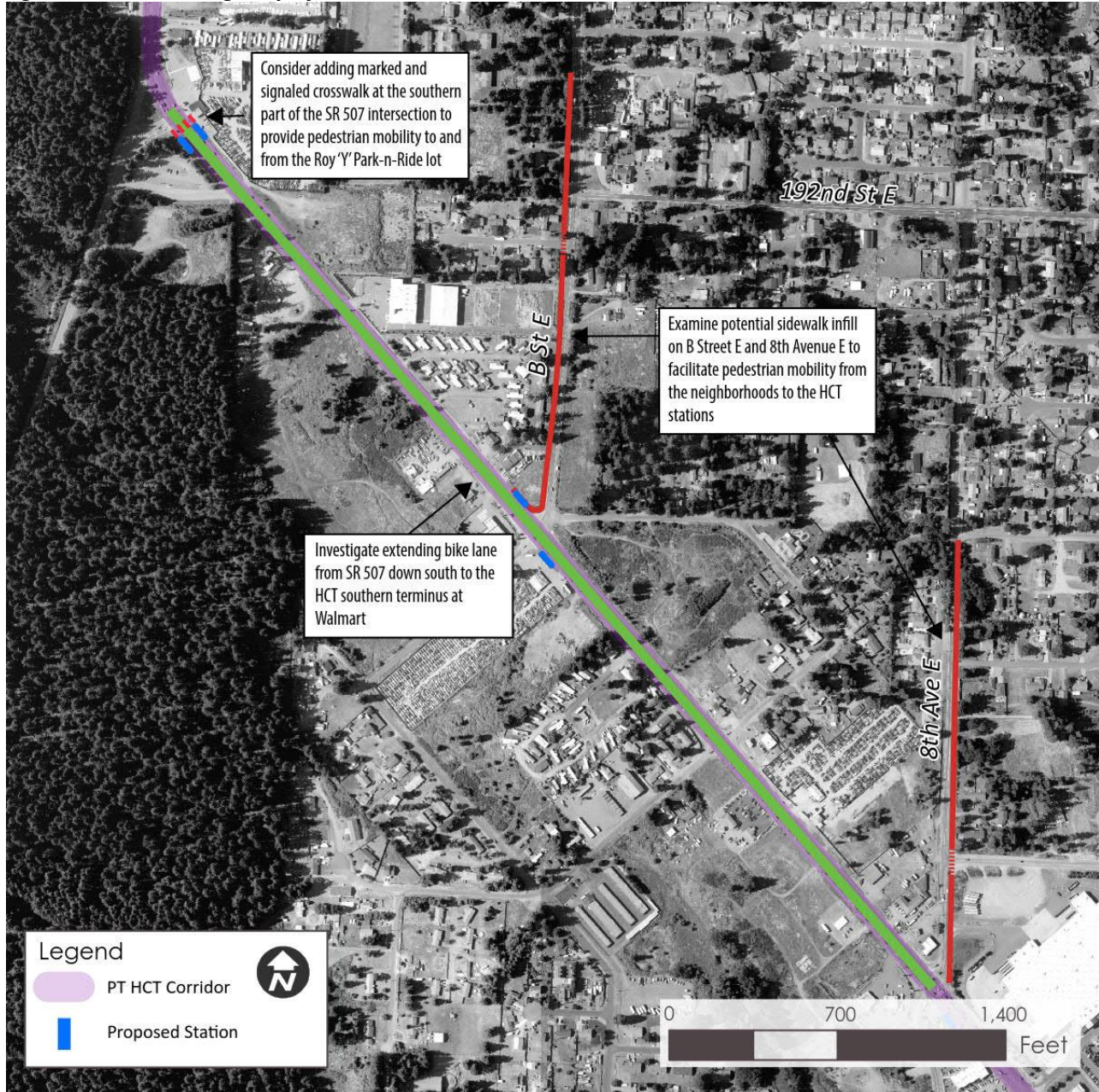


Table 5-15. Pedestrian and Bicycle Access Improvement Summary Assessment – SR 507 to 8th Street

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Bicycle and pedestrian	Higher speeds and no sidewalks anywhere. Lack of safe crossings. Bike/pedestrians crashes present through corridor.	Add sidewalks along adjoining streets to connect neighborhoods to Pacific Avenue. Add safe crossing at Roy 'Y' Park N Ride. Extend striped bike lane to the Walmart Supercenter.	ROW constraints.	\$\$

6 CONCEPTS FOR BICYCLE ACCESS IMPROVEMENTS

Based on existing conditions for cyclists near the proposed BRT corridor, a list of potential projects was developed to improve the access to transit in the areas deemed as having the highest need. These concepts present potential solutions to increasing the total area served by BRT stations.

6.1 PACIFIC AVENUE/S 37TH INTERSECTION STREET CROSSING

As stated in the Pedestrian section, there were a high number of crashes from 2012-2016 at the intersection of Pacific Avenue and S 37th Street even though a median crossing island was installed with a rapid flashing beacon in 2014. However, the flashing beacon is only on the north side of the intersection. S 37th Avenue is one of Tacoma’s designated bicycle boulevards; a further enhanced crossing may be beneficial. Enhancement could include a pedestrian-only signal or a pedestrian-hybrid beacon⁴, including actuation buttons for pedestrians and cyclists, which would allow users to cross more comfortably. The assessment summary for these improvements is documented in Table 6-1.

Table 6-1. Pedestrian and Bicycle Access Improvement Summary Assessment – 37th Street

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Bicycle/pedestrian	High amount of bike/pedestrian crashes.	Enhance current rapid flashing beacon crossing.	New median island already installed (2014).	\$

6.2 S 56TH STREET – A STREET TO D STREET

The proposed BRT Station at Pacific Avenue and 56th Street is along the S 56th Street City of Tacoma designated bicycle route. Between 2012 and 2016 three bicycle crashes were reported at this location. A relatively high number of bicycle crashes was reported (2012-2016) at this location. This may be due to the high speeds along both Pacific Avenue and S 56th Street and a lack of bicycle facilities. Along S 56th Street from B Street through the Pacific Avenue intersection and continuing westward there appears to be ample right-of-way (ROW) that would allow for a buffered or protected bike lane. However, from A Street to B Street on the east side the roadway width decreases which would make that connection more challenging. The assessment summary for these improvements is documented in Table 6-2.

⁴ A Pedestrian Hybrid Beacon (PHB), also known as a HAWK beacon (High-Intensity Activated crossWalk beacon), is a traffic control device used to stop road traffic and allow pedestrians to cross safely.

Table 6-2. Pedestrian and Bicycle Access Improvement Summary Assessment – 56th Street

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Bicycle and pedestrian	High speeds and high amount of bike/pedestrian crashes.	Striped or buffered bike lane along S 56 th Street. Safe crossing at Pacific Avenue/S 56 th Street intersection.	Narrow ROW east of A Street.	\$

6.3 S 82ND AVENUE – A STREET TO S D STREET

Pacific Avenue from S 80th Street to S 82nd Street is an official City of Tacoma bicycle route; however, there is no bicycle facility on this section of Pacific Avenue. S 82nd Street also does not have any bicycle facilities. It may be advisable for the City of Tacoma to remove the bicycle route designation from Pacific Avenue altogether and to implement traffic calming amenities along the S 82nd Avenue corridor from A Street to D Street and back up to S 80th Street. This would direct bicycles off a Pacific Avenue and encourage them to traverse the network via calmer residential streets. Crossing Pacific Avenue at S 82nd Street could entail installing a pedestrian hybrid beacon; a rapid flashing traffic control device to alert drivers to bicycle crossing. The assessment summary for these improvements is documented in Table 6-3.

Table 6-3. Pedestrian and Bicycle Access Improvement Summary Assessment – 82nd Street

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Bicycle and pedestrian	Lack of sidewalks. Official bike route along Pacific Avenue.	Change bike route slightly. Add traffic calming along S 82 nd Avenue. Add safe crossing at S 82 nd Avenue.	Pacific Avenue is not very amenable to bicycle lanes in this area.	\$\$

6.4 PACIFIC AVENUE/176TH STREET S INTERSECTION

Pacific Avenue S and 176th Street S can be a difficult intersection for both bicyclists and pedestrians. It is a higher volume arterial that connects to the Cross-Base Highway.

For bicyclists traveling southbound in the marked bicycle lane, this intersection poses a unique challenge given the existence of the two slip lanes exiting SR 704. Currently a cyclist would cross the 176th Street S intersection and then wait again to safely cross two high volume lanes of traffic to get over to the right. Given that the current slip lanes are already signalized, it may be advisable to add a bicycle signal letting cyclists know when it is safe for them to cross (i.e., when cars in the slip lane have a red light). The assessment summary for these improvements is documented in Table 6-4.

Table 6-4. Pedestrian and Bicycle Access Improvement Summary Assessment – 176th Street

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Bicycle and pedestrian	Lack of sidewalk and crossing on southern end of the intersection. Slip lane could pose comfortability issues. Lack of appropriate bicycle connection through intersection.	Provide marked crossing from slip lane to southeast corner. Tighten corner radii on NW, NE, and SE corners. Southbound bicycle lane improvements.	Signal timing issues for cyclists and adding the crosswalk.	\$\$

7 CONNECTOR SERVICES

7.1 PUYALLUP AVENUE/PORTLAND AVENUE E – CONNECTOR SHUTTLE OR BUS SERVICE

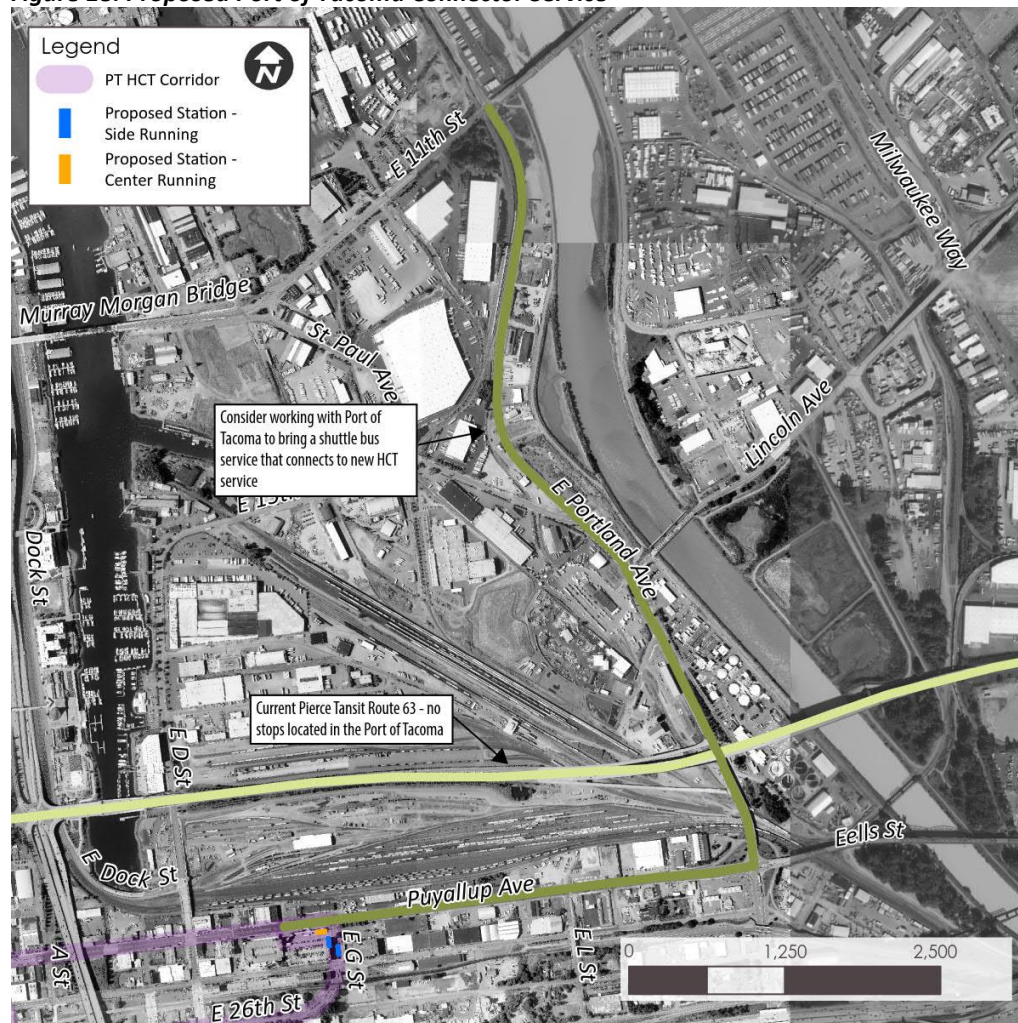
Currently, there is only one bus route that runs from downtown Tacoma into the Port of Tacoma, which employs 29,000 people over 2,400 acres⁵. This gives Pierce Transit and the Port of Tacoma the opportunity to add an additional bus or connector service into the Port connecting to the proposed BRT service and the Tacoma Dome Station by way of Puyallup Avenue and Portland Avenue E and into the Port of Tacoma (Figure 18). Such a plan would likely require a partnership with the port. As a shuttle service, it would be logistically challenging as determining where to drop off passengers given the port’s relative sprawl. The assessment summary for these improvements is documented in Table 7-1. However, Pierce Transit has attempted previous fixed routes in the past to serve this purpose with marginal success because the spread-out nature of the jobs as well as the varying shifts make it challenging to serve. Currently no additional routes are shown or proposed in the Pierce Transit Long-Range Plan. Therefore, it is recommended that this strategy not be implemented in the near-term, but be revisited when Sound Transit’s Central Link service reaches the Tacoma Dome Station.

Table 7-1. Bus Access Improvement Assessment – Connecting Port of Tacoma to BRT/Tacoma Dome Station

Access Mode	Problem	Potential Solution	Implementation Challenge	Cost Estimate
Connector Service	Large employee base and only a single bus line.	Connector service or additional bus service connecting the port to Tacoma Dome Station.	Port is relatively sprawled out. Would require partnership with port (i.e., through a contracted service agreement). Previous attempts have not proven cost-effective. Suggest deferring and reconsidering later once the Tacoma Dome Link Extension is in place.	Unknown

⁵ According to the Port of Tacoma (<https://www.portoftacoma.com/about>)
September 27, 2018

Figure 18: Proposed Port of Tacoma Connector Service



8 RIDESHARING AND AUTOMOBILE ACCESS

8.1 RIDESHARING PARTNERSHIP WITH LYFT

In May 2018, Pierce Transit announced its partnership with Lyft ridesharing service to provide free first-last mile rides to/from select Pierce Transit bus routes. The proposed BRT route would be an ideal candidate for such a program for multiple reasons, including: a) the existing route’s high ridership, b) the deficiencies in pedestrian and bicycle infrastructure in parts of the corridor, and c) the low-density car-dependent characteristics of land use in the southern half of the corridor. Ridesharing can improve mobility and access to transit for many people, including those with accessibility concerns.

To optimize the benefits of Lyft service, the Pierce Transit BRT will need to plan for ridesharing pick up and drop off locations. Opportunities for Lyft locations along the corridor include locations with proximity to bus stations with high ridership. These Lyft pickup locations should be clearly designated for ease of use of transit customers as well as Lyft drivers who can avoid interrupting traffic operations with illegal parking maneuvers impeding traffic operations.

8.2 SPANAWAY PARK AND RIDE

Additional parking, particularly in low-density areas such as the Spanaway Walmart could potentially improve access to transit in locations where walking and cycling are less viable options. In the case of the Walmart parking lot, there is currently excess parking capacity near the location of the proposed BRT station. In fact, Pierce Transit sees a unique opportunity for a mixed-use building with ground floor retail and inclusionary or below market housing within, creating a true 24/7/365 activity center in a part of unincorporated Pierce County that is being rezoned for this type of higher density infill development. The FTA recommends an “independent utility project,” meaning that it would be planned, designed, and constructed regardless of the mode selected or Locally Preferred Alternative (LPA) from the HCT study that is expected to be determined in late 2018. However, the demand for parking may not be initially present. Therefore, the agency is looking at a much smaller scale Bus Turnaround Facility and Operators’ Comfort Station and lounge either adjacent to or very near the last station in the BRT line. This lower cost, at-grade option would offer a 250-stall parking lot initially. The proposed project, which is in the initial planning stage, also has independent utility as it could still be utilized by the current Route 1, even if the “No Build” option were selected ultimately.

9 RECOMMENDATIONS

In addition to the package of enhancements that the Pacific Avenue/SR 7 BRT service would bring to transit operations and ridership in the area, further improvements to the built environment near proposed BRT stations could improve the appeal and ridership of the project. The recommendations in this document are potential improvements that Pierce Transit, or its partner agencies and jurisdictions, may further assess to assist riders in accessing the new BRT line. Additionally, the decision on the lane configurations of the Locally Preferred Alternative will affect how some of these improvements fare in terms of costs and benefits. For example, median transit lanes would likely require fewer crossing improvements as each station would serve as its own median island with redesigned crosswalks to stations.