

Appendix B: Grade Separation Concept Evaluation

Point Defiance Bypass Project



Grade Separation Concept Evaluation



Washington State
Department of Transportation

March 2012

Table of Contents

Summary.....	1
South 56 th Street in Tacoma.....	2
South 74 th Street in Tacoma.....	3
Bridgeport Way SW in Lakewood.....	4
Berkeley Street SW in Lakewood.....	5
Chapter 1 – Introduction and Purpose	7
What is the proposed Project?	7
What is the statewide context for the proposed Project?.....	8
What is the Purpose and Need for the proposed Project?	8
What concepts are analyzed in this <i>Evaluation</i> ?	9
What are some of the benefits and trade-offs of grade separation?.....	10
Chapter 2 – Methods, Studies, and Coordination.....	13
Study Area.....	13
Analysis of Potential Effects	13
Chapter 3 – Grade Separation Concepts.....	17
Construction Effects Common to Each Location Evaluated	17
South 56 th Street in Tacoma.....	17
South 74 th Street in Tacoma.....	30
Bridgeport Way SW in Lakewood.....	41
Berkeley Street SW in Lakewood.....	53
References.....	65

List of Exhibits

Exhibit 1 Project Corridor and Existing Route	iv
Exhibit 2 Summary of Substantial of Effects and Conclusions for South 56 th Street	2
Exhibit 3 Summary of Substantial Effects and Conclusions for South 74 th Street.....	3
Exhibit 4 Summary of Substantial Effects and Conclusions for Bridgeport Way SW.....	4
Exhibit 5 Summary of Substantial Effects and Conclusions for Berkeley Street SW.....	5
Exhibit 6 South 56 th Street	18
Exhibit 7 Existing Condition and Visual Simulation for South 56 th Street	19
Exhibit 8 Summary of Effects and Conclusions for South 56 th Street.....	20
Exhibit 9 Buildings on South 56 th Street and South Washington Street	26
Exhibit 10 Summary of Effects and Conclusions for South 74 th Street.....	30
Exhibit 11 South 74 th Street	32
Exhibit 12 Existing Condition and Visual Simulation for South 74 th Street	33
Exhibit 13 Summary of Effects and Conclusions for Bridgeport Way SW	41
Exhibit 14 Bridgeport Way SW.....	43
Exhibit 15 Existing Condition and Visual Simulation for Bridgeport Way SW.....	44

Exhibit 16 Summary of Effects and Conclusions for Berkeley Street SW 53
Exhibit 17 Berkeley Street SW 55
Exhibit 18 Existing Condition and Visual Simulation for Berkeley Street SW 56

List of Attachments

- Attachment 1 – Design Process, Assumptions, Criteria, and Concept Plan Sheets
- Attachment 2 – Cost Estimate Process, Assumptions, Criteria, and Risk Identification
- Attachment 3 – Supporting Information

Acronyms and Abbreviations

ARRA	American Recovery and Reinvestment Act
BMPs	Best Management Practices
CO	carbon monoxide
dBA	A-weighted decibels
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
Ecology Manual	2005 Stormwater Management Manual for Western Washington
ESA	Endangered Species Act
<i>Evaluation</i>	Grade Separation Concept Evaluation
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
I-5	Interstate 5
L _{dn}	average day/night sound level
LOS	Level of Service
mph	miles per hour
MSAT	mobile source air toxic
NAAQS	National Ambient Air Quality Standards
PGIS	pollutant generating impervious surface
PNWRC	Pacific Northwest Rail Corridor
ppm	parts per million
USC	United States Code
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation

**Exhibit 1
Project Corridor and Existing Route**



Summary

This *Grade Separation Concept Evaluation (Evaluation)* supports the Point Defiance Bypass Project Environmental Assessment (EA). This *Evaluation* examines the potential costs, effects, and benefits of separating vehicle and rail traffic at four locations along the Point Defiance Bypass route between Tacoma and DuPont. The four locations are listed below and are shown in Exhibit 1:

- S. 56th Street in Tacoma
- S. 74th Street in Tacoma
- Bridgeport Way SW in Lakewood
- Berkeley Street SW in Lakewood

Washington State Department of Transportation (WSDOT) prepared this *Evaluation* to respond to requests made by citizens and local agency staff to include grade separation as part of the proposed Project. These requests were made at public open houses and in writing by agencies located along the proposed Project route. Preparing this *Evaluation* allowed WSDOT and the Federal Railroad Administration (FRA) to understand the potential costs, effects, and benefits of grade separation.

Based on the analysis conducted for this *Evaluation*, grade separation is not part of the proposed Project for the following reasons:

- Safety. The projected annual accident rates (expressed as accidents per year) do not rise to the level recommended by the United States Department of Transportation (USDOT) for consideration of grade separation. Peak-hour intersection Level of Service (LOS) conditions are predicted to be within acceptable limits in 2030.
- Cost. The preliminary cost estimates to construct any of the grade-separated intersections cannot be accommodated within the rail budget.
- Context. Constructing the grade separation concepts would have substantial effects on the built and natural environment.

A summary of safety, costs, and substantial environmental effects for each location is provided below.

South 56th Street in Tacoma

The grade separation concept at S. 56th Street would reconfigure the roadway over the railroad tracks. Fill would be placed and retaining walls constructed between S. Proctor Street and S. Tacoma Way to raise S. 56th Street. Short bridges would be constructed over the railroad tracks and over S. Washington Street. The raised profile of the roadway would have a 10 percent grade and would not allow S. Adams Street or S. Washington Street to connect directly to S. 56th Street, as they do today. This concept would build a new street across an undeveloped BNSF parcel between S. Proctor Street and Burlington Way north of S. 56th Street. This new street would replace the access to the industrial properties that would no longer be available at S. Adams Street. A detour roadway would be required to build this concept and keep traffic moving during construction. Exhibit 2 summarizes notable effects of this grade separation concept.

Exhibit 2
Summary of Substantial of Effects and Conclusions for South 56th Street

Attribute	Effects and Conclusions
Business Relocations	10
Businesses with Altered Access	Several businesses on S. Adams and S. Washington Streets would no longer be able to access S. 56 th Street directly. However, access would still be available.
Transportation	Grade separation could minimally reduce delays on S. 56 th Street and adjacent intersections; however, it would not change overall congestion levels at the intersection of S. 56 th Street and S. Tacoma Way. Grade separation at this location is not necessary based on peak hour LOS conditions or predicted number of accidents in accordance with Federal Highway Administration (FHWA) guidance for roadway and rail design (FHWA 2007).
Predicted Accident Experience in 2030	1 accident every 20 years (0.050 accidents per year)
Visual Quality	The elevated bridge structure and retaining wall would change some views in the area. For businesses on the south side of S. 56 th Street near S. Adams Street, views to the north would be blocked by a retaining wall.
Hazardous Materials	There is a high likelihood of encountering hazardous materials on acquired properties during construction.
Wetlands, Water Quality, and Floodplains	15,000 square feet (0.35 acre) of new pollutant generating impervious surfaces (PGIS); otherwise, no measurable effects.
Estimated Cost Range¹	\$36.1 to \$63.1 million

¹ This range represents the -20% to +40% Cost Range, and includes the cost of property acquisitions, construction, engineering, and work or materials that are not provided by the contractor.

South 74th Street in Tacoma

The grade separation concept at S. 74th Street would reconfigure the roadway over the railroad tracks. For this grade separation concept, the reconfigured roadway would begin about 400 feet east of S. Madison Street where a new signalized intersection would be constructed. The intersection would connect a new truck access road to S. 74th Street that would serve the industrial properties on both sides of the roadway. From this new intersection, S. 74th Street would rise quickly at about a 10 percent grade in order to clear the railroad tracks. Fill would be placed and two short bridges would be constructed over the new access road and the railroad tracks. The new roadway would be built slightly south of the existing street and return to grade at S. Tacoma Way. Exhibit 3 summarizes notable effects of the grade separation concept.

Exhibit 3
Summary of Substantial Effects and Conclusions for South 74th Street

Attribute	Effects and Conclusions
Business Relocations	2 (gas station and unidentified business)
Businesses with Altered Access	8 driveways would be altered or closed.
Transportation	Grade separation could minimally reduce delays on S. 74 th Street and adjacent intersections; however, it would not change overall congestion levels at the intersection of S. 74 th Street and S. Tacoma Way. Grade separation at this location is not necessary based on peak hour LOS conditions or predicted number of accidents in accordance with FHWA guidance for roadway and rail design (FHWA 2007).
Predicted Accident Experience in 2030	1 accident every 19 years (0.053 accidents per year)
Visual Quality	The elevated bridge structure and retaining wall would change some views in the area.
Hazardous Materials	There is a high likelihood of encountering hazardous materials on acquired properties during construction.
Wetlands, Water Quality, and Floodplains	17,000 square feet (0.39 acre) of new PGIS; otherwise, no measurable effects.
Estimated Cost Range¹	\$29.1 to \$50.9 million

¹ This range represents the -20% to +40% Cost Range, and includes the cost of property acquisitions, construction, engineering, and work or materials that are not provided by the contractor.

Bridgeport Way SW in Lakewood

The grade separation concept at Bridgeport Way SW would reconfigure the roadway over the railroad tracks. This grade separation concept would place fill and build retaining walls between the southbound (Interstate 5) I-5 ramps and Arrowhead Road SW to raise Bridgeport Way SW. A short bridge would be constructed over the railroad tracks. The new roadway would have an 8 percent grade in order to clear the railroad tracks. In order to raise the intersection with Pacific Highway, fill would be needed and retaining walls constructed on Pacific Highway, approximately one block on either side of Bridgeport Way SW.

A hospital is located just north of the grade separation concept on Bridgeport Way SW. To maintain access for the community and emergency services, lane restrictions on Bridgeport Way SW would likely be extensive. Exhibit 4 summarizes notable effects of the grade separation concept.

Exhibit 4
Summary of Substantial Effects and Conclusions for Bridgeport Way SW

Attribute	Effects and Conclusions
Business Relocations	Approximately 16 (some of the buildings may contain more than one business)
Businesses with Altered Access	4
Transportation	Grade separation could minimally reduce delays on Bridgeport Way SW and adjacent intersections; however, it would not change overall congestion levels at the intersection of Bridgeport Way SW and Pacific Highway. Grade separation at this location is not necessary based on peak hour LOS conditions or predicted number of accidents in accordance with FHWA guidance for roadway and rail design (FHWA 2007).
Predicted Accident Experience in 2030	1 accident every 22 years (0.045 accidents per year)
Visual Quality	The elevated bridge structure and retaining wall would change some views in the area.
Hazardous Materials	There is a high likelihood of encountering hazardous materials on acquired properties during construction.
Wetlands, Water Quality, and Floodplains	No new PGIS or measurable effects.
Estimated Cost Range¹	\$53.6 to \$93.9 million

¹ This range represents the -20% to +40% Cost Range, and includes the cost of property acquisitions, construction, engineering, and work or materials that are not provided by the contractor.

Berkeley Street SW in Lakewood

The grade separation concept at Berkeley Street SW would raise the railroad tracks over the surface street. The roadway would remain in the same configuration as it is today. Because the train requires a 1 percent grade, this concept would require rebuilding the rail line approximately 0.75 mile north and south of the grade crossing. Retaining walls would be constructed beginning about 0.6 mile before the crossing in each direction. A short bridge would also be built over Berkeley Street SW. Exhibit 5 summarizes notable effects of the grade separation concept.

Exhibit 5
Summary of Substantial Effects and Conclusions for Berkeley Street SW

Attribute	Effects and Conclusions
Business Relocations	0
Businesses with Altered Access	2
Transportation	Grade separation could minimally reduce delays on Berkeley Street SW and adjacent intersections; however, it would not change overall congestion levels at the Berkeley Street SW intersection. Grade separation at this location would not improve the peak hour LOS conditions enough to result in the LOS A to D range. Grade separation at this location is not necessary based on the predicted number of accidents in accordance with FHWA guidance for roadway and rail design (FHWA 2007).
Predicted Accident Experience in 2030	1 accident every 33 years (0.030 accidents per year)
Visual Quality and Socioeconomics	The elevated structure and retaining wall would block some views to/from I-5. Less visibility from I-5 to businesses on Union Avenue SW could potentially result in an economic loss for some businesses.
Hazardous Materials	There is a high likelihood of encountering hazardous materials in the railroad right of way during construction.
Wetlands, Water Quality, and Floodplains	2,000 square feet (0.05 acre) of new PGIS; otherwise, no measurable effects.
Estimated Cost Range ¹	\$49.4 to \$86.5 million

¹ This range represents the -20% to +40% Cost Range, and includes the cost of property acquisitions, construction, engineering, and work or materials that are not provided by the contractor.

Chapter 1 – Introduction and Purpose

This *Evaluation* examines the potential effects, benefits, and trade-offs of separating vehicle and rail traffic at four locations along the Point Defiance Bypass route between Tacoma and DuPont. The *Evaluation* supports the Point Defiance Bypass Project EA and documents the reasons why grade separations are not included in the Point Defiance Bypass Project.

Chapter 1 of this *Evaluation* describes the Point Defiance Bypass Project (proposed Project) and how it fits with other proposed rail improvements in the Pacific Northwest Rail Corridor, presents the proposed Project's purpose and need, and introduces the concepts analyzed in this *Evaluation*.

Chapter 2 describes the methods, studies, and coordination conducted for this *Evaluation*.

Chapter 3 describes and evaluates each grade separation concept. WSDOT is using this *Evaluation* to determine if further analysis is warranted.

Attachments 1, 2, and 3 include the preliminary design plans, draft cost estimate criteria, and supporting information for this *Evaluation*, respectively.

Although grade separation is not currently proposed as part of the Point Defiance Bypass Project, this *Evaluation* allows WSDOT and FRA to make an informed decision about the potential costs and benefits of grade separation in the locations examined.

What is the proposed Project?

The proposed Project would reroute Amtrak Cascades and Coast Starlight passenger trains from the existing BNSF route near Point Defiance along Puget Sound to a Sound Transit rail line along the west side of I-5 through south Tacoma, Lakewood, and DuPont. The Point Defiance Bypass route is located within an existing 21-mile rail corridor in Pierce County as shown in Exhibit 1. The majority of the 21-mile rail corridor is owned by Sound Transit, with Tacoma Rail, and BNSF owning portions of the corridor.

The existing BNSF route along Puget Sound is shared by freight and passenger rail traffic and is near capacity. Additional high-speed intercity passenger rail service cannot be accommodated without substantial improvements. Because of

these reasons, WSDOT proposes to improve railroad track and supporting facilities on the Point Defiance Bypass route, relocate the Tacoma Amtrak Station, and shift Amtrak service to the Bypass route to provide more frequent and reliable high-speed intercity passenger rail service. Sound Transit has made improvements along the rail line from Freighthouse Square in Tacoma south to Bridgeport Way SW in Lakewood as part of their *Sounder* Track and Signal Improvement Projects.

The only trains that would use the Point Defiance Bypass route are *Sounder* commuter trains beginning in late 2012, and Tacoma Rail freight trains on an intermittent basis. If the improvements proposed for the Point Defiance Bypass Project are built, up to 12 Amtrak Cascades daily train trips (six round trips) and two Amtrak Coast Starlight daily train trips (one round trip) would travel on this route in addition to the *Sounder*. The speed of these passenger trains will be up to 79 miles per hour (mph). *Sounder* commuter trains are considered part of the existing conditions and will continue operating whether the proposed Project proceeds or not.

What is the statewide context for the proposed Project?

The proposed Project is part of WSDOT's Pacific Northwest Rail Corridor program to improve certain portions of the existing 297-mile BNSF north-south main line between the Columbia River and the Canadian border. The Pacific Northwest Rail Corridor program will provide additional daily trips on Amtrak Cascades for travelers between Seattle and Portland, improve schedule reliability, and reduce the travel time between Seattle and Portland by up to 18 minutes. The proposed Project will also support Amtrak's longer-distance Pacific Northwest passenger rail service—the Coast Starlight¹ and the Empire Builder.²

The American Recovery and Reinvestment Act (ARRA) High Speed Rail award that Washington State received in January 2010 for the Pacific Northwest Rail Corridor will provide funding to complete construction of the proposed Project near the end of 2017. The FRA is requiring the completion of an EA for proposed improvements associated with the Point Defiance Bypass Project under their regulations before the ARRA funding is made available for construction.

What is the Purpose and Need for the proposed Project?

The Point Defiance Bypass Project is part of the larger Pacific Northwest Rail Corridor (PNWRC). Within Washington State, the vision for the PNWRC is to “Improve intercity passenger rail service by reducing travel times and achieving

¹ *The Amtrak Coast Starlight provides service from Seattle to Los Angeles.*

² *The Amtrak Empire Builder will not use the proposed Project corridor but provides service from Seattle/Portland to Chicago.*

greater schedule reliability in order to accommodate growing intercity travel demand....”³

The purpose of the Project is to provide more frequent and reliable high-speed intercity passenger rail service between Tacoma and Nisqually. In an effort to reduce the overall environmental impacts of the Project, the use of an existing transportation corridor and associated infrastructure is preferred, rather than creating a new corridor. The Project is needed to address the deficiencies in the existing rail alignment around Point Defiance. The existing alignment, 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 and freight train scheduling and reliability.

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

- Enhanced frequency: Increasing Amtrak Cascades round trips from four to six⁴ by 2017 in order to meet projected service demands
- Improved reliability: Reducing scheduling conflicts with freight trains that often result in delays; mitigating 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 at least 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, advanced warning signals, and traffic signal improvements

What concepts are analyzed in this *Evaluation*?

This *Evaluation* examines the potential effects and benefits of separating vehicle and rail traffic at four locations along the Point Defiance Bypass route (Exhibit 1). The four locations are:

- S. 56th Street in Tacoma
- S. 74th Street in Tacoma
- Bridgeport Way SW in Lakewood
- Berkeley Street SW in Lakewood

³ *Pacific Northwest Rail Corridor Program Environmental Assessment, 2009.*

⁴ *Eight Amtrak Cascades daily one-way train trips currently to a total of 12 Amtrak Cascades daily train trips (or six round trips) in the future. Additionally, one Amtrak Coast Starlight round trip (two daily train trips) will be supported.*

Amtrak passenger trains would travel through all four of these locations. *Sounder* passenger trains only travel across S. 56th and S. 74th Streets because *Sounder* service currently terminates at the Lakewood Station. WSDOT chose to analyze these locations because grade separating these intersections would likely offer the greatest benefit over other existing at-grade intersections in the Project area based on traffic volumes and operations of the surrounding street grid. Surrounding topography was also considered.

What are some of the benefits and trade-offs of grade separation?

Although grade separation is not currently proposed as part of the Point Defiance Bypass Project, this *Evaluation* allows WSDOT and FRA to make an informed decision about its potential costs and benefits. Grade separating each of the four locations would reduce traffic delays when trains are crossing and eliminate the potential for vehicle-train accidents. However, this *Evaluation* indicates that standard thresholds in FHWA's *Railroad-Highway Grade Crossing Handbook* (FHWA 2007) for considering grade separation have not been met, including:

- Predicted accident rates for the concepts are roughly one accident every 19 to 33 years (0.030 to 0.053 accidents per year), which is below the guideline of one accident approximately every 2 years or 0.50 accidents per year (regardless of cost) and one accident approximately every 5 years or 0.20 accidents per year (when cost can be economically justified).
- Peak-hour intersection LOS conditions are within acceptable limits in 2030.

In addition, grade separating any of the intersections evaluated would affect access and use of many commercial properties. Grade separation is an expensive solution; WSDOT and FRA must weigh the costs and benefits when investing limited transportation dollars.

The grade separation concept locations at S. 56th Street, S. 74th Street, and Bridgeport Way SW would each require the acquisition of several properties to construct the grade separations. The acquisitions would not only contribute to the cost of the concept but would relocate businesses and change access for many adjacent properties. In addition, in order to minimize impacts on surrounding properties, the roadway grades at each of these three locations would be designed to the maximum steepness or slope allowed by each jurisdiction (8 to 10 percent), which means the roadway would be more challenging for vehicles, freight, and non-motorized travelers. It would be possible to design concepts at these locations that would have gentler grades. However, concepts with gentler grades would result in significantly higher costs and impacts to the surrounding communities because they would require major intersection changes with S. Tacoma Way or Pacific Highway S., and would increase the number of property acquisitions.

The grade separation concept at Berkeley Street SW would not acquire any businesses. However, raising the track on an elevated structure would reduce the visibility between businesses and I-5, which could increase the perception of isolation for the Tillicum neighborhood. Less visibility could potentially result in an economic loss for some businesses on Union Avenue SW. The retaining walls for elevated structure would also block noise from I-5 traffic, and would likely decrease noise for some properties along Union Avenue SW. However, noise from trains would be expected to reach receivers farther west because of the elevated structure.

Chapter 2 – Methods, Studies, and Coordination

Study Area

The study area for this *Evaluation* is the area that lies within a 0.50-mile radius for each of the four grade-crossing locations shown in Exhibit 1. The S. 56th Street and S. 74th Street locations are in the city of Tacoma, and Bridgeport Way SW and Berkeley Street SW are in the city of Lakewood.

Analysis of Potential Effects

This *Evaluation* considers grade separation at four locations and documents possible effects of grade separation. This *Evaluation* uses a variety of information sources, including information presented in the discipline reports that support the Project EA as well as other information sources described below. The compiled information was used to analyze the effects that grade separation would have on the environment. The conceptual engineering plans presented in this *Evaluation* followed the *BNSF Railway – Union Pacific Railroad, Guidelines for Railroad Grade Separation Projects* (UPRR 2007), *WSDOT Design Manual* (WSDOT 2011a), *City of Tacoma Public Works Design Manual* (Tacoma 2004), *City of Lakewood Engineering Standards Manual* (Lakewood 2011a), and *City of Lakewood Roadway Standard Plans* (Lakewood 2011b).

Transportation

WSDOT used information from the *Transportation Discipline Report* (WSDOT 2011b) to determine likely effects and benefits of separating the roadway and rail tracks from intersection operations. The *Transportation Discipline Report* analyzed traffic effects using specialized transportation models that evaluate the capacity and safety of operations within the study area. The year 2010 was used to represent existing travel conditions (traffic volumes and how roadways currently operate). Analysts evaluated how the road system works today and how the roads would operate in 2030 with or without the proposed Project. Information from the *Transportation Discipline Report* was used to qualitatively evaluate the potential impacts and benefits of each grade separation concept.

In addition, information from the four design concepts was used to determine effects on traffic, freight, bicycles, and pedestrians; access to businesses and adjacent roadways; parking; and construction impacts for vehicle and rail traffic.

Analysts also considered key traffic operational criteria for grade separation published by the FHWA in their *Railroad-Highway Grade Crossing Handbook*.

Land Use and Relocations

Existing land uses at each of the four locations were determined by:

1. Examining existing land use maps
2. Reviewing the *Draft Land Use Discipline Report* (WSDOT 2011c)
3. Visiting each site

This information, in addition to the engineering drawings for the conceptual grade separations, were used to determine possible effects including temporary effects during construction and the area and types of land uses that would be displaced by property acquisitions. The land use data provided by Pierce County are mapped in Attachment 3 of this *Evaluation*.

Visual Quality

The visual quality analysis qualitatively compared existing visual quality in the area to how the landscape would be expected to look if the grade separations are constructed. Information on visual resources was collected during site visits and by reviewing aerial photographs. The analysis also used information presented in the *Visual Quality Discipline Report* (WSDOT 2011d).

Other Environmental Elements

For this *Evaluation*, the following discipline reports supporting the Project EA were used to qualitatively analyze how conditions might change if the grade was separated at the four locations considered:

- Noise and Vibration (WSDOT 2012a)
- Socioeconomic and Environmental Justice (WSDOT 2011e)
- Public Services and Utilities (WSDOT 2011f)
- Soils and Geology (WSDOT 2011g)
- Hazardous Materials (WSDOT 2007a)
- Cultural Resources (WSDOT 2012b)
- Recreation and Section 4(f)/6(f) Resources
- Wetlands (WSDOT 2011h)
- Water Resources (WSDOT 2012c)
- Fish, Wildlife, and Vegetation (WSDOT 2011i)
- Air Quality (WSDOT 2011j)

Design, Cost, and Risk

The design concepts for each potential grade separation location were determined in discussions with WSDOT staff. Conceptual roadway plans and profiles were

completed using MicroStation and InRoads. Attachment 1 includes the plans and profiles, and describes the design assumptions and criteria. The profiles and quantities are based on planning-level information (one to two percent design). If design is advanced beyond the conceptual planning level, the following information would be required:

- Verifying design assumptions and criteria with the affected local agencies
- Conducting a detailed topographic survey
- Completing geotechnical, stormwater, and utility design
- Investigating potentially affected properties to determine the extent of historic or environmental issues
- Verifying the retaining wall and bridge types

The base costs were compiled on forms from the WSDOT Strategic Analysis and Estimating Office and are included in Attachment 2. Each base cost estimate was then loaded into the WSDOT Risk Based Estimating Self Modeling tool to evaluate anticipated project risks at each location. Costs are presented as a range based on Table 1 in the Cost Estimating Manual for WSDOT Projects (WSDOT 2009). Presenting costs as a range reflects the uncertainty associated with early conceptual designs (as opposed to finalized plans ready for bid). WSDOT staff identified a range of -20 percent to +40 percent as reasonably suited to this level of design. This range is based on construction costs and a substantial list of risk items defined for each location.

Chapter 3 – Grade Separation Concepts

Construction Effects Common to Each Location Evaluated

Details such as construction durations, phasing, and methods were not determined at this conceptual design stage. However, common temporary construction effects were assumed for each site evaluated. Construction effects common to all of the concepts include traffic restrictions, noise, stormwater runoff, and increased dust and emissions. Best Management Practices (BMPs) would be used to control dust, emissions, and erosion.

During construction, traffic would experience lane restrictions, closures, and detours near the grade separation locations. These factors would cause delays at adjacent intersections and slower travel times through the construction area. Detours and lane restrictions could be disruptive to nearby businesses and people traveling through these locations.

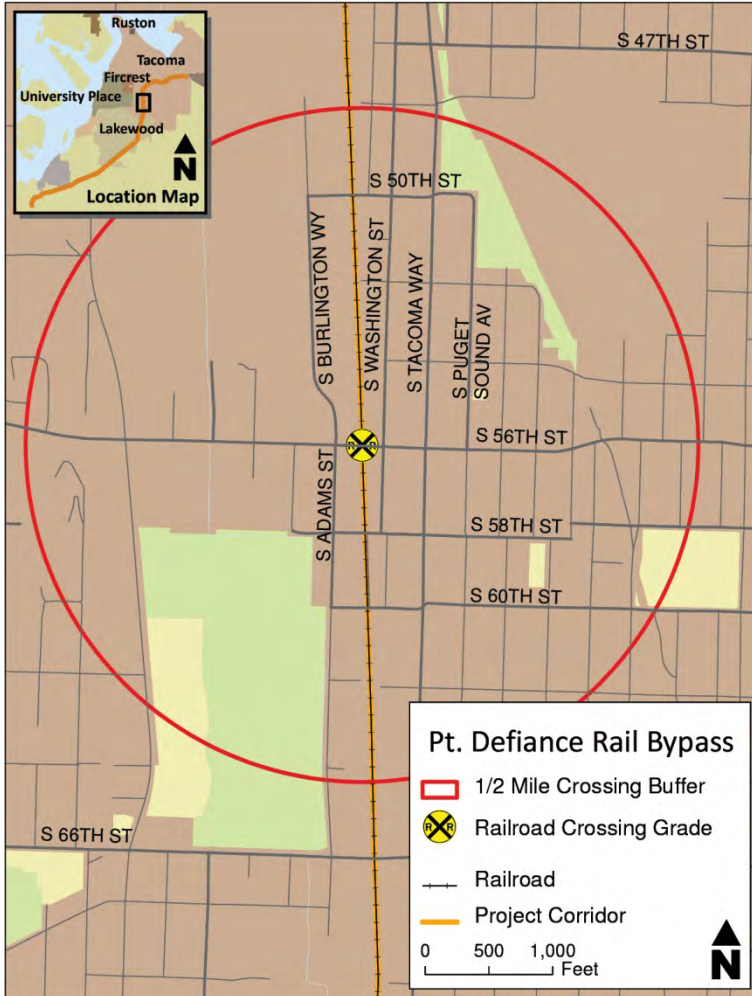
Noise from construction equipment could be bothersome to nearby businesses and residents. The construction contractor would be required to comply with standard specifications and all local sound control and noise level rules, regulations, and ordinances. Noise control measures would be incorporated into the design if the concepts are further developed. For example, internal combustion engines, the most prevalent noise source at construction sites, would be equipped with a muffler of a type recommended by the manufacturer.

South 56th Street in Tacoma

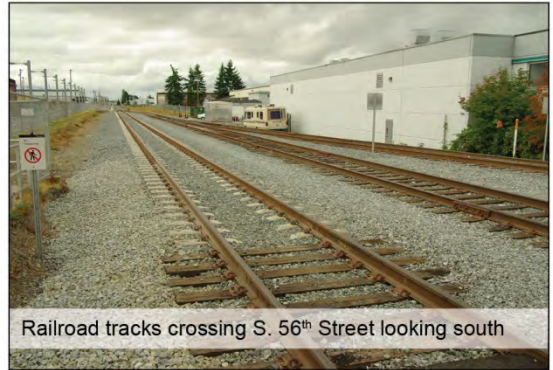
The grade separation concept at S. 56th Street would reconfigure the roadway over the railroad tracks. The tracks currently cross S. 56th Street about a block and a half west of S. Tacoma Way as shown in Exhibit 6. The concept plan sheets are included in Attachment 1.

For this grade separation concept, fill would be placed and retaining walls constructed between S. Proctor Street and S. Tacoma Way to raise S. 56th Street. Short bridges would be constructed over the railroad tracks and over S. Washington Street as shown in Exhibit 7. The new roadway would have about a 10 percent grade in order to clear the railroad tracks and connect back to S. Tacoma Way. The raised profile of the roadway would not allow S. Adams Street or S. Washington Street to connect directly to S. 56th Street. This concept would build a new

Exhibit 6
South 56th Street



Railroad tracks crossing S. 56th Street looking north



Railroad tracks crossing S. 56th Street looking south



Looking east on S. 56th Street towards S. Tacoma Way



Looking west on S. 56th Street at S. Tacoma Way

Exhibit 7
Existing Condition and Visual Simulation for South 56th Street



one-block street across an undeveloped BNSF property between S. Proctor Street and Burlington Way north of S. 56th Street. This new street would replace the access to the industrial properties that would no longer be available at S. Adams Street.

A detour would be needed while the grade separation is constructed within the S. 56th Street right of way. The detour road would be built immediately adjacent to the south side of S. 56th Street between S. Proctor Street and S. Puget Sound Avenue.

Exhibit 8 summarizes the potential effects of the grade separation concept at S. 56th Street.

Exhibit 8
Summary of Effects and Conclusions for South 56th Street

Attribute	Effects and Conclusions
Business Relocations	10
Businesses with Altered Access	Several businesses on S. Adams and S. Washington Streets would no longer be able to access S. 56 th Street directly. However, access would still be available.
Residential Relocations	0
Residences with Altered Access	0
Number of Streets Closed	S. Adams Street would not cross S. 56 th Street.
Retaining Wall	2,160 linear feet
Transportation	Grade separation could minimally reduce delays on S. 56 th Street and adjacent intersections; however, it would not change overall congestion levels at the intersection of S. 56 th Street and S. Tacoma Way. Grade separation at this location is not necessary based on peak hour LOS conditions or predicted number of accidents per FHWA guidance for roadway and rail design (FHWA 2007).
Predicted Accident Experience in 2030	1 accident every 20 years (0.050 accidents per year)
Noise	Similar to existing conditions
Visual Quality	The elevated bridge structure and retaining wall would change some views in the area. For businesses on the south side of S. 56 th Street near S. Adams Street, views to the north would be blocked by a retaining wall.
Socioeconomic and Environmental Justice	No effects are expected on low-income populations. Effects on minority-owned businesses are unknown.
Public Services	No permanent effects; short-term construction activities may cause minor delay for service providers.
Utility Relocations	Utility relocations would be required, including electric, fiber optic, gas, water, and sewer lines. ¹
Geology and Soils	Geology and soils in the area could support the conceptual design.
Hazardous Materials	There is a high likelihood of encountering hazardous materials on acquired properties during construction.

Exhibit 8 (continued)
Summary of Effects and Conclusions for South 56th Street

Attribute	Effects and Conclusions
Historic and Cultural Resources	No effects
Recreation	No effects
Wetlands, Water Quality, and Floodplains	15,000 square feet (0.35 acre) of new PGIS; otherwise, no measurable effects.
Fish, Wildlife, and Vegetation	No measurable effects
Air Quality	No measurable effects
Estimated Cost Range²	\$36.1 to \$63.1 million

¹ Utility relocations would likely include but are not limited to this list. Further design would be needed to identify locations of all utilities in the affected area.

² This range represents the -20% to +40% Cost Range, and includes the cost of property acquisitions, construction, engineering, and work or materials that are not provided by the contractor.

Land Use and Relocations

The land uses and zoning designations in the area immediately adjacent to the S. 56th Street grade separation concept are primarily commercial and industrial with a variety of businesses. The S. 56th Street concept would partially acquire 11 parcels and would fully acquire 17 parcels. Acquisitions are shown in Attachment 1, Figure 3. The 11 partial acquisitions include three commercial and eight industrial properties, which currently house a feed mill, bank, Burlington Northern industrial park, auto shop, and a small shopping center with a grocery store and coffee shop. The 17 full acquisitions include four commercial and 13 industrial properties. Approximately 10 businesses are located on these properties including an animal clinic, night club, tattoo shop, carpet shop, and several auto-related businesses. The exact number of businesses that would need to be acquired and relocated would be determined if the concept is advanced further. Some of the buildings on these potentially acquired properties contain more than one business.

Several of the acquisitions would result from constructing a temporary roadway along the south side of S. 56th Street if the grade separation structure is built. Once construction is complete, these properties could be available for redevelopment.

Transportation

Access and Parking

The S. 56th Street grade separation concept would change access for several properties as summarized below. This concept would remove the S. 56th Street intersections at S. Burlington Way/S. Adams Street and S. Washington Street. Once construction is complete, S. Burlington Way and S. Adams Streets would end in cul-de-sacs on either side of the elevated S. 56th Street. Travelers on S. 56th Street could still reach S. Burlington Way via a new street that would connect S. Proctor Street to S. Burlington Way. This new street would require a new

at-grade railroad crossing of the rail spur that terminates to the north in between the buildings currently used by Northwest Steel & Pipe (4802 S. Proctor Street) and General Plastics Manufacturing (4910 S. Burlington Way). To the west of the railroad tracks, S. Adams Street would remain accessible through the S. 56th Street and S. Durango Street intersection via S. 58th Street. The new elevated S. 56th Street would also cross over S. Washington Street. This would remove direct access to S. 56th Street from S. Washington Street and for the north-south alley just east of S. Washington Street that runs from S. 56th Street to S. 54th Street. The alley would still be accessible from S. Washington Street and S. 54th Street. As described above, this concept would change traffic circulation in the area; however, these changes are expected to have very little, if any, effect on traffic volumes in the area.

With grade separation, changes to the street system would alter access to properties and parking. Around S. 56th Street, several properties would be fully acquired and a few partially acquired as shown in Attachment 1, Figure 3. For properties affected by partial acquisition, access to the sites and parking would change as follows:

- For X-Cel Feeds, Inc. (5432 S. Washington Street) located on the north side of S. 56th Street and on the west side of S. Washington Street, access to parking would not change. Vehicles and pedestrians would not be able to access the property directly from S. 56th Street, but would need to travel on S. 54th Street or S. 58th Street to access S. Washington Street.
- For Heritage Bank (5448 S. Tacoma Way) located north of S. 56th Street between S. Washington Street and S. Tacoma Way, their drive-up banking facilities would need to be relocated and access changed to S. Washington Street. The parking lot would need to be redesigned for the relocated drive-up banking facilities and parking loss is likely to occur. Pedestrian connections to the business would remain relatively unchanged.
- For the Puget Sound Veterinary Referral Center, PLLC (5608 S. Durango Street), two parcels would be fully acquired, which would eliminate the north parking lot and access point on S. Durango Street. The south access point onto S. Durango Street would be partially redesigned, but access to and from the south parking lot would remain the same. Pedestrian connections would change slightly, requiring pedestrians to travel farther south on S. Durango Street to the south access point to reach the business.
- For the parcel located west of S. Adams Street and three parcels south of S. 56th Street, pedestrian connections would change. Pedestrians on S. 56th Street would have to take a longer route via S. Durango Street to access the site.

For the commercial parcel (3510 S. 56th Street) where Starbucks Coffee, the Grocery Outlet, and a salon are located, the parking lot would be reduced in size and access to S. 56th Street would be closed temporarily during construction.

Access would be restored once construction is completed. Pedestrian connections to the parcel would remain relatively similar to existing conditions both during construction and once construction is completed.

Safety

In terms of safety, the at-grade crossing proposed with the Point Defiance Bypass Project is predicted to experience one accident roughly every 20 years, or 0.050 accidents per year with expected conditions in 2030. The FHWA *Railroad-Highway Grade Crossing Handbook* recommends consideration of grade separation on the basis of accident experience. The USDOT Accident Prediction Formula predicts more than one accident every two years (regardless of cost), or one accident every five years when grade separation can be economically justified (FHWA 2007). Therefore, the predicted accident experience at the S. 56th Street crossing does not indicate that grade separation should be considered.

Intersection Level of Service

Today, people experience moderate congestion while traveling on S. 56th Street through the area around the S. Tacoma Way intersection and the railroad crossing. The S. 56th Street and S. Tacoma Way intersection is expected to operate in 2030 at LOS B in the AM peak hour and LOS C in the PM peak hour with the proposed Project. With LOS C operations, a driver might wait up to 35 seconds at a stoplight. For LOS B operations a driver might wait up to 20 seconds at a stoplight, and with LOS A operations, up to 10 seconds. Typically, the City of Tacoma considers intersection operations of LOS A through D to be within acceptable limits.

Grade separating S. 56th Street over the railroad tracks could marginally reduce intersection delay during the 1-hour AM and PM peak periods. However, overall congestion and LOS would not change because passenger trains would regularly cross only twice during the AM peak hour and twice during PM peak hour (one Sound Transit *Sounder* train and one Amtrak Cascades train). These train crossings would block S. 56th Street for approximately two minutes in the AM peak hour and two minutes in the PM peak hour (the Sound Transit *Sounder* train would block the street for a little more than one minute and the Amtrak Cascades train would block the street for a little less than one minute). Given that peak hour operations are within acceptable limits, grade separation is not necessary based on peak hour LOS conditions and passenger train activity.

Freight trains currently block S. 56th Street for longer periods of time than Amtrak and Sound Transit passenger trains would; typically, these freight trains travel outside the AM and PM peak hours. No quantitative analysis for operations during freight train crossings was completed for the *Transportation Discipline Report*. However, only one freight train crossing per day is expected. Based on

the infrequent operations and irregular schedule, grade separation to avoid conflicts with freight train crossings is not necessary.

Bicyclists, Pedestrians, and Transit

This grade separation concept would eliminate delays on S. 56th Street generated by train crossings for vehicles, pedestrians, and bicyclists. Although safety would be improved, non-motorized travel would be more challenging than it is today because bicyclists and pedestrians would encounter a steep hill with grades of 10 percent in order to cross over the railroad tracks.

One Pierce Transit bus route (300) travels through the S. 56th Street and S. Tacoma Way intersection, but currently no bus routes travel through the railroad crossing. The route would not be permanently affected by the proposed Project and north-south movements on S. Tacoma Way would be largely unaffected by train crossings because more than one through lane is provided on S. Tacoma Way. During construction, the buses may experience delays due to increased congestion at the S. 56th Street intersection.

Construction

During construction, S. 56th Street would be routed to a temporary detour immediately adjacent to the south side of the existing S. 56th Street between S. Proctor Street and S. Puget Sound Avenue. The configuration and lane restrictions through the construction area would likely reduce speeds and increase congestion.

Noise

Noise along S. 56th Street is primarily caused by traffic on this arterial and S. Tacoma Way. Existing noise levels measured about 0.75 mile south of S. 56th Street on Puget Sound Avenue, which has significantly less traffic, had an L_{dn} of approximately 54 dBA (WSDOT 2012a). Noise levels along S. 56th Street near S. Tacoma Way are several decibels higher. Because the traffic and *Sounder* trains would continue to contribute to the noise levels on S. 56th Street, the typical noise levels are anticipated to be similar with or without the grade separation.

Grade separation at this location would raise S. 56th Street next to industrial and commercial properties, which are not sensitive noise receivers. Warning equipment needed for at-grade crossings would not be necessary if the grade separation concept were constructed, eliminating this existing noise source.

What is L_{dn} ?

The L_{dn} level is a measure of noise over a 24-hour period and is often lower than peak 1-hour sound levels.

What is dBA?

Sound levels are expressed on a logarithmic scale in units called decibels (dB). A-weighted decibels (dBA) are a commonly used frequency that measures sound levels that people can hear.

A 2-dBA change in noise levels is the smallest change that can be heard by sensitive listeners.

Visual Quality

If the grade were separated, drivers on S. 56th Street would drive up a steep grade over the railroad tracks and S. Washington Street between S. Proctor Street and S. Tacoma Way. Views in the immediate area would change to include the new elevated structure.

At S. 56th Street and S. Washington Street, the X-Cel Feed Mill (shown in Exhibit 9) has been part of the visual landscape in this neighborhood since the 1950s (although the structure has been modified). The feed mill would be close to the highest point of the elevated roadway. Drivers on S. 56th Street would see the mill from a higher vantage point. From S. Washington Street, drivers would see S. 56th Street crossing on a bridge above and distant views would be blocked by the bridge and retaining walls.

Views from S. 56th Street of the metal sculpture (shown in Exhibit 9) placed between a mixed use building and the railroad tracks by Sound Transit would be obscured by the raised roadway. The sculpture would be visible to passengers on the platform and passing trains. The sculpture would be moved during construction and reinstalled once construction is completed.

Views for people in vehicles, pedestrians, and bicyclists traveling on the uphill portions of the elevated roadway would include a slightly more prominent view of the roadway and a decreased ability to see what is in the distance. Traveling downhill, the ability to view the surrounding areas would be slightly improved. Views on S. 56th Street east of S. Tacoma Way would be similar to what they are today. Views would no longer include the rail crossing gates and warning equipment that people see today because the roadway would be above the tracks.

Several buildings on the south side of S. 56th Street would be removed to accommodate the construction detour. It is unknown at this conceptual stage whether it would be economically viable to redevelop these properties once construction is completed.

Exhibit 9
Buildings on South 56th Street and South Washington Street



Socioeconomics and Environmental Justice

The grade separation concept at S. 56th Street is within the South Tacoma Business District and would displace several businesses. It would also change access for S. Adams Street and S. Washington Street because these streets would no longer connect directly to S. 56th Street. Relocation assistance would be provided to affected businesses. Local residents who frequent these businesses would need to travel to other locations to reach the relocated businesses. This grade separation concept is not expected to change the economic environment of this neighborhood.

The post office, the South Tacoma Library, and a church located on S. 56th Street one block east of S. Tacoma Way would not be affected if this concept were built.

Low income populations are not expected to experience disproportionately high and adverse effects from this concept because nearby land uses in this area are commercial and industrial. Because this is a preliminary environmental evaluation of a conceptual design, the number of minority-owned commercial and industrial properties was not determined.

Public Services and Utilities

Sound Transit has resolved utility conflicts along the rail line from Freighthouse Square in Tacoma south to Bridgeport Way SW in Lakewood as part of its *Sounder* Track and Signal Improvement Projects. However, Sound Transit's work does not include utility relocations that would be needed outside of the railroad right of way to construct this grade separation concept. Several utilities would need to be relocated such as electric, fiber optic, natural gas, water, storm drain, and sewer lines to accommodate the new roadway configuration. The specific impacts would be identified during the engineering design process if this concept is developed further. No permanent impacts are anticipated for utilities.

Public services would not experience any permanent adverse impacts. They would benefit from separating the grade because the potential for delays due to a train crossing would be eliminated. During construction, emergency service providers traveling on S. 56th Street could experience delays because of the roadway detour. Transit and school buses could experience delays because of lane restrictions.

Geology and Soils

The proposed Project is located in a seismic hazard area. The structures for this grade separation concept would be designed to meet current safety standards. Site-specific soil and geologic information would be obtained during preliminary design.

During construction, fill would be placed and approximately 2,160 linear feet of retaining wall would be built to support the elevated roadway between the new S. 56th Street. Settlement is not expected; however, if any settlement were to occur, it is expected to be minor and occur soon after the fill is placed. Erosion and dust from construction activities would be minimized by implementing appropriate BMPs.

Hazardous Materials

Railroads have used this corridor for approximately 125 years. Potential sources of contamination along the rail line include spills by lube oil leaks during typical railroad operations and maintenance activities; possible shallow soil contamination from creosote-treated railroad ties; herbicides used for vegetation control; fuel, solvents, and other hazardous material spills; and heavy metal contamination from the Tacoma smelter in Ruston. Site soil and/or groundwater may have also been contaminated from hazardous materials stored, used, or handled on portions of the right of way that have been leased from the railroad (Shannon & Wilson 2004).

Some of the properties along S. 56th Street that would be partially or fully acquired for this grade separation concept include auto-related uses. These properties have the potential to contain soils that are contaminated by gasoline, petroleum, and oil. There is undeveloped BNSF land on the north side of S. 56th Street and west of the railroad tracks that is part of the South Tacoma Field Unit of the Commencement Bay Superfund Site. Remediation of contaminated soils was completed in 1997 (Tacoma 2010).

Historic and Cultural Resources

There are no properties listed on the National Register of Historic Places (NRHP) that would be affected by the grade separation concept at S. 56th Street (WSDOT 2012b). The older buildings in this vicinity have been modified or remodeled and are not considered potentially eligible for the NRHP.

Recreation and Section 4(f)/6(f) Resources

There are no recreational areas, trails, Section 4(f), or Section 6(f) properties immediately adjacent to the grade separation concept on S. 56th Street.

Nearby recreational resources include the South End Recreation Area, South Park, and Water Ditch Trail. The South End Recreation Area is located about 0.25 mile southwest of the grade separation concept. This recreation area is easily accessible from S. Tacoma Way and S. 60th Street and would not be directly affected. South Park is located about 0.5 mile northeast of the concept and is also not expected to be affected by the grade separation. The Water Ditch Trail travels through South Park and has been restored by the City of Tacoma between S. 56th Street and S. 43rd Street. This trail would not be affected by grade separation.

What is Section 4(f)?

Section 4(f) refers to a federal law that protects public park and recreation lands, wildlife and waterfowl refuges, and historic sites. Congress established Section 4(f) as part of the US Department of Transportation Act of 1996 (49 United States Code [USC] 303 and 23 USC 138).

What is Section 6(f)?

Section 6(f) of the National Historic Preservation Act requires federal agencies to consider the effects of their undertakings on historic properties (including archaeological resources) that are on or eligible for listing on the NRHP.

Wetlands, Water Quality, and Floodplains

S. 56th Street is located in Chambers-Clover Water Resource Inventory Area (WRIA) 12 (WSDOT 2012c). Flett Creek crosses S. 56th Street in a pipe at S. Madison Street—a block west of where construction for this grade separation concept would end. BMPs would be used to control erosion during construction.

There are no wetlands or floodplains in the footprint of this grade separation concept. Just west of the concept, running north-south along S. Madison Street, this area is considered to be in the Federal Emergency Management Agency (FEMA) and Pierce County 100-year flood hazard area. The grade separation concept would add approximately 15,000 square feet (0.35 acre) of new PGIS. This amount of PGIS added by the grade separation concept exceeds the 5,000-square-foot threshold for flow control and water quality treatment requirements under the WSDOT *Highway Runoff Manual* and Washington State Department of Ecology (Ecology) 2005 *Stormwater Management Manual for Western Washington* (Ecology Manual). Therefore, any changes in flow and/or water quality resulting from the new PGIS would be controlled by required BMPs. Also, no elevations would be altered within adjacent floodplains or flood hazard areas; therefore, no effects on these areas are expected.

Fish, Wildlife, and Vegetation

The area along S. 56th Street near S. Tacoma Way provides poor habitat for most wildlife, except those that have adapted to urban areas. Wildlife likely to be observed in the area includes, but are not limited to, birds, rodents, and raccoons. This grade separation concept would not change habitat conditions for wildlife. Fish or fish habitat is not present in the nearby vicinity.

A few street trees would be removed and replaced, where feasible. The area near the railroad is not suitable to support plants listed under the Endangered Species Act (ESA). Therefore, no impact on ESA-listed plants is anticipated.

Air Quality

Permanent effects on air quality are not expected if this grade separation concept is constructed. This portion of S. 56th Street is in Pierce County's maintenance area for carbon monoxide (CO). The S. 56th Street and S. Tacoma Way intersection would not exceed CO levels established in the National Ambient Air Quality Standards (NAAQS) or cause a violation of applicable NAAQS. In addition, the proposed Project is not predicted to affect regional vehicle miles traveled or regional ozone and particulate matter levels. The grade separation concept may reduce CO, ozone, and particulate matter releases because it would eliminate the time vehicles are stopped waiting for a train to cross. However, any reduction in these emissions from vehicles would not change air quality in a measurable way. Mobile source air toxic (MSAT) levels are predicted to decrease as a result of the U.S. Environmental Protection Agency (EPA) national control programs, which are projected to reduce annual MSAT emissions by 72 percent between 1999 and 2050 (WSDOT 2011j). Construction of this grade separation concept is not expected to affect this reduction.

As part of the proposed Project, WSDOT will purchase up to eight new locomotives by July 2017 that will meet the new standards currently being developed by the Next Generation Corridor Equipment Pool Committee under the authority of the Passenger Rail Investment and Improvement Act of 2008. The engines would be part of a locomotive pool available to Amtrak and would be used along the corridor. It is presumed the new locomotives would be more fuel efficient and cleaner burning, and would reduce emissions of particulate matter.

Cost

The preliminary estimate of the total cost for the S. 56th Street grade separation concept is \$36.1 to \$63.1 million. The total cost includes an estimated \$13.1 million for right of way and \$21.49 million for construction. Details of the cost estimate and the risk matrix are included in Attachment 2.

Construction Effects

Construction effects unique to S. 56th Street are primarily a result of the temporary roadway detour. The detour would be needed to keep traffic moving while the grade separation is built within the existing right of way. The majority of the fully acquired properties and business relocations would be displaced because of the detour. Vehicles would experience slower speeds and increased congestion through the construction area and S. Tacoma Way intersection.

South 74th Street in Tacoma

The grade separation concept at S. 74th Street would reconfigure the roadway over the railroad tracks. The tracks currently cross S. 74th Street about a block west of S. Tacoma Way as shown in Exhibit 11. The concept plan sheets are included in Attachment 1.

For this grade separation concept, the reconfigured roadway would begin about 400 feet east of S. Madison Street where a new signalized intersection would be constructed. The intersection would connect a new truck access road to S. 74th Street that would serve the industrial properties on both sides of the roadway. From this new intersection, S. 74th Street would rise quickly at about a 10 percent grade in order to clear the railroad tracks. Fill would be placed and two short bridges would be constructed over the new access road and the railroad tracks. The new roadway would be built slightly south of the existing street and return to grade at S. Tacoma Way as shown in Exhibit 12.

Exhibit 10 summarizes the potential effects of the grade separation concept at S. 74th Street.

Exhibit 10
Summary of Effects and Conclusions for South 74th Street

Attribute	Effects and Conclusions
Business Relocations	2 (gas station and unidentified business)
Businesses with Altered Access	8 driveways would be altered or closed.
Residential Relocations	0
Residences with Altered Access	0
Number of Streets Closed	0
Retaining Wall	1,650 linear feet
Transportation	Grade separation could minimally reduce delays on S. 74 th Street and adjacent intersections; however, it would not change overall congestion levels at the intersection of S. 74 th Street and S. Tacoma Way. Grade separation at this location is not necessary based on peak hour LOS conditions or predicted number of accidents in accordance with FHWA guidance for roadway and rail design (FHWA 2007).
Predicted Accident Experience in 2030	1 accident every 19 years (0.053 accidents per year)
Noise	Similar to existing conditions
Visual Quality	The elevated bridge structure and retaining wall would change some views in the area.

Exhibit 10 (continued)
Summary of Effects and Conclusions for South 74th Street

Attribute	Effects and Conclusions
Socioeconomics and Environmental Justice	No effects are expected on low income populations. Effects on minority-owned businesses are unknown.
Public Services	No permanent effects; short-term construction activities may cause minor delay for service providers.
Utility Relocations	Utility relocations would be required, including electric, fiber optic, gas, water, and sewer lines. ¹
Geology and Soils	Geology and soils in the area could support the conceptual design.
Hazardous Materials	There is a high likelihood of encountering hazardous materials on acquired properties during construction.
Historic and Cultural Resources	No effects
Recreation	No effects
Wetlands, Water Quality, and Floodplains	17,000 square feet (0.39 acre) of new PGIS; otherwise, no measurable effects.
Fish, Wildlife, and Vegetation	No measurable effects
Air Quality	No measurable effects
Estimated Cost Range ²	\$29.1 to \$50.9 million

¹ Utility relocations would likely include but are not limited to this list. Further design would be needed to identify locations of all utilities in the affected area.

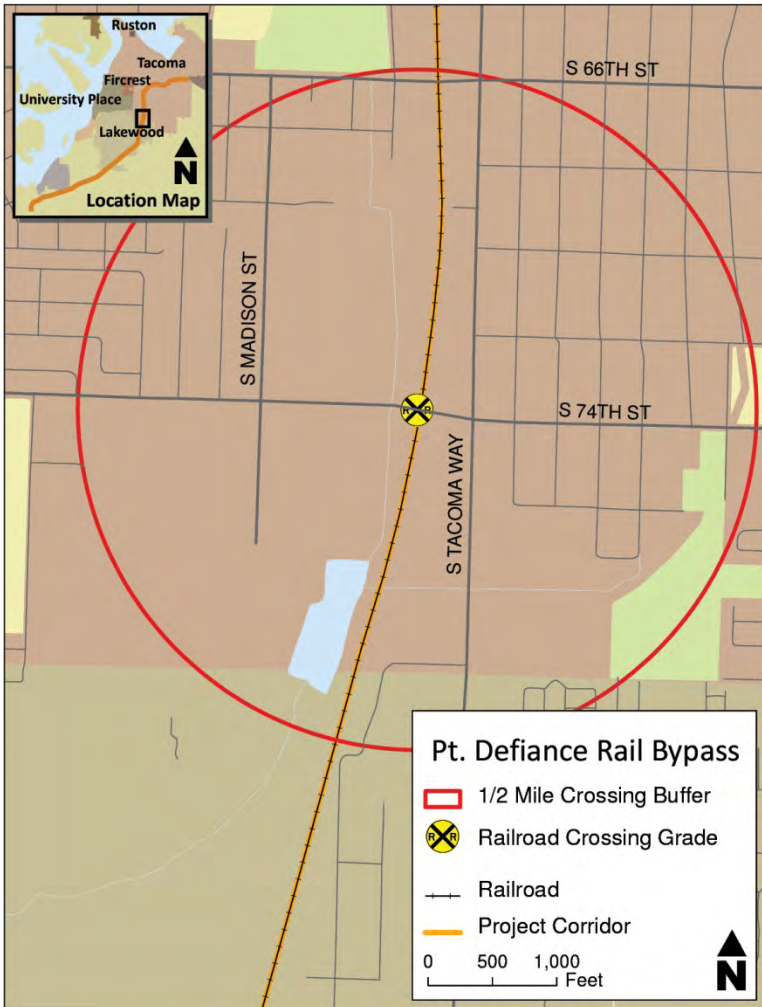
² This range represents the -20% to +40% Cost Range, and includes the cost of property acquisitions, construction, engineering, and work or materials that are not provided by the contractor.

Land Use and Relocations

The portion of S. 74th Street immediately west of the railroad tracks is a mix of industrial and commercial land uses including a large lumber yard, soil supplier, moving company, carpet store, and real estate and title office. East of the railroad tracks and along S. Tacoma Way are a variety of commercial businesses including car dealers, auto repair shops, a gas station, and pawn shop. This area is zoned for commercial and industrial uses. Just outside of the grade separation concept's footprint near S. Madison Street and S. Puget Sound Avenue, the land use and zoning is residential.

The grade separation concept would not change the type of land uses or zoning in the area. However, four full and nine partial property acquisitions would be required to construct this concept. Acquisitions are shown in Attachment 1, Figure 6. Of the four full property acquisitions needed, two are vacant, commercially zoned lands. Property acquisitions would cause at least two

Exhibit 11
South 74th Street



Railroad tracks crossing S. 74th Street looking north



Railroad tracks crossing S. 74th Street looking south



Looking east towards S. 74th Street and S. Tacoma Way intersection



Looking west towards S. 74th Street and S. Tacoma Way intersection

Exhibit 12
Existing Condition and Visual Simulation for South 74th Street



businesses—a gas station and a commercial business—to be relocated. At this time, it is unknown which commercial business would need to be relocated because the acquisition would take a portion of a long warehouse building that houses different businesses, including auto-related businesses and a wholesale baker. To construct the new truck access road, portions of three properties (two industrial and one commercial) located west of the railroad tracks would be acquired. These businesses may need to make some operational adjustments to accommodate the change in access, but they would be able to maintain operations.

This concept would also change access to several businesses as described in the Transportation – Access and Parking section. If this concept is developed further, business impacts would be analyzed in greater detail.

Transportation

Access and Parking

Elevating S. 74th Street over the railroad tracks would change access for properties, add a traffic signal at the truck access road, and change the orientation of S. 74th Street so that it intersects S. Tacoma Way at a 90-degree angle.

With grade separation, several properties would be partially or fully acquired (as shown in Attachment 1, Figure 6), which would alter access to properties and parking. A truck access road would be built west of the railroad tracks and connect with S. 74th Street as a signalized intersection. The access road would provide access to properties north and south of S. 74th Street west of the tracks.

One access point to an office and commercial business parking lot located west of the lumber yard would be closed and access would need to be routed through nearby driveways to the west. Between the railroad tracks and S. Tacoma Way, direct access to S. 74th Street would be blocked by a retaining wall. A car dealer on the northwest corner of S. 74th Street and S. Tacoma Way would lose access to S. 74th Street but retain access to S. Tacoma Way; no alternative access would be needed. On the south side of S. 74th Street east of the railroad tracks, the narrow warehouse building would need to have a portion of the building removed as well as its access to S. 74th Street (the parking lot also would be reduced in size). With its access removed, alternative access would need to be provided to S. Tacoma Way. Except for these changes, access to properties and parking would remain the same.

Safety

In terms of safety, the at-grade crossing proposed with the Point Defiance Bypass Project is predicted to experience one accident roughly every 19 years, or 0.053 accidents per year with expected conditions in 2030. The FHWA *Railroad-Highway Grade Crossing Handbook* recommends consideration of grade separation on the basis of accident experience if the USDOT Accident Prediction

Formula predicts more than one accident every two years (regardless of cost), and one accident every five years when grade separation can be economically justified (FHWA 2007). Therefore, the predicted accident experience at the S. 74th Street crossing does not indicate that grade separation should be considered.

Intersection Level of Service

Today, people experience moderate congestion while traveling through the intersection at S. 74th Street and S. Tacoma Way. The intersection would operate at LOS C in the AM peak hour and LOS D in the PM peak hour for year 2030 with the proposed Project. With LOS C operations, a driver might wait for up to 35 seconds at a stoplight. For LOS D operations a driver might wait up to 55 seconds at a stoplight. Typically, the City of Tacoma considers intersection operations of LOS A through D to be within acceptable limits.

Grade separating S. 74th Street over the railroad tracks could marginally reduce intersection delay during peak hours. However, overall congestion and LOS would not change because passenger trains would regularly cross only twice during the peak hours (one Sound Transit *Sounder* train and one Amtrak Cascades train) and block S. 74th Street for less than two minutes in the 1-hour AM and PM peak periods (each train crossing blocks the street for less than 60 seconds). Given that peak hour operations are within acceptable limits, grade separation is not necessary based on peak hour LOS conditions.

Freight trains currently block S. 74th Street for longer periods of time than Amtrak and Sound Transit passenger trains would; typically, these freight trains travel outside the AM and PM commuter peak hours. No quantitative analysis for street operations during freight train crossings was completed for the *Transportation Discipline Report*. However, only one freight train crossing per day is expected. Based on the infrequent operations and irregular schedule, grade separation to avoid conflicts with freight train crossings is not necessary.

Bicyclists, Pedestrians, and Transit

The grade separation concept would eliminate delays on S. 74th Street generated by train crossings for vehicles, pedestrians, and bicycles. However, non-motorized travel would be more challenging because bicyclists and pedestrians would encounter a steep hill with grades of 10 percent in order to cross over the railroad tracks. Additionally, non-motorized traffic traveling along the north side of S. 74th Street would encounter a signalized crossing at the truck access road located west of the tracks that may occasionally cause delay.

Three Pierce Transit bus routes (3, 202, and 300) travel through the S. 74th Street and S. Tacoma Way intersection. Currently, Route 202 crosses the railroad tracks, but with the concept it would no longer be exposed to delays generated by train crossings and would experience improved reliability. The other two routes would not be permanently affected by the concept. The bus stops near this intersection

may be moved slightly up or down the street to accommodate the new roadway configuration. During construction, the buses would likely experience delays due to lane restrictions, and bus stops may be temporarily closed or relocated outside the construction area.

Construction

During construction, lane restrictions would likely reduce speeds and increase congestion for vehicles traveling through the construction area. Traffic would remain on the existing roadway while the grade separation structure is constructed along the south side of S. 74th Street.

Noise

Noise along S. 74th Street near S. Tacoma Way is primarily caused by traffic on these busy arterials. Existing noise levels measured about 0.75 mile south of S. 74th Street on Durango Street SW, which has significantly less traffic, had an L_{dn} of approximately 55 dBA (WSDOT 2012a). Noise levels along S. 74th Street near S. Tacoma Way are several decibels higher. Because the traffic and *Sounder* trains would continue to contribute to the noise levels on S. 74th Street, the typical noise levels are anticipated to be similar with or without the grade separation.

Grade separation at this location would raise S. 74th Street next to industrial and commercial properties, which are not sensitive noise receivers. Warning equipment needed for at-grade crossings would not be necessary if the grade separation concept were constructed, eliminating this noise source. The truck access road would include a new signal just east of an apartment complex. Freight trucks braking at this signal might create some additional noise; however, no moderate or severe noise impacts would be expected.

Visual Quality

As S. 74th Street travels east towards S. Tacoma Way, the existing roadway climbs up a hill. There are street trees along S. 74th Street between S. Madison Street and the railroad tracks, as well as a narrow strip of vegetation adjacent to the tracks. Some of the street trees along the south side of the roadway would be removed to construct this grade separation concept. With the grade separation concept at S. 74th Street, some views in the immediate area would include the new elevated structure.

Views for people in vehicles, pedestrians, and bicyclists traveling on the uphill portions of the elevated roadway structure would include a slightly more prominent view of the roadway and a decreased ability to see what is in the distance. Traveling downhill, the ability to view the surrounding areas would be slightly increased. Views from the commercial buildings on S. 74th Street just west of the lumber yard would be partially blocked to the north and northeast by the higher roadway elevation. Views at the intersection of S. 74th Street and S. Tacoma Way would be

similar to existing conditions with numerous commercial businesses. Views would no longer include the rail crossing gates and warning equipment that people see today because the roadway would be above the tracks.

Socioeconomics and Environmental Justice

The grade separation concept at S. 74th Street would displace a gas station and commercial business. Relocation assistance would be provided to the affected businesses. Local residents who frequent the gas station and business would need to travel to other locations to reach the relocated businesses or similar services. The concept would also take a portion of three properties to construct the new access road. The higher roadway elevation would decrease visibility to one business and would substantially change access to the industrial properties west of the railroad tracks. These businesses would be able to maintain operations, but the location of their access would change. Overall, this alignment would not be expected to change the economic environment of this neighborhood because most area businesses would not be affected by the concept.

Low-income populations are not expected to experience disproportionately high and adverse effects because the nearby land uses in this area are commercial and industrial properties. Because this is a preliminary environmental evaluation of a conceptual design, the number of minority-owned commercial and industrial properties was not determined.

During construction, roadway restrictions would be expected to cause some delays for freight entering and exiting the businesses such as the lumber yard, moving company, and soil supplier, but access would be maintained. These businesses would have a portion of their properties acquired and reconfigured by the grade separation concept to accommodate their operations.

Public Services and Utilities

Sound Transit has resolved the conflicts with utilities along the rail corridor from Freighthouse Square in Tacoma south to Bridgeport Way SW in Lakewood as part of its *Sounder* Track and Signal Improvement Projects. However, Sound Transit's work does not include utility relocations that would be needed outside of the railroad right of way to construct this grade separation concept at S. 74th Street. As part of construction, several utilities such as electric, fiber optic, gas, and sewer lines would need to be relocated near S.74th Street. The specific impacts would be identified during the engineering design process if this concept is developed further.

The Tacoma Power Southwest Substation is located just west of this concept and there are many power poles in the vicinity. Construction of the grade separation concept would require close coordination with Tacoma Power to move some of the poles and power lines in the vicinity.

Public services would not experience any permanent adverse impacts. They would benefit from the grade separation because the potential for delays due to a train crossing would be eliminated. During construction, emergency services traveling on S. 74th Street could experience additional delay. Although there would be lane restrictions, the construction area is just three blocks long and other vehicles would be expected to yield to emergency services. Transit and school buses could experience delays because of lane restrictions. One private school is located a block northeast of the S. 74th Street and S. Tacoma Way intersection and would not be expected to be directly affected.

Geology and Soils

The proposed Project is located in a seismic hazard area. The structures for this grade separation concept would be designed to meet current safety standards. Site-specific soil and geologic information would be obtained during preliminary design if the concept is advanced. Settlement is not expected; however, if any settlement were to occur, it is expected to be minor and occur soon after the fill is placed.

During construction, fill would be placed and approximately 1,650 linear feet of retaining wall would be built to support the elevated roadway between the new truck access road and S. Tacoma Way. Erosion and dust from construction activities would be minimized by implementing appropriate BMPs.

Hazardous Materials

Railroads have used this corridor for approximately 125 years. Potential sources of contamination along the rail line include spills by lube oil leaks during typical railroad operations and maintenance activities, possible shallow soil contamination from creosote-treated railroad ties; herbicide used for vegetation control; fuel, solvents, and other hazardous material spills; and heavy metal contamination from the Tacoma smelter in Ruston. Site soil and/or groundwater may also be contaminated from hazardous materials stored, used, or handled on portions of the right of way that have been leased from the railroad (Shannon & Wilson 2004).

Many of the properties along S. 74th Street that would be partially or fully acquired for this grade separation concept are auto and freight-related uses. These properties have the potential to have soils that are contaminated by gasoline, petroleum, and oil. Two properties, located on the south side of S. 74th Street between the railroad tracks and S. Tacoma Way, are listed as contaminated by Ecology. This includes the gas station that would require clean-up and removal of the underground storage tanks and contaminated soil.

Historic and Cultural Resources

There are no properties listed on the NRHP that would be affected by the grade separation concept at S. 74th Street. The BNSF rail shed just to the north of S. 74th

Street is a common example of a rail shed and does not meet local or national criteria (WSDOT 2012b).

Recreation and Section 4(f)/6(f) Resources

There are no recreational areas, trails, Section 4(f), or Section 6(f) properties in the immediate area. Mountain View Memorial Park, located just south of the lumber yard, is a private funeral home and is not a recreational property.

Wetlands, Water Quality, and Floodplains

The grade separation concept at S. 74th Street is located in Chambers-Clover WRIA 12 (WSDOT 2012c). Approximately 250 feet west of the railroad tracks, Flett Creek crosses S. 74th Street in a 72-inch pipe approximately 10 feet below the ground (Tacoma 1988). The pipe connects to the Flett Creek Holding Basin located south of a lumber yard, which provides an area for pollutants to settle. The conceptual grade separation structure would not affect this pipe or water quality. However, construction plans would need to ensure that the pipe is not damaged and there is sufficient support for any fill placed above the pipe. Additionally, BMPs would be used to control erosion during construction.

There are no wetlands or floodplains in this grade separation concept footprint. The Flett Creek Holding Basin to the south is considered to be in the FEMA and Pierce County 100-year flood hazard area. This grade separation concept would add approximately 17,000 square feet (0.39 acre) of new PGIS. This amount of PGIS added by the grade separation concept exceeds the 5,000-square-foot threshold for flow control and water quality treatment requirements under the *Highway Runoff Manual* and *Ecology Manual*. Therefore, any changes in flow and/or water quality resulting from the new PGIS would be controlled by required BMPs. Also, no elevations would be altered within adjacent floodplains or flood hazard areas; therefore, no effects on these areas are expected.

Fish, Wildlife, and Vegetation

The Flett Creek pipe is located entirely below grade where it crosses S. 74th Street and does not provide fish habitat. No fish are documented in this area (WSDOT 2011i).

The area along S. 74th Street near S. Tacoma Way provides poor habitat for most wildlife, except those that have adapted to urban areas. Wildlife likely to be observed in the area includes birds, rodents, and raccoons. Constructing this grade separation concept would not change habitat conditions for wildlife.

A small amount of vegetation would be removed on the south side of S. 74th Street adjacent to the railroad tracks, as well as a few street trees. The area near the railroad is not suitable to support plants listed under the ESA. Therefore, no impacts on ESA-listed plants are anticipated.

Air Quality

Permanent effects on air quality are not expected if this grade separation concept is constructed. This portion of S. 74th Street is in Pierce County's maintenance area for CO. S. 74th Street and S. Tacoma Way would not exceed CO levels established in the NAAQS or cause a violation of applicable NAAQS. In addition, the proposed Project is not predicted to affect regional vehicle miles traveled or regional ozone and particulate matter levels. The grade separation concept may reduce CO, ozone, and particulate matter releases because it would eliminate the time vehicles are stopped waiting for a train to cross. However, any reduction in these emissions from vehicles would not change air quality in a measurable way. MSAT levels are predicted to decrease as a result of the EPA national control programs, which are projected to reduce annual MSAT emissions by 72 percent between 1999 and 2050 (WSDOT 2011j). Construction of this grade separation concept is not expected to affect this reduction.

As part of the proposed Project, WSDOT will purchase up to eight new locomotives by July 2017 that will meet the new standards currently being developed by the Next Generation Corridor Equipment Pool Committee under the authority of the Passenger Rail Investment and Improvement Act of 2008. The engines would be part of a locomotive pool available to Amtrak and would be used along the corridor. It is presumed the new locomotives would be more fuel efficient and cleaner burning, and would reduce emissions of particulate matter.

Cost

The preliminary estimate of the total cost for the S. 74th Street grade separation concept is \$29.1 to \$50.9 million. The total cost includes an estimated \$4.3 million for right of way and \$23.01 million for construction. Details of the cost estimate and the risk matrix are included in Attachment 2.

Construction Effects

Construction activities on S. 74th Street would result in several access changes and restrictions to build both the grade separation and the truck access road. Because noise could be bothersome to residents near S. Madison Street, a mitigation plan would be developed to protect the public from excessive noise effects. Freight access to the industrial businesses west of the railroad tracks would need to be coordinated throughout the construction stages. Vehicles would experience slower speeds and increased congestion through the construction area and S. Tacoma Way intersection.

Bridgeport Way SW in Lakewood

The grade separation concept at Bridgeport Way SW would reconfigure the roadway over the railroad tracks. The tracks currently cross Bridgeport Way SW about a half block north of Pacific Highway SW as shown in Exhibit 14. The concept plan sheets are included in Attachment 1.

This grade separation concept would place fill and build retaining walls between the southbound I-5 ramps and Arrowhead Road SW to raise Bridgeport Way SW, as shown in Exhibit 15. A short bridge would be constructed over the railroad tracks. The new roadway would have an 8 percent grade in order to clear the railroad tracks. In order to raise the intersection with Pacific Highway, fill would be needed and retaining walls constructed on Pacific Highway, approximately one block on either side of Bridgeport Way SW.

The City of Lakewood has made improvements and installed landscaping on the north side of the Bridgeport Way SW and Pacific Highway SW intersection to create a gateway for the Lakewood community. A hospital is located just north of the grade separation concept on Bridgeport Way SW. To maintain access for the community and emergency services, this concept may be built in two sections. Temporary roadways would be constructed to the east of Bridgeport Way SW and to the north of Pacific Highway SW to accommodate traffic during construction of the elevated new roadways. Lane restrictions on Bridgeport Way SW would likely be extensive in order to shift traffic to one side of the roadway while the first half of the grade separation structure is built. Then traffic would be shifted to the completed side of the new roadway while the other half of the structure is built. Traffic restrictions would reduce speeds and increase congestion for vehicles traveling through the construction area.

Exhibit 13 summarizes the potential effects of the grade separation concept at Bridgeport Way SW.

Exhibit 13
Summary of Effects and Conclusions for Bridgeport Way SW

Attribute	Effects and Conclusions
Business Relocations	Approximately 16 (some of the buildings may contain more than one business)
Businesses with Altered Access	4
Residential Relocations	0
Residences with Altered Access	0
Number of Streets Closed	0
Retaining Wall	3,820 linear feet

Exhibit 13 (continued)
Summary of Effects and Conclusions for Bridgeport Way SW

Attribute	Effects and Conclusions
Transportation	Grade separation could minimally reduce delays on Bridgeport Way SW and adjacent intersections; however, it would not change overall congestion levels at the intersection of Bridgeport Way SW and Pacific Highway. Grade separation at this location is not necessary based on peak hour LOS conditions or predicted number of accidents in accordance with FHWA guidance for roadway and rail design (FHWA 2007).
Predicted Accident Experience in 2030	1 accident every 22 years (0.045 accidents per year)
Noise	Similar to existing conditions
Visual Quality	The elevated bridge structure and retaining wall would change some views in the area.
Socioeconomics and Environmental Justice	No effects are expected on low income populations. Effects on minority-owned businesses are unknown.
Public Services	No permanent effects; short-term construction activities may cause minor delay for service providers. WSDOT would need to coordinate with St. Clare Hospital throughout construction.
Utility Relocations	Utility relocations would be required, including electric, fiber optic, gas, water, and sewer lines. ¹
Geology and Soils	Geology and soils in the area could support the conceptual design.
Hazardous Materials	There is a high likelihood of encountering hazardous materials on acquired properties during construction.
Historic and Cultural Resources	No effects
Recreation	No effects
Wetlands, Water Quality, and Floodplains	No new PGIS or measurable effects
Fish, Wildlife, and Vegetation	No measurable effects
Air Quality	No measurable effects
Estimated Cost Range²	\$53.6 to \$93.9 million

¹ Utility relocations would likely include but are not limited to this list. Further design would be needed to identify locations of all utilities in the affected area.

² This range represents the -20% to +40% Cost Range, and includes the cost of property acquisitions, construction, engineering, and work or materials that are not provided by the contractor.

Exhibit 14
Bridgeport Way SW

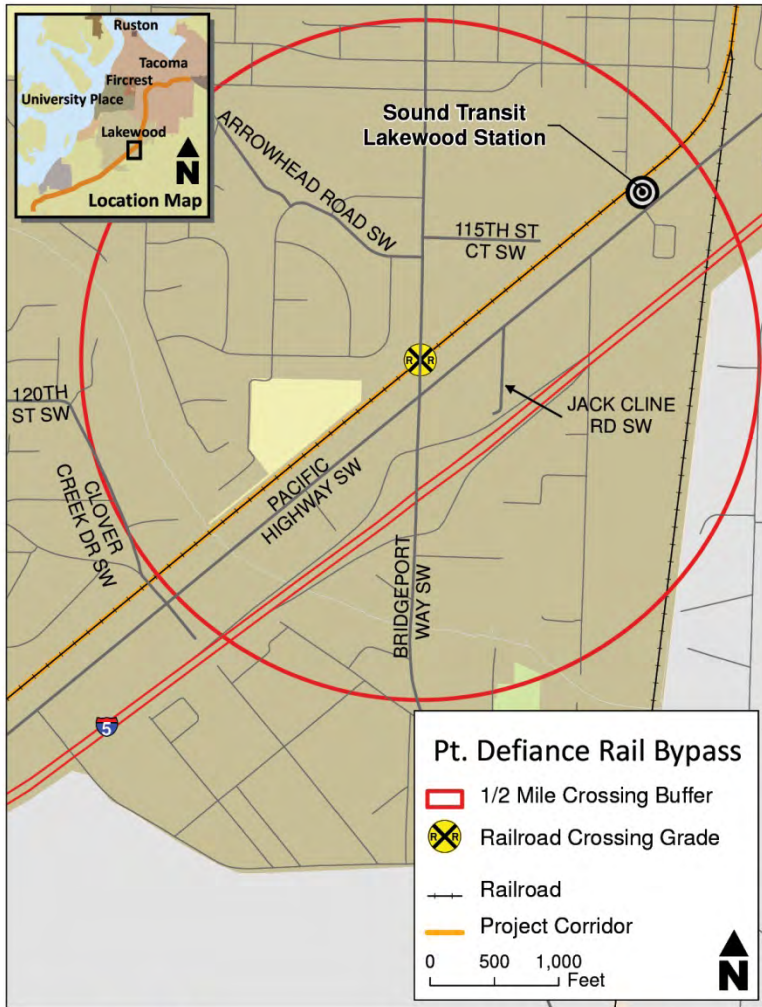


Exhibit 15
Existing Condition and Visual Simulation for Bridgeport Way SW



Land Use and Relocations

The land uses and zoning along the Bridgeport Way SW and Pacific Highway SW intersection are commercial. Northeast of the highway, the land use and zoning designation becomes residential. This large residential neighborhood is accessed from Arrowhead Road SW on the west side of Bridgeport Way SW. There are also a few multi-family residential buildings on the east side of Bridgeport Way SW that are accessed from 115th Street Court SW. A mobile home park is located just east of the construction area at Jack Cline Road SW.

To construct the Bridgeport Way SW grade separation concept, four parcels would be partially acquired and 18 parcels would be fully acquired. Acquisitions are shown in Attachment 1, Figure 10. All of these parcels are commercial properties. The four partial acquisitions include an auto-related business, a portion of the parking lot in front of a casino and bingo hall, and the edge of a vacant gas station property. The 18 full acquisitions include approximately 16 businesses: a gas station, retail and auto-related businesses, and several restaurants. The exact number of businesses that would need to be acquired and relocated would be determined if the concept is advanced. Some of the buildings on these potentially acquired properties contain more than one business.

If this design is developed further, WSDOT would work with the City of Lakewood to incorporate landscaping and design elements consistent with the City's gateway vision for this intersection.

Transportation

Access and Parking

With the grade separation concept, changes to the street system would alter access to properties and parking. Around the Bridgeport Way SW/Pacific Highway SW intersection, several properties would be fully acquired and a few partially acquired (shown in Figure 10 of Attachment 1). For properties affected by partial acquisition, access to the sites and parking would change as follows:

- For AAMCO Transmission & Auto Repair (12006 Pacific Highway SW) located on the north side of Pacific Highway SW, the east access point on Pacific Highway SW would be closed, but the west access point would remain. Pedestrian connections to the business would remain relatively unchanged.
- For JSK's Treasure Chest (11605 Bridgeport Way SW) located on the east side of Bridgeport Way SW, access points onto Bridgeport Way SW would be eliminated and site access would be provided via the existing connections to 115th Street Court SW through the adjoining parcels to the north. Approximately the west half of the west parking lot would be eliminated. Pedestrians traveling northbound on Bridgeport Way SW

would need to travel farther north to access the business and travel through the parcel where the Happy Days Casino is located.

- For Happy Days Casino (11521 Bridgeport Way SW) located on the east side of Bridgeport Way SW, access points onto Bridgeport Way SW would be eliminated and site access would be provided via the existing connections to 115th Street Court SW. Approximately the west half of the west parking lot would be eliminated. Pedestrian connections to the parcel would remain relatively unchanged.
- For the gas station mini mart (11741 Pacific Highway SW) located on the south side of Pacific Highway SW, the west access point would be removed to improve the adjacent access point for the Holiday Inn Express and a connection could be provided to that access driveway. Parking would be eliminated along the west property boundary. Pedestrian connections to the parcel would remain relatively the same.

Safety

The at-grade crossing proposed at Bridgeport Way SW with the Point Defiance Bypass Project is predicted to experience one accident roughly every 22 years, or 0.045 accidents per year with expected conditions in 2030. The FHWA *Railroad-Highway Grade Crossing Handbook* recommends consideration of grade separation on the basis of accident experience if the USDOT Accident Prediction Formula predicts more than one accident every two years (regardless of cost), and one accident every five years when grade separation can be economically justified (FHWA 2007). Therefore, the predicted accident experience at the Bridgeport Way SW crossing does not indicate that grade separation should be considered.

Intersection Level of Service

Today, people experience little to moderate congestion while traveling through the Bridgeport Way SW interchange area. At the Bridgeport Way SW and Pacific Highway SW intersection, traffic currently operates at LOS B in the AM peak hour and LOS C in the PM peak hour. With LOS C operations, a driver might wait up to 35 seconds at a stoplight, and for LOS B operations a driver might wait up to 20 seconds at a stoplight. Typically, the City of Lakewood considers intersection operations of LOS A through D to be within acceptable limits. Grade separating Bridgeport Way SW over the railroad tracks could marginally reduce intersection delay during peak hours. However, overall congestion and LOS would not change because Amtrak passenger trains would regularly cross only once during the AM and PM peak hour and block Bridgeport Way SW for less than one minute in the 1-hour peak period (each train crossing would block the street for less than 60 seconds). Given that peak hour operations are within acceptable limits, grade separation is not necessary based on peak hour LOS conditions and passenger train activity.

Freight trains currently block Bridgeport Way SW for longer periods of time than Amtrak passenger trains would; typically, these freight trains travel outside the AM and PM commuter peak hours. No quantitative analysis for operations during freight train crossings was completed for the *Transportation Discipline Report*. However, only one freight train crossing per day is expected. Based on the infrequent operations and irregular schedule, grade separation to avoid conflicts with freight train crossings is not necessary.

Bicyclists, Pedestrians, and Transit

This grade separation concept would eliminate delays on Bridgeport Way SW generated by train crossings for vehicles, pedestrians, and bicycles. Although safety is improved, non-motorized travel would be more challenging because bicyclists and pedestrians would encounter a steep hill with grades of 8 percent in order to cross over the railroad tracks.

Two Pierce Transit bus routes (206 and 300), four Intercity Transit bus routes (603, 605, 612, and 620), and one Sound Transit Express Route (592) travel through the Bridgeport Way SW and Pacific Highway SW intersection. Currently, only Pierce Transit Route 206 crosses the railroad tracks; with the concept, this route would no longer be exposed to delays generated by train crossings. The other bus routes would not be permanently affected by the concept. The bus stops near this intersection may be moved slightly to accommodate the new roadway configuration. During construction, the buses would likely experience some delays due to lane restrictions, and bus stops may be temporarily closed or relocated outside the construction area.

Construction

During construction, lane restrictions on Bridgeport Way SW would likely be extensive in order to shift traffic to one side of the roadway while the first half of the structure is built. Then traffic would be shifted to the completed side of the new roadway while the other half of the structure is built. Traffic restrictions would reduce speeds and increase congestion for vehicles traveling through the construction area.

Noise

Noise near or at the Bridgeport Way SW/Pacific Highway SW intersection is primarily caused by traffic on this busy arterial and from I-5. Existing noise levels measured at this intersection had an L_{dn} of 70 dBA (WSDOT 2012a), which is similar to the noise level a lawn mower makes 50 feet away. Because vehicle traffic and trains would continue to contribute to the noise levels in the area, the typical noise levels are anticipated to be similar with or without the grade separation. This area also receives periodic aircraft noise from Joint Base Lewis-McChord.

This grade separation concept would raise the roadway near a residential area and Tyee Elementary School. Changing the height of where the noise source is originating could increase noise levels for the homes located along Tomahawk Road SW, just south of Arrowhead Road SW. Further noise analysis would be needed to determine impacts if this concept is developed further.

The only location in the proposed Project area in which trains may experience wheel squeal is northeast of Bridgeport Way SW and Sound Transit's Lakewood Station where the tracks curve. Track lubrication is included in the design to reduce wheel squeal at this location. Warning equipment needed for at-grade crossings would not be necessary if the grade separation concept is constructed, thereby eliminating this noise source.

Visual Quality

The topography of Bridgeport Way SW rises slightly towards the south and the I-5 ramps. To construct the grade separation structure over the railroad tracks, the Bridgeport Way SW/Pacific Highway SW intersection would need to be raised. The City of Lakewood has landscaped this intersection and plans to install a sculpture on the north side of the intersection to create a gateway into the city. There is also a refuge area in the middle of the street to allow pedestrians to cross this large intersection safely.

With the grade separation concept at Bridgeport Way SW, some views in the immediate area would include the new elevated structure. Views for people in vehicles, pedestrians, and bicyclists traveling towards this large intersection would include a slightly more prominent view of the roadway; however, the ability to see what is in the distance would be slightly reduced.

There are also a few street trees north of the railroad tracks that would be removed and replaced, where feasible. There would be several buildings that would be demolished near the Bridgeport Way SW/Pacific Highway SW intersection. However, the views would still be similar to existing conditions because they would include several commercial businesses and the busy roadway with its large signal structure. Views would no longer include the rail crossing gates and warning equipment that people see today because the roadway would be above the tracks.

Socioeconomics and Environmental Justice

The grade separation concept at Bridgeport Way SW would displace approximately 16 businesses. Relocation assistance would be provided to affected businesses. Local residents who frequent these businesses would need to travel to other locations to reach the relocated businesses or similar services and restaurants. This concept would reduce the amount of usable commercial property at this location, but is not expected to change overall economic or neighborhood character along Bridgeport Way SW or Pacific Highway.

Low income populations are not expected to experience disproportionately high and adverse effects because the primary effects in this area would be to the commercial businesses. Because this is a preliminary environmental evaluation of a conceptual design, the number of minority-owned commercial and industrial properties was not determined.

During construction, measures would be implemented to minimize potential noise effects on Tyee Park Elementary School. The school is not directly accessed from Bridgeport Way SW or Pacific Highway SW, but it backs up to the railroad tracks just west of Bridgeport Way SW. If this concept is developed further, the proposed Project would need to identify if any of the school's bus routes would be affected by construction. There is also the potential for minor impacts on connections to the residential neighborhood adjacent to the elementary school. These connections could be affected by the additional traffic congestion from construction activities on Bridgeport Way SW.

Public Services and Utilities

Sound Transit has resolved utility conflicts along the rail line from Freighthouse Square in Tacoma south to Bridgeport Way SW in Lakewood as part of its *Sounder* Track and Signal Improvement Projects. However, Sound Transit's work does not include utility relocations that would be needed outside of the railroad right of way to construct this grade separation concept. Several utilities would need to be relocated such as electric, fiber optic, natural gas, water, storm drain, and sewer lines to accommodate the new roadway configuration. The specific impacts would be identified during the engineering design process if this concept is developed further.

Public services would not experience any permanent adverse impacts. They would benefit from grade separation because the potential for delays due to a train crossing would be eliminated. During construction, emergency service providers traveling on Bridgeport Way SW to St. Clare Hospital could experience delays because of the roadway restrictions. Transit and school buses could experience delays because of lane restrictions.

Geology and Soils

The proposed Project is located in a seismic hazard area. The structures for this grade separation concept would be designed to meet current safety standards. Site-specific soil and geologic information would be obtained during preliminary design.

During construction, fill would be placed and approximately 3,820 linear feet of retaining wall would be built to support the elevated Bridgeport Way SW and Pacific Highway SW roadways. Settlement is not expected; however, if any settlement were to occur, it is expected to be minor and occur soon after the fill is

placed. Erosion and dust from construction activities would be minimized by implementing appropriate BMPs.

Hazardous Materials

Railroads have used this corridor for approximately 125 years. Potential sources of contamination along the rail line include spills by lube oil leaks during typical railroad operations and maintenance activities; possible shallow soil contamination from creosote-treated railroad ties; herbicide used for vegetation control; fuel, solvents, and other hazardous material spills; and heavy metal contamination from the Tacoma smelter in Ruston. Site soil and/or groundwater may also be contaminated from hazardous materials stored, used, or handled on portions of the right of way that have been leased from the railroad (Shannon & Wilson 2004).

Several of the properties that would be acquired along Bridgeport Way SW and Pacific Highway SW for this grade separation concept include auto-related uses. These properties have the potential to contain soils that are contaminated by gasoline, petroleum, and oil. Four properties on Pacific Highway SW near Bridgeport Way SW have reasonably predictable sites for potential contamination (see Exhibit 11 in WSDOT [2007a] – *Hazardous Materials Technical Memorandum*). This includes the gas station that would require clean-up and removal of the underground storage tanks and contaminated soil.

Historic and Cultural Resources

There are no properties listed on the NRHP that would be affected by the grade separation concept at Bridgeport Way SW (WSDOT 2012b).

Recreation and Section 4(f)/6(f) Resources

There are no recreational areas, trails, Section 4(f), or Section 6(f) properties in the immediate area.

Wetlands, Water Quality, and Floodplains

Bridgeport Way SW is located in Chambers-Clover WRIA 12 (WSDOT 2012c). Clover Creek is located approximately 0.4 mile southwest of the railroad crossing. The conceptual grade separation structure would not affect this creek or water quality. BMPs would be used to control erosion during construction.

Much of the area surrounding this railroad crossing is within the Pierce County 100-year flood hazard area. This grade separation concept is not expected to change the storage volume of the floodplains. There are no wetlands adjacent to this grade separation concept.

Fish, Wildlife, and Vegetation

The area along Bridgeport Way SW and Pacific Highway SW provides poor habitat for most wildlife, except those that have adapted to urban areas. Wildlife likely to be observed in the area includes birds, rodents, and raccoons. This grade separation concept would not change habitat conditions for wildlife. There are no fish or fish habitat in the vicinity.

The area near the railroad is not suitable to support plants listed under the ESA. Therefore, no effects on ESA-listed plants are anticipated. Landscaping removed at the intersection, which is part of the city of Lakewood's gateway vision, would be replaced.

Air Quality

Permanent effects on air quality are not expected if this grade separation concept is constructed. This portion of Bridgeport Way SW is in Pierce County's maintenance area for CO. The Bridgeport Way SW and Pacific Highway SW intersection would not exceed CO levels established in the NAAQS or cause a violation of applicable NAAQS. In addition, the proposed Project is not predicted to affect regional vehicle miles traveled or regional ozone and particulate matter levels. The grade separation concept may reduce CO, ozone, and particulate matter releases because it would eliminate the time vehicles are stopped waiting for a train to cross. However, any reduction in these emissions from vehicles would not change air quality in a measurable way. MSAT levels are predicted to decrease as a result of the EPA national control programs, which are projected to reduce annual MSAT emissions by 72 percent between 1999 and 2050 (WSDOT 2011j). Construction of this grade separation concept is not expected to affect this reduction.

As part of the proposed Project, WSDOT will purchase up to eight new locomotives by July 2017 that will meet the new standards currently being developed by the Next Generation Corridor Equipment Pool Committee under the authority of the Passenger Rail Investment and Improvement Act of 2008. The engines would be part of a locomotive pool available to Amtrak and would be used along the corridor. It is presumed the new locomotives would be more fuel efficient and cleaner burning, and would reduce emissions of particulate matter.

Cost

The preliminary estimate of the total cost for the Bridgeport Way SW grade separation concept is \$53.6 to \$93.9 million. The total cost includes an estimated \$17.2 million for right of way and \$35.59 million for construction. Details of the cost estimate and the risk matrix are included in Attachment 2.

Construction Effects

To keep traffic moving through the busy Bridgeport Way SW and Pacific Highway SW intersection construction would likely occur one half at a time. Bridgeport Way SW would likely be restricted and shifted slightly east with a temporary intersection while the structure is being constructed in the existing right of way. At the end of construction, the intersection would likely need to be completely closed for a short time to connect the permanent structure through the Pacific Highway SW intersection. The majority of the fully acquired properties and business relocations would be displaced because of the temporary roadway. Vehicles would experience slower speeds and increased congestion through the construction area and intersection with Pacific Highway SW. There is the potential during the peak hour for traffic to back up on the I-5 off-ramps to Bridgeport Way SW.

Berkeley Street SW in Lakewood

The grade separation concept at Berkeley Street SW would raise the railroad tracks over the surface street. The tracks currently cross Berkeley Street SW between the southbound I-5 ramps and Union Avenue SW as shown in Exhibit 17. The concept plan sheets are included in Attachment 1. There is only about 65 feet between the southbound I-5 ramps and the railroad tracks. The roadway would remain in the same configuration as it is today.

The concept would be constructed within the existing railroad right of way. Because design guidelines recommend a maximum 1 percent grade, this concept would require construction of the rail line to extend approximately 0.75 mile north and south of the grade crossing. Retaining walls would be constructed beginning about 0.6 mile before the crossing in each direction. A short bridge would also be built over Berkeley Street SW as shown in Exhibit 18.

Exhibit 16 summarizes the potential effects of the grade separation concept at Berkeley Street SW.

Exhibit 16
Summary of Effects and Conclusions for Berkeley Street SW

Attribute	Effects and Conclusions
Business Relocations	0
Businesses with Altered Access	2
Residential Relocations	0
Residences with Altered Access	0
Number of Streets Closed	0
Retaining Wall	10,060 linear feet
Transportation	Grade separation could minimally reduce delays on Berkeley Street SW and adjacent intersections; however, it would not change overall congestion levels at the Berkeley Street SW intersection. Grade separation at this location would not improve the peak hour LOS conditions enough to result in a LOS A to D range. Grade separation at this location is not necessary based on the predicted number of accidents in accordance with FHWA guidance for roadway and rail design (FHWA 2007).
Predicted Accident Experience in 2030	1 accident every 33 years (0.030 accidents per year)
Noise	Retaining walls would block I-5 noise to some receptors, and the higher level of the train may increase train noise for receptors that are a block or two to the northwest. Overall, noise levels are expected to be similar to existing conditions.
Visual Quality	The elevated structure and retaining wall would block some views to/from I-5.

Exhibit 16 (continued)
Summary of Effects and Conclusions for Berkeley Street SW

Attribute	Effects and Conclusions
Socioeconomics and Environmental Justice	Less visibility from I-5 to businesses on Union Avenue SW could potentially result in an economic loss for some businesses. Effects on minority-owned businesses are unknown. Increased isolation could be perceived of the Tillicum neighborhood from points east.
Public Services	No permanent effects; short-term construction activities may cause minor delay for service providers.
Utility Relocations	Utility relocations would be required, including electric, fiber optic, gas, water, and sewer lines. ¹
Geology and Soils	Geology and soils in the area could support the conceptual design.
Hazardous Materials	There is a high likelihood of encountering hazardous materials in the railroad right of way during construction.
Historic and Cultural Resources	Visual surroundings for two historic buildings in the vicinity could be affected.
Recreation	No effects
Wetlands, Water Quality, and Floodplains	2,000 square feet (0.05 acre) of new PGIS; otherwise, no measurable effects.
Fish, Wildlife, and Vegetation	No measurable effects
Air Quality	No measurable effects
Estimated Cost Range²	\$49.4 to \$86.5 million

¹ Utility relocations would likely include but are not limited to this list. Further design would be needed to identify locations of all utilities in the affected area.

² This range represents the -20% to +40% Cost Range, and includes the cost of property acquisitions, construction, engineering, and work or materials that are not provided by the contractor.

Land Use and Relocations

This concept would not acquire any properties or change land use in the area. The land use and zoning in the surrounding area is primarily military. However, along Union Avenue SW are several commercial businesses and a residential neighborhood is located to the north-northwest of this concept.

There are three properties on Union Avenue SW that currently have lease agreements with Sound Transit to use a portion of the right of way for parking. These properties would no longer be able to use the right of way with this concept. In the event that the lessee is no longer able to use the right of way, an equitable cost would be negotiated to modify the premises to allow the lessee to operate.

Exhibit 17
Berkeley Street SW

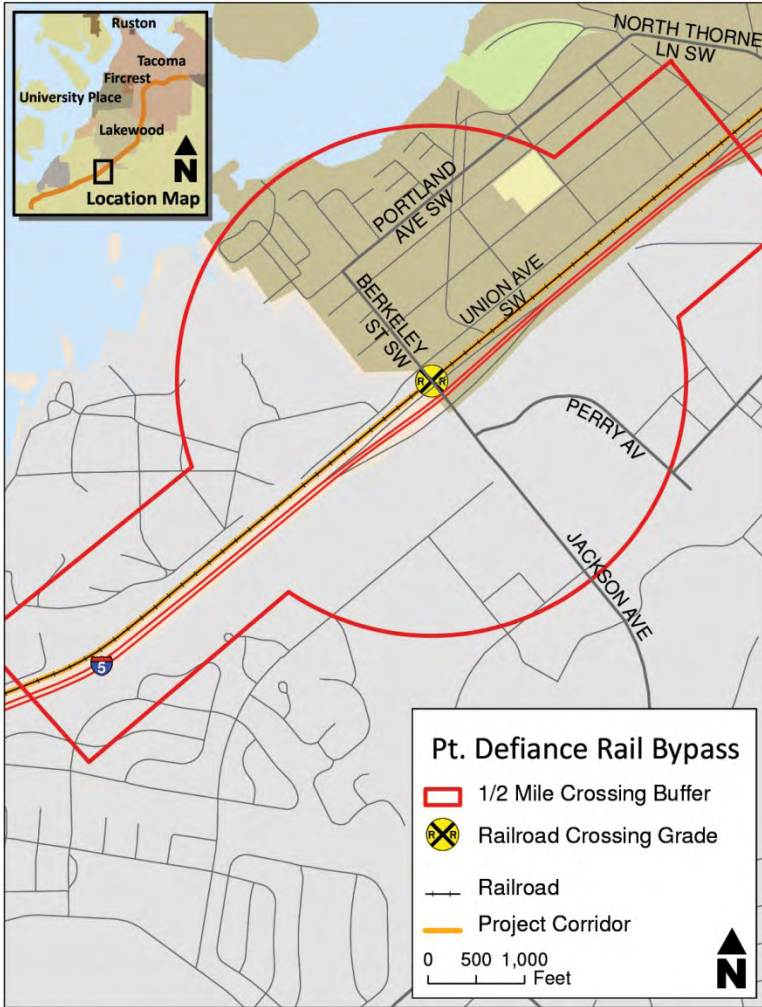


Exhibit 18
Existing Condition and Visual Simulation for Berkeley Street SW



Transportation

Access and Parking

The Berkeley Street SW grade separation concept would keep the street network connections and access for properties that exist today.

Safety

The at-grade crossing proposed at Berkeley Street SW with the Point Defiance Bypass Project is predicted to experience one accident roughly every 33 years, or 0.030 accidents per year with expected conditions in 2030. The FHWA *Railroad-Highway Grade Crossing Handbook* recommends consideration of grade separation on the basis of accident experience if the USDOT Accident Prediction Formula predicts more than one accident every two years (regardless of cost), and one accident every five years when grade separation can be economically justified (FHWA 2007). Therefore, the predicted accident experience at the Berkeley Street SW crossing does not indicate that grade separation should be considered.

Intersection Level of Service

Today people experience severe congestion around the railroad crossing in the PM peak hour because traffic operations are poor at the intersection of Berkeley Street SW and Union Avenue SW. This intersection was signalized and then converted into a four-way stop with flashing red lights because of challenges in coordinating with the I-5 ramp intersection signals. In the year 2030 with the proposed Project, the intersection would be signalized once again and this time would operate on the same controller as the signals at the I-5 ramp intersections to more closely control queuing and traffic flow through the interchange. This change will improve congestion in the AM peak hour from LOS F to LOS E, and in the PM peak hour from LOS F to LOS D. For LOS E operations a driver might wait up to 80 seconds at a stoplight, and for LOS F operations a driver might wait longer than 80 seconds at a stoplight. Typically, the City of Lakewood considers intersection operations of LOS A through D to be within acceptable limits.

Grade separating Berkeley Street SW over the railroad tracks could marginally reduce intersection delay during peak hours. However, overall congestion and LOS would not change because passenger trains would regularly cross only once during the AM peak hour and once during the PM peak hour. Each train crossing would block Berkeley Street SW for less than one minute in the 1-hour peak period. Grade separating this location is not expected to improve overall congestion and LOS enough at the Berkeley Street SW and Union Avenue SW intersection to be within the City's acceptable limits of LOS A through D.

Freight trains currently block Berkeley Street SW for longer periods of time than Amtrak passenger trains would; typically, these freight trains travel outside the AM and PM commuter peak hours. No quantitative analysis for operations during

freight train crossings was completed for the *Transportation Discipline Report*. However, only one freight train crossing per day is expected. Based on the infrequent operations and irregular schedule, grade separation to avoid conflicts with freight train crossings is not necessary.

Bicyclists, Pedestrians, and Transit

The grade separation concept would eliminate delays on Berkeley Street SW generated by train crossings for vehicles, pedestrians, and bicycles. In addition to safety being improved, non-motorized travel would function as it does today on Berkeley Street.

No public transit service is offered through the Berkeley Street interchange; therefore, the concept does not affect transit service.

Construction

During construction, street traffic would most likely be largely unaffected except during placement of the bridge structure over Berkeley Street SW.

Noise

Noise along Berkeley Street SW near Union Avenue SW is primarily caused by traffic on I-5 and the busy surface streets. This area also experiences periodic noise from aircraft taking off and landing at Joint Base Lewis-McChord. Existing noise levels measured between Union Avenue SW and I-5, just north of Berkeley Street SW, had an L_{dn} of approximately 66 to 75 dBA (WSDOT 2012a). Noise levels one block west were measured to have an L_{dn} of approximately 60 dBA. The typical noise levels are anticipated to be similar but the noise source could change with the grade separation.

Grade separation at this location would raise the railroad tracks next to the commercial properties along Union Avenue SW, which are not sensitive noise receivers. The noise from I-5 would likely decrease for several properties because the retaining wall would act as a barrier. However, the noise from the trains would be expected to reach receivers farther west because of the elevated structure. If this concept is developed further, noise analysis would need to be conducted for the residential properties located on Washington Avenue SW.

Warning equipment needed for at-grade crossings would not be necessary if the grade separation concept is constructed, thereby eliminating this noise source.

Visual Quality

With the grade separation concept at Berkeley Street SW, some views in the immediate area would include the new elevated structure. The topography of the existing railroad tracks is flat and on an embankment located between I-5 and

Camp Murray south of Berkeley Street SW, and between I-5 and the Tillicum neighborhood north of Berkeley Street SW. The railroad tracks would be raised approximately 20 feet above Berkeley Street SW and would be a prominent visual feature. To reach this height, retaining walls would extend approximately 0.6 mile in each direction. Sight distances at the Berkeley Street SW, southbound I-5 ramps, and Union Avenue SW would be bounded by the new structure and would limit views to the north and south.

For drivers on I-5 near the Berkeley Street exit, the retaining wall would block views of the businesses on Union Avenue SW and of Camp Murray. Camp Murray's property and buildings would not be affected by the concept but the retaining walls for the grade separation structure would block views to the southeast and alter the surroundings slightly. For people on the west side of the tracks, views to the southeast that currently include I-5 would be blocked. Some viewers may consider the separation from I-5 a benefit while others would view the structure as a barrier.

Socioeconomics and Environmental Justice

The visual barrier created by raising the railroad tracks over Berkeley Street SW could potentially affect some businesses (such as restaurants) that rely on customers passing through on I-5. Because this is a preliminary environmental evaluation of a conceptual design, the number of minority-owned commercial and industrial properties was not determined.

This neighborhood is already perceived as being isolated because it is bounded by I-5 and Camp Murray. Adding the retaining wall may increase the perception that the neighborhood is isolated. Minor effects on community cohesion may also be experienced due to changes in noise. The Tillicum neighborhood has a low income population (WSDOT 2011e). However, these residents are not expected to experience disproportionately high and adverse effects because elevating the tracks over Berkeley Street SW would remove the grade crossing's potential for conflicts with trains. However, if this concept is developed further, additional analysis would likely be needed to determine if there are any specific effects on low income populations.

Traffic congestion caused by construction could affect connections to the Tillicum neighborhood.

Public Services and Utilities

As part of construction, several utilities such as electric, fiber optic, gas, water, and sewer lines that run along Berkeley Street SW or in the railroad right of way would need to be relocated. The specific impacts would be identified during the engineering design process if this concept is developed further.

Public services would not experience any permanent adverse impacts. They would benefit from the grade separation because the potential for delays due to a train crossing would be eliminated. During construction, most of the work would occur within the railroad right of way. However, the temporary tracks would be very close to the southbound I-5 ramps and congestion at the intersection with Berkeley Street SW could cause some additional delays for emergency services.

Geology and Soils

The proposed Project is located in a seismic hazard area. The structures for this grade separation concept would be designed to meet current safety standards. Site-specific soil and geologic information would be obtained during preliminary design if the concept is advanced. Settlement is not expected; however, if any settlement were to occur it is expected to be minor and occur soon after the fill is placed.

During construction, fill would be placed and approximately 10,060 linear feet of retaining wall would be built to support the elevated tracks. Erosion and dust from construction activities would be minimized by implementing appropriate BMPs.

Hazardous Materials

Railroads have used this corridor for approximately 125 years. Potential sources of contamination along the rail line include spills by lube oil leaks during typical railroad operations and maintenance activities; possible shallow soil contamination from creosote-treated railroad ties; herbicide used for vegetation control; fuel, solvents, and other hazardous material spills; and heavy metal contamination from the Tacoma smelter in Ruston. Site soil and/or groundwater may also be contaminated from hazardous materials stored, used, or handled on portions of the right of way that have been leased from the railroad (Shannon & Wilson 2004).

The north end of the area is located in the vicinity of a previously contaminated aquifer that is part of the former Fort Lewis Logistics Center Superfund site. Clean-up was completed in 1997 (WSDOT 2007a).

Historic and Cultural Resources

There are two historic resources in the vicinity of this grade separation concept: the Adjutant General's Residence and the Barbecue Inn.

The Adjutant General's Residence (also known as The Arsenal) is located on Camp Murray and is listed on the NRHP (Jones & Stokes 2008; WSDOT 2012b). The Adjutant General's Residence would not be affected by the concept but the retaining walls for the grade separation structure would block views to the southeast and somewhat change the visual landscape of the area.

The Barbecue Inn located at 8102 Maple Street SW appears eligible for listing because it is a good representative of Streamline Moderne architecture (common in the 1930s and 1940s) and of a roadside café building, which is increasingly rare in Pierce County (WSDOT 2012b). The building was likely constructed in 1927 and altered in 1944 to its current appearance, with the exception of the pedestrian entrance on the east side, which was likely the result of construction post-2000. This building is located at the north end of the concept where the grade of the railroad tracks would begin to rise. The building would not be affected by the concept, but the context in which the retaining walls for the grade separation structure are built to the southwest of this location would alter its surroundings slightly.

Recreation and Section 4(f)/6(f) Resources

There are no recreational areas, trails, or Section 6(f) properties in the immediate area. The Adjutant General's Residence is listed on the NRHP. If this concept is developed further, additional analysis would be needed to evaluate possible use under Section 4(f).

Wetlands, Water Quality, and Floodplains

Berkeley Street SW is located in Chambers-Clover WRIA 12 (WSDOT 2012c). American Lake is to the northwest of the proposed Project and would not be affected by this concept. Murray Creek flows underneath I-5 and the railroad tracks in a concrete culvert and onto Camp Murray south of Berkeley Street SW. The area along Murray Creek is designated as a FEMA and Pierce County 100-year flood hazard area. The grade separation concept would remove the portion of the existing culvert beneath the railroad right of way and construct a bridge over Murray Creek at this location. The adjacent retaining walls would be constructed outside of the flood hazard area.

There is one small wetland on the east side of the tracks where water overflows from Murray Creek (WSDOT 2011h). During construction, BMPs would need to be put in place to ensure the wetland is protected.

This grade separation concept would add approximately 2,000 square feet (0.05 acre) of new PGIS. This amount of PGIS added by the grade separation concept does not exceed the 5,000-square-foot threshold for flow control and water quality treatment requirements under the *Highway Runoff Manual* and Ecology Manual. Therefore, under the presumptive approach, flows or water quality are not likely to be affected. BMPs would be used to control erosion during construction.

Fish, Wildlife, and Vegetation

The area near the Berkeley Street SW and Union Avenue SW intersection provides poor habitat for most wildlife, except those that have adapted to urban areas. Wildlife likely to be observed in the area includes birds, rodents, and

raccoons. Farther south around Murray Creek there is limited habitat. Vegetative cover on the banks of Murray Creek is dominated by common cattail (*Typha latifolia*) and reed canarygrass (*Phalaris arundinacea*). West of the railroad tracks, Murray Creek flows about 3,000 feet before entering American Lake. Cutthroat trout (*Oncorhynchus clarkii*) are documented as occurring in the creek.

According to field survey data and background research, there are bald eagle nests located on the southeast shore of American Lake, over 600 feet from the railroad right of way (WSDOT 2007b). The nests are located outside the proposed Project study area and south of the Berkeley Street SW grade separation concept. The nests are not visible from the railroad due to screening by trees and large buildings; nesting eagles are likely not to be disturbed by the railroad based on thresholds outlined in the *National Bald Eagle Management Guidelines* (USFWS 2007).

Constructing this grade separation concept would not change habitat conditions for wildlife or fish. The area near the railroad is not suitable to support plants listed under the ESA. Therefore, no effects on ESA-listed plants are anticipated.

Air Quality

Permanent effects on air quality are not expected if this grade separation concept is constructed. The area near Berkeley Street SW is in Pierce County's maintenance area for CO. The Berkeley Street SW and Union Avenue SW intersection would not exceed CO levels established in the NAAQS or cause a violation of applicable NAAQS. The hot spot analysis completed for this intersection modeled the proposed Project in 2040 as having a 1-hour CO concentration of 4.3 and 8-hour concentration of 3.9, well below the 1-hour standard of 35 parts per million (ppm) and the 8-hour standard of 9 ppm (WSDOT 2011j).

In addition, the proposed Project is not predicted to affect regional vehicle miles traveled or regional ozone and particulate matter levels. The grade separation concept may reduce CO, ozone, and particulate matter releases because it would eliminate the time vehicles are stopped waiting for a train to cross. However, any reduction in these emissions from vehicles would not change air quality in a measurable way. MSAT levels are predicted to decrease as a result of the EPA national control programs, which are projected to reduce annual MSAT emissions by 72 percent between 1999 and 2050 (WSDOT 2011j). Construction of this grade separation concept is not expected to affect this reduction.

As part of the proposed Project, WSDOT will purchase up to eight new locomotives by July 2017 that will meet the new standards currently being developed by the Next Generation Corridor Equipment Pool Committee under the authority of the Passenger Rail Investment and Improvement Act of 2008. The engines would be part of a locomotive pool available to Amtrak and would be

used along the corridor. It is presumed the new locomotives would be more fuel efficient and cleaner burning, and would reduce emissions of particulate matter.

Cost

The preliminary estimate of the total cost for the Berkeley Street SW grade separation concept is \$49.4 to \$86.5 million. The total cost includes an estimated \$46.33 million for construction. Details of the cost estimate and the risk matrix are included in Attachment 2.

Construction Effects

Construction activities for this concept would primarily occur within the railroad right of way. Construction equipment and trucks would use surface streets to access the railroad right of way and could increase congestion temporarily. In order to construct the structure over Berkeley Street SW, the trains would run on temporary tracks immediately west of the existing tracks. These temporary tracks would be adjacent to the southbound I-5 ramps. Railroad gates and crossing equipment would likely need to be placed on the southbound I-5 off-ramp potentially backing traffic up on I-5.

Berkeley Street SW would only be restricted for a short time when the bridge above it is constructed. During that time, traffic would experience additional delays and congestion through this intersection.

References

- FHWA (Federal Highway Administration). 2007. FHWA Railroad-Highway Grade Crossing Handbook – Revised Second Edition. Available at: http://safety.fhwa.dot.gov/xings/com_roaduser/07010/. August 2007.
- Jones and Stokes. 2008. Final Cultural Resources Survey Report. Point Defiance Bypass Project, Pierce County, Washington. March (J&S 006692.06). Bellevue, WA. Prepared for the Washington State Department of Transportation.
- Lakewood, City of. 2011a. Engineering Standards Manual. March 2011.
- Lakewood, City of. 2011b. City of Lakewood Roadway Standard Plans. March 2011.
- Shannon & Wilson, Inc. 2004. Alignment Screening Report. South Tacoma Segment. Sound Transit Commuter Rail, Pierce County, Washington 21-1-16403-002-R1. August 26th, 2004.
- Tacoma, City of. 1988. S. 74th Street, Lakewood Drive to S. Tacoma Way Plan Drawing. Department of Public Works. June 1988. Accessed on October 26, 2011 at: <http://wspwit01.ci.tacoma.wa.us/govMe/Maps/Inter/MapGuideCS/MGMain.aspx>.
- Tacoma, City of. 2004. Public Works Design Manual. Available at: <http://www.govme.org/download/PDF/Code/2004DesignManual1.pdf>. April 2004.
- Tacoma, City of. 2010. South Tacoma Manufacturing/Industrial Center. Pierce County Regional Council Submittal Packet. June 2010.
- UPRR (Union Pacific Railroad). 2007. BNSF Railway – Union Pacific Railroad, Guidelines for Railroad Grade Separation Projects. Available at: https://www.uprr.com/aboutup/operations/specs/attachments/grade_separation.pdf. January 24, 2007.
- USFWS (U.S. Fish and Wildlife Service). 2007. National Bald Eagle Management Guidelines. Available at: <http://www.fws.gov/pacific/eagle/NationalBaldEagleManagementGuidelines.pdf>. Published May 2007.
- WSDOT (Washington State Department of Transportation). 2007a. Point Defiance Bypass Project Draft Hazardous Materials Technical Memorandum. Prepared by HDR Engineering, Inc. and The Resource Group Consultants, Inc. August 2007.
- WSDOT. 2007b. Point Defiance Bypass Project Fish, Wildlife, and Vegetation Technical Memorandum. Prepared for WSDOT by HDR Engineering, Inc. and the Resource Group Consultants, Inc. August 2007.

- WSDOT. 2009. Cost Estimating Manual for WSDOT Projects. Available at:
<http://www.wsdot.wa.gov/publications/manuals/m3034.htm>. July 2009.
- WSDOT. 2011a. Design Manual (M 22-01.08). Available at:
<http://www.wsdot.wa.gov/publications/manuals/fulltext/M22-01/design.pdf>.
July 2011.
- WSDOT. 2011b. Point Defiance Bypass Project Final Transportation Discipline Report.
Prepared by Parametrix. December 2011.
- WSDOT. 2011c. Point Defiance Bypass Project Draft Land Use Discipline Report.
Prepared by WSDOT. October 2011.
- WSDOT. 2011d. Point Defiance Bypass Project Final Visual Quality Discipline Report.
Prepared by Parametrix. October 2011.
- WSDOT. 2011e. Point Defiance Bypass Project Final Socioeconomic and Environmental
Justice Discipline Report. Prepared by Parametrix. December 2011.
- WSDOT. 2011f. Point Defiance Bypass Project Final Public Services and Utilities
Discipline Report. Prepared by Parametrix. November 2011.
- WSDOT. 2011g. Point Defiance Bypass Project Soils and Geology Discipline Report.
Prepared by Landau Associates Inc. November 2011.
- WSDOT. 2011h. Point Defiance Bypass Project Final Wetland Discipline Report.
Prepared by WSDOT. October 2011.
- WSDOT. 2011i. Point Defiance Bypass Project Final Fish, Wildlife, and Vegetation
Discipline Report. Prepared by WSDOT. October 2011.
- WSDOT. 2011j. Point Defiance Bypass Project Air Quality Discipline Report. Prepared
by WSDOT. October 2011.
- WSDOT. 2012a. Point Defiance Bypass Project Final Noise and Vibration Discipline
Report. Prepared by Parsons Brinckerhoff. February 2012.
- WSDOT. 2012b. Point Defiance Bypass Project Draft Section 106 Survey Report –
Historic, Cultural, and Archaeological Resources Discipline Report. Prepared by
Sarah J. Van Galder, Angel Tomes, Edgar K. Huber, and Scott Thompson,
Statistical Research, WA.
- WSDOT. 2012c. Point Defiance Bypass Project Water Resources Discipline Report.
Prepared by Parametrix. February 2012.

**Attachment 1 – Design Process,
Assumptions, Criteria, and
Concept Plan Sheets**

1019 39th AVE SE, SUITE 100
PUYALLUP, WA 98374
T. 253.604.6600 F. 253.604.6799
www.parametrix.com

TECHNICAL MEMORANDUM

Date: February 28, 2012
To: Myria Foisy - WSDOT South Central Region
Jason Biggs, P.E. - WSDOT Marine & Rail Division
From: Kirk Wilcox/Owen Kikuta
Subject: Design Process, Assumptions, Criteria, and Concept Plan Sheets
cc: Project File
Project Number: 554-1631-090 (AH/02A)
Project Name: Point Defiance Bypass Project
Grade Separation Concept Evaluation

This memorandum summarizes the conceptual design process, design assumptions, and roadway design criteria for the preliminary analysis of grade separation alternatives for the Point Defiance Rail Bypass project. The purpose of the overall project is to enhance rail service frequency, reliability, and safety. The 20.5-mile long Project is located in Pierce County. Grade separation concepts were developed at the following four locations in Tacoma and Lakewood:

- S. 56th Street over the existing track just west of S. Tacoma Way
- S. 74th Street over the existing track just west of S. Tacoma Way
- Bridgeport Way SW over the existing track just west of Pacific Highway SW
- Existing track over Berkeley Street just west of I-5

Design Process

After determining the roadway design criteria, the preliminary design concepts for the grade separation alternatives were established in MicroStation and Inroads. The design process included the layout of horizontal alignments, vertical profiles, channelization, temporary roadways to maintain traffic during construction, bridge and retaining wall locations, and earthwork modeling. The footprint results from the preliminary design were used to estimate the costs and impacts for construction and right-of-way acquisition. The design layouts also helped to assess project risks as part of the preliminary cost risk assessment.

Existing Base Map

The existing base map and surface was created from 2 foot contours from LIDAR (light detection and ranging) and GIS (geographic information system) information obtained from WSDOT GIS. There is approximately $\pm 1'$ accuracy when creating the existing surface at the four site locations from contours. Future ground survey will need to be completed at all locations to provide a more accurate surface for potential future design phases.

Design Criteria References

Roadway design criteria for this project references the following documents:

- City of Tacoma Public Works Department, Design Manual, April 2004
- City of Lakewood, Engineering Standards Manual, March 2011
- American Association of State Highway and Transportation Officials (AASHTO) "Green Book", 2004 Edition
- BNSF Railway – Union Pacific Railroad, Guidelines for Railroad Grade Separation Projects, January 2007
- Washington State Department of Transportation, Design Manual, Volume 2-Design Criteria, July 2011

Roadway Design Criteria

The table below summarizes the key design criteria for each roadway in this grade separation analysis.

Table 1. Proposed Roadway Design Criteria

Road	Classification	Design/Posted Speed	Lane Width	Shoulder Width	Max. Grade	Design Vehicle
S. 56 th Street	Urban Arterial	30/30	Varies*	N/A	10%	WB-67
S. 74 th Street	Urban Arterial	30/30	Varies*	N/A	10%	WB-67
S. Tacoma Way	Urban Arterial	35/35	Varies*	N/A	5%	WB-67
Bridgeport Way SW	Principal Arterial	30/30	Varies**	N/A	8%	SU Truck
Pacific Highway	Principal Arterial	30/30	Varies**	N/A	8%	SU Truck

* Lane widths for a multilane Urban Arterial with a total roadway width of 56’ are 12’ curb lanes, 11’ inside lanes and 10’ center turn lane per City of Tacoma roadway standards.

** Lane widths for a Principal/Minor Arterial with a total roadway width of 58’ are 12’ curb lanes, 11’ inside lanes and a 12’ center turn lane per City of City of Lakewood roadway standards.

Horizontal Design Summary

South 56th Street:

S. 56th Street would be reconstructed to raise the profile on its current alignment from S. Tacoma Way to approximately 1300’ west to S. Proctor Street, in order to achieve grade separation over the Sound Transit railroad tracks. This is approximately 1300’ of impact along S. 56th Street.

A temporary at-grade roadway would be constructed south of the existing roadway to maintain traffic flow during construction. A temporary at-grade rail crossing and rail signal system would be provided on the temporary roadway.

Right-of-way must be acquired along the south side of S. 56th Street to provide space for the temporary roadway. Several businesses will require relocation and demolition of existing structures will be necessary.

Two new structures would be provided. The first is over S. Washington Street to maintain local traffic flow under the raised profile of S. 56th Street. The second structure will be located over the three existing Sound Transit railroad tracks. These tracks will be upgraded to meet the needs of a higher speed rail line.

Due to the high retaining walls and bridges along S. 56th Street, access to 56th would be limited to S. Durango Street and S. Tacoma Way. South Adams Street and Burlington Way would both become cul-de-sacs at S. 56th Street. A new at-grade, unsignalized road crossing across the existing railroad spur line would be constructed between S. Proctor Street and Burlington Way. This new road connection would provide access from Burlington Way to S. 56th Street, using S. Proctor Street.

A new signalized T-intersection would be provided at Durango Street to help mitigate the loss of access from S. Adams Street and S. Washington Street.

South 74th Street:

S. 74th Street would be reconstructed to raise the profile from 300' east of S. Madison Street to S. Puget Sound Avenue, in order to achieve grade separation over the Sound Transit railroad tracks. This is approximately 1700' of impact along S. 74th Street. The road alignment would be shifted south of the existing roadway to match into the tangent alignment east of S. Tacoma Way, and to maintain traffic flow on S. 74th Street during construction. Potential environmental issues with a property that contains an existing gas station at intersection of S. 74th Street and S. Tacoma Way may occur with proposed new roadway shifting into this location.

Two new structures would be provided. The first structure is located over the proposed at-grade truck access road and would be approximately 85' length. The proposed Truck Access Road is assumed to be at-grade. The truck access road will provide access circulation for the industrial properties west of the tracks, where the new retaining walls would prevent direct access onto S. 74th Street. The access road is designed to accommodate WB-67 vehicles and would be signalized at the new intersection with S. 74th Street at the west end of the project. Existing truck traffic from the lumber yard currently exits onto the south side of S. 74th Street. Due to the high retaining wall at this current exit location, the lumber yard exit would have to be relocated to either S. Madison Street or the new truck access road.

The second structure is located over existing Sound Transit railroad tracks and would be approximately 128' length. The existing tracks will need to be upgraded to meet the needs of a higher speed rail line outside of existing upgraded rail line at the intersection.

Bridgeport Way SW:

Bridgeport Way SW would be reconstructed to raise the profile on its current alignment from the southbound I-5 ramp terminal to Arrowhead Road SW, in order to achieve grade separation over the Sound Transit railroad tracks. This is approximately 1700' of impact along Bridgeport Way SW.

A temporary at-grade roadway would be constructed east of the existing roadway to maintain traffic flow during construction. A temporary at-grade rail crossing and rail signal system would be provided on the temporary roadway.

The proposed structure over existing Sound Transit railroad tracks is approximately 160' length. Extra bridge length on the north side would accommodate local access to the power substation to the west of the roadway.

Bridgeport Way SW would still be tapered outwards approaching the intersection at Pacific Highway to continue to provide a short stretch of median space for a potential City of Lakewood gateway sign and landscaping.

Local commercial business accesses would be impacted on the east side of Bridgeport Way due to proposed retaining wall along east side of roadway

Pacific Highway SW:

Pacific Highway would be reconstructed approximately 700' on each side of Bridgeport Way SW to raise the roadway profile to match into the raised profile of Bridgeport Way SW.

A temporary at-grade roadway will be constructed north of the existing roadway to maintain traffic flow during construction. This temporary roadway will create a relocated intersection with the temporary roadway for Bridgeport Way SW. A temporary signal system would be provided at this relocated intersection during construction.

Local business access along both sides of Pacific Highway would be impacted due to proposed retaining walls along both sides of the roadway.

Vertical Design Summary

Design speeds are equal to the posted speeds in accordance with the City of Tacoma Public Works Department, Design Manual, April 2004; Section 4.0.10 (A) Per the City of Tacoma Public Works Department, Design Manual, April 2004; Section 4.0.20 (B) the roadway profile grades in commercial and industrial areas should not exceed 8 %, and 5 % is desirable. Per the City of Lakewood, Engineering Standards Manual, March 2004; Appendix 2, Table 3, a 10 % maximum grade may be used for a 35 miles per hour (mph) or less design speed.

Per WSDOT Design Manual, Exhibit 720-1 (July 2011), the minimum vertical clearance for a new bridge over railroad tracks is 23.5', and for a new bridge over a non-freeway route is 16.5'. The design assumes a 4' structure depth for structures over railroads.

For sag curve lengths within WSDOT right-of-way that propose to meet the minimum length for comfort, an Evaluate Upgrade justification will need to be provided, along with continuous illumination in the proposed design.

South 56th Street:

A maximum grade of 10% was used on S. 56th Street to tie into existing grade before the intersection with S. Tacoma Way, to avoid impacting potentially historic properties along S. Tacoma Way. This 10% grade exceeds the City's 8% maximum grade guideline, but a justification through the City approval process could cite the range of maximum grades (8%-11%) presented in AASHTO Exhibit 7-10. A 2% grade on S. 56th Street would extend through the S. Tacoma Way intersection to provide the minimum vertical sag curve length for comfort at 30 mph design speed approaching the 10% grade.

The minimum vertical clearance over the travelled way of S. Washington Street is 15.5' at curb line. Providing the desirable 16.5' clearance over S. Washington Street would require a lesser grade on S. 56th Street that would substantially increase footprint impacts through the intersection with S. Tacoma Way. The minimum clearance over Sound Transit railroad tracks is 25.4'.

South 74th Street:

A maximum grade of 10% was used on S. 74th Street to tie into existing grade before the driveways of an apartment complex, and the intersection with S. Tacoma Way. This 10% grade exceeds the City's 8% maximum grade guideline, but a justification through the City approval process could cite the range of maximum grades (8%-11%) presented in AASHTO Exhibit 7-10. A 30 mph design speed, sag curve length for comfort was used for the profile tie-in location approaching S. Tacoma Way to reduce the grading impact to the intersection and

business accesses on S. Tacoma Way. A 35 mph design speed, sag curve length for comfort was used for the profile tie-in location approaching the western limit of the project to avoid impacting the existing driveways of the apartment complex and local businesses.

The minimum vertical clearance of the proposed structures over the existing railroad tracks is approximately 24', and approximately 30' over the truck access road.

Bridgeport Way SW:

The maximum grade of 8% was used on Bridgeport Way SW to minimize impacts to driveway access for adjacent commercial properties. The I-5 southbound ramp terminal intersection would need to be raised approximately 1' above existing grade to accommodate the raised Bridgeport Way SW profile. A 30 mph design speed, sag curve length for comfort mph and 8% grade was used to tie into existing grade before the approach slab of the existing structure over I-5. A 30 mph design speed, sag curve length for comfort mph and 8 % grade was used to tie into existing grade before Arrowhead Road SW on the north limit of the project.

The minimum vertical clearance of the proposed structure over the existing Sound Transit railroad tracks is approximately 25'.

The profile on Bridgeport Way SW maintains a 2% cross-slope across Pacific Highway SW.

Pacific Highway SW:

The maximum grade of 8% was used on Pacific Highway SW to minimize impacts to driveway access for adjacent commercial properties. The intersection would be raised approximately 27' to meet the proposed raised profile of Bridgeport Way SW.

A 30 mph design speed, sag curve length for comfort mph and 8% grade was used for the profile tie-in locations to minimize impacts to the driveways of adjacent businesses.

The grade of the long driveway entrance to large hotel in the southeast quadrant would need to be steepened to meet the raised profile of Pacific Highway SW

Berkeley Street SW:

The vertical clearance of the proposed railroad structure is 18' over Berkeley Street SW.

Cross Section Design Summary

Roadway cross-section widths follow the guidelines of the City of Tacoma and City of Lakewood roadway standards manuals. Roadway cross-slopes are assumed normal crown at all locations due to the urban location and low design and posted speeds for each roadway.

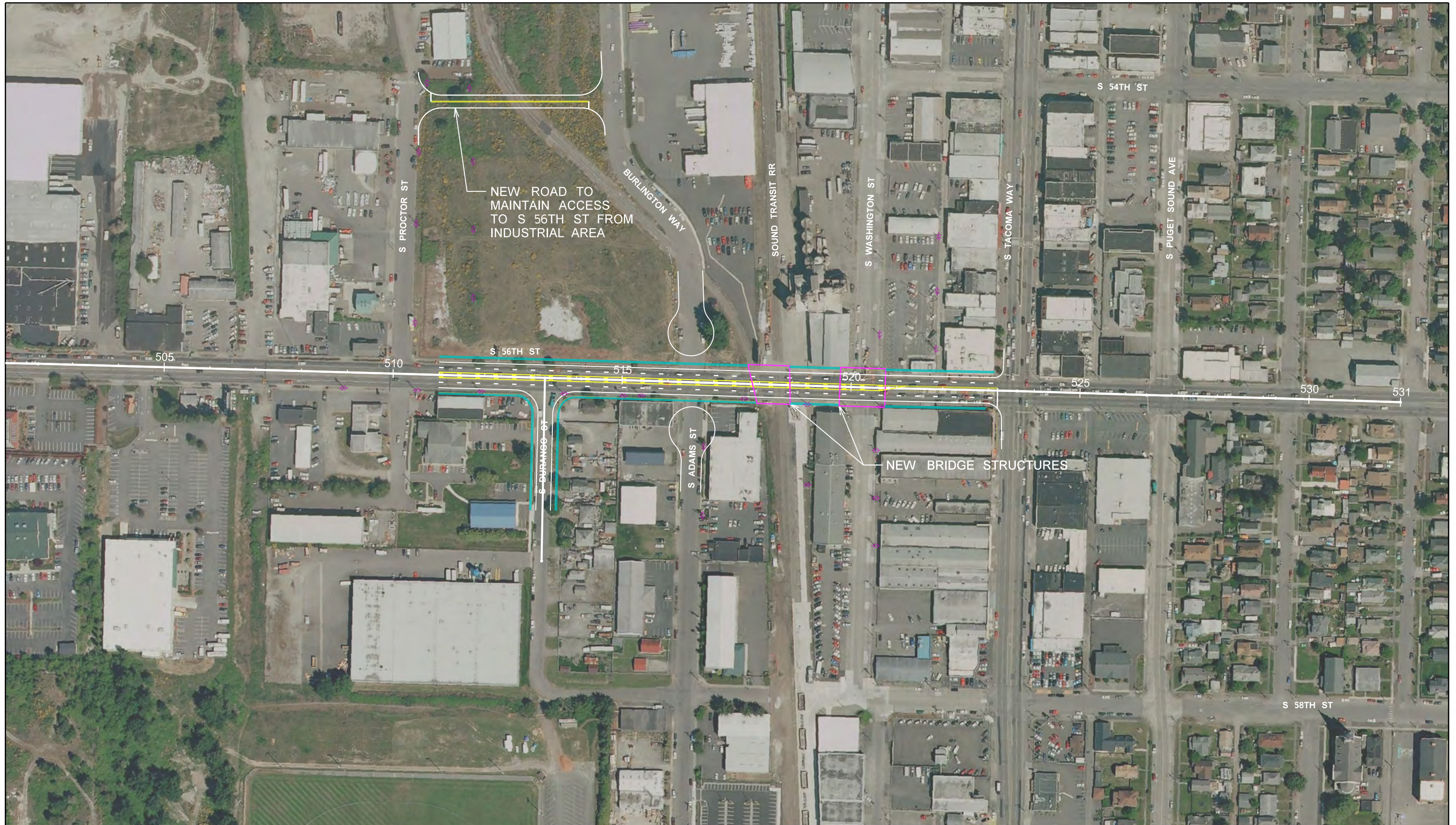
Portland Cement Concrete Pavement is assumed for S. 56th Street and S. 74th Street due to 10% grades and sizable volumes of truck traffic. Severe rutting could occur with asphalt concrete pavement on grades of this magnitude.

Asphalt concrete pavement is assumed for Bridgeport Way SW, Pacific Highway SW and Berkeley Street SW since they do not exceed 8% max grade and have lower truck volumes

Limitations of the Current Work and Next Steps:

Design was taken to a conceptual level to determine general impacts and costs for grade separations at these locations. Each design is based on the above assumptions and criteria, all of which would need to be verified with the affected local agencies. The profiles and quantities are based on planning-level LIDAR survey data. More detailed topographic survey would be needed for more detailed design work. Assumptions for wall and bridge types were made for the purposes of estimating, these would need to be verified in a more detailed design phase.

No geotechnical, stormwater or utility design was completed as part of this effort. Also, more detailed investigation of potentially impacted properties would be needed to determine the extent of historical or environmental issues.



Parametrix DATE: 11/23/2011 FILE: Site_Figures.dgn

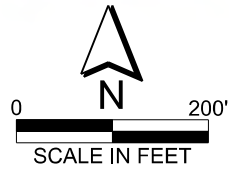
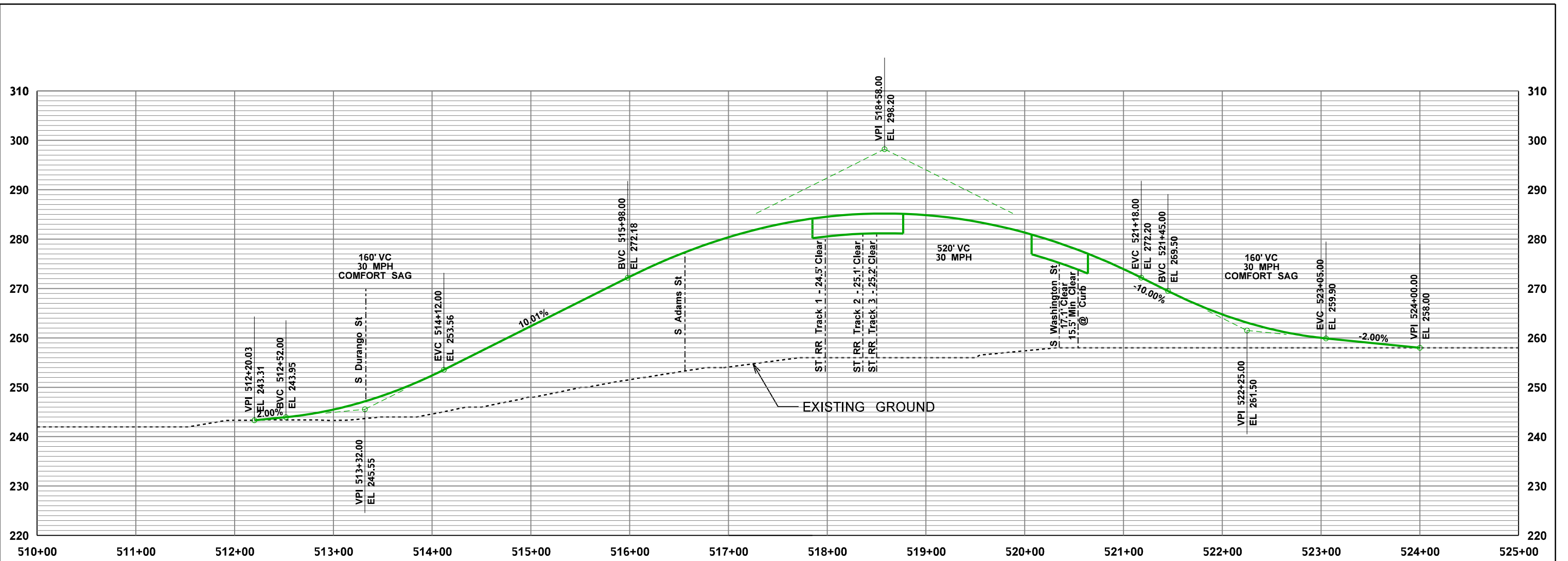


Figure 1
Point Defiance Bypass Project
S 56th St Grade Separation
Concept Plan



NOTES:

1. EXISTING GROUND PER LIDAR 2' CONTOURS, SOURCE: WSDOT GIS.
2. BRIDGE STRUCTURE DEPTH ASSUMED TO BE 4' FOR CLEARANCE CALCULATIONS.
3. 2' OBJECT HEIGHT FOR STOPPING SIGHT DISTANCE ON VERTICAL CURVES.

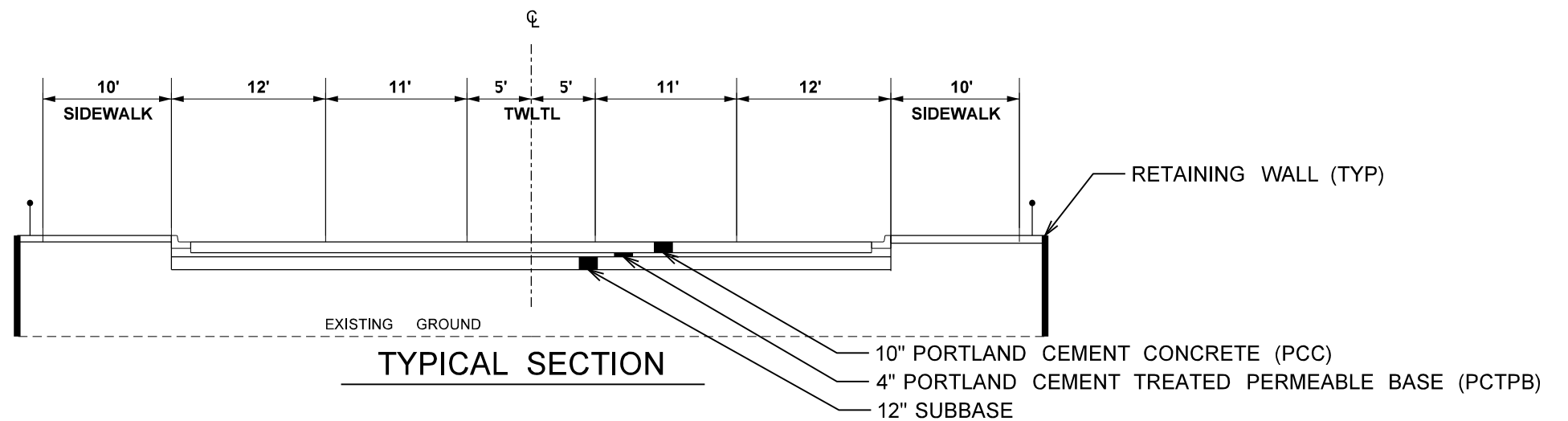
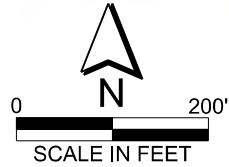


Figure 2
Point Defiance Bypass Project
S 56th St Grade Separation
Concept Profile



Parametrix DATE: 11/23/2011 FILE: Site_Figures.dgn



LEGEND

- | | | | |
|---|---------------------|---|---------------------------|
|  | Partial Acquisition |  | TEMPORARY IMPACT BOUNDARY |
|  | Full Acquisition |  | PERMANENT IMPACT BOUNDARY |

Figure 3
Point Defiance Bypass Project
S 56th St Grade Separation
Concept Impact Plan

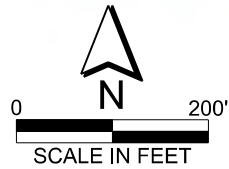
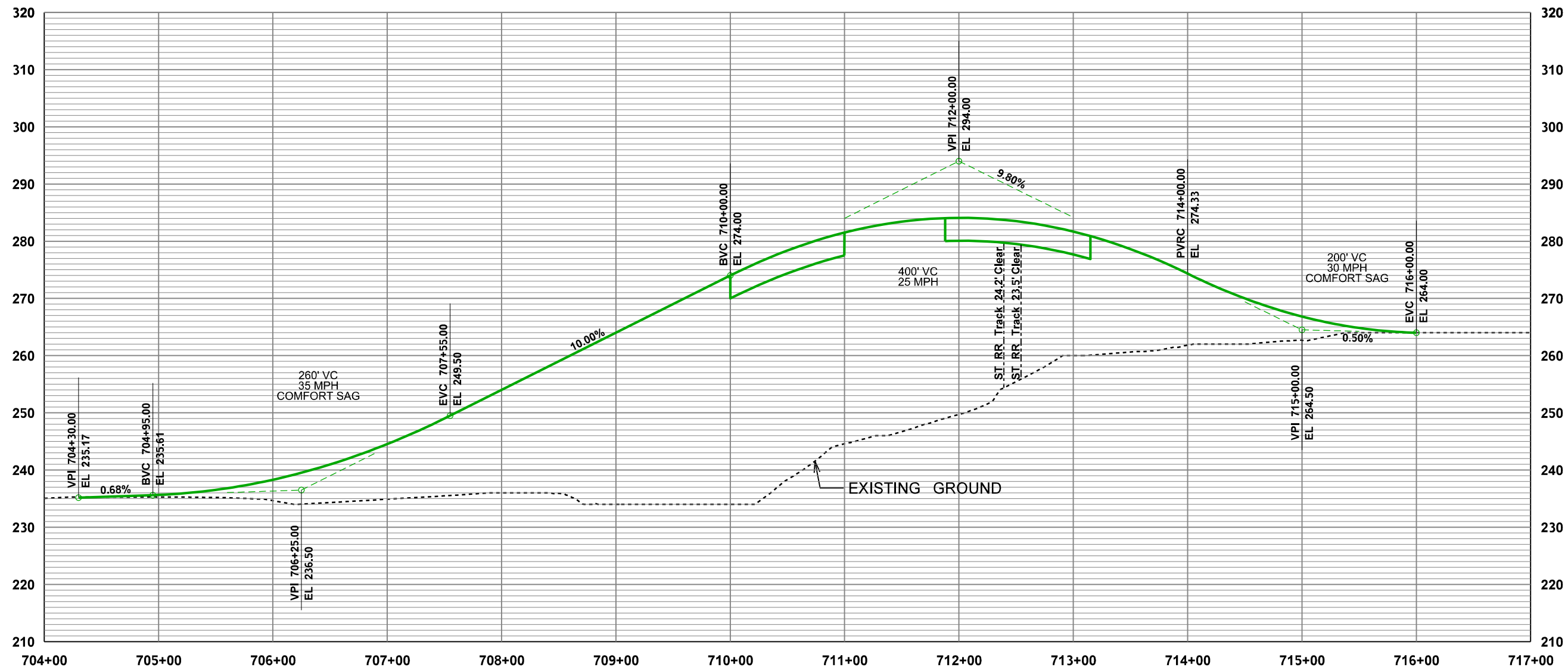


Figure 4
Point Defiance Bypass Project
S 74th St Grade Separation
Concept Plan



NOTES:

1. EXISTING GROUND PER LIDAR 2' CONTOURS, SOURCE: WSDOT GIS.
2. BRIDGE STRUCTURE DEPTH ASSUMED TO BE 4' FOR CLEARANCE CALCULATIONS.
3. 2' OBJECT HEIGHT FOR STOPPING SIGHT DISTANCE ON VERTICAL CURVES.

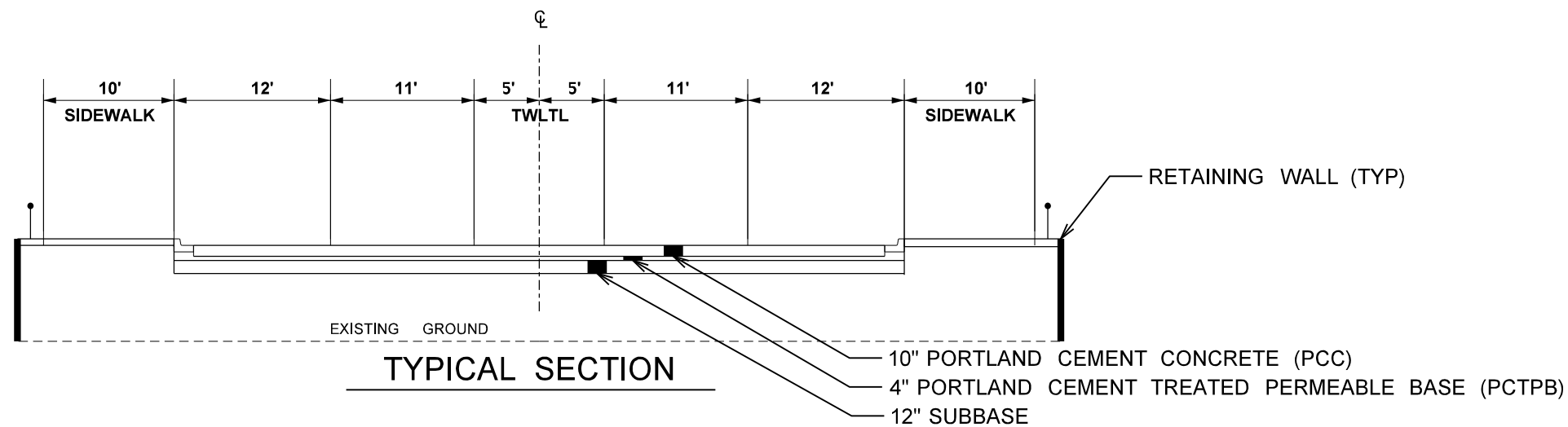
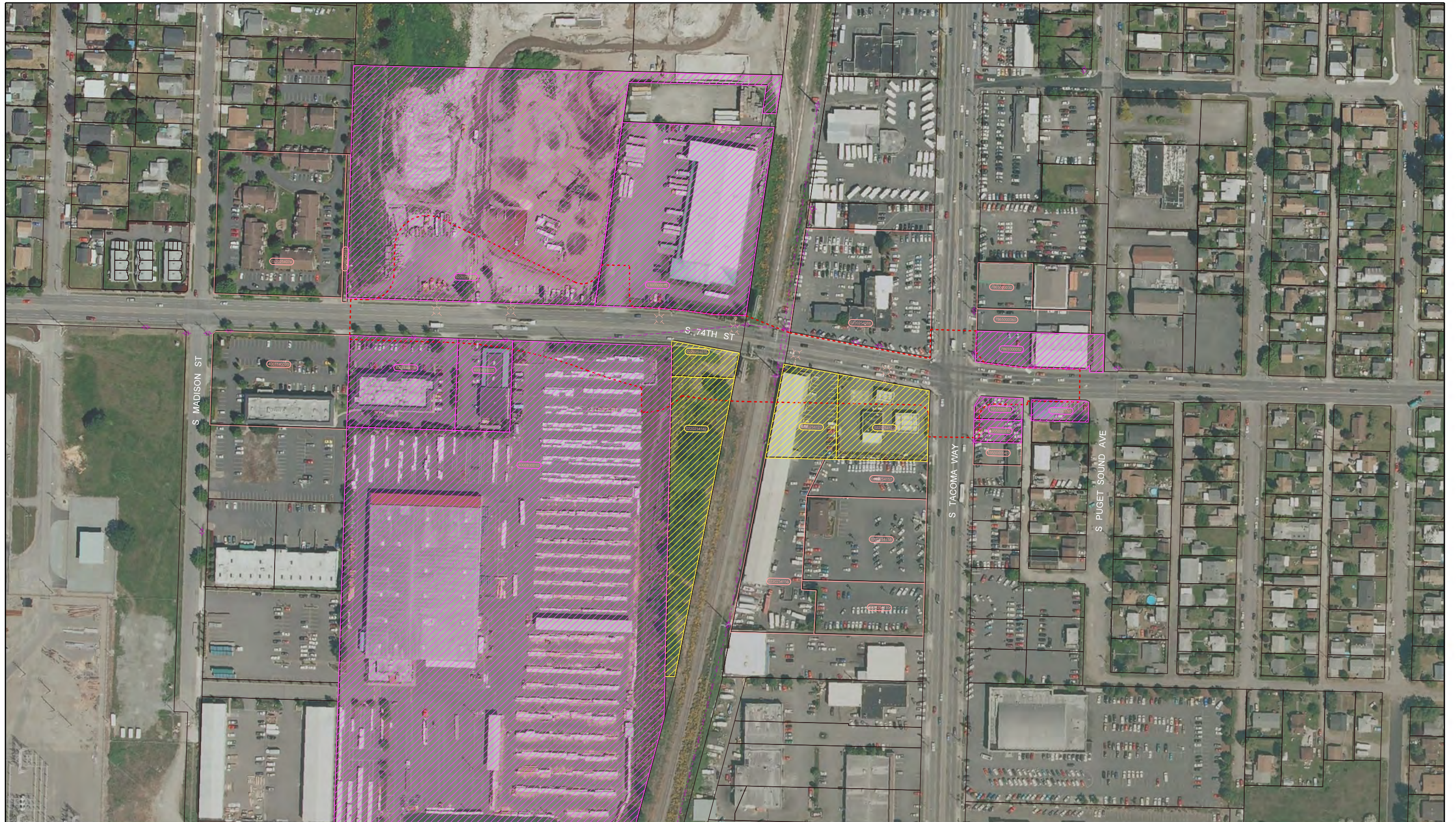
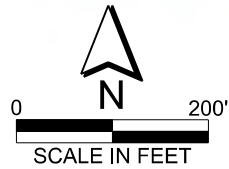


Figure 5
Point Defiance Bypass Project
S 74th St Grade Separation
Concept Profile



Parametrix DATE: 11/23/2011 FILE: Site_Figures.dgn



LEGEND

- | | | | |
|---|---------------------|---|---------------------------|
|  | Partial Acquisition |  | TEMPORARY IMPACT BOUNDARY |
|  | Full Acquisition |  | PERMANENT IMPACT BOUNDARY |

Figure 6
Point Defiance Bypass Project
S 74th St Grade Separation
Concept Impact Plan



Parametrix DATE: 11/23/2011 FILE: Site_Figures.dgn

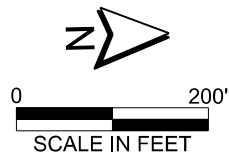
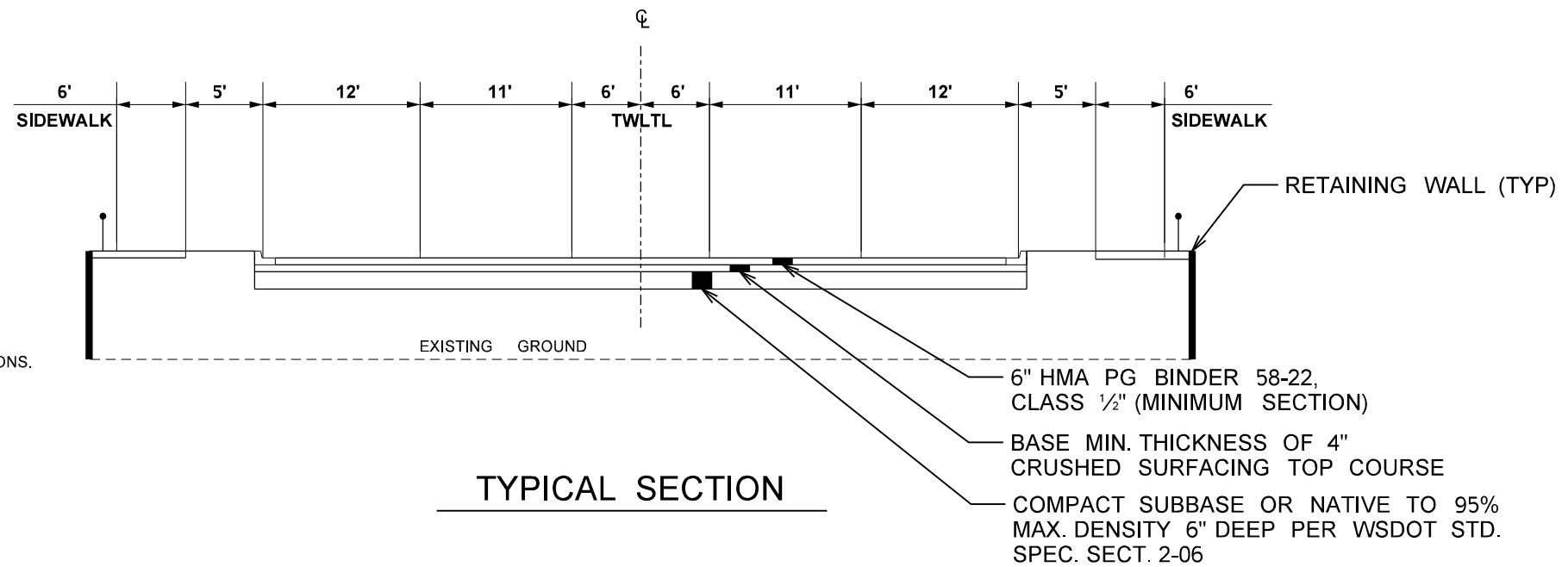
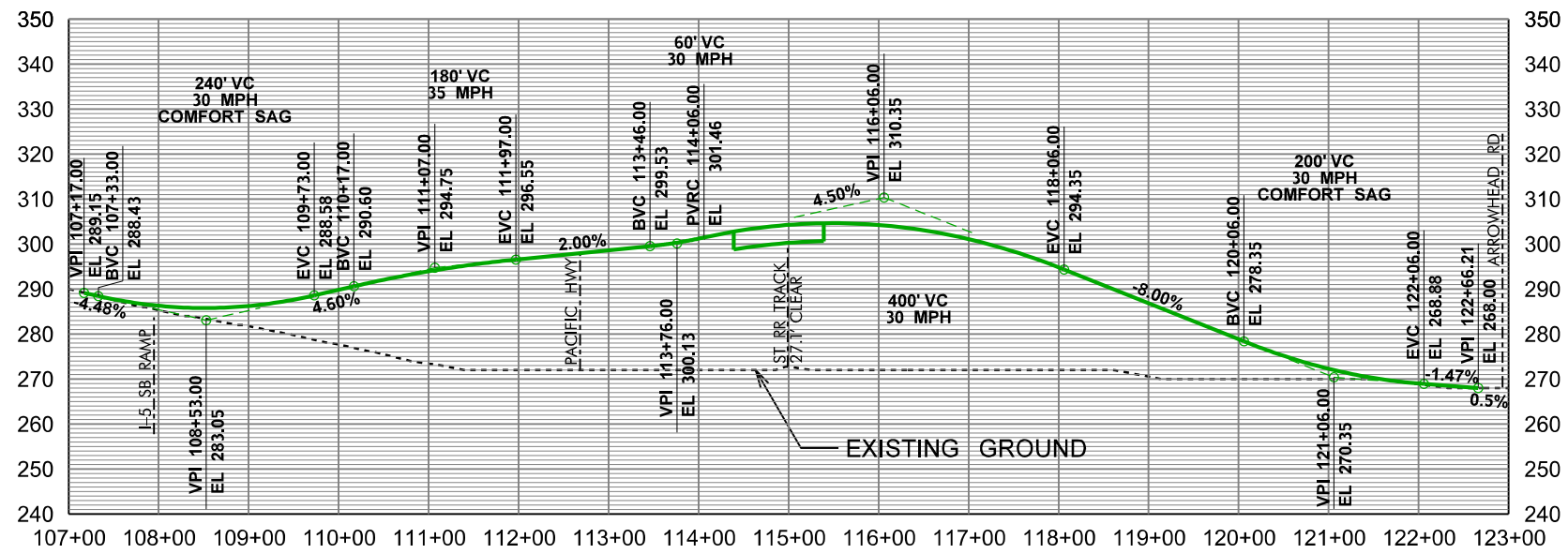


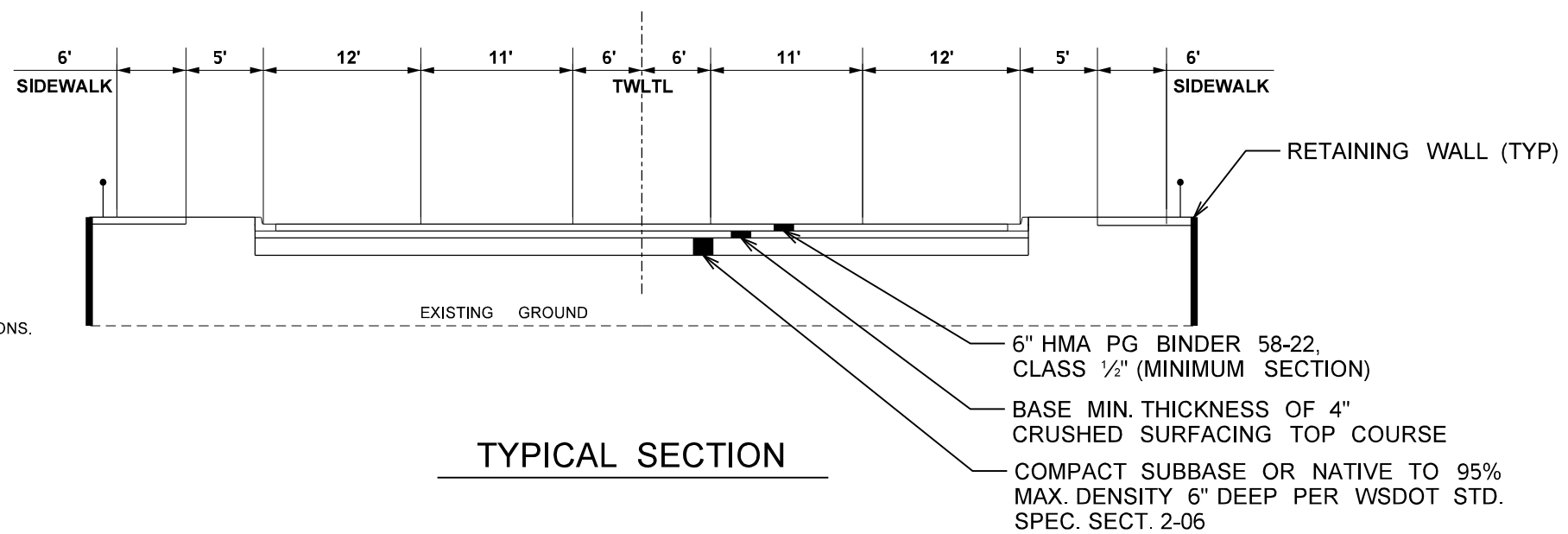
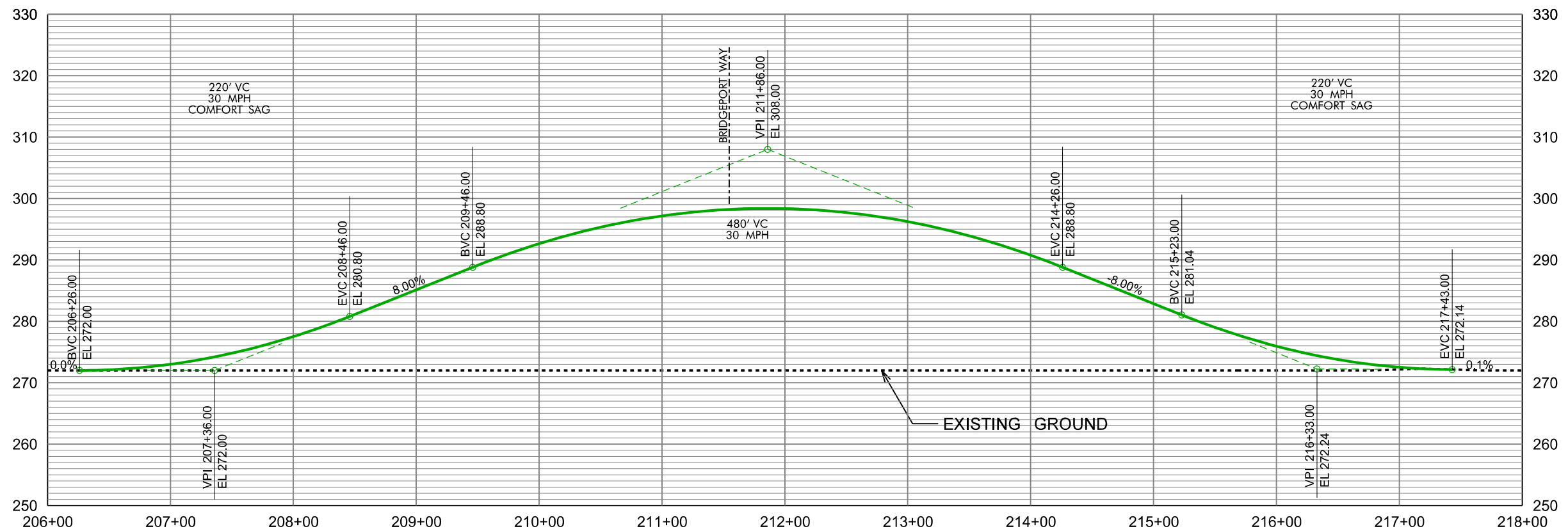
Figure 7
Point Defiance Bypass Project
Bridgeport Way SW Grade Separation
Concept Plan



NOTES:

1. EXISTING GROUND PER LIDAR 2' CONTOURS, SOURCE: WSDOT GIS.
2. BRIDGE STRUCTURE DEPTH ASSUMED TO BE 4' FOR CLEARANCE CALCULATIONS.
3. 2' OBJECT HEIGHT FOR STOPPING SIGHT DISTANCE ON VERTICAL CURVES.

Figure 8
Point Defiance Bypass Project
Bridgeport Way SW Grade Separation
Concept Profile



NOTES:

1. EXISTING GROUND PER LIDAR 2' CONTOURS, SOURCE: WSDOT GIS.
2. BRIDGE STRUCTURE DEPTH ASSUMED TO BE 4' FOR CLEARANCE CALCULATIONS.
3. 2' OBJECT HEIGHT FOR STOPPING SIGHT DISTANCE ON VERTICAL CURVES.

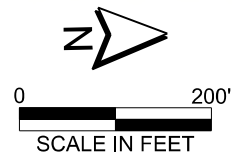
TYPICAL SECTION

- 6" HMA PG BINDER 58-22, CLASS 1/2" (MINIMUM SECTION)
- BASE MIN. THICKNESS OF 4" CRUSHED SURFACING TOP COURSE
- COMPACT SUBBASE OR NATIVE TO 95% MAX. DENSITY 6" DEEP PER WSDOT STD. SPEC. SECT. 2-06

Figure 9
Point Defiance Bypass Project
Pacific Hwy SW Grade Separation
Concept Profile



Parametrix DATE: 11/23/2011 FILE: Site_Figures.dgn



LEGEND

- | | | | |
|---|---------------------|---|---------------------------|
|  | Partial Acquisition |  | TEMPORARY IMPACT BOUNDARY |
|  | Full Acquisition |  | PERMANENT IMPACT BOUNDARY |

Figure 10
Point Defiance Bypass Project
Bridgeport Way SW Grade Separation
Concept Impact Plan



Parametrix DATE: 11/23/2011 FILE: Site_Figures.dgn

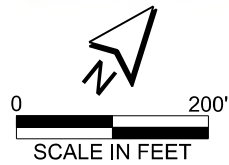


Figure 11
Point Defiance Bypass Project
Berkeley St Grade Separation
Concept Plan

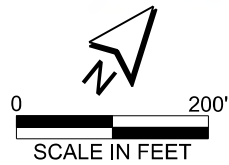
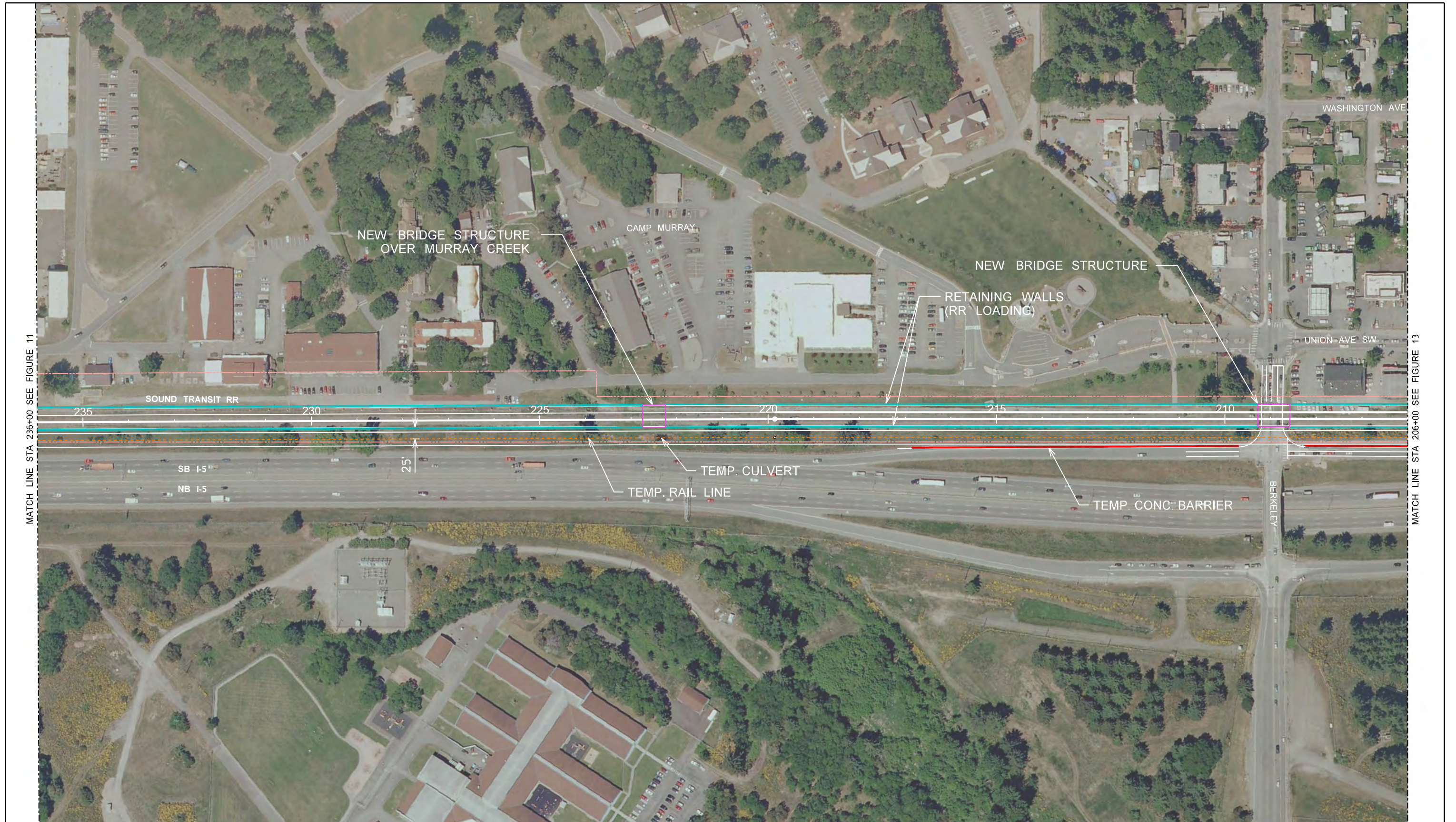


Figure 12
Point Defiance Bypass Project
Berkeley St Grade Separation
Concept Plan



Parametrix DATE: 11/23/2011 FILE: Site_Figures.dgn

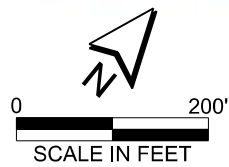
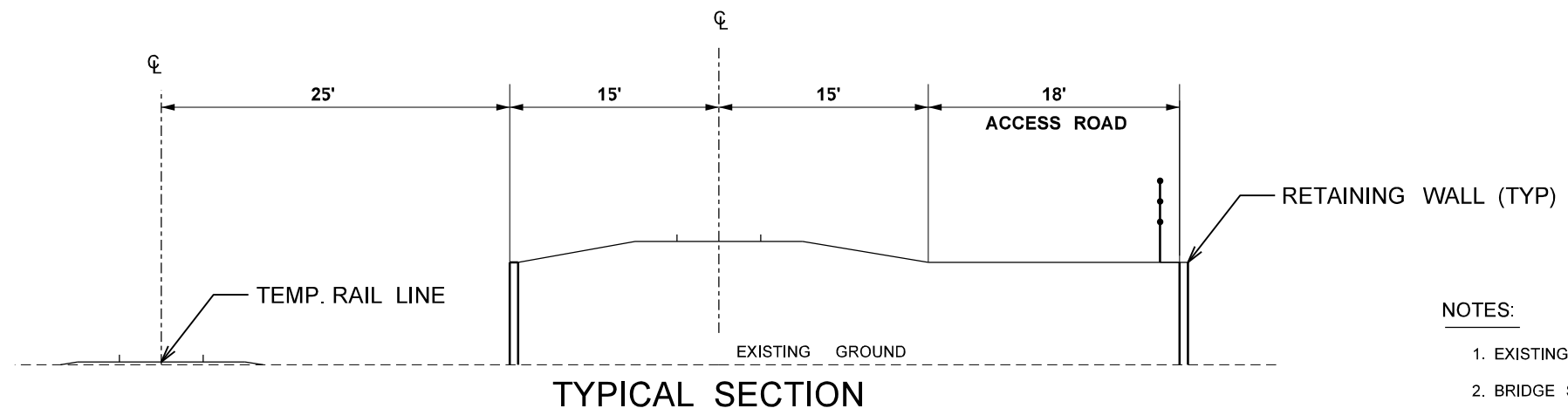
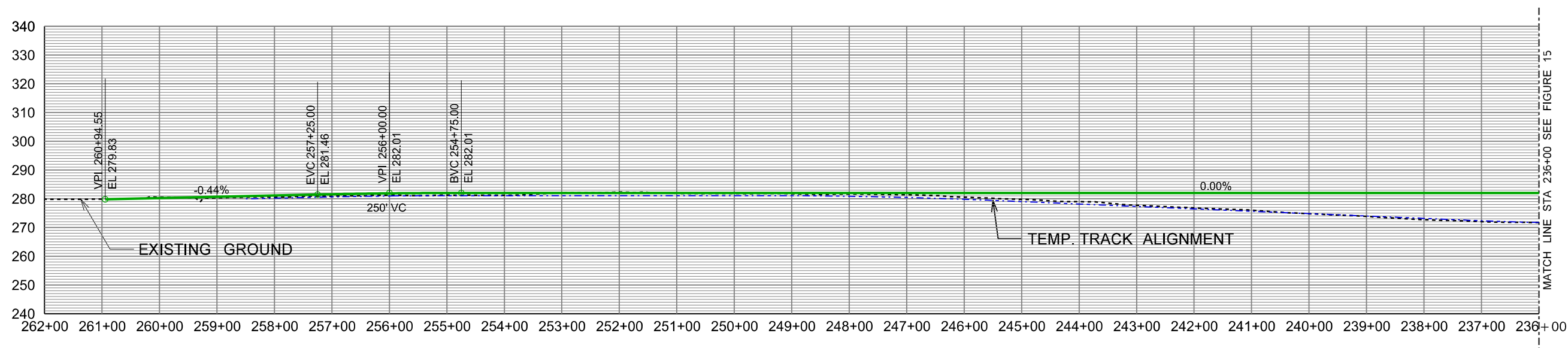


Figure 13
Point Defiance Bypass Project
Berkeley St Grade Separation
Concept Plan



- NOTES:
1. EXISTING GROUND PER LIDAR 2' CONTOURS, SOURCE: WSDOT GIS.
 2. BRIDGE STRUCTURE DEPTH ASSUMED TO BE 4' FOR CLEARANCE CALCULATIONS.



Figure 14
Point Defiance Bypass Project
Berkeley St Proposed Rail Profile

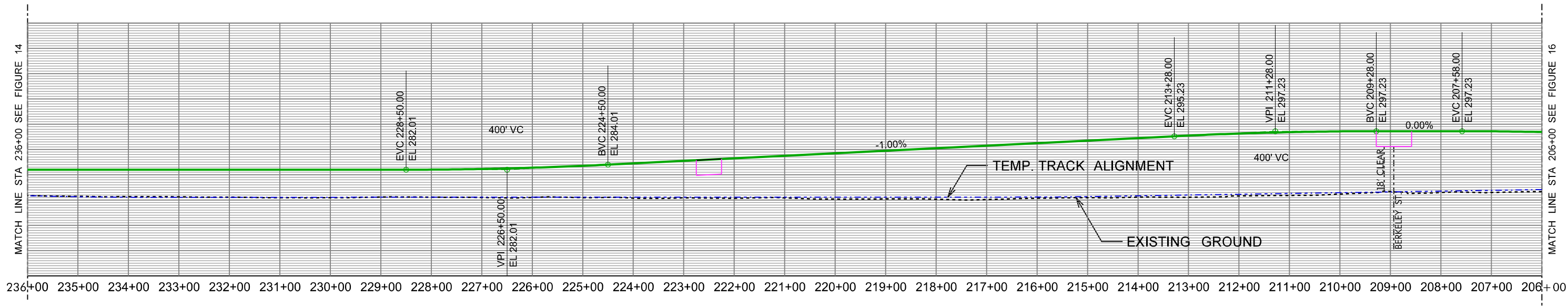


Figure 15
Point Defiance Bypass Project
Berkeley St Proposed Rail Profile

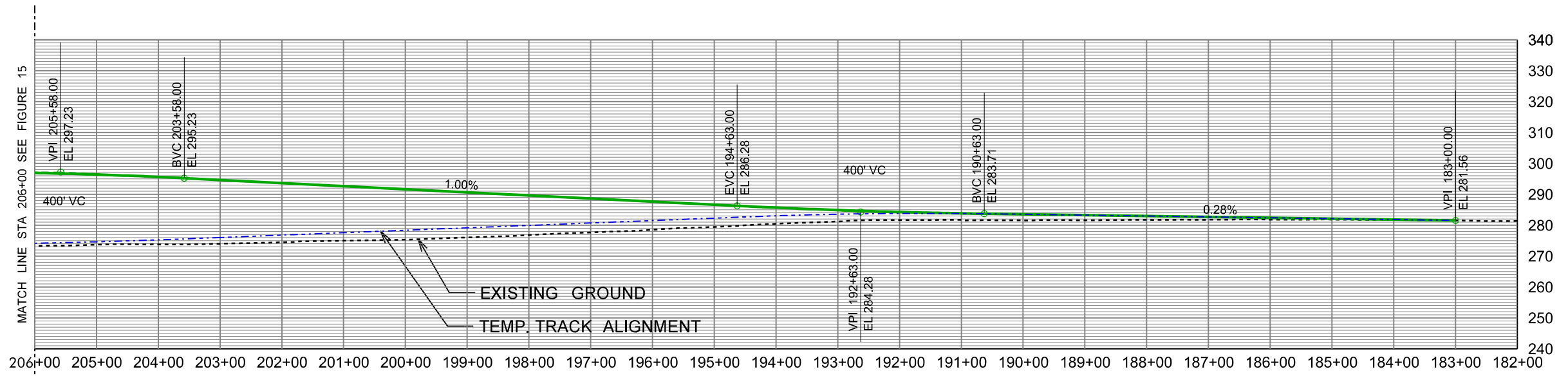


Figure 16
Point Defiance Bypass Project
Berkeley St Proposed Rail Profile

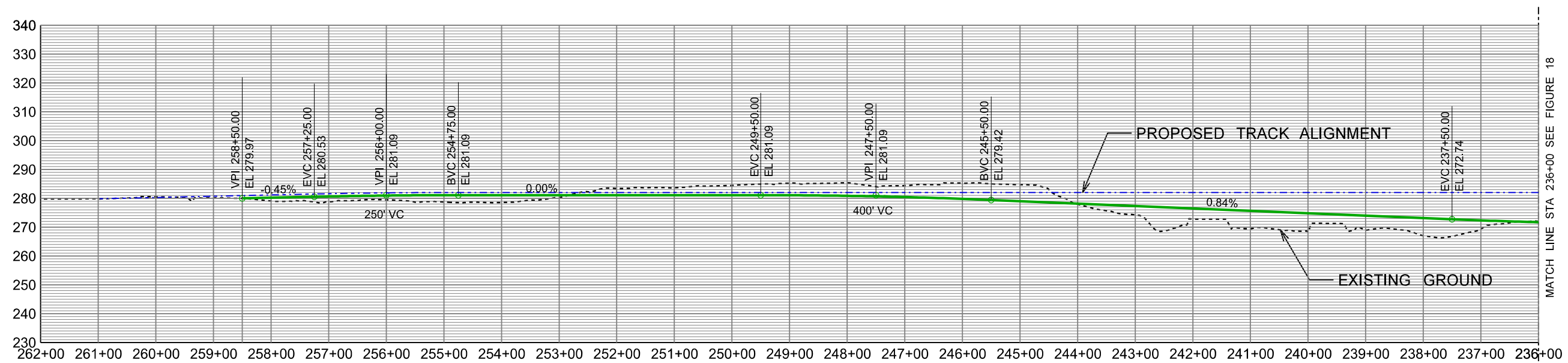


Figure 17
Point Defiance Bypass Project
Berkeley St Temp Rail Profile

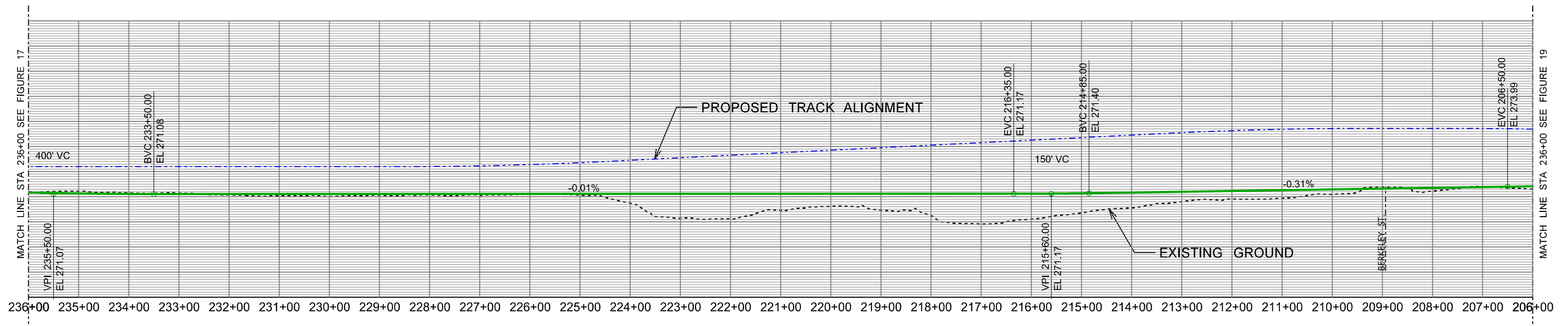


Figure 18
Point Defiance Bypass Project
Berkeley St Temp Rail Profile

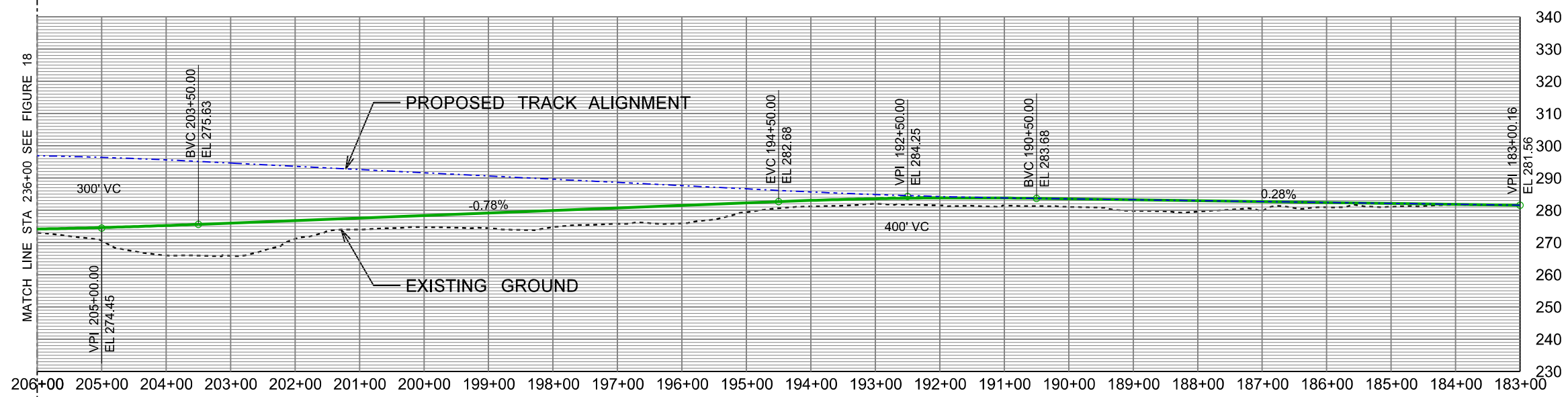


Figure 19
Point Defiance Bypass Project
Berkeley St Temp Rail Profile

**Attachment 2 – Cost Estimate Process,
Assumptions, Criteria, and
Risk Identification**

1019 39th AVE SE, SUITE 100
PUYALLUP, WA 98374
T. 253.604.6600 F. 253.604.6799
www.parametrix.com

TECHNICAL MEMORANDUM

Date: January 5, 2012
To: Myria Foisy - WSDOT South Central Region
Jason Biggs, P.E. - WSDOT Marine and Rail Division
From: Owen Kikuta/Kirk Wilcox
Subject: Cost Estimate Process, Assumptions, Criteria, and Risk Identification
cc: Project File
Project Number: 554-1631-090 (AH/02A)
Project Name: Point Defiance Bypass Project Grade Separation Concept Evaluation

This memorandum is to document the process used for developing preliminary cost estimates for the Point Defiance Rail Bypass grade separation concepts. This submittal incorporates WSDOT input from our review meetings on October 11, 2011, November 1, 2011, and email comments dated November 18, 2011. The preliminary results are summarized in the table below.

Table 1. Cost Summary (Dollars in millions, year 2011)

Location	Construction*	Preliminary Engineering	Right of Way	Base Cost	60 th Percentile Risk Cost	-20% to + 40% Cost Range
S. 56 th Street	\$21.49	\$2.83	\$13.08	\$37.40	\$45.1	\$36.1 - \$63.1
S. 74 th Street	\$23.01	\$3.03	\$4.33	\$30.37	\$36.3	\$29.1 - \$50.9
Bridgeport Way SW	\$35.59	\$4.68	\$17.2	\$57.47	\$67.1	\$53.6 - \$93.9
Berkeley Street SW	\$46.33	\$6.10	\$0.1	\$52.53	\$61.8	\$49.4 - \$86.5

* Sum of the construction cost, change orders, sales tax, 700 level items, and construction engineering.

Cost Estimating Methodology

Preliminary Roadway Layout

The design concepts for each potential grade separation location were determined in discussions with Kevin Jeffers of the WSDOT Marine and Rail office. The basic configurations chosen were roadways over the railroad tracks at S. 56th Street, S. 74th Street and Bridgeport Way SW and railroad over the roadway at Berkeley Street SW. These decisions were made based on surrounding topography and a high-level assessment of potential impacts to surrounding streets and properties.

Conceptual roadway plans and profiles were completed using MicroStation and InRoads at each location. The number of lanes at each location matches the current street channelization. Lane and sidewalk widths are per the appropriate City of Tacoma or Lakewood design standards. A maximum 10 percent grade was used at the S.56th Street and S. 74th Street crossings. The maximum grade is 8% at the Bridgeport Way SW crossing. The maximum railroad grade at Berkeley Street SW is 1%.

Construction Cost Estimate

To produce the base cost estimate, direct quantities were calculated from the plans and profiles for embankments, excavation, bridge deck areas, bridge approach slabs, wall areas, paving and sidewalk areas, and temporary detour roadway areas. The project footprint lengths and areas were used to make per square foot or per linear foot assumptions for items such as storm sewer pipe, stormwater detention and water quality features, illumination and pavement markings. Large ticket items such as traffic signals and railroad crossings were estimated on an individual basis at each location. Markup percentages were used for mobilization and items that are difficult to estimate at the preliminary stages of projects such as utilities, temporary water pollution control, construction staging, traffic control, roadside restoration, and other miscellaneous items. The percentages were adjusted for each project location to match individual conditions.

Sources for pricing included the WSDOT Unit Bid History, bid results from individual WSDOT and local agency projects with similar scopes, Parametrix bid history records, and engineering judgment from the team preparing the estimate. Overall project costs were compared to similar projects to confirm that the base estimate is within the proper order of magnitude. Two projects in particular used for comparison are the WSDOT SR 522 to US 2 ramp overcrossing of the BNSF mainline tracks in Monroe (awarded in June 2010) and the City of Puyallup Shaw Road overcrossing of BNSF mainline tracks (completed in 2010).

Right of Way Cost Estimate

Right of way impacts were developed using the project footprint from the preliminary design work above and overlaid on Pierce County Assessor's maps. Costs for impacted properties were determined using the assessed values with markup factors similar to those used by WSDOT Real Estate Services staff on the SR 510 Yelm Loop corridor. The markup factors include a 20% premium over the assessed value for assumed market value, relocation cost and/or cost to cure if appropriate, acquisition labor, and a factor for condemnation costs. Engineering judgment based on field visits and aerial photos were used to determine whether relocation would be necessary and what level of work would be necessary for an impacted property to remain in use (the cost to cure determination). At the Berkeley Street location, no right of way acquisition is anticipated, and any potential existing encroachment by adjacent property owners is assumed to not add additional costs, except as already estimated.

Risk Assessment Modeling

The base costs were compiled on forms from the WSDOT Strategic Analysis and Estimating Office. Each base cost estimate was then loaded into the WSDOT Risk Based Estimating Self Modeling tool to evaluate project risks at each location. The risks, probabilities and values were initially determined by the project team and modified following our initial review meeting on October 11. The 60th percentile risk values shown in the table above are directly from the Risk Based Estimating tool. The individual base costs, Risk Based Estimating results, and right of way estimate sheets are included with this memo.

Establishment of Cost Range

Guidance is provided for the establishment of likely cost ranges based on the level of project maturity in Table 1 of the *Cost Estimating Manual for WSDOT Projects (July, 2009)*. While the level of design completed in support of this estimate is very low (likely in the 1% to 3% range), it is our opinion that the ranges provided in the table would be overly conservative. Per Table 1 of the referenced manual, these estimates should be bracketed in either the -50% to +200% range or -40% to +100% range. For the projects as defined for this effort, we are able to clearly define the major cost items, specifically the structure, wall, embankment and paving items. With these costs well established, a substantial list of risk items defined for each location, and other similar grade separation projects that have been built recently, we think that a range of -20% to +40% more reasonably suits this specific estimating level of effort. Also, the scope of each project is constrained by surrounding existing features. For instance, the grade separations at 56th Street and 74th Street need to match existing grade by the point that they reach South Tacoma Way. Any substantial grade change to South Tacoma Way would have very expensive ripple effects through the densely developed urban neighborhood, and the large increase in right of way impacts and construction cost would likely not be worth the benefit of a reduced maximum grade for the grade-separated street. This increases our confidence that the projects as defined are realistic and would likely remain similar in size and impact if more detailed designs were carried forward at each location.

Key Assumptions and Issues

S. 56th Street

Key assumptions and issues at S. 56th Street include:

- Matching in at South Tacoma Way to avoid impacting potential historic properties, which necessitates a 10% maximum grade.
- Providing a second structure at S. Washington Street in addition to the railroad overcrossing to maintain local circulation that would otherwise be cut off by the approach embankment.
- Providing a new signalized intersection at S. 56th Street and Durango Street to facilitate local access.
- Using Portland Cement Concrete Pavement for S. 56th Street due to the steep (10%) grades and sizable volumes of truck traffic. Severe rutting could occur with asphalt concrete pavement on grades of that magnitude.
- A new connection across a railroad spur line is included to connect Adams Street on the north side of S. 56th Street to Proctor Street. This new crossing is assumed to be at-grade and unsignalized.
- A temporary roadway would be built to the south of the existing S. 56th Street railroad crossing to detour traffic during construction. This is the source of much of the right of way impacts.

S. 74th Street

Key assumptions and issues at S. 74th Street include:

- Matching in at South Tacoma Way to minimize roadway reconstruction and parcel access impacts, which necessitates a 10% maximum grade.
- Using Portland Cement Concrete Pavement for S. 74th Street due to the steep (10%) grades and sizable volumes of truck traffic. Severe rutting could occur with asphalt concrete pavement on grades of that magnitude.
- Providing a second structure to the west of the railroad overcrossing to provide local access and truck circulation for the industrial properties west of the tracks. The access road is designed to accommodate WB-67 vehicles and would be signalized at S. 74th Street.
- The new bridge would be to the south of the existing crossing, so much of the work could be completed with traffic on the existing road. A short detour roadway on the proposed truck access road would be needed at the west end of the project and some temporary retaining walls are assumed to allow embankment construction while traffic is maintained.
- Costs for overhead power relocation were left to the risk portion of the estimate since it is not known at this time whether the costs would be borne by the utility or the contracting agency. This would be an important first step to resolve if this grade separation location is carried forward.

Bridgeport Way SW

Key assumptions and issues at Bridgeport Way SW and Pacific Highway include:

- Matching in at the southbound I-5 ramp terminal and before the Arrowhead Road intersection, which results in an 8% maximum grade.
- Asphalt concrete pavement is assumed to be used for this location since the maximum grade is 8% and there are lower truck volumes.
- The railroad overcrossing structure has been extended to the north to accommodate a local access to a power substation.
- The grade of Pacific Highway is assumed to touch down in time to avoid access impacts to a large hotel in the southeast quadrant.
- It is assumed that temporary detour roadways would need to be constructed to the east of Bridgeport Way SW and to the northwest of Pacific Highway to maintain traffic during construction. This would keep the future alignment of Bridgeport Way SW in the same location as the current roadway. Some costs could be saved by moving the crossing to the east and routing construction traffic on the existing street but curvature would be induced in the alignment, the skewed intersection with Pacific Highway would be worsened, and the I-5 ramp terminal intersection would possibly be affected.
- Several street closures would be needed to complete the final embankments across the Bridgeport Way SW and Pacific Highway temporary roadways. The Pacific Highway closure could be avoided by lengthening the railroad crossing structure to the south over the temporary roadway.

Berkeley Street SW

Key assumptions and issues at Berkeley Street SW include:

- A 100-foot span over Berkeley Street SW will be adequate to accommodate future widening of the street as improvements are made to the I-5 interchange.
- A second 50-foot bridge is included to cross Murray Creek.
- Costs and difficulties with removing business encroachments from the west side of the railroad right of way are included in the risk section of the estimate.
- An increased cost factor was used for backfilling the “T-Walls” as compared to embankment with typical Structural Earth Walls at the other locations. This is reflected in the gravel borrow unit price for the proposed rail line.

Estimate Summary

Construction Costs	\$		16,797,844		
Design Allocations			-		
<u>Change Order Cont.</u>		4.0%	\$ 753,986.42		
<u>Sales Tax</u>		8.5%	\$ 1,427,816.73		
CN Subtotal			\$ 18,849,661		
<hr/>					
Right of Way Costs		13080000	\$ 13,080,000		
<u>Preliminary Engineering</u>		15%	\$ 2,827,449.09		
<u>Construction Engineering</u>		10%	\$ 1,884,966.06		
<u>700 Level Items</u>		\$624,000	\$ 624,000		
<u>800 Level Items</u>		\$ -	\$ -		
Total Project Costs			\$ 37,396,062		
<hr/>					
Total Project Costs (from 60th Percentile Risk Base Est.)			\$ 45,100,000		
Total Project Costs (-20% to +40% Range from 60th Percentile)		-20%	\$ 36,080,000		
		+40%	\$ 63,140,000		

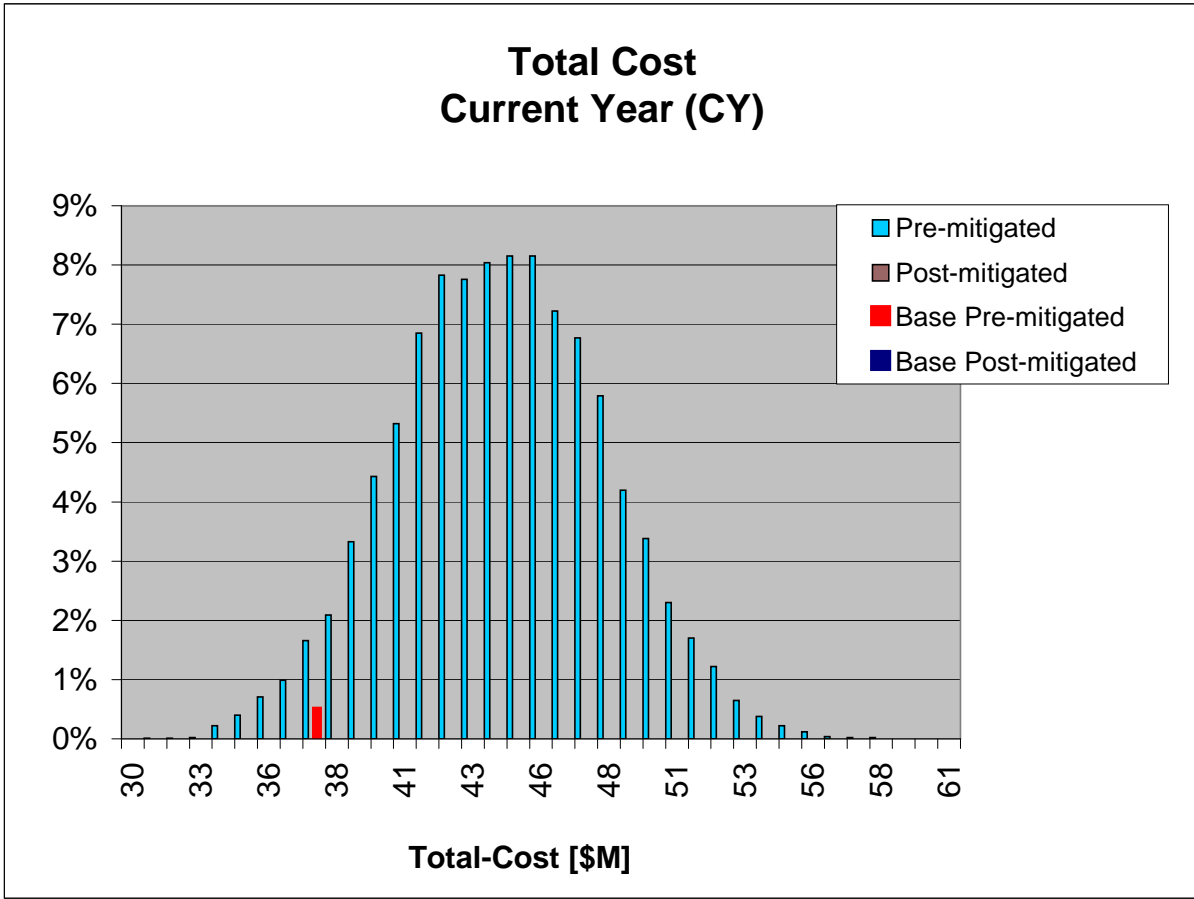
Project Title	Point Defiance Bypass Project
PIN #	N/A
WIN#	N/A
SR	N/A
Mileposts	South 56th Street
Project Manager (PE)	
Preparers Name	Edward Soto / Owen Kikuta
Date of Costs	10/11
Date of Update	
Date of Basis of Estimate	
Date of Review	

Summary Project Assumptions
Based on conceptual design prepared in 2011. Assumptions listed in more detail in the Estimate Sheet and estimate backup.

Summary of Risks
Hazardous waste from rail yard and old buildings
Impacts to potentially historic buildings Additional utility costs and delays
See Risk Matrix Spreadsheet for complete list of risks

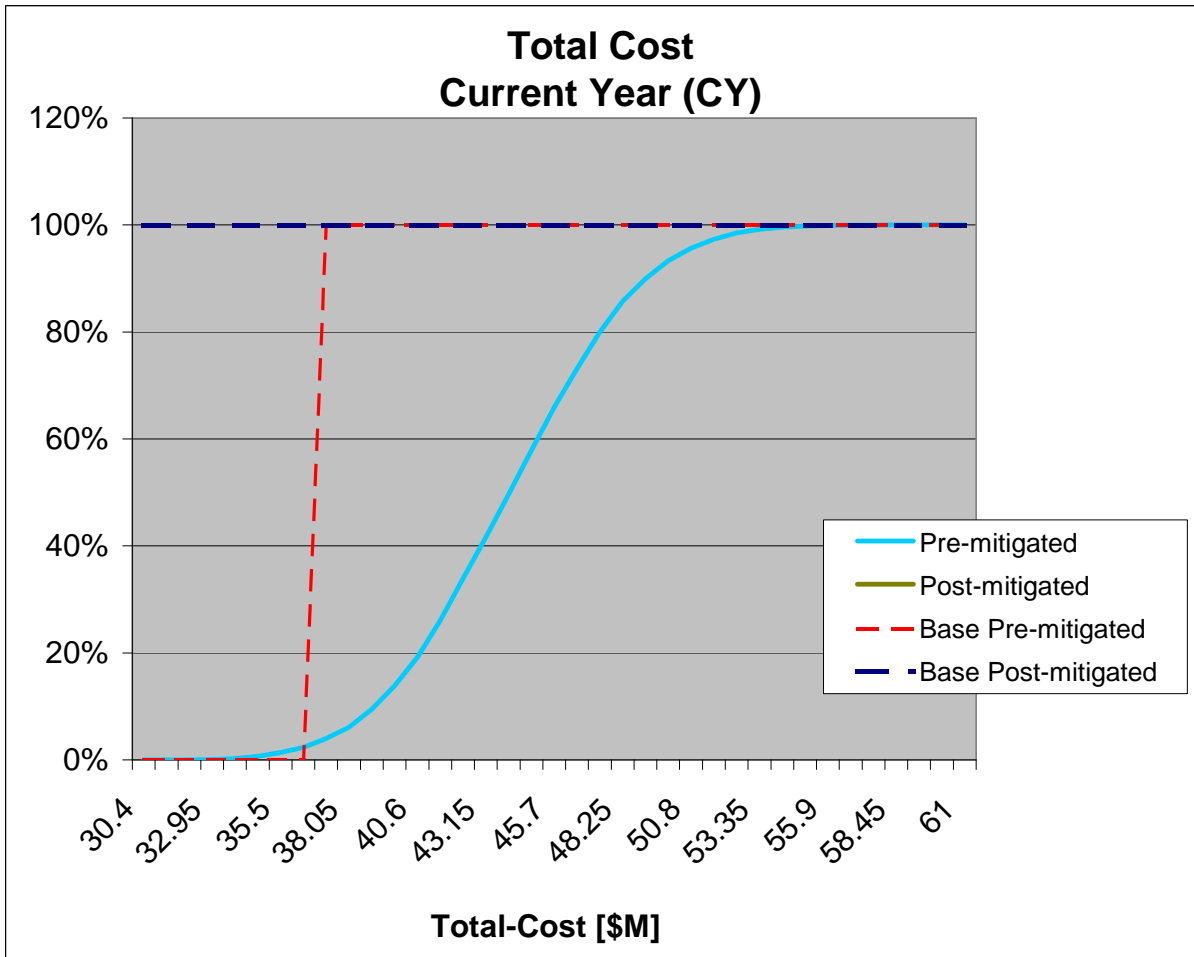
COST ESTIMATE - 56th Street
Prepared by Parametrix for WSDOT Rail and Marine Office

PIN NUMBER:		N/A		DESCRIPTION OF WORK			
SR, MP's:		N/A South 56th Street					
PROJECT TITLE:							
Point Defiance Bypass Project							
REGION:		State Rail & Marine Office		56th Street grade separation concept over rail line			
Item Description	UOM	Unit Quan	Item Unit Cost	By Item Total	Major item LS Total	Group Total	NOTES
MOBILIZATION AND PREPARATION						\$ 1,890,951	
Mobilization	10%	1	\$ 1,660,951		\$ 1,660,951		Approximately 10% of Construction Total
Building Demolition	L.S.	1	\$ 140,000		\$ 140,000		\$2/SF
Removal of Structures and Obstructions	L.S.	1	\$ 90,000		\$ 90,000		\$100k/lane-mi
				\$ -			
				\$ -			
				\$ -			
GRADING, DRAINAGE AND STOCKPILING						\$ 1,106,600	
Roadway Excavation	C.Y.	12000	\$10		\$ 120,000		NWR UBA, for SEW foundation
Gravel Borrow	Ton	78100	\$11		\$ 859,100		NWR UBA, includes SEW backfill
Embankment Compaction	C.Y.	42500	\$3		\$ 127,500		NWR UBA
					\$ -		
				\$ -			
				\$ -			
WATERLINES, STORM AND SANITARY SEWERS						\$ 488,000	
Detention Vault	L.S.	1	\$250,000		\$ 250,000		\$10/SF impervious, assume treat half of impervious on east side of crest curve
Filtration Water Quality Treatment	L.S.	1	\$15,000		\$ 15,000		\$0.60/SF impervious, assume treat half of impervious on east side of crest curve
Detention Pond	L.S.	1	\$50,000		\$ 50,000		\$2/SF impervious, assume treat half of impervious west of crest curve
Water Quality Pond	L.S.	1	\$13,000		\$ 13,000		\$0.50/SF impervious, assume treat half of impervious west of crest curve
Catch Basin Type 1	EA	15	\$1,500		\$ 22,500		Incl Excav, Shoring, etc
Catch Basin Type 2	EA	5	\$3,500		\$ 17,500		Incl Excav, Shoring, etc
Schedule A Storm Sewer Pipe	L.F.	3000	\$ 40		\$ 120,000		Incl Excav, Shoring, etc
				\$ -			
STRUCTURES						\$ 5,088,540	
Roadway Bridge 1- spans up to 140 ft	S.F.	8,304	\$180		\$ 1,494,720		WSDOT Bridge Manual, previous projects
Roadway Bridge 2- spans up to 140 ft	S.F.	6,874	\$180		\$ 1,237,320		WSDOT Bridge Manual, previous projects
Structural Earth Walls	S.F.	26,545	\$50		\$ 1,327,250		WSDOT Bridge Manual, Conc. Panel
Structural Earth Wall Traffic Barrier	L.F.	2,400	\$300		\$ 720,000		NWR UBA
Bridge Approach Slabs	S.Y.	837	\$250		\$ 209,250		
Bridge Architectural Features	L.S.	1	\$100,000		\$ 100,000		
				\$ -			
				\$ -			
				\$ -			
ASPHALT AND SURFACING						\$ 203,750	
HMA	Ton	1850	\$75		\$ 138,750		NWR UBA, 0.5' depth (Durango, Proctor connector, cul-de-sacs)
Crushed Surfacing Top Course	Ton	1200	\$25		\$ 30,000		NWR UBA, 0.33' depth
Crushed Surfacing Base Course	Ton	1750	\$20		\$ 35,000		NWR UBA, 0.5' depth
				\$ -			
				\$ -			
				\$ -			
CEMENT CONCRETE PAVEMENT						\$ 640,277	
Portland Cement Concrete Pavement	SF	58207	\$ 11		\$ 640,277		SF cost all-inclusive per PMX tool, 0.83' depth PCCP & 1' CSBC on 56th
				\$ -			
				\$ -			
				\$ -			
TRAFFIC						\$ 1,573,500	
Curb, Gutter, and Sidewalk	L.F.	2450	\$ 30		\$ 73,500		PMX base cost tool
Pavement Markings	L.F.	10000	\$ 1		\$ 10,000		
Signing	L.S.	1	\$ 30,000		\$ 30,000		\$36k/lane-mi
Illumination	EA	20	\$ 15,000		\$ 300,000		Pole every 150' each side, \$15k/pole
Temp Signal System	L.S.	2	\$ 150,000		\$ 300,000		Washington & Adams St intersections w/ temp roadway during construction
Permanent Signal System	L.S.	1	\$ 150,000		\$ 150,000		Durango St, 3-leg intersection
Traffic Signal Modifications	L.S.	1	\$ 50,000		\$ 50,000		South Tacoma Way intersection
Temporary Roadway	SF	110000	\$ 6.00		\$ 660,000		To maintain traffic during bridge/wall construction, HMA SF cost all-inclusive
				\$ -			
				\$ -			
OTHER ITEMS						\$ 5,806,226	
Utilities	5%	1	\$455,033		\$ 455,033		PMX base cost tool, assumes utilities by franchise
Temporary Water Pollution Control	4%	1	\$364,027		\$ 364,027		PMX base cost tool
Construction Staging	5%	1	\$455,033		\$ 455,033		PMX base cost tool
Traffic Control	10%	1	\$910,067		\$ 910,067		PMX base cost tool, urban area
Roadside Restoration	2%	1	\$182,013		\$ 182,013		Seeding, Planting, Fencing, Cleanup
Design Allowance for Additional Items	30%	1	\$3,440,052		\$ 3,440,052		
				\$ -			
				\$ -			
				\$ -			
NON - BID COSTS 700 Level Items						\$ 624,000	
NON - BID COSTS 800 Level Items						\$ -	
700 Railroad Flagging	DAY	200	\$600		\$ 120,000		
700 Temp Railroad Crossing	SF	4200	\$40		\$ 168,000		Precast railroad crossing panels for temp roadway during construction
700 Temp Railroad Crossing Signal	L.S.	1	\$300,000		\$ 300,000		Crossing signal for temp roadway during construction
700 Railroad Crossing	SF	900	\$40		\$ 36,000		Precast RR x-ing panels for new unsignalized crossing between Proctor & Adams
800					\$ -		
800					\$ -		
800					\$ -		
		1		\$ -			
				\$ -			
				\$ -			
				\$ -			
Total						\$ 16,797,844	



Total Base Estimate (CY)	
Pre-mitigated	Post-mitigated
37.42 \$M	0.00 \$M

Statistics	Pre-mitigated	Post-mitigated
Min	30.42 \$M	
Max	58.32 \$M	
Median	44.03 \$M	
10%	39.02 \$M	
20%	40.71 \$M	
30%	41.90 \$M	
40%	42.98 \$M	
50%	44.03 \$M	
60%	45.10 \$M	
70%	46.17 \$M	
80%	47.41 \$M	
90%	49.11 \$M	



Project Title	Point Defiance Bypass - 56th Street Grade Separation Conceptual Estimate				Value	Variability	Risk Markups	WSDOT Escalation tables built-in.	%	Total Cost CY [\$M]	Total Cost YOY [\$M]	Ad Date	®	End Construction date	WSDOT Ovidiu Cretu 360-705-7599
Estimate Date	11/21/11	Target AD date	04/15/15	10%	Mob	10.0%	A/B/A Duration	3Mo	50	44.03	48.98	June 12, 2015	50%	November 13, 2017	
Project PIN #	n/a	Estimated CN Duration	24.0Mo	15%	Tax	8.5%	on-WSDOT rat	YOY	60	45.10	50.15	June 28, 2015	60%	December 4, 2017	
Last Review Date	n/a	Estimated PE Cost	2.83 \$M	10%	CE	10.0%	PE		2.9\$M	70	46.17	July 17, 2015	70%	December 29, 2017	
Project Manager	J. Biggs	Estimated ROW Cost	13.10 \$M	15%	PE	13.2%	ROW		14.3\$M	80	47.41	August 7, 2015	80%	January 26, 2018	
		Estimated CN Cost	21.49 \$M	15%	C.O.C	4.0%	CN		24.5\$M	90	49.11	September 6, 2015	90%	March 6, 2018	

The yellow highlighted cells have to be filled in order for macro to run correctly. The light green highlighted cells may be filled if you know what you are doing. !!!!! Existing (Pre-Mitigated) Design!!!!!! Created and Maintained by WSDOT, contact Ovidiu Cretu 360-705-7599, cretuo@wsdot.wa.gov

Risk Identification					Quantitative Analysis					Qualitative Display of the Best Guess Impact					Risk Response Plan			Monitoring and Control		Critical Issue
Risk #	Status	Dependency	Project Phase	Summary Description Threat and/or Opportunity	Detailed Description of Risk Event (Specific, Measurable, Attributable, Relevant, Timebound) [SMART]	Risk Trigger	Type	Probability/Correlation	Risk Impact (\$M or Mo)	Expected Impact (\$M)	Probability (%)	Impact	Risk Matrix (Probability of Occurrence by Expected Impact)	Strategy	ACTION TO BE TAKEN Response Actions including advantages and disadvantages include date	Risk Owner	Risk Review Dates	Date, Status and Review Comments (Do not delete prior comments, therefore providing a history)	Is Risk on Critical Path?	
(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)	(10)	[10a]	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
EXAMPLE	Active		ROW	Threat Wetland mitigation may require additional R/W	The mitigation ratio has not been finalized and also there could be additional impacts to wetlands which would increase the amount of R/W needed for the mitigation area.	If Wetland impact is larger than 1/2 acre and ratio exceeds 4:1.	Cost	88%	MIN 1.00\$M MAX 8.00\$M Most Likely 5.00\$M	4\$M	Very High	Very High	Probability VH H M L VL	Mitigation	Finalize design to identify all wetlands that are impacted. Early coordination with the outside agencies to determine mitigation ratio.	Design Leader/Enviro. mgr	2007-Jan-2	As of Nov. 15, 2005 there are only two potential areas where there could be additional wetland impacts. As of Dec. 2, 2005 agency has initially determined that mitigation ration would be 4:1.	YES	
1	Active		Construction	Threat Hazardous materials may increase excavation costs	There is potential for hazardous waste to be encountered during excavation or building demo due to historic use of the area as a rail maintenance and switching yard.	Material to be excavated tests as contaminated.	Cost	75%	MIN 0.20\$M MAX 2.00\$M Most Likely 0.50\$M	0.53\$M	High	Moderate	Probability VH H M L VL	Acceptance	A soil testing program would be implemented during preliminary design activities if the project is carried forward.	Design Team			YES	
2	Active		Pre-construction	Threat Possible historic buildings	Buildings to be demolished for the project could be determined to be eligible for historic listing, which could lead to additional environmental documentation costs	Building(s) are identified as historic	Cost	50%	MIN 0.00\$M MAX 1.00\$M Most Likely 0.20\$M	0.15\$M	Moderate	Low	Probability VH H M L VL	Acceptance	A study of buildings to be demolished as part of the project would be completed during the preliminary design phase.	Design Team			YES	
3	Active		Construction	Threat Additional Utility Costs/Delays	The project could be burdened with additional cost responsibility for utilities that are impacted by the work.	Utility relocation costs are assigned to the project.	Cost	50%	MIN 1.00\$M MAX 4.00\$M Most Likely 2.50\$M	1.25\$M	Moderate	Very High	Probability VH H M L VL	Avoidance	Coordinate early in the design process with utility owners	Design Team		10/10/2011: Assumption is that primary utility relocation costs will be covered by others under franchise agreements. Additional research into existing utility agreements is needed.	YES	

The yellow highlighted cells have to be filled in order for macro to run correctly. The light green highlighted cells may be filled if you know what you are doing. !!!!! Existing (Pre-Mitigated) Design!!!!!!!!!!!!!! Created and Maintained by WSDOT, contact Ovidiu Cretu 360-705-7599, cretuo@wsdot.wa.gov

Risk Identification																				
Risk #	Status	Dependency	Project Phase	Summary Description Threat and/or Opportunity	Detailed Description of Risk Event (Specific, Measurable, Attributable, Relevant, Timebound) [SMART]	Risk Trigger	Type	Quantitative Analysis			Qualitative Display of the Best Guess Impact			Risk Response Plan			Monitoring and Control		Critical Issue	
								Probability/Correlation	Risk Impact (\$M or Mo)	Expected Impact (\$M)	Probability (%)	Impact	Risk Matrix (Probability of Occurrence by Expected Impact)	Strategy	ACTION TO BE TAKEN Response Actions including advantages and disadvantages include date	Risk Owner	Risk Review Dates	Date, Status and Review Comments (Do not delete prior comments, therefore providing a history)		
(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)	(10)	[10a]	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
4	Active		ROW	Threat Additional R/W Costs/Delays	Right of way acquisition could be more expensive or take longer than assumed	Negotiations break down with property owners	Cost	30%	MIN 1.00\$M MAX 3.00\$M Most Likely 2.00\$M	0.60\$M	Low	High	Probability VH H M L VL Mo	Acceptance	Begin appraisals and negotiations in a timely manner.	Real Estate Svcs Mgr				YES
				Threat			Schedule	4	0	MIN 0.0Mo MAX 4.0Mo Most Likely 2.0Mo	0.6Mo	Very Low								
5	Active		Pre-construction	Threat Additional improvements needed to City streets	There may be additional street work needed to match into the City street system as compared to the conceptual design, such as improvements to 58th and Durango to compensate for the Adams St closure.	City disagrees with preliminary design concept	Cost	25%	MIN 0.50\$M MAX 2.00\$M Most Likely 0.75\$M	0.23\$M	Low	Moderate	Probability VH H M L VL Mo	Avoidance	Work with City staff to accept the proposed design	Design Team				YES
				Threat			Schedule	0	Master Duration Risk	MIN 0.0Mo MAX 3.0Mo Most Likely 1.0Mo	0.3Mo	Very Low								
6	Active		Pre-construction	Threat Minimal design effort	Only very preliminary conceptual work has been completed. The scope has a high probability of growing as further refinement and detail is added.	The project definition/scope grows beyond that assumed for the current estimate	Cost	75%	MIN 0.00\$M MAX 7.50\$M Most Likely 4.00\$M	2.94\$M	High	Very High	Probability VH H M L VL Mo	Avoidance	Work with project stakeholders to manage the scope	Design Team	10/18/11: Assumed Max is approximately 20% of base total project cost			YES
				Threat			Schedule	6	0	MIN 0.0Mo MAX 4.0Mo Most Likely 1.0Mo	1.0Mo	Very Low								
7	Retired						Cost		MIN MAX Most Likely	0.00\$M	NO RISK	NO RISK	Probability VH H M L VL							YES
							Schedule	0	Master Duration Risk	MIN MAX Most Likely	0.0Mo	NO RISK								
8	Retired						Cost		MIN MAX Most Likely	0.00\$M	NO RISK	NO RISK	Probability VH H M L VL							YES
							Schedule	8	0	MIN MAX Most Likely	0.0Mo	NO RISK								
9	Retired						Cost		MIN MAX Most Likely	0.00\$M	NO RISK	NO RISK	Probability VH H M L VL							YES
							Schedule	0	Master Duration Risk	MIN MAX Most Likely	0.0Mo	NO RISK								

Estimate Summary

Construction Costs		\$	18,417,415
Design Allocations		\$	-
Change Order Cont.	4.0%	\$	807,395.82
Sales Tax	8.5%	\$	1,565,480.29
CN Subtotal		\$	20,184,896

Right of Way Costs	4330000	\$	4,330,000
Preliminary Engineering	15%	\$	3,027,734.33
Construction Engineering	10%	\$	2,018,489.55
700 Level Items	\$ 202,000	\$	202,000
800 Level Items	\$ -	\$	-
Total Project Costs		\$	30,368,515

Total Project Costs (from 60th Percentile Risk Base Est.)			\$36,330,000
Total Project Costs (-20% to +40% Range from 60th Percentile)	-20%		\$29,064,000
	-40%		\$50,862,000

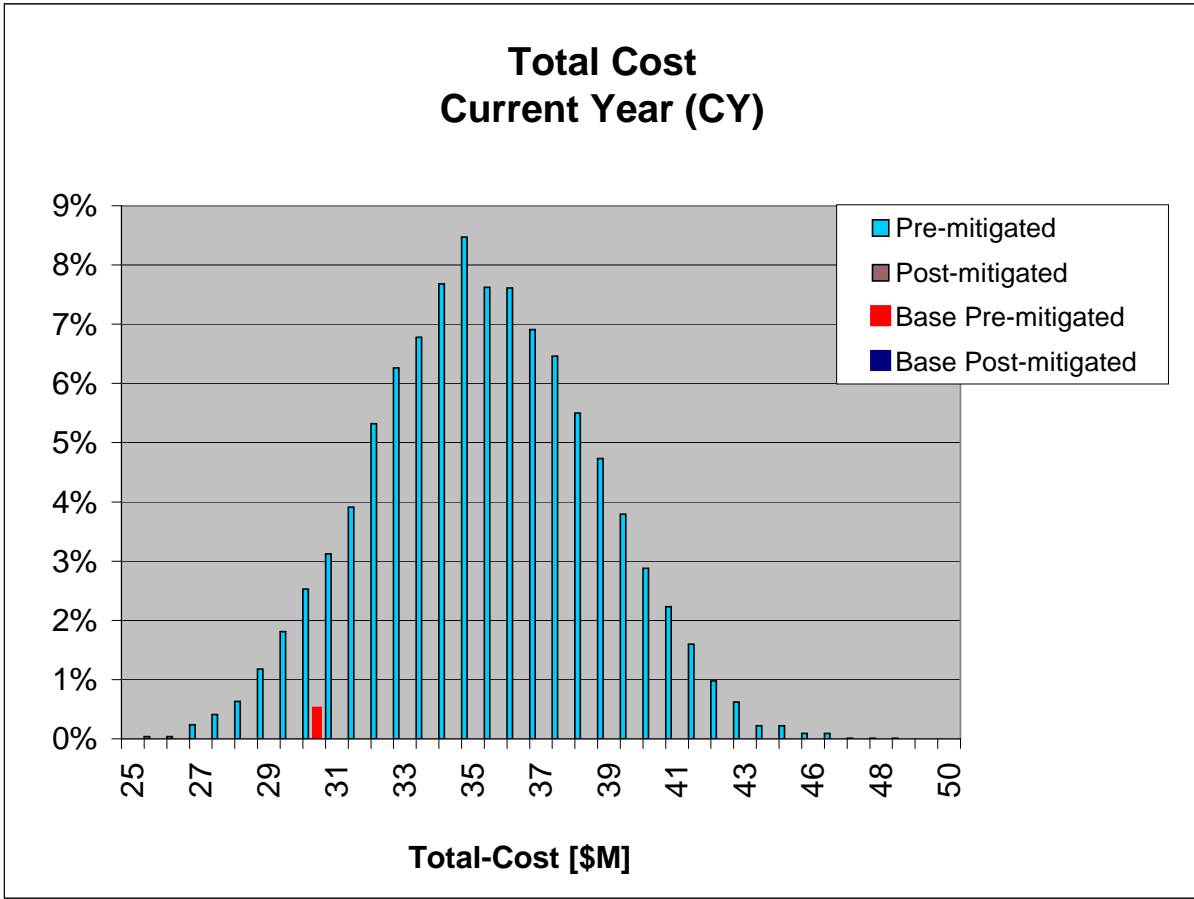
Project Title	Point Defiance Bypass Project
PIN #	N/A
WIN#	N/A
SR	N/A
Mileposts	South 74th Street
Project Manager (PE)	
Preparers Name	Edward Soto, Owen Kikuta
Date of Costs	10/07/11
Date of Update	
Date of Basis of Estimate	
Date of Review	

Summary Project Assumptions

Summary of Risks
Additional utility costs and delays
Railroad and industrial site hazardous material Gas station underground contamination
See Risk Matrix Spreadsheet for complete list of risks

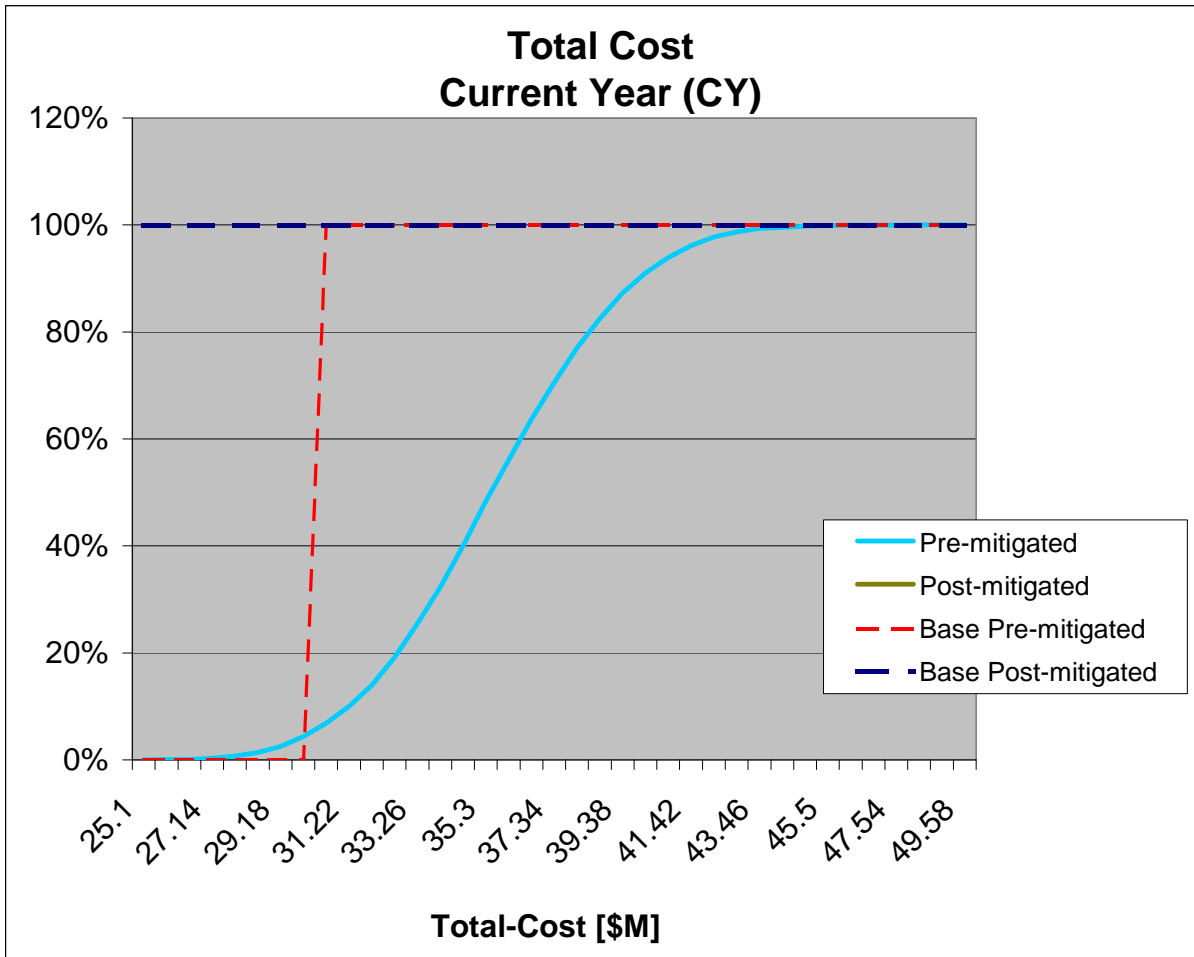
COST ESTIMATE - 74th Street
Prepared by Parametrix for WSDOT Rail and Marine Office

PIN NUMBER:		N/A		DESCRIPTION OF WORK		
SR, MP's:		N/ASouth 74th Street				
PROJECT TITLE:						
Point Defiance Bypass Project						
REGION:		State Rail & Marine Office		S 74th Street grade separation concept over rail line		
MOBILIZATION AND PREPARATION				\$	2,131,381	
Mobilization	10%	1	\$ 1,785,381	\$	1,785,381	Approximately 10% of Construction Subtotal
Building Demolition	L.S.	1	\$ 25,000	\$	25,000	\$2/sf
Removal of Structures and Obstructions	L.S.	1	\$ 121,000	\$	121,000	\$100k/lane-mi
Gas Station Demolition and Cleanup	L.S.	1	\$ 200,000	\$	200,000	Incl. UST removal & soil cleanup
				\$	-	
				\$	-	
				\$	-	
GRADING, DRAINAGE AND STOCKPILING				\$	1,596,500	
Roadway Excavation	C.Y.	8500	\$10	\$	85,000	NWR UBA, for SEW foundation
Gravel Borrow	Ton	108000	\$11	\$	1,188,000	NWR UBA, includes SEW backfill
Embankment Compaction	C.Y.	62000	\$3	\$	186,000	NWR UBA
Plain ST. Culv. Pipe 0.138 in. Th. 72 In. Diam.	LF	275	\$500	\$	137,500	Includes excavation, and other misc. work
				\$	-	
				\$	-	
				\$	-	
WATERLINES, STORM AND SANITARY SEWERS				\$	402,000	
Detention Vault	L.S.	1	\$150,000	\$	150,000	\$10/SF impervious, assume treat half of impervious on east side of crest curve
Filtration Water Quality Treatment	L.S.	1	\$10,000	\$	10,000	\$0.60/SF impervious, assume treat half of impervious on east side of crest curve
Detention Pond	L.S.	1	\$55,000	\$	55,000	\$2/SF impervious, assume treat half of impervious west of crest curve
Water Quality Pond	L.S.	1	\$14,000	\$	14,000	\$0.50/SF impervious, assume treat half of impervious west of crest curve
Catch Basin Type 1	EA	16	\$1,500	\$	24,000	Incl Excav, Shoring, etc
Catch Basin Type 2	EA	6	\$3,500	\$	21,000	Incl Excav, Shoring, etc
Schedule A Storm Sewer Pipe	L.F.	3200	\$ 40	\$	128,000	Incl Excav, Shoring, etc
				\$	-	
				\$	-	
				\$	-	
STRUCTURES				\$	5,966,460	
Roadway Bridge 1- spans up to 140 ft	S.F.	8,081	\$180	\$	1,454,580	WSDOT Bridge Manual, previous projects
Roadway Bridge 2- spans up to 140 ft	S.F.	10,136	\$180	\$	1,824,480	WSDOT Bridge Manual, previous projects
Structural Earth Walls	S.F.	28,273	\$50	\$	1,413,650	WSDOT Bridge Manual, Conc. Panel
Structural Earth Wall Traffic Barrier	L.F.	1,800	\$300	\$	540,000	NWR UBA
Bridge Approach Slabs	S.Y.	675	\$250	\$	168,750	
Bridge Architectural Features	L.S.	1	\$75,000	\$	75,000	
Temp. Retaining Walls	S.F.	9,800	\$50	\$	490,000	For staging and temp roadway
				\$	-	
				\$	-	
				\$	-	
ASPHALT AND SURFACING				\$	344,000	
HMA	Ton	3130	\$75	\$	234,750	NWR UBA, 0.5' depth, Truck access road
Crushed Surfacing Top Course	Ton	2050	\$25	\$	51,250	NWR UBA, 0.33' depth
Crushed Surfacing Base Course	Ton	2900	\$20	\$	58,000	NWR UBA, 0.5' depth
				\$	-	
				\$	-	
				\$	-	
CEMENT CONCRETE PAVEMENT				\$	630,850	
Portland Cement Concrete Pavement	S.F.	57350	\$11	\$	630,850	SF cost all-inclusive per PMX tool, 0.83' depth PCCP & 1' CSBC on 74th
				\$	-	
				\$	-	
				\$	-	
TRAFFIC				\$	771,600	
Curb, Gutter, and Sidewalk	L.F.	2550	\$30	\$	76,500	PMX base cost tool
Pavement Markings	L.F.	6500	\$1	\$	6,500	
Signing	L.S.	1	\$45,000	\$	45,000	\$36k/lane-mi
Illumination	EA	20	\$15,000	\$	300,000	Pole every 150', \$15k/pole
Permanent Signal System	L.S.	1	\$150,000	\$	150,000	At truck access roadway, 3-leg intersection
Traffic Signal Modifications	L.S.	1	\$100,000	\$	100,000	Two modifications for staging at S. Tacoma Way
Temporary Roadway	S.F.	15600	\$6	\$	93,600	To maintain traffic during bridge/wall construction, SF cost all-inclusive
				\$	-	
				\$	-	
OTHER ITEMS				\$	6,574,625	
Utilities	5%	1	\$485,571	\$	485,571	PMX base cost tool, assumes utility franchise
Temporary Water Pollution Control	4%	1	\$388,456	\$	388,456	PMX base cost tool
Construction Staging	5%	1	\$485,571	\$	485,571	PMX base cost tool
Traffic Control	10%	1	\$971,141	\$	971,141	PMX base cost tool
Roadside Restoration	5%	1	\$485,571	\$	485,571	Seeding, Planting, Fencing, Cleanup- 5% because of restoration of existing 74th
Design Allowance for Additional Items	30%	1	\$3,758,316	\$	3,758,316	
				\$	-	
				\$	-	
				\$	-	
				\$	-	
NON - BID COSTS 700 Level Items				\$	202,000	
NON - BID COSTS 800 Level Items				\$	-	
700 Railroad Flagging	DAY	170	\$600	\$	102,000	
700 Rail X-ing Signal Modification	L.S.	1	\$100,000	\$	100,000	Relocate signal due to construction impact
700				\$	-	
800				\$	-	
800				\$	-	
800				\$	-	
		1		\$	-	
				\$	-	
				\$	-	
				\$	-	
Total				\$	18,417,415	



Total Base Estimate (CY)	
Pre-mitigated	Post-mitigated
30.37 \$M	0.00 \$M

Statistics	Pre-mitigated	Post-mitigated
Min	25.14 \$M	
Max	47.71 \$M	
Median	35.44 \$M	
10%	31.22 \$M	
20%	32.65 \$M	
30%	33.71 \$M	
40%	34.62 \$M	
50%	35.44 \$M	
60%	36.33 \$M	
70%	37.28 \$M	
80%	38.39 \$M	
90%	39.86 \$M	



Project Title	Point Defiance Bypass - 74th Street Grade Separation Conceptual Estimate				Value	Variability	Risk Markups	WSDOT Escalation tables built-in.		%	Total Cost CY [\$M]	Total Cost YOY [\$M]	Ad Date	®	End Construction date	WSDOT Ovidiu Cretu 360-705-7599
Estimate Date	10/28/11	Target AD date		04/15/15	10%	Mob	10.0%	A/B/A Duration	3Mo	50	35.44	39.55	July 18, 2015	50%	October 31, 2017	
Project PIN #	n/a	Estimated CN Duration		24.0Mo	15%	Tax	8.5%	on-WSDOT rat	YOY	60	36.33	40.54	August 11, 2015	60%	November 25, 2017	
Last Review Date	n/a	Estimated PE Cost		3.03 \$M	10%	CE	10.0%	PE		3.1\$M	70	37.28	September 5, 2015	70%	December 21, 2017	
Project Manager	J. Biggs	Estimated ROW Cost		4.33 \$M	15%	PE	13.2%	ROW		4.7\$M	80	38.39	October 1, 2015	80%	January 18, 2018	
		Estimated CN Cost		23.01 \$M	15%	C.O.C	4.0%	CN		26.2\$M	90	39.86	November 1, 2015	90%	February 24, 2018	

The yellow highlighted cells have to be filled in order for macro to run correctly. The light green highlighted cells may be filled if you know what you are doing. !!!!!!! Existing (Pre-Mitigated) Design!!!!!! Created and Maintained by WSDOT, contact Ovidiu Cretu 360-705-7599, cretuo@wsdot.wa.gov

Risk Identification					Quantitative Analysis				Qualitative Display of the Best Guess Impact				Risk Response Plan			Monitoring and Control		Critical Issue		
Risk #	Status	Dependency	Project Phase	Summary Description Threat and/or Opportunity	Detailed Description of Risk Event (Specific, Measurable, Attributable, Relevant, Timebound) [SMART]	Risk Trigger	Type	Probability/Correlation	Risk Impact (\$M or Mo)	Expected Impact (\$M)	Probability (%)	Impact	Risk Matrix (Probability of Occurrence by Expected Impact)	Strategy	ACTION TO BE TAKEN Response Actions including advantages and disadvantages include date	Risk Owner	Risk Review Dates	Date, Status and Review Comments (Do not delete prior comments, therefore providing a history)	Is Risk on Critical Path?	
(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)	(10)	[10a]	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
EXAMPLE	Active		ROW	Threat Wetland mitigation may require additional R/W	The mitigation ratio has not been finalized and also there could be additional impacts to wetlands which would increase the amount of R/W needed for the mitigation area.	If Wetland impact is larger than 1/2 acre and ratio exceeds 4:1.	Cost	88%	MIN 1.00\$M MAX 8.00\$M Most Likely 5.00\$M	4\$M	Very High	Very High	Probability VH H M L VL	Mitigation	Finalize design to identify all wetlands that are impacted. Early coordination with the outside agencies to determine mitigation ratio.	Design Leader/Enviro. mgr	2007-Jan-2	As of Nov. 15, 2005 there are only two potential areas where there could be additional wetland impacts. As of Dec. 2, 2005 agency has initially determined that mitigation ration would be 4:1.	YES	
1	Active		Pre-construction	Threat Hazardous materials may increase excavation costs	There is potential for hazardous waste to be encountered during excavation or building demo due to gas station and automotive-related businesses in the area as well as RR R/W and commercial/industrial sites.	Material to be excavated tests as contaminated.	Cost	50%	MIN 0.25\$M MAX 2.00\$M Most Likely 0.50\$M	0.35\$M	Moderate	Moderate	Probability VH H M L VL	Acceptance	A soil testing program would be implemented during preliminary design activities if the project is carried forward.	Design Team			YES	
2	Active		Pre-construction	Threat Maintaining commercial accesses during construction	Access to commercial businesses during construction could require additional budget to maintain.	Accesses are restricted during construction, requiring additional work or compensation.	Cost	50%	MIN 0.00\$M MAX 1.00\$M Most Likely 0.50\$M	0.25\$M	Moderate	Moderate	Probability VH H M L VL	Mitigation	Design work needs to account for the commercial accesses during each traffic phase.	Design Team			YES	
3	Active		Construction	Threat Additional Utility Costs/Delays	The project could be burdened with additional cost responsibility for utilities that are impacted by the work. This does not include power transmission lines, see separate risk.	Utility relocation costs are assigned to the project.	Cost	30%	MIN 0.50\$M MAX 2.00\$M Most Likely 2.00\$M	0.53\$M	Low	High	Probability VH H M L VL	Avoidance	Coordinate early in the design process with utility owners	Design Team		10/25/2011: Assumption is that primary utility relocation costs will be covered by others under franchise agreements. Per meeting on 10/11/2011, Transmission mains and proximity to substation is treated under a separate risk.	YES	

The yellow highlighted cells have to be filled in order for macro to run correctly. The light green highlighted cells may be filled if you know what you are doing. !!!!! Existing (Pre-Mitigated) Design!!!!!!!!!!!!!! Created and Maintained by WSDOT, contact Ovidiu Cretu 360-705-7599, cretuo@wsdot.wa.gov

Risk Identification																				
Risk #	Status	Dependency	Project Phase	Summary Description Threat and/or Opportunity	Detailed Description of Risk Event (Specific, Measurable, Attributable, Relevant, Timebound) [SMART]	Risk Trigger	Type	Quantitative Analysis			Qualitative Display of the Best Guess Impact			Risk Response Plan			Monitoring and Control		Critical Issue	
								Probability/Correlation	Risk Impact (\$M or Mo)	Expected Impact (\$M)	Probability (%)	Impact	Risk Matrix (Probability of Occurrence by Expected Impact)	Strategy	ACTION TO BE TAKEN Response Actions including advantages and disadvantages include date	Risk Owner	Risk Review Dates	Date, Status and Review Comments (Do not delete prior comments, therefore providing a history)		
(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)	(10)	[10a]	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
4	Active		ROW	Threat Additional R/W Costs/Delays	Right of way acquisition could be more expensive or take longer than assumed	Negotiations break down with property owners	Cost	30%	MIN 0.00\$M MAX 2.00\$M Most Likely 1.00\$M	0.30\$M	Low	Moderate	Probability VH H M L VL Mo \$	Acceptance	Begin appraisals and negotiations in a timely manner.	Real Estate Svcs Mgr			YES	
5	Active		Pre-construction	Threat Additional improvements needed to City streets	There may be additional street work needed to match into the City street system as compared to the conceptual design.	City disagrees with preliminary design concept	Cost	25%	MIN 0.25\$M MAX 1.00\$M Most Likely 0.50\$M	0.14\$M	Low	Moderate	Probability VH H M L VL Mo \$	Avoidance	Work with City staff to accept the proposed design	Design Team			YES	
6	Active		Pre-construction	Threat Power Transmission Line Costs/Delays	Additional costs and/or schedule delays are incurred because of additional power transmission line work. Seasonal restrictions on transmission line shutdowns could have substantial delays.	Cost responsibility or power relocations or delays in schedule affect the project.	Cost	50%	MIN 1.00\$M MAX 3.00\$M Most Likely 2.00\$M	1.00\$M	Moderate	High	Probability VH H M L VL Mo \$	Avoidance	Coordinate with Tacoma Power to minimize impacts to the power transmission system.	Design Team		Transmission mains and proximity to substation may result in seasonal restrictions on relocations	YES	
7	Active		Pre-construction	Threat Minimal design effort	Only very preliminary conceptual work has been completed. The scope has a high probability of growing as further refinement and detail is added.	The project definition/scope grows beyond that assumed for the current estimate	Cost	75%	MIN 0.00\$M MAX 6.00\$M Most Likely 3.00\$M	2.25\$M	High	Very High	Probability VH H M L VL Mo \$	Avoidance	Work with project stakeholders to manage the scope.	Design team		10/25/11: Assumed Max is approximately 20% of base total project cost	YES	
8	Retired						Cost		MIN MAX Most Likely	0.00\$M	NO RISK	NO RISK	Probability VH H M L VL						YES	
9	Retired						Cost		MIN MAX Most Likely	0.00\$M	NO RISK	NO RISK	Probability VH H M L VL						YES	

Estimate Summary

Construction Costs		\$	28,330,169
Design Allocations		\$	-
<u>Change Order Cont.</u>	4.0%	\$	1,248,729.35
<u>Sales Tax</u>	8.5%	\$	2,408,064.39
CN Subtotal		\$	31,218,234
Right of Way Costs	17210000	\$	17,210,000
<u>Preliminary Engineering</u>	15%	\$	4,682,735.05
<u>Construction Engineering</u>	10%	\$	3,121,823.37
<u>700 Level Items</u>	\$ 480,000	\$	480,000
<u>800 Level Items</u>	\$ -	\$	-
Total Project Costs		\$	57,481,521
Total Project Costs (from 60th Percentile Risk Base Est.)		\$	67,060,000
Total Project Costs (-20% to +40% Range from 60th percentile)		-20%	\$ 53,648,000
		+40%	\$ 93,884,000

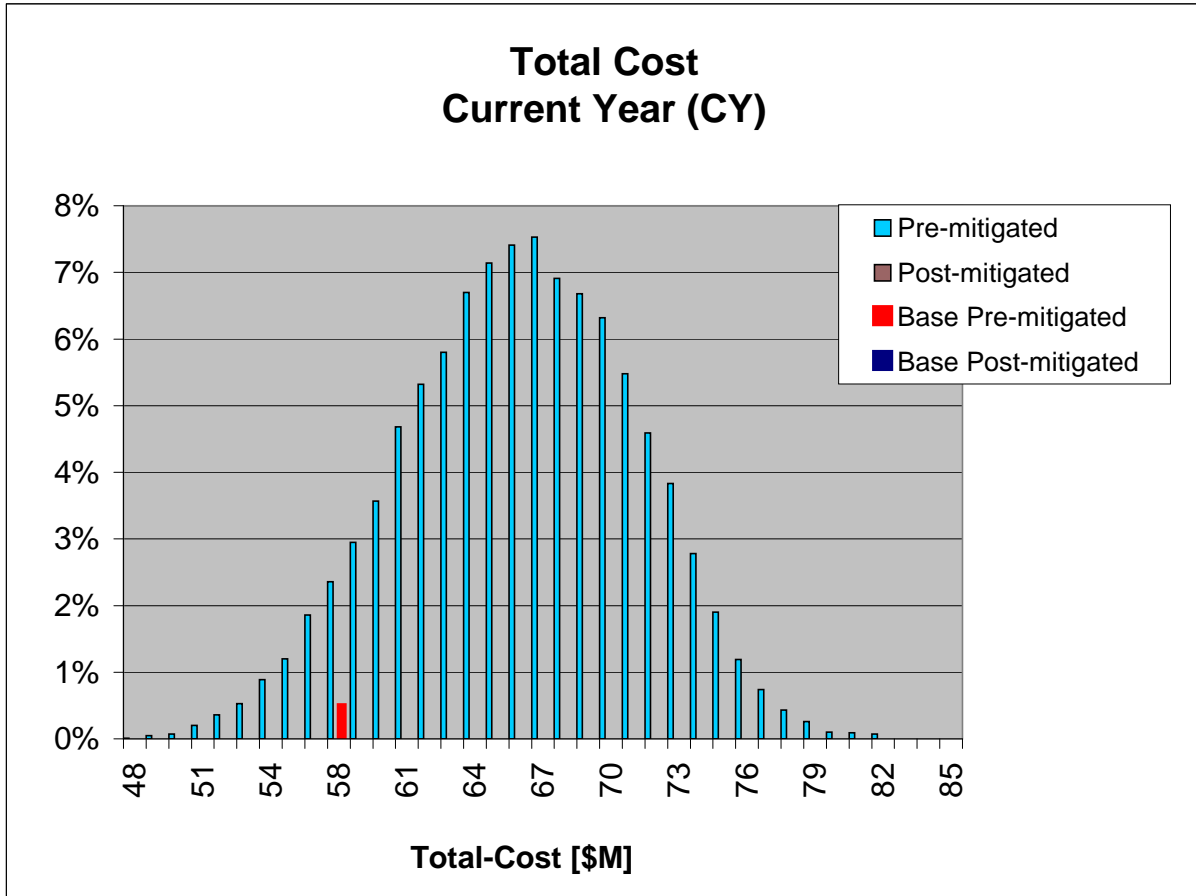
Project Title	Point Defiance Bypass Project
PIN #	N/A
WIN#	N/A
SR	N/A
Mileposts	Bridgeport Way SW
Project Manager (PE)	
Preparers Name	Edward Soto, Owen Kikuta
Date of Costs	10/11
Date of Update	10/28/11
Date of Basis of Estimate	
Date of Review	

Summary Project Assumptions

Summary of Risks
<p style="text-align: center;">Additional utility cost and delay</p> <p style="text-align: center;">Complex construction staging and traffic control Business access during construction</p> <p style="text-align: center;">Proximity to I-5, hospital, schools</p> <p style="text-align: center;">See Risk Matrix Spreadsheet for complete list of risks</p>

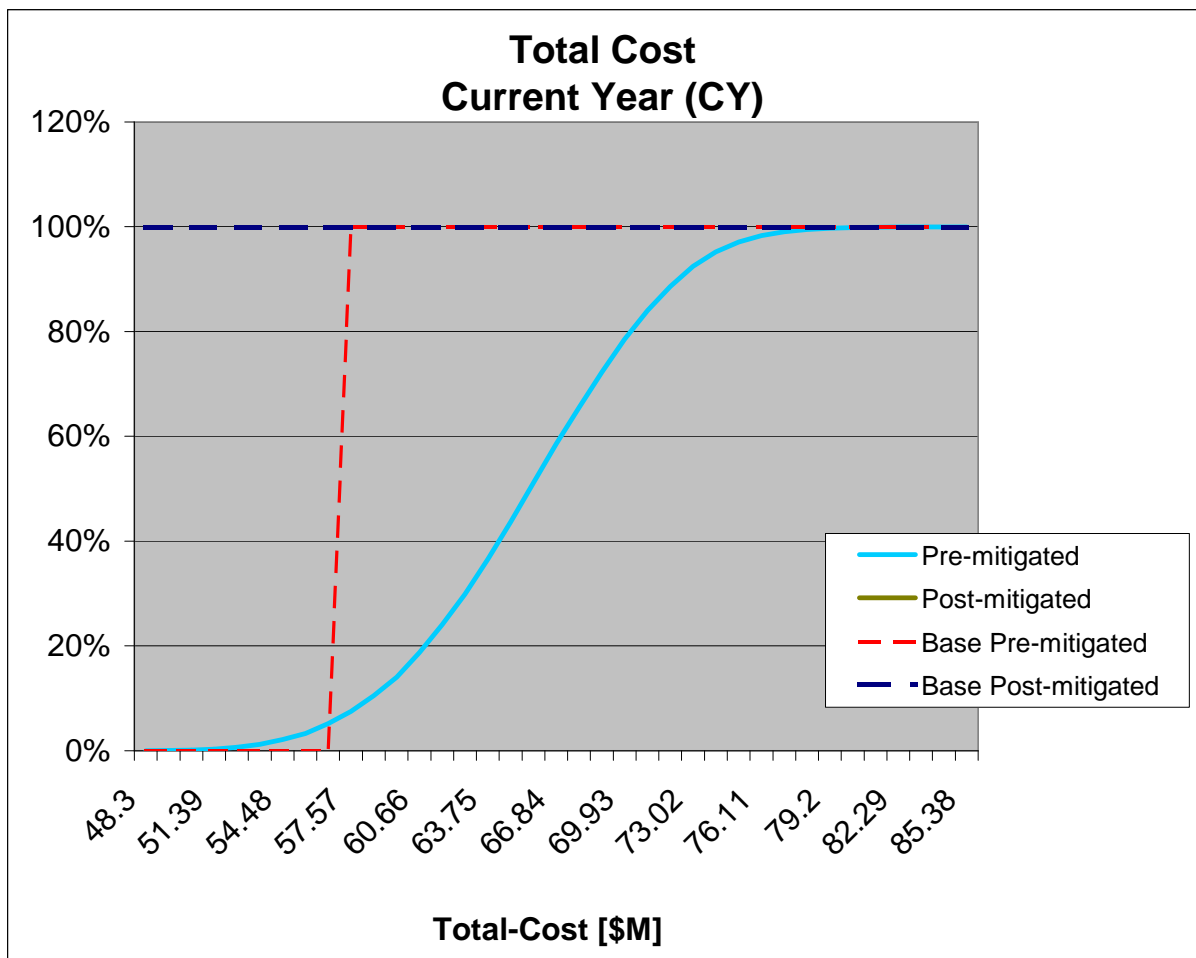
COST ESTIMATE -Bridgeport Way
Prepared by Parametrix for WSDOT Rail and Marine Office

PIN NUMBER:		N/A		DESCRIPTION OF WORK		
SR, MP's:		N/A Bridgeport Way SW				
PROJECT TITLE:						
Point Defiance Bypass Project						
REGION:		State Rail & Marine Office	Bridgeport Way SW grade separation concept over rail line			
MOBILIZATION AND PREPARATION				\$	3,503,680	
Mobilization	10%	1	\$ 2,691,680	\$	2,691,680	Approximately 10% of Construction Subtotal
Building Demolition	L.S.	1	\$ 150,000	\$	150,000	\$2/SF
Removal of Structures and Obstructions	L.S.	1	\$ 262,000	\$	262,000	\$100k/lane-mi
Gas Station Demolition and Cleanup	L.S.	2	\$ 200,000	\$	400,000	Incl. UST removal & soil cleanup; incl. U-haul site: former gas station
			\$ -	\$	-	
			\$ -	\$	-	
			\$ -	\$	-	
GRADING, DRAINAGE AND STOCKPILING				\$	3,190,716	
Roadway Excavation	C.Y.	26,000	\$10	\$	260,000	NWR UBA, for SEW foundation
Gravel Borrow	Ton	233,000	\$11	\$	2,563,000	NWR UBA, includes SEW backfill
Embankment Compaction	C.Y.	122,572	\$3	\$	367,716	NWR UBA
				\$	-	
			\$ -	\$	-	
			\$ -	\$	-	
WATERLINES, STORM AND SANITARY SEWERS				\$	746,000	
Detention Vault	L.S.	1	\$210,000	\$	210,000	\$10/SF impervious, assume treat half of impervious north of structure
Filtration Water Quality Treatment	L.S.	1	\$13,000	\$	13,000	\$0.60/SF impervious, assume treat half of impervious on east side of crest curve
Detention Pond	L.S.	1	\$158,000	\$	158,000	\$2/SF impervious, assume treat half of impervious south of structure
Water Quality Pond	L.S.	1	\$40,000	\$	40,000	\$0.50/SF impervious, assume treat half of impervious west of crest curve
Catch Basin Type 1	EA	36	\$1,500	\$	54,000	Incl Excav, Shoring, etc
Catch Basin Type 2	EA	10	\$3,500	\$	35,000	Incl Excav, Shoring, etc
Schedule A Storm Sewer Pipe	L.F.	5900	\$ 40	\$	236,000	Incl Excav, Shoring, etc
				\$	-	
			\$ -	\$	-	
			\$ -	\$	-	
STRUCTURES				\$	7,510,000	
Roadway Bridge 1- spans up to 200 ft	S.F.	16,200	\$200	\$	3,240,000	WSDOT Bridge Manual, previous projects
Structural Earth Walls	S.F.	59,600	\$50	\$	2,980,000	WSDOT Bridge Manual, Conc. Panel
Structural Earth Wall Traffic Barrier	L.F.	4,300	\$300	\$	1,290,000	NWR UBA
				\$	-	
			\$ -	\$	-	
			\$ -	\$	-	
			\$ -	\$	-	
ASPHALT AND SURFACING				\$	899,500	
HMA	Ton	8,200	\$75	\$	615,000	NWR UBA, 0.5' depth
Crushed Surfacing Top Course	Ton	5,300	\$25	\$	132,500	NWR UBA, 0.33' depth
Crushed Surfacing Base Course	Ton	7,600	\$20	\$	152,000	NWR UBA, 0.5' depth
				\$	-	
			\$ -	\$	-	
			\$ -	\$	-	
			\$ -	\$	-	
CEMENT CONCRETE PAVEMENT				\$	-	
				\$	-	Assumed HMA only for this project: low truck volumes and 8% max grades.
				\$	-	
			\$ -	\$	-	
			\$ -	\$	-	
			\$ -	\$	-	
TRAFFIC				\$	1,905,500	
Curb, Gutter, and Sidewalk	L.F.	2550	\$ 30	\$	76,500	PMX base cost tool
Pavement Markings	L.F.	15000	\$ 1	\$	15,000	
Signing	L.S.	1	\$ 94,000	\$	94,000	\$36k/lane-mi
Illumination	EA	40	\$ 15,000	\$	600,000	Pole every 150' each side, \$15k/pole
Traffic Signal System	L.S.	1	\$ 250,000	\$	250,000	New monotube signal system
Temporary Signal System	L.S.	1	\$ 150,000	\$	150,000	For temp roadway intersection
Temporary Roadway	S.F.	120000	6	\$	720,000	To maintain traffic during bridge/wall construction, SF cost all-inclusive
				\$	-	
			\$ -	\$	-	
			\$ -	\$	-	
OTHER ITEMS				\$	10,574,773	
Utilities	5%	1	\$712,586	\$	712,586	PMX base cost tool
Temporary Water Pollution Control	4%	1	\$570,069	\$	570,069	PMX base cost tool
Construction Staging	10%	1	\$1,425,172	\$	1,425,172	PMX base cost tool
Traffic Control	10%	1	\$1,425,172	\$	1,425,172	PMX base cost tool
Roadside Restoration	5%	1	\$712,586	\$	712,586	Seeding, Planting, Fencing, Cleanup, Landscaping
Design Allowance for Additional Items	30%	1	\$5,729,190	\$	5,729,190	
				\$	-	
			\$ -	\$	-	
			\$ -	\$	-	
			\$ -	\$	-	
			\$ -	\$	-	
NON - BID COSTS 700 Level Items				\$	480,000	
NON - BID COSTS 800 Level Items				\$	-	
700 Railroad Flagging	DAYS	180	\$600	\$	108,000	
700 Temp Railroad Crossing	S.F.	1800	\$40	\$	72,000	Precast RR x-ing panels for temp roadway during construction.
700 Temp Railroad X-ing Signal	L.S.	1	\$300,000	\$	300,000	For temp roadway during construction
800				\$	-	
800				\$	-	
800				\$	-	
		1		\$	-	
				\$	-	
				\$	-	
				\$	-	
				\$	-	
Total				\$	28,330,169	



Total Base Estimate (CY)	
Pre-mitigated	Post-mitigated
57.48 \$M	0.00 \$M

Statistics	Pre-mitigated	Post-mitigated
Min	48.28 \$M	
Max	82.20 \$M	
Median	65.66 \$M	
10%	58.46 \$M	
20%	60.94 \$M	
30%	62.75 \$M	
40%	64.24 \$M	
50%	65.66 \$M	
60%	67.06 \$M	
70%	68.56 \$M	
80%	70.20 \$M	
90%	72.31 \$M	



Project Title	Point Defiance Bypass - Bridgeport Way Grade Separation Conceptual Estimate				Value	Variability	Risk Markups	WSDOT Escalation tables built-in.		%	Total Cost CY [\$M]	Total Cost YOY [\$M]	Ad Date	®	End Construction date	WSDOT Ovidiu Cretu 360-705-7599
Estimate Date	11/23/11	Target AD date		04/15/15	10%	Mob	10.0%	A/B/A Duration	3Mo	50	65.66	72.96	May 29, 2015	50%	February 27, 2018	
Project PIN #	n/a	Estimated CN Duration		30.0Mo	15%	Tax	8.5%	on-WSDOT rat	YOY	60	67.06	74.50	June 12, 2015	60%	March 18, 2018	
Last Review Date	n/a	Estimated PE Cost		4.68 \$M	10%	CE	10.0%	PE		4.8\$M	70	68.56	76.14	70%	April 9, 2018	
Project Manager	J. Biggs	Estimated ROW Cost		17.21 \$M	15%	PE	13.1%	ROW		18.8\$M	80	70.20	77.94	80%	May 1, 2018	
		Estimated CN Cost		35.59 \$M	15%	C.O.C	4.0%	CN		40.7\$M	90	72.31	80.29	90%	June 2, 2018	

The yellow highlighted cells have to be filled in order for macro to run correctly. The light green highlighted cells may be filled if you know what you are doing. !!!!!!! Existing (Pre-Mitigated) Design!!!!!! Created and Maintained by WSDOT, contact Ovidiu Cretu 360-705-7599, cretuo@wsdot.wa.gov

Risk Identification					Quantitative Analysis				Qualitative Display of the Best Guess Impact				Risk Response Plan			Monitoring and Control		Critical Issue		
Risk #	Status	Dependency	Project Phase	Summary Description Threat and/or Opportunity	Detailed Description of Risk Event (Specific, Measurable, Attributable, Relevant, Timebound) [SMART]	Risk Trigger	Type	Probability/Correlation	Risk Impact (\$M or Mo)	Expected Impact (\$M)	Probability (%)	Impact	Risk Matrix (Probability of Occurrence by Expected Impact)	Strategy	ACTION TO BE TAKEN Response Actions including advantages and disadvantages include date	Risk Owner	Risk Review Dates	Date, Status and Review Comments (Do not delete prior comments, therefore providing a history)	Is Risk on Critical Path?	
(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)	(10)	[10a]	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
EXAMPLE	Active		ROW	Threat Wetland mitigation may require additional R/W	The mitigation ratio has not been finalized and also there could be additional impacts to wetlands which would increase the amount of R/W needed for the mitigation area.	If Wetland impact is larger than 1/2 acre and ratio exceeds 4:1.	Cost	88%	MIN 1.00\$M MAX 8.00\$M Most Likely 5.00\$M	4\$M	Very High	Very High	Probability VH H M L VL Mo \$	Mitigation	Finalize design to identify all wetlands that are impacted. Early coordination with the outside agencies to determine mitigation ratio.	Design Leader/Enviro. mgr	2007-Jan-2	As of Nov. 15, 2005 there are only two potential areas where there could be additional wetland impacts. As of Dec. 2, 2005 agency has initially determined that mitigation ration would be 4:1.	YES	
1	Active		Pre-construction	Threat Hazardous materials may increase excavation costs	There is potential for hazardous waste to be encountered during excavation or building demo due to gas stations and other commercial businesses.	Material to be excavated tests as contaminated.	Cost	30%	MIN 0.10\$M MAX 1.00\$M Most Likely 0.20\$M	0.10\$M	Low	Low	Probability VH H M L VL Mo \$	Acceptance	A soil testing program would be implemented during preliminary design activities if the project is carried forward.	Design Team			YES	
2	Active		Pre-construction	Threat Maintaining commercial accesses during construction	Access to commercial businesses during construction could require additional budget to maintain.	Accesses are restricted during construction, requiring additional work or compensation.	Cost	50%	MIN 0.00\$M MAX 0.50\$M Most Likely 0.20\$M	0.11\$M	Moderate	Very Low	Probability VH H M L VL \$Mo	Mitigation	Design work needs to account for the commercial accesses during each traffic phase.	Design Team			YES	
3	Active		Pre-construction	Threat Additional Utility Costs/Delays	The project could be burdened with additional cost responsibility for utilities that are impacted by the work.	Utility relocation costs are assigned to the project.	Cost	30%	MIN 0.00\$M MAX 2.00\$M Most Likely 0.50\$M	0.20\$M	Low	Low	Probability VH H M L VL Mo \$	Avoidance	Coordinate early in the design process with utility owners	Design Team		10/10/2011: Assumption is that primary utility relocation costs will be covered by others under franchise agreements.	YES	

The yellow highlighted cells have to be filled in order for macro to run correctly. The light green highlighted cells may be filled if you know what you are doing. !!!!! Existing (Pre-Mitigated) Design!!!!!! Created and Maintained by WSDOT, contact Ovidiu Cretu 360-705-7599, cretuo@wsdot.wa.gov

Risk Identification																				
Risk #	Status	Dependency	Project Phase	Summary Description Threat and/or Opportunity	Detailed Description of Risk Event (Specific, Measurable, Attributable, Relevant, Timebound) [SMART]	Risk Trigger	Type	Quantitative Analysis			Qualitative Display of the Best Guess Impact			Risk Response Plan		Monitoring and Control		Critical Issue		
								Probability/Correlation	Risk Impact (\$M or Mo)	Expected Impact (\$M)	Probability (%)	Impact	Risk Matrix (Probability of Occurrence by Expected Impact)	Strategy	ACTION TO BE TAKEN Response Actions including advantages and disadvantages include date	Risk Owner	Risk Review Dates		Date, Status and Review Comments (Do not delete prior comments, therefore providing a history)	
(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)	(10)	[10a]	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
4	Active		ROW	Threat Additional R/W Costs/Delays	Right of way acquisition could be more expensive or take longer than assumed	Negotiations break down with property owners	Cost	50%	MIN 1.00\$M MAX 6.00\$M Most Likely 3.00\$M	1.58\$M	Moderate	High	Probability VH H M L VL Mo \$	Acceptance	Begin appraisals and negotiations in a timely manner.	Real Estate Svcs Mgr			YES	
5	Active		Pre-construction	Threat Additional improvements/urban design features needed for City streets	There may be additional street work or "gateway" urban design needed to match into the City street system as compared to the conceptual design.	City disagrees with preliminary design concept	Cost	25%	MIN 0.25\$M MAX 1.00\$M Most Likely 0.50\$M	0.14\$M	Low	Low	Probability VH H M L VL Mo \$	Avoidance	Work with City staff to accept the proposed design	Design Team		YES		
6	Retired		ROW	Opportunity Re-sale of excess R/W	There may be an opportunity to sell some of the R/W needed during construction following completion of the project.	Excess R/W with adequate access is available following construction of the project.	Cost	0%	MIN 0.00\$M MAX 0.00\$M Most Likely 0.00\$M	0.00\$M	NO RISK	NO RISK	Probability VH H M L VL	Mitigation	Minimize encumbrances on excess R/W during design and construction	Design Team	This was determined not to be an opportunity because the revenue from sales of excess R/W would not go back into the project budget.	YES		
7	Active		Pre-construction	Threat Construction traffic challenges	There will be high expectations for maintenance of traffic during construction due to the proximity to I-5, a hospital and schools- additional construction measures may be needed, including needs for pedestrian/non-motorized connectivity.	More features for Maintenance of Traffic (MOT) are needed	Cost	75%	MIN 0.50\$M MAX 2.00\$M Most Likely 1.00\$M	0.81\$M	High	Moderate	Probability VH H M L VL \$	Mitigation	Develop construction staging plans to minimize traffic disruptions.	Design Team		YES		
8	Active		Pre-construction	Threat Minimal design effort	Only very preliminary conceptual work has been completed. The scope has a high probability of growing as further refinement and detail is added.	The project definition/scope grows beyond that assumed for the current estimate.	Cost	75%	MIN 2.00\$M MAX 11.00\$M Most Likely 7.00\$M	5.13\$M	High	Very High	Probability VH H M L VL Mo \$	Avoidance	Work with project stakeholders to manage the scope	Design Team	10/25/11: Assumed Max is approximately 20% of base total project cost	YES		
9	Retired						Cost		MIN MAX Most Likely	0.00\$M	NO RISK	NO RISK	Probability VH H M L VL					YES		

Estimate Summary

Construction Costs		\$	37,115,314
Design Allocations		\$	-
<u>Change Order Cont.</u>	4.0%	\$	1,625,684.61
<u>Sales Tax</u>	8.5%	\$	3,154,801.66
CN Subtotal		\$	40,642,115
<hr/>			
Right of Way Costs		\$	-
<u>Preliminary Engineering</u>	15%	\$	6,096,317.29
<u>Construction Engineering</u>	10%	\$	4,064,211.53
<u>700 Level Items</u>	\$ 372,000	\$	372,000
<u>800 Level Items</u>	\$ -	\$	-
Total Project Costs		\$	52,428,329
<hr/>			
Total Project Costs (from 60th Percentile Risk Base Est.)		\$	61,750,000
Total Project Costs (-20% to +40% Range from 60th percentile)	-20%	\$	49,400,000
	-40%	\$	86,450,000

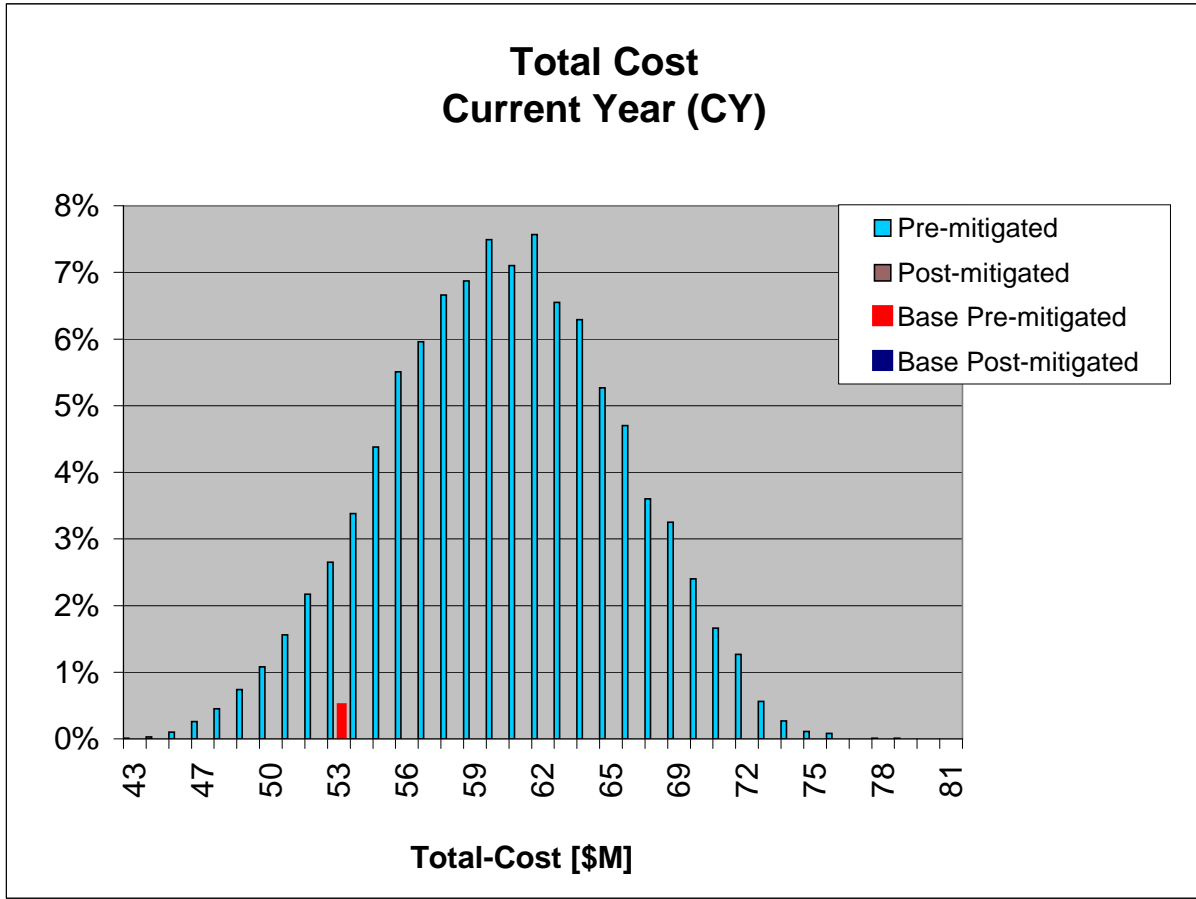
Project Title	Point Defiance Bypass Project
PIN #	N/A
WIN#	N/A
SR	N/A
Mileposts	Berkeley Street
Project Manager (PE)	
Preparers Name	Edward Soto, Owen Kikuta
Date of Costs	10/10/11
Date of Update	
Date of Basis of Estimate	
Date of Review	

Summary Project Assumptions

Summary of Risks
<p style="text-align: center;">Maintenance of traffic at Berkeley I/C</p> <p style="text-align: center;">Maintaining rail access during construction Neighborhood concerns of raised rail line</p> <p style="text-align: center;">See Risk Matrix Spreadsheet for complete list of risks</p>

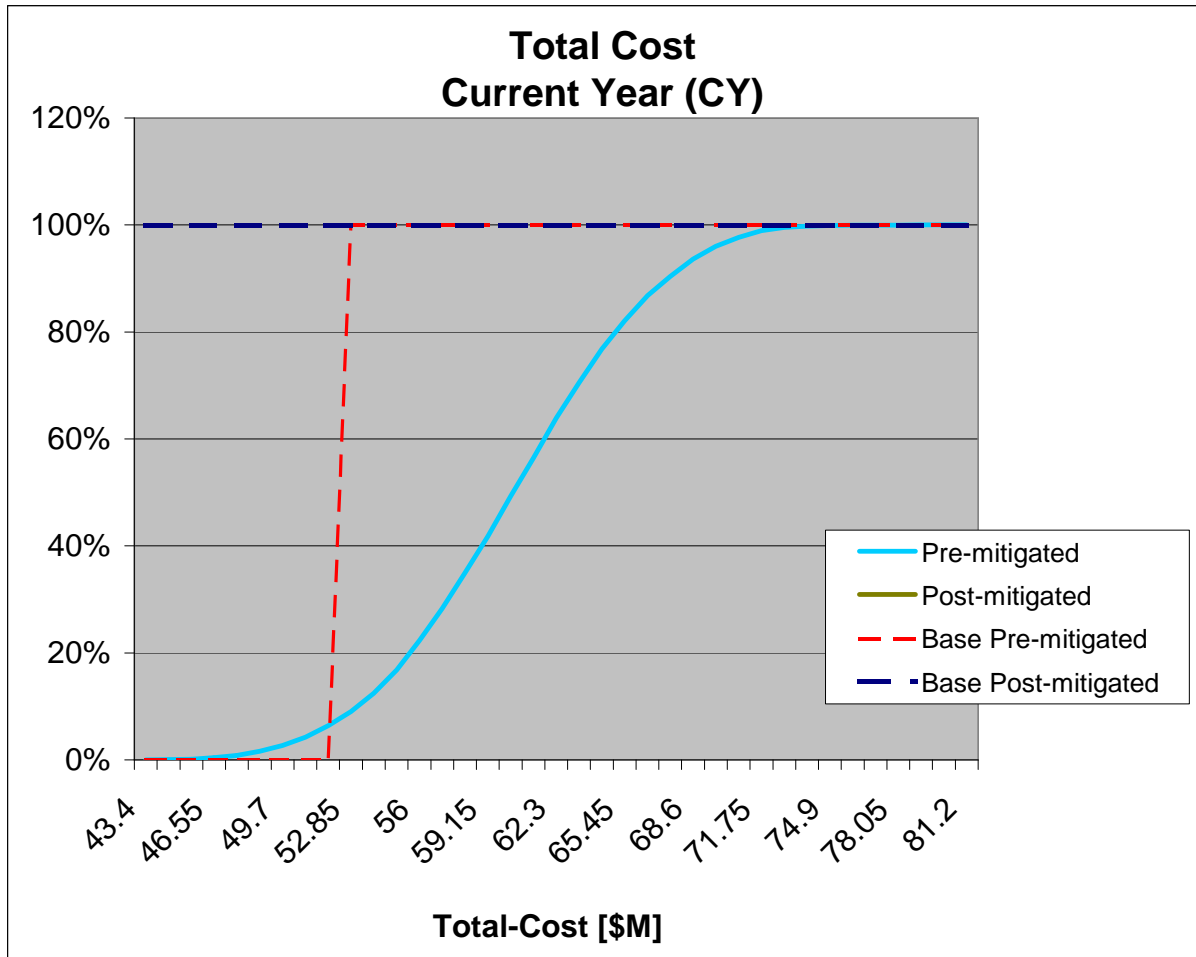
COST ESTIMATE - Berkeley St. Grade Separation
Prepared by Parametrix for WSDOT Rail and Marine Office

PIN NUMBER:		N/A		DESCRIPTION OF WORK		
SR, MP's:		N/A Berkeley Street				
PROJECT TITLE:						
Point Defiance Bypass Project						
REGION:		State Rail & Marine Office		Berkeley Street SW grade separation concept		
MOBILIZATION AND PREPARATION				\$	3,786,619	
Mobilization	10%	1	\$ 3,686,619	\$	3,686,619	Approx. 10% of Construction Subtotal
Building Demolition	L.S.	1	\$ -	\$	-	
Removal of Structures and Obstructions	L.S.	1	\$ 100,000	\$	100,000	
				\$	-	
				\$	-	
				\$	-	
GRADING, DRAINAGE AND STOCKPILING				\$	6,263,054	
Roadway Excavation (Proposed Rail Line)	C.Y.	28,000	\$10	\$	280,000	NWR UBA,
Gravel Borrow (Proposed Rail Line)	Ton	317,300	\$15	\$	4,759,500	NWR UBA, complex placement, different backfill
Embankment Compaction (Proposed Rail Line)	C.Y.	167,000	\$3	\$	501,000	NWR UBA
Roadway Excavation (Temp. Rail Line)	C.Y.	15,000	\$10	\$	150,000	NWR UBA
Gravel Borrow (Temp. Rail Line)	Ton	44,500	\$11	\$	489,500	NWR UBA
Embankment Compaction (Temp. Rail Line)	C.Y.	23,500	\$3	\$	70,500	NWR UBA
Gravel Borrow (SB Off-Ramp Widening)	Ton	1,000	\$11	\$	11,000	NWR UBA
Embankment Compaction (SB Off-Ramp Widening)	C.Y.	518	\$3	\$	1,554	NWR UBA
				\$	-	
				\$	-	
				\$	-	
WATERLINES, STORM AND SANITARY SEWERS				\$	-	
				\$	-	
				\$	-	
				\$	-	
				\$	-	
STRUCTURES				\$	14,343,340	
Railroad Undercrossing- over Berkeley	LF	100	\$15,000	\$	1,500,000	WSDOT Bridge Manual Double Track
Structural Earth Walls	S.F.	172,762	\$70	\$	12,093,340	Rail "T-Walls"
Railroad Undercrossing - over Murray Creek	LF	50	\$15,000	\$	750,000	WSDOT Bridge Manual Double Track- Murray Creek Crossing
				\$	-	
				\$	-	
				\$	-	
				\$	-	
ASPHALT AND SURFACING				\$	30,910	
HMA	Ton	205	\$100	\$	20,500	NWR UBA, SB off-ramp widening, Berkeley repair
Crushed Surfacing Top Course	Ton	126	\$35	\$	4,410	NWR UBA, SB off-ramp widening, Berkeley repair
Crushed Surfacing Base Course	Ton	200	\$30	\$	6,000	NWR UBA, SB off-ramp widening, Berkeley repair
				\$	-	
				\$	-	
				\$	-	
CEMENT CONCRETE PAVEMENT				\$	-	
				\$	-	
				\$	-	
				\$	-	
				\$	-	
TRAFFIC				\$	283,600	
Curb, Gutter, and Sidewalk	L.F.	5000	\$ 30	\$	150,000	
Pavement Markings	L.F.	2800	\$ 1	\$	2,800	
Signing	L.S.	1	\$ 15,000	\$	15,000	\$36k/lane-mi
Illumination	EA	4	\$ 15,000	\$	60,000	Pole every 150', \$15k/pole
Traffic Signal Modifications	L.S.	1	\$ 100,000	\$	100,000	At SB Ramp terminal
Cable Barrier	L.F.	5050	\$ 16	\$	80,800	For access road fall protection on railroad embankment
Temporary Conc. Barrier	LF	1250	\$ 20	\$	25,000	
				\$	-	
				\$	-	
OTHER ITEMS				\$	12,407,791	
Permanent Rail Line	LS	1	\$510,000	\$	510,000	\$400000/mile , assumes rails, ties, ballast, and surface equipment
Temporary Detour Rail Line	LS	1	\$400,000	\$	400,000	\$300000/mile, assumes rails, ties, ballast, and surface equipment
Rail signal system and conduit	LS	1	\$250,000	\$	250,000	
Utilities	2%	1	\$418,418	\$	418,418	PMX base cost tool, potential fiber optic relocation
Temporary Water Pollution Control	2%	1	\$418,418	\$	418,418	PMX base cost tool
Construction Staging	3%	1	\$627,627	\$	627,627	PMX base cost tool
Traffic Control	5%	1	\$1,046,045	\$	1,046,045	PMX base cost tool
Roadside Restoration	5%	1	\$1,046,045	\$	1,046,045	Seeding, Planting, Cleanup, removal of temporary rail embankment
Design Allowance for Additional Items	30%	1	\$7,691,237	\$	7,691,237	
				\$	-	
				\$	-	
NON - BID COSTS 700 Level Items				\$	372,000	
NON - BID COSTS 800 Level Items				\$	-	
700 Railroad Flagging	Days	150	\$600	\$	90,000	
700 Temp Railroad Crossing	SF	2050	\$40	\$	82,000	
700 Railroad Signal Modification	L.S.	1	\$200,000	\$	200,000	For temp rail crossing during construction
800				\$	-	
800				\$	-	
800				\$	-	
800				\$	-	
		1		\$	-	
				\$	-	
				\$	-	
				\$	-	
Total				\$	37,115,314	



Total Base Estimate (CY)	
Pre-mitigated	Post-mitigated
52.53 \$M	0.00 \$M

Statistics	Pre-mitigated	Post-mitigated
Min	43.37 \$M	
Max	78.07 \$M	
Median	60.31 \$M	
10%	53.17 \$M	
20%	55.56 \$M	
30%	57.31 \$M	
40%	58.90 \$M	
50%	60.31 \$M	
60%	61.75 \$M	
70%	63.29 \$M	
80%	65.01 \$M	
90%	67.45 \$M	



Project Title	Point Defiance Bypass - Berkeley St. Grade Separation Conceptual Estimate				Value	Variability	Risk Markups	WSDOT Escalation tables built-in.	%	Total Cost CY [\$M]	Total Cost YOY [\$M]	Ad Date	®	End Construction date	WSDOT Ovidiu Cretu 360 705-7599	
Estimate Date	11/23/11		Target AD date	04/15/15	10%	Mob	10.0%	A/B/A Duration	3Mo	50	60.31	67.29	May 24, 2015	50%	August 25, 2017	
Project PIN #	n/a	The above macro should be activated to generate the final results. it is running. Do not stop it if	Estimated CN Duration	24.0Mo	15%	Tax	8.5%	on-WSDOT rat	YOY	60	61.75	68.87	June 8, 2015	60%	September 11, 2017	
Last Review Date	n/a		Estimated PE Cost	6.10 \$M	10%	CE	10.0%	PE		6.3\$M	70	63.29	70.60	June 22, 2015	70%	September 28, 2017
Project Manager	J. Biggs		Estimated ROW Cost	0.10 \$M	15%	PE	13.2%	ROW		0.1\$M	80	65.01	72.54	July 7, 2015	80%	October 19, 2017
			Estimated CN Cost	46.33 \$M	15%	C.O.C	4.0%	CN		52.8\$M	90	67.45	75.23	July 28, 2015	90%	November 16, 2017

The yellow highlighted cells have to be filled in order for macro to run correctly. The light green highlighted cells may be filled if you know what you are doing. !!!!!!! Existing (Pre-Mitigated) Design!!!!!!!!!!!!!! Created and Maintained by WSDOT, contact Ovidiu Cretu 360-705-7599, cretuo@wsdot.wa.gov

Risk Identification					Quantitative Analysis				Qualitative Display of the Best Guess Impact				Risk Response Plan			Monitoring and Control		Critical Issue		
Risk #	Status	Dependency	Project Phase	Summary Description Threat and/or Opportunity	Detailed Description of Risk Event (Specific, Measurable, Attributable, Relevant, Timebound) [SMART]	Risk Trigger	Type	Probability/Correlation	Risk Impact (\$M or Mo)	Expected Impact (\$M)	Probability (%)	Impact	Risk Matrix (Probability of Occurrence by Expected Impact)	Strategy	ACTION TO BE TAKEN Response Actions including advantages and disadvantages include date	Risk Owner	Risk Review Dates	Date, Status and Review Comments (Do not delete prior comments, therefore providing a history)	Is Risk on Critical Path?	
(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)	(10)	[10a]	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
EXAMPLE	Active		ROW	Threat Wetland mitigation may require additional R/W	The mitigation ratio has not been finalized and also there could be additional impacts to wetlands which would increase the amount of R/W needed for the mitigation area.	If Wetland impact is larger than 1/2 acre and ratio exceeds 4:1.	Cost	88%	MIN 1.00\$M MAX 8.00\$M Most Likely 5.00\$M	4\$M	Very High	Very High	Probability VH H M L VL Impact VL L M H VH	Mitigation	Finalize design to identify all wetlands that are impacted. Early coordination with the outside agencies to determine mitigation ratio.	Design Leader/Enviro. mgr	2007-Jan-2 2006-Dec-2	As of Nov. 15, 2005 there are only two potential areas where there could be additional wetland impacts. As of Dec. 2, 2005 agency has initially determined that mitigation ration would be 4:1.	YES	
1	Active		Pre-construction	Threat Hazardous materials may increase excavation costs	There is potential for hazardous waste to be encountered during excavation due to working in RR right of way and encroachment area.	Material to be excavated tests as contaminated.	Cost	50%	MIN 0.25\$M MAX 1.00\$M Most Likely 0.50\$M	0.27\$M	Moderate	Low	Probability VH H M L VL Impact VL L M H VH	Acceptance	A soil testing program would be implemented during preliminary design activities if the project is carried forward.	Design Team			YES	
2	Active		Pre-construction	Threat Maintaining local access during construction	Access to this area during construction is critical because of the lack of alternate routes into this area of Lakewood, key for Camp Murray. Additional budget to maintain access.	Access to Berkeley Street/Union Ave. is restricted during construction, requiring additional work.	Cost	40%	MIN 0.50\$M MAX 2.00\$M Most Likely 1.00\$M	0.43\$M	Moderate	Moderate	Probability VH H M L VL Impact VL L M H VH	Mitigation	Design work needs to account for local access during each traffic phase.	Design Team			YES	
3	Active		Pre-construction	Threat Additional Utility Costs/Delays	The project could be burdened with additional cost responsibility for utilities that are impacted by the work, including relocation of fiber optic lines.	Utility relocation costs are assigned to the project.	Cost	75%	MIN 0.50\$M MAX 2.00\$M Most Likely 2.00\$M	1.31\$M	High	Moderate	Probability VH H M L VL Impact VL L M H VH	Avoidance	Coordinate early in the design process with utility owners	Design Team		10/10/2011: Assumption is that primary utility relocation costs will be covered by others under franchise agreements.	YES	

The yellow highlighted cells have to be filled in order for macro to run correctly. The light green highlighted cells may be filled if you know what you are doing. !!!!!!! Existing (Pre-Mitigated) Design!!!!!!!!!!!!!!Created and Maintained by WSDOT, contact Ovidiu Cretu 360-705-7599, cretuo@wsdot.wa.gov

Risk Identification																					
Risk #	Status	Dependency	Project Phase	Summary Description Threat and/or Opportunity	Detailed Description of Risk Event (Specific, Measurable, Attributable, Relevant, Timebound) [SMART]	Risk Trigger	Type	Quantitative Analysis				Qualitative Display of the Best Guess Impact				Risk Response Plan			Monitoring and Control		Critical Issue
								Probability/Correlation	Risk Impact (\$M or Mo)	Expected Impact (\$M)	Probability (%)	Impact	Risk Matrix (Probability of Occurrence by Expected Impact)	Strategy	ACTION TO BE TAKEN Response Actions including advantages and disadvantages include date	Risk Owner	Risk Review Dates	Date, Status and Review Comments (Do not delete prior comments, therefore providing a history)	Is Risk on Critical Path?		
(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)	(10)	[10a]	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	
4	Active		ROW	Threat Delays clearing RR R/W from encroachments	Both I-5 ramps and NW side businesses encroach on RR R/W, Difficulty clearing encroaching property uses from the RR R/W could be encountered.	Neighboring property owners don't vacate in a timely manner.	Cost	25%	MIN 0.00\$M	MAX 2.00\$M	Most Likely 1.00\$M	0.25\$M	Low	Moderate	Probability VH H M L VL Mo \$	Acceptance	Begin contacts with surrounding property owners in a timely manner.	Real Estate Svcs Mgr		YES	
				Threat			Schedule	4	0	MIN 0.0Mo	MAX 4.0Mo	Most Likely 2.0Mo	0.5Mo	Very Low							
5	Active		Pre-construction	Threat Additional improvements needed I/C ramps or I-5	There may be additional work needed on the I-5 ramps to address additional queuing because of the construction work. This I/C is critical for access to JBLM and the ramps already routinely queue onto I-5.	WSDOT disagrees with preliminary design concept	Cost	25%	MIN 0.25\$M	MAX 2.00\$M	Most Likely 1.00\$M	0.26\$M	Low	Moderate	Probability VH H M L VL Mo \$	Avoidance	Work with WSDOT staff to develop an acceptable ramp intersection design and adequate Maintenance of Traffic plans	Design Team		YES	
				Threat			Schedule	0	Master Duration Risk			0.3Mo	Very Low								
6	Active		Pre-construction	Threat Community mitigation needed because of raised rail line	The raised rail line may be considered to isolate Lakewood from I-5, impacting aesthetics and business visibility.	Mitigation is requested during the design phase	Cost	50%	MIN 0.50\$M	MAX 2.00\$M	Most Likely 1.00\$M	0.54\$M	Moderate	Moderate	Probability VH H M L VL Mo \$	Mitigation	Address during the environmental/pre-design process	Design Team		YES	
				Threat			Schedule	6	0	MIN 0.0Mo	MAX 2.0Mo	Most Likely 1.0Mo	0.5Mo	Very Low							
7	Active		Pre-construction	Threat Environmental issues arise due to Murray Creek impacts	The railroad line embankment crosses Murray Creek, possible ESA or Section 404/401 issues could arise	Additional mitigation is requested during environmental documentation or permitting phase	Cost	20%	MIN 0.50\$M	MAX 1.00\$M	Most Likely 0.75\$M	0.15\$M	Low	Low	Probability VH H M L VL Mo \$	Avoidance	The current estimate includes a 50-ft. bridge over Murray Creek, which is currently in a culvert	Environmental Team		YES	
				Threat			Schedule	0	Master Duration Risk			0.4Mo	Very Low								
8	Active		Pre-construction	Threat Impacts to historic buildings on Camp Murray or adjoining Lakewood neighborhood	Buildings in the vicinity of the project have potential for historic significance which could be affected by the project.	Mitigation is required for impacts to historic structures	Cost	10%	MIN 0.10\$M	MAX 0.50\$M	Most Likely 0.20\$M	0.02\$M	Very Low	Very Low	Probability VH H M L VL \$.Mo	Mitigation	This is a low probability since there is are no direct impacts to buildings with the current design concept.	Environmental Team		YES	
				Threat			Schedule	8	0	MIN 0.0Mo	MAX 3.0Mo	Most Likely 1.0Mo	0.1Mo	Very Low							
9	Active		Pre-construction	Threat Minimal design effort	Only very preliminary conceptual work has been completed. The scope has a high probability of growing as further refinement and detail is added.	The project definition/scope grows beyond that assumed for the current estimate.	Cost	75%	MIN 2.00\$M	MAX 10.00\$M	Most Likely 6.00\$M	4.50\$M	High	Very High	Probability VH H M L VL Mo \$	Avoidance	Work with project stakeholders to manage the scope.	Design Team	10/27/11: Assumed Max is approximately 20% of base total project cost.	YES	
				Threat			Schedule	0	Master Duration Risk			1.0Mo	Very Low								

POINT DEFIANCE BYPASS PROJECT

10/27/2011
S. 56TH ST
Right of Way Estimate

Parcel #	Owner Name	Area (acre)	Assessed Value	Assumed Market Value (+20%)	ROW Acquisition (Sq. Ft.)	Additional Unusable Area (Sq. Ft.)	Total Acquisition Area (Acres)*	Relocation Cost	Cost to Cure	Acquisition Labor	Condemnation (50%) **	Acquisition
												Cost (\$)
4695000910	FOSTER KIM E	0.140	\$69,700	\$84,000	6,005		0.14	\$ -	\$ -	\$ 10,000	\$ -	\$ 93,000
4695000930	SDK VENTURES LLC	0.140	\$43,400	\$53,000	70	5,940	0.14	\$ -	\$ -	\$ 10,000	\$ 32,000	\$ 95,000
4695000941	SDK VENTURES LLC	0.930	\$621,900	\$747,000	90		0.00	\$ -	\$ 20,000	\$ 10,000	\$ -	\$ 32,000
4695001170	TRAN DUC HUU & TRAN TAI HUU	0.140	\$191,400	\$230,000	6,004		0.14	\$ 15,000	\$ -	\$ 10,000	\$ 126,000	\$ 378,000
4695001010	MILLER RESIDENTIAL PROPERTIES, LL	0.070	\$255,900	\$308,000	3,000		0.07	\$ 50,000	\$ -	\$ 10,000	\$ 182,000	\$ 546,000
4695001150	STOJACK EDWARD J	0.280	\$72,100	\$87,000	-	12,010	0.28	\$ 25,000	\$ -	\$ 10,000	\$ 61,000	\$ 182,000
4695001160	STOJACK EDWARD J	0.210	\$46,800	\$57,000	1,120	7,890	0.21	\$ 10,000	\$ -	\$ 10,000	\$ 39,000	\$ 116,000
4695001021	MILLER RESIDENTIAL PROPERTIES, LL	0.210	\$107,600	\$130,000	4,895	4,120	0.21	\$ -	\$ -	\$ 10,000	\$ 70,000	\$ 209,000
4695001031	MILLER RESIDENTIAL PROPERTIES, LL	0.210	\$104,400	\$126,000	50	8,960	0.21	\$ -	\$ -	\$ 10,000	\$ 68,000	\$ 203,000
4695001180	5601 LLC	0.650	\$1,318,400	\$1,583,000	6925	21,380	0.65	\$ 100,000	\$ -	\$ 10,000	\$ 847,000	\$ 2,540,000
4695001210	AF INVESTMENTS LLC	0.740	\$1,246,900	\$1,497,000	5,220	27,060	0.74	\$ 25,000	\$ -	\$ 10,000	\$ 768,000	\$ 2,303,000
4695001250	AF INVESTMENTS LLC	0.830	\$1,391,500	\$1,670,000	14,235	21,810	0.83	\$ 100,000	\$ -	\$ 10,000	\$ 888,000	\$ 2,663,000
2783010231	BN LEASING CORP	1.180	\$33,400	\$41,000	9,460	2,553	0.28	\$ -	\$ -	\$ 10,000	\$ -	\$ 20,000
2783010221	SUPER CELL LLC	1.830	\$230,900	\$278,000	9,040		0.21	\$ -	\$ -	\$ 10,000	\$ -	\$ 42,000
4695000400	WESTERN FINANCE CO	0.090	\$84,000	\$101,000	610		0.01	\$ -	\$ 25,000	\$ 10,000	\$ -	\$ 51,000
4695000410	WESTERN FINANCE CO	0.090	\$106,500	\$128,000	630		0.01	\$ -	\$ 60,000	\$ 10,000	\$ -	\$ 91,000
2783010252	BL LEASING CORP	1.290	\$44,700	\$54,000	3,554		0.08	\$ -	\$ -	\$ 10,000	\$ -	\$ 14,000
2783010251	BURLINGTON NORTHERN SF RR	1.290	\$45,000	\$54,000	3,278		0.08	\$ -	\$ -	\$ 10,000	\$ -	\$ 14,000
2783010011	BN LEASING CORP	0.550	\$172,300	\$207,000	1,540		0.04	\$ -	\$ -	\$ 10,000	\$ -	\$ 24,000
4695000590	X-CEL FEEDS INC	0.580	\$1,174,700	\$1,410,000	965		0.02	\$ -	\$ 30,000	\$ 10,000	\$ -	\$ 94,000
4695001000	FOSTER KIM E	0.140	\$276,800	\$333,000	6,004		0.14	\$ 50,000	\$ -	\$ 10,000	\$ 194,000	\$ 582,000
4695000920	SDK VENTURES LLC	0.210	\$67,100	\$81,000	1,100	7,805	0.20	\$ -	\$ -	\$ 10,000	\$ 45,000	\$ 134,000
4695001400	HOGAN WALTER / ROBERT/ WAYNE	0.900	\$1,279,400	\$1,536,000	3,520		0.08	\$ -	\$ 15,000	\$ 10,000	\$ -	\$ 163,000
4695000871	RIEDLER TONY R	0.340	\$463,600	\$557,000	4,780	10,240	0.34	\$ 25,000	\$ -	\$ 10,000	\$ 300,000	\$ 900,000
4695000991	SDK VENTURES LLC	0.210	\$723,600	\$869,000	1,060	7,950	0.21	\$ 50,000	\$ -	\$ 10,000	\$ 458,000	\$ 1,374,000
4695000981	SDK VENTURES LLC	0.140	\$43,400	\$53,000		6,005	0.14	\$ -	\$ -	\$ 10,000	\$ 32,000	\$ 95,000
4695000970	SDK VENTURES LLC	0.070	\$21,700	\$27,000		3,005	0.07	\$ -	\$ -	\$ 10,000	\$ 19,000	\$ 56,000
4695000900	AUTOMOTIVE SOUND INC	0.550	\$423,200	\$508,000	1,665		0.04	\$ -	\$ 15,000	\$ 10,000	\$ -	\$ 61,000
TOTAL		18.320	\$17,140,100	\$20,595,000	94,820	146,728	5.55					\$ 13,080,000

* Sum of ROW Acquisition and Additional Unusable Area
** 50% of sum of costs for Acquired Parcel Market Value, Relocation, Cost to Cure, and Labor

Full Acquisition
Partial Acquisition

POINT DEFIANCE BYPASS PROJECT

10/27/2011
S. 74TH ST
Right of Way Estimate

Raised 74th Street over RR Alternative

Parcel #	Owner Name	Area (acre)	Assessed Value	Assumed Market Value (+20%)	ROW Acquisition (Sq. Ft.)	Additional Unusable Area (Sq. Ft.)	Total Acquisition Area (Acres)*	Relocation Cost	Cost to Cure	Acquisition Labor	Condemnation (50%) **	Acquisition Cost (\$)	
4000830020	JOHNSON MICHAEL L	0.550	\$722,400	\$867,000	1,460		0.03	\$ -	\$ 10,000	\$10,000	\$ -	\$ 73,000	Abbey Carpet
4000830010	WYERHAESER NR COMPANY	15.830	\$8,980,600	\$10,777,000	24,400		0.56	\$ -	\$ 25,000	\$10,000	\$ -	\$ 417,000	
0220254016	RIGNEY MICHAEL	0.220	\$97,400	\$117,000	9,662		0.22	\$ -	\$ -	\$10,000	\$ 64,000	\$ 192,000	
0220254121	74TH STREET MAXIPSACE LLC	0.620	\$239,400	\$288,000	9,420	17,760	0.62	\$ 50,000	\$ -	\$10,000	\$ 175,000	\$ 525,000	Latino Auto Repair
0220254122	GREWAL SHIVTAL & BALDEV	0.750	\$1,050,500	\$1,261,000	9,630	24,500	0.78	\$ 50,000	\$ -	\$10,000	\$ 689,000	\$ 2,067,000	76 Gas Station
5955000011	KHAMANEHI BIJAN & F S ALIABADI	0.110	\$294,000	\$353,000	1,960		0.04	\$ -	\$ 10,000	\$10,000	\$ -	\$ 165,000	Cars R Us used autos
5955000030	KHAMANEHI BIJAN & F S ALIABADI	0.120	\$169,600	\$204,000	470		0.01	\$ -	\$ 2,000	\$10,000	\$ -	\$ 31,000	Cars R Us used autos
5955000090	SWEGLER NATHAN & THUY	0.130	\$420,100	\$505,000	310		0.01	\$ -	\$ -	\$10,000	\$ -	\$ 38,000	Quality Stitching
0220254142	RIGNEY MICHAEL	1.160	\$51,200	\$62,000	6,350	46,230	1.21	\$ -	\$ -	\$10,000	\$ 38,000	\$ 113,000	
0220254150	NIELSEN PACIFIC LTD	7.010	\$1,145,000	\$1,374,000	54,900		1.26	\$ -	\$ -	\$10,000	\$ -	\$ 258,000	
9300000012	HALVERSON SORENSON & WHITE LLP	3.110	\$2,093,300	\$2,512,000	6,400		0.15	\$ -	\$ -	\$10,000	\$ -	\$ 129,000	
7865000052	CROFT 7241 LLC	0.470	\$755,500	\$907,000	220		0.01	\$ -	\$ 10,000	\$10,000	\$ -	\$ 30,000	Pawn Xchange
4001140010	FIRST AMERICAN TITLE INS CO	1.090	\$3,737,600	\$4,486,000	1,900		0.04	\$ -	\$ 10,000	\$10,000	\$ -	\$ 200,000	First American Title office
0220254088	PHILLIPS KENNETH M & ROBIN C	1.830	\$2,677,700	\$3,214,000	-		0.00	\$ -	\$ 25,000	\$10,000	\$ -	\$ 35,000	Kia Auto Dealership
TOTAL		46.820	\$42,165,900.00	\$50,619,000.00	127,082	88,490	4.95					\$ 4,330,000	

* Sum of ROW Acquisition and Additional Unusable Area

** 50% of sum of costs for Acquired Parcel Market Value, Relocation, Cost to Cure, and Labor

Full Acquisition
Partial Acquisition



-
-

POINT DEFIANCE BYPASS PROJECT

10/27/2011
BRIDGEPORT
Right of Way Estimate

Parcel #	Owner Name	Area (acre)	Assessed Value (2011)	Assumed Market Value (+20%)	ROW Acquisition (Sq. Ft.)	Additional Unusable Area (Sq. Ft.)	Total Acquisition Area (Acres)*	Relocation Cost	Cost to Cure	Acquisition Labor	Condemnation (50%) **	Acquisition Cost (\$)	
0219111075	COATES FAMILY TRUST	0.410	\$489,000	\$587,000	1,180		0.03	\$ -	\$ 10,000	\$10,000	\$ -	\$ 59,000	AAMCO
0219111022	CHANG EMERY J & HO PHOEBE J	0.150	\$201,200	\$242,000	2,250	4,480	0.15	\$ 10,000	\$ -	\$10,000	\$ 135,000	\$ 405,000	Pawn shop
0219111001	AF INVESTMENTS	0.340	\$268,300	\$322,000	7,610	7,420	0.35	\$ 25,000	\$ -	\$10,000	\$ 181,000	\$ 543,000	Auto repair, abandoned?
0219111033	GATEWAY CENTER LLC	0.370	\$890,100	\$1,069,000	9,660	6,800	0.38	\$ 25,000	\$ -	\$10,000	\$ 564,000	\$ 1,691,000	Strip mall, food stores
0219111008	CITY OF LAKEWOOD	0.240	\$166,100	\$200,000	3,510	4,120	0.18	\$ -	\$ -	\$10,000	\$ 78,000	\$ 234,000	
0219122058	U-HAUL REAL ESTATE CO	0.760	\$699,000	\$839,000	19,930	13,275	0.76	\$ 50,000	\$ -	\$10,000	\$ 451,000	\$ 1,353,000	U-Haul
0219122005	GLASS HORST ETAL	0.490	\$374,600	\$450,000	7,010	14,680	0.50	\$ 10,000	\$ -	\$10,000	\$ 239,000	\$ 717,000	Tattoo
0219126016	HARMAN MANAGEMENT CORP	0.630	\$776,100	\$932,000	12,150	14,500	0.61	\$ 25,000	\$ -	\$10,000	\$ 471,000	\$ 1,412,000	KFC/A&W
0219122114	CHO MYOUNG HWAN & HYO SOOK	0.380	\$447,900	\$538,000	6,320	10,295	0.38	\$ 25,000	\$ -	\$10,000	\$ 288,000	\$ 864,000	Church's Chicken
0219126020	SPLASHY ENTERPRISES LLC	0.720	\$472,800	\$568,000	5,750	25,520	0.72	\$ 25,000	\$ -	\$10,000	\$ 301,000	\$ 903,000	Shur-Kleen Car Wash.Share access w/ casino?
0219122060	KIRKEBO HAMES E JR	3.220	\$1,516,900	\$1,821,000	11,120		0.26	\$ -	\$ 20,000	\$10,000	\$ -	\$ 175,000	Assumes can share access w/ pawn shop
2650000120	L KIM LLC	0.750	\$1,636,600	\$1,964,000	900		0.02	\$ -	\$ 10,000	\$10,000	\$ -	\$ 75,000	Temp construction easement?
0219114056	ANDRADE WILLIAM P	0.260	\$457,000	\$549,000		10,210	0.23	\$ 25,000	\$ -	\$10,000	\$ 265,000	\$ 795,000	Motorcycle parts
0219114055	MIDY I LLC	0.610	\$465,900	\$560,000		19,880	0.46	\$ 25,000	\$ -	\$10,000	\$ 227,000	\$ 681,000	Auto service
0219122070	DURGA INC	0.230	\$256,500	\$308,000		9,830	0.23	\$ -	\$ -	\$10,000	\$ 157,000	\$ 470,000	
0219122053	DURGA INC	0.620	\$967,800	\$1,162,000	2,705	23,950	0.61	\$ 50,000	\$ -	\$10,000	\$ 604,000	\$ 1,811,000	76 Gas
0219122097	DENNYS RESTAURANT #309 INC	0.790	\$758,800	\$911,000		35,804	0.82	\$ 25,000	\$ -	\$10,000	\$ 492,000	\$ 1,475,000	
0219126017	CHO DAVID MYONG HWAN & HYO SOOK	0.650	\$927,600	\$1,114,000		27,450	0.63	\$ 25,000	\$ -	\$10,000	\$ 558,000	\$ 1,674,000	Asian Market
0219126021	SPLASHY ENTERPRISES LLC	0.330	\$134,700	\$162,000		14,500	0.33	\$ -	\$ -	\$10,000	\$ 87,000	\$ 261,000	Share access w/ casino?
0219122099	DENNY'S REALTY INC	0.520	\$368,700	\$443,000		21,600	0.50	\$ -	\$ -	\$10,000	\$ 217,000	\$ 650,000	
0219122161	HOSPITALITY DEVELOPMENT GROUP II LLC	0.460	\$345,300	\$415,000	1,400	18,580	0.46	\$ -	\$ -	\$10,000	\$ 212,000	\$ 636,000	Share access w/ La Quinta hotel?
0219122163	LDH INVESTMENTS INC	0.710	\$600,200	\$721,000	2,350		0.05	\$ -	\$ 10,000	\$10,000	\$ -	\$ 75,000	
TOTAL		19.660	\$24,536,500.00		93,845	282,894	8.65					\$ 16,970,000	

* Sum of ROW Acquisition and Additional Unusable Area

** 50% of sum of costs for Acquired Parcel Market Value, Relocation, Cost to Cure, and Labor

Full Acquisition
Partial Acquisition



POINT DEFIANCE BYPASS PROJECT

10/27/2011
 BERKELEY
 Right of Way Estimate

Raised Railroad Profile Alternative

Parcel #	Microstation #	Owner Name	Area (acre)	Assessed Value	ROW Acquisition (Sq. Ft.)	Drainage ROW or Esm't (Sq. Ft.)	Additional Unusable Area (Sq. Ft.)	Acquisition	Acquisition
								Area (Acres)	Cost (\$)
0219211051		BELL DAVID D & UN-KYONG	0.230	\$245,300				0.00	\$ -
0219211021		WAYPOINTS I LLC	0.230	\$301,300				0.00	\$ -
0219211075		WAYPOINTS I LLC	0.170	\$121,400				0.00	\$ -
0219211076		MORGAN ROBERT ETAL	0.050	\$33,200				0.00	\$ -
0219211003		MORGAN ROBERT ETAL	0.240	\$237,800				0.00	\$ -
0219211000		CHANG SOONG C & KEUM S	0.460	\$480,200				0.00	\$ -
0219211062		KIM MINJOO	0.690	\$749,100				0.00	\$ -
0219211019		DAVID THOMAS M	0.230	\$116,400				0.00	\$ -
0219211086		HARRIS SUN-TOK	0.180	\$103,800				0.00	\$ -
0219211053		LONG SHOT TO PLACE LLC	0.430	\$570,500				0.00	\$ -
0219211061		YOON SANGKOO & KIM SEJIN	0.390	\$441,900				0.00	\$ -
0219211071		MADISON REAL PROPERTY LLC	0.400	\$328,900				0.00	\$ -
0219211070		LUCKY SEVEN FOOD STORES INC	0.190	\$240,200				0.00	\$ -
0219211082		NWR REALTY LLC	0.220	\$156,800				0.00	\$ -
0219211081		NWR REALTY LLC	0.240	\$571,000				0.00	\$ -
0219211007		MADISON REAL PROPERTY LLC	0.090	\$72,900				0.00	\$ -
0219211042		MADISON REAL PROPERTY LLC	0.140	\$107,100				0.00	\$ -
0219211017		MADISON REAL PROPERTY LLC	0.110	\$100,300				0.00	\$ -
0219211008		MADISON REAL PROPERTY LLC	0.100	\$124,000				0.00	\$ -
0219211006		COAST SATELLITE	0.230	\$530,500				0.00	\$ -
0219211043		HHANS' PROPERTIES LLC	0.240	\$219,600				0.00	\$ -
0219211073		HHANS' PROPERTIES LLC	0.080	\$56,200				0.00	\$ -
0219211074		HAM MYOUNG HWAN & HEI SOOK	0.140	\$163,400				0.00	\$ -
0219211084		BG OLSON NORTHWEST LLC	0.210	\$340,200				0.00	\$ -
0219211048		KIM MOON SOO	0.110	\$200,900				0.00	\$ -
0219211038		YU KUN YE	0.230	\$253,400				0.00	\$ -
0219211047		MAYNARD JOHN H & Misko Y	0.110	\$245,000				0.00	\$ -
0219211049		BOWMAN MASON C	0.110	\$81,200				0.00	\$ -
0219211037		BOWMAN MASON C	0.110	\$188,900				0.00	\$ -
TOTAL			6.360	\$7,381,400.00	-	-	-	-	\$ -

Note: No right-of-way acquisition is anticipated at this location.

Full Acquisition
 Partial Acquisition
 No Acquisition



#REF!
 #REF!

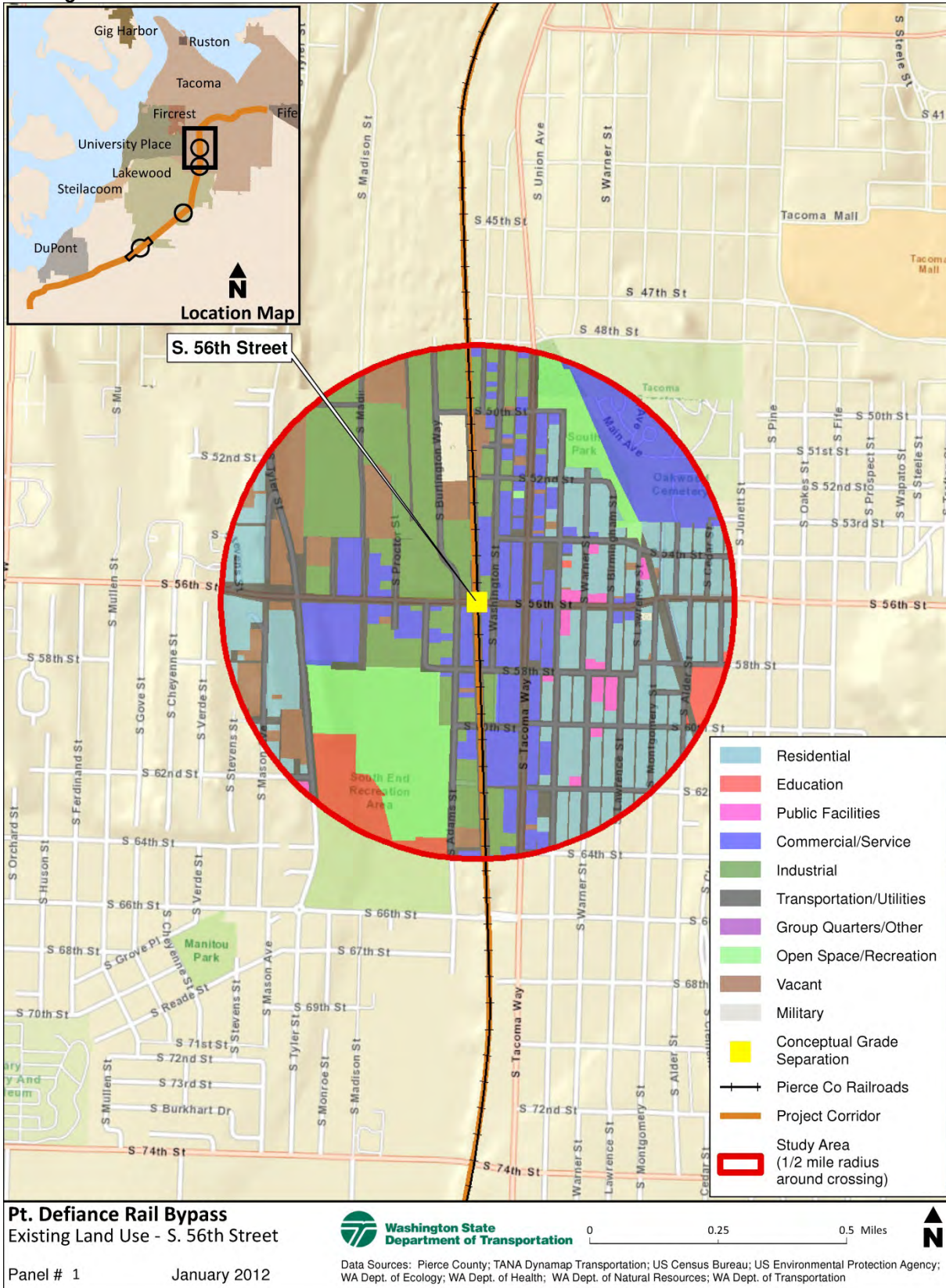
Attachment 3 – Supporting Information

Attachment 3 – Supporting Information

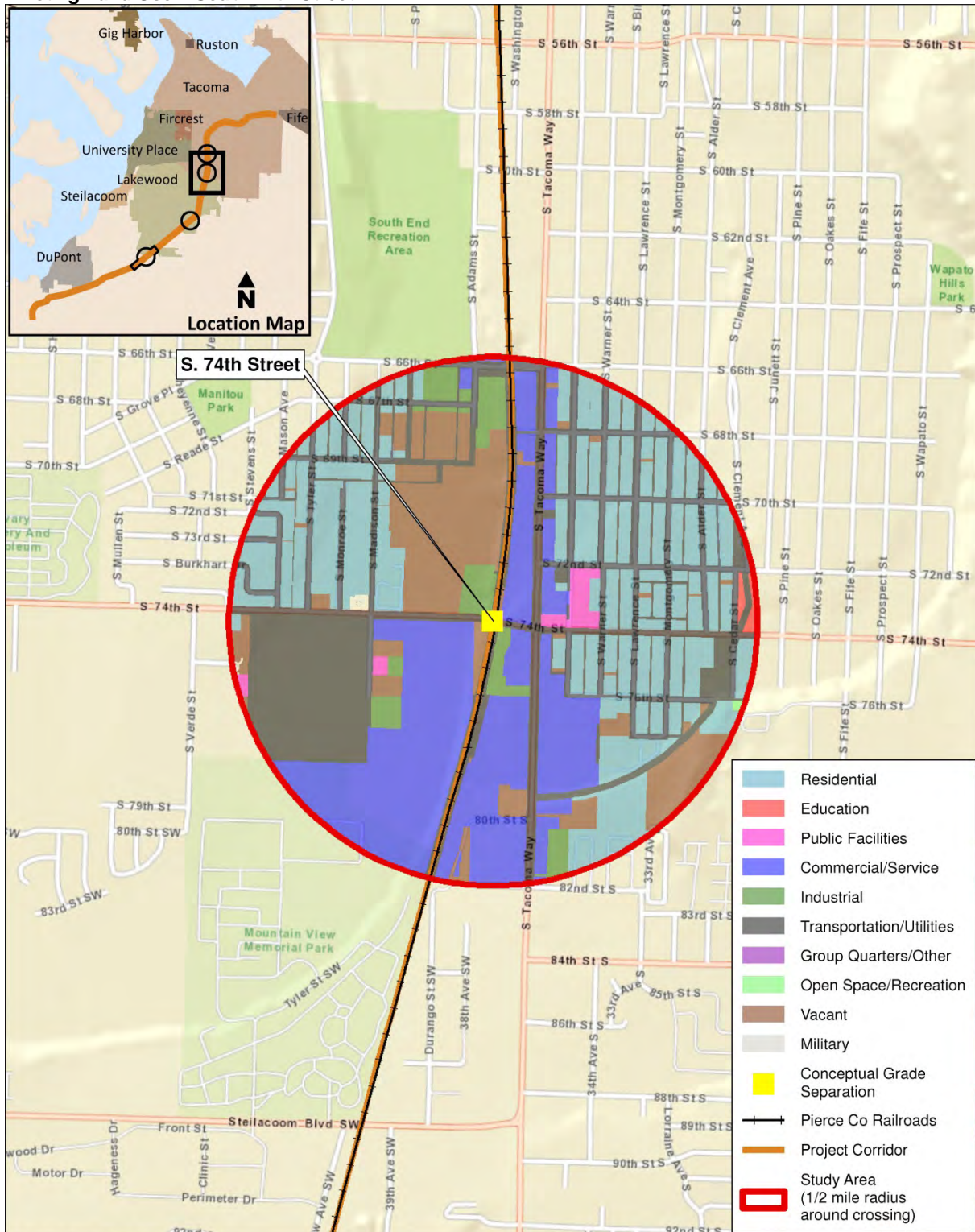
List of Exhibits

- Exhibit A3-1 Existing Land Use – South 56th Street
- Exhibit A3-2 Existing Land Use – South 74th Street
- Exhibit A3-3 Existing Land Use – Bridgeport Way SW
- Exhibit A3-4 Existing Land Use – Berkeley Street SW
- Exhibit A3-5 Zoning – South 56th Street
- Exhibit A3-6 Zoning – South 74th Street
- Exhibit A3-7 Zoning – Bridgeport Way SW
- Exhibit A3-8 Zoning – Berkeley Street SW
- Exhibit A3-9 Public Services, Schools, and Park Facilities – South 56th Street
- Exhibit A3-10 Public Services, Schools, and Park Facilities – South 74th Street
- Exhibit A3-11 Public Services, Schools, and Park Facilities – Bridgeport Way SW
- Exhibit A3-12 Public Services, Schools, and Park Facilities – Berkeley Street SW
- Exhibit A3-13 Surface Water and Floodplains – South 56th Street
- Exhibit A3-14 Surface Water and Floodplains – South 74th Street
- Exhibit A3-15 Surface Water and Floodplains – Bridgeport Way SW
- Exhibit A3-16 Surface Water and Floodplains – Berkeley Street SW

**Exhibit A3-1
Existing Land Use – South 56th Street**



**Exhibit A3-2
Existing Land Use – South 74th Street**



Pt. Defiance Rail Bypass
Existing Land Use - S. 74th Street



0 0.25 0.5 Miles

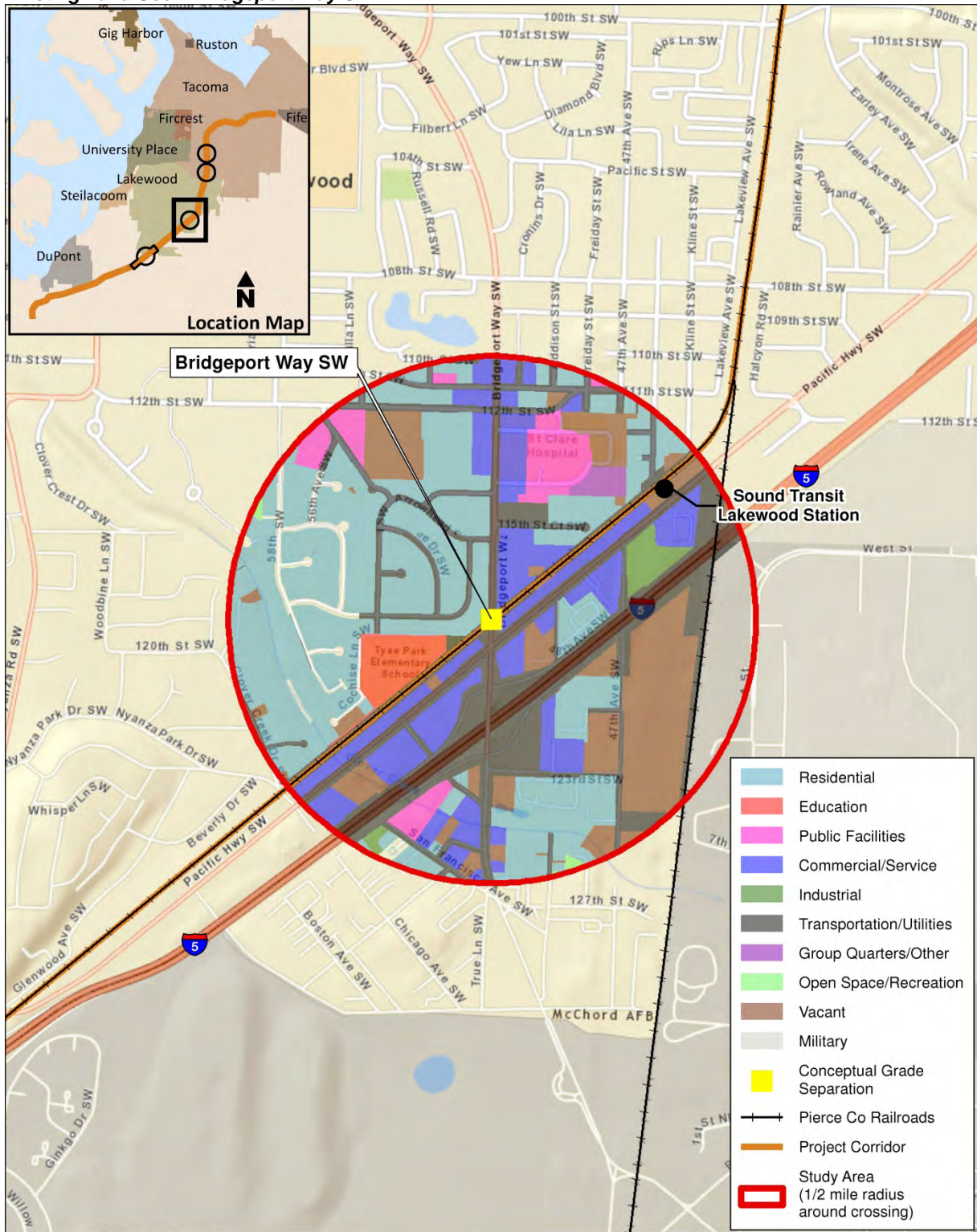


Panel # 2

January 2012

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

**Exhibit A3-3
Existing Land Use – Bridgeport Way SW**



Pt. Defiance Rail Bypass
Existing Land Use - Bridgeport Way SW



0 0.25 0.5 Miles

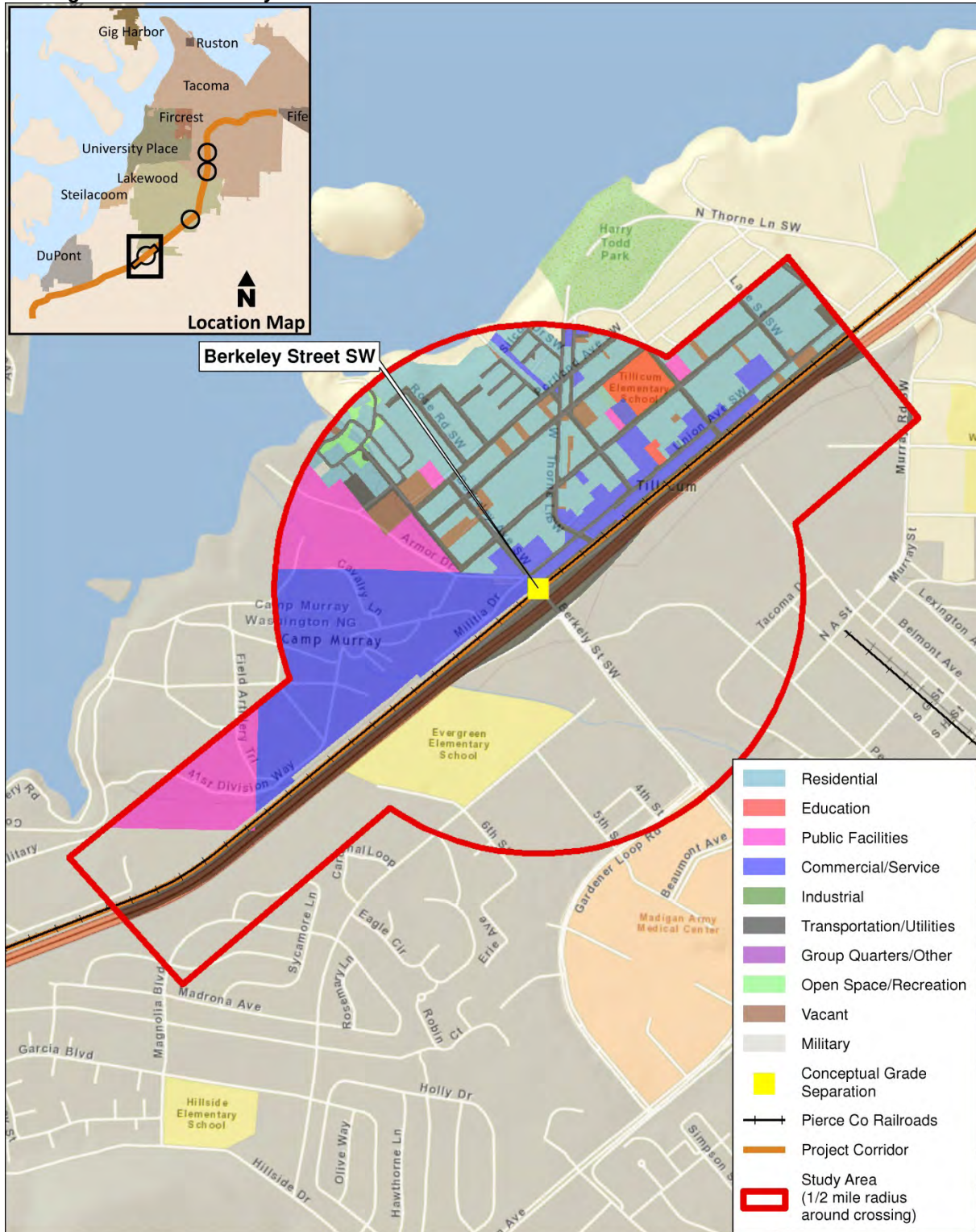


Panel # 3

January 2012

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

Exhibit A3-4
Existing Land Use – Berkeley Street SW



Pt. Defiance Rail Bypass
 Existing Land Use - Berkeley Street SW



0 0.25 0.5 Miles

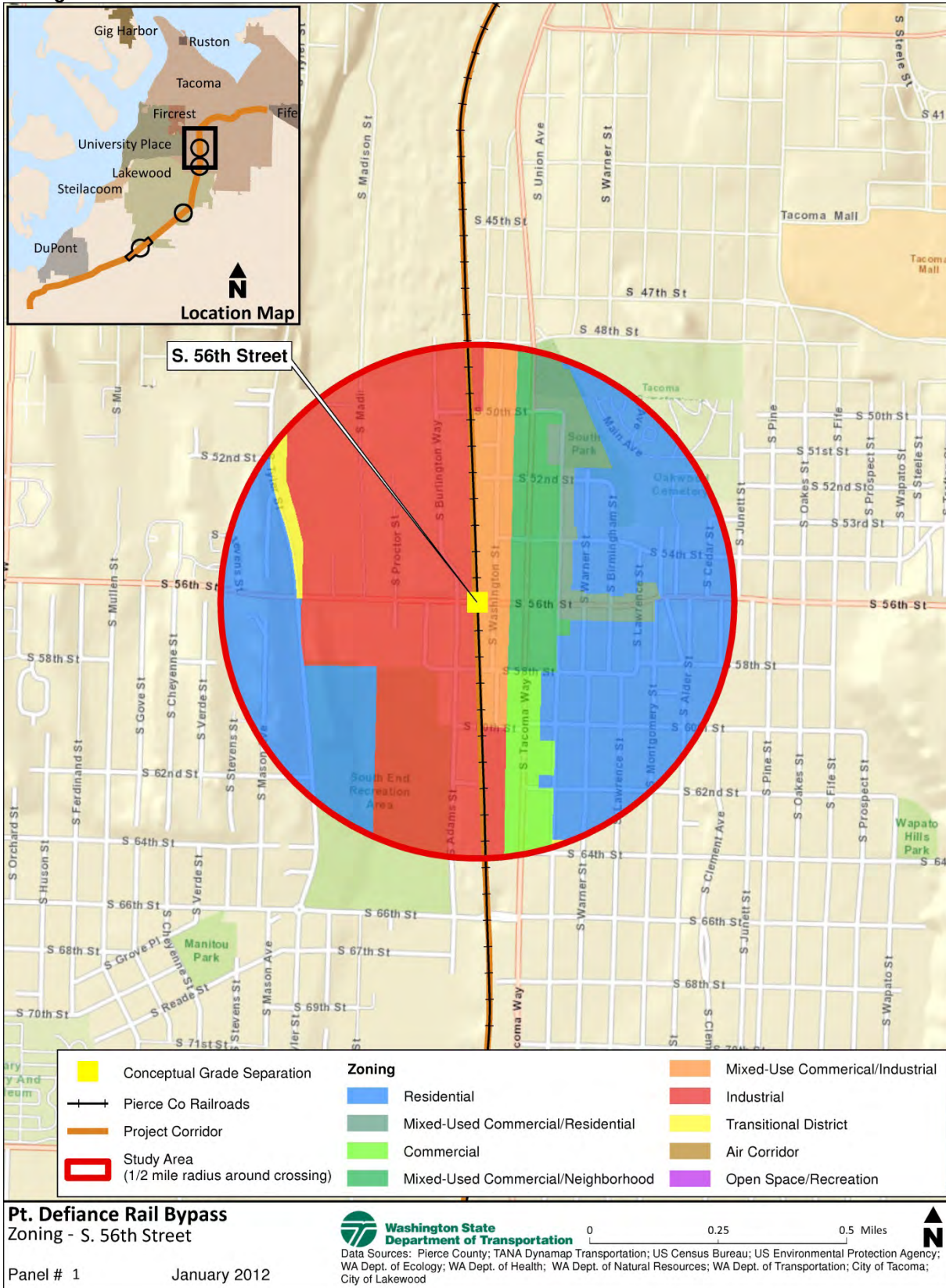


Panel # 4

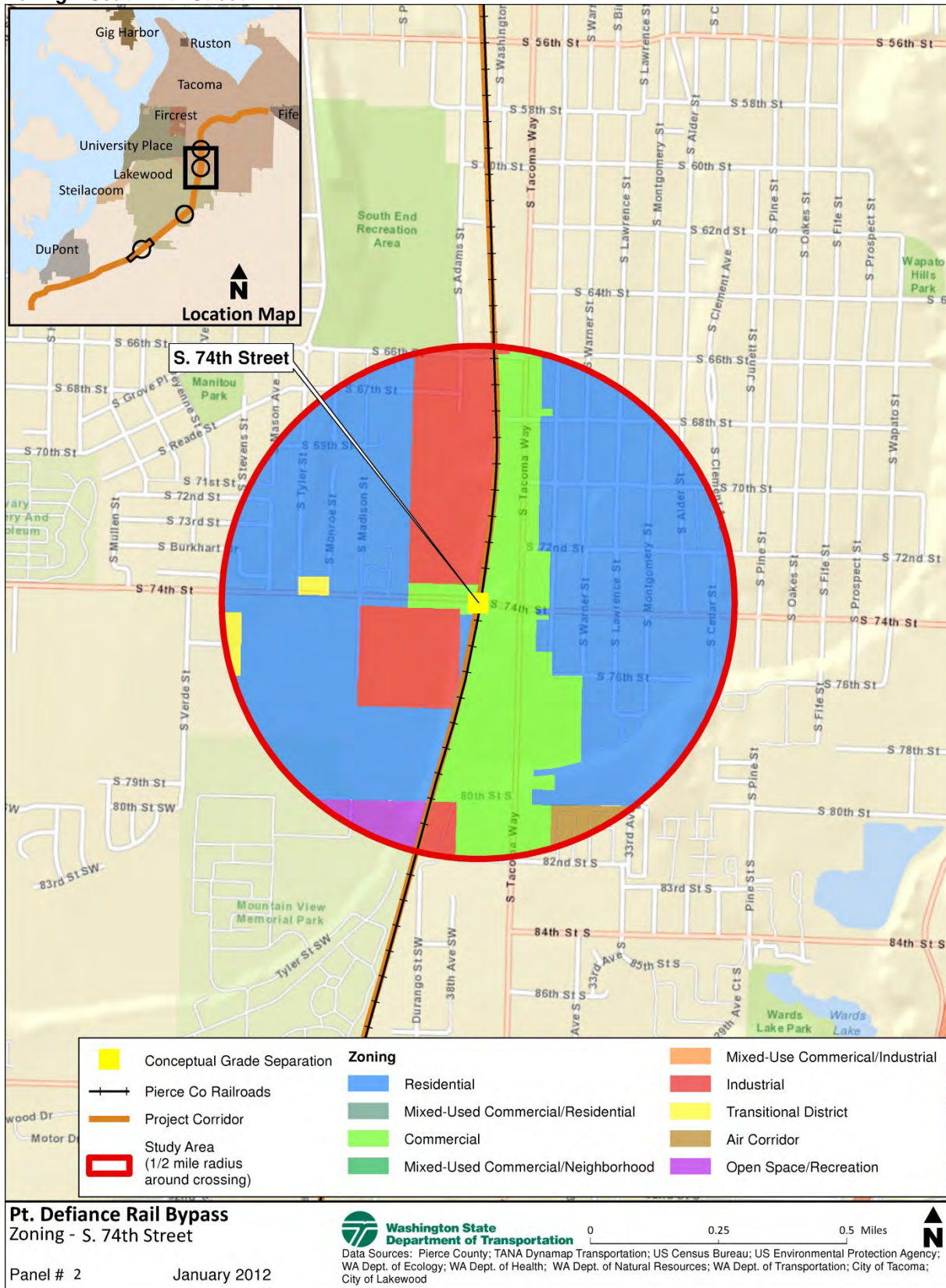
January 2012

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

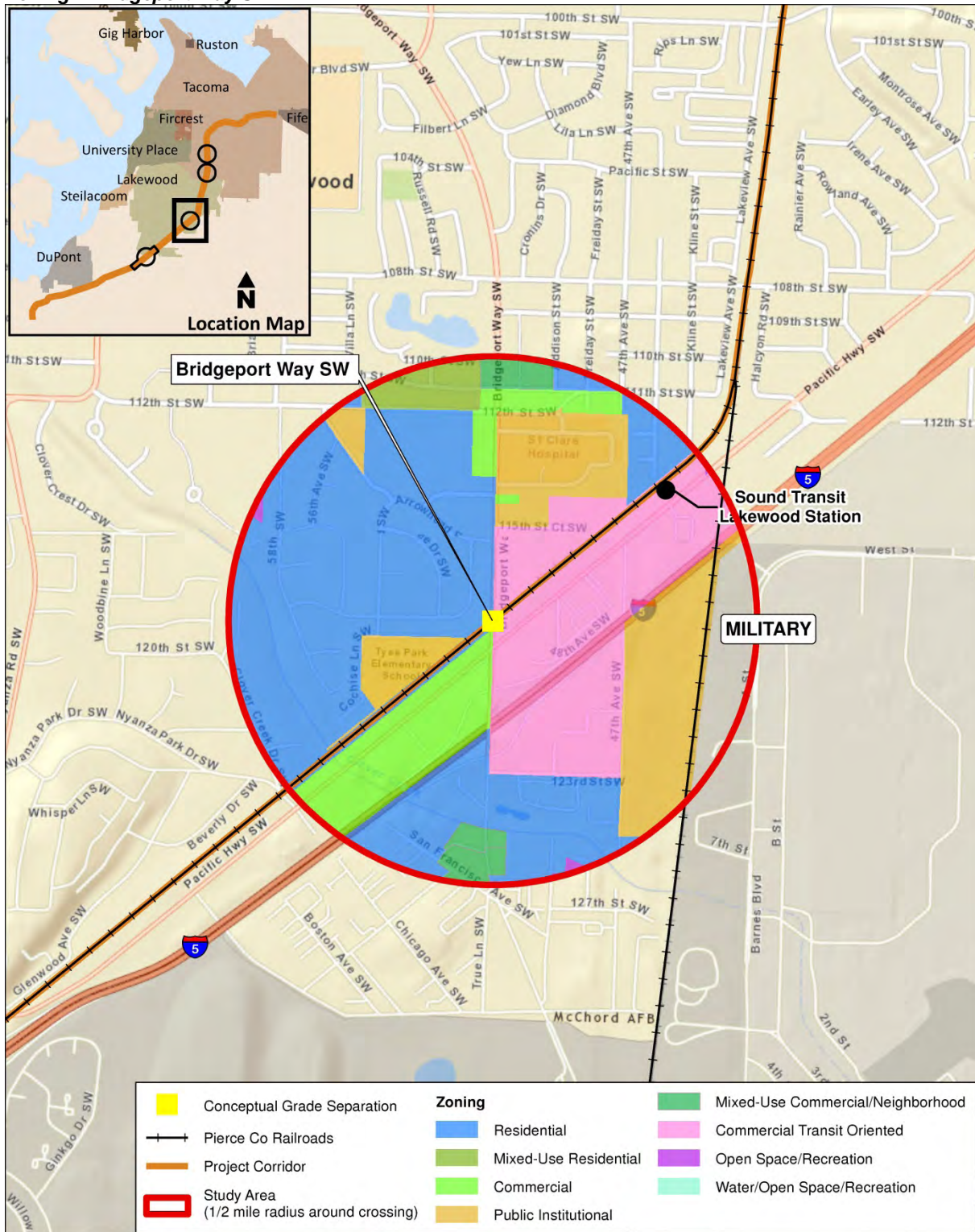
**Exhibit A3-5
Zoning – South 56th Street**



**Exhibit A3-6
Zoning – South 74th Street**



**Exhibit A3-7
Zoning – Bridgeport Way SW**



**Pt. Defiance Rail Bypass
Zoning - Bridgeport Way SW**

Panel # 3

January 2012



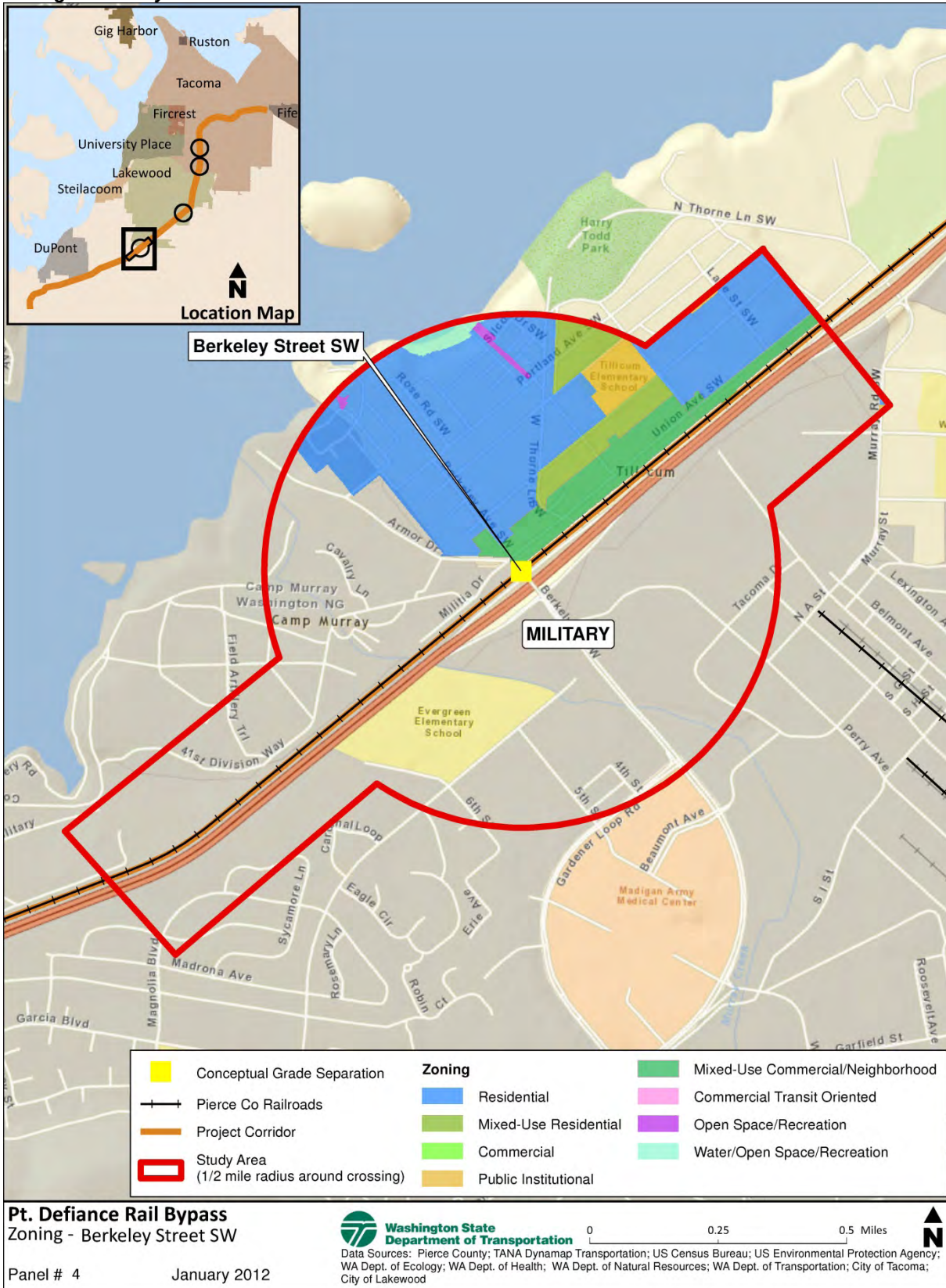
**Washington State
Department of Transportation**

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; City of Tacoma; City of Lakewood



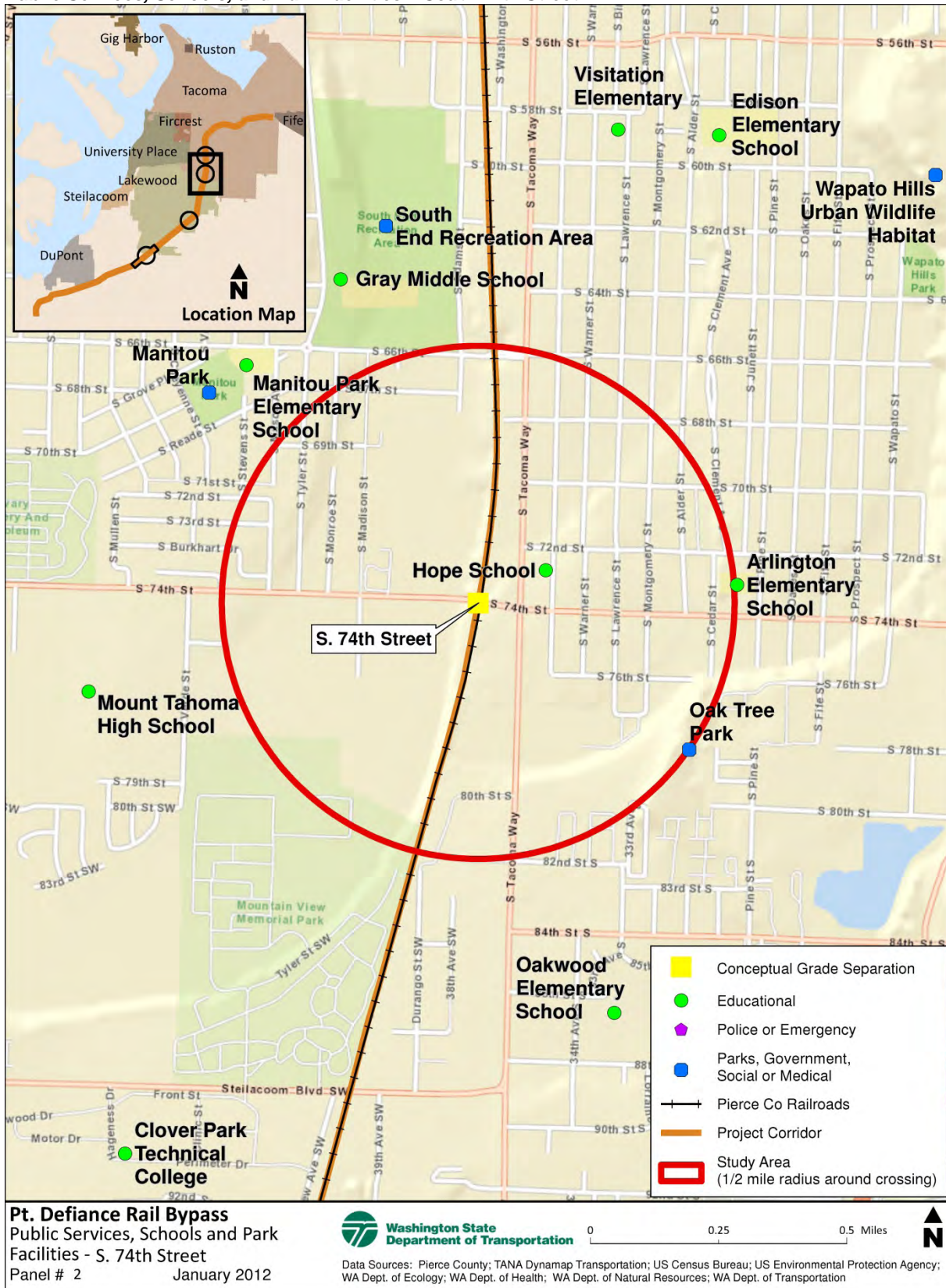
**Exhibit A3-8
Zoning – Berkeley Street SW**



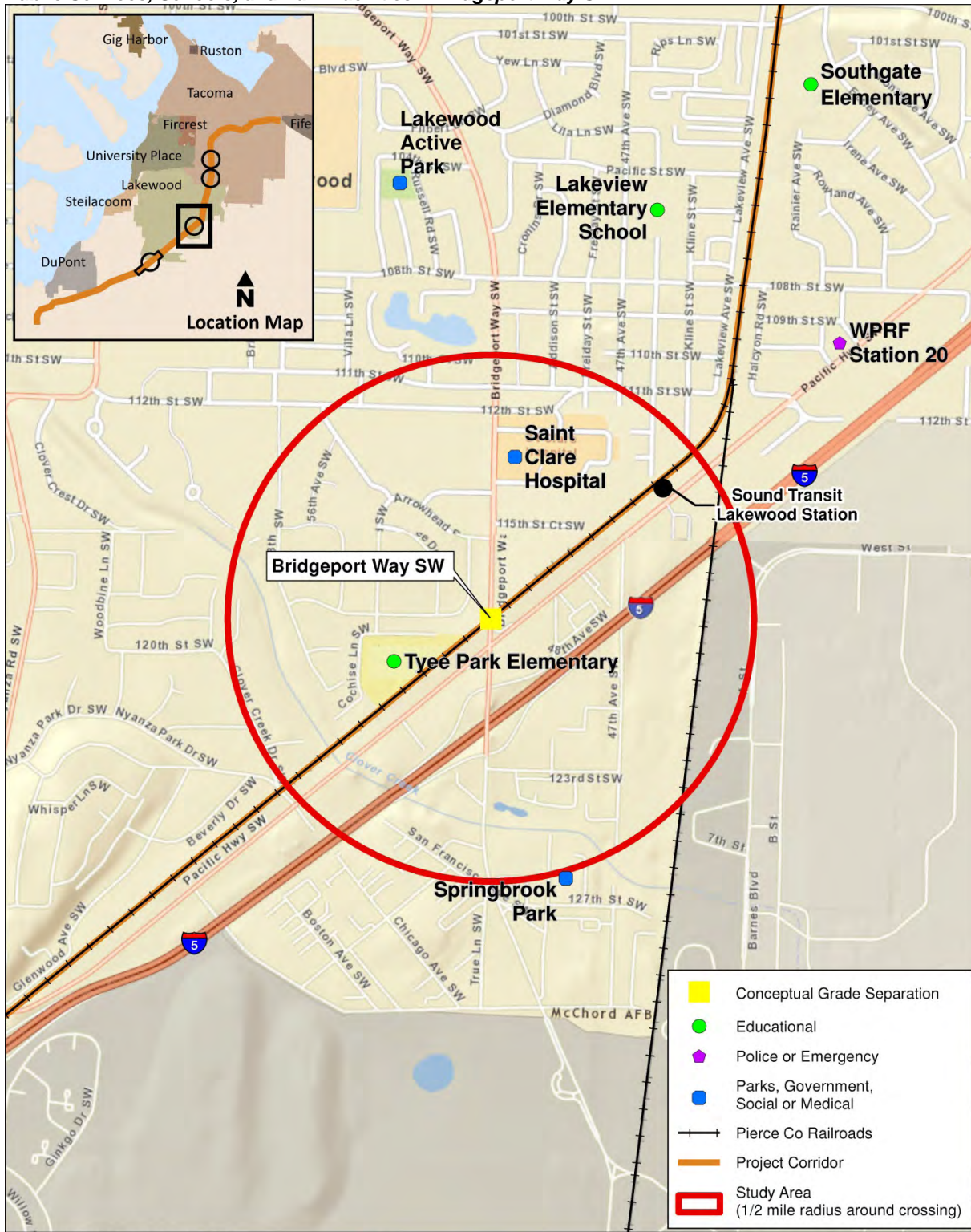
**Exhibit A3-9
Public Services, Schools, and Park Facilities – South 56th Street**



Exhibit A3-10
Public Services, Schools, and Park Facilities – South 74th Street



**Exhibit A3-11
Public Services, Schools, and Park Facilities – Bridgeport Way SW**



Pt. Defiance Rail Bypass
Public Services, Schools and Park Facilities - Bridgeport Way SW
Panel # 3 January 2012



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

Exhibit A3-12
Public Services, Schools, and Park Facilities – Berkeley Street SW



Pt. Defiance Rail Bypass
 Public Services, Schools and Park
 Facilities - Berkeley Street SW
 Panel # 4 January 2012



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

Exhibit A3-13
Surface Water and Floodplains – South 56th Street

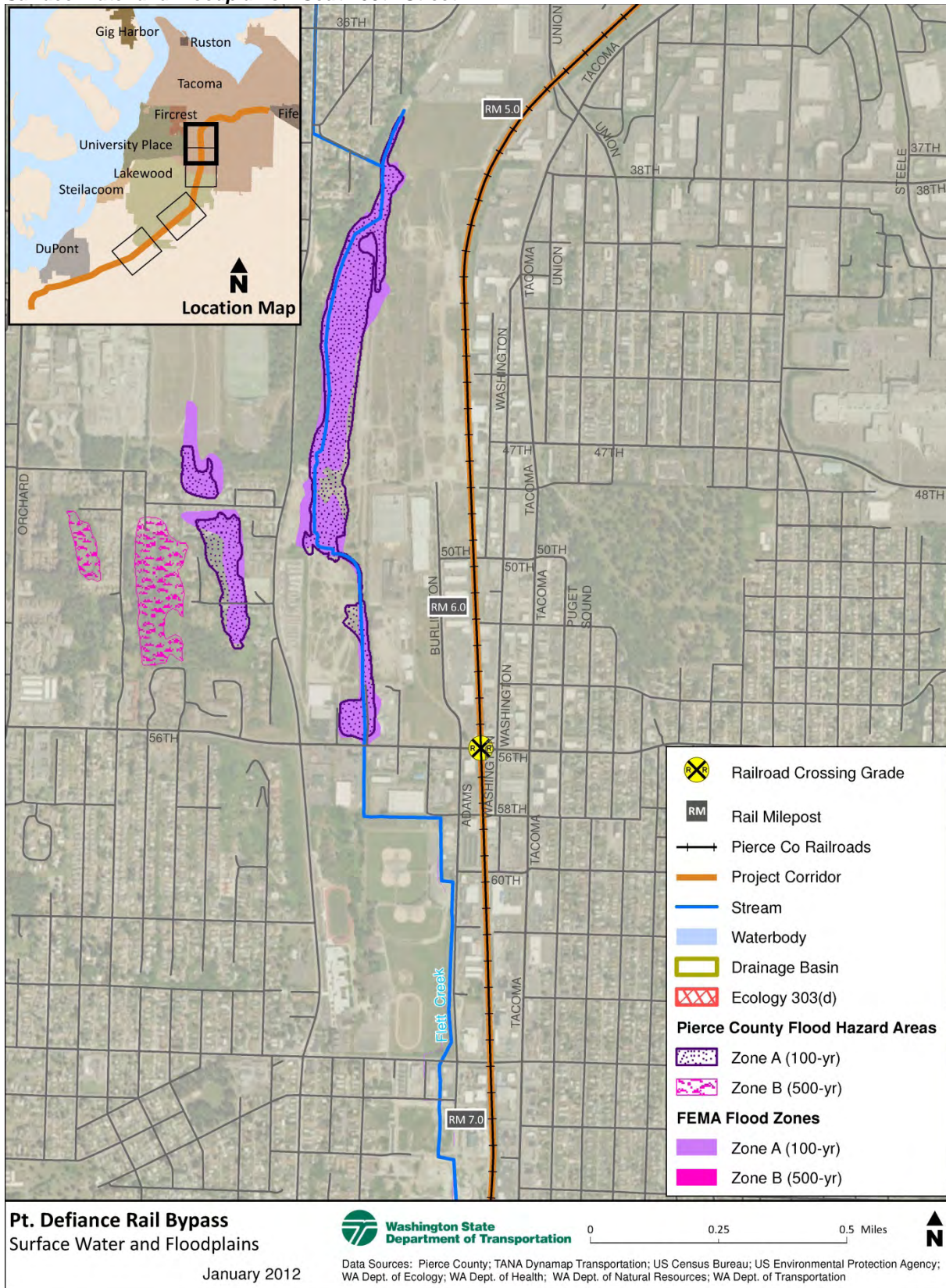


Exhibit A3-14
Surface Water and Floodplains – South 74th Street

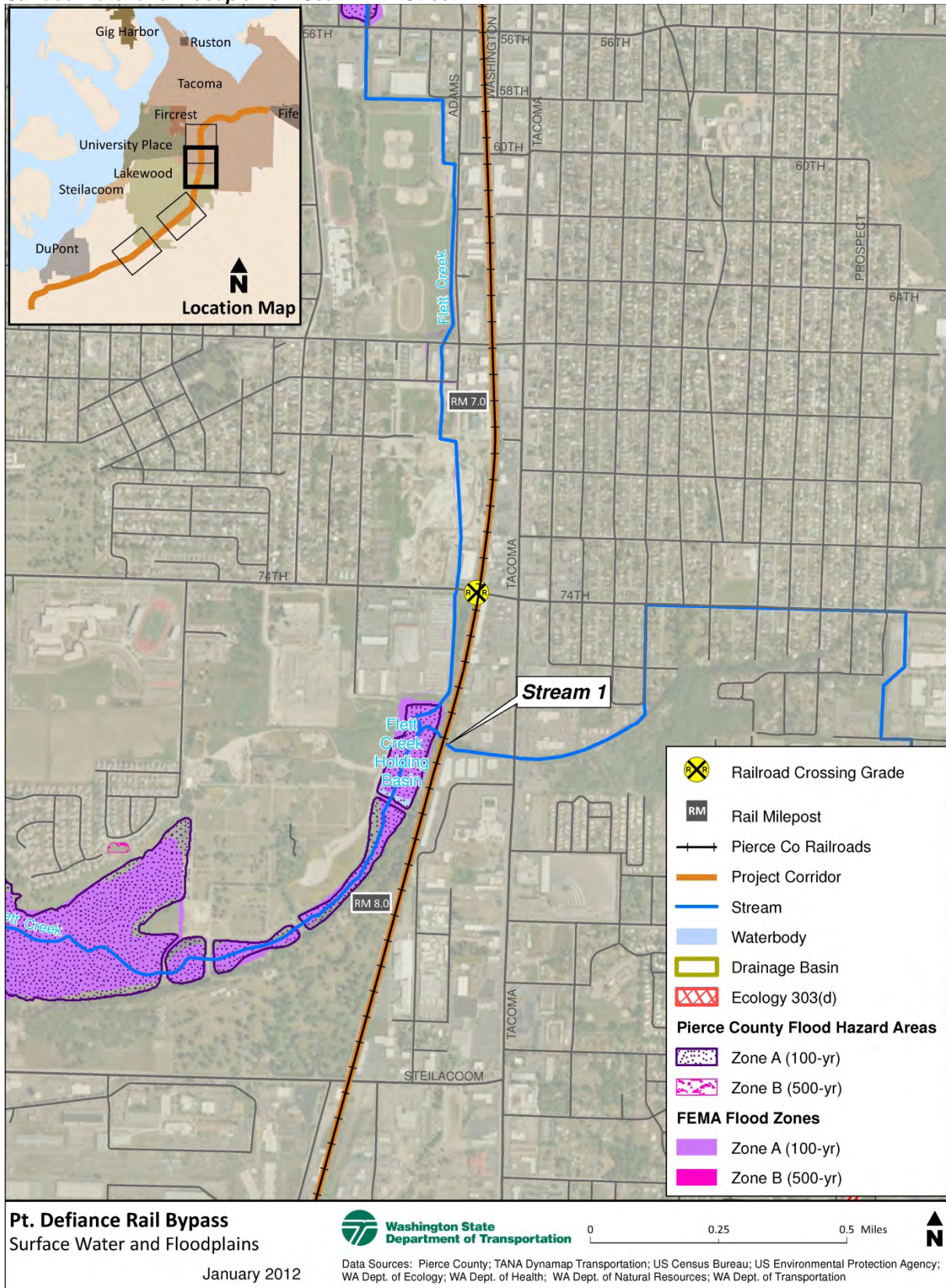


Exhibit A3-15
Surface Water and Floodplains – Bridgeport Way SW

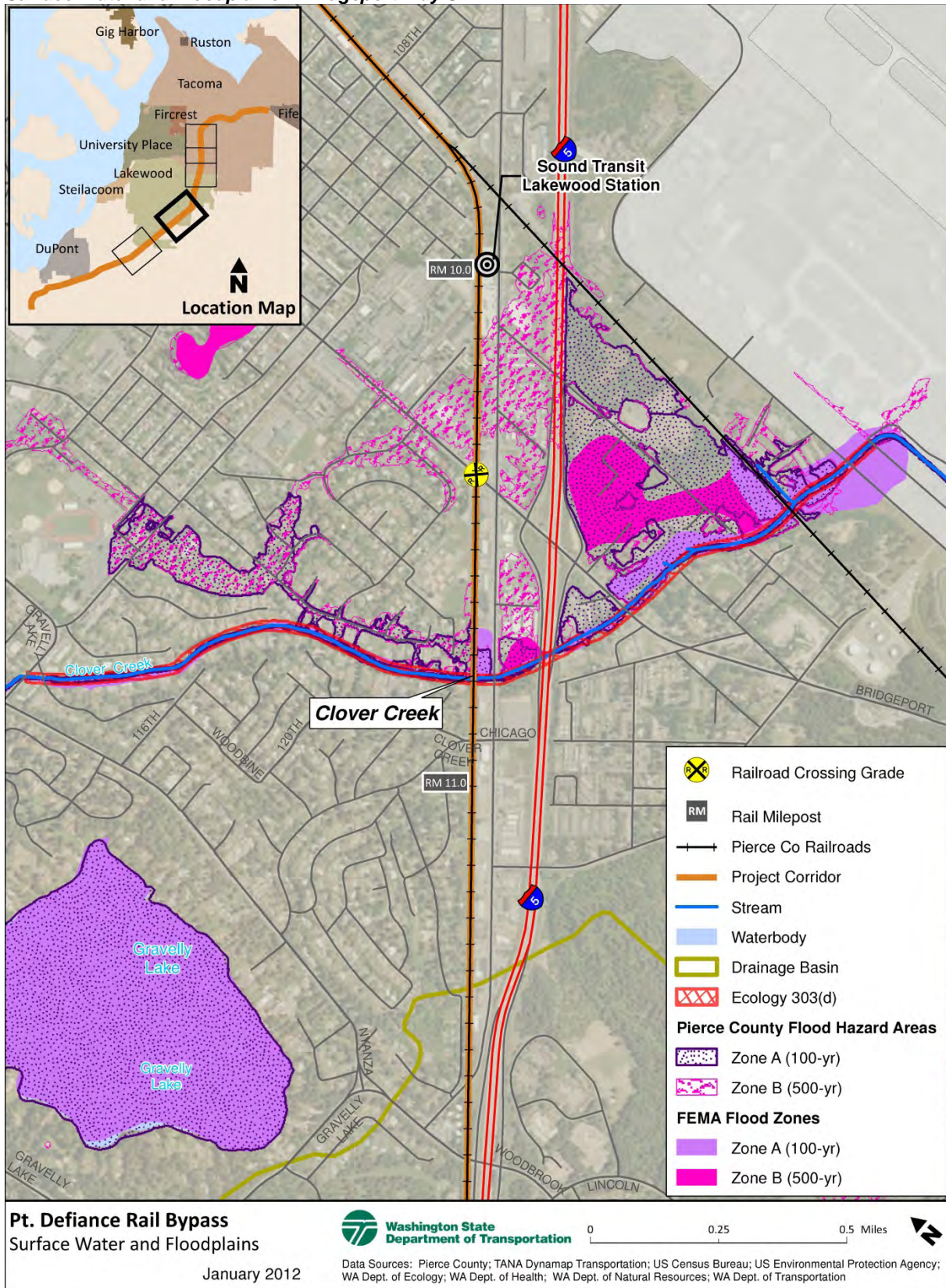


Exhibit A3-16
Surface Water and Floodplains – Berkeley Street SW

