U.S. Department of Transportation, Office of the Secretary of Transportation

Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies (FASTLANE) FY 2017 Grant Application

Bridging the Valley:
Pines Road (SR 27) BNSF Grade Separation Project

Project Name.	**Bridging the Valley: Pines Road (SR 27) BNSF Grade Separation Project**
Was a FASTLANE application for this project submitted previously?	Yes.
• If yes, what was the name of the project in the previous application?	Bridging the Valley: Barker Road and Pines Road (SR 27) BNSF Grade Separation Project
Previously Incurred Project Cost	$394,385.
Future Eligible Project Cost	$19,765,000.
Total Project Cost	$20,159,385.
FASTLANE Request	$11,859,000.
Total Federal Funding (including FASTLANE)	$11,859,000.
Are matching funds restricted to a specific project component? If so, which one?	No.
Is the project or a portion of the project currently located on National Highway Freight Network	No.
Is the project or a portion of the project located on the National Highway System	Yes.
• Does the project add capacity to the Interstate system?	No.
• Is the project in a national scenic area?	No.
Do the project components include a railway-highway grade crossing or grade separation project?	Yes.
• If so, please include the grade crossing ID.	066367E
Do the project components include an intermodal or freight rail project, or freight project within the boundaries of a public or private freight rail, water (including ports), or intermodal facility?	No.
If answered yes to either of the two component questions above, how much of requested FASTLANE funds will be spent on each of these project components?	$11,859,000 for railway-highway grade separation.
State(s) in which project is located.	Washington.
Small or large project	Small.
Urbanized Area (UA) in which project is located, if applicable.	Spokane, WA UA.
Population of Urbanized Area.	387,487 (2010 Census)
Is the project currently programmed in the:	
• TIP.	Yes.
• STIP.	Yes.
• MPO Long Range Transportation Plan.	Yes.
• State Long Range Transportation Plan.	No. (It defers to State Freight Plan)
• State Freight Plan?	Yes.

FASTLANE Grant Re-Application: Summary of Changes since April 2016

The enclosed FY17 application is very similar to Spokane Valley's FASTLANE FY16 application previously submitted in April 2016. Key differences between the applications are highlighted yellow throughout the document and are summarized here.

Since FASTLANE FY16:

- ***Split two major grade separation projects into two FASTLANE FY17 applications.***
- ***The ROW purchase of a key $0.5M parcel using City funds is almost complete.***
- ***Design services are being procured for the Pines Road BNSF project using City funds.***
- ***City has increased committed funding.***

Scope

- The previous application included two railway-highway grade separation projects: one on Barker Road and one on Pines Road. The current application includes only the Pines Road BNSF grade separation project. A separate FASTLANE FY17 application is being submitted for the Barker Road BNSF grade separation project.
- The combined project in the FASTLANE FY16 application was categorized as a large rural project. This application is for a small urban project.

Design, Right-of-Way, and Schedule Advancements

- The City of Spokane Valley is committed to delivering this project. They are currently working on a STIP amendment to start design. Using their own funds, the City is about to procure services to proceed with the engineering phase of this project. Contract execution is expected during the first quarter of 2017.
- In an effort to keep the project moving forward, the City has also allocated funds to advance the design phase while they pursue additional funding sources.
- Right-of-way acquisition for a key $510,000 parcel is almost complete using City funds. This parcel is needed for a key piece of the grade crossing realignment.
- The City is committed to obtaining funding sources for this project and have moved the anticipated construction date up by just over a year to September 2020. This change improved the B/C ratio from 8.7 to 8.8 when discounted at three percent.

Funding

- Some funding sources specific to the Pines Road BNSF grade separation project have changed:
  - The City increased committed funds by $920,735 to a total of $1,700,000 (8.6 percent of the project) in order to begin the design phase of the project.
  - The FASTLANE request was decreased from $17,655,155 to $11,859,000. The request is 60 percent of the project cost.
  - Other expected funding sources (e.g. Washington state TIB) increased by $4,885,420.

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Contact Information:
Steve M. Worley
Capital Improvement Program Manager
11707 E Sprague Ave, Suite 106
Spokane Valley, WA 99206
509-720-5014
sworley@spokanevalley.org

1 Project Description

This section describes the proposed project, the challenges the project aims to address, key project objectives and proposed solutions, and key benefits.

1.1 Project Description

The City of Spokane Valley requests $11,859,000 from the FY 2017 FASTLANE Grant Program to complete funding for the Pines Road (SR 27)/BNSF Grade Separation Project. The Pines Road/BNSF Grade Separation Project replaces an at-grade crossing with an underpass of BNSF's railroad tracks; lowers the intersection and adds lanes at the nearby Pines Road/Trent Avenue (SR 290); and closes the at-grade crossing of University Road at the BNSF railway.

The project is classified as a small urban project. The total project size of $20,159,385 includes $394,385 previously incurred costs and $19,765,000 future eligible costs. The project is in the small category because the project size is less than Washington State's $100 million FY 2017 apportionment for projects located in one state. The project is also classified as urban based on the description in Section 2 (Project Location).

Despite being a small project, **the construction of this project has both national and regional significance.** At the national level, this project improves the safety of freight trains, passenger trains, and freight trucks by eliminating road/rail conflicts and also improves the mobility of freight trucks. The BNSF railway carries freight and passenger trains between western ports and Midwest intermodal facilities. The removal of two at-grade crossings will eliminate train/vehicle crash risks through Spokane Valley. The elimination of delays at the rail crossings will improve the mobility of freight trucks traveling from Canada to Interstate 90 just south of the project. Additional benefits at the regional level include unlocking the economic potential to develop prime vacant land zoned for industrial, mixed-use, and commercial uses; re-connecting communities and recreation areas; supporting active pedestrian and bicycle lifestyles; and improving the quality of life through noise and emissions reductions. The overall project supports regional commerce within the

Figure 1. Project Location Related to National BNSF Intermodal Freight Movement

Inland Pacific Hub and helps achieve regional planning goals that have been in place for more than a decade.

Expected system users that will benefit from this project include:

- Travelers (automobile drivers/passengers, pedestrians, bicyclists)
- Trucking companies and the companies that use their services for freight transport
- BNSF Railway and companies that use the railway for freight transport
- Amtrak and their passengers
- Property owners near the project (businesses, residents, vacant land owners)

1.2 Challenges Project Aims to Address

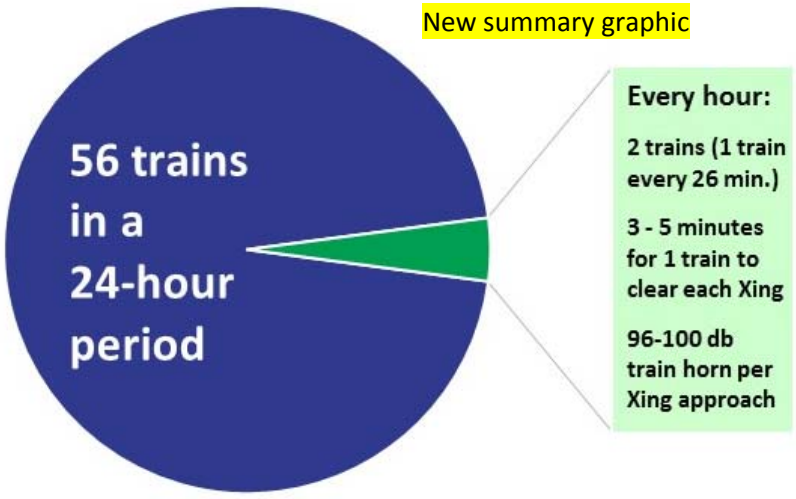
This project aims to address safety, mobility, economic, and community challenges associated with the two existing at-grade crossings as described in this section.

1.2.1 Safety Risk at and Near the Crossings

All at-grade crossings have the potential for fatalities, serious injuries, and hazardous material spills (e.g. Bakken oil), particularly when there are high volumes of rail traffic and roadway traffic, such as at the Pines Road/BNSF rail line crossing.

1.2.2 Long Delays at and Near Crossings

On average, people and freight are delayed 56 times per day at each roadway-railway crossing. With trains nearly one and a half miles in length, crossings are closed for approximately three to five minutes for each train to pass. Queuing vehicles on the crossing approaches compounds the delay once the train has passed. Additional delay is incurred at the nearby intersection at SR 290.



Challenges Posed by Frequent Train Crossings

1.2.3 Inefficient Emergency Services Access

Key emergency services (fire, police, hospital) are located south of the railway. The long and frequent delays at the rail crossings may cause delays for providing emergency services to the north.

1.2.4 Economic Development Standstill

Close to 170 acres of mixed-use or commercially-zoned parcels and 56 acres of prime industrially-zoned parcels are undeveloped because property owners and developers cannot afford to mitigate the LOS 'E' operating conditions at the Pines Road (SR 27)/Trent Avenue (SR 290) intersection. These parcels, and several hundred more acres beyond the city limits, are some of the last undeveloped parcels available for industrial use in the area.

1.2.5 Inefficient Intermodal Activities

Frequent long delays at the crossings hinder long-haul and short-haul freight trucks from reaching destinations in a timely manner. Trent Avenue (SR 290) and Pines Road are preferred long-haul freight routes for accessing Interstate 90 to the south due to heavy congestion on Highway 95 through Coeur d'Alene, Idaho. Short-haul freight trucks also travel through the crossing to reach the many industrial land uses served by spur rail lines near the project site.

1.2.6 Lack of Community Connectivity

The BNSF railway bisects the northern parts of Spokane Valley from the main city south of the railway. On Pines Road, the BNSF railway provides a barrier between neighborhoods, recreation areas, commercial retail sites, and schools located on both sides of the railway. While the crossing has sidewalks (although no pedestrian gates), it does not provide bicycle facilities, making the route unappealing to pedestrians and bicyclists.

1.2.7 Noise Pollution from Train Whistles

Spokane Valley residents have long complained about the noise pollution of the train whistles. Federal law requires locomotives to sound their horns at 96 to 100 decibels as they approach at-grade crossings and continue blowing the horn until the train clears the crossing. Not only do the horns disturb the peacefulness of the surrounding area, medical studies have linked loud noises, such as train whistles, to stress-related health problems, such as stroke and heart disease[1].

1.3 Key Project Objectives and Proposed Solutions

This section provides a summary of the key project objectives, proposed solutions, and a summary of the before and after conditions.

This project is part of the broader Bridging the Valley effort where the main goal is separating vehicle traffic from train traffic in the 42-mile corridor between Spokane, Washington and Athol, Idaho. Bridging the Valley includes project objectives to:

[1] "Spokane Valley, Cheney residents want to silence train whistles." The Spokesman-Review, March 6, 2016. See attachment.

- Improve public safety by reducing rail/vehicle collisions
- Improve emergency services access to residents and businesses along the corridor
- Eliminate waiting times and improve traffic flow for all travel modes at rail crossings
- Reduce noise levels, particularly related to train whistles at crossings
- Enhance economic opportunities for a rail corridor served by a key regional railroad

Proposed solutions for the Pines Road/BNSF Railway project include:

- Grade-separation so that Pines Road passes under the BNSF railway
- Add sidewalks and bicycle lanes to the Pines Road underpass
- Lower the Pines Road/Trent Avenue (SR 290) intersection and add lane capacity
- Close the University Road/BNSF at-grade crossing

Table 1 provides a summary of the before and after project impacts.

Table 1. Before and After Conditions at BNSF Railway Crossings

Conditions	Before (2016)	After (2022)
At-grade crossings	2	0
Train volumes (freight/passenger)*	54 / 2	70 / 2
Daily volumes at crossing (vehicles)	16,400	17,850
Crash risk (fatalities/year)	0.047	0
Annual automobile idling delay (hours)**	26,261	0
Annual truck idling delay (hours)	906	0
Fuel consumption (gallons/year)***	21,735	0
Level of service at SR 290	E	D
Acres of undeveloped land	226	0
Daily train whistles	112	0

* Current track capacity is 76 trains. Freight train volumes are increasing approximately three to four percent per year. In the future when BNSF adds a second mainline track, approximately 125 trains per day are anticipated by 2035. (Sources: Federal Rail Administration (http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/query/invdetl.aspx) and *Washington State Rail Plan* 2013, Technical Note 4a, Figures 4.1 and 4.2)

** Vehicle delay also accounts for delay to emergency services and school buses.

*** Fuel consumption is correlated to emissions, which includes numerous measures of particulate matter such as CO. The fuel consumption includes idling delay at the crossing.

The key benefits for the Pines Road BNSF grade separation project remain unchanged except for a B/C increase from 8.7 to 8.8 discounted at 3%. The numbers reflect this project only instead of the combined Barker and Pines project numbers.

1.4 Key Benefits

This FASTLANE project will generate key long-term benefits that leverage federal investment by improving the mobility and safety of people and freight in the Inland Pacific Hub, while also providing economic opportunities and enhancing the environment and surrounding communities. This project will result in the following outcomes:

Cost-Effectiveness

- Overall project **benefit-cost ratio** is 3.3 (discounted at 7%) and 8.8 (discounted at 3%).

Economic Outcomes

- Decrease transportation costs and improve long-term efficiency, reliability, and costs in the movement of workers and goods
- Significantly reduce the cost of transporting export cargoes from Canada
- Enhance the access and reliability to close to 170 acres of mixed-use and commercially-zoned and 56 acres of prime, buildable industrial-zoned land
- Generate approximately $1.3 billion in state economic output, including **8,719 new jobs** (4,312 of those in Spokane Valley) and new general fund taxes ($8.2 million for City and **$101.9 million for State**)

Mobility Outcomes

- **Dramatically reduce delay** to vehicles, bicycles, and pedestrians and improve traffic circulation
- Greatly enhance accessibility of pedestrians and bicyclists by eliminating infrastructure gaps and reducing delay

Safety Outcomes

- **Eliminates the growing risk of conflict** between roadway users and trains by separating uses
- Adds ADA-accessible pedestrian and bicycle features to increase safety
- Addresses existing safety concerns at roadway intersections

Community and Environmental Outcomes

- Improves community connectedness between neighborhoods, commercial retail sites, schools, and nearby recreational areas
- **Eliminates train horn noise** due to safety requirements for trains crossing roadways at grade, which also improves the health and well-being of surrounding residents and businesses
- **Reduces fuel consumption and tailpipe emissions** for vehicles idling in delayed traffic

Partnership and Innovation

- Helps fulfill the vision of the MPO's "Bridging the Valley" and "Horizon 2040 Metropolitan Transportation Plan" to separate vehicle traffic from train traffic in the 42-mile corridor between Spokane, Washington and Athol, Idaho

Cost Share

- Helps a city with limited resources to reconnect communities that are bisected by a private railroad line

2 Project Location

Figure 2 shows the proposed project location and surrounding area. Key features shown include:

- **Project:** highway-rail crossing improvements on the BNSF rail line: grade separation at Pines Road and crossing closure at University Road
- **Freight Rail Routes:** BNSF and UPRR lines
- **Freight Roadway Routes:** designated freight routes and ton haulage per year
- **Traffic Data:** BNSF train volumes (56 per day) and average daily traffic on project roadways (up to 24,500 vehicles per day)
- **Traffic Signals:** existing signal included in the Pines Rd project and the nearby future signal at the Pines Road (SR 27)/Mirabeau Parkway intersection
- **Intersection Level of Service:** sub-standard service level at the Trent Avenue (SR 290)/Pines Road (SR 27) intersection
- **Land Use:** key industrial areas, parks and recreation areas, schools, and vacant land zoned for industrial, mixed-use, or commercial uses (more detail shown in Figure 3)
- **Urbanized Area (UA) Boundary from 2010 Census:** the Pines Road project falls within the UA, satisfying the urban requirement of the FASTLANE grant

3 Project Parties

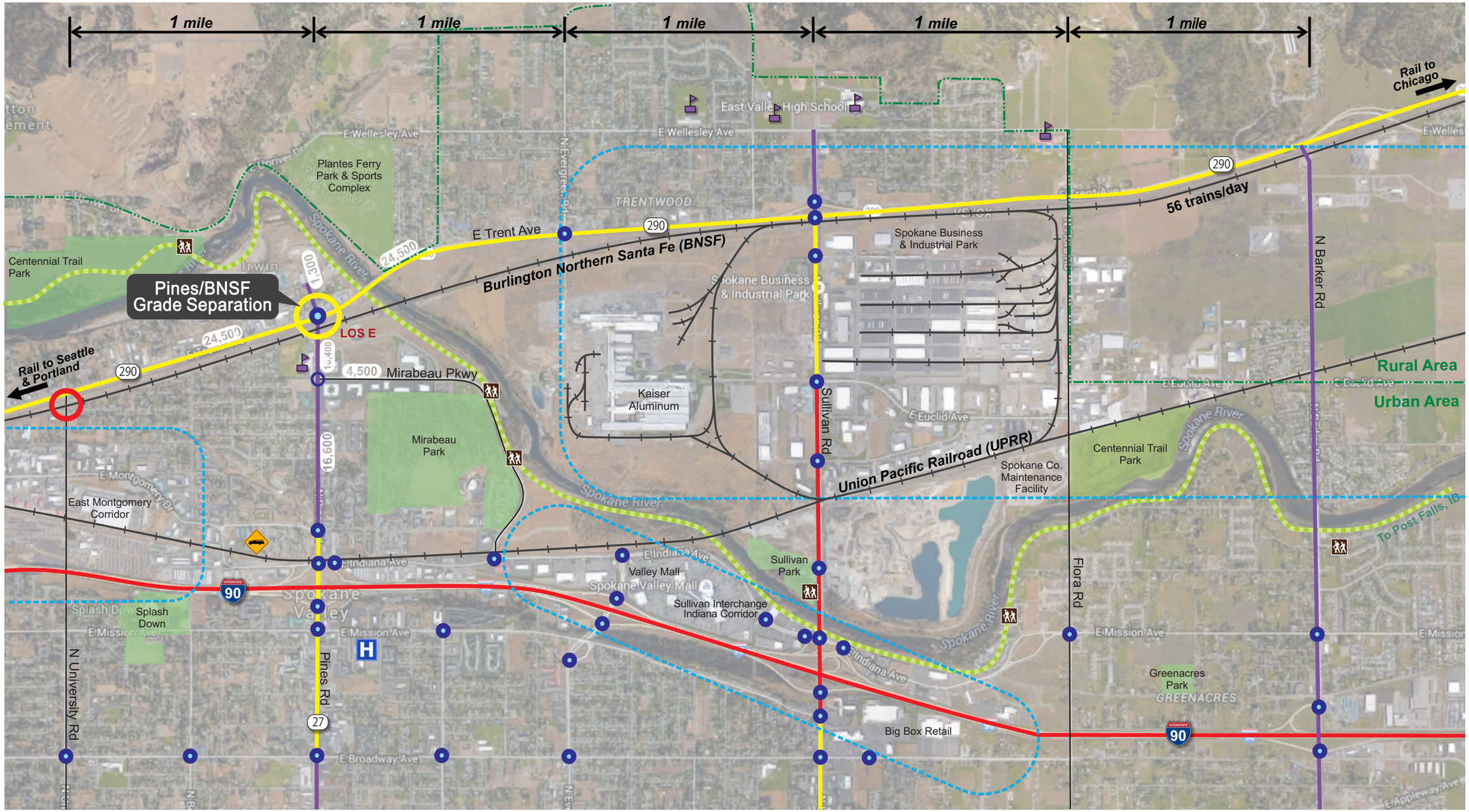
The City of Spokane Valley is the applicant for this project and will manage any grant funding awarded and all design and construction activities associated with the project. The City will work closely with the Washington State Department of Transportation (WSDOT) and BNSF Railway to deliver the project. Appendix A includes letters of support from all three partners.

The **City of Spokane Valley** is located near the eastern border of Washington and is the ninth largest city in Washington with a population of 93,340[2].

WSDOT is responsible for building, maintaining, and operating the state highway system and state ferry system. They are responsible for 26 miles of highway within Spokane Valley, including two project roadways: Trent Avenue (SR 290) and Pines Road (SR 27).

BNSF Railway operates the east-west Class I railway at the heart of this project. This railway connects Seattle and Portland in the west to Chicago and Minneapolis-St. Paul in the east with many service points in between. This railway also connects customers with the global marketplace. The Spokane region is a convergence of several rail lines on the northern tier of BNSF's network.

[2] Washington State Office of Financial Management. http://www.ofm.wa.gov/pop/april1/default.asp. April 1, 2015.



LEGEND

- Traffic Signal
- Planned Traffic Signal
- Highway-Rail Grade Crossing Separation
- Highway-Rail Grade Crossing Closure
- Rail Lines
- Selected Employment Activity Centers
- Recreational Trail
- Urbanized Area Boundary (2010 Census)
- Hospital
- Fire Station
- School
- Trailhead
- Land Use: Parks & Rec

LOS - Level of Service

(7,900) - Average Daily Vehicles

Project Roadway Freight & Goods Designations:

- T-1 - > 10 Million Tons/Year
- T-2 - 4 to 10 Million Tons/Year
- T-3 - 300,000 to 4 Million Tons/Year

City of Spokane Valley

Figure 2

Project Location

No Scale

The project partners will coordinate closely and support project delivery:

Project Activity:	Spokane Valley	WSDOT	BNSF Railway
Manage Funding Allocations	✓		
Procurement	✓		
Project Reviews/Approvals	✓	✓	✓
Public Involvement	✓	✓	

4 Sources and Uses of All Project Funding

We are requesting $11,859,000 in FASTLANE grant funds, which is 60 percent of the total $19,765,000 project future eligible cost. These funds will be used for project design, right-of-way acquisition, construction, and project oversight. This section provides discussion on the future eligible cost, committed and expected funding, federal funding overview, project budget, FASTLANE funding allocation, and the City's financial condition and grant management capabilities.

4.1 Future Eligible Cost

The future eligible project cost for this project is $19,765,000. Previously incurred project costs include $394,385 for planning (done in 2004), preliminary engineering (done in 2004), which included 30 percent design plans and cost estimates, and environmental documentation (NEPA approval in 2006). The future eligible costs will be used for the following activities:

- Pre-construction activities:
  - Preliminary and final engineering (this includes an update of the 30% plans and cost estimates to bring the plans to current standards, add bicycle facilities, and account for current costs)
  - Acquisition of real property
- Construction

4.2 Committed and Expected Funding

Non-federal committed funding sources have been secured for $1,700,000, or 8.6 percent, of the $19,765,000 total future eligible project costs. The funds are from the City of Spokane Valley. The City is pursuing 60.0 percent of the expected funding from federal funding opportunities (this FASTLANE grant) and 31.4 percent from other sources. The City has the opportunity to receive additional matching funds through the Washington State Transportation Improvement Board (TIB) each year. The City fully intends on pursuing grant funds for these projects in 2016-2018. In addition to the TIB funding source, the City continues to petition the Washington State Legislature for additional legislative discretionary funds and pursue funding from the Washington Freight

Mobility Strategic Investment Board (FMSIB). The City Council fully supports this project and may also consider additional city funding sources or alternate funding mechanisms, such as selling bonds. Table 2 provides a detailed breakdown of the committed and expected funding for both federal and non-federal sources.

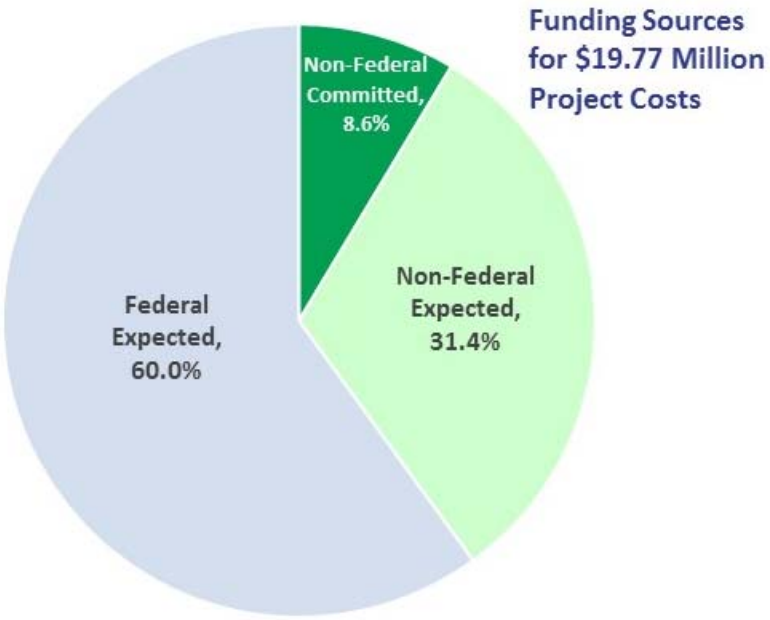


Table 2. Committed and Expected Funding

	Funding Source	Total ($)	Total (%)
Federal Funding			
Expected	FASTLANE	$11,859,000	60.0%
	Subtotal:	**$11,859,000**	**60%**
Non-Federal Funding			
Committed	City of Spokane Valley	$1,710,000	8.6%
Expected	BNSF*	$237,180	1.2%
	Other (e.g., TIB)	$5,958,820	30.2%
	Subtotal:	**$7,906,000**	**40%**
	Total:	**$19,765,000**	**100%**

* Per 23CFR 646.210, BNSF will determine their funding commitment once the 30% design plans and cost estimates (done in 2004) have been brought up to current standards. Their letter of support demonstrates their willingness to contribute to the funding of this project.

The total project cost remains the same. The FASTLANE FY16 application included a $17,665,155 FASTLANE request, $779,265 of committed City funds, and $1,083,400 expected Other non-federal funds.

4.3 Federal Funding Overview

The federal funding component of this project is comprised exclusively of this FASTLANE grant for $11,859,000. It represents 60 percent of the total project cost.

4.4 Project Budget

The City generally plans to apply each funding source proportionately throughout each phase of the project based on the funding source's percentage of the total project costs. The engineering can start in early 2017 using committed City funds once a STIP amendment is finalized.

Table 3. Project Budget

Project Phase	FASTLANE	Other Federal	Non-Federal	Total Cost
Right-of-Way Acquisition	$1,770,000 (60.0%)	-	$1,180,000 (40.0%)	$2,950,000
Engineering	$714,000 (60.0%)	-	$476,000 (40.0%)	$1,190,000
Construction	$9,375,000 (60.0%)	-	$6,250,000 (40.0%)	$15,625,000
TOTAL:	**$11,859,000**	**$0**	**$7,906,000**	**$19,765,000**

4.5 FASTLANE Funding Allocation

If awarded $11,859,000 in FASTLANE funding, the City will allocate the funding to the engineering, right-of-way acquisition, and construction of the project elements. All of the funding will be spent on railway-highway grade separation.

4.6 City's Financial Condition and Grant Management

Spokane Valley Key Financial Features	
Capital Funding:	REET
Operations Funding:	Gas and Telephone Tax
Contingency Plan:	Capital Reserve Fund, General Fund
Grant Oversight:	Approximately $5 - $8 million per year; audited annually
Financial Condition:	Annual Budget

The financial condition of the City of Spokane Valley is reported in their comprehensive annual budget and monthly financial reports[3]. The City employs staff with experience in grant management. The City successfully manages approximately five to eight million dollars in grants (federal and non-federal) on an annual basis and documents this in the annual budget. The primary source of the City capital funding for transportation projects comes from the City's Real Estate Excise Tax (REET) Revenue and transportation operations funding comes from state gas tax revenue and a utility tax on telephones. The City's Street Fund has sufficient funding to cover operations and maintenance of the project. The City has a Capital Reserve Fund as a contingency for capital projects and the General Fund may be used as a contingency for operating costs. **Independent Audit Opinions** are performed annually for the City of Spokane Valley under the U.S. Office of Management and Budget (OMB)

[3] Spokane Valley Budget & Financial Reports: http://www.spokanevalley.org/content/6836/6902/7156/default.aspx

Circular A-133. The two most recent, for fiscal years 2013 and 2014, **reported no Significant Deficiencies or Material Weaknesses**.

The City is currently managing the $15 million Sullivan Road W Bridge Replacement Project, which combines four funding sources: one federal, two state, and a local city match. The City hired a consultant using a RFQ process. The design was completed, right-of-way was obtained, the project was bid, and construction began in the summer of 2014. The project is administered and inspected by the City. Construction was substantially completed in late 2016.

5 Merit and Other Selection Criteria

This section provides a summary of how the project meets the merit selection criteria and other review selection criteria.

5.1 Merit Selection Criteria

This section describes how the project meets the merit selection criteria for outcomes related to the economy, mobility, safety, community, and the environment.

5.1.1 Economic Outcomes

The smooth flow of trade, so vital to U.S. economic competitiveness, is facilitated by addressing key deficiencies across the system. The Pines Road grade separation of the BNSF mainline provide an opportunity to target a local deficiency that effectively ripples benefit through the rest of the transportation system. The BNSF mainline that travels through the City of Spokane Valley is part of a broad rail network that moves freight between international marine ports and terminals on the west coast and points across the western half of the U.S. **Almost 94 percent of Washington's east-west bulk cargo rail traffic travels through this corridor.**[4] The BNSF rail line also serves interstate passenger rail service via Amtrak's Empire Builder route between Seattle and Chicago. Currently, the BNSF line carries an average of 54 freight and two passenger trains daily, and usage on the line is estimated to grow 143 percent by 2035.[5] Upon completion of the project and the Barker Road BNSF grade separation project, an 8.8-mile section of rail corridor between Vista Road and Harvard Road will be unencumbered by at-grade crossings.

Almost 94 percent of Washington's east-west bulk cargo rail traffic travels BNSF's northern tier corridor through Spokane Valley.

[4] Washington Department of Transportation (WSDOT). Washington State Rail Plan. Technical Note 3a: Freight Rail Demand, Commodity Flows and Volumes. Dec. 2013.
[5] Ibid.

The Pines Road grade separation also has a significant benefit to trade facilitated by trucking. Pines Road (SR 27) serves as a primary arterial roadway directly connecting a State Highway (SR 290) at the project site with Interstate 90 to the south. Pines Road is a preferred freight route to I-90 from north Idaho and Canada to avoid the congestion on U.S. Highway 95 through Coeur d'Alene, Idaho. The project promotes improved interstate freight movement from Canada and Idaho through Spokane County/Kootenai County by eliminating vehicle-train conflicts as envisioned in the 2004 Bridging the Valley Plan.

The project improves regional economic vitality by significantly improving reliability and accessibility to the City's largest undeveloped industrial area, home to close to 170 acres of mixed-use or commercially-zoned and 56 acres of prime industrially-zoned parcels shown in Figure 3. With the City expected to accommodate an additional 20,000 residents and 18,000 employees, the Pines/SR 290/BNSF/I-90 quadrant is a targeted locale for growth. This project contributes significantly to supporting and managing this economic growth by building transportation infrastructure necessary to attract, retain, and expand businesses.

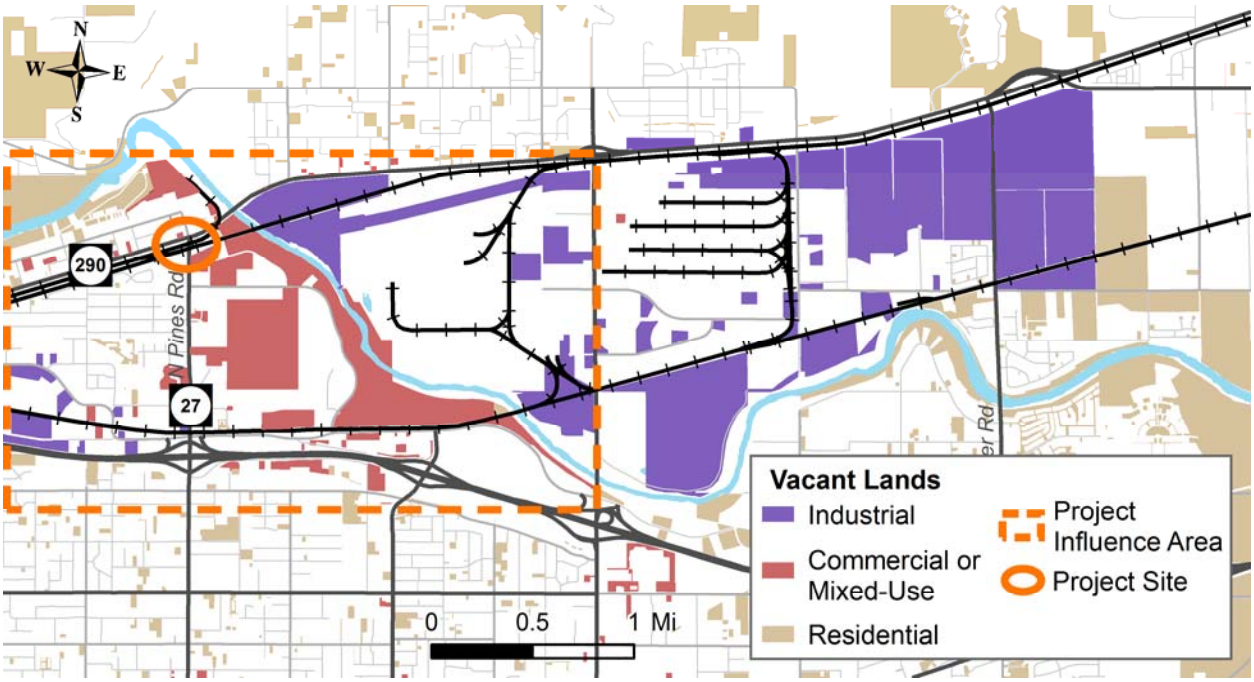


Figure 3. Vacant Parcels in Spokane Valley

Economic analysis estimates that this project will be a **significant generator of jobs and revenues**:

	Pines Rd/BNSF
State economic output:	$1.3 billion
New jobs in state (local share):	8,719 (4,312)
New City general fund taxes:	$8.2 million
New State general fund taxes:	$101.9 million

(See Appendix C for detailed fiscal and economic analysis)

5.1.2 Mobility Outcomes

The 21st century transportation system enhances the mobility needs of all users. The project design results in improved mobility for vehicles, bicycles, and pedestrians. As previously noted, the community of Spokane Valley is growing and experiencing the transportation impacts associated with growth. The existing intersection at Pines Road (SR 27) and Trent Avenue (SR 290) operates at LOS 'E' and has a projected LOS of 'F' in future years due to high traffic volumes on both Pines Road and Trent Avenue. Add to the mix an average of 56 trains per day, up to 7,700 feet in length (nearly 1.5 miles in length), and the impact on traffic flow at these at-grade crossings is significant. **The project improvements for Trent Avenue (SR 290) at Pines Road transforms the LOS 'E' intersection to LOS 'D'.** This greatly benefits travel time reliability for all modes, but significantly for emergency response vehicles where delay can have tragic outcomes; for school buses where delay means tardiness; and for commercial vehicles where delay has negative economic impact.

The positive outcome for freight and passenger rail travel by removing two at-grade crossings of the BNSF line is the continued implementation of the Bridging the Valley Plan that envisions a freight and passenger rail corridor unencumbered by at-grade crossings. The project will also accommodate the planned additional mainline tracks for the rail corridor.

The ability to walk or bike safely on Trent Avenue (SR 290) between the residential communities, schools, commercial centers, and employment areas is hampered by gaps in the pedestrian and bicycle networks on Pines Road. The project significantly enhances mobility for pedestrian and bicyclists by constructing Americans with Disabilities Act (ADA)-compliant sidewalks and bicycle lanes that connect the land uses to the north and south of the project area.

5.1.3 Safety Outcomes

The BNSF rail line and Trent Avenue (SR 290) are high volume train and vehicle corridors respectively. This creates the potential for significant safety hazards for vehicle, pedestrian, and bicyclist cross-traffic. The project eliminates two at-grade roadway-railway

Rail traffic is expected to increase to 125 trains per day (approximately 5 trains per hour) and will negatively impact Spokane Valley without the construction of this project.

crossings. With an average 56 trains per day using the BNSF line currently **and the expectation that rail traffic will increase to 125 daily freight trains – that is five trains every hour** – the reduction in exposure to conflicts between modes is enormous. This is of particular concern to the community because the BNSF rail corridor is the route for commodity travel from the North American interior through Spokane Valley on its way to west coast terminals. To illustrate the magnitude of shipments, the **Washington State Department of Ecology estimates that 2.87 billion gallons per year of Bakken oil travels through Spokane Valley**[6]. This project eliminates the risk of fatalities, serious injuries, and road-related commodity spills that can happen at any roadway-railway at-grade crossing. This project eliminates two at-grade crossings, including one that is on a well-traveled arterial route.

In addition to the positive outcomes of the roadway-railway at-grade closures, the project offers additional safety benefits by improving the configuration of the Pines Road intersection with Trent Avenue (SR 290). The Pines Road and SR 290 intersection will be realigned slightly and lowered to match the new grade resulting from the underpass. Additional turn lane capacity will be included as part of the realignment.

The safety of pedestrians and bicyclists will be enhanced with the addition of ADA-accessible sidewalks and bicycle lanes on the Pines Road underpass.

5.1.4 Community and Environmental Outcomes

The Pines Road BNSF Grade Separation project will substantially contribute to the improved livability for residents in the region by enhancing community connectivity while reducing the negative effects of train horn noise and decreasing transportation delays. The BNSF rail corridor bisects the community. The area north of SR 290 is largely residential interspersed with three schools and the Plantes Ferry Park and Sports Complex. South of the BNSF corridor and SR 290 lies the majority of the City's commercial, employment, and residential uses. This project will help knit together the northern and southern sectors of the community by eliminating barriers that impede mobility. The project delivers additional north-south grade separated connections that allow travelers to avoid the long waits for passing trains.

The project will complete key gaps in the City's pedestrian and bicycle networks that provide transportation and recreational options. Sidewalks and bicycle lanes are proposed for Pines Road. SRTC's Horizon 2040 Plan shows the planned pedestrian and bicycle networks.

[6] Maps of Oil Movement across Washington: http://www.ecy.wa.gov/programs/spills/OilMovement/Maps.html

This project enhances the unique characteristics of Spokane Valley. Pines Road is a gateway for access to the 37.5-mile paved, mixed-use Centennial Trail that runs along the Spokane River between Spokane, Washington and Coeur d'Alene, Idaho. Plantes Ferry Park and Sports Complex, located north of SR 290, is a 95-acre regional sports complex with sporting fields, trails, picnic areas, and playgrounds. This project significantly improves connections to these community amenities.

This project enhances access to the Centennial Trail and nearby river recreation activities, which makes the area an attractive place to live, work, and play.

In addition to the community benefits, the grade separation of the BNSF rail line also generates environmental benefits in reduced noise and air pollution. Without safety measures, federal law requires locomotives to sound their horns at 96 to 110 decibels as they approach at-grade crossings. The horns must continue blowing until the train clears the intersection. For Spokane Valley residents this represents a seemingly continuous sounding of horns along the BNSF corridor from Barker Road to Pines Road. With a grade separation at Pines Road and the closure of the University Road at-grade crossing, the required sounding of the horn is eliminated in a 5.1-mile stretch (Evergreen Road to Harvard Road), resulting in a significant reduction in noise pollution.

This project will eliminate train horns that cause noise pollution approximately 5.6 hours per day at each crossing.

Air quality and fuel efficiency also receive a boost from this project. Vehicles will no longer sit idling as 56 trains per day cross a key north-south route. With trains nearly one and a half miles in length, crossings are closed for approximately three to five minutes for each train to pass and then vehicles are further delayed as the traffic clears. In that time, idling vehicles are consuming fuel and emitting harmful air pollutants. Spokane Valley and the rest of the region are identified by the U.S. Environmental Protection Agency (EPA) as maintenance areas for Particulate Matter (PM_{10}) and Carbon Monoxide (CO). With the grade separation, the fuel use from idling drops from an estimated 21,735 gallons per year to 0 (in Year 2022), providing a significant annual reduction in CO, particulate matter, and greenhouse gas as compared with the current configuration.[7]

5.2 Other Review Selection Criteria

This section shows how the project meets the other review selection criteria being considered by the U.S. DOT: partnership and innovation, as well as cost share.

5.2.1 Partnership and Innovation

This project demonstrates support from numerous public and private partners across the region. Two states, several regional public entities, multiple cities, and local business organization, as well as two

[7] Spokane Valley FASTLANE Appendix B: Benefit Cost Analysis Summary

Class I railroads actively participated in the Bridging the Valley Transportation Study completed in 2004 and subsequent workshops, stakeholder outreach, and funding initiatives to further this effort.

Bridging the Valley Partners

State and Local Agencies

- Idaho Transportation Department
- Washington State Department of Transportation
- Washington Freight Mobility Strategic Investment Board
- Washington Utility and Transportation Commission
- State and Federal Legislators

Regional Agencies

- Spokane Regional Transportation Council
- Spokane Transit Authority
- Kootenai Metropolitan Planning Organization

Railroads

- BNSF Railway
- Union Pacific Railroad

Local Agencies and Districts

- Kootenai County
- Spokane County
- City of Athol
- Town of Millwood
- City of Rathdrum
- City of Spokane
- City of Spokane Valley
- Area Fire Districts/Emergency Response Systems
- Area School Districts

Chambers of Commerce

- Spokane Valley
- Spokane Regional

The significance of this project can be shown through the partnership Spokane Valley has with the Washington State Freight Mobility and Strategic Investment Board (FMSIB). **This project also enjoys the benefit of a partnership with the BNSF Railroad, who plans to contribute several hundreds of thousands of dollars (per CFR 646.210) in additional matching funds.**

The City of Spokane Valley has a great working relationship with WSDOT and we collaborate on roughly 10 to 20 projects per year. WSDOT maintains and operates 26 miles of state roadways within Spokane Valley. The City and WSDOT are both members of the Spokane Regional Transportation Management Center (SRTMC) and work together to provide active regional transportation systems management and operations (e.g., incident management, traveler information). WSDOT and the City have delivered several intelligent transportation system (ITS) projects together, and WSDOT operates and maintains City traffic signals and ITS infrastructure on the state highways within the City through a long-standing Interlocal Agreement. The City and WSDOT collaboratively review traffic impact studies and permits for properties on Trent Avenue (SR 290) and Pines Road (SR 27). Other recent joint projects include planning efforts for three interchange justification reports (IJRs), paving projects, and bridge projects. The City is working closely with WSDOT to develop a consultant engineering scope of services for the Pines Road BNSF grade separation project.

The City coordinates with BNSF Railway regarding the roadway crossings (at-grade and grade-separated) throughout the city. The two entities have worked together to complete several crossing diagnostic reviews in the past few years and coordinate all regularly scheduled and unplanned maintenance activities. In recent years, the City and BNSF have worked together to add an expansion joint to the Fancher Road overpass, enhance safety at the Vista Road at-grade crossing, and add barrier curb at the Park Road at-grade crossing. The City is working with BNSF while developing the consultant engineering scope of services for the Pines Road BNSF grade separation project to account for BNSF requirements.

With regard to innovation, the City of Spokane Valley will evaluate innovative bridge construction techniques to reduce the impact on the community and the existing traffic. This may include constructing the structures off-site before staging for construction. The project will also take advantage of the Spokane Regional Transportation Management Center (SRTMC) ITS infrastructure to communicate traveler information about construction activities and expected delays throughout the project using SRTMC's website and 511 telephone system. Other ITS technologies, such as work zone queue management and speed management systems, will be evaluated for applicability during project engineering.

5.2.2 Cost Share

The community the size of Spokane Valley is greatly challenged to fund a project of this magnitude on its own. With many competing needs for city funds, the financial wherewithal to locally shoulder the entire burden of this project is inconceivable. With such geographically dispersed benefits generated by this project, federal assistance is not only a necessity, but also a wise investment for the broader multi-modal transportation system. Grade separation projects are commonly completed as public-private partnerships. This is true for the Pines Road grade separation. BNSF is contributing funding to the project in partnership with the City of Spokane Valley. The City of Spokane Valley is sufficiently positioned to financially deliver this project with the assistance of the FASTLANE funding.

6 Small Project Requirements

The proposed project, while categorized as a small project, meets the large project criteria for FASTLANE funding due to its ability to provide regional and state benefits (parenthesis indicate report section where each is discussed):

- ✓ Project generates national or regional economic, mobility, or safety benefits (5.1)
- ✓ Is cost-effective (7)
- ✓ Contributes to one or more goals described in 23 U.S.C. 150 (1.3)
- ✓ Based on the results of preliminary engineering (8.1)
- ✓ Has one or more stable and dependable funding or financing sources to construct, maintain, and operate and contingency amounts to cover unanticipated costs (4.2)
- ✓ Cannot be easily and efficiently completed without other federal funding or financial assistance (5.2.2)
- ✓ Reasonably expected to begin construction no later than 18 months after the date of obligation (8)

The B/C ratio improved from 8.7 to 8.8 because the construction schedule moved up a year.

7 Cost-Effectiveness Analysis

This $19,765,000 capital project (in year of expenditure dollars) discounted at three percent has a net present value of $140.9 million, and a **benefit-cost ratio of 8.8**. Discounted at seven percent, the project has a net present value of $35.8 million and a benefit-cost ratio of 3.3 as shown in Table 4. The cost-effectiveness of the project is largely due to the reduction of vehicle hours of delay but is also attributed to eliminating the safety risks of at-grade crossings, reductions in emissions, and reduced operating costs over the life cycle of the project.

The factors (and their sources) used for the benefit-cost calculations are provided in Appendix B. The Excel spreadsheet included with this grant application shows results using discount rates of both three and seven percent as noted in U.S. DOT's *BCA Resource Guide*.

Table 4. Benefit/Cost Analysis Summary

	Present Value of Capital Costs	Benefits Total	Net Present Value	Benefit/Cost Ratio
Discounted at 3%	($17,989,883)	$158,970,700	$140,980,817	8.8
Discounted at 7%	($15,339,424)	$51,134,360	$35,794,936	3.3

8 Project Readiness

With the help of FASTLANE funding, the Pines Road (SR 27)/ BNSF Grade Separation Project is expected to begin construction well before the grant deadline and be fully constructed by September 2020. This project readiness section provides a summary of the technical feasibility, project schedule, required approvals needed, and mitigations for anticipated scope, schedule, and budget risks. The City is moving ahead with the final design of the Pines Road/BNSF grade separation project, has started the procurement process for engineering services, and expects to have a design contract executed during the first quarter of 2017. City funds will be used to complete the design in 2018. By the end of December 2016, the City will have purchased a parcel of land ($510,000) needed as a protective purchase so development does not occur such that it inhibits the construction of the project.

8.1 Technical Feasibility

The technical feasibility of the proposed improvements has been thoroughly established through previous planning and preliminary engineering efforts. This section describes the statement of work, design criteria and basis of design, basis of cost estimate and contingency levels, and scope/schedule/budget risk mitigation measures.

8.1.1 Statement of Work

This project will construct a grade-separated undercrossing of Pines Road at the BNSF Railway and also closes the at-grade crossing of the BNSF Railway at University Road. Figure 4 illustrates and lists the key design features of the project. Table 5 provides the detailed project scope of work pertaining to how the design and construction will be achieved for the project.

8.1.2 Design Criteria and Basis of Design

The oversight of the project design and construction will be a joint effort by the City of Spokane Valley, WSDOT, and BNSF Railway. Project roles for each stakeholder are described in Section 3. Design criteria was identified in the Bridging the Valley preliminary engineering effort and includes national standards as well as City, WSDOT, and BNSF standards. The process will follow WSDOT's project development and delivery procedures and standards supplemented with City procedures and standards as applicable to the project. Procedures and design criteria from the *BNSF-UPRR Guidelines for Railroad Grade Separation Projects* will also guide the project. The City, WSDOT, and BNSF have recently been collaborating on the design criteria and basis of design while developing an engineering services contract, which is expected to be executed in the first quarter of 2017.

8.1.3 Basis of Cost Estimate and Contingency Levels

Cost estimates have been completed for the 30-percent design effort completed in 2004. As part of a previous funding request, the Barker Road/BNSF Grade Separation cost estimate was updated in 2014. Unit prices from that update were used in the Pines Road/BNSF Grade Separation cost estimate as part of this grant request. These estimates included inflation through the end of the construction period and a 30-percent contingency for construction costs. A detailed cost estimate is included in Appendix B.

8.1.4 Scope, Schedule, and Budget Risk Mitigation Measures

The scope, schedule, and budget risks for this project are low because the engineering is already 30-percent complete and the project details have been vetted through numerous planning and design efforts. Both the City of Spokane Valley and WSDOT have proven design standards and project delivery procedures in place.

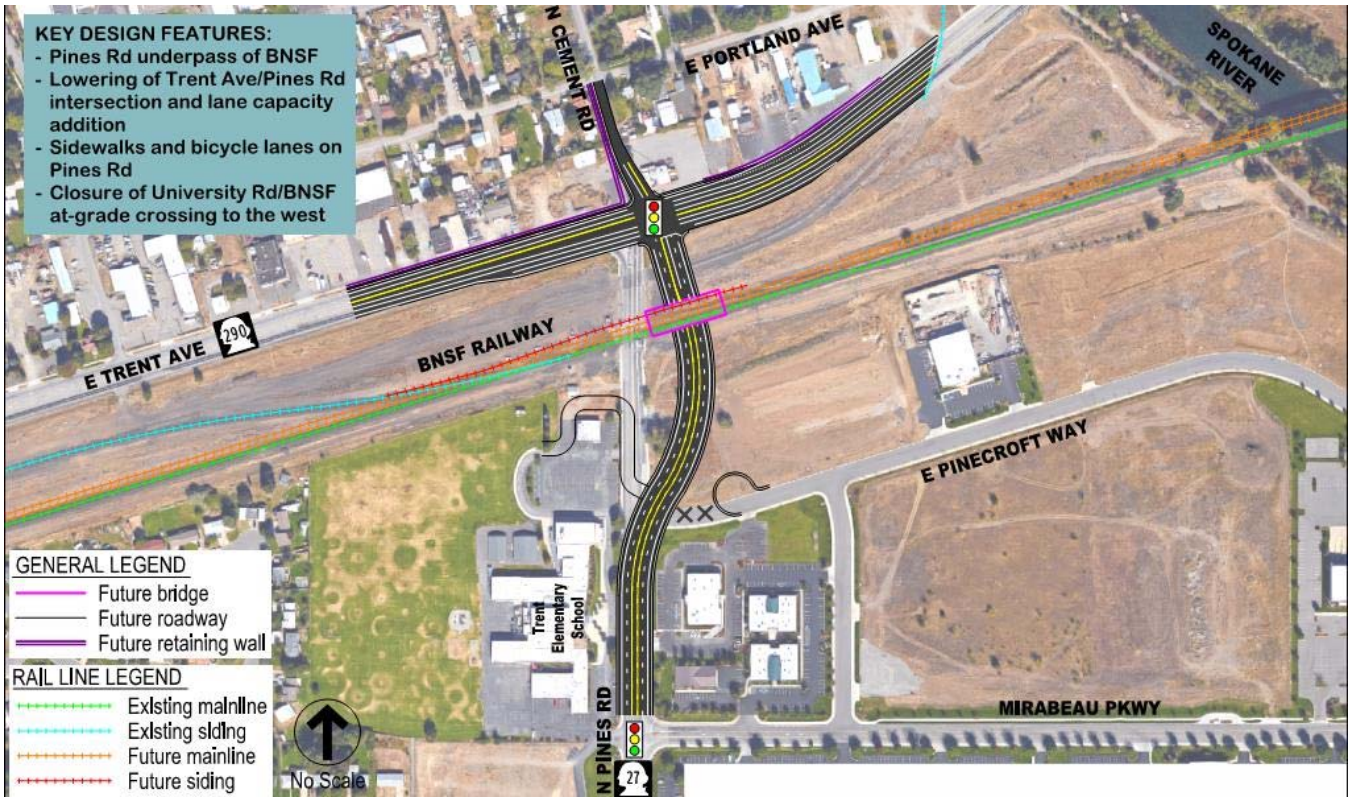


Figure 4. Pines Road/BNSF Grade Separation Conceptual Layout

Table 5. Project Scope of Work

Engineering	Bid Letting & Construction
• Procurement of Engineering Services • Task 1: Surveying & Mapping • Task 2: Utility Coordination • Task 3: 30% Plans and Estimate Update* • Task 4: 60% PS&E • Task 5: 90% PS&E • Task 6: Final PS&E • Task 7: Local Agency Permits • Task 8: Public Involvement • Task 9: Project Management • Task 10: Quality Management • Task 11: Project Team Meetings Tasks 1 through 6 will be completed in the order shown, while Tasks 7 through 11 will be ongoing throughout the course of the engineering.	• Final PS&E Review by FHWA, WSDOT, Spokane Valley, and BNSF • Advertisement and Bid Letting • Procurement of Contractor • Notice to Proceed • Shop Drawings and Submittal Reviews • Fabrication of Structural Supports • Mobilization and Erosion Control • Temporary Traffic Control • Utility Demarcation • Bridge Structure Construction • Roadway and Rail Construction • Site Visits and Inspection • Record ("As Constructed") Drawings • Meetings

* Although 30% plans and costs were developed in 2004, they will need to be updated to current standards (including all required railroad clearances) and to account for current conditions and unit prices. This update may include geotechnical updates if needed.

8.2 Project Schedule

The project schedule shown in Figure 5 includes the major project milestones for right-of-way acquisition, engineering, and construction and demonstrates that the project easily meets the funding obligation and construction deadlines required by the FASTLANE grant program. Environmental approval was obtained through NEPA in 2006 as part of the Bridging the Valley environmental documentation process. Project-specific NEPA documentation will be developed as part of the engineering effort and approval is anticipated by early 2018. Although portions of the project are in the STIP, an amendment is currently underway that is needed prior to starting the full engineering process. The schedule takes into account procurement and review timelines. With FASTLANE funding, the full project will be constructed by September 2020. This schedule is based on receiving full funding by the end of 2018. The City will continue to pursue grant and other financing opportunities to fully fund the project to ensure the obligation requirements are met.

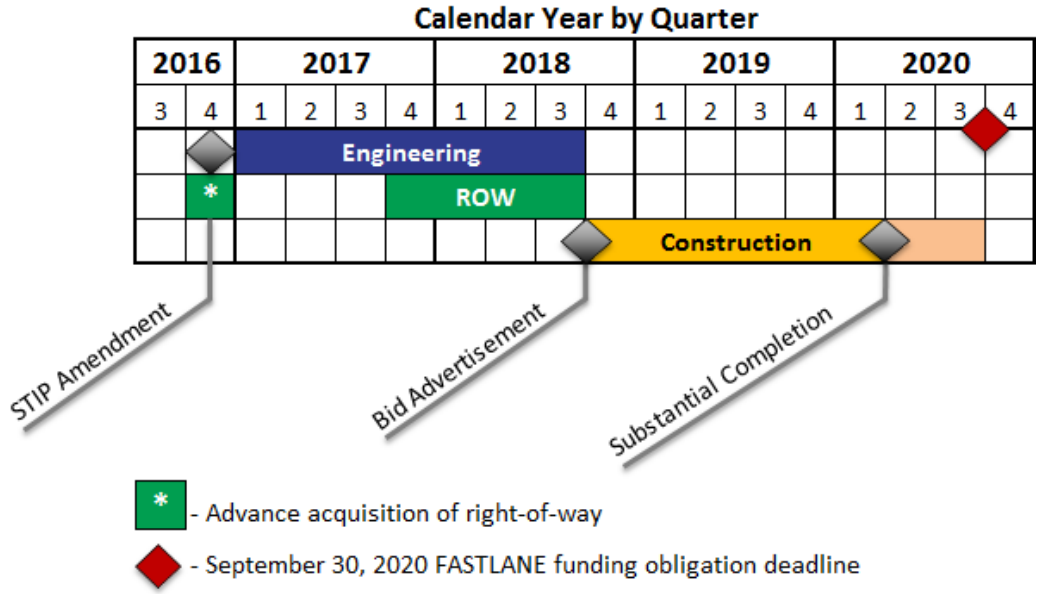


Figure 5. Project Schedule

The FASTLANE FY16 construction schedule went through September 2021 and the FASTLANE FY16 funding obligation deadline was September 30, 2019.

8.3 Required Approvals

This section provides a summary of all required approvals related to environmental permits and reviews, state and local approvals, and state and local planning.

8.3.1 Environmental Permits and Reviews

The project has completed the environmental process as follows:

Environmental Process	Completed Efforts
National Environmental Protection Agency (NEPA) and State EPA (SEPA) Status	Project has **already received NEPA Class II Categorical Exclusion and SEPA Categorical Exemption** per WAC 197-11-800 on August 22, 2006. The approval documentation is posted on the City's website[8]. Project-specific NEPA documentation will be developed as part of the engineering effort and approval is anticipated by early 2018.
Reviews, Approvals, and Permits by other Agencies	The NEPA approval documentation provides a full list of all required permits and reviews. The Bridging the Valley stakeholders listed in Section 5.2.1 participated in reviews. This included reviews by the City of Spokane Valley, WSDOT, and BNSF.
Environmental Studies and other Documents	Full environmental documentation in hard copy is on file at the Spokane Regional Transportation Council (SRTC). Copies are available upon request. The project was found to have no effect for most environmental components. Where there are small environmental impacts, mitigation measures have been identified and include procedures for hazmat disposal, erosion control, and stormwater treatment facilities.
DOT Discussions on NEPA Compliance	The project team coordinated with WSDOT to obtain SEPA approval concurrently with the NEPA approval.
Public Engagement	Extensive public engagement has been an on-going effort as part of the Bridging the Valley planning and engineering efforts. A Strategic Advisory Committee (SAC) was formed to oversee public engagement. Efforts included public open houses, alternatives workshops, site visits with neighborhoods at each crossing in Washington and Idaho, mailings, and outreach. Public support has been overwhelmingly positive. Public engagement will continue through the right-of-way, engineering, and construction of this project.

8.3.2 State and Local Approvals

The Pines Road/BNSF Grade Separation project is included in the STIP, Horizon 2040 Metropolitan Transportation Plan, and the Spokane Valley TIP. A STIP amendment, needed before proceeding with the full engineering phase of the project, is underway. The amendment is shown in the project schedule in Section 8.2. Additional right-of-way, engineering, and construction approvals will be obtained from the City, WSDOT, and BNSF at key milestones throughout the project.

[8] http://www.spokanevalley.org/filestorage/6836/6914/BTV-Local_Agency_Env_Classification_Summary.pdf

8.3.3 State and Local Planning

Significant planning and preliminary engineering for this project have been completed. These efforts show that the proposed project is not only feasible but has the support of all project partners, the community, the region, and beyond:

Planning or Design Effort	Project Elements
Bridging the Valley Planning Study	• *Grade Separation Analysis:* development, evaluation, refinement, and documentation of grade separation alternatives to support transportation needs and BNSF operations • *Traffic Analysis:* evaluation of traffic impacts associated with each alternative for 2001 and 2020 • *Economic Analysis:* benefit-cost analysis of all alternatives
Bridging the Valley 30% Preliminary Engineering	• Right-of-Way needs were determined for this project • Design reports (including criteria), 30% plans, cost estimate, and environmental documentation were performed for these projects
Inland Pacific Hub Transportation Investment and Project Priority Blueprint	• Lists the Bridging the Valley grade separation projects as priority rail improvement projects with significant project synergy economic benefits • Demonstrates support from local partners and identifies a midterm construction period of 2016-2021
Washington State Freight Mobility Plan 2014	• Identifies project for future implementation
Horizon 2040 Metropolitan Transportation Plan	• Identifies this project and other Bridging the Valley grade separation projects
Spokane Valley Comprehensive Plan (2014)	• Goal to support and encourage the continued viability of passenger and freight rail system in the region; Policy to support Bridging the Valley grade separation projects
City of Spokane Valley TIP	• Includes project funding for early pre-construction activities
Fiscal and Economic Analysis of Project	• Analysis of incremental development, tax revenue benefits, economic output, jobs, and wages showing the significant benefit of implementing this project (see Appendix C for full report)

8.4 Assessment of Project Risks and Mitigation Strategies

We have identified the following potential project risks and the associated mitigation measures:

Potential Risks	Mitigation Measures
Project Funding	The City has multiple options for meeting the project's remaining financing needs. The City plans to actively pursue other funding opportunities including TIB. The City Council will consider providing additional funding, including selling bonds. The project schedule also allows some leeway to obtain funding for the construction phase.
Environmental Issues	The project has already received NEPA approval for a categorical exclusion and minor mitigation measures (e.g., erosion control, stormwater treatment) have been identified. This information will be used to complete project-specific NEPA documentation.
Utility Conflicts	Potential utility issues were identified during the 30% preliminary engineering, which means utility coordination can start early.
Right-of-Way Acquisition	On-going engagement with the public has built positive support for development potential. These efforts will be continued.
Water Table at Pines Road	The project is near the Spokane River. Sometimes the water table is low near rivers. The nearby Argonne Road/BNSF Grade Separation project constructed an underpass of the rail line and did not run into any water table issues. Similar construction techniques will be used for excavation.

Appendix A.

Letters of Support

- Letters of support for this project are posted on the City's website:

  http://www.spokanevalley.org/content/6836/6914/9948.aspx

Appendix B.

Benefit-Cost Analysis (BCA) and Cost Estimate Summary

- Benefit-Cost Analysis (BCA)

- Cost Estimate Summary for Pines Road/BNSF Grade Separation Project

December 2016

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Table 1 General Inputs

Input #	Input Name	Units	Value
1	Real discount factor - scenario 1	%	7%
2	Real discount factor - scenario 2	%	3%
3	Base Year of Analysis	year	2015
4	Project Start Date	date	2018
5	Project End Date	date	2020
6	Benefits Start Date	date	2020
7	End Date of Analysis	date	2069
8	Number of days Freight Trains Running per year	days	365
9	Number of days Passenger Trains Running per year	days	365
10	Feet per Mile	feet	5,280
11	Grams per Short Ton	grams	907,185
12	Average Vehicle Speed Through Crossing	mph	45
13	Design Start Year	year	2017
14	Growth assumptions for train travel:	%	3.40%

Table 2 Summary of the benefits of the infrastructure improvements

		Pines
1	**Travel Time Savings**	$33.89
2	**Safety**	$14.03
3	**Operating Costs**	$1.84
4	**Environment and Emissions**	$1.37

Table 3 Anticipated funding sources and project costs

Funding Source	Pines Rd	% of Total Cost		
FASTLANE	$11,859,000	60.0%	**60.0%**	**Federal Funds**
City of Spokane Valley ROW and Design	$1,700,000	8.6%		
BNSF *	$237,180	1.2%	**40.0%**	**Non-Federal Funds**
Other (e.g., TIB) **	$5,968,820	30.2%		
Total	**$19,765,000**	100.0%	100.0%	

*** Per 23 CFR 646.10 (need more background on how this was calculated; assumed 1.2% also applies to Pines)**

**** Other expected funding sources may come from TIB.**

Table 4 Summary of Undiscounted Pines Benefits vs Costs per year

Year	Project Year	Pines Undiscounted Cost	Pines Undiscounted Benefit	Pines Undiscounted Benefit-Cost	Pines Benefit/Cost Ratio
2017	1	-$1,417,500	$0	-$1,417,500	
2018	2	-$4,675,625	$0	-$4,675,625	
2019	3	-$7,812,500	$0	-$7,812,500	
2020	4	-$5,859,375	$2,153,984	-$3,705,391	
2021	5	-$11,000	$2,251,063	$2,240,063	
2022	6	-$11,245	$2,354,148	$2,342,903	
2023	7	-$11,496	$2,462,660	$2,451,164	
2024	8	-$11,753	$2,576,696	$2,564,943	
2025	9	-$12,015	$2,697,453	$2,685,438	
2026	10	-$12,283	$2,824,304	$2,812,021	
2027	11	-$12,557	$2,958,187	$2,945,630	
2028	12	-$12,837	$3,099,442	$3,086,605	
2029	13	-$13,124	$3,248,814	$3,235,690	
2030	14	-$13,417	$3,406,274	$3,392,857	
2031	15	-$13,716	$3,573,195	$3,559,479	
2032	16	-$14,022	$3,750,362	$3,736,340	
2033	17	-$14,335	$3,937,420	$3,923,085	
2034	18	-$14,655	$4,135,477	$4,120,822	
2035	19	-$14,982	$4,339,948	$4,324,967	
2036	20	-$15,316	$4,559,394	$4,544,078	
2037	21	-$15,658	$4,791,322	$4,775,664	
2038	22	-$16,007	$5,037,762	$5,021,755	
2039	23	-$16,364	$5,299,539	$5,283,175	
2040	24	-$16,729	$5,576,564	$5,559,834	
2041	25	-$17,103	$5,866,271	$5,849,169	
2042	26	-$17,484	$6,172,618	$6,155,134	
2043	27	-$17,874	$6,497,674	$6,479,800	
2044	28	-$18,273	$6,841,990	$6,823,717	
2045	29	-$18,681	$7,206,711	$7,188,030	
2046	30	-$19,098	$7,593,056	$7,573,958	
2047	31	-$19,524	$8,002,327	$7,982,803	

Year	Project Year	Pines Undiscounted Cost	Pines Undiscounted Benefit	Pines Undiscounted Benefit-Cost	Pines Benefit/Cost Ratio
2048	32	-$19,960	$8,436,635	$8,416,676	
2049	33	-$20,405	$8,896,039	$8,875,634	
2050	34	-$20,860	$9,382,812	$9,361,952	
2051	35	-$21,326	$9,898,625	$9,877,299	
2052	36	-$21,802	$10,445,258	$10,423,457	
2053	37	-$22,288	$11,024,604	$11,002,316	
2054	38	-$22,785	$11,638,673	$11,615,888	
2055	39	-$23,294	$12,289,607	$12,266,313	
2056	40	-$23,813	$12,979,680	$12,955,866	
2057	41	-$24,345	$13,711,311	$13,686,966	
2058	42	-$24,888	$14,487,072	$14,462,184	
2059	43	-$25,443	$15,309,696	$15,284,253	
2060	44	-$26,011	$16,182,092	$16,156,081	
2061	45	-$26,591	$17,107,348	$17,080,756	
2062	46	-$27,185	$18,088,749	$18,061,564	
2063	47	-$27,791	$19,129,786	$19,101,995	
2064	48	-$28,411	$20,234,173	$20,205,762	
2065	49	-$29,045	$21,405,855	$21,376,810	
2066	50	-$29,693	$22,649,026	$22,619,333	
2067	51	-$30,356	$23,968,146	$23,937,791	
2068	52	-$31,033	$25,367,956	$25,336,923	
2069	53	-$31,726	$26,853,495	$26,821,770	
			0		
Sum		-$20,725,601	$472,701,295	$451,975,694	22.8

Table 5 Summary of 7% discounted Pines Benefits vs Costs per year

Year	Project Year	Pines 7% Discounted Cost	Pines 7% Discounted Benefit	Pines Net 7% Discounted Benefit	Pines Benefit/Cost Ratio
2017	1	-$1,238,099	$0	-$1,238,099	
2018	2	-$3,816,703	$0	-$3,816,703	
2019	3	-$5,960,119	$0	-$5,960,119	
2020	4	-$4,177,653	$1,537,119	-$2,640,534	
2021	5	-$7,330	$1,501,607	$1,494,277	
2022	6	-$7,003	$1,467,985	$1,460,982	
2023	7	-$6,691	$1,435,599	$1,428,908	
2024	8	-$6,393	$1,404,200	$1,397,807	
2025	9	-$6,108	$1,374,248	$1,368,140	
2026	10	-$5,836	$1,345,169	$1,339,333	
2027	11	-$5,576	$1,317,208	$1,311,632	
2028	12	-$5,327	$1,290,283	$1,284,956	
2029	13	-$5,090	$1,264,390	$1,259,300	
2030	14	-$4,863	$1,239,440	$1,234,577	
2031	15	-$4,646	$1,215,725	$1,211,079	
2032	16	-$4,439	$1,193,066	$1,188,627	
2033	17	-$4,241	$1,171,188	$1,166,947	
2034	18	-$4,052	$1,150,205	$1,146,153	
2035	19	-$3,872	$1,128,713	$1,124,841	
2036	20	-$3,699	$1,108,831	$1,105,132	
2037	21	-$3,534	$1,089,646	$1,086,112	
2038	22	-$3,377	$1,071,399	$1,068,022	
2039	23	-$3,226	$1,054,157	$1,050,931	
2040	24	-$3,082	$1,037,400	$1,034,318	
2041	25	-$2,945	$1,020,635	$1,017,690	
2042	26	-$2,814	$1,004,275	$1,001,461	
2043	27	-$2,688	$988,769	$986,080	
2044	28	-$2,569	$973,840	$971,271	
2045	29	-$2,454	$959,457	$957,003	
2046	30	-$2,345	$945,593	$943,248	
2047	31	-$2,240	$932,221	$929,980	

Year	Project Year	Pines 7% Discounted Cost	Pines 7% Discounted Benefit	Pines Net 7% Discounted Benefit	Pines Benefit/Cost Ratio
2048	32	-$2,140	$919,591	$917,451	
2049	33	-$2,045	$907,141	$905,096	
2050	34	-$1,954	$895,122	$893,168	
2051	35	-$1,867	$883,516	$881,649	
2052	36	-$1,784	$872,306	$870,523	
2053	37	-$1,704	$861,477	$859,773	
2054	38	-$1,628	$851,014	$849,385	
2055	39	-$1,556	$840,902	$839,346	
2056	40	-$1,486	$831,128	$829,642	
2057	41	-$1,420	$821,682	$820,262	
2058	42	-$1,357	$812,550	$811,193	
2059	43	-$1,296	$803,722	$802,425	
2060	44	-$1,238	$795,187	$793,949	
2061	45	-$1,183	$786,937	$785,753	
2062	46	-$1,131	$778,961	$777,830	
2063	47	-$1,080	$771,251	$770,171	
2064	48	-$1,032	$763,799	$762,767	
2065	49	-$986	$756,596	$755,610	
2066	50	-$942	$749,637	$748,695	
2067	51	-$900	$742,913	$742,013	
2068	52	-$860	$736,418	$735,558	
2069	53	-$822	$730,146	$729,324	
Sum		-$15,339,424	$51,134,360	$35,794,936	3.3

Table 6 Summary of 3% discounted Pines Benefits vs Costs per year

Year	Project Year	Pines 3% Discounted Cost	Pines 3% Discounted Benefit	Pines Net 3% Discounted Benefit	Pines Benefit/Cost Ratio
2017	1	-$1,336,130	$0	-$1,336,130	
2018	2	-$4,278,859	$0	-$4,278,859	
2019	3	-$6,941,305	$0	-$6,941,305	
2020	4	-$5,054,348	$1,858,046	-$3,196,303	
2021	5	-$9,212	$1,885,230	$1,876,017	
2022	6	-$9,144	$1,914,138	$1,904,994	
2023	7	-$9,075	$1,944,047	$1,934,971	
2024	8	-$9,008	$1,974,823	$1,965,815	
2025	9	-$8,940	$2,007,159	$1,998,218	
2026	10	-$8,874	$2,040,337	$2,031,464	
2027	11	-$8,807	$2,074,813	$2,066,005	
2028	12	-$8,742	$2,110,569	$2,101,828	
2029	13	-$8,676	$2,147,849	$2,139,172	
2030	14	-$8,612	$2,186,357	$2,177,746	
2031	15	-$8,547	$2,226,697	$2,218,149	
2032	16	-$8,484	$2,269,031	$2,260,547	
2033	17	-$8,420	$2,312,819	$2,304,399	
2034	18	-$8,357	$2,358,405	$2,350,047	
2035	19	-$8,295	$2,402,924	$2,394,629	
2036	20	-$8,233	$2,450,899	$2,442,666	
2037	21	-$8,172	$2,500,555	$2,492,383	
2038	22	-$8,111	$2,552,592	$2,544,482	
2039	23	-$8,050	$2,607,022	$2,598,972	
2040	24	-$7,990	$2,663,398	$2,655,408	
2041	25	-$7,930	$2,720,159	$2,712,229	
2042	26	-$7,871	$2,778,845	$2,770,974	
2043	27	-$7,813	$2,839,982	$2,832,170	
2044	28	-$7,754	$2,903,374	$2,895,619	
2045	29	-$7,696	$2,969,069	$2,961,373	
2046	30	-$7,639	$3,037,125	$3,029,486	
2047	31	-$7,582	$3,107,600	$3,100,018	
2048	32	-$7,525	$3,180,833	$3,173,308	

Year	Project Year	Pines 3% Discounted Cost	Pines 3% Discounted Benefit	Pines Net 3% Discounted Benefit	Pines Benefit/Cost Ratio
2049	33	-$7,469	$3,256,350	$3,248,881	
2050	34	-$7,413	$3,334,496	$3,327,082	
2051	35	-$7,358	$3,415,347	$3,407,989	
2052	36	-$7,303	$3,498,983	$3,491,680	
2053	37	-$7,249	$3,585,489	$3,578,241	
2054	38	-$7,195	$3,674,952	$3,667,758	
2055	39	-$7,141	$3,767,463	$3,760,322	
2056	40	-$7,088	$3,863,116	$3,856,029	
2057	41	-$7,035	$3,962,010	$3,954,975	
2058	42	-$6,982	$4,064,246	$4,057,263	
2059	43	-$6,930	$4,169,929	$4,162,999	
2060	44	-$6,878	$4,279,170	$4,272,292	
2061	45	-$6,827	$4,392,081	$4,385,254	
2062	46	-$6,776	$4,508,779	$4,502,003	
2063	47	-$6,725	$4,629,385	$4,622,660	
2064	48	-$6,675	$4,754,025	$4,747,350	
2065	49	-$6,625	$4,882,827	$4,876,202	
2066	50	-$6,576	$5,015,925	$5,009,349	
2067	51	-$6,527	$5,153,458	$5,146,931	
2068	52	-$6,478	$5,295,568	$5,289,090	
2069	53	-$6,430	$5,442,403	$5,435,973	
Sum		-$17,989,883	$158,970,700	$140,980,817	8.8

Table 7 Summary of Undiscounted Pine Benefits per year

Year	Travel Time Saving at Pines Road	Pines Safety Benefit	Pines Operating Cost	Pines Emissions	Pines Undiscounted Benefit
2020	1,095,663	940,533	$61,251	$56,537	2,153,984
2021	1,165,394	963,823	$65,377	$56,469	2,251,063
2022	1,239,947	987,691	$69,561	$56,949	2,354,148
2023	1,318,856	1,012,151	$73,975	$57,678	2,462,660
2024	1,402,789	1,037,218	$78,675	$58,014	2,576,696
2025	1,492,063	1,062,907	$83,886	$58,597	2,697,453
2026	1,587,019	1,089,234	$89,441	$58,610	2,824,304
2027	1,688,020	1,116,214	$95,338	$58,615	2,958,187
2028	1,795,449	1,143,863	$101,597	$58,533	3,099,442
2029	1,909,716	1,172,198	$108,266	$58,633	3,248,814
2030	2,031,256	1,201,237	$115,314	$58,466	3,406,274
2031	2,160,533	1,230,996	$123,156	$58,510	3,573,195
2032	2,298,038	1,261,494	$131,871	$58,959	3,750,362
2033	2,444,295	1,292,749	$141,107	$59,269	3,937,420
2034	2,599,862	1,324,779	$150,965	$59,871	4,135,477
2035	2,765,332	1,357,604	$161,408	$55,604	4,339,948
2036	2,941,334	1,391,244	$172,588	$54,227	4,559,394
2037	3,128,539	1,425,719	$184,473	$52,591	4,791,322
2038	3,327,661	1,461,049	$197,570	$51,482	5,037,762
2039	3,539,457	1,497,257	$211,503	$51,322	5,299,539
2040	3,764,735	1,534,363	$226,323	$51,143	5,576,564
2041	4,004,353	1,572,390	$238,167	$51,361	5,866,271
2042	4,259,224	1,611,361	$250,633	$51,400	6,172,618
2043	4,530,319	1,651,299	$263,752	$52,304	6,497,674
2044	4,818,671	1,692,229	$277,559	$53,532	6,841,990
2045	5,125,378	1,734,175	$292,090	$55,068	7,206,711
2046	5,451,609	1,777,162	$307,384	$56,902	7,593,056
2047	5,798,606	1,821,215	$323,480	$59,026	8,002,327
2048	6,167,693	1,866,363	$340,420	$62,160	8,436,635
2049	6,560,274	1,912,631	$358,249	$64,885	8,896,039
2050	6,977,846	1,960,048	$377,015	$67,903	9,382,812
2051	7,422,000	2,008,642	$396,765	$71,219	9,898,625

Year	Travel Time Saving at Pines Road	Pines Safety Benefit	Pines Operating Cost	Pines Emissions	Pines Undiscounted Benefit
2052	7,894,428	2,058,442	$417,551	$74,837	10,445,258
2053	8,396,930	2,109,479	$439,429	$78,766	11,024,604
2054	8,931,420	2,161,782	$462,456	$83,015	11,638,673
2055	9,499,935	2,215,384	$486,691	$87,596	12,289,607
2056	10,104,642	2,270,317	$512,200	$92,521	12,979,680
2057	10,747,844	2,326,614	$539,048	$97,805	13,711,311
2058	11,431,992	2,384,308	$567,306	$103,465	14,487,072
2059	12,159,693	2,443,434	$597,049	$109,520	15,309,696
2060	12,933,719	2,504,029	$628,355	$115,989	16,182,092
2061	13,757,021	2,566,128	$661,305	$122,894	17,107,348
2062	14,632,734	2,629,769	$695,987	$130,259	18,088,749
2063	15,564,196	2,694,990	$732,491	$138,109	19,129,786
2064	16,554,956	2,761,830	$770,915	$146,472	20,234,173
2065	17,608,789	2,830,330	$811,358	$155,378	21,405,855
2066	18,729,711	2,900,531	$853,927	$164,857	22,649,026
2067	19,921,993	2,972,475	$898,735	$174,944	23,968,146
2068	21,190,179	3,046,205	$945,898	$185,674	25,367,956
2069	22,539,100	3,121,765	$995,543	$197,087	26,853,495
Sum	359,411,212	91,109,651	$18,085,402	$4,095,029	472,701,295

Table 8 Summary of 7% discounted Pines Benefits per year

Year	Travel Time Saving at Pines Road	Pines Safety Benefit	Pines Safety Benefit	Pines Safety Benefit	Pines 7% discounted Benefit
2020	781,192	670,587	$43,671	$41,669	1,537,119
2021	776,551	642,236	$43,563	$39,256	1,501,607
2022	772,177	615,084	$43,319	$37,405	1,467,985
2023	767,586	589,081	$43,054	$35,877	1,435,599
2024	763,024	564,178	$42,794	$34,204	1,404,200
2025	758,489	540,328	$42,643	$32,787	1,374,248
2026	753,981	517,487	$42,493	$31,207	1,345,169
2027	749,501	495,612	$42,331	$29,763	1,317,208
2028	745,047	474,662	$42,159	$28,414	1,290,283
2029	740,621	454,599	$41,988	$27,183	1,264,390
2030	736,221	435,384	$41,795	$26,041	1,239,440
2031	731,847	416,981	$41,717	$25,180	1,215,725
2032	727,500	399,357	$41,747	$24,463	1,193,066
2033	723,179	382,478	$41,749	$23,783	1,171,188
2034	718,884	366,312	$41,743	$23,266	1,150,205
2035	714,614	350,831	$41,711	$21,557	1,128,713
2036	710,371	336,004	$41,682	$20,774	1,108,831
2037	706,152	321,804	$41,638	$20,052	1,089,646
2038	701,960	308,204	$41,677	$19,559	1,071,399
2039	697,792	295,179	$41,697	$19,488	1,054,157
2040	693,649	282,705	$41,700	$19,346	1,037,400
2041	689,532	270,758	$41,011	$19,334	1,020,635
2042	685,439	259,317	$40,334	$19,185	1,004,275
2043	681,370	248,359	$39,669	$19,371	988,769
2044	677,326	237,864	$39,014	$19,635	973,840
2045	673,306	227,814	$38,371	$19,966	959,457
2046	669,310	218,187	$37,738	$20,356	945,593
2047	665,339	208,968	$37,116	$20,797	932,221
2048	661,391	200,139	$36,505	$21,557	919,591
2049	657,466	191,683	$35,904	$22,088	907,141
2050	653,566	183,584	$35,312	$22,660	895,122
2051	649,688	175,827	$34,731	$23,270	883,516

Year	Travel Time Saving at Pines Road	Pines Safety Benefit	Pines Safety Benefit	Pines Safety Benefit	Pines 7% discounted Benefit
2052	645,834	168,399	$34,159	$23,914	872,306
2053	642,003	161,284	$33,597	$24,593	861,477
2054	638,195	154,470	$33,045	$25,304	851,014
2055	634,409	147,944	$32,501	$26,047	840,902
2056	630,647	141,694	$31,967	$26,821	831,128
2057	626,906	135,708	$31,442	$27,625	821,682
2058	623,189	129,975	$30,925	$28,461	812,550
2059	619,493	124,484	$30,418	$29,327	803,722
2060	615,819	119,226	$29,918	$30,224	795,187
2061	612,168	114,189	$29,427	$31,152	786,937
2062	608,538	109,365	$28,944	$32,113	778,961
2063	604,930	104,746	$28,470	$33,105	771,251
2064	601,344	100,321	$28,003	$34,131	763,799
2065	597,779	96,083	$27,544	$35,190	756,596
2066	594,235	92,025	$27,092	$36,284	749,637
2067	590,713	88,138	$26,649	$37,414	742,913
2068	587,211	84,415	$26,212	$38,580	736,418
2069	583,731	80,849	$25,783	$39,783	730,146
Sum	33,891,215	14,034,909	1,838,675	1,369,560	51,134,360

Table 9 Summary of 3% discounted Pines Benefits per year

Year	Travel Time Saving at Pines Road	Pines Safety Benefit	Pines Safety Benefit	Pines Emissions	Pines 3% discounted Benefit
2020	945,128	811,312	$52,836	$48,770	1,858,046
2021	975,999	807,187	$54,752	$47,292	1,885,230
2022	1,008,190	803,083	$56,559	$46,305	1,914,138
2023	1,041,117	799,001	$58,396	$45,532	1,944,047
2024	1,075,121	794,941	$60,298	$44,463	1,974,823
2025	1,110,235	790,903	$62,419	$43,602	2,007,159
2026	1,146,497	786,886	$64,614	$42,341	2,040,337
2027	1,183,943	782,890	$66,869	$41,111	2,074,813
2028	1,222,613	778,915	$69,183	$39,858	2,110,569
2029	1,262,547	774,961	$71,577	$38,763	2,147,849
2030	1,303,786	771,028	$74,016	$37,527	2,186,357
2031	1,346,373	767,116	$76,747	$36,461	2,226,697
2032	1,390,351	763,225	$79,784	$35,671	2,269,031
2033	1,435,766	759,354	$82,886	$34,814	2,312,819
2034	1,482,665	755,503	$86,093	$34,144	2,358,405
2035	1,531,097	751,673	$89,368	$30,787	2,402,924
2036	1,581,112	747,862	$92,775	$29,150	2,450,899
2037	1,632,761	744,072	$96,275	$27,447	2,500,555
2038	1,686,098	740,302	$100,107	$26,085	2,552,592
2039	1,741,178	736,551	$104,046	$25,247	2,607,022
2040	1,798,058	732,820	$108,093	$24,426	2,663,398
2041	1,856,797	729,109	$110,437	$23,816	2,720,159
2042	1,917,456	725,417	$112,832	$23,140	2,778,845
2043	1,980,097	721,745	$115,280	$22,861	2,839,982
2044	2,044,785	718,091	$117,781	$22,716	2,903,374
2045	2,111,588	714,457	$120,337	$22,687	2,969,069
2046	2,180,573	710,842	$122,950	$22,760	3,037,125
2047	2,251,814	707,245	$125,619	$22,922	3,107,600
2048	2,325,382	703,668	$128,347	$23,436	3,180,833
2049	2,401,355	700,109	$131,135	$23,751	3,256,350
2050	2,479,811	696,569	$133,985	$24,132	3,334,496
2051	2,560,831	693,047	$136,897	$24,573	3,415,347

Year	Travel Time Saving at Pines Road	Pines Safety Benefit	Pines Safety Benefit	Pines Emissions	Pines 3% discounted Benefit
2052	2,644,499	689,543	$139,873	$25,069	3,498,983
2053	2,730,901	686,058	$142,914	$25,617	3,585,489
2054	2,820,128	682,590	$146,022	$26,212	3,674,952
2055	2,912,270	679,141	$149,199	$26,853	3,767,463
2056	3,007,424	675,710	$152,445	$27,537	3,863,116
2057	3,105,689	672,296	$155,763	$28,262	3,962,010
2058	3,207,165	668,901	$159,154	$29,026	4,064,246
2059	3,311,957	665,523	$162,619	$29,830	4,169,929
2060	3,420,175	662,162	$166,161	$30,672	4,279,170
2061	3,531,930	658,819	$169,781	$31,551	4,392,081
2062	3,647,337	655,493	$173,481	$32,468	4,508,779
2063	3,766,517	652,184	$177,262	$33,422	4,629,385
2064	3,889,592	648,893	$181,127	$34,414	4,754,025
2065	4,016,689	645,618	$185,076	$35,443	4,882,827
2066	4,147,942	642,361	$189,113	$36,510	5,015,925
2067	4,283,484	639,120	$193,239	$37,615	5,153,458
2068	4,423,456	635,896	$197,457	$38,760	5,295,568
2069	4,568,004	632,689	$201,767	$39,944	5,442,403
Sum	115,446,282	35,912,880	6,005,743	1,605,795	158,970,700

Table 10 Pines Costs per Year

	Pines				
	Maintenance	P.E.+R/W+Construction	Total - Undiscounted	Total - Discounted 7%	Total - Discounted 3%
2017	$0	-$1,417,500	-$1,417,500	-$1,238,099	-$1,336,130
2018	$0	-$4,675,625	-$4,675,625	-$3,816,703	-$4,278,859
2019	$0	-$7,812,500	-$7,812,500	-$5,960,119	-$6,941,305
2020	$0	-$5,859,375	-$5,859,375	-$4,177,653	-$5,054,348
2021	-$11,000	$0	-$11,000	-$7,330	-$9,212
2022	-$11,245	$0	-$11,245	-$7,003	-$9,144
2023	-$11,496	$0	-$11,496	-$6,691	-$9,075
2024	-$11,753	$0	-$11,753	-$6,393	-$9,008
2025	-$12,015	$0	-$12,015	-$6,108	-$8,940
2026	-$12,283	$0	-$12,283	-$5,836	-$8,874
2027	-$12,557	$0	-$12,557	-$5,576	-$8,807
2028	-$12,837	$0	-$12,837	-$5,327	-$8,742
2029	-$13,124	$0	-$13,124	-$5,090	-$8,676
2030	-$13,417	$0	-$13,417	-$4,863	-$8,612
2031	-$13,716	$0	-$13,716	-$4,646	-$8,547
2032	-$14,022	$0	-$14,022	-$4,439	-$8,484
2033	-$14,335	$0	-$14,335	-$4,241	-$8,420
2034	-$14,655	$0	-$14,655	-$4,052	-$8,357
2035	-$14,982	$0	-$14,982	-$3,872	-$8,295
2036	-$15,316	$0	-$15,316	-$3,699	-$8,233
2037	-$15,658	$0	-$15,658	-$3,534	-$8,172
2038	-$16,007	$0	-$16,007	-$3,377	-$8,111
2039	-$16,364	$0	-$16,364	-$3,226	-$8,050
2040	-$16,729	$0	-$16,729	-$3,082	-$7,990
2041	-$17,103	$0	-$17,103	-$2,945	-$7,930
2042	-$17,484	$0	-$17,484	-$2,814	-$7,871
2043	-$17,874	$0	-$17,874	-$2,688	-$7,813
2044	-$18,273	$0	-$18,273	-$2,569	-$7,754
2045	-$18,681	$0	-$18,681	-$2,454	-$7,696
2046	-$19,098	$0	-$19,098	-$2,345	-$7,639
2047	-$19,524	$0	-$19,524	-$2,240	-$7,582
2048	-$19,960	$0	-$19,960	-$2,140	-$7,525

	Pines				
	Maintenance	P.E.+R/W+Construction	Total - Undiscounted	Total - Discounted 7%	Total - Discounted 3%
2049	-$20,405	$0	-$20,405	-$2,045	-$7,469
2050	-$20,860	$0	-$20,860	-$1,954	-$7,413
2051	-$21,326	$0	-$21,326	-$1,867	-$7,358
2052	-$21,802	$0	-$21,802	-$1,784	-$7,303
2053	-$22,288	$0	-$22,288	-$1,704	-$7,249
2054	-$22,785	$0	-$22,785	-$1,628	-$7,195
2055	-$23,294	$0	-$23,294	-$1,556	-$7,141
2056	-$23,813	$0	-$23,813	-$1,486	-$7,088
2057	-$24,345	$0	-$24,345	-$1,420	-$7,035
2058	-$24,888	$0	-$24,888	-$1,357	-$6,982
2059	-$25,443	$0	-$25,443	-$1,296	-$6,930
2060	-$26,011	$0	-$26,011	-$1,238	-$6,878
2061	-$26,591	$0	-$26,591	-$1,183	-$6,827
2062	-$27,185	$0	-$27,185	-$1,131	-$6,776
2063	-$27,791	$0	-$27,791	-$1,080	-$6,725
2064	-$28,411	$0	-$28,411	-$1,032	-$6,675
2065	-$29,045	$0	-$29,045	-$986	-$6,625
2066	-$29,693	$0	-$29,693	-$942	-$6,576
2067	-$30,356	$0	-$30,356	-$900	-$6,527
2068	-$31,033	$0	-$31,033	-$860	-$6,478
2069	-$31,726	$0	-$31,726	-$822	-$6,430

Table 11 Inputs and Assumptions for Pines Vehicle Delay

Input #	Input Name	Units	Value	Source/Comment
1	2016 - No. of Freight Trains Passing the Crossing/ day	trains/day	56	http://goo.gl/UlvLS0 | http://goo.gl/1j9AKd | http://goo.gl/j6CsrA | http://goo.gl/SPthLH
2	2069 No. of Freight Trains Passing the Crossing/ day	trains/day	288	http://goo.gl/SPthLH
3	2016 No. of Passenger Trains Passing the Crossing/ day	trains/day	2	http://goo.gl/UlvLS0 | Crossing # 066244T
4	Expected Passenger Annual Traffic Growth	%	2.00%	Estimate from DKS
5	Avg. Speed of Freight Train	mph	25	Speed Regulations in the BNSF Spokane area | http://goo.gl/2pXWk1
6	Avg. Speed of Passenger Train	mph	30	Speed Regulations in the BNSF Spokane area | http://goo.gl/2pXWk1
7	Avg. Freight Train Length	feet	6,500	http://goo.gl/go220P | http://goo.gl/mlLOIp
8	Avg. Passenger Train Length	feet	1,000	
9	Pines/ Trent Intersection Annual Veh. Growth	%	1.40%	
10	N Del Rey Residential Area Annual Veh. Growth	%	5.50%	
11	Time of Lead/ Lag	minutes	0.6	
12	2016 Avg. Daily Traffic (ADT) at the Grade Crossing	vehicles	16,400	http://goo.gl/UlvLS0 | then filter for Washington State, Spokane
13	2069 Avg. Daily Traffic (ADT) at the Grade Crossing	vehicles	31,600	
14	Year of ADT	year	2016	
15	Automobile Driver and Passenger Value of Time	$/hour	$12.50	https://goo.gl/VAR0hX
16	Bus Passenger Value of Time	$/hour	$15.00	
17	Truck Driver Value of Time	$/hour	$25.80	
18	Bus Driver Value of Time	$/hour	$26.70	
19	Value of Time Annual Growth Rate	%	1.45%	
20	2016 Avg. Daily Traffic (ADT) to N Del Rey Residential Area	vehicles	1,500	
21	Base Case Distance from Grade Crossing	miles	0	Google Earth Measurement | https://goo.gl/BecMWb
22	Alt Case Distance from Grade Crossing	miles	0	Google Earth Measurement | https://goo.gl/BecMWb
23	Base Case Avg. Veh. Speed	mph	12	Two one minute stops at Trent/Pines | https://goo.gl/8cw97c
24	Alt Case Avg. Veh. Speed	mph	30	Estimate from DKS
25	% of Automobiles of Total Traffic	%	87.00%	Estimate from DKS
26	% of Buses of Total Traffic	%	1.00%	Estimate from DKS
27	% of Trucks of Total Traffic	%	12.00%	Estimate from DKS
28	Avg. No. of Persons/ Automobile	persons	1.6	http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/CAFE_2012-2016_FRIA_04012010.pdf
29	Avg. No. of Passenger/ Bus	passengers	60	http://goo.gl/RwTDcH

Table 12 Pines Safety Inputs and Assumptions

Name of the Input	Units	Value	Input specific to grade crossing, from Database Input sheet		
Rail Grade Crossing Expected Accident Rate per Year - Base Case	accidents/year	0.1718	http://goo.gl/rIz9y3	http://goo.gl/gaelTM	http://goo.gl/a6BNaK
Rail Grade Crossing Expected Accident Rate per Year - Alt. Case	accidents/year	0	0		
Fatalities as Share of Total Accidents	%	31%	http://goo.gl/lE6oZU	Calculations below	Avg. of 1991-2014 (No of fatalities)/(total no of crossing accidents)
Injuries as Share of Total Accidents	%	69%	http://goo.gl/lE6oZU	Calculations below	Avg. of 1991-2014 (No of fatalities)/(total no of crossing accidents)
Road Intersection Expected Injuries per year - Base Case	injuries/year	1.25	Provided from the City of Spokane Valley		
Road Intersection Expected Fatalities per year - Base Case	fatalities/year	0.047304	Conversion of a two-way stop to a diamond interchange		
Road Intersection Expected PDO per year - Base Case	PDO/year	1.81332			
Road Intersection Expected Injuries per year - Alt Case	injuries/year	0.21024			
Road Intersection Expected Fatalities per year - Alt Case	fatalities/year	0.024528			
Road Intersection Expected PDO per year - Alt Case	PDO/year	0.36792			
Value of a Statistical Life	2,014$	$9,400,000	https://goo.gl/1LY0U3		
Average Cost per Accident Injury	2,013$	$166,778	US DOT, Based on MAIS Injury Severity Scale and KACBO-AIS Conversion if Injurty Unknown. Department of Transportation Analyses. 2013.		
Cost of a Property Damage Only (PDO) Accident	2,013$	$3,927	https://goo.gl/Mf9sZd		
Growth of the Cost of Accidents	%	1.07%	Adjusted for growth in real income (source: US DOT)		

Table 13 Pines Operating Costs Inputs and Assumptions

Fixed inputs:			
Description	**Value**	**Unit**	**Source**
Fuel consumption at idle (auto)	0.44	gal/hr	Argonne National Laboratory Idling Worksheet - Average of Gas Passenger Cars (http://www.anl.gov/sites/anl.gov/files/idling_worksheet.pdf)
Fuel consumption at idle (bus)	0.97	gal/hr	Argonne National Laboratory Idling Worksheet - Transit Bus (http://www.anl.gov/sites/anl.gov/files/idling_worksheet.pdf)
Fuel consumption at idle (truck)	1.1	gal/hr	Argonne National Laboratory Idling Worksheet - Delivery Truck with Load (http://www.anl.gov/sites/anl.gov/files/idling_worksheet.pdf)
Fuel economy (auto)	23.41	mi/gal	Dept of Energy AFDC Avg Fuel Economy of Major Vehicle Categories updated 2015 - Car (http://www.afdc.energy.gov/data/10310)
Fuel economy (bus)	6.64	mi/gal	Dept of Energy AFDC Avg Fuel Economy of Major Vehicle Categories updated 2015 - Delivery Truck (http://www.afdc.energy.gov/data/10310)
Fuel economy (truck)	6.30	mi/gal	Dept of Energy AFDC Avg Fuel Economy of Major Vehicle Categories updated 2015 - School Bus (http://www.afdc.energy.gov/data/10310)

Table 14 Pines Emissions Inputs and Assumptions

Fixed inputs:			
Description	**Value**	**Unit**	**Source**
Fuel consumption at idle (auto)	0.44	gal/hr	Argonne National Laboratory Idling Worksheet - Average of Gas Passenger Cars (http://www.anl.gov/sites/anl.gov/files/idling_worksheet.pdf)
Fuel consumption at idle (bus)	0.97	gal/hr	Argonne National Laboratory Idling Worksheet - Transit Bus (http://www.anl.gov/sites/anl.gov/files/idling_worksheet.pdf)
Fuel consumption at idle (truck)	1.10	gal/hr	Argonne National Laboratory Idling Worksheet - Delivery Truck with Load (http://www.anl.gov/sites/anl.gov/files/idling_worksheet.pdf)
Fuel economy (auto)	23.41	mi/gal	Dept of Energy AFDC Avg Fuel Economy of Major Vehicle Categories updated 2015 - Car (http://www.afdc.energy.gov/data/10310)
Fuel economy (bus)	6.64	mi/gal	Dept of Energy AFDC Avg Fuel Economy of Major Vehicle Categories updated 2015 - Delivery Truck (http://www.afdc.energy.gov/data/10310)
Fuel economy (truck)	6.30	mi/gal	Dept of Energy AFDC Avg Fuel Economy of Major Vehicle Categories updated 2015 - School Bus (http://www.afdc.energy.gov/data/10310)
Monetized value of VOCs	$1,844	2015$/short ton	Corporate Average Fuel Economy for MY2017-MY2025 Passenger Cars and Light Trucks (August 2012), page 922, Table VIII-16, "Economic Values Used for Benefits Computations (2010 dollars)" http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/FRIA_2017-2025.pdf
Monetized value of NOx	$7,266	2015$/short ton	
Monetized value of PM	$332,405	2015$/short ton	
CO2 per gallon of fuel burned	8,887	gram/gal	US DOT. NHTSA. Light-Duty Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards. 75 FR 25324, May 7, 2010.
Grams per short ton	907,185	grams	

Table 15 Pines Road Cost Estimates

Bridging The Valley				
City of Spokane Valley				
Cost Estimate				
12/15/2016				
Alternative:		**General Description:**		
Consolidated Corridor		Construct New Railroad Overhead grade separation structure		
Project Name:	Bridge #	Realign Pines Road to the east of right-angle crossing of track and better approach to Trent		
Pines - BNSF		Allows construction on new alignment while maintaining traffic on old alignment		
Location:	RR Milepost:	Construct bridge in phases: 1st phase constructs the north 2/3		
Pines Rd near Trent	62.95	of the bridge. Single mainline traffic is sifted to the north side utilizing the planned turnouts		
Project Type:		to maintain the control point, while the south third of the structure is constructed		
Road Underpass				
Project Information:	**Comments:**		**Cost (2016 Dollars)**	
Roadway	Proposed:	Existing:		$2,653,908
Crossing road	Pines (SR 27)			
Classification	Principal Arterial (P-6)			
Bicycle lanes	1 bicycle lane on each side of bridge	0		
No. of Through lanes	4 1300 ft. on new alignment to cross the right angle			
No. of Turn lanes	2	4 thru + 0 turn lanes		
Intersecting road	Trent (SR 290). Highway Milepost 8.4 +/-			
Classification	Principal Arterial (P-6)			
No. of Through lanes	4 1500 ft. on lowered alignment to match Pines Rd grade	4		
No. of Turn lanes	3	4 thru + 2 turn		
Railroad Tracks				$0
No. of Mainline	3	Existing Main + 2 new main track		
No. of Siding	1	spur track to cement transload facility north of Trent		
No. of Yard	0			

Crossing Removal	2	one for existing mainline and one for spur track			
Bridge				$2,903,760	
RR Bridge					
Configuration	4 spans, 40-44-44-40 with concrete piers in center median, spill through abutments				
Structure Type	precast, prestressed concrete box girder spans on concrete pile supported substr.				
Ancillary Facilities					
Frontage roads	No				
Retaining Walls	Yes				
Pump station	Yes				
Traffic Signal	Yes	Plus streetlights			
Utilities	Yes	Sewer, water, power, gas, petro, telephone			
Temporary Facilities				$940,000	
Road detour	Yes	Lane Shift			
Shoring	Yes				
Bridge structure	No				
Traffic Control	Yes				
	Construction Subtotal			$8,311,827	
	Contingency		30%	$2,493,548	
	Mobilization		10%	$1,080,538	
	Total Construction Cost				$11,885,913
	Design Engineering		10%	$1,188,591	
	Construction Engr and Insp		16.5%	$1,961,176	
	Total Project Development Cost				$3,149,767
	Sales Tax	% of Total Construction Cost	8.4%		$998,417
Other Direct Costs				$779,350	
Railroad Flagging	Yes	9 Months			
Shoofly Track	Yes	2621 TF, turnouts in permeant triple track estimate			
Remove RR Crossing	Yes	2621 TF, turnouts in permeant triple crossing estimate			
Temporary RR Signals	Yes				

Temporary RR Crossing	Yes	2		$779,350
Project Estimate - subtotal				$16,813,446

Project ROW Costs	$2,950,000
Project Total Estimate	$19,763,446
Indirect Project Costs (Paid by others, not included in the estimate above)	$789,625

PINES UNDERCROSSING

Work Item	L x W x D	Qty	Unit	Unit Cost	Cost
Pines Road cut	1262x138avex11 .5ave	74,000	CY	$8	$592,000
Additional 8' of width added	1262x8x11.5	4,300	CY	$12	$51,600
Pines Road realignment	1245x5 lane	1,245	LF	$400	$498,000
Pines Road Realignment with 8' addl width	8' additional width	1,245	LF	$52	$64,740
Removal of Structures and Obstructions (boulders in the cut area)		1	FA	$35,000	$35,000
Cement Road cut	334x40x8ave	4,000	CY	$8	$32,000
Cement Road realignment	334x2 lane Residential	334	LF	$167	$55,778
Trent road cut	1600x128x7ave	53,000	CY	$8	$424,000
New Trent	300 x 5-lane	300	LF	$396	$118,800
New Trent	1300 x 7-lane	1,300	LF	$554	$720,200
New School Driveways & Pinecroft Way	370 x 2-lane	370	LF	$167	$61,790
RR Bridge over Highway	168x61	1	LS	$2,552,000	$2,552,000
Additional 8' of width for	13% added to project	1	LS	$331,760	$331,760
Under bridge lighting	168 LF	1	LS	$20,000	$20,000
Additional 8' of width for	13% added to project	1	LS	$2,600	$2,600
MSE walls Cement Rd	(180x8ave)	1,440	SF	$42	$59,976
MSE walls Trent (North side)	(340x8ave)+(520x10ave)	7,920	SF	$42	$329,868
Pump station		1	EA	$500,000	$500,000
Communication (ITS- fiber line)	1245	1,245	LF	$7	$8,715
Traffic Signal		1	EA	$400,000	$400,000
Lights	Pines I Trent intersection	1	INT	$25,000	$25,000

Utility Relocation: Qwest Buried Telephone	Trent . Pines. Cement	2000	LF	$200	$400,000
Utility Relocation: Water Mains	in Trent & Pines	1760	LF	$50	$88,000
Shoring for Staged Bridge Construction	168 LF	1	LS	$50,000	$50,000
ACP overlay on Pines for RR shoo-Oy Xing	200x50	10000	SF	$1	$10,000
Shoring for Staged Trent Construction	1000x6 ave	6000	SF	$30	$180,000
Traffic Control		1	LS	$100,000	$100,000
Construction Phasing Impacts	6 phases	6	EA	$100,000	$600,000
Construction Subtotal					$8,311,827
Other Direct Costs					
Remove Existing RR Xing Signals	2 crossings	1	LS	$9,000	$9,000
Remove Existing RR Xing	2 crossings	1	LS	$6,000	$6,000
Install Temporary Two Track Crossing		1	LS	$20,000	$20,000
Install temporary Control Point (Signal Costs)		1	LS	$200,000	$200,000
Railroad Flagging	9 months x 21 daysfmo	189	Days	$800	$151,200
Railroad Shoofly (turnouts in Track Costs)		2621	TF	$150	$393,150
ODC Subtotal					$779,350
Indirect Project Costs (Paid by Others)					
Utility Relocation: Yellowstone Pipeline	south of tracks	570	LF	$200	$114,000
Utility Relocation: Century Link		1245	LF	$125	$155,625
Utility Relocation: Avista 12-inch Gas Main	south side of Trent	1450	LF	$200	$290,000
Utility Relocation: Avista 2-inch Gas Main	north side of Trent	1150	LF	$200	$230,000
IPC Subtotal					$789,625

Assumptions:

This estimate was only reviewed with the City to provide our assistance in suggesting updates to the Engineers estimate. The previous estimate was only updated where highlighted.

This estimate does not account for a revision in the bridge standards or RR crossing width/height revisions.

1. Increased construction management costs from 15% to 16.5% to account for management costs that will be extended over 3 years.
2. Increased contingency costs up to 30% to account for a budget estimate based on a 30% design.
3. Increased cost for traffic signal ($300,000 + $100,000 for a temporary signal with multiple phases due to the lowering and reconfiguration of the signalized intersection.
4. Increased MSE wall to match Barker MSE at $41.65. Previously listed at $35 per SF
5. Contingency does not cover if bridge standards require additional height or width for the bridge crossings.
6. Added 8' additional width to Pines to accommodate bicycle lanes on both sides of the bridge undercrossing. This would account for additional cut, pavement, and structure under the RR.

Items Missing (contingency):

1. Clearing and Grubbing
2. Erosion Water Pollution Control
3. Bridge transverse joint seal
4. Waterproofing membrane
5. Landscaping
6. Elements associated with roadway (assumed included in unit price for new road) Signing, striping, curb and gutter
7. Not sure how or if there will be dewatering required during construction but if this is a factor, the costs may exceed this contingency.
8. ITS fiber on Pines that runs up to Trent. Fairly good size fiber line. Century link on the east side of Pines that is on the project.
9. BNSF is working on their RR pre-emption and its part of a project that they are working on. Not sure if they will implement this before the project or after it.

Appendix C.

Fiscal and Economic Benefits of the Project

- Report for Fiscal and Economic Benefits of the Pines Road/BNSF Grade Separation Project

ECONorthwest
ECONOMICS • FINANCE • PLANNING

DATE: April 8, 2016
TO: Gloria Mantz, Chaz Bates, and Mike Basinger, City of Spokane Valley
FROM: Morgan Shook and Austin Rempel, ECONorthwest
SUBJECT: FISCAL AND ECONOMIC BENEFITS OF THE PINES ROAD UNDERPASS PROJECT

Background and Purpose

The City of Spokane Valley (City) is currently contemplating investments in infrastructure to support better mobility and safety within the City. The City is currently assembling a funding application to construct the Pines Road Underpass.

As part of the planning, the City would like to better understand both the tax benefits and economic effects of the project to support decision-making. This memorandum summarizes preliminary results of analyses that estimate the ability of targeted infrastructure to support development in the immediate vicinity of the project. Specifically, the analyses include estimates of:

- Potential affected development estimates stemming from the infrastructure project
- Potential tax revenue benefits accruing to the City of Spokane Valley and State of Washington from the affected development.
- Potential direct and indirect economic effects of development and construction activities (e.g. economic output, jobs, and wages) to Spokane County of both land development and the infrastructure project.

Analytic Framework

The infrastructure projects provide benefits to development in the form of better access, travel-time savings, safety improvements, and operational savings. These types of improvements allow for land development to host greater levels of economic uses. Those increased development benefits improve the economy through increases in regional productivity and the benefits of urbanization and agglomeration; enhanced employment accessibility; and, eventually, impacts on land rents and property values.

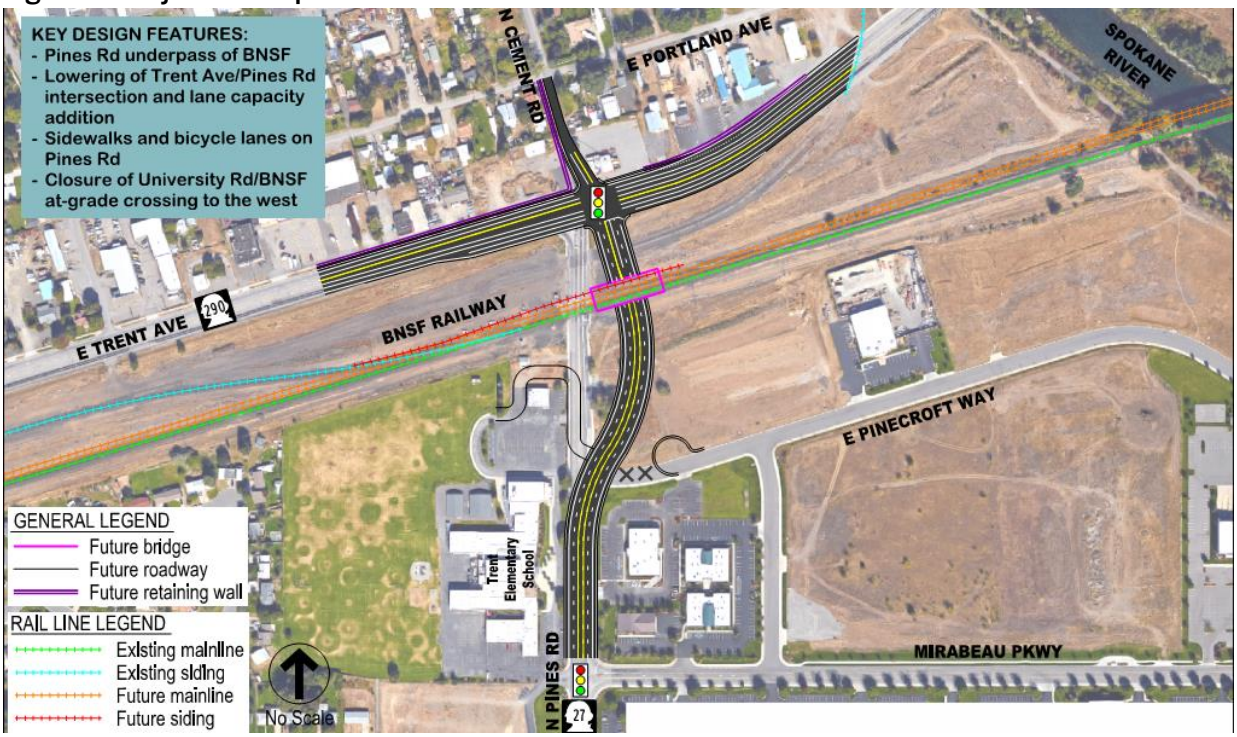
In this analysis, it is assumed that the underpass project will aid in the relative attractiveness of development on land parcels. As Spokane Valley builds out its vacant residential and commercial lands, positioning its remaining vacant lands for highest and best economic uses will help both the city, region, and state create robust economy in eastern Washington. Maximizing vacant land development makes the most of initial development before infill development becomes the norm. Taking advantage of these types of opportunities helps position communities for better long-run economic future. While not all the tax and job impacts estimated in this analysis are directly attributed to the underpass project, completing the project will incrementally help land developers either build earlier or larger projects on the affected area.

Description of the Proposed Project

This project proposes to reconstruct Pines Road to pass under existing BNSF tracks. To accommodate this, Trent Avenue will also be lowered, similar to the Argonne Road underpass. This project will allow the City of Spokane Valley to request closure of the University Road railroad crossing one mile to the west. The closure would further improve public safety by reducing the possibility of rail-vehicle collisions at this intersection. BNSF's tracks currently carry approximately 55 scheduled trains a day, a figure that will increase substantially to serve a projected expansion in agricultural production, natural resources and other sectors. In 2016, the project cost was estimated at 18 million dollars. These costs are beyond the financial ability of Spokane Valley to bear on its own.

This project is critical because of the projected increase in vehicular traffic in the area through 2040 and because of its location, which is approximately half way between the two nearest crossings of the BNSF track (Argonne Rd to the West and Sullivan Rd to the East). The separation of Pines Road and the BNSF tracks will provide a vital transportation link to the businesses and residences north of Trent (SR-290), south along Pines (SR-27), I-90 and further south to the Palouse. This project eliminates rail-crossing crashes at both the Pines (SR-27) and University BNSF crossing. It would also greatly reduce delay along Pines Road and along Trent (SR-290) when accessing Pines (SR-27). The new grade separation project will address the current extremely poor Level of Service (LOS) at the Pines Road/SR-290 intersection. The project is shown below.

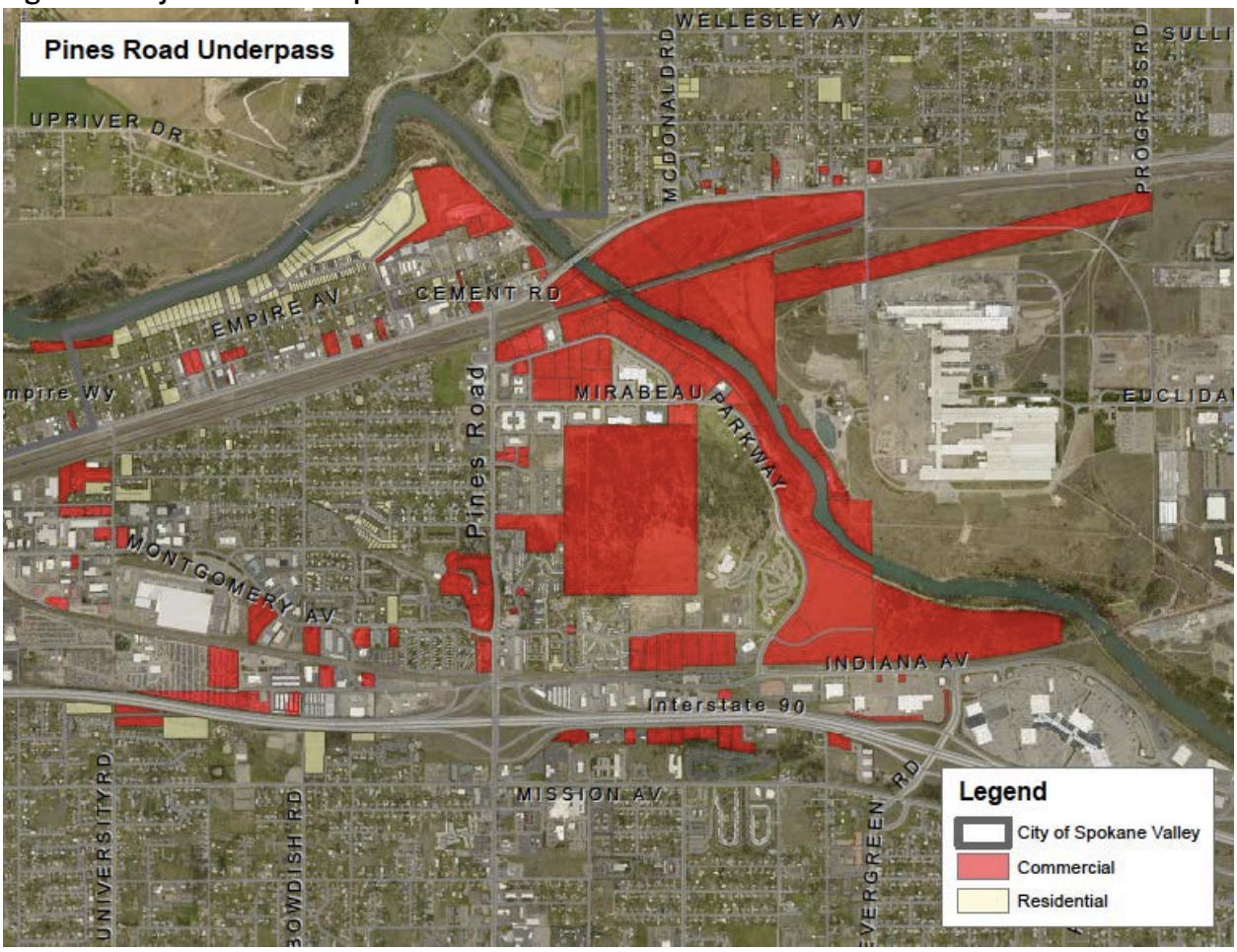
Figure 1: Project Description



There are over 226 acres of nearby undeveloped residential, commercial, and industrial-zoned land that are likely to be directly influenced by the underpass project (649 acres are shown in

Figure 2 – 226 acres represent those parcels that are most likely to benefit from the project). Without improvement, the crossing will experience continued increases in poor LOS or failure, vehicle and rail conflicts that erode the quality of life in nearby residential areas and hamper economic growth.

Figure 2: Project Context Map



Summary of Findings

The ability to attract businesses will positively affect economic growth in the area. The investment in infrastructure will allow for the land to support economic development at a much higher intensity and/or sooner. The economic and tax impacts of that higher level of development are estimated as follows stemming from the construction and occupation of residential, commercial, and industrial developments.

- $1.3 billion in total economic output in Spokane County ($686 million in direct spending)
- 8,719 new jobs supported in the county (4,312 direct jobs)
- $8.2 million in new general fund taxes to the city (25 year present value at 4%)
- $101.9 million in new general fund taxes to Washington State (25 year present value at

4%)

Projected Land Development Program

Several developers have proposed some land use in anticipation of the underpass project covering 149 of the 226 acres of the affected area. A rough breakdown of the tenant uses is shown below:

- 1,044 units of housing
- 63,890 square feet of retail development
- 577,570 square feet of office development
- 150 room hotel

The remaining 77 acres consist of 56 acres of industrial land and 21 acres mixed use commercial. A rough breakdown of the tenant uses is shown below:

- 365,904 square feet of heavy industrial development
- 320,166 square feet of office development

Fiscal Impacts

The action studied in this fiscal analysis is the development and operation of residential, commercial, and industrial businesses enabled by the infrastructure project. For the analysis, it is assumed that construction and occupation of the development would take place in 2016. Build out is assumed to take over 15 years. The analysis uses current City and state tax policy to estimate revenues to the jurisdictions. Because little is known about the exact facilities and economic activities that might be housed on the site, average cost and productivity assumptions are used to account for typical construction types for industrial buildings.

Figure 3 summarizes the tax impacts. In summary, about $8.2 million in new general fund taxes to the City would be produced on the increment of new development. That same increment of higher intensity industrial development would generate about $101.9 million in new general fund taxes to Washington State.[1]

[1] Both analyses assume a 2016 buildout over 15 years and over tax benefits over a 25-year time frame and discounted back to 2015-dollar values at a discount rate of 4%.

Figure 3: Total Incremental Revenues Resulting From Development By Jurisdiction & Source (Figures in thousands)

Total Incremental Revenues Resulting From Development By Jurisdiction & Source (in thousands - 2016$)		
Revenue Source	**City**	**State**
Property Taxes	$3,100	$5,000
Sales Tax on Construction	$2,700	$20,600
Ongoing Sales Tax	$2,400	$18,400
B&O on Construction	-	$4,800
Ongoing B&O Tax	-	$53,100
Total Incremental Revenues	**$8,200**	**$101,900**

Economic Impacts

The economic impacts are separated into two types: one-time impacts from construction and annual recurring impacts resulting from on-going operation of the business at steady state. Economic impacts can be measured in several ways. Three most common measures of reporting impacts are:

- Output is the broadest measure of economic activity and represents the value of production (or roughly sales). Output includes wages, business income, and other income (described immediately below, so the impact measures are not additive).
- Income includes wages, business income, and other income.
    - Wages represent wages and salaries, as well as other payroll benefits such as health and life insurance, retirement payments, and non-cash compensation.
    - Business income (also called proprietor's income) represents the payments received by small-business owners or self-employed workers (doctors, accountants, lawyers, etc.).
    - Other kinds of income include payments to individuals in the form of rents received on properties, royalties from contracts, dividends paid by corporations and profits earned by corporations.
- Job impacts are reported as full- and part-time jobs. This is consistent with covered employment statistics gathered and reported by state employment agencies in the United States. Job impacts have also been converted to full-time equivalents (FTEs) using detailed bridge tables provided by the Bureau of Economic Analysis (BEA).

One-Time Effects: Construction of the Pines Road Underpass

Construction spending associated with the Pines Road underpass project will generate short-term impacts for workers and business owners in Spokane County and elsewhere in the state of Washington. Results for Spokane County are listed below. The estimated construction cost of the project is 18 million dollars of which $14.9 million is slated for right-of-way and construction.

Figure 4: Summary of Underpass Construction Impacts

Economic Output	
Direct Output	$14,868,678
Indirect Output	$6,737,385
Induced Output	$6,197,771
Total Output	$27,803,833

Income	
Direct Labor Income	$5,316,891
Indirect Labor Income	$2,147,959
Induced Labor Income	$2,015,970
Total Labor Income	$9,480,819

Jobs	
Direct Jobs	99
Indirect Jobs	45
Induced Jobs	49
Total Jobs	193

- **Job Impacts.** The incremental construction estimates of the project would support about 99 direct jobs in the local construction industry over the entire project. It would also create an additional 94 jobs resulting from indirect and induced economic activity from the construction. The total job impact would be 193 jobs from construction.
- **Economic Output.** The $14.9 million construction investment would also create an additional $12.9 million in multiplier incremental economic activity from indirect and induced economic activity from the construction. The total impact would be about $27.8 million.

One-Time Effects: Construction of Residential, Commercial, and Industrial Buildings

Assumed construction costs are based on comparable figures of residential, commercial, and industrial buildings. These direct construction expenditures will go towards the construction industry. However, the project might also use architecture, planning, and engineering industries' services in the area – these impacts are not counted in this analysis.

Figure 5: Summary of Building Construction Impacts

Economic Output	
Direct Output	$365,005,120
Indirect Output	$166,175,881
Induced Output	$131,657,347
Total Output	$662,838,348

Income	
Direct Labor Income	$103,034,375
Indirect Labor Income	$55,362,152
Induced Labor Income	$42,828,971
Total Labor Income	$201,225,498

Jobs	
Direct Jobs	1,959
Indirect Jobs	1,265
Induced Jobs	1,038
Total Jobs	4,263

- **Job Impacts.** The incremental construction estimates of facilities would support about 1,959 direct jobs in the local construction industry over the entire project. It would also create an additional 1,303 jobs resulting from indirect and induced economic activity from the construction. The total job impact would be 4,263 jobs from construction.
- **Economic Output.** The $365 million construction investment would also create an additional $298 million in multiplier incremental economic activity from indirect and induced economic activity from the construction. The total impact would be about $663 million.

On-Going Impacts: Annual Operation of the Commercial and Industrial Businesses

The following analysis uses assumptions on the number of jobs that might be supported in the area once all the buildings are constructed and occupied by businesses. The direct impacts estimates use commercial and industrial lands employment densities commonly found in their respective buildings to estimate the incremental employment growth.

Figure 6: Summary of Business Operations Impacts

Economic Output	
Direct Output	$305,835,538
Indirect Output	$86,299,521
Induced Output	$168,801,597
Total Output	$560,936,656

Income	
Direct Labor Income	$175,180,841
Indirect Labor Income	$28,904,013
Induced Labor Income	$54,888,102
Total Labor Income	$258,972,956

Jobs	
Direct Jobs	2,254
Indirect Jobs	680
Induced Jobs	1,329
Total Jobs	4,263

- **Job Impacts.** In addition to the 2,254 direct jobs at the businesses, the business activity would create an additional 2,009 jobs resulting from indirect and induced economic activity. Total job impacts would be 4,263 jobs.
- **Economic Output.** Under the employment assumptions above, the business would generate $306 million in business income/output on a annual basis. The business would then create an additional $255 million in multiplier impacts from indirect and induced economic activity. A total impact of $561 million to the county economy.

Background and Methodology on Fiscal and Economic Impact Analysis

Fiscal Impacts

A public revenue model was used to allow for estimation of likely net tax revenue impacts resulting from new development in the study area .The analysis used a cash flow revenue model that will build up from the development assumptions, including phasing and timing of development, to estimate changes in affected tax bases, which in turn is used to estimate revenues for all affected jurisdictions. Current tax rates are applied to the incremental tax bases to estimate potential public revenues. Revenues are organized according to the legislative or policy limits on their use and whether they are one-time or ongoing revenues. The revenue model includes:

- Property Tax
- Sales Tax (both on construction and ongoing from business operations)
- B&O Taxes (both on construction and ongoing from business operations)[2]

Economic Impacts

In general terms, economic impacts models work by tracing how spending associated with an industry circulates through an economy or study area. That is, changes in one sector or multiple sectors trigger changes in demand and supply throughout the economy. Initial changes in the demand spread through the economy, altering the quantities of inputs and outputs and associated jobs, income, and value-added. These *multiplier effects* continue until the initial change in final demand leaks out of the economy in the form of savings, taxes, and imports. Here, the final demand reflects the total amount of output created by the initial investment.

Input-output models enable the user to follow expenditures from a company as they ripple through the economy. These impacts are called the *multiplier* effects, and they measure the full scope of economic impacts. Economic impact analysis employs specific terminology to identify different types of economic impacts. The three major types of impacts are discussed below within the context of this analysis.

- Direct economic effects. Construction spending associated with the project represent the initial change in final demand. The direct economic impacts are then determined by this spending and the availability of goods and services locally—as estimated by the regional purchase coefficients (RPCs) for each of the 440 industry sectors in the IMPLAN model for Spokane County.
- Indirect economic effects. The project indirectly affects the local and state economies because the firms that provide direct services to project must also purchase materials and supplies. For instance, a local contractor hired to install bridge railings will have to purchase welding supplies or lease portable lighting when operating at night. The

[2] The city of Spokane Valley does not collect a business and occupation tax. Only the state tax is modeled.

welding supply wholesaler will also have to purchase goods and services necessary to operate. These types of spending generate indirect impacts.

- Induced economic effects. The direct and indirect effects on employment and income affect overall purchasing power within the economy, thereby inducing further consumption spending. For instance, construction workers who use their income to buy groceries or take their families to the movies generate economic impacts for workers and businesses in those sectors. These individuals will, in turn, spend their incomes much like construction workers. This cycle continues until the spending eventually leaks out of the economy as a result of taxes, savings, or purchases of non-locally produced goods and services (imports).

The most commonly used input-output modeling software and the one ECONorthwest used in this analysis is called IMPLAN (for IMpact Analysis for PLANning).[3] IMPLAN has been developed and distributed by the Minnesota IMPLAN Group, Inc., since 1993. Currently there are over 1,500 public and private users of the IMPLAN modeling software. In addition, the United States Department of Agriculture (USDA) recently recognized the IMPLAN modeling framework as "*one of the most credible regional impact models used for regional economic impact analysis"* and, following a review by experts from seven USDA agencies, selected IMPLAN as its analysis framework for monitoring job creation associated with many federal investment activities. The model is used to track how an economic action, such as money spent at a jobs created by the industrial activity, will ripple through the local economy creating different levels of business revenue, jobs, and income in many different economic sectors.

[3] IMPLAN was originally developed by the Forest Service of the U.S. Department of Agriculture in cooperation with the Federal Emergency Management Agency and the Bureau of Land Management of the U.S. Department of the Interior to assist federal agencies in their land and resource management planning. Applications of IMPLAN by the U.S. government, public agencies, and private firms span a wide range of projects. Examples include new factories, resource extraction facilities, and public infrastructure projects. IMPLAN can also be applied to a variety of policy issues. Predicting the effects of a tourism marketing campaign or measuring the importance of an existing industry on a local community are common examples.