

# **City of Kelso Railroad Crossing Study**

## Design Options Summary Report

### **Provided to:**

City of Kelso

203 South Pacific Avenue

Kelso, Washington 98626

### **Provided by:**

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**March 4, 2013**



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# EXECUTIVE SUMMARY

## INTRODUCTION

The Washington State High Speed Railroad (HSR) program includes improvements to the Burlington Northern Santa Fe Railroad (BNSF) mainline corridor through the City of Kelso. As part of that program, South Kelso is within the limits of BNSF's proposed \$126 million Kelso–Martins Bluff Project, which includes the addition of a third railroad mainline track from the Kelso station to Longview Junction. It is a major railroad improvement with regional benefits for freight and passenger trains and is intended to increase rail capacity. In December 2011, the Federal Railroad Administration (FRA) approved moving the Kelso–Martins Bluff Project to the preliminary design stage. South Pacific Avenue runs parallel to the rail corridor and serves as a major north/south connection in the area that serves city and county citizens with several east/west at-grade roadway crossings over the tracks used by vehicles, bicyclists, and pedestrians.

Anticipating the increase in potential conflicts at these crossings, the City of Kelso (the City) has undertaken a study to review impacts to these transportation connections. The study includes evaluation of the current roadway crossing locations and geometry, and consideration of adjustments to the crossing locations before the HSR plans are finalized. This study summarizes the evaluation of road crossing impacts; options for grade-separation of the crossings; and recommendations to balance safety, mobility, and cost considerations for residents, commuters, and businesses.

The Kelso–Martin's Bluff portion of the HSR program will proceed and is scheduled for completion in 2017. The approximate timeline for the City's grade-separation project could take three to four years, allowing for preliminary engineering design, environmental permitting, bidding, and construction. This does not include the time needed to secure funding.

The study effort represents a significant proactive commitment in addressing the impacts of the HSR program. This study provides a foundation for the City to work with BNSF, Washington State Department of Transportation (WSDOT), Cowlitz County, key stakeholders, and the affected area of the community as the HSR program moves forward. It prioritizes issues, and proposes solutions to challenges such as safety, connectivity, constructability, and cost.

## PURPOSE AND NEED

The purpose of the study is to identify a grade-separated railroad crossing location and configuration for South Kelso, which includes reviewing the impacts of eliminating an at-grade crossing at Yew Street, and addressing safety issues related to access to the residential area and property west of the railroad and South Pacific Avenue. The study is needed in order to determine viable options before the planned addition of the third railroad mainline track proposed as part of HSR program.

Land on both sides of South Pacific Avenue and the BNSF tracks lies within both the City of Kelso and Cowlitz County jurisdictions. While the study enables the City to plan appropriate measures to

address existing and future safety issues associated with crossing the railroad corridor for all modes of travel, it also gives the City the opportunity to provide input related to its objectives for safety and connectivity.

The goals and objectives of the City of Kelso Railroad Crossing Study are to:

- Review and build on previous studies for the project area
- Obtain input from key stakeholders
- Identify potential crossing locations and options
- Develop evaluation criteria and evaluate impacts of proposed crossing options
- Develop preliminary design and an opinion of probable costs
- Recommend a viable crossing option

## STUDY AREA

The study area is located in the southwestern part of the City of Kelso, and the area is roughly bounded by 13<sup>th</sup> Street on the east, Hawthorne Street on the north, Hazel Street on the south, and South River Road on the west. Crossing options reviewed for this report are located within this outlined area. Impacts varied by option, and investigations into land use issues, traffic impacts, and potential crossing closures were reviewed. For a map of the study area, please see Figure 1 in Section 3.

## CROSSING OPTIONS

In a 2002 Alternatives Study for the Kelso-Martin's Bluff Rail Project, WSDOT considered many options in several locations for providing a safe crossing of the railroad tracks given the addition of a third track in the corridor. Four options were put forth for consideration, all of which would require closure of the Yew Street and Mill Street at-grade crossings and provide a pedestrian underpass at Yew Street.

The City considered two corridors for crossing options as the focus of this study—Hazel Street and Hawthorne Street. The five crossing locations and configurations that were evaluated were:

- Option 1 – Hazel Street crossing under the railroad tracks
- Option 2A – Hazel Street crossing over South Pacific Avenue and the BNSF railroad tracks
- Option 2B – Hazel Street crossing over the railroad tracks
- Option 3 – Hawthorne Street crossing under the railroad tracks
- Option 4 – Hawthorne street crossing over the BNSF railroad tracks

For all of the options, it was assumed that the east/west roadways would include maintaining or building connections to 13<sup>th</sup> Avenue to the east and to River Road to the west. The goal is to promote connectivity and to minimize the need for out-of-direction travel through neighborhoods to the greatest extent possible in facilitating use of a new grade-separated crossing.

## EVALUATION PROCESS

Possible alignments were developed based on the Hazel and Hawthorne corridors and considered over- or underpass configurations. The options were progressively adjusted and evaluated through a series of meetings with City staff and key stakeholders (the Stakeholder Group). The options were evaluated against a set of criteria developed by the project team and reviewed by the Stakeholder Group.

The Stakeholder Group was created to review design concepts from the consultant team, provide community and agency perspective, and offer guidance and feedback throughout the evaluation process. The Stakeholder Group included representatives from:

- City of Kelso Engineering
- City of Kelso Planning
- Cowlitz-Wahkiakum Council of Governments (CWCOG)
- Cowlitz County Engineering
- Washington State Department of Transportation Local Programs
- Washington State Department of Transportation Rail
- Three Rivers Golf Course

Four stakeholder meetings were held from September 2011 to March 2012. The meetings progressively reviewed project options, impacts, prioritization of key issues, development of evaluation criteria, costs, community impacts, rail-related issues and the HSR program, and funding needs and opportunities. Along with the evaluation process, the discussion and feedback at these meetings helped shape the crossing configuration.

Evaluation criteria were developed in response to key issues raised by the Stakeholder Group and City staff, and each criterion was weighted based on prioritization in order to develop scoring. Criteria included neighborhood safety, cost, property impacts, constructability, environmental impacts, redevelopment opportunity, and maintenance. Each of the five options was evaluated and scored (see Table 1, below, for a summary of the five options). General characteristics of the crossing locations and configurations can be described as follows:

### *HAZEL STREET ALIGNMENT VERSUS HAWTHORNE STREET ALIGNMENT*

The Hazel Street alignment generally has good connectivity to the surrounding area, including 13<sup>th</sup> Avenue. Hazel Street is currently classified as a minor arterial; it has adequate existing width to accommodate this project and provides midpoint access to the area west of the tracks, with the golf course to the south and residences to the north.

The Hawthorne Street alignment is closer to the existing at-grade crossings subject to closure than the Hazel Street alignment and would serve a larger number of the residences east of South Pacific Avenue. There would be potentially significant impacts to residences west of the tracks because of

the narrow existing right-of-way. To connect to 13<sup>th</sup> Avenue, Hawthorne Street would need to be extended across the CDID #3 slough, and thus would introduce increased traffic to the neighborhood in accomplishing the connectivity.

#### *UNDERCROSSING VERSUS OVERCROSSING*

Building an undercrossing would be a good visual fit for the surrounding area, since the tracks are already elevated on a berm parallel to South Pacific Avenue. South Pacific Avenue would be lowered at the approaches to the crossing, thus creating simplified vehicular access. However, extensive retaining walls would be needed, which would impact property and complicate construction. To build an undercrossing, train traffic would have to be diverted to a shoofly track, interrupting operations and also impacting property. High groundwater and storm drainage needs would require a permanent pump system to be installed in the low point under the track crossing, and this pump system would increase cost and maintenance, both in the short term and in the long term. From a user perspective, there are typically concerns from the community about an underpass, because it creates a “tunnel feeling” for pedestrians.

Building an overcrossing structure would simplify coordination with rail operations, since a such a structure can be built without interrupting train traffic. A shoofly track would not be required. Given that there is evidence of high groundwater in the area, excessive excavation needed to place the road crossing below grade would not be necessary with an overcrossing. These factors greatly reduce cost and maintenance, and simplify construction. However, an overcrossing will have a substantial visual impact on the immediately adjacent properties. Light pole heights would need to be limited because of the proximity to the Kelso Longview Airport (also known as Southwest Washington Regional Airport).

#### **PROXIMITY TO SOUTHWEST WASHINGTON REGIONAL AIRPORT (SWRA)**

The flight path for the SWRA is adjacent to the Hazel Street crossing location. Federal Aviation Administration (FAA) requirements call for a 15-foot clearance for local roadways. Using glide path information in the SWRA Master Plan and applying the more conservative WSDOT vertical clearance requirement of 16.5 feet for vertical obstructions, there is sufficient clearance for the new overcrossing bridge structure. Appendix K contains the flight path diagram for SWRA as it relates to the project area. GIS-level aerial topography was used to develop the design concepts. For final design, detailed design and field survey must be developed to verify and make any adjustments that are required to address clearance. Although the bridge deck meets clearance requirements, the approach may need to be adjusted to increase clearances. Also, it will be necessary to limit streetlight and utility pole heights (if applicable) to provide allowable vertical clearances. This may require the use of a greater number of pedestrian-scale light poles, with closer spacing than typical cobra-head poles, to obtain adequate illumination.

**Table 1. Summary of Options**

Option	Location / Configuration	Cost	Advantages/Disadvantages	Evaluation Score***
<b>Option 1</b>	Hazel/Under	\$51,000,000	<ul style="list-style-type: none"> <li>• Low traffic impacts in neighborhood east of South Pacific Avenue</li> <li>• Highest cost, expected long-term maintenance crossing under railroad</li> <li>• Construction uncertainties with high groundwater</li> </ul>	176
<b>Option 2A*</b>	Hazel/Over	\$23,620,000	<ul style="list-style-type: none"> <li>• Limited traffic impacts in neighborhood east of South Pacific Avenue</li> <li>• Least anticipated cost, constructability, and maintenance</li> </ul>	213
<b>Option 2B**</b>	Hazel/Over	\$33,250,000	<ul style="list-style-type: none"> <li>• Limited traffic impacts in neighborhood east of South Pacific Avenue</li> <li>• Significant retaining walls needed would inhibit pedestrian/vehicular circulation; extent of walls may affect neighborhood livability</li> </ul>	117
<b>Option 3</b>	Hawthorne/Under	\$55,540,000	<ul style="list-style-type: none"> <li>• Location best situated adjacent with regard to pedestrian concentration</li> <li>• Significant impacts to property west of tracks from road widening</li> <li>• Increased traffic impacts in neighborhood east of South Pacific Avenue with connection to 13<sup>th</sup> Avenue</li> <li>• Highest cost, expected long-term maintenance crossing under railroad</li> </ul>	83
<b>Option 4</b>	Hawthorne/Over	\$28,460,000	<ul style="list-style-type: none"> <li>• Location best situated adjacent with regard to pedestrian concentration</li> <li>• Significant impacts to property west of tracks from road widening</li> <li>• Increased traffic impacts in neighborhood east of South Pacific with connection to 13<sup>th</sup> Avenue</li> </ul>	107

\*Option 2A provides access from South Pacific Avenue onto the overcrossing via Douglas Street and an extension of 3<sup>rd</sup> Avenue (see *Hazel Street: Option 2A Overcrossing* diagram in Section 4).

\*\*Option 2B provides access from South Pacific Avenue directly onto the overcrossing by raising South Pacific Avenue and the approach from Hazel Street above the existing track elevation (see *Hazel Street: Option 2B Overcrossing* diagram in Section 4).

\*\*\*Maximum possible score = 245.

## RECOMMENDED OPTION

Based on the evaluation process, input from the Stakeholder Group, and feedback from the public at the open house, the Hazel Street overcrossing Option 2A is recommended as the preferred option for further development. The Hazel Street overcrossing option appears to provide the optimum balance of safety, costs, constructability, and maintenance.

# 1. INTRODUCTION

With the construction of the High Speed Railroad (HSR) in the Kelso area, it is important for the City of Kelso (the City) to review potential impacts to current crossings, and to consider adjustments before the HSR plans are finalized. The goal for the City is to determine a preferred location for crossing the BNSF railroad line in South Kelso that will provide a safe grade-separated crossing and improved access to the land between the railroad line and the Cowlitz River, and to be proactive in recommending a preferred option before the implementation of the HSR program. The completed railroad crossing study will also provide the basis and justification for securing the funding needed to complete design and construction of the new grade-separated crossing.

Funding to complete this crossing study came from the Federal High Speed Rail program. Initially the money was designated for the construction of an at-grade pedestrian signal near the Allen Street Bridge; however, that project was cancelled and the money was returned to WSDOT. The City has been successful in its efforts to have that money transferred to this study for a grade-separated vehicle crossing.

WSDOT and others have completed previous studies to evaluate crossing options at several locations in the study area. For this study, those previous studies were reviewed, and the information from those studies was used to determine locations for further consideration. The City has determined that two corridors should be the main focus of this study, and the report should evaluate the potential crossing location along the Hazel Street alignment and the potential crossing location along the Hawthorne Street alignment.

Appendix A contains the plan drawings and the cost estimates for the options that were evaluated. Appendices B through K present supporting information on sensitive areas and their regulation, geotechnical recommendations for construction, traffic analysis, comprehensive plan and zoning regulations, design criteria worksheets and scored results of the evaluation process, County and City letters recommending closure of one at-grade crossing, documents from the public involvement program, the location of underground storage tanks, and the flight path diagram for SWRA.

# 2. PURPOSE AND NEED

The purpose of the study is to determine a grade-separated railroad crossing location and configuration, to address safety issues, and to provide improved access to the undeveloped property west of the BNSF mainline tracks and South Pacific Avenue.

The study will determine the appropriate solution in advance of the planned addition of a third railroad mainline track proposed as part of the Washington State HSR program. As part of that program, this area of Kelso is within the limits of BNSF's proposed \$126 million Kelso–Martins Bluff Project, which includes the addition of a third railroad mainline from the Kelso station to Longview Junction. The railroad corridor carries both freight and passenger rail traffic, and proposed improvements to the rail corridor are intended primarily to increase capacity of the rail system in

this area. In December 2011, the Federal Railroad Administration (FRA) approved moving the Kelso–Martins Bluff Project to the preliminary design stage. BNSF is planning to have a preliminary layout for the third railroad mainline track completed by the summer of 2012, and the project must be completed by July 2017.

Performing this study enables the City to plan appropriate measures to address existing and future safety issues associated with crossing the railroad corridor for all modes of travel, and it also gives the City the opportunity to provide input to the HSR design related to its objectives for safety and connectivity in this area, and to pursue funding to complete the crossing project.

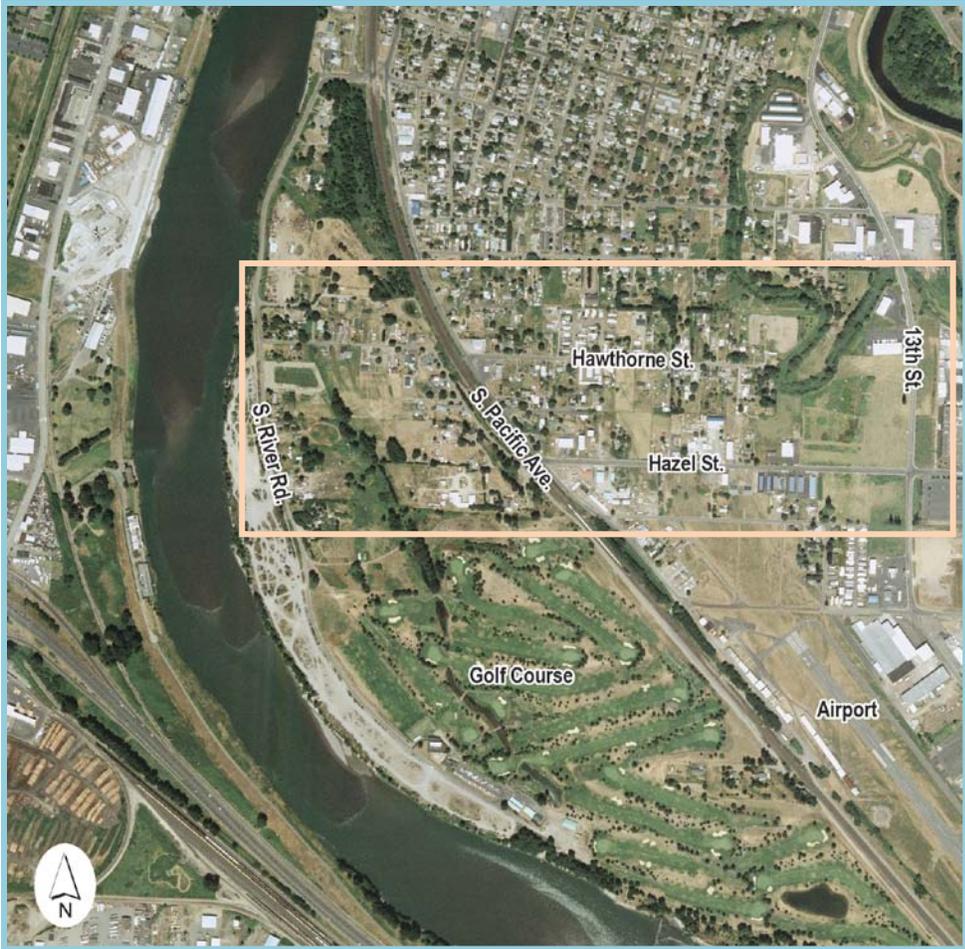
The goals and objectives of the City of Kelso Railroad Crossing Study are to:

- Review and build on previous studies for the study area,
- Obtain input from key stakeholders,
- Identify potential crossing locations and options,
- Develop evaluation criteria and evaluate impacts of the proposed crossing locations and configurations,
- Develop a preliminary design and opinion of probable cost, and
- Recommend a viable crossing option.

### 3. EXISTING CONDITIONS

The study area is located in the southwestern part of the City of Kelso, and the area is outlined in the aerial photo below. The area is roughly bounded by 13<sup>th</sup> Avenue on the east and at an alignment with Hawthorne Street on the north, Hazel Street on the south, and South River Road on the west. All the crossing options reviewed for this report are contained within this outlined area.

The south Kelso area is separated from the Cowlitz River by the BNSF railroad tracks, and South Pacific Avenue runs parallel to and east of the tracks. The Southwest Washington Regional Airport (SWRA) (also known as Kelso-Longview Airport) is also located in the southern part of the City. Approximately 265 acres of undeveloped or underdeveloped land lies between the river and the tracks (referred to in this report as Southwest Kelso), and includes the Three Rivers Golf Course. Southwest Kelso is accessed by two at-grade crossings, which are located at Yew Street and at Mill Street. Both of the existing crossings have poor sight distance and substandard roadway geometry. Safety issues will likely increase with the introduction of a third track and increased freight and passenger rail traffic.



**Figure 1. Study area located in the south Kelso area**



**Figure 2. South Pacific Avenue at Hazel Street, looking north**

The majority of the study area is relatively flat, at approximately elevation 20 feet. An elevated berm adjacent to South Pacific Avenue supports the two BNSF railroad tracks at about elevation 33 feet. The tracks bisect the study area on a northwest to southeast angle. The berm is approximately 27 feet wide at the top. Paved roads and several homes and businesses are located in the vicinity of the potential planned rail crossings. A gravel access road parallels the west side of the railroad tracks south of the study area. The Cowlitz River is approximately 2,150 feet west of the tracks.



**Figure 3. Hazel Street corridor west of the track**

apparent wetland conditions about 50 feet beyond the swale along both sides.

The Hazel Street corridor west of the tracks is vegetated largely by non-native pasture grasses (tall fescue and bentgrass), and by invasive, exotic weed species (Scots broom and Armenian blackberry). This area also supports numerous black cottonwood trees and saplings. The only water or wetland feature identified within the Hazel Street alignment area west of the tracks was a wetland swale extending north/south, approximately 300 feet east of South River Road. The wetland is centered on an inundated swale approximately 30 feet wide and having

Appendix B contains a technical memorandum with a more detailed description of the sensitive areas.

The study area lies within the Cowlitz Drainage Improvement District #3 (CDID 3). Dikes separate the study area from the Cowlitz River. An existing stormwater pump station connection to the Cowlitz River appears to be impassable to fish. Groundwater levels near the study area were measured at depths of 10 to 12 feet when observed in November 2011, and will fluctuate in response to precipitation and the level of the nearby Cowlitz River. Groundwater levels may approach the ground surface during periods of heavy precipitation and/or extended flood levels in the Cowlitz River.

Soils near the surface are alluvium deposits consisting of sand and silt and are underlain by gravel. A large mound of apparent dredge spoils occupies the area immediately west of South Pacific Avenue and the railroad tracks. Geotechnical studies disclosed alluvial sand 100 feet deep at the single boring location and indicated that there is liquefaction potential to an approximate depth of 80 feet during a design-level earthquake. Liquefaction would result in loss of soil strength and significant deformation of the ground surface that would impact structures in the areas, including retaining walls or bridge abutments that would be used in any of the crossing options. Ground improvement will be required to limit deformation and mitigate the risk of potential collapse of portions of the retained embankments and bridge approaches. Because of the risk of liquefaction, foundation support for bridges will likely be provided by deep foundations, such as driven piles, or spread footings in conjunction with ground improvement. (Appendix C, Geotechnical Report, contains the results of the geotechnical survey.)

### 3.1. TRAFFIC AND CROSSING GEOMETRY

Two at-grade roadways currently cross the railroad tracks in the study area: Mill Street and Yew Street.

Mill Street, a two-lane roadway, crosses the railroad tracks at a nearly perpendicular angle, with some grade change. The crossing has flashing lights and arms that lower to halt traffic when a train is approaching. It connects a predominantly residential neighborhood to the Three Rivers Mall and Riverside Drive; two Cowlitz River crossings and Exit 39 from I-5 lie to the north.

Yew Street approaches South Pacific Avenue from the east and crosses over the tracks intersecting South River Road. It is a two-lane roadway that crosses the railroad tracks at a skewed angle. A steeper grade occurs as it climbs up the east side railroad embankment, approximately 1,600 feet south of Mill Street. The crossing includes flashing lights and arms that lower to halt traffic when a train is approaching. Yew Street/South River Road serves only the adjacent residential neighborhoods, with no through traffic. Most of the traffic using the Yew Street/South River Road crossing is traveling northbound or southbound on South Pacific Avenue. The awkward intersection configuration can make it difficult for large vehicles traveling northbound on South Pacific Avenue to turn left, climb the embankment, and cross the railroad tracks. The Yew Street/South River Road crossing carries more traffic traveling to and from areas to the south than the Mill Street crossing.

Although the Mill Street crossing is closer to downtown, the Yew Street/South River Road crossing carries the higher traffic volumes on both weekdays and weekend days. The existing daily traffic for the Mill Street crossing ranges from 200 vehicles per day (winter weekend) to 475 vehicles per day (summer weekend). The existing daily traffic for the Yew Street/South River Road crossing ranges from 1,175 vehicles per day (lowest on winter weekends) to 2,440 vehicles per day (highest on summer weekends). Traffic volume data for the existing conditions were collected during the winter of 2011. Traffic volumes were seasonally adjusted to summer conditions to account for greater recreational activity, particularly at the Three Rivers Golf Course. The traffic analysis report can be found in Appendix D.

### *3.1.1. CRASH ANALYSIS*

#### **3.1.1.1. Roadway Crash History**

A crash analysis reviewed crash history data from January 1, 2006, through December 31, 2010. Of the 45 reported crashes during that time, fixed object and angle crashes accounted for 58 percent. The crash analysis shows 16 crashes at key locations within the study area. Most of the crashes were property damage only (12). There were no fatalities reported at study area intersections.

The intersection of Mill Street and South Pacific Avenue had the greatest number of reported crashes (6). One-half of these crashes resulted in an injury. Collision types included rear end (2), angle (2), and sideswipe (2).

The Yew Street/South River Road intersection with South Pacific Avenue had four reported property damage only crashes. Collision types included rear end (1), angle (1), and sideswipe (2).

Three property damage only crashes were reported at the South River Road crossing of the railroad tracks. None were related to train activity. Two of the crashes involved a single vehicle collision with a fixed object. The third crash was identified as non-collision and involved two vehicles.

The South River Road intersection with Riverside Drive had three reported crashes; one resulted in an injury. Two of the collisions involved a single vehicle with a fixed object. One collision was categorized as “other” and involved two vehicles and resulted in an injury.

### **3.1.1.2. Rail Crash History**

Crash history along the BNSF alignment was compiled for this study from data provided by the FRA’s Web Accident Prediction System, which generates reports of public rail intersections ranked by predicted collisions per year. The Web Accident Prediction System’s “accident prediction formula” is based upon basic data about the crossing’s physical and operating characteristics as well as five years of crash history. The rankings are not meant to be a standalone list and should be used in conjunction with engineering judgment and further evaluation to identify rail crossing locations that may require additional attention.

There are three crossings of the BNSF railroad tracks within the City of Kelso: Cowlitz Garden (which lies beyond the study area), Mill Street, and Yew Street/South River Road. There were no crashes related to train activity at either the Mill Street crossing or the Yew Street/South River Road crossing during the five-year analysis period (2006 through 2010).

## **3.2. LAND USE**

There are 265 acres of relatively underdeveloped and undeveloped land that occupies a crescent-shaped area formed by South Pacific Avenue and the BNSF tracks to the east, and River Road and the Cowlitz River to the west and south. Figure 4 shows the current jurisdictional boundaries in the study area, with the areas within incorporated City of Kelso shaded pink and areas of unincorporated Cowlitz County shaded light yellow.



**Figure 4. Kelso and Unincorporated Cowlitz County in project area**

BNSF/Union Pacific Railroad (UPRR) tracks parallel the west side of South Pacific Avenue along the top of an approximately 12-foot-tall berm. Access to the area is limited by the two at-grade crossings of the railroad tracks at Yew and Mill streets.



**Figure 5. Milwaukee Place parallels the tracks to the west**

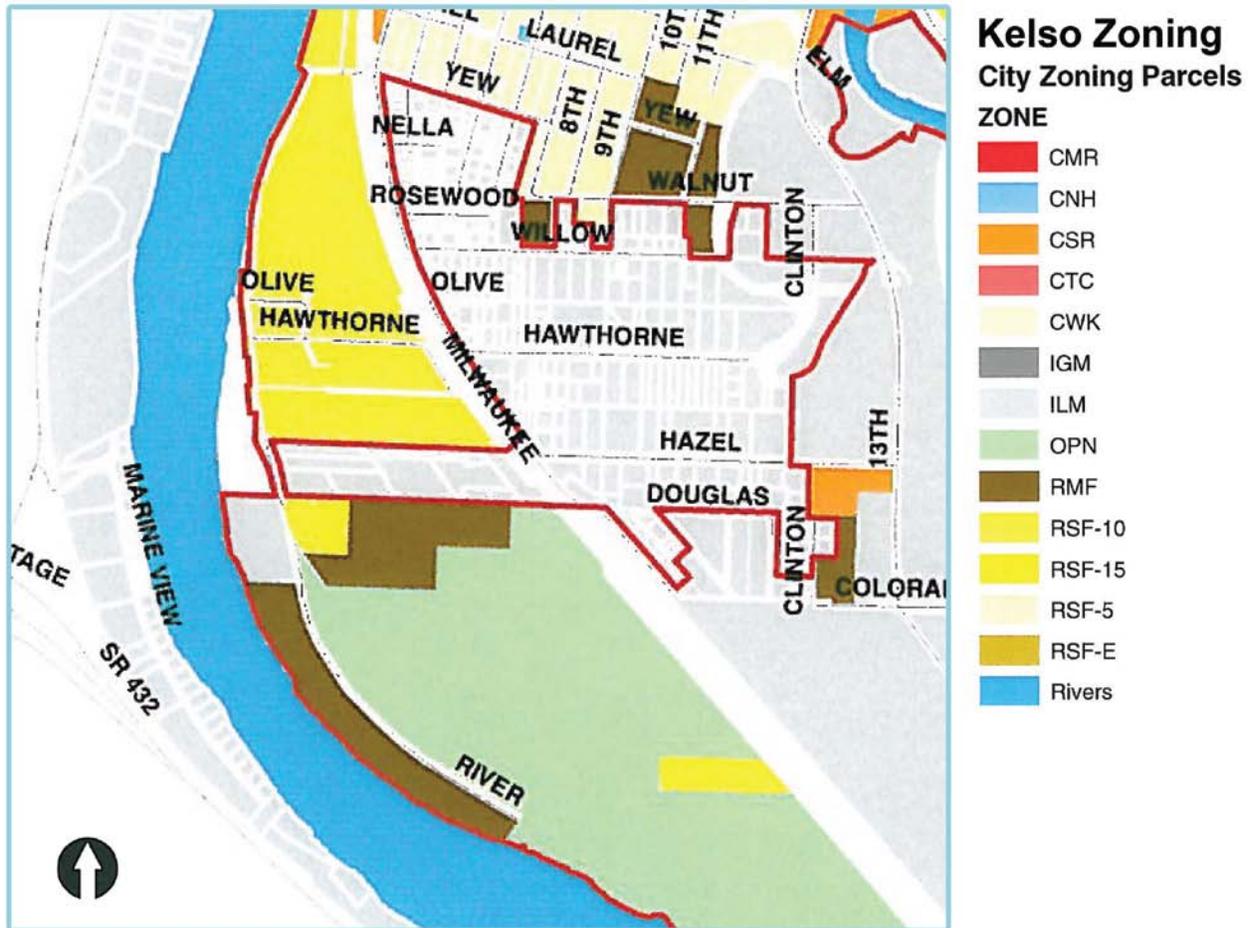
The low-lying area west of the tracks has a mix of undeveloped land, a golf course, and single-family residential uses. The northern part of the study area contains mostly older, single-family homes on large lots. The residences take access from one of six roads in this area: Hawthorne Street, Virginia Street, Olive Street, Milwaukee Place, South River Road, and Riverside Drive. During a site reconnaissance, one multifamily residential building was noted, close to Milwaukee Place. There are a few low-intensity industrial and/or commercial service uses along Milwaukee Place. According to the City of Kelso, much of the residential area does not have public water or sewer service, relying instead on private wells and septic systems. A privately

owned golf course occupies the recreation area to the south, where South River Road terminates. The golf course is accessed by South River Road.

Residential, industrial, and commercial development in unincorporated Cowlitz County occupies the area east of South Pacific Avenue. Some industrial uses are found near 13<sup>th</sup> Avenue in Kelso.

The City of Kelso Land Use Map shows three designations for land uses in the study area: Retail/Office/Commercial, Industrial, and Open. The land roughly north of Olive Street is designated as Retail/Office/Commercial, and the land between Olive Street and the unincorporated area is designated Industrial. South of the unincorporated area there is a strip that is designated Industrial, with the remaining area designated Open.

The City of Kelso zoning map (see Figure 6) designates the area roughly north of an alignment with Hazel Street as RSF-10, a single-family designation that allows 10,000-square-foot minimum lot area per dwelling unit. Land immediately south of the unincorporated boundary is zoned RMF, a residential multifamily zone that allows 1,350-square-foot minimum lot area per dwelling unit.



**Figure 6. Excerpt from City of Kelso, Washington Zoning Map**

There is a pocket of land zoned RSF-10 near South River Road. Most of the area is zoned OPN, open space zone. The purpose of the OPN zone is to ensure that areas characterized by environmental sensitivity are preserved for the most part in their original undisturbed and/or natural state. Areas appropriate for the OPN zoning district are characterized by public and/or private land that is permanently protected from development. There is a pocket of land between South River Road and the Cowlitz River designated ILM, light manufacturing industrial zone. Although there is a strip of land west of South River Road that is zoned RMF (residential multifamily), there does not appear to be any multifamily development currently.

An area of unincorporated Cowlitz County is roughly bounded on the north by an alignment with Hazel Street, on the south by an alignment with Douglas Street west of the BNSF tracks, and on the west by South River Road. County Comprehensive Plan Maps 34-8-2W show the area east of the tracks and south of Willow Street designated/zoned as UR (Urban Residential), except for lots immediately adjacent to South Pacific Avenue, where the designation is C-2 (Urban Commercial). East of the BNSF tracks, the land south of Hazel Street is designated/zoned MH (Heavy Manufacturing), and north of Hazel Street is designated/zoned ML (Light Manufacturing). The unincorporated area between South River Road and the BNSF tracks is designated/zoned AG (Agriculture).

While there is no direct access to the Cowlitz River shoreline from the land east of River Road, the Cowlitz River is a shoreline of the state. Floodplains and wetlands in and near the study area are considered part of the shoreline jurisdiction associated with the Cowlitz River. Such shoreline environments have shoreline designations in the local land use ordinances. The study area is designated “Urban,” which allows the most intense use of the shoreline.

### 3.3. CONSISTENCY WITH PLANNED LAND USES AND POTENTIAL FOR REDEVELOPMENT

The railroad crossing project is expected to impact land within both the City and County jurisdictions. Cowlitz County and its cities are not required to plan under the Washington State Growth Management Act (GMA) but are required to implement the requirements of the Shoreline Management Act and the Critical Areas regulations of the GMA. Appendix E contains an evaluation of the consistency of the crossing options with plan policies and objectives. The City of Kelso has initiated an update to its City plan, known as the Kelso “Land Use Plan.” The changes proposed as of date of this report do not appear to affect existing policies with respect to arterial or collector transportation facilities in the study area.

The residential lot patterns west of the tracks are irregular, and many exceed the maximum lot size for their zones. There are approximately 65 acres of land within the City of Kelso that are zoned RSF-10 that could eventually redevelop when urban services are provided.

One inconsistency between Kelso’s zoning and its Land Use Plan concerns the existing residential uses and zoning, and the planned retail/commercial/office designation on the Land Use Plan for Kelso.

The Land Use Plan for Kelso notes, in Chapter 4, that the area west of the railroad tracks and bordered by the Columbia and Cowlitz rivers is zoned for industrial uses but may not be suitable for such uses given the limitations of wetlands in the area. Future development will be subject to independent permitting processes in areas with wetlands, so the development potential of that land will be addressed on a case-by-case basis.

Although the unincorporated portion west of the tracks is zoned AG, no commercial agricultural use of the properties is evident. The agricultural land in Cowlitz County would need to be annexed and designated for urban land uses before it could be redeveloped for uses other than agriculture. Some existing uses may be nonconforming.

### 3.4. FEDERAL, STATE, AND LOCAL ENVIRONMENTAL PERMITS

A roadway crossing project in this area would likely need to meet the following federal and state regulatory and permitting requirements: Clean Water Act Section 404, Washington Hydraulic Project Approval (HPA), Federal Endangered Species Act (ESA), Title 14 of the Code of Federal Regulations (CFR) Part 77 (Form 7460-1), Migratory Bird Treaty Act (MBTA), National Environmental Policy Act (NEPA), and the National Historic Preservation Act. See Appendix B for the complete summary of the federal and state permitting requirements.



**Figure 7. Wetland ponding north of the Hazel Street alignment**

Because of the proximity of the Kelso-Longview Airport, the FAA would likely require the applicant to file a form 7460-1. The form documents the equipment to be used for construction as well as the finished height of the project. Height restrictions depend on where the project falls within the airspace.

Local permits from the City and Cowlitz County (the County) will be required for construction, including Shoreline, Critical Areas, and Flood development permits. Construction of the project would require completion of a State Environmental Policy Act (SEPA) checklist for both jurisdictions in

connection with any local permits. A mitigated determination of non-significance would be expected. Appendix E contains a description of the applicable zoning code regulations.

The railroad crossing project would likely require a Shoreline Development Permit. A Shoreline Conditional Use permit would be required because of the stipulation for conditional review for proposed landfills. However, if no fill is proposed in the shoreline area, a Shoreline Substantial Development permit would likely be required instead of a Shoreline Conditional Use Permit.

The railroad crossing project is likely to occur in one or more critical areas or associated buffer areas, such as wetlands or soils having geotechnical issues for construction. Roads are exempt from requiring a permit for development in a critical area only if the construction activity is limited to the existing impact area. None of the City of Kelso railroad crossing options would qualify for this exemption, because they all require work outside existing facilities. If the construction area crosses a critical area, then a permit would be required.

### 3.5. WETLANDS AND THREATENED AND ENDANGERED SPECIES

There is an existing wetland swale on the west side of the tracks that will be considered environmentally sensitive for regulatory purposes. The Kelso Washington/Oregon quadrangle of the National Wetland Inventory depicts this area as a palustrine emergent seasonal wetland. Following on-site and database research, project biologists concluded that only two listed and proposed threatened or endangered species have any possible occurrence or suitable habitat in the vicinity. However, those species are highly unlikely to occur in the study area because of the high levels of human activity and disturbance of suitable habitat. More detail on this topic is presented in the technical memoranda in Appendix B.

### 3.6. SOIL AND GROUNDWATER

Based on the geotechnical investigations performed for this project, it was determined that, in the study area, sand beneath the water table will liquefy to a depth of about 80 feet during a design-level earthquake. Liquefaction results in loss of soil strength and significant deformation of the

ground surface at abutments and beneath embankments and retaining walls. Because of the risk of liquefaction, foundation support for bridges will likely be provided by deep foundations, such as driven piles, or spread footings in conjunction with ground improvement.

The planned roadway elevation of the undercrossing options will be below the groundwater level for significant portions of the year. The relatively clean sand encountered in the boring that was conducted for this project has the potential to yield relatively large quantities of water; therefore, a permanent dewatering and pumping station will be needed to lower the groundwater level below the roadway elevation.

Although fine-grained, highly compressible silt soils were not encountered in the boring completed for this project, the experience of the geotechnical experts in the area and a review of available geotechnical information for other nearby sites indicate that such fine-grained, highly compressible silt soils are common in this area. Additional explorations at the planned crossing location are recommended in order to evaluate the site-specific subsurface conditions before construction. If fine-grained soils are encountered, design considerations, such as long-term settlement, may be significant. (See Appendix C, Geotechnical Report, for more details.)

### 3.7. ENVIRONMENTAL JUSTICE EVALUATION

A high-level review of the census data for the State of Washington, Cowlitz County, and the study area was completed to identify any potential concerns related to environmental justice and project impacts. Appendix E contains the memorandum that documents this research. The memorandum was completed at an earlier stage of project development, and overestimated the residential impacts associated with Options 1, 2A, and 2B. The statements below have been modified based on current estimates regarding displacements.

The census data review revealed that the study area has a slightly higher percentage of Hispanic population, minority population, and population living below the poverty line than the City of Kelso or Cowlitz County as a whole. However, only the percentage of persons living below the poverty level is greater than that of the state. Although Census Tract (CT) 11 in the study area has a higher percentage of minorities and people below the poverty line than the County does, its demographics are fairly similar to those of the City of Kelso. The study area does not include any known affordable housing projects. However, the census data that generates this conclusion is drawn from a larger area than the immediate study area, one that includes downtown Kelso.

Crossing Options 1, 2A, and 2B, described below, would not displace any residences, but they would displace between two and three businesses. Crossing Options 3 and 4, described below, could displace four or more residences and two to three businesses. It is not known whether the residential displacements would affect a low-income, minority, or Hispanic person(s) or household(s). Therefore, the impacts associated with Options 3 and 4 are higher for individuals than the impacts associated with Options 1, 2A, or 2B. However, even if the households that could be displaced are found to be minority or low-income households, it does not appear that the impacts to a population would be disproportional and adverse, because of the mitigation of impacts that would occur through the right-of-way acquisition process. Residential displacements would be

mitigated through property purchase and provision of relocation assistance. Business displacements would be mitigated with relocation assistance.

## 4. PROJECT CROSSING OPTIONS

### 4.1. PREVIOUS PLANNING EFFORTS

In a 2002 Alternatives Study for the Kelso–Martins Bluff Project, WSDOT considered many options, at several locations, for providing a safe crossing of the railroad tracks in the event a third track were added to the corridor. After public and agency input, four options were put forth for consideration. All would have required closure of the Yew Street and Mill Street at-grade crossings and provision of a pedestrian underpass at Yew Street. Three options would have created access roads under the berm that carries the railroad tracks—one at Hawthorne Street, one between Hawthorne and Virginia streets, and a third at Hazel Street. South Pacific Avenue would have needed be lowered to meet the undercrossing grades at those locations. The three underpass options would have needed a pump system to handle stormwater runoff and to prevent flooding. A fourth option would have entailed an overpass at Hazel Street, with frontage roads on the east side to provide access to Hazel Street and on the west side to provide access to Milwaukee Place.

In July 2009, OTAK studied conceptual designs for a Hazel Street railroad undercrossing. Two alignment corridors were compared, one running due west from Hazel Street to South River Road and a second beginning at Hazel Road east of the tracks and curving south to meet South Pacific Avenue at a 90-degree angle, then curving on the west side to impact fewer developed parcels. The second alignment corridor was recommended for further study based on its better intersection geometry with South Pacific Avenue, fewer land use impacts, and lower structural costs.

### 4.2. DESIGN CRITERIA

Design criteria used for the development of the crossing options include those of the American Association of State Highway and Transportation Officials (AASHTO) (2004), the City of Kelso Engineering Design Manual (2008), and the BNSF and Union Pacific Railroad (UPRR) Joint Manual Guidelines for Railroad Grade Separation (2007).

The determination of the roadway classification is important, because it establishes design speed, typical section widths, intersection spacing, and other important elements of the roadway. The roadway classification used for this project is a minor arterial east of South Pacific Avenue and a minor collector west of South Pacific Avenue. A design exception to the City's standard typical sections will be needed in order to create a tailored typical section for the new roadway corridor to better match the existing roadway widths and future needs of the area. Part of the modification includes providing bicycle and pedestrian connectivity along the corridor, eliminating center turn lanes where appropriate, eliminating parking where appropriate, and reducing overall right-of-way width to accommodate these modifications. A center turn lane will be added at the intersections, when appropriate.

Early in the project development phase, the design criteria for the crossing options were refined to best match existing conditions and to be consistent with the overall goals of the project. The above roadway classification designations are consistent with the current Cowlitz County roadway classification for Hazel Street on the east side of the BNSF tracks and the road system on the west side of the BNSF tracks.

Appendix F contains the Design Criteria Worksheets. The worksheets list the standards and criteria used for this study.

### 4.3. CROSSING OPTIONS

The Hazel Street and Hawthorne Street corridors were examined using a set of evaluation criteria developed specifically to address the variety of issues and impacts subject to this study. The evaluation criteria, priorities, and follow-up results were developed and discussed with City staff, the Stakeholder Group, and the public. The Hazel Street corridor provided three crossing options for evaluation (Option 1, Option 2A, and Option 2B), and the Hawthorne Street corridor provided two options for evaluation (Option 3 and Option 4), for a total of five options. All options have the same typical section for a standard collector west of the railroad crossing and a modified minor arterial east of the railroad crossing.

The study for this railroad crossing project also reviewed potential closures of the existing Mill and Yew streets at-grade crossings with emergency providers (police and fire). Cowlitz 2 Fire & Rescue preferred, at a minimum, that the Mill Street crossing remain open as a secondary emergency access to the west side of the tracks, and that the Yew Street crossing be closed. (See Appendix G for letters on the at-grade closures from the City of Kelso and Cowlitz County). One of the chief concerns was that the area west of the tracks is subject to localized flooding that sometimes hinders access and circulation.

As mentioned previously, the geotechnical investigation disclosed a deep alluvial sand layer combined with a high liquefaction risk. Because of this risk of liquefaction, foundation support for bridges will likely consist of deep foundations, such as driven piles or spread footings in conjunction with ground improvement. Ground improvement will be required to limit deformation and mitigate the risk of potential collapse of portions of the retained embankments and bridge approaches.

Since the City of Kelso and Cowlitz County have jurisdictional land within the study area, it is anticipated that an Intergovernmental Agreement between the agencies will be needed for road design and future maintenance responsibilities. This study did not evaluate specifics of such an agreement, such as annexations or shared costs.

Water quality can be provided for all options with roadside infiltration swales. The area is composed of well-draining sand, and infiltration is the preferred method of stormwater disposal. On the west side of the railroad line, the infiltration swale would run the length of the project on either the north or south side of the roadway, with catch basins approximately every 300 feet. The infiltration swale would perform dual functions of water quality treatment and conveyance. Using the infiltration swales for conveyance will limit the amount of pipe and be more cost-effective. On

the east side of the railroad line, quality could be achieved through an infiltration basin located within purchased right-of-way.

The study does not evaluate specific recommendations regarding public or private utilities to be added to the project. However, it is anticipated that the City of Kelso may consider installation of a pipeline for future use as a water main to serve the area. This study did not review sizing requirements or anticipated future needs for waterlines. It is recommended that future designs review the anticipated needs to evaluate appropriate expansion of a waterline system and review other potential utilities to be carried to the west side of the BNSF tracks.

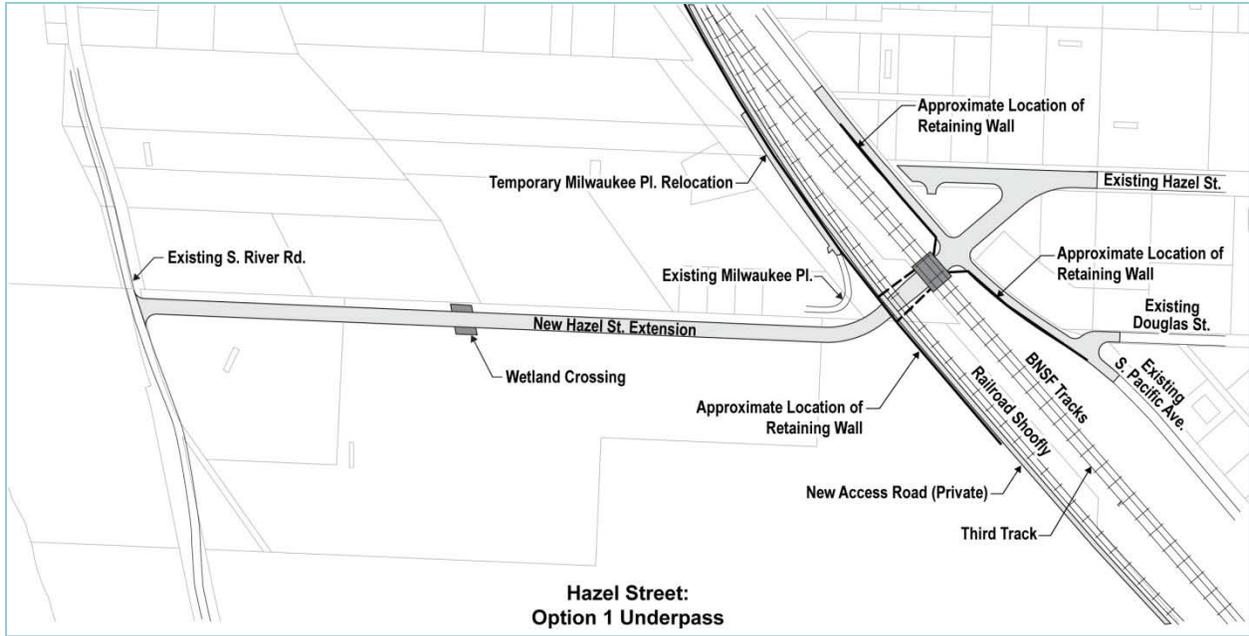
#### *4.3.1. HAZEL STREET ALIGNMENT*

The Hazel Street alignment would construct a new roadway extension from South Pacific Avenue west across the BNSF railroad track and would create a new connection to the existing network that extends from 13<sup>th</sup> Avenue on the east to River Road on the west. Various design speeds and connectivity issues were reviewed, and the ultimate design criteria used are described in Section 4.2, Design Criteria, above. The Hazel Street alignment generally:

- Has overall good connectivity to the surrounding area and creates a new connection to the existing network that extends to 13<sup>th</sup> Avenue;
- Has current classification as a minor arterial with adequate existing width to accommodate this project; and
- Provides midpoint access to the area west of the tracks, with the golf course to the south and residences to the north.

##### **4.3.1.1. Option 1: Hazel Street Alignment Undercrossing**

Option 1 realigns Hazel Street east of the tracks to cross under the tracks at an approximately 90-degree angle. Hazel Street would continue west to an intersection with South River Road (see Figure 8 on the following page). The roadway would be approximately 20 to 25 feet below the top of the railroad tracks (10 to 15 feet below existing ground).



**Figure 8. Option 1: Hazel Street Alignment Undercrossing**

This option would require lowering the entire intersection of Hazel Street and South Pacific Avenue, and the impacts would extend 500 feet north and south on South Pacific Avenue. It is likely that the underpass structure would be designed and owned by BNSF, and maintenance would need to be addressed that may require a financial commitment to BNSF from the City. The underpass would have less visual impact than an overcrossing; however, this option would require a pump station to drain runoff.



**Figure 9. Looking west along Hazel Street alignment near the BNSF tracks**

was determined to be the preferred option. The double-span option would require a column in the

Existing Hazel Street at South Pacific Avenue would be dead-ended. The remnant portion of South Pacific Avenue would require a turnaround. The intersection of Douglas Street and South Pacific Avenue would be reconstructed and lowered to meet the new grade. Access to the undercrossing from the east would be via South Pacific Avenue at the new Hazel Street intersection.

Schematic layouts for single- and double-span bridge options were reviewed. Though a Type, Size, and Location study was not developed for this report, the single-span structure

center of the roadway, would introduce an obstruction for vehicles, and would likely require offset lanes across the intersection. Further study would be needed to review additional geometric layout issues caused by adding a column in the center of the roadway. The double-span structure would reduce the depth of the structure and thus reduce the amount of cut for the underpass. However, the benefit of the single span's intersection geometry outweighed the depth gain from the double-span design.

Depending on the type of bridge used to support railroad traffic as part of the undercrossing option, the new roadway surface for Hazel Street and South Pacific Avenue would be at about elevation 6 feet, which places the finished grade approximately 10 to 15 feet below existing grades. Based on the results of the geotechnical investigation, the groundwater level would approach the finished grade of the new road surface, and extensive permanent and temporary dewatering systems would be required for the undercrossing option. The relatively clean sand encountered in the geotechnical investigation has the potential to yield relatively large quantities of water; therefore, a permanent dewatering and pumping station will be needed to lower the groundwater level below the roadway elevation.

The system of dewatering wells would need to be operated during the design life of the undercrossing and may likely require a backup power system to maintain stability of the improvements during a flood event. Operation of a long-term dewatering system could affect groundwater levels near the site. If Option 1 is considered further, additional investigation, including a pump test, should be completed to evaluate aquifer properties, potential pumping volumes, and the potential impacts of nearby residential domestic wells.

To maintain rail traffic during construction of the railroad bridge, the rail line would need to be rerouted temporarily on a new portion of track called a "shoo-fly." The shoo-fly would reroute rail traffic to the west side of the proposed underpass. The conceptual shoo-fly layout is based on design speeds required to accommodate Amtrak and freight train traffic along this segment of the BNSF rail line. Constructing the shoo-fly and rerouting rail traffic would allow work on South Pacific Avenue and the eastern portion of Hazel Street at the same time as the bridge construction, shortening the construction schedule. The shoo-fly would likely need to be built to the same standards that BNSF uses for permanent mainline installations. The alignment of the shoo-fly is controlled by the broadness of the horizontal curves, and adequate distance must be provided between the shoo-fly and the proposed undercrossing in order to allow room for constructing a new undercrossing structure.

The shoo-fly would require a new embankment that would affect Milwaukee Place and access to a number of residential properties. Milwaukee Place would be temporarily relocated west. A portion of the golf course to the south, including several golf course holes, would be temporarily removed from use and later restored. Pre-cast retaining walls that would support the relocated track would limit but not eliminate impacts to the adjacent properties.

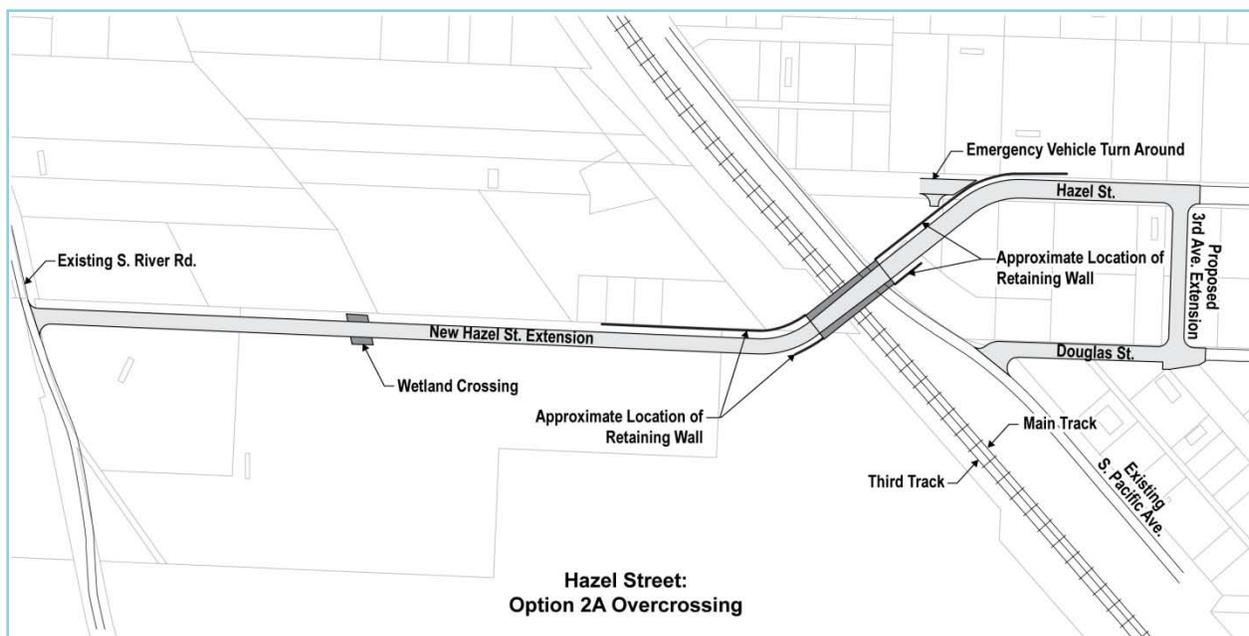
At the northwest end of the shoo-fly is an existing turnout or "switch" to storage track that extends to the passenger station. This switch would need to either be taken out of service temporarily or relocated on the shoo-fly alignment near its current location.

The existing mainline has a set of crossovers (switches connecting the two main tracks) and associated signals about 1,500 feet away from the shoo-fly. Constructing the shoo-fly would require that the crossovers be taken out of service during the construction of the bridge, which may not be acceptable to BNSF. The cost of the underpass could be expected to increase by \$2 to \$4 million if BNSF requires the function of the crossovers to be accommodated nearby or within the shoo-fly.

One item not fully developed for this study was an option to raise the railroad grade to reduce the amount of cut required for construction of the underpass. During a stakeholder meeting, it was suggested that this crossing study should look at minimizing the excavation needed for the underpass by raising the height of the railroad near the new crossing. To raise the tracks approximately 8 feet, the shoo-fly would likely need to be extended 1,500 feet or more to have an acceptable slope for rail traffic and to match existing grades. A wider rail embankment would be required, causing greater permanent impacts on the adjacent roadways and private properties. Elevating the tracks would still require lowering the South Pacific Avenue and Hazel Street intersection approximately 10 feet. Revising the railroad profile grade would require significant additional funds. The benefit of the adjustment would not likely offset the additional cost, because facilities to drain and pump groundwater in the underpass would still be needed.

#### 4.3.1.2. Option 2A: Hazel Street Alignment Overcrossing

Similar to the previous option, Option 2A would revise the Hazel Street alignment just east of the tracks and construct a new portion of the street to cross over the tracks at an approximately 90-degree angle. Hazel Street would continue west to an intersection with South River Road (see Figure 10 below and drawings for Option 2A in Appendix A). BNSF guidelines require the vertical alignment or profile of the roadway to be a minimum 23 feet 4 inches above the top of track, which places the finished grade of the new roadway approximately 40 to 45 feet above existing ground for this option.



**Figure 10. Option 2A: Hazel Street Alignment Overcrossing**

The railroad crossing is slightly to the south of the Option 1 alignment, with a longer approach from Hazel Street and a longer structure to cross the tracks. The new crossing would be above the existing Hazel Street, and there would be no direct connection between the original and new Hazel streets west of the new bridge approach. A dead end of Hazel Street at the new bridge approach would provide an emergency vehicle turnaround. West of the tracks, the road would have essentially the same alignment as Option 1 west to South River Road.

As mentioned above, the existing connection between South Pacific Avenue and Hazel Street would be closed. Two alternative connections were reviewed: access from Virginia Street and access from Douglas Street. Ultimately, it was determined that the access from Douglas Street would provide good connectivity between Hazel Street and South Pacific Avenue without having to construct a new street through the neighborhood to the north. The Douglas Street and South Pacific Avenue intersection will need to be improved to accommodate the increased traffic, and Douglas Street would need to be widened to include bike lanes and sidewalks. In addition, an extension or improvement of the 3<sup>rd</sup> Street alignment between Douglas Street and Hazel Street would be needed to complete the connection, which will require property acquisition from adjacent landowners.

Because of the change in grade approaching the east side of the overcrossing, two additional driveways to businesses on the south side of Hazel Street would need to be closed. Although there may be a reconfigured design that could preserve the accesses, it is assumed for the purposes of conservatively comparing the options that complete acquisitions of the businesses would be required due to the access closures.

The proposed overcrossing accommodates the addition of a third track in the railroad corridor, and the construction would likely have minimal impacts on rail operations. The design meets railroad design standards, which allows for the project to be completed independently of the railroad work and provides the flexibility to move forward with the project as soon as funding is secured. This option would not require the construction of a temporary railroad alignment or shoo-fly; however, construction coordination would be required with BNSF during the life of the project. The structure would likely be owned and maintained by the City of Kelso (as opposed to BNSF under Option 1).

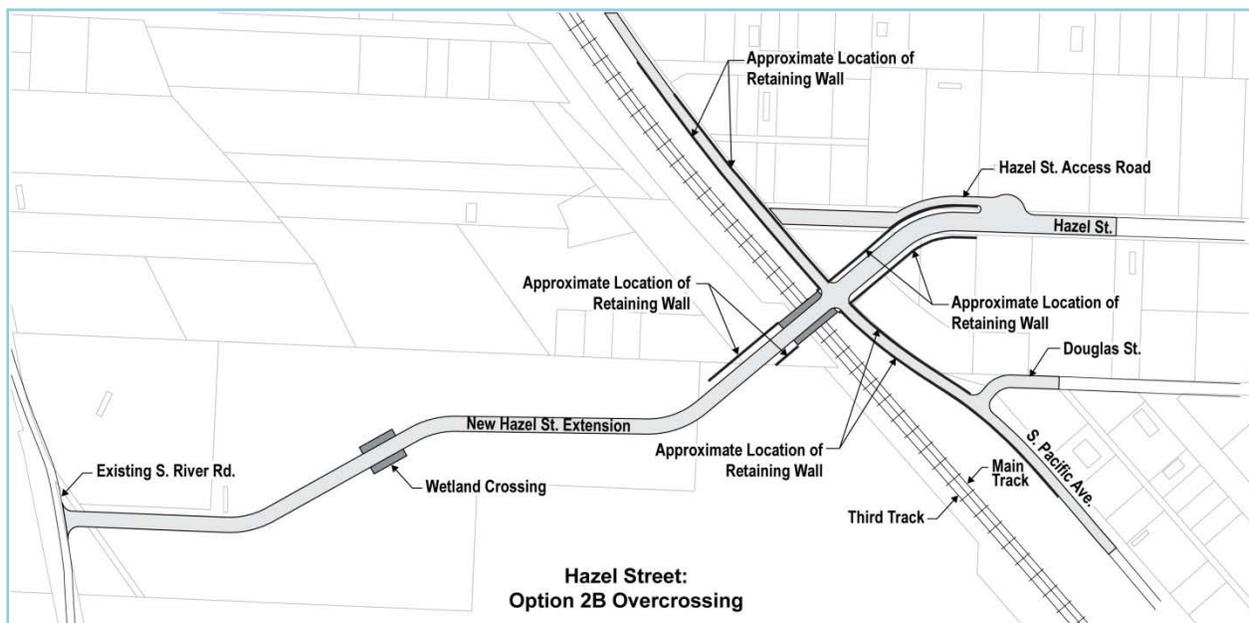
This option would have the most visual impact on nearby residents because of its height compared to surrounding structures. The height of structure at the proposed location does not impact the current flight path from SWRA (also known as Kelso-Longview Airport). However, future expansion of the airport will likely place the lighting on the bridge and potentially other items within the flight path surface (see plan and profiles in Appendix A that show the flight path surface). Continued coordination with the airport representatives is recommended, and the option should be developed to minimize obstructions in the flight path (such as reduced height of illumination poles) as the project progresses.

#### **4.3.1.3. Option 2B: Hazel Street Alignment Overcrossing**

Option 2B would have the same alignment over the tracks as Option 2A. The difference is in access to the overcrossing (see Figure 11 on the next page). This option provides access via South Pacific Avenue, which would be raised to meet the new elevation of Hazel Street (see Option 2B profile drawing in Appendix A), whereas Option 2A provides access to Hazel Street via Douglas Street.

Extensive retaining walls on both sides of South Pacific Avenue and Hazel Street would be needed to minimize the direct impact to the properties immediately adjacent. The Douglas Street intersection with South Pacific Avenue would be reconstructed. A westbound connection on Hazel Street would be provided in order to provide access to the properties between the existing Hazel Street and South Pacific Avenue intersection. For discussion purposes, the alignment west of the BNSF tracks for Option 2B is different than under the other options; however, an alignment similar to the one shown for either Option 1 or Option 2A is also possible.

Although the bridge over the BNSF railroad tracks would be shorter under this option than under Option 2A, the overcrossing would still have major visual impacts and significant physical impacts to the immediate neighborhood and traffic circulation pattern.



**Figure 11. Option 2B: Hazel Street Alignment Overcrossing**

#### 4.3.2. HAWTHORNE STREET ALIGNMENT

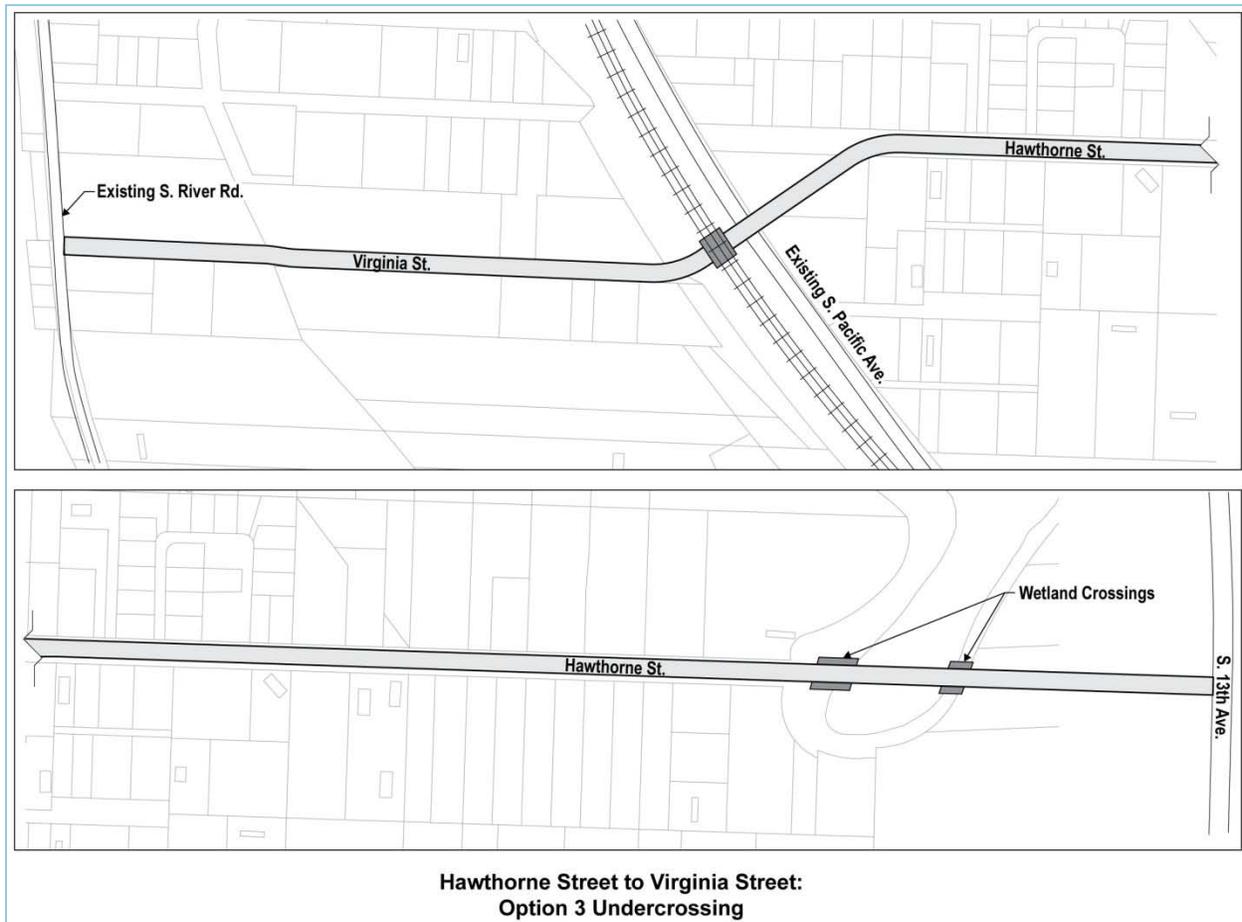
The Hawthorne Street alignment would construct a new roadway east and west of the tracks. It would extend Hawthorne Street from South Pacific Avenue west across the BNSF railroad track to South River Road, and construct a new roadway east from the existing end of Hawthorne Street to 13<sup>th</sup> Avenue. This new roadway would cross undeveloped land and create new structures across the CDID #3 slough. A number of design speeds and options for connectivity were reviewed. The final design criteria are described in the Section 4.2, Design Criteria, above. Generally, the Hawthorne Street alignment:

- Is slightly closer to existing crossings than Hazel Street;
- Would need to extend Hawthorne Street across the slough to provide connection to 13<sup>th</sup> Avenue;
- Would require improvement of existing Hawthorne Street; and

- Would have potentially significant impacts on residential property and housing west of the tracks.

#### 4.3.2.1. Option 3: Hawthorne Street to Virginia Street Undercrossing

Option 3 would construct a new section of Hawthorne Street from 13<sup>th</sup> Avenue to the existing dead end, revise the horizontal alignment of existing Hawthorne Street immediately east of the tracks, and construct a new section to the southwest under the tracks and west to an intersection with South River Road (see Figure 12 below).



**Figure 12. Option 3: Hawthorne Street to Virginia Street Undercrossing**

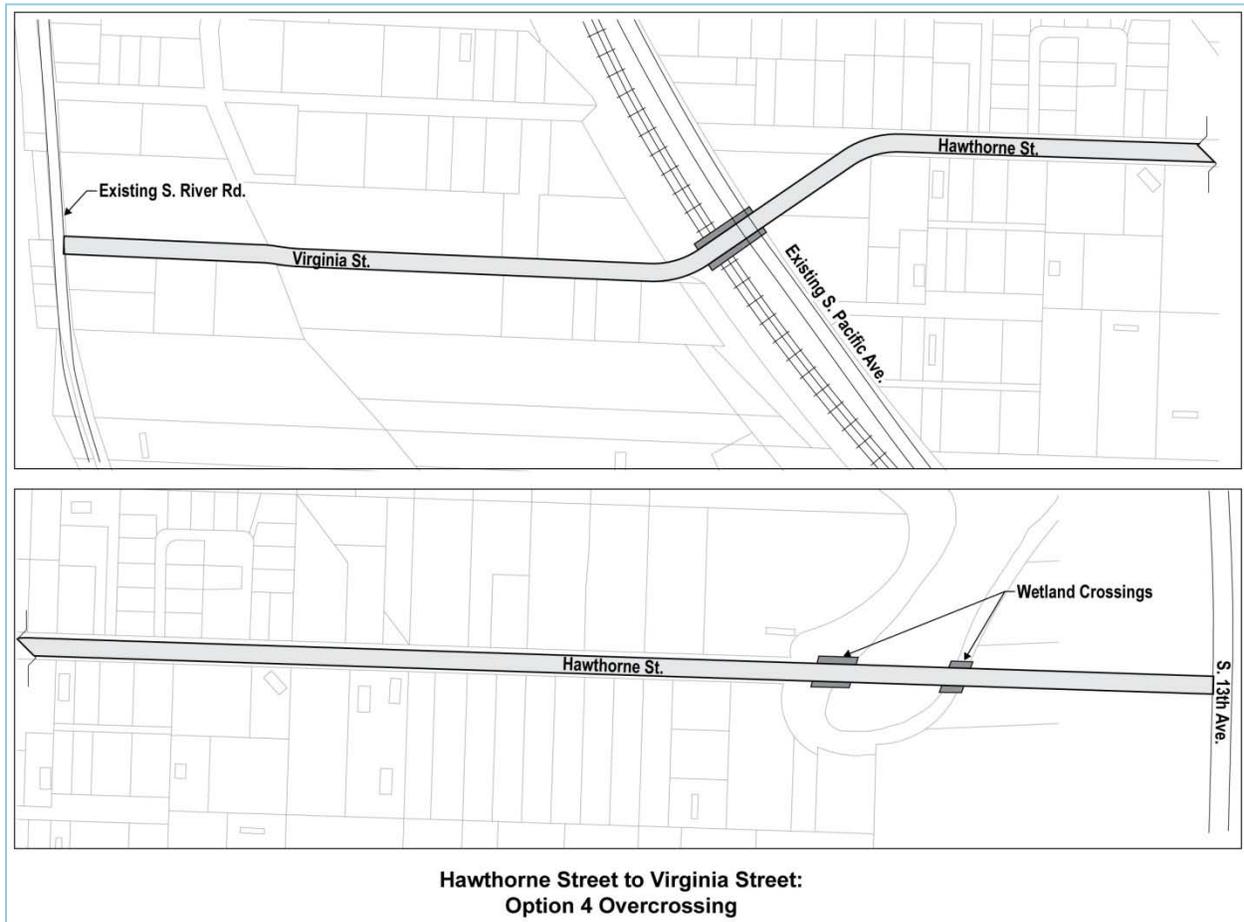
The study of crossing options did not include establishing the vertical geometry of Option 3. Similar to Option 1, the vertical alignment of the roadway would need to be approximately 20 to 25 feet below top of rail, which is assumed to be 10 to 15 feet below existing ground level. Option 3 would lower the entire intersection of Hawthorne Street and South Pacific Avenue and would require a pump system to remove stormwater from the underpass.

Street widening along the existing Hawthorne Street east of the tracks would be included to provide bike lanes and sidewalks, as shown on the typical sections (see Appendix A). The impacts of this street widening were not fully investigated, and the design would need to be advanced in order to fully examine impacts for all the properties along this corridor. It is anticipated that most

properties would be impacted because of the narrow existing right-of-way. Several entire properties would need to be purchased under this option. The extension to the east would require either two new bridges or large culverts to cross the CDID #3 slough approaching 13<sup>th</sup> Avenue. Additional design would be needed to determine the additional project impacts and size requirements of culverts/bridges and other elements needed to accomplish this option.

#### 4.3.2.2. Option 4: Hawthorne Street to Virginia Street Overcrossing

This option uses the same horizontal alignment as Option 3, but it would cross over the tracks, rather than under (see Figure 13 below).



**Figure 13. Option 4: Hawthorne Street to Virginia Street Overcrossing**

Although the study did not fully investigate impacts from the vertical alignment for Option 4, the profile of the roadway would be a minimum 23 feet 4 inches above the top of track, which likely places the finished grade of the new roadway approximately 40 to 45 feet above the existing ground level, similar to Option 1. The impacts to Hawthorne Street and the surrounding areas from the horizontal geometry would be similar to those described under Option 3. The differences would be the result of longer retaining walls being needed for several hundred feet east and west of the new overcrossing. This option would have similar connectivity issues as Option 2A from South Pacific Avenue to the new crossing. To connect Hawthorne Street to South Pacific Avenue, a new

road would likely need to be constructed via Olive Street or Virginia Street. Additional roadway design in several areas would be needed to investigate completely the impacts and requirements of this option.

## 5. TRAFFIC ANALYSIS RESULTS

For the purpose of analyzing potential traffic circulation impacts, it has been assumed that the grade-separated crossing proposed by this project would replace at least one of the existing at-grade crossings and that Yew Street would be closed. Mill Street could also be closed to traffic, although this is not desired because of impacts to emergency vehicle services. Scenarios considering both these options were evaluated.

### 5.1. TRAFFIC DATA

#### 5.1.1. FUTURE TRAFFIC VOLUMES

To evaluate a range of possible growth scenarios, two growth rates were considered for the study area. An annual growth rate of 0.5 percent per year was initially considered as a low-end scenario that would have little redevelopment or growth in the area west of the railroad tracks. A scenario with a higher growth rate of 2.0 percent per year was added to account for redevelopment at higher densities in some of the study area west of the railroad tracks. These growth rates were applied to the estimated 2011 summer weekday traffic volumes. Only weekday volumes were developed for the future condition, because the weekday volumes were consistently higher than the weekend volumes.

#### 5.1.2. FUTURE TRAFFIC WITH EXISTING AT-GRADE CROSSINGS

The projected weekday traffic for each existing at-grade crossing and growth scenario is presented in Table 2.

**Table 2. Summary of Future (2035) Volume Estimates with Existing At-Grade Crossings**

Railroad Crossing	2035 Weekday Traffic (vehicles/day)	
	0.5% Growth	2% Growth
Mill Street At-Grade	535	765
Yew Street/South River Road At-Grade	2,215	3,160
<b>Total Crossing Volume</b>	<b>2,750</b>	<b>3,925</b>

#### 5.1.3. FUTURE TRAFFIC WITH HAZEL STREET GRADE-SEPARATED CROSSING

Two at-grade crossing closure scenarios were considered: (1) closure of just the Yew Street crossing and (2) closure of both the Yew Street and Mill Street crossings with emergency vehicle access remaining at Mill Street. The projected weekday traffic for each existing at-grade crossing and growth scenario is presented in Table 3.

**Table 3. Summary of Future (2035) Volume Estimates with Hazel Street Grade-Separated Crossing**

Railroad Crossing	2035 Weekday Traffic (vehicles/day)			
	0.5% Growth		2% Growth	
	Low Option 1 (Yew Closed)	Low Option 2 (Both Closed)	High Option 1 (Yew Closed)	High Option 2 (Both Closed)
Mill Street At-Grade	980	0	1,395	0
Yew Street At-Grade	0	0	0	0
Hazel Street Grade-Separated	1,770	2,750	2,525	3,920

If only the Yew Street crossing were to be closed, the estimated weekday volumes across the new Hazel Street crossing are 1,770 vehicles for the low-growth scenario and 2,525 vehicles for the high-growth scenario. The closing of both the Yew Street and Mill Street crossings would result in average daily traffic (ADT) volumes across the new Hazel Street crossing of approximately 2,750 vehicles for the low-growth scenario and 3,920 vehicles for the high-growth scenario. Both growth scenario forecasts are within the volume range typical for a two-lane arterial roadway.

## 5.2. PROPOSED TRAFFIC CONTROL

The Hazel Street railroad crossing will be grade-separated with either a structure crossing over the railroad tracks (an overcrossing) or a new road passing under the railroad tracks (an undercrossing).

### 5.2.1. TRAFFIC CONTROL WITH HAZEL STREET UNDERCROSSING OPTION

Hazel Street/South Pacific Avenue is currently STOP-controlled with a less typical configuration for the three-leg intersection. Because the highest travel movements occur between the Hazel Street leg and the north leg of South Pacific Avenue, these movements flow freely while the south leg of South Pacific Avenue is stopped. With an undercrossing at Hazel Street, the intersection would go from three legs to four legs and alternative traffic control configurations should be considered.

#### 5.2.1.1. Signal Warrant Analysis

From a traffic analysis standpoint, the option that will create the busiest intersection operations would be the undercrossing connection at South Pacific Avenue (Option 1). Therefore, signal warrants were evaluated for that intersection. Because traffic signals generate more average vehicle delay and typically have higher crash rates, a series of criteria or warrants were developed to identify when a traffic signal should be considered. The warrants used most frequently are traffic-volume-based; it is generally desirable for the 4-hour volumes or 8-hour volumes warrant to be met. Preliminary signal warrant analysis would suggest that under existing conditions, the vehicular volumes are not high enough to warrant a signal. Even with the high-growth scenario in 2035 and both at-grade crossings closed, volumes are not expected to warrant a signal at the intersection of Hazel Street and South Pacific Avenue.

#### 5.2.1.2. STOP-Control Options

With the Hazel Street undercrossing option (Option 1), the intersection would go from three legs to four legs, and alternative STOP-control configurations should be considered. There are three typical configurations that could be applied:

- Two-way STOP control that stops traffic on Hazel Street and allows free movement of traffic on South Pacific Avenue.
- Two-way STOP control that stops traffic on South Pacific Avenue and allows free movement of traffic on Hazel Street.
- All-way STOP control that stops traffic on both Hazel Street and South Pacific Avenue.

Although traffic data were not available for peak hours, the daily volumes were assessed assuming that 10 percent of the traffic demand would occur during the peak hour and that 60 percent of the traffic would travel in the peak direction. Based on these assumptions, any of the three STOP-control configurations could be applied to the Hazel Street/South Pacific Avenue intersection with the expectation that stopped traffic would experience relatively short delays.

Two-way STOP control can be applied to all intersections created by the Hazel Street overcrossing options, which would have lower intersection volumes than the undercrossing option.

#### **5.2.1.3. Cross-Section**

A two-lane or three-lane cross-section for Option 1 would be adequate for the forecast traffic demand on Hazel Street. The advantage of the three-lane cross-section would be additional storage capacity in the short section of roadway that would connect between South Pacific Avenue east of the railroad tracks and Milwaukee Place west of the railroad tracks.

#### **5.2.1.4. Traffic Circulation**

The creation of a new railroad crossing at Hazel Street would cause some change in traffic circulation patterns in the area. Traffic to/from the north (i.e., residential neighborhoods, Three Rivers Mall, and downtown) would have to travel farther south than Yew Street/South River Road to cross the railroad tracks. This could result in more demand at the Mill Street crossing. Traffic volumes on South Pacific Avenue between Yew Street and Hazel Street might increase as drivers travel to the Hazel Street crossing. However, this increase might be offset by a reduction in traffic demand to/from the south (i.e., the industrial area and airport), since these drivers would have a shorter travel distance with the new crossing.

### *5.2.2. TRAFFIC CONTROL WITH THE HAZEL STREET OVERCROSSING OPTIONS*

The Hazel Street overcrossing options (Options 2A and 2B) would eliminate the Hazel Street intersection with South Pacific Avenue and route traffic onto Douglas Street instead.

#### **5.2.2.1. Signal Warrant Analysis**

Traffic demand at the Douglas Street/South Pacific Avenue intersection with Options 2A and 2B (Hazel Street overcrossing) would likely be lower than the demand at the Hazel Street/South Pacific Avenue intersection with Option 1 (Hazel Street undercrossing). Therefore, for Options 2A and 2B, signal warrants would not be met at the Douglas Street/South Pacific Avenue intersection.

#### **5.2.2.2. STOP-Control Options**

Options 2A and 2B (Hazel Street overcrossing) would eliminate the Hazel Street intersection with South Pacific Avenue and route traffic onto Douglas Street instead. Two-way STOP control could be applied to the Douglas Street/South Pacific Avenue intersection as well as the new intersections

created by the Hazel Street overcrossing options because all of these intersections would likely have lower volumes than the undercrossing option.

### **5.2.2.3. Cross-Section**

A two-lane cross-section for a Hazel Street overcrossing would be adequate for the forecast traffic demand on Hazel Street. Because intersection spacing would be greater with these options, there is less need for additional storage created by turn lanes.

### **5.2.2.4. Traffic Circulation**

In addition to the traffic circulation changes discussed for the Hazel Street undercrossing option, the overcrossing options would likely affect traffic demand on Douglas Street. Because Hazel Street would no longer connect directly to South Pacific Avenue with the overcrossing options, Douglas Street would become the primary travel route between South Pacific Avenue and Talley Way. Additional evaluation of the intersections along that route and of how an increase in traffic demand could affect traffic flow and safety is recommended.

### **5.2.3. SUMMARY OF THE RESULTS OF TRAFFIC ANALYSIS**

The traffic analysis revealed the following key findings:

- Two-way STOP control at the Hazel Street undercrossing intersection with South Pacific Avenue is adequate for both growth scenarios.
- Two-way STOP control can be applied to the Douglas Street intersection with South Pacific Avenue and the new intersections created by the Hazel Street overcrossing options.
- Given the estimate of peak-period and ADT volumes, a three-lane east/west roadway section for the Hazel Street undercrossing would generally provide for more than adequate operations through year 2035, although a two-lane facility would also work.
- A two-lane east/west section for the Hazel Street overcrossing would provide sufficient capacity.
- A traffic signal would not be warranted for any scenario or option.

## **6. OPTIONS EVALUATION PROCESS**

### **6.1. STAKEHOLDER INVOLVEMENT AND COORDINATION**

A key Stakeholder Group was created to review design concepts from the consultant team; provide community and agency perspective regarding background, key issues, and impacts; and offer guidance and feedback throughout the project evaluation process. The Stakeholder Group included representatives from:

- City of Kelso Engineering
- City of Kelso Planning
- Cowlitz-Wahkiakum Council of Governments (CWCOG)

- Cowlitz County Engineering
- Washington State Department of Transportation Local Programs
- Washington State Department of Transportation Rail
- Three Rivers Golf Course

Four stakeholder meetings were held from September 2011 to March 2012. The meetings progressively reviewed project options, impacts, prioritization of key issues, development of evaluation criteria, costs, community impacts, rail-related issues and the HSR program, and funding needs and opportunities. Along with the evaluation process, discussion and feedback at the meetings helped shape the crossing options. These meetings were followed by an open house in April 2012 that focused primarily on the affected area. Appendix H contains the meeting notes and open house materials.

## 6.2. EVALUATION CRITERIA

Evaluation criteria were developed in response to key issues raised by the Stakeholder Group and City staff. The City and the key stakeholders narrowed the list to eight key criteria. The criteria were prioritized to compare the advantages and disadvantages of each option. Each criterion was weighted based on prioritization, using a scale of 1 (lower priority) to 10 (higher priority). It was emphasized that elements receiving lower priority than others are not unimportant; rather, being on the list of criteria implies that a particular issue is considered extremely important. The prioritization and weighting is meant to reflect the importance of a particular issue relative to the other issues for this particular project.

The criteria, their weighted values, and scoring are described as follows:

1. *Neighborhood Safety.* Weighted 10 points. (What is the relative safety of the option based on increased traffic to residential areas, and safest environment for nonmotorized users? Scoring: 5 for best; 1 for worst.)
2. *Construction Costs.* Weighted 9 points. (Which option costs the least? Scoring: 5 for lowest; 1 for highest.)
3. *Complete Property Acquisitions.* Weighted 7 points. (Which option requires the fewest number of complete acquisitions of lots/buildings? Scoring: 5 for least impact; 1 for most impact.)
4. *Constructability.* Weighted 7 points. (Which option has the lowest risk for potentially significant impacts to safety, cost, or construction feasibility during construction? Scoring: 5 for least; 1 for highest.)
5. *Environmental Impact.* Weighted 5 points. (Which option has the least impact on the natural and built environments and, therefore, has the least risky environmental documentation process? Includes natural resources, visual, and socioeconomic/economic issues. Scoring: 5 for lowest; 1 for highest.)

6. *Redevelopment Opportunity*. Weighted 4 points. (Which option creates opportunities for future redevelopment of either remnant parcels of land remaining, or on land adjacent to the realignment? Scoring: 5 for most opportunities; 1 for least.)
7. *Long-Term Maintenance*. Weighted 4 points. (Which option commits the City to the highest long-term maintenance cost? Scoring: 5 for best; 1 for worst.)
8. *Partial Property Acquisitions*. Weighted 3 points. (Which option has the least overall need to acquire land from existing properties? Scoring: 5 for least impact; 1 for most impact.)

Each of the five options was then evaluated against the others based on the evaluation criteria and ranked from 1 to 5. A weighted score was then calculated multiplying the weight of each respective criterion by its ranking and then totaling the scores. The highest possible score was 245.

### 6.3. RESULTS OF OPTIONS EVALUATION

The results of the weighted total scores are shown in Table 4 below.

**Table 4. Summary Results of Options Evaluation**

Hazel Street Crossing Location			Hawthorne Street Crossing Location	
Option 1 - Under	Option 2A - Over	Option 2B - Over (Raise S Pacific Ave)	Option 3 - Under	Option 4 - Over
176	213	117	83	107

The full scoring results for each option are included in Appendix I.

It is important to note that while Option 2A scored the highest, there appeared to be a clear separation between Options 1 and 2A at Hazel Street over the other options. This was primarily attributed to these options' lower likelihood of introducing additional through traffic into the neighborhood east of South Pacific Avenue, fewer property impacts, and lower environmental impacts from a new street extension near 13<sup>th</sup> Street. Underpass options become significantly more cost-prohibitive because of the shoo-fly, groundwater, and drainage issues.

A discussion of how the options met each evaluation criterion is provided below.

#### 6.3.1. NEIGHBORHOOD SAFETY

During the evaluation process, the most important criterion for any option was maintaining neighborhood safety. All of the grade-separated options will provide improved safety over existing at-grade crossings.

Option 1 limits local traffic impacts to the adjacent neighborhood to the east. The most significant change is the Hazel Street and South Pacific Avenue relocation and improvements to the South Pacific Avenue and Douglas Street intersection.

Option 2A is similar to Option 1, with the majority of traffic remaining on Hazel Street and South Pacific Avenue. However, this option extends South 3<sup>rd</sup> Avenue from Hazel Street to Douglas Street to maintain left-turn circulation from South Pacific Avenue into the neighborhood (and access onto the overpass). This introduces a new local circulation pattern through Douglas Street, South Pacific

Avenue, and Hazel Street. It also will require pedestrians to use a stairway or ramp to access the overpass.

Option 2B appears to have somewhat greater impacts than Option 2A because of the significant impact from raising South Pacific Avenue. A new access to the existing properties at the west end of Hazel Street would be required and the intersection of South Pacific Avenue and Virginia Street would also need to be raised to the new elevation of the roadway. There would be extensive construction of retaining walls that would restrict pedestrian circulation.

Options 3 and 4 introduce additional through traffic to Hawthorne Street, affecting traffic patterns with pedestrians and thereby neighborhood safety. Both options convert Hawthorne Street to a through street, effectively converting a local street to a collector.

### *6.3.2. CONSTRUCTION COSTS*

BNSF and Amtrak need to maintain full operation through the corridor at all times. For any undercrossing option to be constructed, the project would need to provide a temporary shoo-fly designed to meet current capacity and design speeds. The cost of a temporary shoo-fly is estimated to be \$15 million, which would be added to the cost of construction of all undercrossing options.

Option 1 is estimated at \$51 million for design and construction, which includes a temporary railroad shoo-fly and stormwater pump system.

Option 2A is estimated at \$24 million for design and construction. This option would not require a temporary railroad shoo-fly nor would it require groundwater management.

Option 2B is estimated at \$33 million for design and construction. This option is more expensive than Option 2A because of the increased length of retaining walls along South Pacific Avenue and Hazel Street.

Option 3 is estimated at \$56 million. In addition to requiring a shoo-fly and groundwater management, it would also require roadway widening and right-of-way acquisition from several properties along Hawthorne Street and Virginia Street.

Option 4 is estimated at \$28 million. In addition to the same improvements as under Option 2, it would require roadway widening and right-of-way acquisition from several properties along Hawthorne Street and Virginia Street.

### *6.3.3. COMPLETE PROPERTY ACQUISITIONS*

Option 1 would eliminate fewer industrial buildings just east of South Pacific and south of Hazel Street in the MH (Kelso) zone than Options 2A and 2B. Most of the alignment crosses property that is underdeveloped or undeveloped in AG (Cowlitz County), OPN (Kelso), RMF (Kelso), and RSF-10 (Kelso) designations.

Option 2A would directly impact several industrial buildings on Hazel Street, and possibly reconstruct accesses on Douglas Street. Option 2B would have industrial displacement impacts east of the tracks that are similar to Option 1. However, Option 2B angles through the area, potentially

displacing structures near River Road, although the impacts might be able to be minimized depending on details of final design.

Options 3 and 4 would acquire full properties on commercially zoned (C-2) and residentially zoned land just east of the tracks. At least one full industrially zoned parcel (ILM) would be acquired at 13<sup>th</sup> Avenue. Land and/or residences (zoned RSF-10) would be acquired for the new right-of-way along the Option 3 and Option 4 alignments to South River Road.

#### *6.3.4. CONSTRUCTABILITY*

Major constructability issues with the undercrossing Options 1 and 3 include addressing groundwater and significant impacts from the footprint that a shoo-fly creates. The shoo-fly would require temporary easements along several properties west of the railroad tracks, and groundwater would need to be managed during construction. South Pacific Avenue will most likely have to be temporarily closed during construction.

Option 2A has the least constructability issues of all the options presented, because overpass work can be done without major impact to the railroad and local traffic.

Option 2B would have more complex staging and traffic control than Option 2B because of the need to raise the elevation of South Pacific Avenue. Maintaining traffic flows during construction would be challenging. Significant rerouting of motor vehicle traffic would be required, as well as making sure rail traffic is not impacted.

Option 4 has similar constructability issues to Options 2A and 2B, but has additional issues such as a second crossing of sensitive areas and conversion of a residential street into a collector road.

#### *6.3.5. ENVIRONMENTAL IMPACTS*

##### **6.3.5.1. Land Use**

In general, Options 1, 2A, and 2B are more compatible with existing uses than Options 3 and 4. The greater consistency comes from the location of the alignments, which separate the recreation uses in the south of the area and the largely residential uses to the north. The alignments of Options 1, 2A, and most of Option 2B cross property that is underdeveloped or undeveloped in AG (Cowlitz County), OPN (Kelso), RMF (Kelso), and RSF-10 (Kelso) designations. Option 2A, east of the tracks, is likely to cause increased traffic along the new connection between Douglas Street and Hazel Street, possibly attracting more traffic closer to the residential area. West of the tracks, Options 2A and 2B would separate the residential area to the north from the recreation development to the south, similar to Option 1. Both Hawthorne options (Options 3 and 4) would tend to bisect the residential area west of the tracks and are likely to add additional recreation and possibly future industrial traffic through the residential neighborhoods east and west of the tracks. The addition of such traffic may adversely impact the livability of the neighborhoods more than the other options would.

### 6.3.5.2. Visual Quality

Visually, the bridge would dominate the immediate area, since the approach would be raised. It was considered in the evaluation process that the overpass Options 2A and 2B and 4 would have the greatest visual impact because they are located closest to the study area.

### 6.3.5.3. Wetlands

All options would impact the wetland swale. Options 1, 2A, and 2B would have the smallest impacts. Options 3 and 4 would have a larger impact on wetlands because they would cross presumed sensitive areas just west of South 13<sup>th</sup> Avenue.

### 6.3.5.4. Hazardous Materials

The consultant team accessed existing databases on the Washington Department of Ecology website for reports of hazardous materials. Relevant hazmat site databases were searched for sites within one-quarter mile of the study area. The searches revealed 15 underground storage tanks at six sites, which are shown on the map below. The table in Appendix J lists the addresses and status of the underground storage tanks. All are either closed in place, in operation, or removed.



**Figure 14. Hazardous Materials Search Results**

### 6.3.6. REDEVELOPMENT OPPORTUNITY

All options could encourage future growth in the area because of enhanced access. There are approximately 65 acres of land zoned RSF-10. A maximum build-out could contain up to 260 single-family residences based on a maximum build-out of four units per acre. The actual density would depend on land needed for streets, and any site or building constraints, such as critical areas.

Perhaps 15 acres of land south of the unincorporated area is zoned RMF, Residential Multifamily, which allows a maximum density of 32 units per acre. Thus, more than 400 multifamily units could be permitted, again, not accounting for site constraints such as wetlands. West of River Road there is another area of RMF-zoned land and a pocket of land zoned ILM. However, this area's proximity to the shoreline, the potential presence of other critical areas, and the lack of access could prevent the land from being developed for the zoned densities and uses.

Future development hinges somewhat on the timing for provision of sanitary services to the residential areas not currently served as well as incorporation of the AG area, if appropriate. Options 1 and 2A, by providing a logical separation of residential from recreation and industrial zones, could be more likely to attract future development. Option 2B would remove more residential and industrial land from future development than Options 1 and 2A. The Hawthorne Street alignment options are likely to remove the most amount of land available for development or redevelopment in commercial, industrial, agricultural, and residential designations because of the extension to South 13<sup>th</sup> Avenue.

However, future development under any of the options may also depend on clarifying the vision for the area by reconciling the plan and zoning inconsistencies, and on the presence of existing nonconforming uses, as discussed earlier in this report. These include the residential large lot patterns west of the tracks, the comprehensive plan references to a proposal for a regional shopping mall to replace the golf course, and the planned retail/commercial/office designation on the Land Use Plan for Kelso.

#### *6.3.7. LONG-TERM MAINTENANCE*

All options would require maintenance of the roadway, retaining walls, and water quality facilities for the life of the road. The undercrossing Options 1 and 3 would have the greatest long-term maintenance requirements due to the need for a pump station for storm drainage and fluctuating groundwater. Option 2B would follow as requiring the next-greatest level of long-term maintenance because of the increased number of retaining walls that are part of this option. The overcrossing Options 2A and 4 would require the least amount of maintenance compared to the other options, but would require the maintenance associated with a longer structure over South Pacific Avenue and the BNSF tracks.

#### *6.3.8. PARTIAL PROPERTY ACQUISITIONS*

Under Option 1, a corner of the Three Rivers Golf Course property would be acquired for the roadway, and the shoo-fly would temporarily impact the northeastern boundary of the Three Rivers Golf Course. Options 2A and 2B would also acquire a corner of the golf course property for the roadway, but because there would be no shoo-fly required, it would avoid the temporary impacts of Option 1 on the golf course. Options 3 and 4 would acquire partial rights-of-way to the east and west of the tracks.

## 7. RECOMMENDATION

At the September 2011 Stakeholder Group meeting, the following options were presented: Hazel Street undercrossing and overcrossings, and a Hawthorne Street alignment. General discussion included the typical section, design (arterial or collector), and design speed. Other issues discussed were emergency response times and the closure of both at-grade crossings, airport height restrictions (a maximum of 44 feet), bicycle and pedestrian connectivity, utilities, intergovernmental agreements, and the addition of representatives from the airport and the diking district to the Stakeholder Group. At this meeting, it was recommended that we focus on a crossing at the Hazel Street location, shown in Options 1 and 2.

At the December 2011 Stakeholder Group meeting, modified typical sections were presented, along with more advanced designs showing retaining wall locations, potential drainage and water quality issues, groundwater information, and airport flight path information. The pros and cons of three options were discussed: Option 1, Undercrossing at Hazel; Option 2A, Overcrossing at Hazel (with Douglas Street or Virginia Street connections); and Option 2B, Overcrossing at Hazel (raises South Pacific Avenue). Other topics raised for discussion were: sight distance issues at the connection to South River Road, straight alignment versus curvature approaching River Road to minimize building impacts (west of the tracks), traffic impacts to the residential neighborhood east of South Pacific Avenue, and impacts and challenges of the Hawthorne options that appear to make the Hazel options preferable.

Based on the evaluation process, the Hazel Street overcrossing Option 2A was recommended as the preferred option for further development. The recommendation is based on the fact that the Hazel Street overcrossing option provides the most optimal balance in regard to the evaluation criteria.

## 8. FUNDING STRATEGY

With gas and sales tax revenues in decline, this is a very difficult time to seek funding for new projects. Thus, in the near term, the strategy should be to focus on preparing the needed information and a network of support so that the project will be well positioned to take advantage of funding opportunities. The timing for such an opportunity is dependent upon external events such as an economic recovery, development needs to the west of the track, and the Kelso–Martins Bluff Project.

The City's strategy should include developing the following:

- Use of this study to show the need for the project and preferred crossing location
- Local support for the project, including an individual to act as a champion for the project, if possible
- A capital reserve to use as a local match when state and federal funds become available

## 8.1. POTENTIAL FUNDING SOURCES

### 8.1.1. LOCAL

- City budget – including allocations from the state from gas tax and vehicle registration.
- Public Works Trust Fund – [www.pwb.wa.gov](http://www.pwb.wa.gov).

### 8.1.2. SYSTEM DEVELOPMENT CHARGES

- Transportation
- Stormwater

### 8.1.3. STATE

- **Washington Utilities and Transportation Commission (Commission), Grade Crossing Protective Fund (GCPF).** This fund provides grants for projects that eliminate or mitigate public safety hazards at railroad crossings and along railroad rights-of-way in Washington State. Any public, private or nonprofit entity may submit an application to the Commission for a GCPF grant–  
<http://www.utc.wa.gov/publicSafety/railSafety/Pages/gradeCrossingProtectionFundGrants.aspx>

- **Washington State Department of Transportation, Highways and Local Programs.** The “Safe Routes to School” program provides funds to improve safety and mobility for children. The purpose is to enable and encourage them to walk and bicycle to school. Funding from this program is for projects within two miles of primary and middle schools (K-8) and will be targeted to address engineering improvements, education and encouragement activities, and enforcement.

The Google Maps “directions” feature measures the distance between Milwaukee Place and Wallace Elementary School as approximately one mile, using the Yew Street crossing, potentially qualifying that crossing for funding–

<http://www.wsdot.wa.gov/localprograms/>

- **Washington State Department of Transportation, Highways and Local Programs.** WSDOT distributes federal safety money to cities and counties in Washington State to reduce fatal and serious injury collisions. Funds come from the [Federal Transportation Act \(SAFETEA-LU\)](#). Washington State’s plan is called [Target Zero](#). The City Safety Program and the County Safety Program fund improvements to reduce fatal and serious injury collisions on city and county streets (and managed access to state highways in cities with a population above 25,000). The City Safety Program distributes funds from [SAFETEA-LU](#)’s Federal Highway Safety Improvement Program (HSIP). The County Safety Program distributes funds from [SAFETEA-LU](#)’s Federal HSIP and High Risk Rural Roads Program (HRRRP). The most recent projects were selected in early 2012. Contact the [Traffic Services Manager](#) for more information.
- **Transportation Improvement Board.** The Washington State Legislature created the Transportation Improvement Board (TIB) to foster state investment in quality local transportation projects. The TIB distributes grant funding, which comes from the revenue generated by three cents of the statewide gas tax, to cities and counties for funding transportation projects. The TIB provides funding for population centers of

over 5,000 through three grant programs: Urban Arterial Program, Urban Corridor Program, and Urban Sidewalk Program (SP).

Eligible projects must be located within the federally designated urban area in compliance with the Growth Management Act. Projects are usually large in scale, with multiple funding sources ranging from local contribution to private developer fees. These projects are selected annually on a competitive basis. Each program has distinct characteristics for the best-suited project, and the Kelso railroad crossing may qualify under the Urban Corridor Program. The web page is:  
<http://www.tib.wa.gov/grants/urban/UrbanOverview.cfm>.

#### 8.1.4. FEDERAL

- **Surface Transportation Program (STP).** STP funds are apportioned to states by formula, a portion of which must be used for safety (10 percent), enhancement (10 percent), and allocated by formula to urbanized and rural areas in the state. STP funds may be used for planning, construction, reconstruction, rehabilitation, and operational highway improvements.

**U.S. Department of Transportation – Rail Highway Crossing Hazard Elimination in High Speed Rail Corridors Program.** Section 1103f of this funding source is administered by WSDOT’s Rail Office. States along the 11 federally designated high-speed rail corridors are eligible to apply, including the Pacific Northwest Rail Corridor. This program, jointly administered by the FRA and the Federal Highway Administration, provides support for safety improvements at both public and private highway-rail grade crossings along federally designated high-speed rail corridors.

- **U.S. Department of Transportation – Elimination of Hazards Relating to Railway-Highway Crossings. Title 23 provides** for the funding of highway maintenance and repair, to be implemented by state departments of transportation. Section 1401(d) allows funds for the cost of construction of projects for the elimination of hazards of railway-highway crossings, including the separation or protection of grades at crossings, the reconstruction of existing railroad grade crossing structures, and the relocation of highways to eliminate grade crossings. WSDOT is the agency that manages these funds through the Highways and Local Programs, described above.
- **U.S. Department of Transportation – Capital Grants for Rail Line Relocation and Improvement Projects.** This program provides support to construction projects undertaken for the improvement of the route or structure of a rail line that meet the following criteria: are carried out for the purpose of mitigating the adverse effects of rail traffic on safety, motor vehicle traffic flow, community quality of life, or economic development; or involve a lateral or vertical relocation of any portion of the rail line. Eligible construction projects include locating, surveying, and mapping; track and related structure installation, restoration, and rehabilitation; acquisition of rights-of-way; relocation assistance, acquisition of replacement housing sites, and acquisition and rehabilitation, relocation, and construction of replacement housing; and elimination of obstacles and relocation of utilities. Eligible pre-construction activities are also supported. The application deadline is in fall 2012.

## 8.2. FUNDING STRATEGY RECOMMENDATIONS

To increase the chance of leveraging various funding sources in the future, the discussion should focus on highlights that address and connect the variety of issues, impacts, and challenges as the HSR program is built out in the region, including:

- Safety and livability of those in the affected community
- Increased rail crossing safety necessary for pedestrians, bicyclists, and motor vehicles
- Increased transportation connectivity
- Stormwater treatment benefits
- Potential developments to the west of the BNSF tracks

The funding strategy should be discussed with local, state, and federal officials to assess their willingness to help, hear their suggestions, make revisions, and prepare for next steps. The coalition might include the following groups:

- City of Kelso
- WSDOT Rail
- Property owners in the area
- Development interests west of the BNSF tracks
- Community groups such as the Kelso-Longview Chamber of Commerce

In preparing to request funding, the City of Kelso should prepare an amendment to the Statewide Transportation Improvement Program (STIP). Projects must be in the STIP to be eligible for state and federal funding. The schedule for adding a project to the STIP is shown on the web page [www.wsdot.wa.gov/LocalPrograms/ProgramMgmt/STIP.htm](http://www.wsdot.wa.gov/LocalPrograms/ProgramMgmt/STIP.htm).

## 9. NEXT STEPS

It is important to maintain the momentum initiated by this study process. The Kelso–Martins Bluff Project portion of the HSR program will proceed and is scheduled for completion in 2017. The approximate timeline for a grade-separation project by the City could take three to four years, allowing for preliminary and final engineering design, environmental documentation and approvals, bidding, and construction. This does not include the time needed to secure funding from the variety of sources that need to be considered.

The study effort represents the City’s significant commitment to being proactive in addressing the impacts of the HSR project. This study provides a solid foundation for the City to work with BNSF, WSDOT, Cowlitz County, key stakeholders, and the affected area of the community as the HSR project moves forward. It prioritizes issues, and proposes solutions to challenges such as safety, connectivity, constructability, and cost. It also separates two intertwined efforts—a major railroad improvement with very broad regional benefits, and a local transportation connection that is necessary to maintain safety for residents, commuters, and businesses. South Pacific Avenue serves as a major north/south connection in the area that serves City and County citizens.

Funding for public works projects is extremely competitive. Jurisdictions that invest resources, as the City has done, to examine and solve critical issues before submitting funding applications often have a competitive advantage over other proposed projects that have not invested in such a process. The partnering spirit developed through the stakeholder process should be continued to build support for completion of the grade-separation project. This type of support is essential in positioning for funding, and in addressing the long-term impacts of the HSR program with residents and businesses, not only in Kelso but also in neighboring Cowlitz County.

The following is a brief summary of steps to be taken to bring the grade-separation project to completion:

- Coordinate with BNSF and WSDOT for the HSR program (scheduled completion 2017) – Be an active stakeholder to the highest degree possible. During the design process there are often opportunities to solve various design issues. City staff should maintain close contact with BNSF and WSDOT to stay abreast of the HSR program schedule and design details, understand where available options are presented in the design that could help facilitate the grade-separation project, and use that relationship to help build wider regional support for funding.
- Seek regional support and funding – Circulate among partner agencies represented in the Stakeholder Group to develop support to compete for funding at the state and federal level. Actively apply for and seek funding from available sources. Build support, urgency, and enthusiasm among City stakeholders such as the City Council. Use materials developed in the study to reach out to constituents of the CWCOC as well as others, such as the Cowlitz County Commissioners, as opportunities present themselves.
- Engineering design – Although not yet scheduled due to funding, consider developing a program in which sufficient survey and design could be started quickly and accomplished in

order to move into the environmental clearance process. Final design must be completed in order to finalize land acquisitions and bid the project, but it is important to move into the environmental approval process as early as possible.

- Obtain environmental approvals – This process often becomes the critical path. There are a number of issues to be fully documented, such as geotechnical and environmental justice issues, and impacts on environmentally sensitive areas. It is necessary to obtain all environmental clearances to use federal funding to purchase right-of-way. This project will require several complete acquisitions as well as a number of partial land acquisitions that are not fully identified in this study due to its preliminary nature.
- Right-of-way acquisition – As early as possible in the preliminary design process, consider identifying the complete acquisitions, so appraisals can occur early on.
- Construction – The overcrossing options allow more flexibility to separate the HSR schedule from the grade-separation project schedule. To avoid potential complications and safety issues with access across the railroad right-of-way during construction (for example, residents, emergency services, and golf course users), careful consideration of how to stage and sequence the grade-separation project during preliminary design is needed. Advanced coordination with area residents, businesses, and emergency services will be necessary.