

Appendix P:
Public Services and Utilities
Discipline Report

Point Defiance Bypass Project



Public Services and Utilities Discipline Report

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Summary

Affected Environment

The Point Defiance Bypass Project (the Project) crosses through the cities of Tacoma, Lakewood, and DuPont. It also crosses military reservation land for Joint Base Lewis McChord (JBLM) and is adjacent to Camp Murray. There are 26 public and private schools within the study area from the three school districts: Tacoma, Clover Park, and Steilacoom Historical. All three school districts have schools in the study area that require busing across the study area. There are at least five medical facilities, two hospitals (Saint Clare Hospital and Madigan Army Medical Center), 11 recreational facilities, and two facilities for disadvantaged people in the study area. Fifty-two religious facilities were identified as were four cemeteries. Pierce Transit and Sound Transit provide public transportation services.

Police services are provided by the City of Tacoma, City of Lakewood, and City of DuPont. The Puyallup Tribe police provide police services for the tribal properties. Fire services are provided by City of Tacoma, West Pierce Fire and Rescue, and City of DuPont. JBLM provides police and fire services on military installations only.

There is a mix of private and public service providers for utilities. Utilities include water, wastewater, stormwater, solid waste, telephone, cable, internet, electricity, and gas.

Potential Effects

Direct Project effects are primarily related to construction, and are minor and temporary in nature. No indirect or cumulative effects were identified for the Project.

Construction Effects

Because the route is located in a separate right-of-way from general traffic except at intersections, most construction delays would occur during intersection construction with little to no effect during track upgrades outside of intersections with roadways. Delays for emergency vehicles and school and public buses would be similar to typical construction-related traffic. Access to public facilities located within the active construction

zone may be affected by either lane closures or increased traffic congestion. This would result in increased travel times to some facilities. These effects would be temporary and of short duration.

Sound Transit has resolved the conflicts with utilities along the route from Bridgeport Way Southwest north to Freighthouse Square in Tacoma as part of their *Sounder* Track and Signal Improvement Projects. FRA, WSDOT, and Sound Transit have identified potential utility conflicts and relocation needs from the Clover Creek Drive intersection to the southern terminus of the Project. As part of construction south of but not including Bridgeport Way Southwest, utilities may need to be relocated, deepened and/or hardened within the railroad right-of-way. The specific effects would be identified during final design.

Similar to construction delays described above, construction would be required to move the existing Tacoma Amtrak Station to the proposed Tacoma Dome Station at Freighthouse Square in Tacoma. Sound Transit uses Freighthouse Square as a hub for its *Sounder*, Tacoma Link, and bus services. Construction could affect traffic and access to local services as well as local utilities.

Operational Effects

Operational effects would be similar for all the public service sectors including schools, emergency services, access to medical centers and government offices, and transit. The most common effect is traffic delays due to the seven daily round trips operated by Amtrak (total of 14 trains; 12 Cascades trains and two Coast Starlight trains). Traffic delays are anticipated to be minor as the intersections are closed for approximately three minutes and intersections typically clear within one to two cycles of the traffic signal. For more detail on the delays and queues at the at-grade crossings, please refer to the *Point Defiance Bypass Transportation Discipline Report*.¹ Train or track malfunctions could cause an unanticipated intersection closure but these are not common, typically of short duration, and detours would be available.

No permanent effects are anticipated for utilities. Utility owners may need to access their buried or aerial for maintenance and upgrades but this is unlikely to affect track operations or the community.

Relocation of the Tacoma Amtrak station to the Tacoma Dome at Freighthouse Square would have minor permanent effects to public services or utilities related to the potential for increased traffic and parking needs. However, these needs would likely not be measurable when compared with the other transit needs for Sound Transit.

¹ WSDOT 2011a

Proposed Minimization Measures

Minor effects were identified for the Project construction and operation. Minor, short-term construction effects can be minimized with the following measures:

- Coordinate and communicate with public service providers including school districts, emergency service organizations, and agencies such as Sound Transit to ensure that they are fully informed of construction progress and identify ways to minimize delays.
- Coordinate with utility owners to determine conflicts and determine a suitable resolution to avoid or minimize disruption. This will include coordination with the local fire department if there could be effects to fire suppression water and/or pressure.
- Post construction schedules near affected crossings and provide the information to local newspapers for publication or to the local jurisdictions for distribution by mail to residents and businesses in the area. Project construction updates can also be posted on FRA or WSDOT's Project website.

Effects related to operation of the Project involve potential traffic delays, safety, and access issues at intersections. The *Transportation Discipline Report*² presents minimization for safety concerns and travel time delays.

² WSDOT 2011a

Chapter 1 – Project Description

Introduction

Under the High-Speed Intercity Passenger Rail (HSIPR) Program and pursuant to a programmatic Tier I Environmental Assessment (EA) the Federal Railroad Administration (FRA) has approved an application from the Washington State Department of Transportation (WSDOT) to improve the Pacific Northwest Rail Corridor (PNWRC), a federally designated high-speed rail corridor. One project included in the PNWRC application is the Point Defiance Bypass Project (the Project), which would respond to deficiencies in the existing rail operations around Point Defiance. This Discipline Report has been prepared in support of the project-specific EA for the Point Defiance Bypass project.

The Project is located in Pierce County along an existing approximately 20-mile rail corridor between Tacoma and Nisqually.³ The Project would provide for the re-routing of Amtrak passenger trains from the BNSF rail line that runs along the southern Puget Sound shoreline (Puget Sound route) to the Point Defiance Bypass route, an existing rail corridor that runs along the west side of I-5. The Project would consist of railroad track and support facility improvements, and relocation of the Tacoma Amtrak Station to Freighthouse Square in Tacoma.

Purpose and Need

As described above, the Point Defiance Bypass route is part of the larger PNWRC. Within Washington State, the vision for the PNWRC is to “...improve intercity passenger rail service by reducing travel times and achieving greater schedule reliability in order to accommodate growing intercity travel demand...”⁴.

The purpose of the Project is to provide more frequent and reliable high-speed intercity passenger rail service along the PNWRC between Tacoma and Nisqually. In conformity with the decisions under the Tier 1 Programmatic EA, the PNWRC Improvement Program has reduced the overall environmental effects of providing improved passenger rail service with the use of an existing transportation corridor and associated infrastructure, rather than creating a new corridor.

³ *The three owners of the project corridor are Sound Transit, Tacoma Rail, and BNSF.*

⁴ *WSDOT 2009*

The Project is needed to address the deficiencies in the existing rail alignment around Point Defiance. The existing alignment (Puget Sound route), shared by freight and passenger rail traffic, is near capacity and is therefore unable to accommodate additional high-speed intercity passenger rail service without substantial improvements. In addition, the existing alignment has physical and operational constraints that adversely affect both passenger train scheduling and reliability.

Improving intercity passenger rail service in the project area and meeting the Project needs would be accomplished by:

- **Enhanced Frequency:** Increasing Amtrak Cascades round-trips from four to six by 2017 to meet projected service demands.
- **Improved Reliability:** Reducing scheduling conflicts with freight trains that often result in delays, and by minimizing or avoiding operational delays (e.g., drawbridge openings) and weather-related delays (e.g., mudslides), and improving on-time performance from 68 percent to 88 percent.
- **Enhanced Efficiency:** Enhancing the efficient movement of people by decreasing trip times by 10 minutes, and reducing the amount of time passenger trains spend yielding to freight movements.
- **Improved Safety:** Constructing at-grade crossings with upgraded safety features, including wayside horns, median barriers, advance warning signals, and traffic signal improvements.

What alternatives are being considered for the Point Defiance Bypass Project?

FRA and WSDOT conducted an evaluation of three build alternatives: the Point Defiance Bypass Alternative, the Shoreline Alternative, and the Greenfield Alternative. Two of the alternatives (the Shoreline Alternative, and the Greenfield Alternative) were eliminated from further study. Although both alternatives could meet the Project's purpose and need, they were determined to be impracticable and unfeasible due to technical constraints, high construction costs, and significant environmental effects. Grade separations were also evaluated for further consideration. FRA and WSDOT's preliminary analysis revealed that current and projected future traffic volumes do not warrant the construction of new grade-separated crossings.

What's happening in the bypass corridor today?

The rail line between TR Junction and East "D" Street in Tacoma hosts both freight and commuter trains, including freight operators Tacoma Rail and BNSF, and Sound Transit's *Sounder* commuter rail service. Freight

train traffic between TR Junction and East “D” Street averages under two trains per day, while Sound Transit currently operates 18 trains per day between Freighthouse Square and Seattle each weekday, and also offers occasional special event trains, usually on weekends, to serve sporting and other events in Seattle. *Sounder* service to Lakewood begins in late 2012.

What would happen if the Project were not built?

If the Project were not built (the No Build Alternative), Amtrak’s Cascades and Coast Starlight passenger train service would continue to use the existing Puget Sound route. The No Build Alternative includes only the minor maintenance and repair activities necessary to keep the existing Puget Sound route operational. With the No Build Alternative, it would be expected that as freight traffic increases, congestion would adversely affect Amtrak service reliability, and the travel time for Amtrak trains between Seattle and Portland would increase.

Along the Point Defiance Bypass route, the Tacoma Rail and BNSF freight services would continue. The at-grade crossings at Clover Creek Drive Southwest, North Thorne Lane Southwest, Berkeley Street Southwest, 41st Division Drive, and Barksdale Avenue Southwest would not be upgraded.

Sound Transit’s *Sounder* commuter passenger trains will become operational in late 2012 between the Tacoma Dome Station at Freighthouse Square in Tacoma and Sound Transit’s Lakewood Station (on the Point Defiance Bypass route) with as many as 18 *Sounder* trains per day.

What are the proposed improvements and related activities of the Point Defiance Bypass Project?

The Project consists of railroad track and support facility improvements, and the relocation of Amtrak’s Tacoma Station. Exhibit 1 shows the components of the Build Alternative. The following details specific components of the Build Alternative.

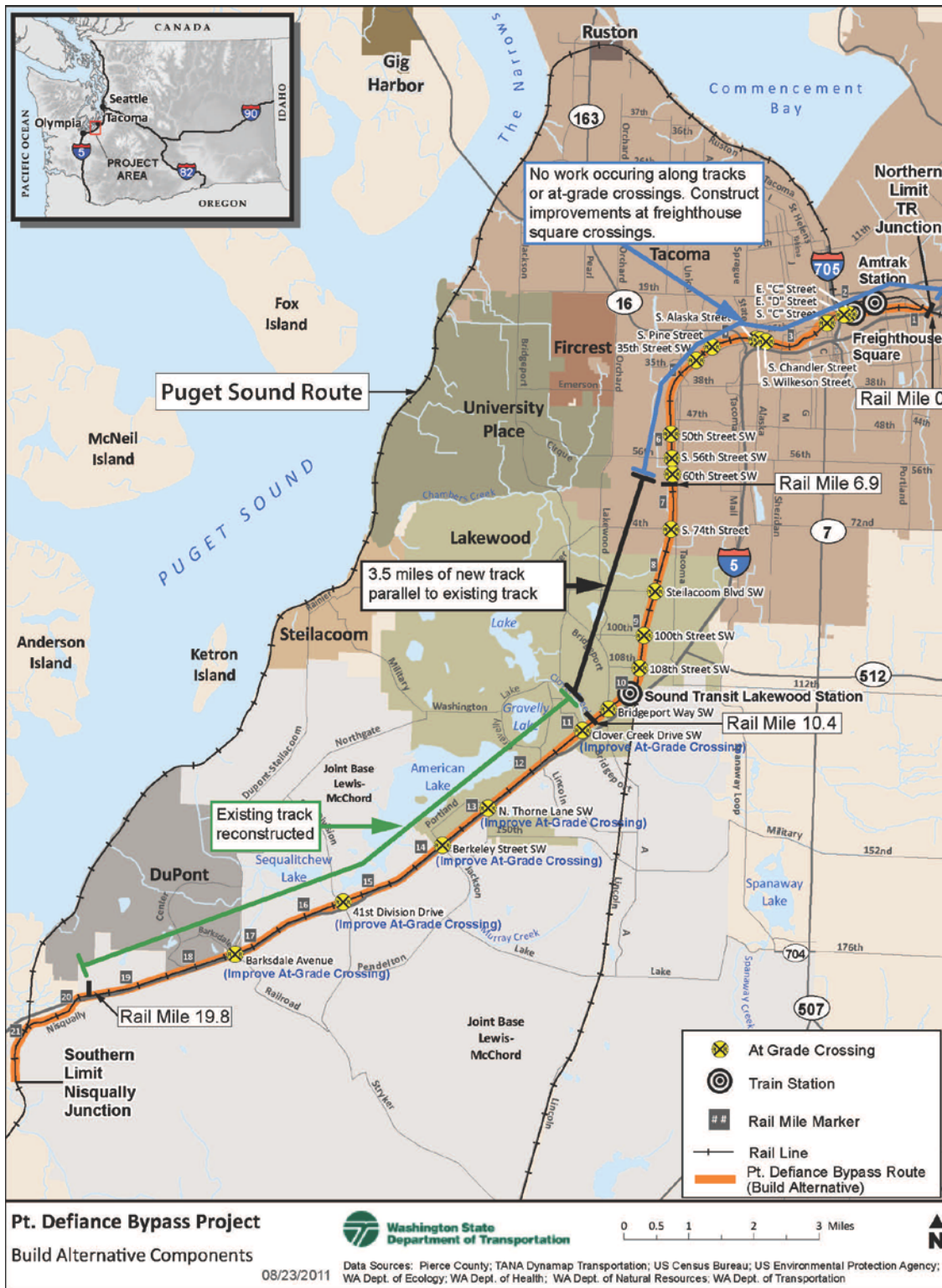
- **Construct New Track Adjacent to the Existing Main Line** – A new 3.5-mile track adjacent to the existing main line would be constructed from South 66th Street (Rail MP 6.9) in Tacoma to between Bridgeport Way SW (Rail MP 10.4) and Clover Creek Drive SW (Rail MP 10.9) in Lakewood.
- **Reconstruct and Rehabilitate the Existing Main Line** – Starting just southwest of Bridgeport Way Southwest (Rail MP 10.4) in Lakewood, the existing track would be reconstructed to a location southeast of the I-5/Mounts Road Southwest interchange (Rail MP 19.8) at Nisqually Junction.

- **Improvements at at-Grade Crossings** – Several grade crossings would be improved with wayside horns, gates, traffic signals and signage, sidewalks, median separators, and warning devices. These crossings include Clover Creek Drive Southwest, North Thorne Lane Southwest, Berkeley Street Southwest, 41st Division Drive and Barksdale Avenue.
- **Tacoma Amtrak Station Relocation** – The existing Tacoma Amtrak Station would be relocated from its Puyallup Avenue location to the Tacoma Dome Station at Freighthouse Square, at 430 E. 25th Street in Tacoma.

What are the proposed operational changes that would result from the Point Defiance Bypass Project?

Amtrak’s existing Cascades and Coast Starlight passenger train service would be rerouted from the Puget Sound route along the Puget Sound shoreline to the Point Defiance Bypass route. The Project would also provide for additional Amtrak Cascades service by increasing the number of round trips provided from 4 to 6, or a total of 12 Cascades service train trips. Amtrak Coast Starlight would also travel on the Point Defiance Bypass route for a total of two Coast Starlight service train trips. The speed of these passenger trains would be up to 79 mph.

Exhibit 1. Build Alternative Components



Chapter 2 – Methodology

What is included in the report?

This report covers Public Services and Utilities for the Project. Public services include police, fire, schools, churches, recreational facilities, and medical facilities. Utilities can be provided by public or private entities and include water, sewer, storm drainage, electricity, natural gas, and telecommunications.

How was the study area defined?

The Project is located on an existing rail corridor starting at the TR Junction located near the Puyallup River and ending just north of the Nisqually River. The Project is located within Pierce County and traverses through cities of Tacoma, Lakewood, and DuPont, and JBLM. The study area for this discipline report is ½ mile on either side of the Project route.

How was the information collected?

Multiple sources were used to collect information on the location and routing of public service providers and utilities. These sources include:

- Publically available data and mapping. All mapped information was cross checked with at least one other source.
 - Pierce County mapping⁵
 - Lakewood and Tacoma Fire District websites⁶
 - For cemeteries, searching websites such as <http://www.interment.net/> and USGenWeb Tombstones.org^{7, 8}
 - Google Earth⁹
- 2010 Census data were collected from www.factfinder.census.gov.
- Data, including geographic information system (GIS) when available, from local jurisdictions through personal communications and their websites.

⁵ Accessed June 15, 2011

⁶ www.cityoftacoma.org and www.westpierce.org Accessed June 15, 2011

⁷ Accessed June 2011.

⁸ <http://www.usgwtombstones.org/washington/pierce.htm>

⁹ Accessed June 2011

How were effects to public services and utilities from the Project evaluated?

The methodology for evaluating effects on public services and utilities followed WSDOT's *Environmental Procedures Manual (EPM)*. This included collecting publically available data, verifying and mapping that data and analyzing the overlap of public services and utilities with the Project.

Chapter 3 – Studies and Coordination

What regulations apply?

Public services and utilities are required subject areas of the National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA) as part of the potential effects on the human environment.

While not a regulation, WSDOT's *Environmental Procedures Manual* Chapter 458 and associated website information provides guidance on the content and analysis that should be contained in this document.

What studies and coordination were used in the public services and utilities analysis?

This report draws from and updates a 2007 technical memorandum for the corridor, which has been updated to include the extended project corridor and new information available. New information includes using the 2010 census data and an updated review of the local jurisdiction and utility websites for new information.

This report was prepared in coordination with other authors on the Point Defiance Bypass team, including those responsible for the transportation, land use, and socioeconomic analyses.

Chapter 4 – Affected Environment

What public services are found in the study area?

Public services and utilities include a wide variety of facilities as well as access to those facilities. Following is a description of the existing facilities identified within ½ mile of the Project corridor. Exhibit 2 presents the locations of these facilities.

Educational Facilities

The study area is served by three public school districts: Tacoma, Clover Park, and Steilacoom Historical school districts. Many of the students who attend these schools rely on bus transportation to and from school.

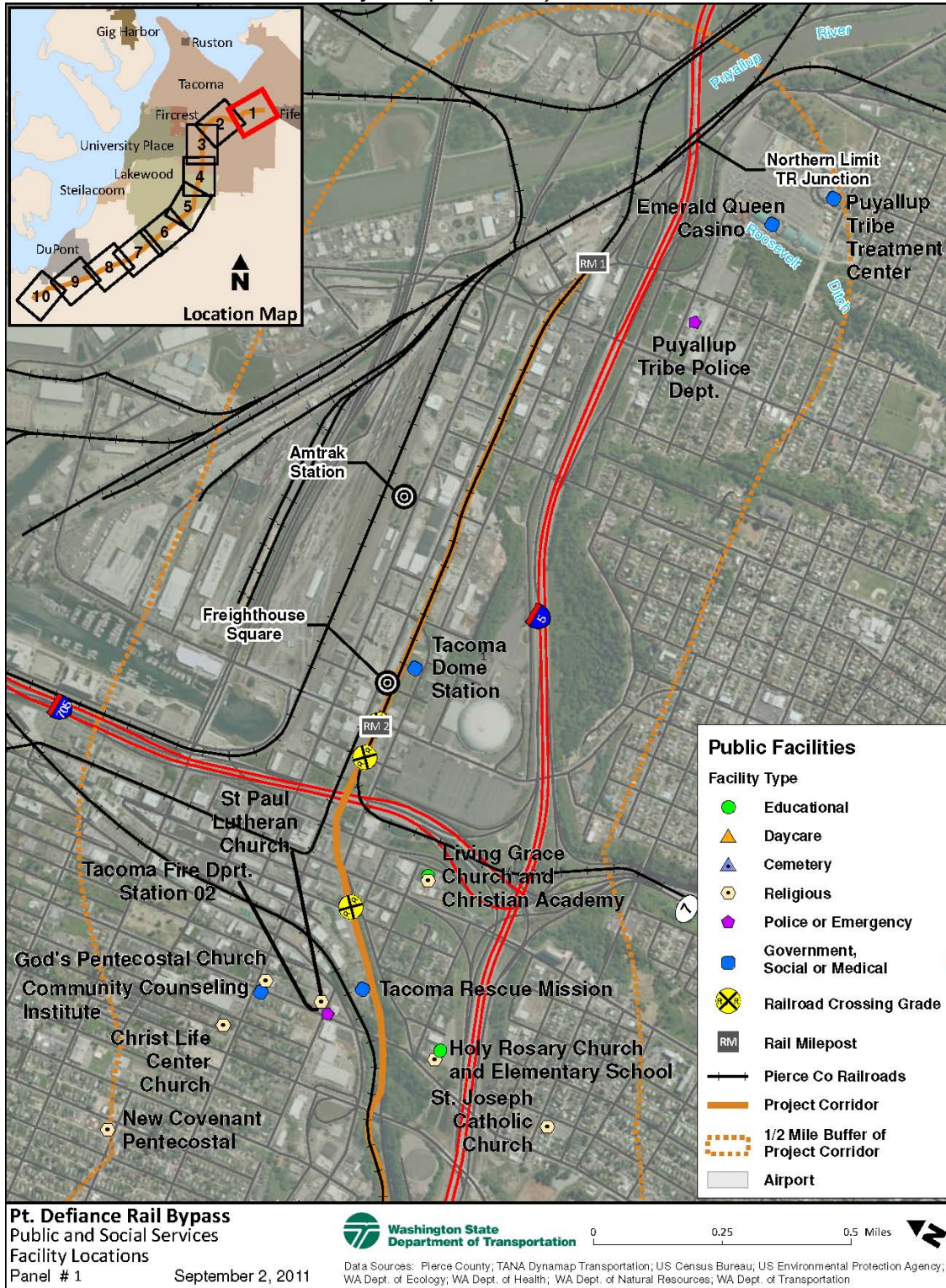
Tacoma Public Schools serve more than 28,000 children in kindergarten through grade 12 in 65 schools. Many of the students who attend Manitou Park Elementary School, Gray Middle School, and Mount Tahoma High School live east of the study area while the schools are located west of the study area; as a result, many students would either cross the project corridor on a bus or through personal vehicles.

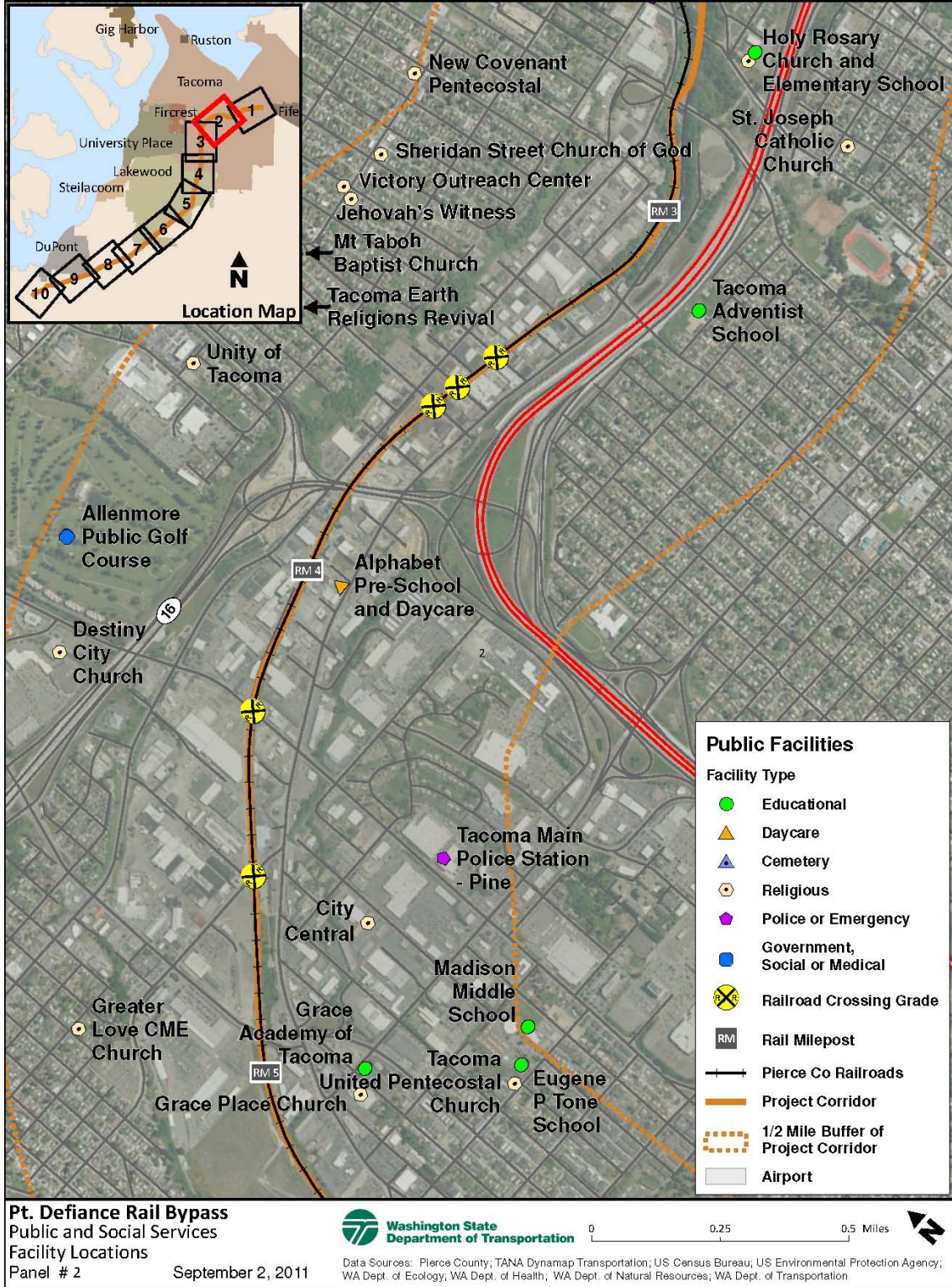
Clover Park School District serves nearly 12,000 students in kindergarten through grade 12 in 28 schools.¹⁰ The Oakwood Elementary School, Lakeview Hope Academy, Tyee Park Elementary School, Tillicum Elementary School, and Beachwood Elementary bus coverage requires many of the students to cross the study area daily. Mann, Woodbrook, and Lochburn middle schools also require busing across the project corridor as do Clover Park and Lakes high schools.¹¹

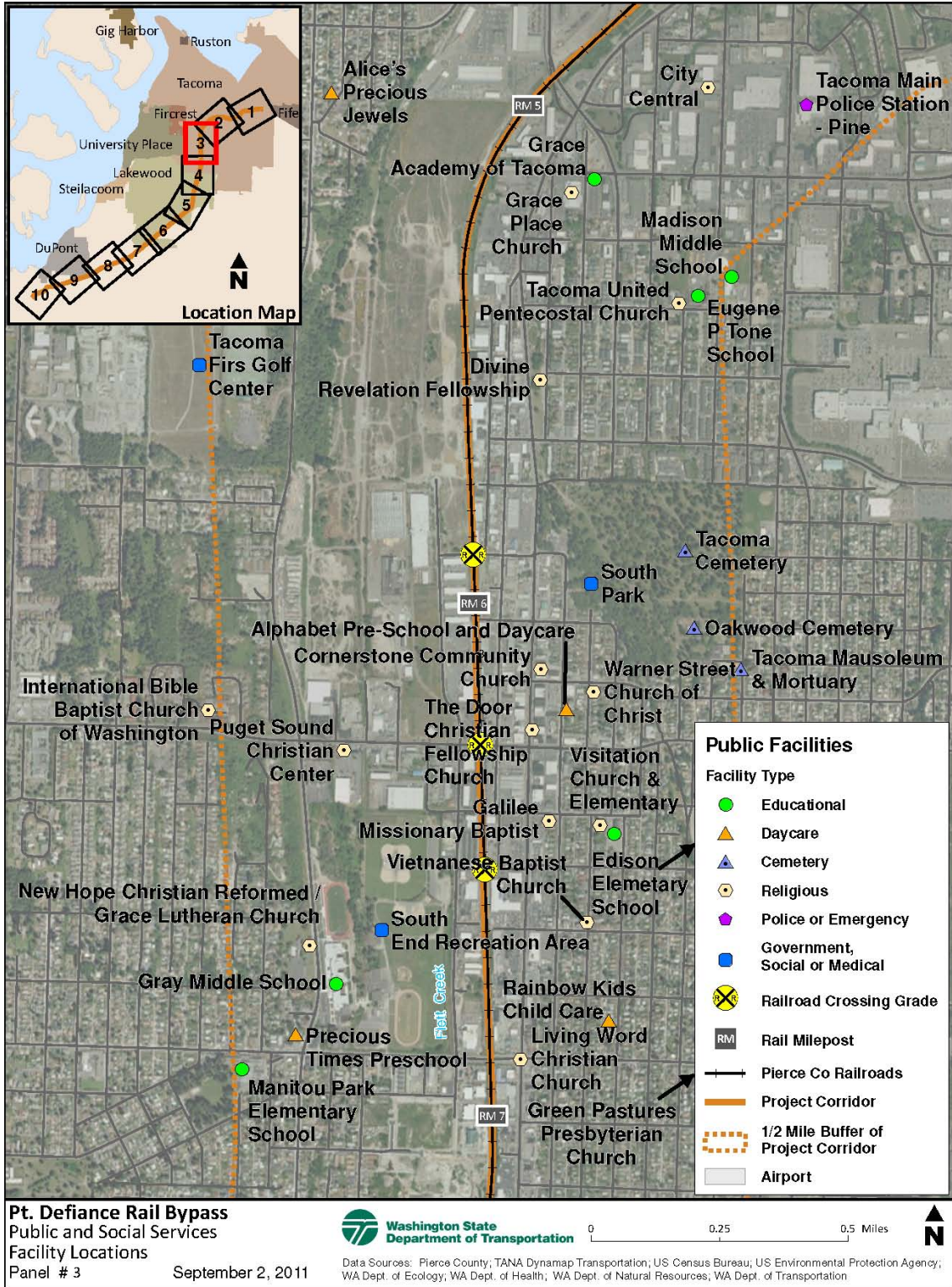
¹⁰ <http://www.cloverpark.k12.wa.us/Admin/AboutCPSD.aspx> Accessed June 21, 2011.

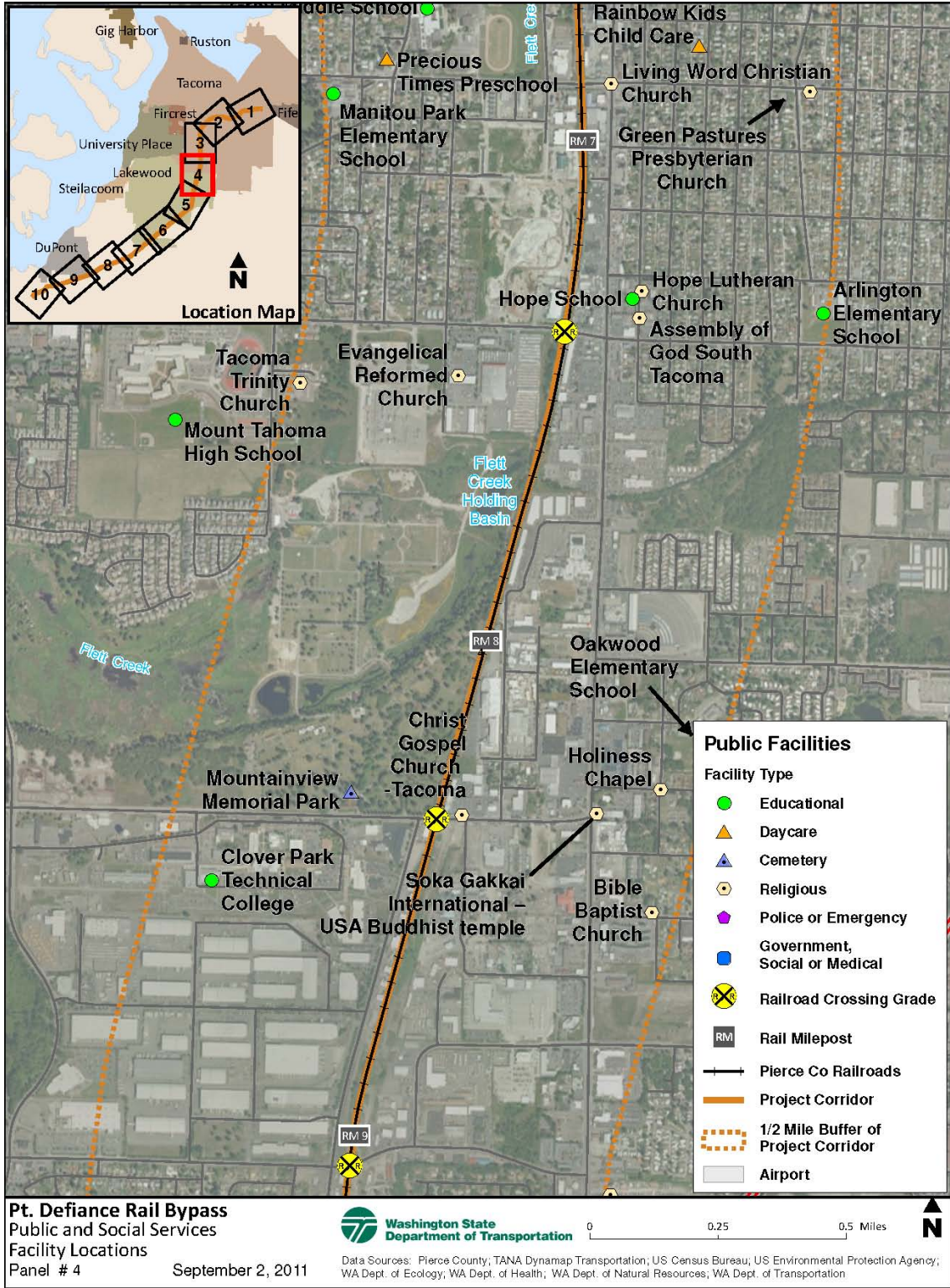
¹¹ <http://www.schoolsitenline.com/schoolsitelocator/?districtcode=49274> Accessed June 21, 2011.

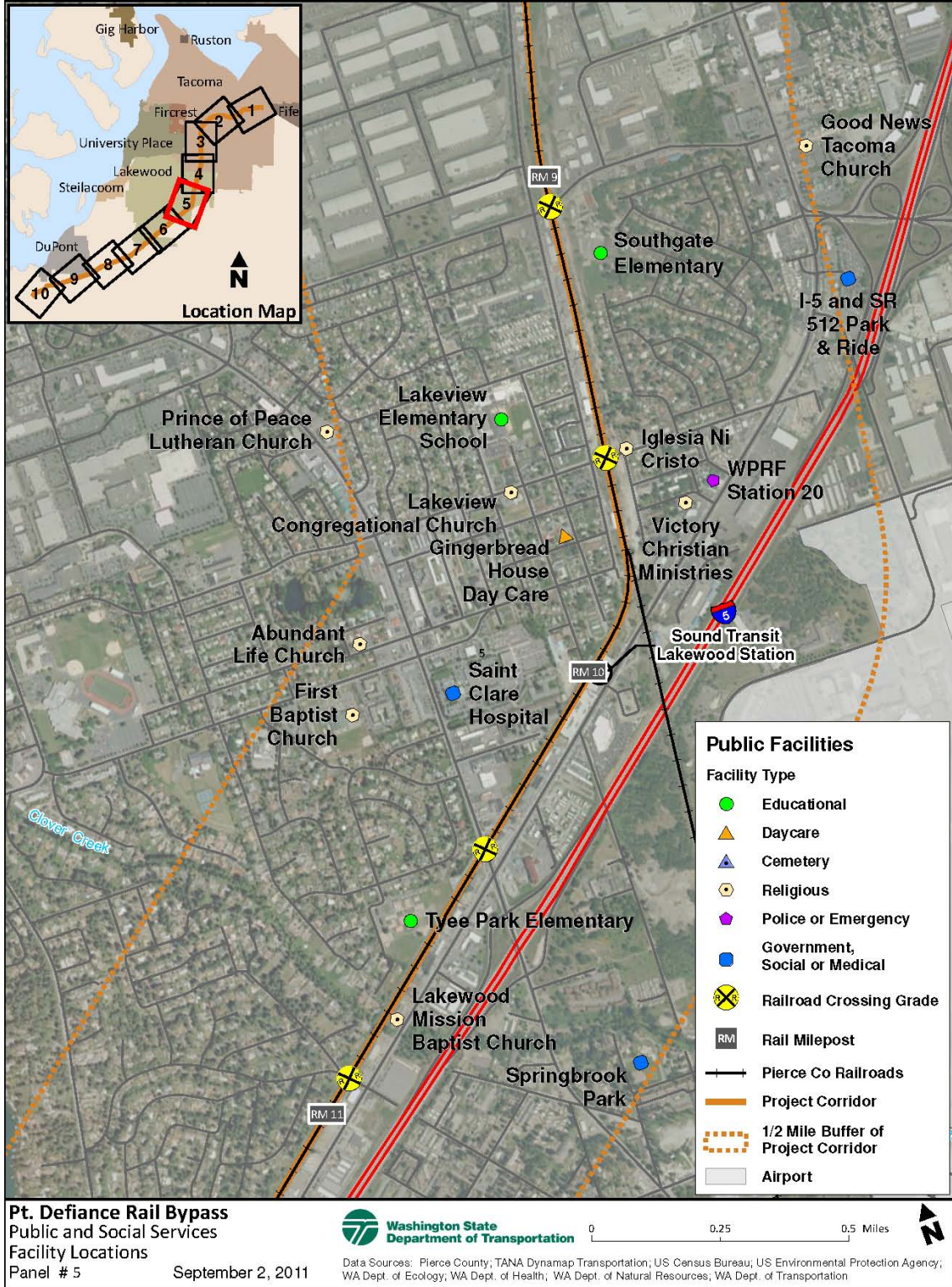
Exhibit 2. Public Facilities in the Study Area (Panels 1-10)

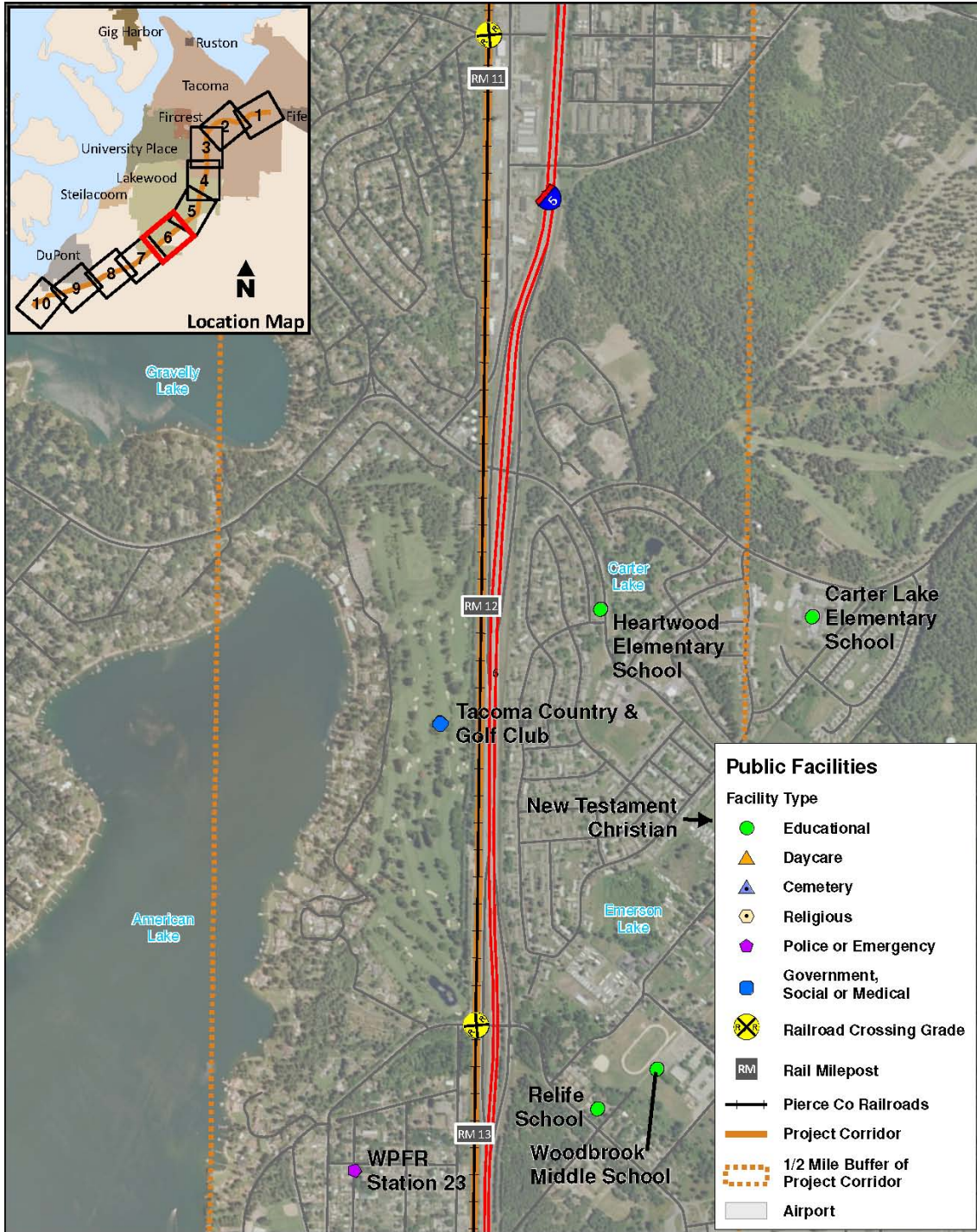






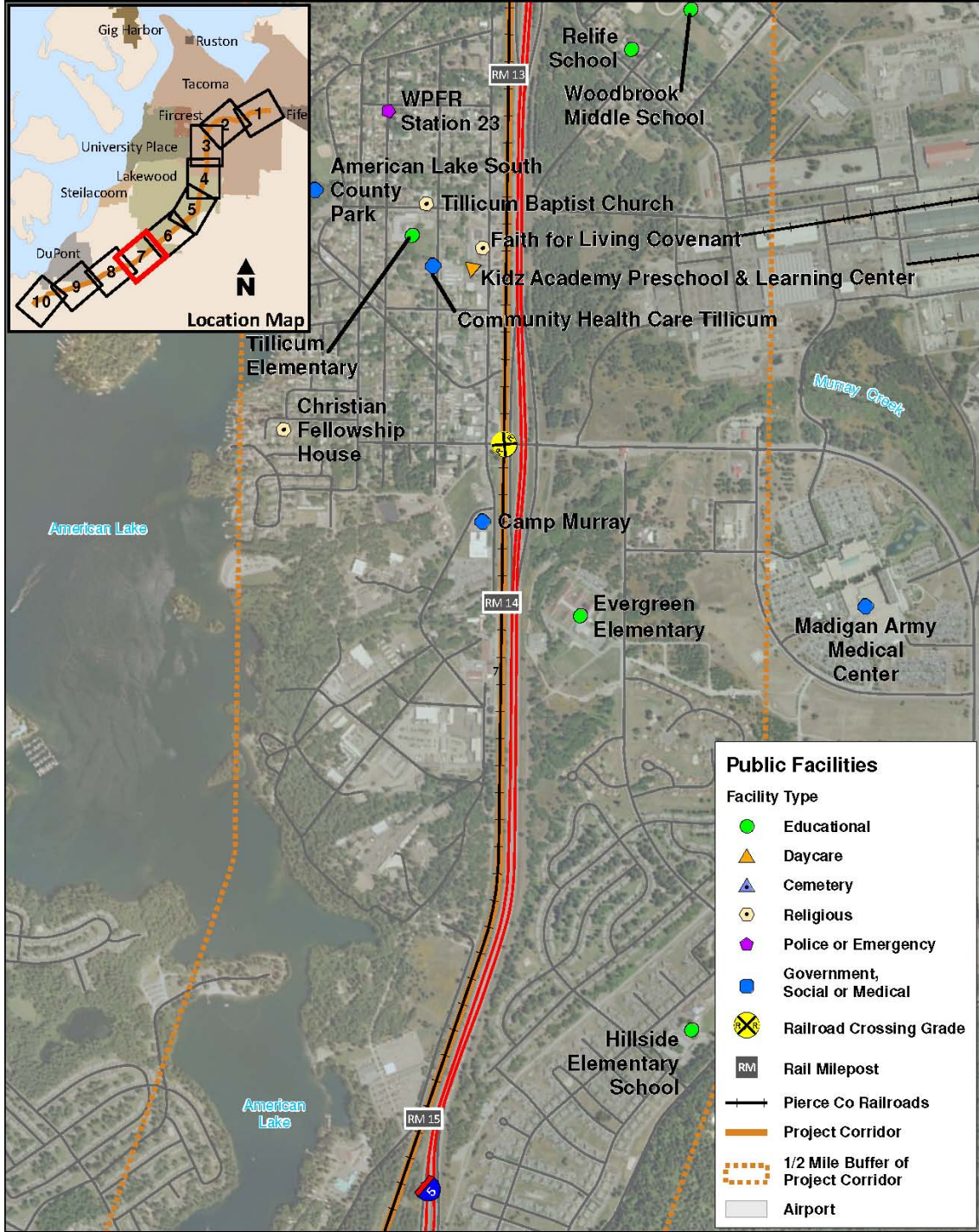






Pt. Defiance Rail Bypass
 Public and Social Services
 Facility Locations
 Panel # 6
 September 2, 2011

Washington State Department of Transportation
 0 0.25 0.5 Miles
 Data Sources: Pierce County; TANA Dynamap Transportation; US Census Bureau; US Environmental Protection Agency; WA Dept. of Ecology; WA Dept. of Health; WA Dept. of Natural Resources; WA Dept. of Transportation



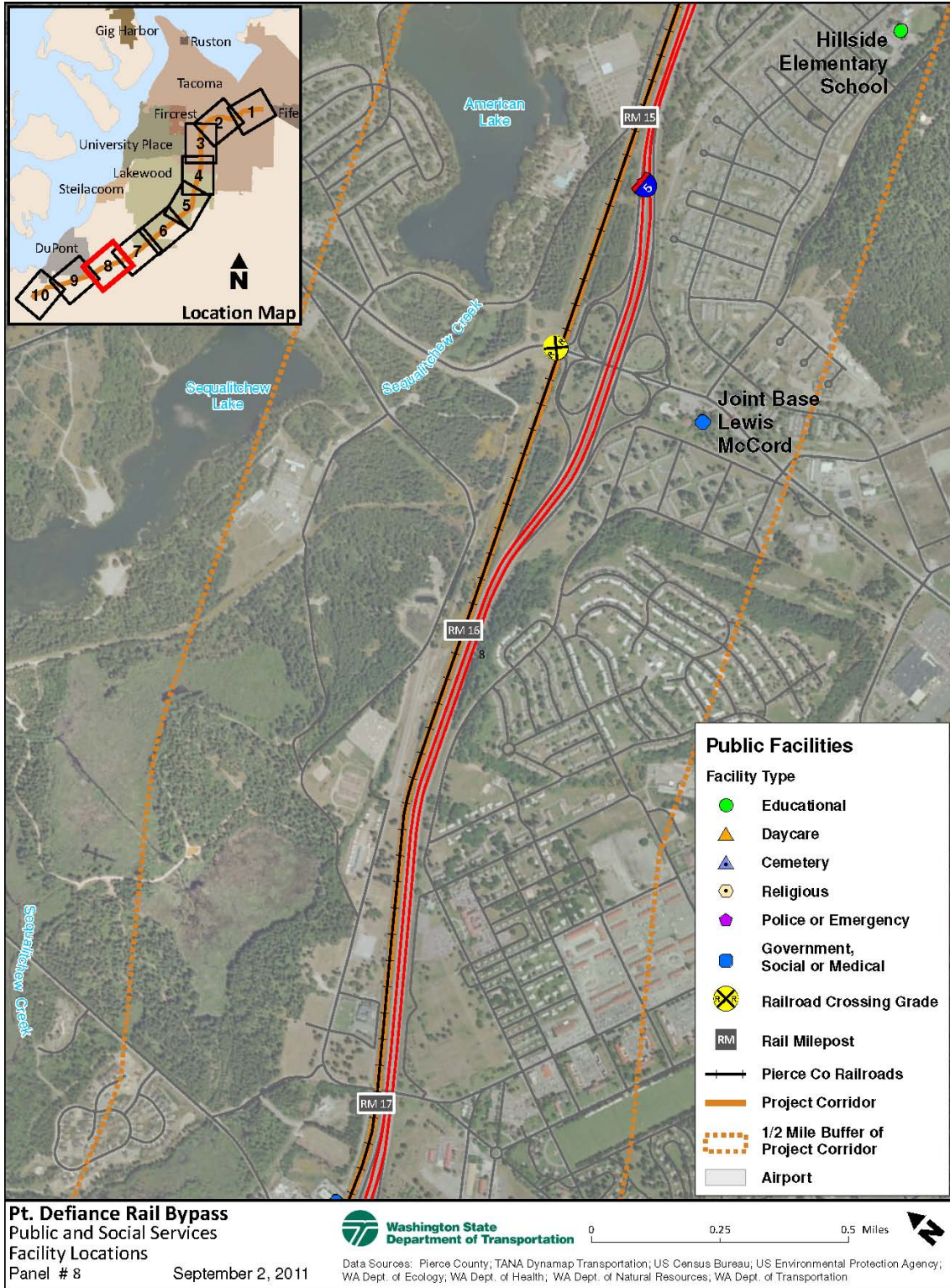
Pt. Defiance Rail Bypass
Public and Social Services
Facility Locations
 Panel # 7

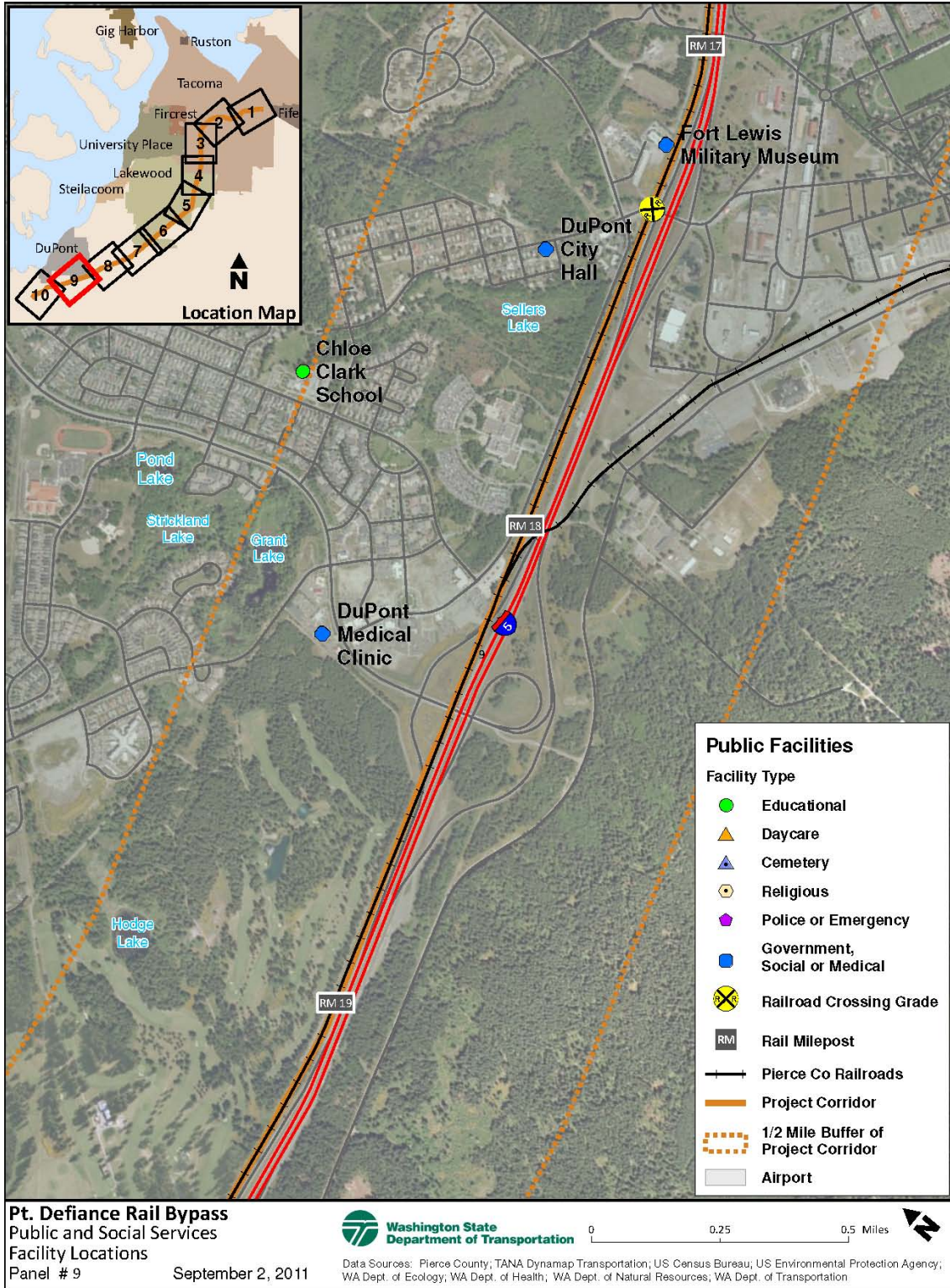
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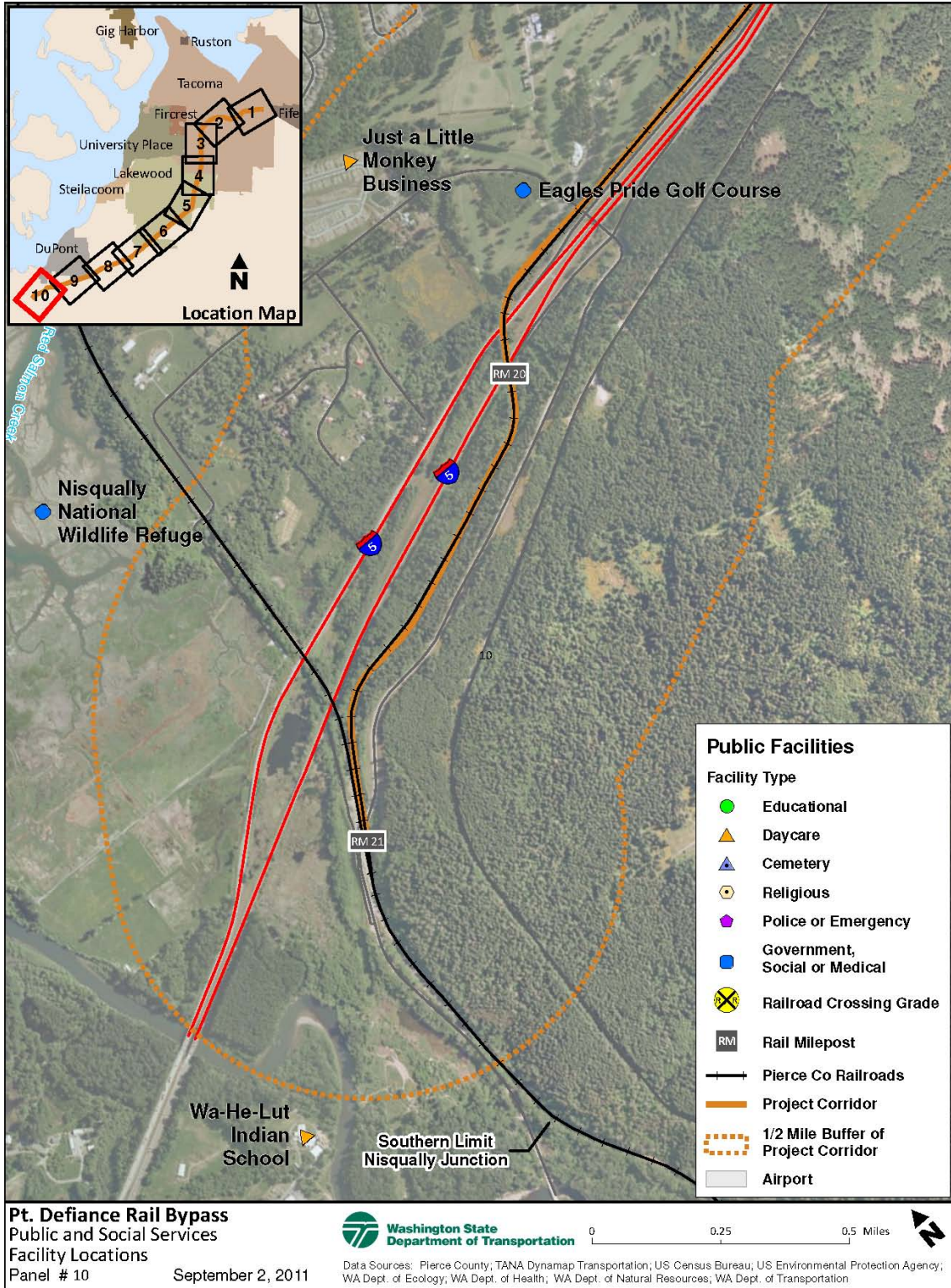


Data Sources: Pierce County; TANA Dynamap Transportation; US Census Bureau; US Environmental Protection Agency; WA Dept. of Ecology; WA Dept. of Health; WA Dept. of Natural Resources; WA Dept. of Transportation









Steilacoom Historical School District is the oldest organized school district in Pierce County and serves about 4,600 students in pre-kindergarten through 12th grade in eight facilities. 12 Students attending Pioneer Middle School may cross the project corridor while busing.¹³

There are also a number of church-based and private schools, and a college in the study area listed in Exhibit 3. Transportation is typically by personal vehicle, and the students attending these schools come from a wide area with an undetermined number crossing the project corridor.

Exhibit 3. Educational Facilities in the Study Area

Education Facility	Address	City
Holy Rosary Catholic Elementary School	504 South 30 th Street	Tacoma
Grace Christian Academy	106 South 28 th Street	Tacoma
Tacoma Adventist School	1125 South 34 th Street	Tacoma
Grace Academy of Tacoma	3801 South Puget Sound	Tacoma
Madison Middle School	3101 South 43 rd Street	Tacoma
Eugene P. Tone School	3110 South 43 rd Street	Tacoma
Edison Elementary School	5830 South Pine Street	Tacoma
Visitation Church Elementary	3306 South 58 th Street	Tacoma
Mount Tahoma High School	6229 South Tyler Street	Tacoma
Gray Middle School	6229 South Tyler Street	Tacoma
Manitou Park Elementary School	4330 South 66 th Street	Tacoma
Hope School	7212 South Puget Sound Avenue	Tacoma
Arlington Elementary School	3002 South 72 nd Avenue	Tacoma
Oakwood Elementary School	3230 85 th Street South	Lakewood
Clover Park Technical College	4500 Steilacoom Blvd Southwest	Lakewood
Southgate Elementary	10202 Earley Avenue Southwest	Lakewood
Lakeview Elementary School	10501 47 th Avenue Southwest	Lakewood
Tyee Park Elementary	11920 Seminole Rd Southwest	Lakewood
Heartwood Elementary School	4010 Woodbrook Drive Southwest	Tacoma
Carter Lake Elementary School		JBLM
Relife School	14721 Murray Rd Southwest	Lakewood
Woodbrook Middle School	14920 Spring Street Southwest	Lakewood
Tillicum Elementary	8514 Maple Street Southwest	Lakewood
Evergreen Elementary	9010 Blaine Street	JBLM
Hillside Elementary School	6399 Magnolia Blvd	JBLM
Chloe Clark School (K-4)	1700 Palisade Blvd	DuPont

Daycare and pre-school facilities identified in the study area are listed in Exhibit 4.

¹² http://www.steilacoom.k12.wa.us/do/asp/dist_info.asp Accessed June 21, 2011.

¹³ <http://www.steilacoom.k12.wa.us/do/asp/busstops.asp> Accessed June 21, 2011.

Exhibit 4. Pre-Schools and Day Care Facilities in the Study Area

Pre-school/Day Care	Address	City
Alphabet Pre-School and Daycare	2305 South Tacoma Way	Tacoma
Alice's Precious Jewels	3706 South Manitou Way	Tacoma
Alphabet Pre-School and Daycare	5419 South Puget Sound Avenue	Tacoma
Precious Times Preschool	6436 South Tyler Street	Tacoma
Rainbow Kids Child Care	6418 South Lawrence Street	Tacoma
Gingerbread House Day Care	10922 Kline Street Southwest	Tacoma
Kidz Academy Preschool & Learning Center	14924 Union Avenue Southwest	Lakewood
Just a Little Monkey Business	1150 Swan Loop	DuPont

Government, Social, and Medical Facilities

This section identifies a variety of facilities including government facilities, social organizations, recreational facilities and parks, hospitals, and museums listed in Exhibit 5.

Exhibit 5. Government, Social, and Medical Facilities in the Study Area

Facility	Address	City
Puyallup Tribe elder support and drug and alcohol treatment facility	2209 East 32 nd Street	Tacoma
Emerald Queen Casino	2024 East 29 th Street	Tacoma
Community Counseling Institute	2502 Tacoma Avenue South	Tacoma
Tacoma Rescue Mission	425 South Tacoma Way	Tacoma
Allenmore Public Golf Course	2125 South Cedar Street	Tacoma
Tacoma Firs Golf Center	4504 South Tyler Street	Tacoma
South Park	South Tacoma Way	Tacoma
South End Recreation Area	South 60 th Street and Adams Street	Tacoma
Saint Clare Hospital	11315 Bridgeport Way Southwest	Lakewood
Springbrook Park	127 th Street Southwest at Addison Street Southwest	Lakewood
Tacoma Country and Golf Club	13204 Country Club Drive Southwest	Lakewood
American Lake South County Park	Woodlawn Avenue Southwest	Lakewood
Community Health Care Tillicum	14916 Washington Avenue Southwest	Lakewood
JBLM		JBLM
Camp Murray	Militia Drive at Berkeley Street Southwest and Railroad Avenue	Tacoma
Madigan Army Medical Center	9040 Fitzsimmons Drive	JBLM
Ft. Lewis Military Museum	Accessed via Barksdale Avenue crossing	JBLM
DuPont City Hall is located on Barksdale Avenue	1700 Civic Drive	DuPont
DuPont Medical Clinic	1175 Center Drive, Suite 130	DuPont
Eagles Pride Golf Course		JBLM
Nisqually National Wildlife Refuge		Olympia

Police and Emergency Services

Four jurisdictions provide fire and police protection within the study area: City of Tacoma, City of Lakewood, City of DuPont, and JBLM. In addition, the Pierce County Sheriff and Washington State Patrol support police services in the study area. The Puyallup Tribe also provides police services for tribal properties and members with the station located at East 29th Street and East Portland Avenue in Tacoma.

WPFR Station 20 could have restricted access to the west at the at-grade crossing on 108th Street Southwest.

WPFR Station 23 could have restricted access to the Thorne Lane at-grade crossing to I-5.

Only three police and fire department buildings are located within the project corridor. However, police and emergency services utilize the entire project corridor to respond to medical, fire, traffic, and other emergencies. Access from and to I-5 is critical for responders.

City of Tacoma

The City of Tacoma provides 24-hour police protection from its Sector 1 and 3 precincts.¹⁴ Sector 1 is covered by the Central Substation located at 1524 Martin Luther King Way. Sector 1 has a core staff of one Commander and three Community Liaison Officers that is supported by the four Tacoma Police-Business Improvement Area officers and the Operations/Patrol contingent comprising one Assistant Chief, one Captain, six Sergeants, and 50 Patrol Officers. Sector 3 Substation is located at 1501 South 72nd Street. Sector 3 is staffed by one Commander, three Community Liaison Officers, eight Sergeants, and approximately 40 Patrol Officers.

Tacoma Fire has over 400 firefighters covering the city.¹⁵ There are 16 engine companies, five of which are staffed with Advanced Life Support paramedics. All other uniformed field personnel are trained Basic Life Support responders. The Tacoma Fire Department Station 02, located at 2701 Tacoma Avenue South, is the only facility within the study area. Access from the facility is not restricted by the Project.

City of Lakewood

The City of Lakewood provides law enforcement services within the city limits from its headquarters located at 5504 112th Street Southwest in Lakewood.¹⁶ Lakewood has one of the largest departments in the state

¹⁴ <http://www.cityoftacoma.org/Page.aspx?hid=351> Accessed June 21, 2011.

¹⁵ <http://www.cityoftacoma.org/Page.aspx?hid=8015> Accessed June 21, 2011.

¹⁶ http://police.cityoflakewood.us/index.php?option=com_content&view=article&id=14&Itemid=15

while also being a relatively new police force created in 2004. The Lakewood Police Department consists of 123 full-time employees including one Chief, an assistant Chief, five Lieutenants, 14 Sergeants, 10 Detectives, 70 Officers, 10 Limited Commission Officers, and 11 civilians.

West Pierce Fire and Rescue (WPFR) provides fire and emergency services for the cities of Lakewood and University Place.¹⁷ There are seven stations in the district. Two fire stations are located in the study area: Station 20, 10928 Pacific Highway Southwest; and Station 23, 14505 Grant Avenue Southwest. Station 20 is located just east of the at-grade crossing on 108th Street Southwest and Lakeview Avenue Southwest. Station 23 is located just west of the North Thorne Lane Southwest at-grade crossing for access to I-5.

While the majority of Lakewood is located on the west side of I-5, there are two neighborhoods on the east side of I-5 that are the responsibility of the Lakewood Police Department and the Lakewood Fire District. The Springbrook area is accessible from Bridgeport Way Southeast. The American Lake Gardens neighborhood is accessed by North Thorne Lane Southwest.

City of DuPont

The City of DuPont Police Department is headquartered at 1780 Civic Drive, Suite 100. The department is staffed by one Chief, two Sergeants, a detective, a record specialist, and six Officers. The Fire Department is also located at 1780 Civic Drive Suite 100. It is staffed by the Chief, an Operations Chief, two Lieutenants, one acting Lieutenant, and nine firefighters.¹⁸

Joint Base Lewis McChord

As federal agencies, JBLM provides their own emergency services including police and fire operations. There are no inter-local agreements between neighboring jurisdictions, and, by law, the military forces cannot respond to civilian calls or local requests off the base.

Religious Facilities

Religious facilities listed in Exhibit 6 include places of worship, regardless of the religious affiliation. Exhibit 7 includes cemeteries.

Accessed June 21, 2011 and personal communication with Sandy Schaefer, City of Lakewood Human Resources and Jennifer Lundberg on July 7, 2011.

¹⁷ *University Place and Lakewood fire departments merged in March 2011.*

<http://www.westpierce.org/About.asp?Page=History> Accessed June 21, 2011.

¹⁸ *Personal communication with Bernadette Moreland, HR Manager for the City of DuPont and Jennifer Lundberg via email on June 27, 2011.*

Exhibit 6. Religious Facilities in the Study Area

	Address	City
Living Grace Church	106 South 28 th Street	Tacoma
St. Paul Lutheran Church	2553 Tacoma Avenue South	Tacoma
Holy Rosary Church	504 South 30 th Street	Tacoma
God's Pentecostal Church	2501 Tacoma Avenue South	Tacoma
Christ Life Center Church	711 South 25 th Street	Tacoma
St. Joseph Catholic Church	608 South 34 th Street	Tacoma
New Covenant Pentecostal	2156 South "K" Street	Tacoma
Sheridan Street Church of God	2303 South Sheridan Avenue	Tacoma
Jehovah's Witnesses	2308 South Cushman Avenue	Tacoma
Victory Outreach Church	2150 South Cushman Avenue	Tacoma
Mt. Tabor Baptist Church	2302 South Alaska Street	Tacoma
Tacoma Earth Religions Revival	2325 South Ash Street	Tacoma
Unity of Tacoma	2102 South 23 rd Street	Tacoma
Destiny City Church	3102 South 23 rd Street	Tacoma
City Central	3630 South Cedar Street #A	Tacoma
Religious Facility Grace Place Church	3801 South Union Avenue #A	Tacoma
Greater Love CME Church	3403 South Proctor Street	Tacoma
Tacoma United Pentecostal Church	3201 South 43 rd Street	Tacoma
Divine Revelation Fellowship	4502 South Union Avenue	Tacoma
Cornerstone Community Church	5237 South Tacoma Way	Tacoma
Warner Street Church of Christ	3362 South 54 th Street	Tacoma
The Door Christian Fellowship Church	5437 South Tacoma Way	Tacoma
Puget Sound Christian Center	4020 South 56 th Street	Tacoma
International Bible Baptist Church of Washington	4602 South 55 th Street #59	Tacoma
Galilee Missionary Baptist	5802 South Puget Sound Avenue	Tacoma
Visitation Church	3314 South 58 th Street	Tacoma
Vietnamese Baptist Church	6046 South Warner Street	Tacoma
New Hope Christian Reformed	6202 South Tyler Street	Tacoma
Grace Lutheran Church	6202 South Tyler Street	Tacoma
Living Word Christian Church	6437 South Tacoma Way	Tacoma
Green Pastures Presbyterian Church	3010 South 66 th Street	Tacoma
Hope Lutheran Church	7209 South Puget Sound Avenue	Tacoma
Assembly of God South Tacoma	7227 South Puget Sound Avenue	Tacoma

	Address	City
Evangelical Reformed Church	7435 South Madison Street #A	Tacoma
Tacoma Trinity Church	7461 South Verde Street	Tacoma
Christ Gospel Church-Tacoma	3909 Steilacoom Blvd Southwest	Tacoma
Soka Gakkai International – USA Buddhist temple	8815 South Tacoma Way #112	Tacoma
Bible Baptist Church – Tacoma	3403 92 nd Street South	Tacoma
Holiness Chapel	8801 34 th Avenue South	Tacoma
Good News Tacoma Church	10103 South Tacoma Way	Lakewood
Prince of Peace Lutheran Church LCMS	10333 Bridgeport Way Southwest	Tacoma
Iglesia Ni Cristo	4205 108 th Street Southwest	Tacoma
Lakeview Congregational Church	4606 108 th Street Southwest	Lakewood
Victory Christian Ministries	4102 110 th Street Southwest #G	Tacoma
Abundant Life Church	5219 111 th Street Southwest	Lakewood
First Baptist Church	5400 112 th Street Southwest	Lakewood
Lakewood Mission Baptist Church	12212 Pacific Hwy Southwest	Lakewood
New Testament Christian	7007 146 th Street Southwest	Tacoma
Voice of Hope Adventist Church	8105 Washington Blvd Southwest	Lakewood
Tillicum Baptist Church	8415 Maple Street Southwest	Lakewood
Faith for Living Covenant Church	14814 Union Avenue	Lakewood
Christian Fellowship House	8918 Rose Rd Southwest	Lakewood

Exhibit 7. Cemeteries Located in the Study Area

Cemetery	Address	City
Tacoma Cemetery	4801 South Tacoma Way	Tacoma
Oak Wood Cemetery	in South Park near South Tacoma Way	South Tacoma
Tacoma Mausoleum and Mortuary	5302 South Junett Street	Tacoma
Mountainview Memorial Park	4100 Steilacoom Blvd Southwest	Lakewood

Public Transportation

Public transportation locally and regionally includes bus, train, and trolley services as well as park-and-rides and vanpools. The public transportation organizations work together to increase public transportation usage. In the study area, these partnerships include Pierce Transit, Intercity Transit, King County Metro, Amtrak, and Sound Transit, as well as connections to Greyhound and other non-governmental transportation providers.

Pierce Transit

Pierce Transit provides 52 Pierce Transit bus routes and eight Sound Transit routes within a 414-square mile area including the cities of Tacoma, Lakewood, and DuPont. In addition to bus service, Pierce Transit provides specialized transportation for people with disabilities, vanpool, park-and-ride lots (see Exhibit 8), and inter-county express commuter service in cooperation with King County Metro, Tacoma Link light rail, Sound Transit, and Intercity Transit.

Exhibit 8. Park-and-Ride Facilities Located in the Study Area

Park-and-Ride Lot	Address	City
Tacoma Dome Station	424 East 25 th Street	Tacoma
South Tacoma Station	5650 South Washington Street	Tacoma
I-5/SR 512 Park-and-Ride	10617 South Tacoma Way	Tacoma
Sound Transit Lakewood Station	11424 Pacific Highway Southwest	Lakewood

Sound Transit

Sound Transit is the regional transit authority that operates bus and train service for Snohomish, King, and Pierce Counties. The Sound Transit express bus service is for longer bus trips between major cities and has limited stops. Tacoma Link is part of the light rail service in the region and serves 1.6 miles through downtown Tacoma. Sound Transit *Sounder* commuter trains operate between Seattle and Lakewood, including the planned extension from Tacoma to Lakewood, as well as a route from Seattle to Everett. The Tacoma-Lakewood extension of the *Sounder* line includes parallel tracks that are part of the Project.

Intercity Transit

Intercity Transit operates three commuter routes to the Tacoma and Lakewood area where connections can be made to the Sound Transit express bus or *Sounder* commuter rail service.

What utility services are provided in the study area?

City of Tacoma

Tacoma Water is the water provider to the City of Tacoma.¹⁹ The Green River watershed near Stampede Pass in the Cascade Mountains is the primary source of water consisting of melting snow and collected rainfall. Tacoma Water also owns 24 wells pumping from underground aquifers as a secondary source of water.

Wastewater management is performed by the Tacoma Public Works Environmental Services Department.²⁰ The City operates and maintains two wastewater treatment plants, 50 pump stations, and over 700 miles of sewer pipe. The Central Wastewater Treatment Plant is located to the north of the study area near the northern terminus of the Project. The North End Treatment Plant is located north of the project corridor. Treated effluent from both facilities is discharged into Commencement Bay.

Surface water is also managed by the Tacoma Public Works Department.²¹ It maintains 500 miles of storm drainage system including 22,000 catch basins. To help prevent flooding, the City has developed detention facilities or holding basins such as the one on Flett Creek near the north end of the study area. Flett Creek is a system of lakes, ponds, and basins intended to hold surface flows and minimize local flooding. To the east of the study area are the Ward's Lake and "Gravel Pit" detention facilities.

Tacoma Power, a division of Tacoma Public Utilities, provides electricity to the City of Tacoma. Within the study area, the service area is the study area north of 80th Street.²² Electricity distributed by Tacoma Power is generated from several resources; however, 88 percent of the electricity is based on hydroelectric power.

Solid waste, recycling, and yard debris pick-up is handled by the Tacoma Solid Waste Management Division of the Public Works Environmental Services Department.²³ The utility also manages the landfill, recycling center, and household hazardous waste facility.

Click!Network is the telecommunications division of Tacoma Power.²⁴ Click!Network provides retail cable television, wholesale high-speed

¹⁹ <http://www.mytpu.org/tacomawater/water-system/service-area/Default.htm> Accessed June 20, 2011.

²⁰ <http://www.cityoftacoma.org/Page.aspx?hid=1474> Accessed June 20, 2011.

²¹ <http://www.cityoftacoma.org/Page.aspx?hid=924#Tacoma's> Accessed June 20, 2011.

²² http://www.mytpu.org/files/library/tacoma-power-service_003.pdf Accessed June 20, 2011.

²³ <http://www.cityoftacoma.org/Page.aspx?nid=185> Accessed June 20, 2011

²⁴ <http://www.click-network.com/AboutUs/ClickFacts.aspx> Accessed June 20, 2011.

internet over cable modem, and wholesale high-speed data services over fiber optics. Its system offers cable television, high-speed internet, and broadband services to residential and business customers in Tacoma. It also supports infrastructure for city government, including providing automated meter reading and advanced metering infrastructure.

The City of Tacoma, through Tacoma Rail, provides freight rail service along tracks owned by Sound Transit as well as connections through BNSF.²⁵ This service includes track within the study area.

City of Lakewood

Water facilities serving the City of Lakewood are constructed and maintained by Lakewood Water District.²⁶ The Lakewood Water District maintains 248 miles of main line and pumps water from a deep underground aquifer. The 31 wells range in depth from 225-1,060 feet. The District also maintains 13 aboveground storage tanks with a 26-million-gallon capacity.

Pierce County Public Works and Utilities provides the wastewater utility service for the City of Lakewood.^{27,28} However, some of the residential properties within the City remain on septic systems. The County maintains 625 miles of sanitary sewer line, 94 pump stations, and the Chamber Creek Regional Wastewater Treatment Plant.

Electricity for the City of Lakewood is provided by Tacoma Power, Puget Sound Energy (PSE), and Lakeview Light and Power.²⁹

PSE provides natural gas service to residents and businesses in the City of Lakewood.³⁰ PSE is a private, investor-owned utility with the responsibility for providing service to over 750,000 customers in a nine-county service area.

There are three cable providers in the City of Lakewood: Click,³¹ AT&T, and Comcast.³² Telephone service is provided by Qwest.

²⁵ <http://www.mytpu.org/tacomarail/Default.htm> Accessed June 20, 2011.

²⁶ <http://www.lakewood-water-dist.org/index.php?section=1> Accessed June 21, 2011 and <http://www.cityoflakewood.us/community/living/frequently-called-numbers.html#> Accessed June 21, 2011.

²⁷ Pierce County 2010.

²⁸ <http://www.cityoflakewood.us> Accessed June 21, 2011 and <http://www.cityoflakewood.us/community/living/frequently-called-numbers.html#> Accessed June 21, 2011.

²⁹ <http://www.cityoflakewood.us/community/living/frequently-called-numbers.html#> Accessed June 21, 2011.

³⁰ http://pse.com/aboutpse/PseNewsroom/MediaKit/1213_service_area_map.pdf Accessed June 20, 2011.

³¹ <http://www.clickcabletv.com/CableTV/FAQs.aspx> Accessed June 20, 2011.

The Surface Water Management Division of the City of Lakewood manages surface water systems.³³

Lakewood Refuse, a division of LeMay Inc., and Pierce County Refuse provide solid waste and recycling services for the residents of the City.³⁴

Joint Base Lewis McChord

JBLM maintains its own utility infrastructure including water, sewer, and storm drainage. The base also provides those services to Camp Murray. Joint Base McChord manages its utility services separate from Joint Base Lewis. Electricity and gas service is provided by PSE. Cable television is provided by Qwest and Comcast. Solid waste collection service is provided by LeMay – Waste Management.³⁵

City of DuPont

The City of DuPont is responsible for the maintenance and operations of all City infrastructure including water and storm drainage.³⁶ Wastewater services are provided by Pierce County Public Works and Utilities.³⁷ Electricity is provided by PSE, as is natural gas service. Solid waste collection is handled by Pierce County Refuse or LeMay, Inc. Telephone service is provided by Qwest, and Comcast provides cable television and internet service.³⁸

Tacoma Amtrak Station

The existing Tacoma Amtrak Station is located about two blocks northeast of the proposed Tacoma Dome Station at Freighthouse Square. The existing Tacoma Amtrak Station is located adjacent to the BNSF mainline.

The proposed Tacoma Dome Station at Freighthouse Square Station is currently used by Sound Transit for the *Sounder* commuter train service

³² <http://www.cityoflakewood.us/community/living/frequently-called-numbers.html#> Accessed June 21, 2011.

³³ <http://www.cityoflakewood.us/departments.html#p./departments/public-works/surface-water-management-division.html> Accessed June 20, 2011.

³⁴ http://www.lemayinc.com/Pierce%20Co/welcome_pierce.html Accessed June 20, 2011 and <http://www.cityoflakewood.us/community/living/frequently-called-numbers.html#> Accessed June 21, 2011.

³⁵ Personal communication by Jennifer Lundberg with JBLM Lewis Main Housing Office on June 21, 2011.

³⁶ <http://www.ci.dupont.wa.us/public-works/index.html> Accessed June 21, 2011.

³⁷ Pierce County 2010

³⁸ Personal communication between Jennifer Lundberg and City Hall receptionist on June 21, 2011.

Chapter 5 – Potential Project Effects

Project effects include operational, indirect, and cumulative. Operational effects include temporary or construction-related effects and permanent or operational effects. Indirect effects occur distant in place or time from the project corridor. Cumulative effects are the sum of the direct and indirect effects of the Project on a resource when taken in consideration with past and other reasonably foreseeable actions or projects.

How were effects identified?

Potential effects to public services were identified through review and coordination with other disciplines and specifically with the *Point Defiance Bypass Project Transportation Discipline Report*. The potential for disruption or delays in service as well as potential decreases or increases in demand for services was examined.

FRA and WSDOT coordinated with Sound Transit to identify which utility relocations have already occurred and to update the previous list of potential utility conflicts. Sound Transit has completed utility relocations at Bridgeport Way Southwest and north to Freighthouse Square in Tacoma. Potential effects to utilities south of, but not including, Bridgeport Way Southwest are still being assessed but preliminary information is provided below.

Effects related to the relocation of the Tacoma Amtrak Station to the Tacoma Dome Station at Freighthouse Square were identified through coordination with other disciplines.

What direct effects on public services and utilities were identified?

Construction Effects

Construction effects are minor and temporary in nature. No indirect effects were identified for public services and utilities. Because most of the Project route is located in a separate right-of-way from general traffic, most construction delays would occur during intersection construction with little to no effect to public services during track upgrades outside of intersections with roadways.

Emergency vehicles (fire trucks, police vehicles, and ambulances) and school and public buses are likely to experience some delays due to construction lane closures and other typical construction-related traffic. There may be minor delays through construction areas for emergency response vehicles (specifically ambulances) and people accessing medical facilities, including Saint Clare Hospital, Madigan Army Medical Center, and associated health and social services facilities.

Access to public facilities located within the active construction zone may be affected by either lane closures or increased traffic congestion, which may result in increased travel times to some facilities during construction. These effects would be temporary and of short duration so long-term behavior would not be affected. No construction effects are anticipated for cemetery and religious facility access.

Sound Transit is completing all necessary track and intersection upgrades from Bridgeport Way Southwest in Lakewood north to the northern terminus of the Project in Tacoma. The upgrades include resolving utility relocations. FRA and WSDOT has identified potential conflicts, although the need for relocations, hardening, and deepening has not been finalized. Locations for potential effects on utilities would include intersections with roadways and where utilities cross under or over the tracks. Effects on public utilities would not include effects outside of roadway intersections because the railroad right-of-way currently exists and no excavation is planned other than to refresh the ballast, railroad ties, and tracks, and clear drainage ditches in the southern portion of the Project. These activities are similar to maintenance activities.

Exhibit 9 and Exhibit 10 list the identified potential utility conflicts in the right-of-way and at intersections.

Exhibit 9. Potential Utility Conflicts in Right of Way

Utility Location	Type of Utility	Buried or Overhead
Rail MP 10.4 to Rail MP 21.5 running along the rail line at various distances from the center line of track	Fiber Optic X3	Buried, and to be relocated at various locations to be determined
Rail MP 11.17	Water	Buried
Rail MP 11.72	Telephone	Buried
Rail MP 14.95	Storm Drainage	Buried
	Sanitary Sewer	Buried
Rail MP 15.56	Water	Buried
Rail MP 15.65	Sanitary Sewer	Buried
Rail MP 15.85	Water	Buried
Rail MP 15.90	Sanitary Sewer	Buried
Rail MP 15.98	Storm Drainage	Buried
Rail MP 16.66	Water	Buried
	Telephone	Buried
Rail MP 16.70	Natural Gas	Buried
Rail MP 16.94	Sanitary Sewer	Buried
Rail MP 16.97	Natural Gas	Buried
Rail MP 17.40	Storm Drainage	Buried
Rail MP 17.70	Sanitary Sewer	Buried
Rail MP 18.20	Telephone	Buried

Exhibit 10. Potential Utility Conflicts at Intersections

Intersection	Type of Utility	Buried or Overhead?
Clover Creek Drive Southwest	Water	Buried
	Natural Gas	Buried 4-inch line
	Power	Buried and Overhead
	Cable	Buried
	Telephone	Buried and Overhead
North Thorne Lane Southwest	Power	Buried and Overhead
	Telephone	Overhead
Berkeley Street	Power	Buried and Overhead
41st Division Drive	Power	Buried and Overhead
	Telephone	Buried
Barksdale Avenue	Power	Buried
	Natural Gas	Buried
	Storm Drainage	Buried
	Telephone	Buried

If utility conflict occurs, FRA and WSDOT would relocate utilities within the railroad right-of-way at the time of construction. Minor disruptions in utility service may occur during construction. However, to avoid or minimize utility disruption, FRA and WSDOT would coordinate with utility purveyors, implement strategies and provide public notification of service interruptions or disruptions.

Construction effects related to Freighthouse Square include parking and possible intersection and/or driveway construction and construction to upgrade the Freighthouse Square Station. Utilities to Freighthouse Square may need to be upgraded and/or expanded to support the needs of the terminal. These upgrades may require temporary lane closures and other disruptions to the nearby roads.

Operational Effects

Schools

Delays due to train traffic associated with the Project are likely to be minimal. Amtrak would operate seven daily round trips (total of 14 trains; 12 Cascades trains, and two Coast Starlight trains) through the study area, with up to two trains going through Lakewood during peak travel times. School bus routes and people driving to schools that cross the Project corridor could experience delays, but these delays are anticipated to be minimal because the roadway is closed to vehicle traffic for less than one minute when an Amtrak train passes through an at-grade crossing. Intersections typically clear within one to two cycles of the traffic signal. For more detail on the delays and queues at the at-grade crossings, please refer to the *Point Defiance Bypass Transportation Discipline Report*.³⁹

Police and Fire

Fire and police response times could be affected, although they have the ability to pass through intersections before other traffic when using lights and sirens. In the event that crossing gates were down for an expected Amtrak train pass-by, an emergency vehicle could be delayed for less than one minute. However, normal train operations are not anticipated to affect fire and police response times.

A track or train malfunction causing a train to block an intersection for an indefinite period could affect response times for fire and police vehicles. This has been noted as a concern in the Lakewood to DuPont portion of the Project due to the limited number of ingress/egress points to the local neighborhoods, such as Springbrook and American Lake Gardens. However, the length of the Amtrak train is short enough to not block more than one crossing, leaving access open to all neighborhoods from at least

³⁹ WSDOT 2011a

one location but possibly requiring a detour or reroute. There are grade separated ingress/egress routes throughout the Project corridor that are less likely to be closed due to track or train malfunctions. Since the crossing in DuPont is grade separated, it would not be affected. The frequency of track or train malfunctions is low; the probability of this occurrence, coupled with an emergency situation, is extremely low and therefore is not anticipated to affect fire and police response times.

Public Transit

Public transit (bus) operations would be affected in the same way as school buses and passenger vehicles. There may be short delays (e.g., waiting for one to two signal cycles) at an at-grade crossing when a train passes through it.

Hospitals

Emergency vehicles accessing Saint Clare Hospital or Madigan Army Medical Center would possibly be affected by delays at the 108th Street Southwest, Bridgeport Way Southwest, North Thorne Lane Southwest, and Berkeley Street Southwest crossings when the passenger trains are passing. Similar to fire and police responses, ambulances have the ability to pass through intersections as soon as the safety gate is raised or the lights stop flashing and would not have to wait through one to two traffic signal cycles, as would regular traffic. Delays can also be expected for people in personal vehicles traveling to medical or social services facilities near the hospitals. Most intersections would recover within one to two traffic signal cycles, and emergency vehicles would be given crossing preference; therefore there is a minor effect.

Utilities

No operational effects on utilities are anticipated because there are sufficient procedures in place to ensure utility owners have access to their infrastructure where it is located within the railroad right-of-way. Utility providers are currently capable of meeting service demands and the Project would not change the demand for existing utilities.

What indirect and cumulative effects on public services and utilities were identified?

Indirect Effects

The Project is located within an existing rail corridor and urbanized area. The only potential indirect effect tied to the Project is that it may indirectly influence limited redevelopment near the relocated Amtrak

Station at Freighthouse Square (see Land Use Discipline Report⁴⁰). Such redevelopment is not anticipated to increase the demand for existing public services or utilities beyond their service capacity. Thus, the Project would not have an indirect effect on public services or utilities.

Cumulative Effects

The project would not affect demand for or capacity of public services. Thus, the Project would not contribute to a cumulative effect on these resources. According to FRA and WSDOT analysis, there would be a slight beneficial cumulative effect throughout the project corridor since the improvements that would be made to the intersection signals would not otherwise occur for both the opening year of the Project and the horizon year of 2030. The *Transportation Discipline Report*⁴¹ provides a detailed evaluation of the existing and potential operational effects to the intersections within the Point Defiance Bypass corridor.

⁴⁰ *WSDOT 2012a*

⁴¹ *WSDOT 2012b*

Chapter 6 – Recommended Minimization Measures

As noted previously, no significant effects on public services and utilities are anticipated. This chapter provides Best Management Practices (BMPs) that could be applied during construction and operation to minimize the Project's effects.

What minimization is required for the No Build Alternative?

No minimization is proposed under the No Build Alternative since there would be no effects on public services or utilities.

What minimization is required for the Build Alternative?

The following minimization measures for the Build Alternative predominantly focus on minimization of potential construction and operational effects:

- Prior to construction, notify transit agencies and school districts of lane closures, detours, and other traffic alterations in order to minimize delays.
- Coordinate with emergency service organizations to develop an emergency response plan and have procedures in place prior to construction. Notify emergency response providers of construction plans and schedules in advance, including lane closures, detours, and other traffic alterations to minimize increases in delayed response times.
- Notify and coordinate with fire departments for water line relocations that could temporarily cause a disruption in service, reduce flow, or establish alternative sources of water supply in case of an emergency during breaks in service.
- Coordinate with utility purveyors to confirm conflicts, implement strategies to avoid or minimize service disruptions, and provide public notification of service interruptions or disruptions. Coordinate any necessary agreements or other documents necessary for identified utility relocations.
- Minimize or avoid overlapping construction schedules by the various utility service providers that would increase the risk and frequency of public service and utility interruptions. Limit the

number and duration of utility outages affecting both business and residential customers.

- Post clear signage alerting workers to the presence of overhead power, telephone, or cable lines to help prevent accidental interference or damage during construction.
- Post construction schedules near affected crossings and provide the information to local newspapers for publication or to the local jurisdictions for distribution by mail to residents and businesses in the area. Project updates, including construction schedules, would be posted on FRA or WSDOT's Project website.

Effects related to operation of the Project involve potential traffic delays, safety, and access problems at intersections. Refer to the *Transportation Discipline Report*⁴² for a discussion of the transportation-related minimization for safety and travel time delays.

⁴² WSDOT 2011a

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