Cook Road Corridor Study
Final

Prepared for

SCOG
SKAGIT COUNCIL OF GOVERNMENTS

November 2017

Prepared by
Parametrix

Cook Road Corridor Study

Prepared for

Skagit Council of Governments
204 W. Montgomery
Mount Vernon, WA 98273

Prepared by

Parametrix
719 2nd Avenue, Suite 200
Seattle, WA 98104
T. 206.394.3700 F. 1.855.542.6353
www.parametrix.com

November 2017

CITATION

Parametrix. 2017. Cook Road Corridor Study. Prepared by Parametrix, Seattle, WA. November 2017.

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

LOS	Level of Service
I-5	Interstate 5
BNSF	Burlington Northern Sante Fe
WSDOT	Washington State Department of Transportation
SCOG	Skagit Council of Governments
SR	State Route
Marine Cargo Forecast	2016 Draft Washington State Marine Cargo Forecast
FRA	Federal Railroad Association
SPUI	Single Point Urban Interchange
NHFN	National Highway Freight Network
NHS	National Highway System
STP	Surface Transportation Program
STBG	Surface Transportation Block Grant
HSIP	Highway Safety Improvement Program
RAP	Rural Arterial Program

EXECUTIVE SUMMARY

The Cook Road corridor is a critical link in Skagit County's transportation network, providing freight access between I-5 and the City of Sedro-Woolley to the east, and a bypass to the congested SR 20 corridor through Burlington. Cook Road serves important general purpose, freight, industrial, and agricultural transportation needs and is intersected by the Burlington Northern Santa Fe (BNSF) mainline, which currently serves up to 21 trains per day. The Cook Road corridor has been identified as a priority in several studies, including the Skagit Council of Governments' (SCOG) Rail Crossing Study, the Joint Transportation Committee's Road-Rail Conflicts Study, and the Washington State Department of Transportation's (WSDOT) Draft Candidate Urban and Rural Freight Corridors Program. Cook Road is also included in the Skagit 2040 Regional Transportation Plan as a fiscally-constrained project. High vehicle volumes in the Cook Road corridor currently cause congestion that frequently extends onto I-5 and creates travel delay for both general purpose and freight traffic in the corridor. This is compounded by added delay from train crossing closures that can block east-west travel for up to 33 minutes per day.

Both train and vehicle traffic is expected to grow in Skagit County in the future and diversion from I-5 to Cook Road and other surface streets is expected. In addition to future growth in vehicle traffic that could result in up to 20,000 vehicles per day in the corridor, the City of Sedro-Woolley recently completed the realignment and extension of State Route (SR) 20 and Cook Road, which has shifted freight vehicles to the Cook Road corridor. Growth in train traffic could result in an additional 68 minutes of delay for a total of up to approximately one hour 45 minutes of delay per day by 2040.

This Cook Road Corridor Study analyzed existing and future transportation impacts in the Cook Road corridor and evaluated both short-term and long-term alternatives to improve operations. Short-term alternatives included modifying traffic control at the I-5 off-ramps, increasing vehicle storage on the I-5 northbound off-ramp, and increasing capacity on Cook Road. Long-term alternatives had higher costs and would fully grade-separate Cook Road from the BNSF mainline.

This study concluded the following:

- Traffic congestion and delay in the corridor is and will continue to be problematic, and
- Conflicts between vehicles and the rail line should be addressed.

It is recommended that a short-term alternative be implemented to address congestion and delay in the Cook Road corridor. The short-term solution includes the following:

- Signalize both the I-5 southbound and northbound ramp termini;
- Increase capacity on the I-5 northbound off-ramp; and
- Increase capacity on Cook Road between the I-5 Northbound ramps and Green Road.

Additionally, it is recommended that additional refinement and vetting is needed in order to move forward with one of the long-term grade separation alternatives. A three to five percent design effort is recommended to identify and address major trade-offs.

1. INTRODUCTION

The Cook Road corridor is a critical link in Skagit County's transportation network, providing freight access between I-5 and the City of Sedro-Woolley to the east, and a bypass to the congested SR 20 corridor through Burlington. Cook Road serves important general purpose, freight, industrial, and agricultural transportation needs and is intersected by the Burlington Northern Santa Fe (BNSF) mainline, which currently serves up to 21 trains per day. The Cook Road corridor has been identified as a priority in several studies, including SCOG's Rail Crossing Study and the Joint Transportation Committee's Road-Rail Conflicts Study, and is designated by WSDOT as a Critical Rural Freight Corridor. Cook Road is also included in the Skagit 2040 Regional Transportation Plan as a fiscally-constrained project. High vehicle volumes in the Cook Road corridor currently cause congestion that frequently extends onto I-5 and creates travel delay for both general purpose and freight traffic in the corridor. This is compounded by added delay from train crossing closures that can block east-west travel for up to 33 minutes per day.

Both train and vehicle traffic is expected to grow in Skagit County in the future and diversion from I-5 to Cook Road and other surface streets is expected. In addition to future growth in vehicle traffic that could result in up to 20,000 vehicles per day in the corridor, the City of Sedro-Woolley recently completed the realignment and extension of SR 20 and Cook Road, which has shifted freight vehicles to the Cook Road corridor. Growth in train traffic could result in an additional 68 minutes of delay for a total of up to approximately one hour 45 minutes of delay per day by 2040.

This study analyzed existing and future transportation impacts in the Cook Road corridor and evaluated alternatives to improve operations. The information contained in this report will help stakeholders to prepare for and secure funding for future planning and design phases. As shown on Figure 1-1, the project is in the early stages of identifying the problem and developing a project definition. Stakeholder and public input collected through this study provided guidance on selecting a solution for the corridor so that the project can be competitive for Federal and State grant opportunities.

Figure 1-1. Project Implementation Process

2. OUTREACH

Outreach is an important piece of the planning process and was completed for both the general public and local agencies and stakeholders. Outreach for the Cook Road Corridor Study was conducted through a public meeting as well as focused outreach with key stakeholders.

2.1 Stakeholder Outreach

Coordination with key stakeholders and local agencies was completed throughout this project to help identify local community needs and ensure construction feasibility of any of the alternatives. Key stakeholders included:

- City of Sedro-Woolley
- Skagit County
- WSDOT
- SCOG

At the beginning of the project process, a kick-off meeting was held with key stakeholders and local agencies to identify potential strategies for grade separating the crossing. The kick-off meeting also allowed key stakeholders to provide information on agency priorities and other concerns in the project area.

Throughout the study, the key stakeholder group provided feedback and input on the alternatives at a series of meetings.

2.2 Public Meeting

A public meeting was held to inform community members about the Cook Road Corridor Study and collect feedback on the process and alternatives. The public meeting was held on February 7th at Allen Elementary School. The meeting was advertised through SCOG's website and flyers were also delivered to businesses in the project vicinity.

The meeting focused on providing information about the project process and context to the public. Attendees were asked to provide feedback on the design challenges associated with either providing a grade-separated Cook Road over Old Highway 99 or providing an elevated intersection of Cook Road and Old Highway 99. There were approximately 20 attendees, which included public agency representatives, Skagit County residents, and local businesses. The major findings from the meeting included:

- Concerns with congestion on the I-5 northbound off-ramps;
- Concerns with traffic congestion on Cook Road in both the AM and PM peak periods;
- Desire for rail crossing to be grade separated;
- Concerns with delay for emergency vehicles near the interchange and rail crossing;
- Impacts to businesses from driveway access changes or train crossing activity; and
- Impacts from high volumes of freight trucks.
- Impacts to agricultural uses

Attendees also provided design suggestions, which included adding additional lanes, constructing roundabouts, moving the I-5 ramps, moving the rail line, and constructing bypass lanes.

3. TRANSPORTATION CONDITIONS ANALYSIS

Both existing and future transportation conditions were evaluated as part of this study to provide an understanding of both existing and potential future impacts. Analysts reviewed traffic volume data, freight truck volumes, intersection operations, train volumes, daily gate-down time, and existing land use and agricultural facilities. The study area for the Cook Road corridor Study is shown on Figure 3-1.

Figure 3-1. Study Area

Traffic operations in the study area were analyzed using two separate software programs called SimTraffic and Sidra:

- SimTraffic is a microsimulation traffic operations model. In microsimulation models, each individual vehicle is explicitly modeled as it travels along the roadway network. Each vehicle interacts with other vehicles on the network, and with the various elements of the transportation network such as stop signs, signals, and rail crossings. Because each vehicle is explicitly modeled, SimTraffic accounts for congestion in one location spilling back through the transportation network and affecting other locations. SimTraffic is also capable of capturing the effects of a rail crossing event, which may only happen once during the analysis period but have impacts to traffic even after the train crossing event is over.
- Sidra is a deterministic traffic operations model. Unlike microsimulation models that evaluate each vehicle, deterministic models perform calculations based on vehicle flow and roadway capacity assumptions. Sidra does not fully capture the effects of congestion spilling back through the transportation network. It also outputs typical conditions, and does not capture the effects of events such as rail crossing closures, which may only happen once during the analysis period.

SimTraffic was used as an analysis tool because it can model the effects of a train crossing event on the roadway network; however, SimTraffic has limited capabilities to analyze roundabouts. Sidra is a robust roundabout analysis tool but its ability to capture the effects of network spillback is limited. During a rail crossing event, the operational impact of the at-grade rail crossing is the primary factor determining how the transportation system operates. This is because congestion from the rail crossing closure can spill back from the at-grade crossing and affect other nearby intersections in the roadway network. Because all roundabouts were analyzed using Sidra, the operational results for roundabouts do not account for the congestion spilling back from the at-grade crossing.

3.1 Existing Conditions

The existing conditions analysis evaluated transportation facilities and operations for the year 2016.

3.1.1 Traffic and Freight Volumes

Traffic counts were collected at study area intersections in November 2016. Traffic volumes during the PM peak hour (4:30-5:30 PM) are shown on Figure 3-2. The traffic volume counts indicated that through movements along Cook Road are higher and traffic flow is more concentrated in the eastbound direction. There is also a high volume of right-turning vehicles at the I-5 northbound off-ramp during the PM peak hour.

Freight truck volumes are also high on Cook Road. Cook Road is currently designated a freight class T-2 route in Washington State's Freight and Goods Transportation System (FGTS). Currently, freight truck traffic makes up approximately 10 to 12 percent of daily traffic.

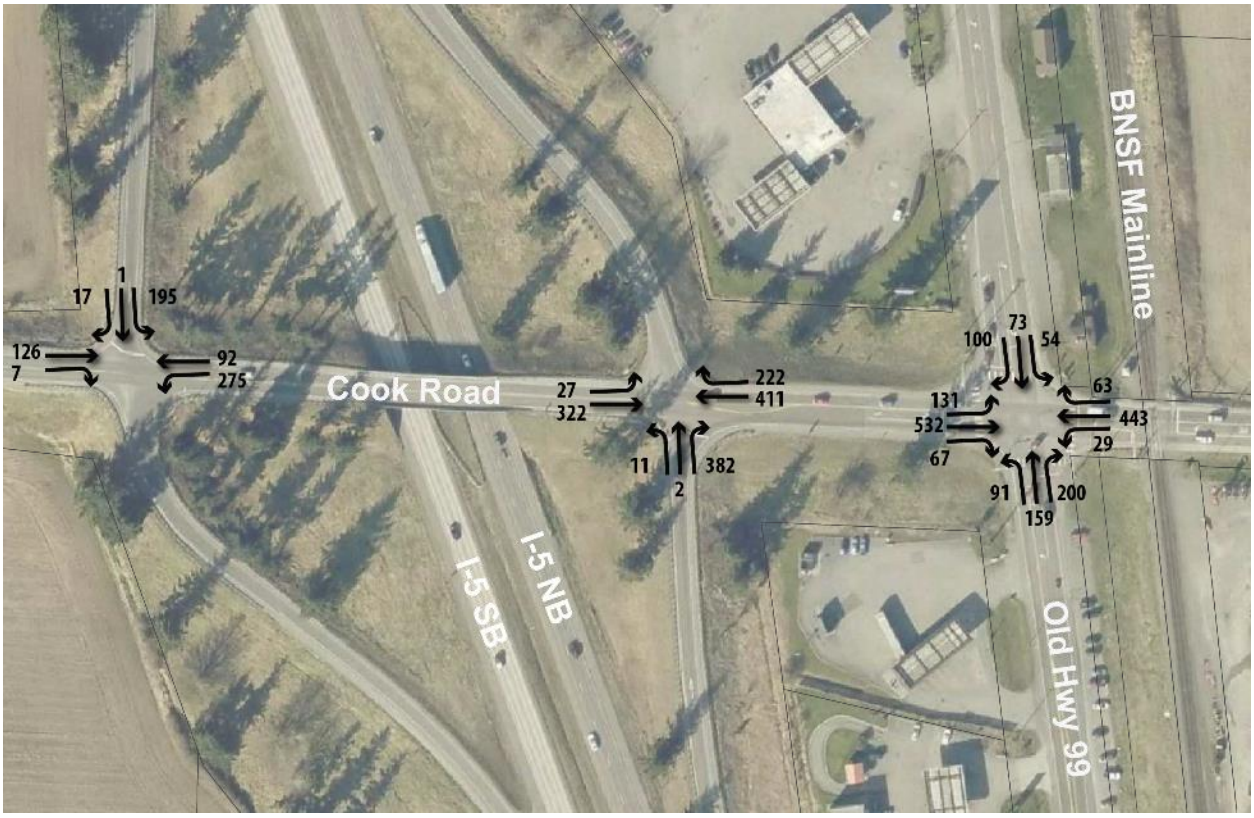


Figure 3-2. Existing (2016) PM Peak Hour Traffic Volumes

3.1.2 Train Volumes and Gate-Down Time

Train volume data at the mainline crossing on Cook Road was provided by BNSF. Currently, there are an average of 17 freight trains per day and 4 passenger trains per day. Freight trains travel at a speed of approximately 45 miles per hour and passenger trains travel at a speed of approximately 50 miles per hour. It is estimated that with this volume of train traffic, Cook Road is closed to traffic for approximately 33 minutes per day. It is important to note that the disruption to traffic movement is longer than 33 minutes per day because congestion impacts vehicles even after the crossing re-opens. When a train crossing event occurs during congested travel periods, it often takes additional time for vehicle queuing to dissipate and the road network to fully recover after the crossing is open.

Train crossing and vehicle queuing data was collected in December 2016 to provide information on how queuing in the Cook Road corridor is affected by train crossing events, train volume and gate-down time (amount of time the crossing is closed to traffic). Data was collected during the PM peak period, between 4:00 and 7:00 PM, when traffic volumes are highest. Figure 3-3 displays the locations where queuing information was collected as well as the length of roadway available to store queued vehicles.

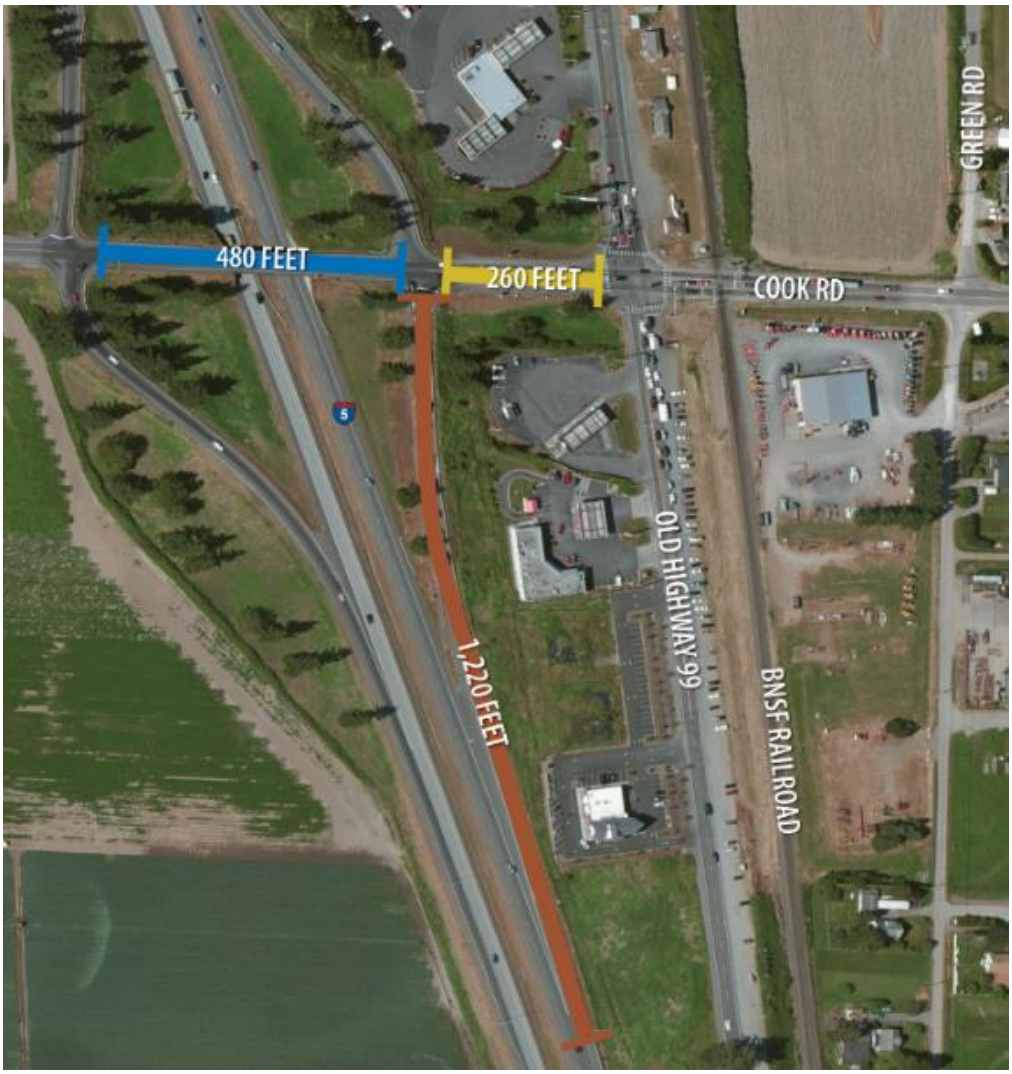


Figure 3-3. Roadway Storage Lengths for Queuing Vehicles

There were two train crossing events during the PM peak hour when data was collected. The train crossing events closed the rail crossing for between approximately 2 minutes and 3 minutes 30 seconds. As summarized in Table 3-1, both the maximum and average queue lengths were longer during and immediately after a train crossing event, except for on Cook Road east of the I-5 northbound off-ramp. Queuing was similar on this roadway segment from 4:00 PM to 5:00 PM compared to during and immediately after a train crossing event, likely because this roadway segment is relatively short and the eastbound volume is relatively high.

Table 3-1. Comparison of Existing Queue Lengths with and without Train Crossing Event

	Queue Length 4:00-5:00 PM		Queue Length During and 10 minutes after Train Crossing Event	
Roadway Segment	**Average**	**Maximum**	**Average**	**Maximum**
Cook Road east of the I-5 northbound off-ramp	228	260 (FULL)	222	260 (FULL)
Cook Road overpass west of the I-5 northbound off-ramp	64	300	213	480 (FULL)
I-5 northbound off-ramp	206	650	787	1220 (FULL)

Figure 3-4 displays the queuing that was recorded for every one-minute period between 4:00 and 6:00 PM. Train crossing events are shown in green on the figure. Queued vehicles filled up the entire roadway segment space on Cook Road and the I-5 northbound off-ramp during and immediately after a train crossing event. It is also important to note that queuing on the I-5 northbound off-ramp takes longer to recover after a train crossing event when compared to the other roadway segments. This is because the I-5 northbound off-ramp is stop controlled and queued traffic must wait for vehicles to clear on Cook Road.

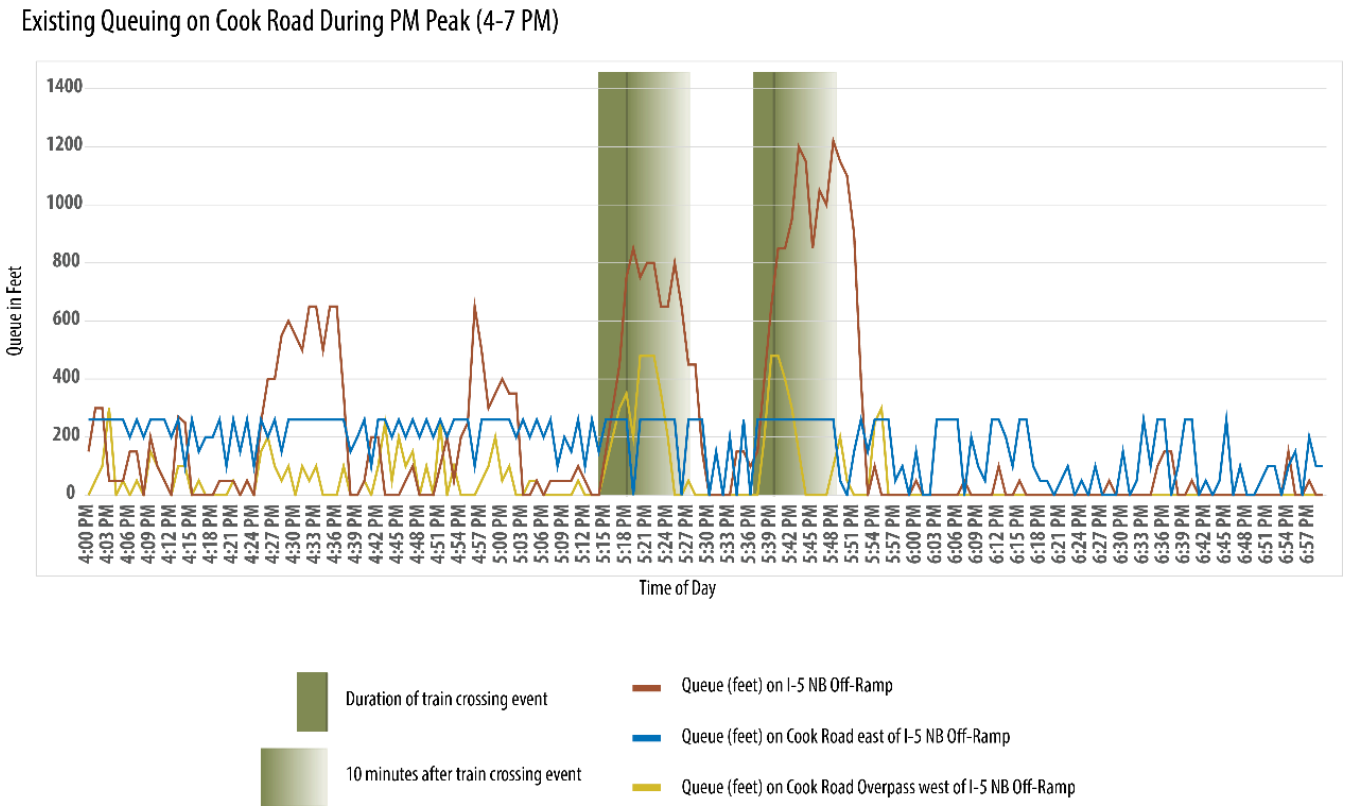


Figure 3-4. Queues by Time of Day (2016)

3.1.3 Intersection Operations and Vehicle Queues

Intersection operations and queuing were evaluated at study intersections using SimTraffic software and 2016 traffic volumes. The operations analysis evaluated conditions during a train crossing event. Intersection operations are measured on a scale of Level of Service (LOS) A to F, with LOS A representing the best conditions and LOS F representing the worst conditions, as shown on Table 3-2.

Table 3-2. Vehicle Level of Service and Delay

Level of Service	Description	Signalized Intersection Delay (sec/veh)	Unsignalized Intersection Delay (sec/veh)
A	Free flowing	<10	<10
B	Little delay	>10 and ≤20	>10 and ≤15
C	Some delay	>20 and ≤35	>15 and ≤25
D	Some driver frustration; moderate delay	>35 and ≤55	>25 and ≤35
E	High level of frustration; high levels of delay	>55 and ≤80	>35 and ≤50
F	Severe congestion; excessive delays	>80	>50

Intersection operations during the PM peak hour are summarized on Figure 3-5 and Table 3-3. During the PM peak hour with a train crossing event, the intersection of Cook Road and the I-5 northbound off-ramp operates at LOS F with approximately 3 minutes and 25 seconds (204 seconds) of delay per vehicle. This intersection is stop-controlled and has a high number of right-turning vehicles that conflict with a large volume of through traffic, which results in poor intersection operations. Queues at the Cook Road/I-5 northbound off-ramps intersection also often extend beyond the available storage length during the PM peak hour. The intersection of Cook Road and Old Highway 99 operates at LOS D with an average delay of 46 seconds during the PM peak hour.

Table 3-3. 2016 Existing Conditions Traffic Operations during PM Peak Hour (with Train Crossing Event)

Location	LOS	Delay per Vehicle (s)
Cook Road and Southbound Ramps	C	20
Cook Road and Northbound Ramps	F	204
Cook Road and Old Highway 99	D	46

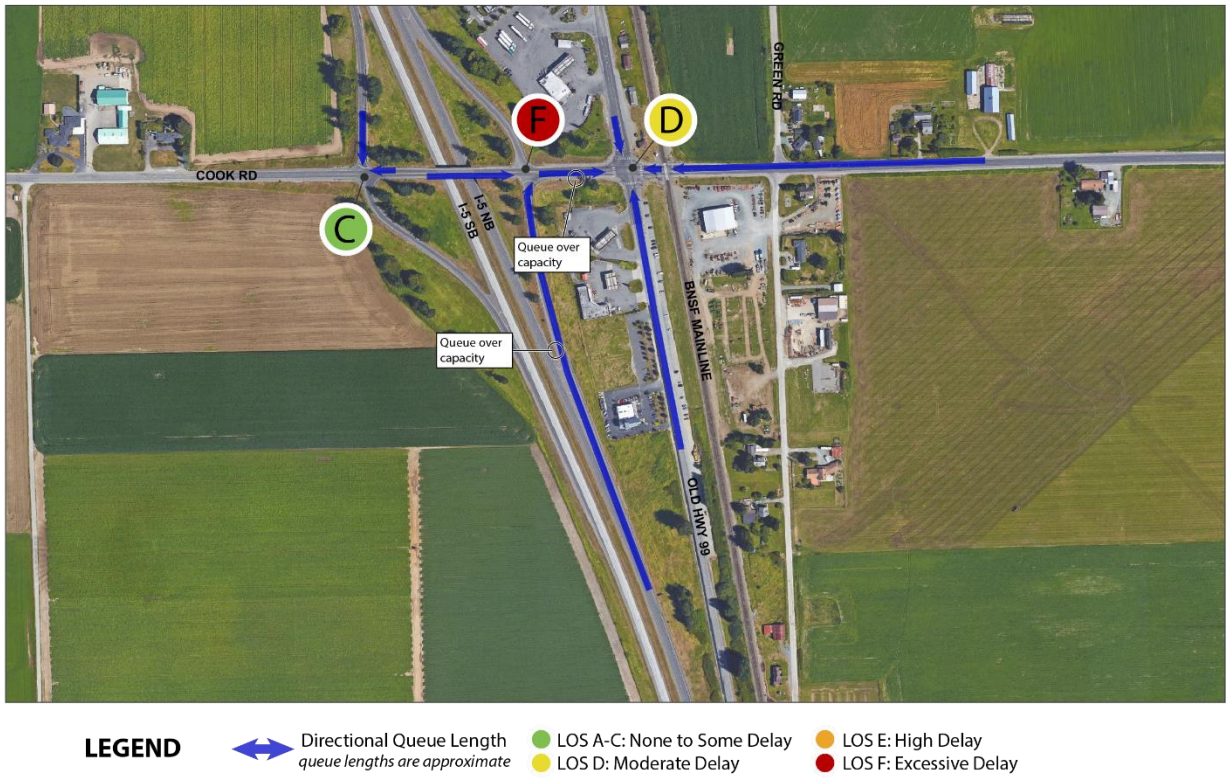


Figure 3-5. Existing (2016) PM Peak Hour Intersection Operations during Train Crossing Event

3.1.4 Land Use and Agricultural Facilities

The majority of properties within proximity of the Cook Road corridor are zoned Agricultural-Natural Resource Lands or Rural Reserve. Land zoned Agricultural-Natural Resource Lands supports continued

farming activities. Rural Reserve-zoned properties allow low-density development and support the preservation of open space character. The properties immediately adjacent to the intersection of Cook Road and Old Highway 99 are zoned Rural Freeway Service and Rural Business. These zoning designations support small scale commercial uses.

Agricultural support businesses along the Cook Road corridor include Scholten's Equipment, which operates an agricultural equipment dealership at the intersection of Cook Road and Green Road. Other businesses near the I-5 interchange and the Cook Road rail crossing support the freight and trucking industry and travelers on the I-5 corridor. Support facilities include gas stations with freight truck parking, restaurants, a hotel, and coffee shops.

The Cook Road corridor also provides vital access for various agricultural businesses in the corridor. Agricultural machinery, such as tractors, also use the Cook Road corridor to travel between different fields on either side of I-5. This equipment often travels with traffic on the roadway. The entire length of the Cook Road corridor provides access for agricultural machinery.

3.2 Future Conditions

The future conditions analysis evaluated transportation facilities and operations for the year 2040.

3.2.1 Traffic and Freight Truck Volumes

Traffic volumes are anticipated to grow annually by 1.38 percent. PM peak hour traffic volumes for the year 2040 are shown on Figure 3-6. Overall traffic flows are expected to be similar to existing conditions with higher through and eastbound traffic flows during the PM peak hour.

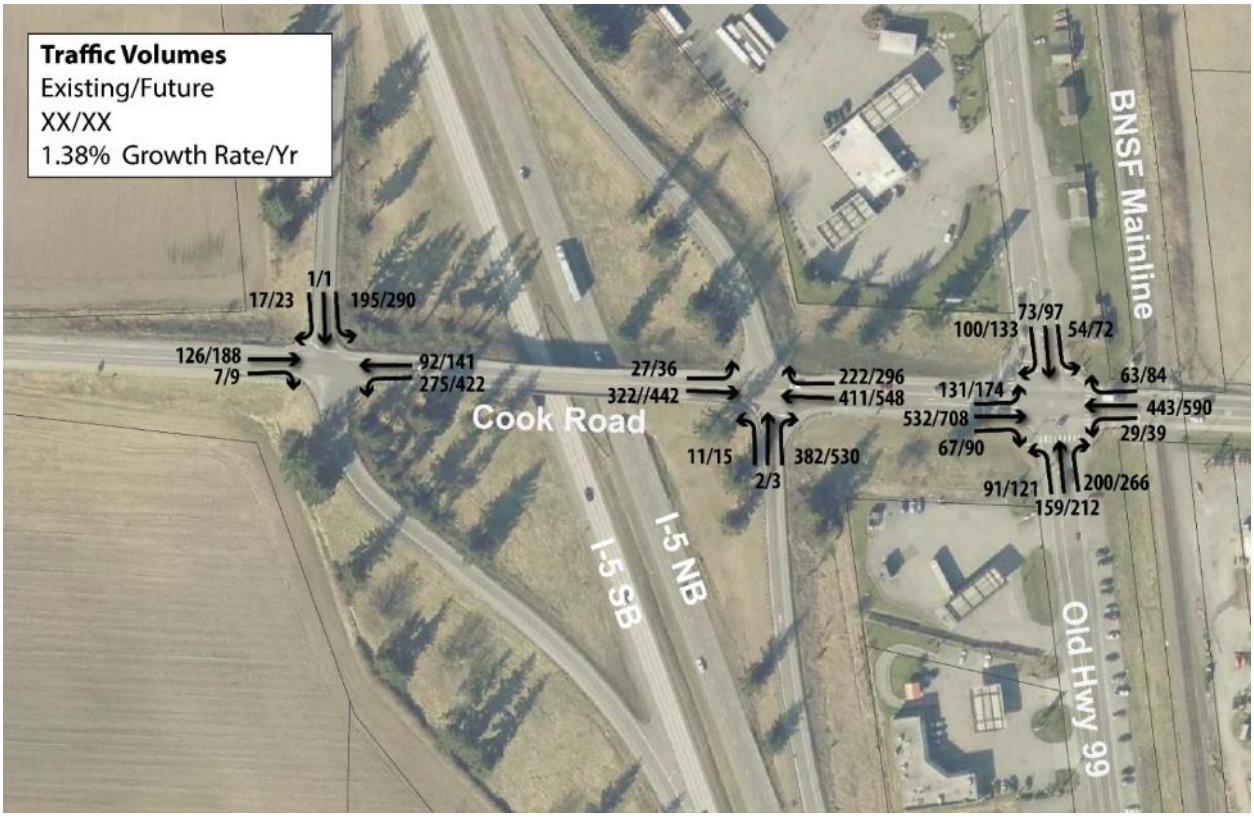


Figure 3-6. Existing (2016) and Future (2040) PM Peak Hour Traffic Volumes

3.2.2 Train Volumes and Gate-Down Time

Freight train volumes at the Cook Road crossing are expected to increase in the future by approximately 160 percent. This growth could increase train volumes to approximately 55 trains per day. There are several sources of information on potential growth patterns of freight train traffic, which include the SCOG Rail Crossing Study, the 2016 Draft Washington State Marine Cargo Forecast (Marine Cargo Forecast), the 2014 Washington State Marine and Rail Oil Transportation Study, and the 2014 Washington State Rail Plan. However, due to the volatility and uncertainty of energy exports and other commodities shipped by rail, the total number of freight trains could fluctuate depending on the total volume of these types of trains operating in the future. With an increase in train volumes, gate-down time could increase to approximately 101 minutes per day.

For the analysis included in this report, it was assumed that one train crossing event would occur during the PM peak hour that would close the crossing for approximately 2 minutes and 30 seconds. The Washington State Marine Cargo Forecast Report estimates that growth in rail traffic will increase in the future and could be 'tremendous' if several proposed projects are built. With anticipated growth, it is possible that more than one train crossing event could occur during the PM peak hour. BNSF is responsible for scheduling train movements on their rail network, which is influenced in part by available capacity on the various rail lines. With increased train volumes in the future, it is possible that BNSF may need to schedule additional train movements during time periods that are considered high impact to the roadway network, including the PM peak hour. Multiple train crossing events during the PM peak hour would compound the congestion that occurs on the roadway network during and after a rail crossing event. The roadway network may not be able to fully recover between crossing events if more than one train closed the crossing during the PM peak hour. This could result in extensive queuing and delay for vehicles in the Cook Road corridor, which could also have the potential to impact downstream intersections.

3.2.3 Intersection Operations and Vehicle Queues

To establish a future baseline condition, intersection operations and vehicle queuing during the PM peak hour were evaluated in 2040 with no improvements made to the corridor. Similar to the existing conditions analysis, the 2040 Baseline operations analysis evaluated conditions during a train crossing event using Synchro 9 software.

The 2040 Baseline intersection operations are summarized in Figure 3-7 and Table 3-4. With the anticipated traffic growth in 2040, there would be substantial delay during the PM peak hour when a train crossing event occurs. At the southbound off-ramp, there would be approximately 65 seconds of delay per vehicle. Queued vehicles on the southbound approach of Cook Road and the southbound off-ramp would extend beyond the available capacity, likely backing up onto I-5.

Table 3-4. 2040 Baseline Conditions Traffic Operations during PM Peak Hour (with Train Crossing Event)

Location	LOS	Delay per Vehicle (s)
Cook Road and Southbound Ramps	F	170
Cook Road and Northbound Ramps	F	>300
Cook Road and Old Highway 99	F	152

At the northbound off-ramp, vehicles could experience more than 5 minutes (300 seconds) of delay in 2040 during the PM peak hour when a train crossing event occurs. Similar to the southbound off-ramp, vehicles queued on the northbound off-ramp would exceed available capacity, interfering with mainline I-5. The Cook Road and Old Highway 99 intersection would also operate at very congested levels with approximately 150 seconds of delay per vehicle and long queues in the westbound and northbound directions. Eastbound queued vehicles at the Cook Road and Old Highway 99 intersection would exceed the available capacity.

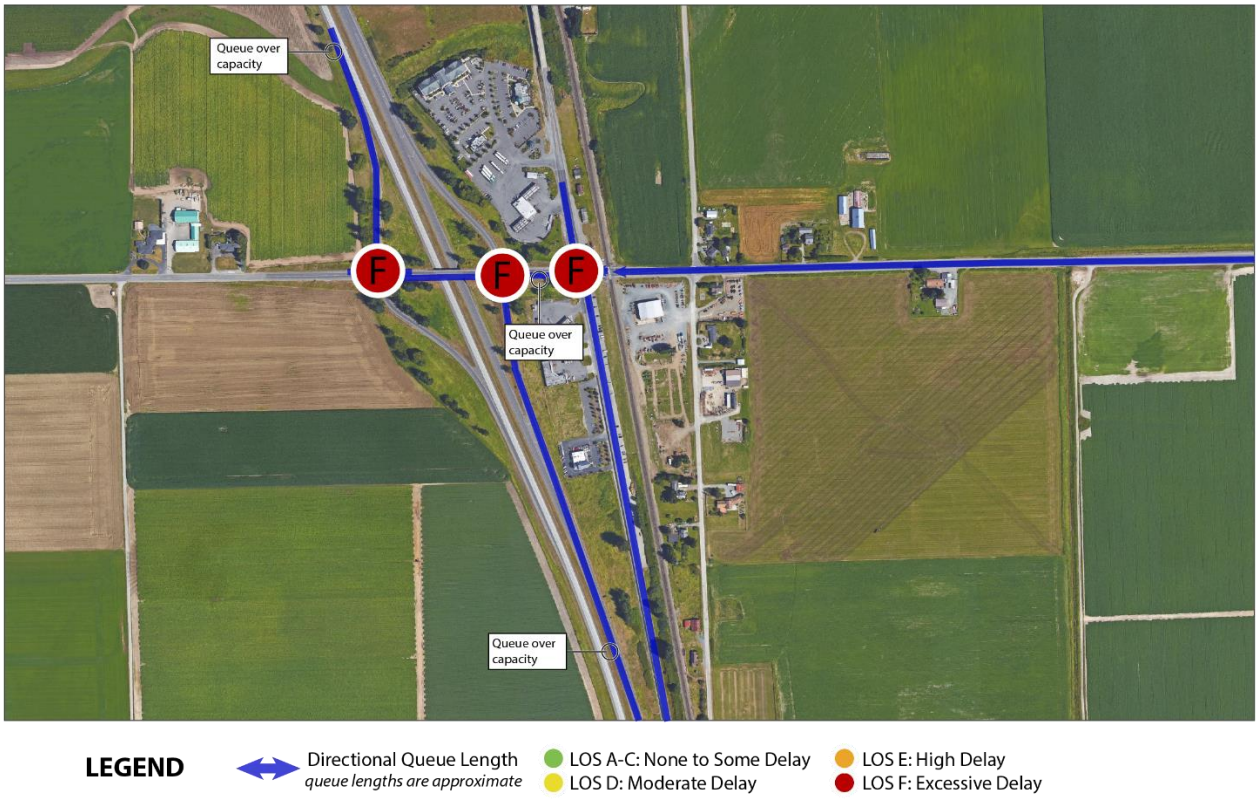


Figure 3-7. Future Baseline (2040) PM Peak Hour Intersection Operations during Train Crossing Event

3.2.4 Land Use and Agricultural Facilities

Land use and agricultural facilities would be expected to remain similar to those that exist in the project vicinity today. Agricultural equipment would also be expected to continue to travel on the Cook Road corridor to access properties on either side of I-5.

4. SHORT-TERM AND LONG-TERM ALTERNATIVES

Both short-term and long-term alternatives for addressing the at-grade rail crossing and congestion in the Cook Road corridor were evaluated as part of this study.

The short-term alternatives could be implemented sooner and would primarily address congestion and safety in the corridor. Short-term alternatives include modifying traffic control at the I-5 off-ramps, increasing vehicle storage on the I-5 northbound off-ramp, and increasing capacity on Cook Road. These types of improvements would have a lower cost compared to a grade separation. The short-term alternatives have also been coordinated with WSDOT and are included in the Regional Transportation Plan.

The long-term alternatives would likely to take longer to implement and would fully grade-separate Cook Road from the BNSF rail line. Seven long-term alternatives were evaluated using a two-level screening process. Three of the seven alternatives moved beyond the first screening level and were evaluated at a conceptual level for possible benefits and trade-offs.

4.1 Short-Term Alternatives

A phased approach to addressing the issues in the Cook Road corridor is an important consideration because a grade separation is costly and could take time to secure funding. Improving operations in the corridor could address some of the congestion and safety concerns in the interim period. Short-term alternatives would focus on relieving congestion on the I-5 ramps and along the Cook Road corridor. However, delay and potential safety impacts from train crossing events would not be addressed by the short-term alternatives since the crossing would continue to be at-grade. The selection of a short-term alternative should not preclude the implementation of a long-term alternative; compatibility with a long-term solution should be considered for any of the short-term alternatives.

A three-phase approach was evaluated for a short-term alternative to improve operations in the Cook Road corridor:

- Phase 1: Modify Off-Ramp Intersections:
  - Signals: Install a traffic signal at the I-5 northbound and southbound ramps, or
  - Roundabouts: Install a roundabout at the I-5 northbound and southbound ramps.
- Phase 2: Capacity on I-5 Northbound Off-Ramp: Increase I-5 northbound off-ramp taper lane to Joe Leery Slough (approximately 1 mile to the south), combined with the first phase improvement.
- Phase 3: Capacity on Cook Road: Widen Cook Road between Old Highway 99 and the I-5 northbound off-ramp, combined with the first and second phase improvements.

An operations analysis of each short-term improvement phase was completed using 2040 traffic volumes. Phase 1 of the interim approach would include either roundabouts or signals depending on which long-term representative alternative would be selected.

Phase 2 would include the improvement made in the first phase and would also add a taper lane on the northbound I-5 off-ramp to ensure that any queuing vehicles would not interfere with traffic on the I-5 mainline.

Phase 3 would include the improvements from the two previous phases and would also widen Cook Road to provide additional vehicle capacity. The Cook Road at-grade rail crossing would likely need to be

widened in order to provide additional lanes between the I-5 northbound off-ramp and Old Highway 99. Additional capacity along Cook Road between the I-5 northbound ramps and the rail crossing would relieve some traffic congestion. However, construction at the at-grade crossing would require coordination with BNSF and the Federal Rail Administration (FRA). This would also likely have higher design and construction costs. Construction of a short-term solution would likely be a partnership between Skagit County and WSDOT.

It should be noted that these improvements could either occur in separate phases or together as one project.

4.1.1 Intersection Operations and Vehicle Queues

The different phases of the short-term alternatives were analyzed with SimTraffic and Sidra software to determine how the improvements would affect traffic operations. The interim solution analysis used 2040 traffic volumes.

Phase 1: Signals

As shown in Table 4-1, all of the intersections would operate at LOS F with the Phase 1: Signals improvements during the PM peak hour when a train crossing event occurs. There would be approximately four minutes (240 seconds) of delay per vehicle at the southbound off-ramp and nearly five minutes (287 seconds) of delay per vehicle at the northbound ramp. Queues at both the I-5 southbound and northbound off-ramps would exceed available roadway storage space and extend onto the I-5 mainline. At the Cook Road and Old Highway 99 intersection, vehicles would experience approximately two minutes and 40 seconds (160 seconds) of delay per vehicle. Queues would be extensive in the northbound and westbound directions. The queues at the eastbound left-turn, northbound left-turn, and southbound left-turn would exceed available roadway storage space.

Table 4-1. PM Peak Hour Operations Results with a Train Crossing Event for Phase 1: Signals (2040)

Location	LOS	Delay (sec)	95%tile Queue Length (feet)	
Cook Road and Southbound Off-Ramp	F	242	Eastbound Through	370
			Westbound Through	301
			Southbound Through	3,674*
Cook Road and Northbound Off-Ramp	F	287	Eastbound Through	579*
			Westbound Through	285*
			Northbound Through	5,579*
			Northbound Right	104
Cook Road and Old Highway 99	F	160	Eastbound Left	238*
			Eastbound Through	256
			Westbound Left	54
			Westbound Through	4,564
			Northbound Left	409*
			Northbound Through	4,486
			Southbound Left	304*
			Southbound Through	327
			Southbound Right	154

* queue exceeds roadway storage space

Phase 1: Roundabouts

As shown in Table 4-2, roundabouts at the southbound and northbound ramp termini would result in minimal delay for vehicles during typical conditions. However, during a rail crossing event, the LOS, delay, and queue lengths would likely be similar to those shown in Table 4-1 for signalized off-ramp intersections. This is because of congestion spilling back from the rail crossing and the intersection of Cook Road and Old Highway 99 that is not captured using the Sidra operations analysis tool, as described in Section 3.

Vehicles at the Cook Road and Old Highway 99 intersection would experience approximately four minutes (160 seconds) of delay per vehicle during a rail crossing event. Queues would be extensive in the northbound and westbound directions. The queues for the eastbound left-turn, northbound left-turn, and southbound left-turn would exceed available roadway storage space.

Table 4-2. PM Peak Hour Operations Results for Phase 1: Roundabouts (2040)

Location	LOS	Delay (sec)	Queue Length (feet)	
Cook Road and Southbound Off-Ramp	B#	10#	Westbound	0
			Southbound	74
			Eastbound	57
Cook Road and Northbound Off-Ramp	A#	8#	Northbound	206
			Westbound	277*
			Eastbound	0
Cook Road and Old Highway 99	F	156	Eastbound Left	266*
			Eastbound Through	291
			Westbound Left	55
			Westbound Through	5,374
			Northbound Left	411*
			Northbound Through	4,257
			Southbound Left	283
			Southbound Through	317
			Southbound Right	140

* queue exceeds roadway storage space

LOS and delay do not capture the effects of a train crossing event

Phase 2: Capacity on I-5 Northbound Off-Ramp

Providing an approximately mile-long taper lane on the northbound off-ramp would reduce the interference of queuing vehicles with the I-5 mainline and improve safety. A taper lane is an additional lane provided on the off-ramp to allow for additional vehicle storage capacity. As described in the existing conditions, future conditions, and the first phase of short-term solutions sections, queued vehicles on the northbound off-ramp can extend back to the mainline. With increased traffic volumes in the future, vehicle queues are expected to be longer. Constructing a taper lane would not have an effect on intersection operations but would improve safety on I-5 near the Cook Road corridor.

Phase 3: Signals

Capacity could be added on the Cook Road corridor in addition to signalizing the I-5 off-ramps; these combined improvements would further improve traffic flow and reduce congestion in the Cook Road

corridor. For this analysis, an additional lane in each direction was added to Cook Road between the I-5 northbound ramps and east of the at-grade crossing. With these improvements, delay would be approximately 35 seconds per vehicle at both the I-5 southbound and northbound off-ramps during the PM peak hour when a train crossing event occurs, as shown in Table 4-3. The queue length in the eastbound direction at the northbound off-ramp would exceed the available roadway storage space. At the Cook Road and Old Highway 99 intersection, there would be approximately 60 seconds of delay per vehicle during the PM peak hour when a train crossing event occurs. Queues at this intersection would be extensive in the westbound and northbound directions. Queues would exceed available roadway storage space on the eastbound left-turn movement and the northbound left-turn movement.

Table 4-3. PM Peak Hour Operations Results for Phase 3: Signals (2040)

Location	LOS	Delay (sec)	Queue Length (feet)	
Cook Road and Southbound Off-Ramp	C	33	Eastbound Through	136
			Westbound Through	446
			Southbound Through	538
Cook Road and Northbound Off-Ramp	C	33	Eastbound Through	536*
			Westbound Through	269
			Westbound Right	103
			Northbound Left Through	611
			Northbound Right	819
Cook Road and Old Highway 99	E	62	Eastbound Left	220*
			Eastbound Through	275
			Westbound Left	56
			Westbound Through	1,607
			Northbound Left	404*
			Northbound Through	1,981
			Southbound Left	124
			Southbound Through	110

* queue exceeds roadway storage space

Phase 3: Roundabouts

In addition to constructing roundabouts at the I-5 off-ramps, an additional lane would be added in each direction on Cook Road between the I-5 northbound ramps and just east of the at-grade rail crossing. This would provide additional capacity in the corridor and improve traffic operations. There would be minimal delay at the I-5 southbound and northbound off-ramps during typical conditions, as shown in Table 4-4. However, during a rail crossing event, conditions would be similar to those shown in Table 4-3 for signalized off-ramp intersections. As described earlier, Sidra does not capture the effects of a train crossing event on roadway operations, so the delay shown in Table 4-4 would likely be more.

At the intersection of Cook Road and Old Highway 99, there would be approximately 65 seconds of delay per vehicle during the PM peak hour when a train crossing event occurs. Queues would be extensive for the northbound and westbound approaches of the intersection of Old Highway 99 and Cook Road. Queuing vehicles for the northbound left-turn and the eastbound through movement would exceed available roadway storage space.

Table 4-4. PM Peak Hour Operations Results for Phase 3: Roundabouts (2040)

Location	LOS	Delay (sec)	Queue Length (feet)	
Cook Road and Southbound Off-Ramp	B#	10#	Westbound	0
			Southbound	74
			Eastbound	57
Cook Road and Northbound Off-Ramp	A#	6#	Northbound	129
			Westbound	81
			Eastbound	0
Cook Road and Old Highway 99	E	64	Eastbound Left	222
			Eastbound Through	282*
			Westbound Left	55
			Westbound Through	1,214
			Northbound Left	410*
			Northbound Through	2, 107
			Southbound Left	116
			Southbound Through	123
			Southbound Right	107

* queue exceeds capacity

LOS and delay do not capture the effects of a train crossing event

4.2 Long-Term Alternatives

A total of seven alternatives to grade separate the at-grade rail crossing were evaluated as part of the Cook Road Corridor Study. The alternatives developed were conceptual options for addressing traffic congestion and delay related to the at-grade rail crossing. The alternatives were also evaluated to ensure that they did not preclude the possibility of a short-term alternative to address congestion at the I-5 northbound off-ramp and on Cook Road. The goals of the alternatives were to:

- Eliminate or significantly reduce vehicle delay and queue lengths at the at-grade crossing;
- Avoid or minimize right-of-way impacts to the commercial businesses and agricultural land along Old Highway 99 and Cook Road.;
- Develop a cost effective approach to design alternatives;
- Meet all design standards.

There were two approaches to grade separating the Cook Road corridor from the BNSF mainline – grade separating Cook Road with Old Highway 99 beneath, and raising both Cook Road and Old Highway 99 so they remain at the same grade with the railroad passing underneath. Each of the alternatives are described in the following pages.

4.2.1 Alternative 1A – Structure over Old 99/BNSF with Single Point Urban Interchange (SPUI) Configuration

Alternative 1A would be an elevated structure spanning the BNSF mainline and Old Highway 99. A single point urban interchange (SPUI) would be provided underneath the Cook Road overpass to allow circulation between Cook Road and Old Highway 99, as shown on Figure 4-1. The intersections of the I-5 off-ramps and Cook Road would be signalized. A short-term alternative would include signalizing the intersections of Cook Road and the I-5 off-ramps. The intersection of the I-5 northbound off-ramp and Cook Road would also be relocated to the west. Additional capacity could also be provided at the I-5 northbound off-ramp.

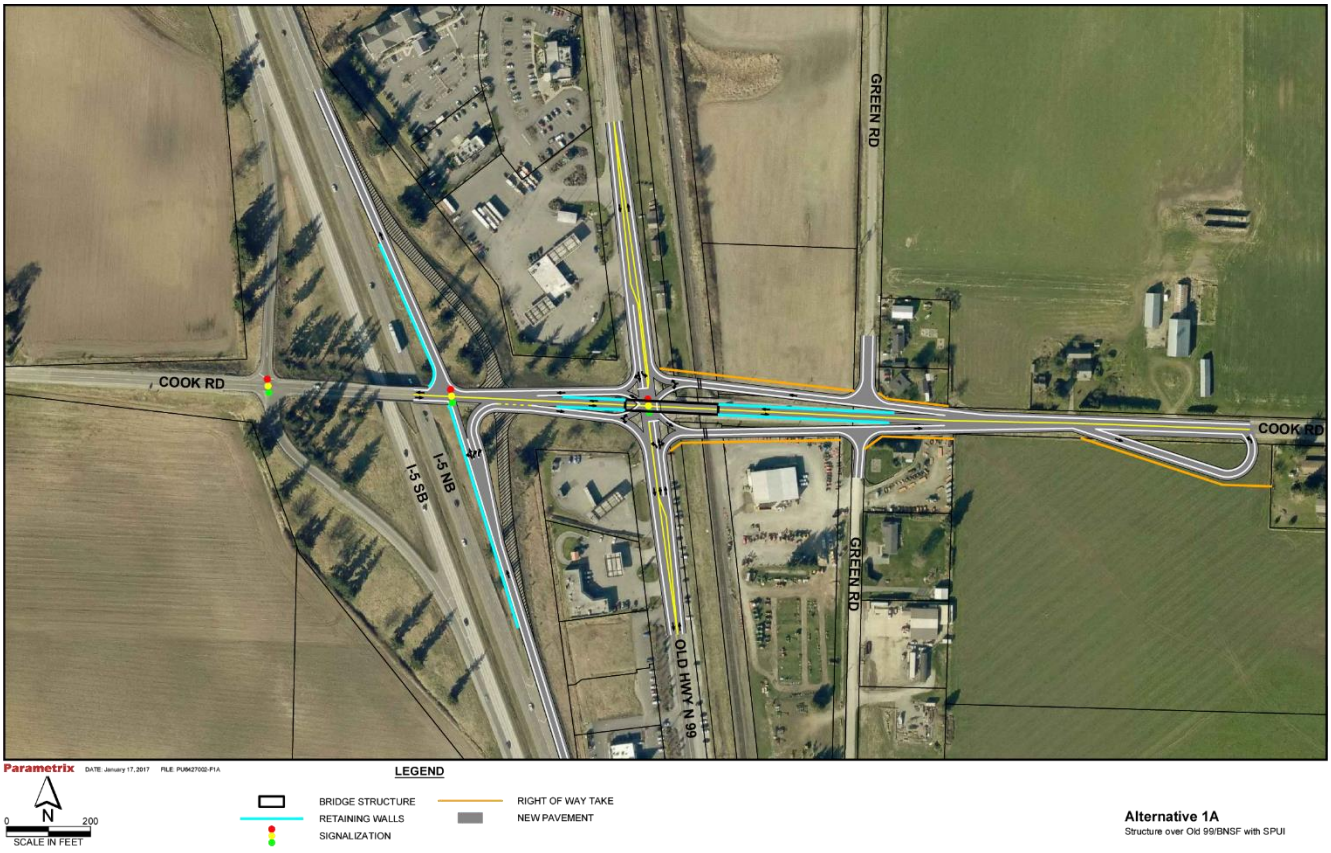


Figure 4-1. Alternative 1A Conceptual Drawing

4.2.2 Alternative 1B Option 1– Structure over Old 99/BNSF with Dogbone Roundabout

Alternative 1B Option 1 would be an elevated structure spanning the BNSF Mainline and Old Highway 99 with a dogbone-shaped roundabout underneath to provide access between Cook Road and Old Highway 99, as shown on Figure 4-2. The intersections of the I-5 off-ramps and Cook Road would be signalized. A short-term solution would include signalizing the intersections of Cook Road and the I-5 off-ramps. The intersection of the I-5 northbound off-ramp and Cook Road would also be relocated to the west. Additional capacity could also be provided at the I-5 northbound off-ramp.

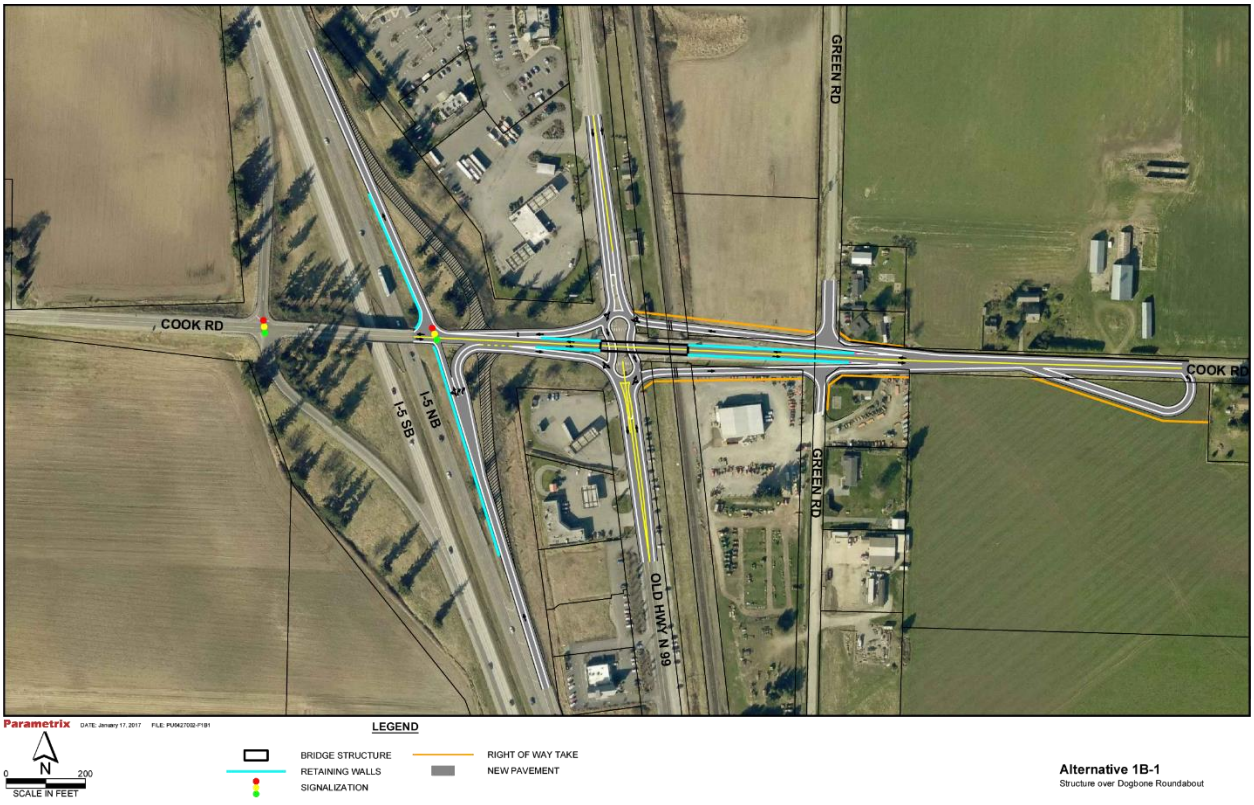


Figure 4-2. Alternative 1B Option 1 Conceptual Drawing

4.2.3 Alternative 1B Option 2 – Structure over Old 99/BNSF with Oval Roundabout

Alternative 1B Option 2 would be an elevated structure spanning the BNSF Mainline and Old Highway 99. An oval roundabout underneath the Cook Road structure would provide access between Cook Road and Old Highway 99, as shown on Figure 4-3. Roundabouts would be provided at the intersections of the I-5 off-ramps and Cook Road. Alternatively, a signal could be provided at the I-5 southbound off-ramp and a roundabout could be provided at the I-5 northbound off-ramp. Constructing roundabouts or a combination of signals and roundabouts at the intersections of Cook Road and the I-5 ramps could be completed as a short-term improvement.

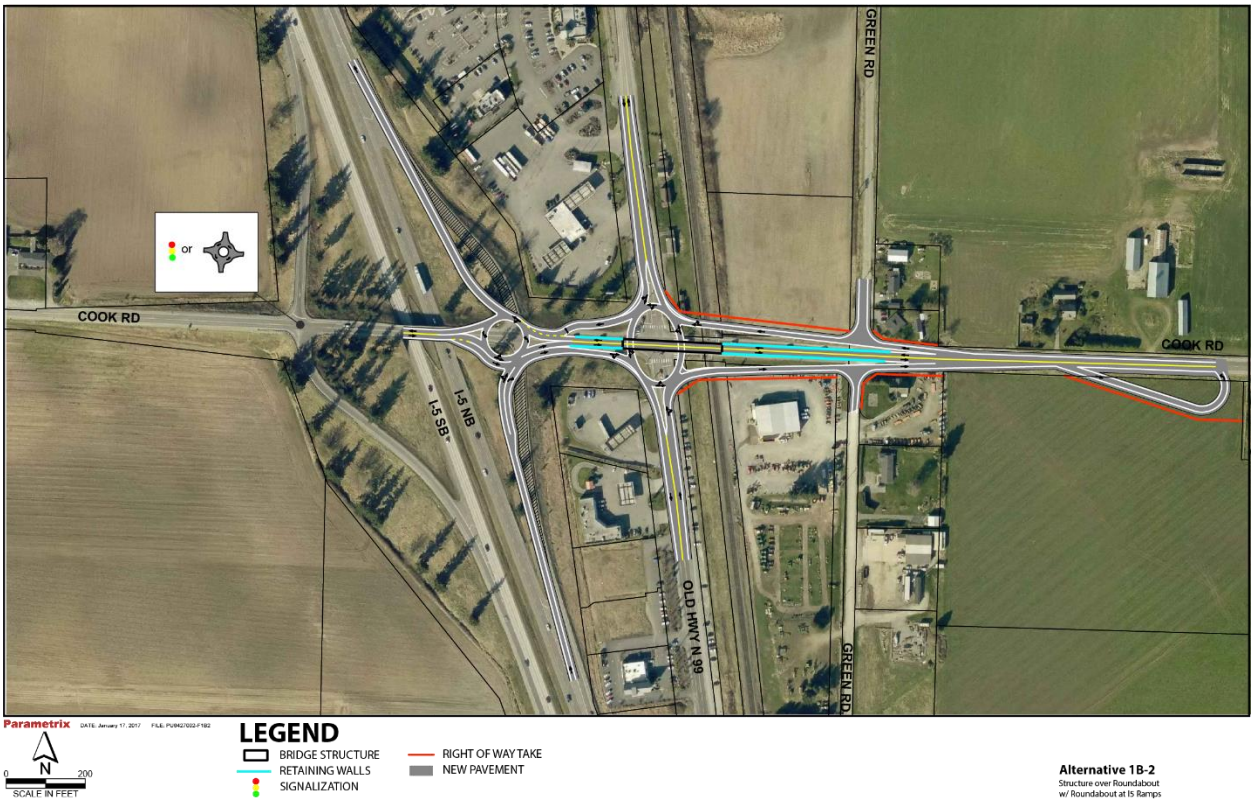


Figure 4-3. Alternative 1B Option 2 Conceptual Drawing

4.2.4 Alternative 1C – Structure over Old 99/BNSF with Half-Diamond Ramps

Alternative 1C, shown on Figure 4-4, would be an elevated structure spanning the BNSF mainline and Old Highway 99 with ramps providing access between northbound/southbound Old Highway 99 and the west side of Cook Road. Roundabouts would be provided at the intersections of the I-5 off-ramps and Cook Road. Alternatively, a signal could be provided at the I-5 southbound off-ramp and a roundabout could be provided at the I-5 northbound off-ramp. Traffic connecting between Old Highway 99 and eastbound Cook Road and between westbound Cook Road and Old Highway 99 would use the roundabout at the I-5 northbound ramps. Constructing roundabouts or a combination of signals and roundabouts at the intersections of Cook Road and the I-5 ramps could be completed as a short-term solution.

Figure 4-4. Alternative 1C Conceptual Drawing

4.2.5 Alternative 1D – Structure over Old 99/BNSF with Loop Ramps

Alternative 1D would be an elevated structure spanning the BNSF mainline and Old Highway 99 with loop ramps on the west side of Old Highway 99 providing access to and from Cook Road, as shown on Figure 4-5. The intersection of the I-5 ramps and Cook Road would be signalized. A short-term improvement would include signalizing the intersections of Cook Road and the I-5 off-ramps. The intersection of the I-5 northbound off-ramp and Cook Road would also be relocated to the west. Additional capacity could also be provided at the I-5 northbound off-ramp.

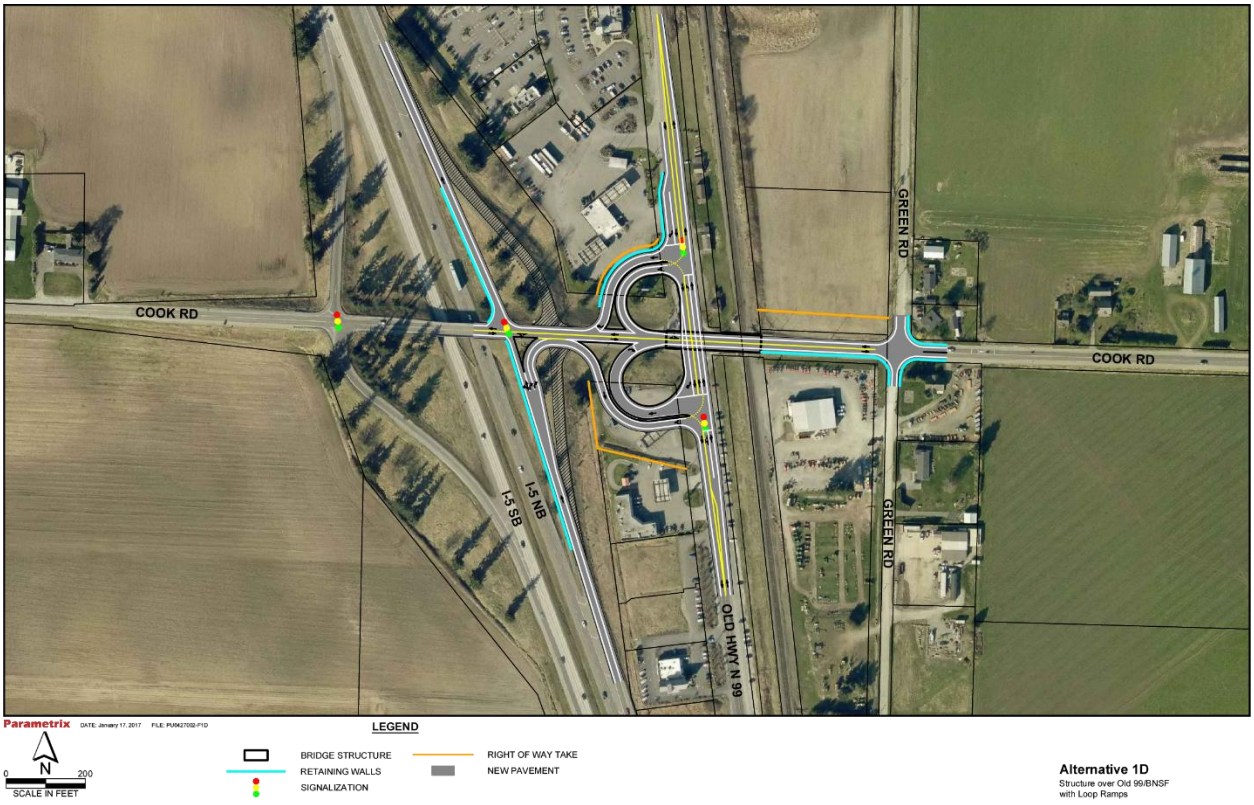


Figure 4-5. Alternative 1D Conceptual Drawing

4.2.6 Alternative 2 - Elevated At-Grade Intersection with New Frontage Access Road

Alternative 2, shown on Figure 4-6, would be an elevated structure spanning the BNSF mainline with the intersection of Cook Road and Old Highway 99 elevated. Frontage access would be reconfigured on both the north and south sides of Cook Road. The intersections of the I-5 off-ramps and Cook Road would be signalized. Additional capacity would be added to both the I-5 northbound off-ramp and on Cook Road between the I-5 northbound off-ramp and east of the rail line. A short-term improvement would include signalizing the intersections of Cook Road and the I-5 off-ramps.

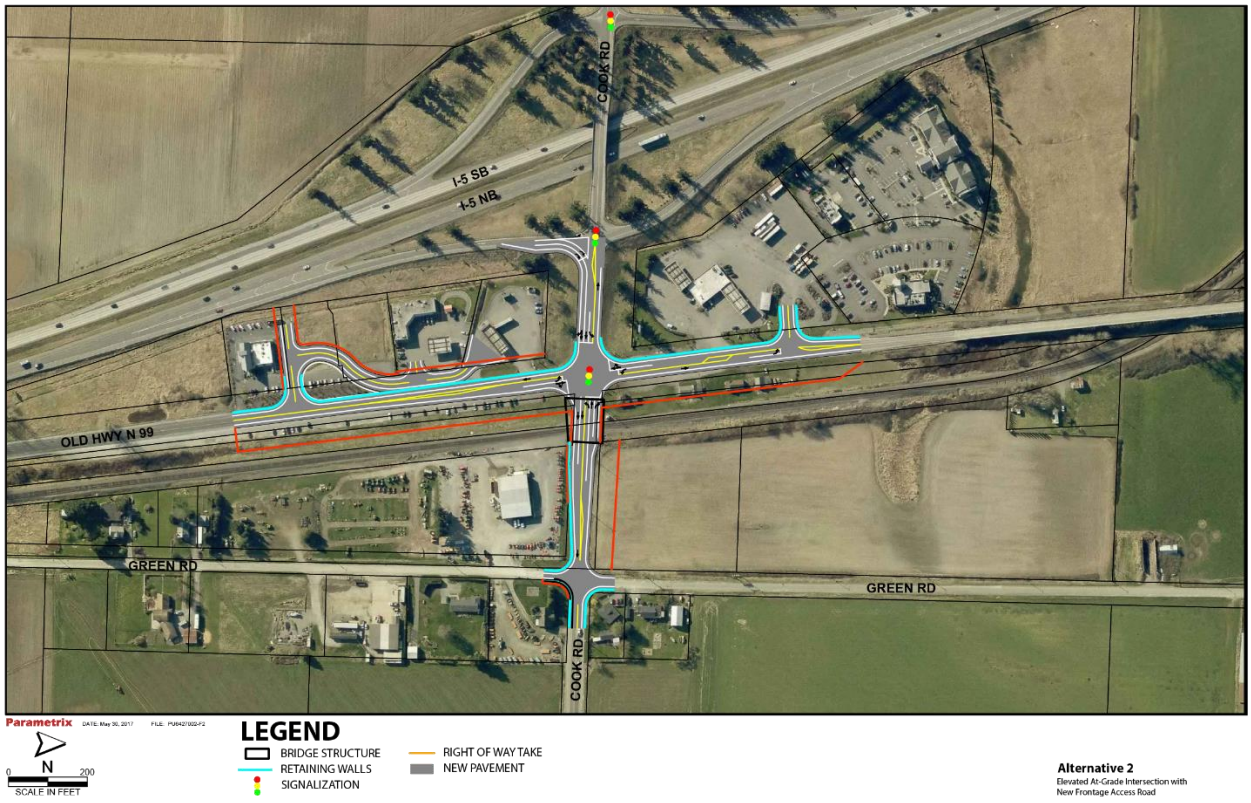


Figure 4-6. Alternative 2 Conceptual Drawing

4.2.7 Alternative 3 – Relocate Northbound Ramps – Elevated At-Grade Intersection with New Frontage Access Road

Alternative 3, shown on Figure 4-7, would provide an elevated structure over the BNSF mainline with the intersection of Cook Road and Old Highway 99 elevated. The I-5 northbound ramps would be relocated to the north of the hotel and the right-of-way for the existing ramps would be repurposed as local access streets.

Figure 4-7. Alternative 3 Conceptual Drawing

4.2.8 Evaluation of Long-Term Alternatives

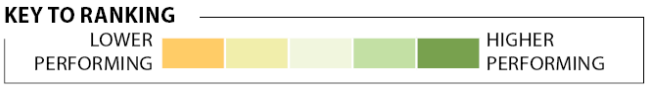
Each of the alternatives were evaluated using several criteria, including planning level cost, property impacts, traffic impacts, rail impacts, and agricultural impacts. The alternatives were evaluated in two stages. Screen 1 included a feasibility criteria to determine if there were any barriers to moving the alternative forward. Screen 2 included a more detailed evaluation of the traffic impacts.

4.2.8.1 Screen 1 Evaluation

Table 4-5 and Table 4-6 summarize the results of the comparative evaluation for each of the alternatives. Green represents a higher, or better, performance, and orange represents a lower performance. Based on the comparative evaluation and feedback from the stakeholder group, Alternative 1B Option 2, Alternative 1C, and Alternative 2 were evaluated in further detail in Screen 2.

Table 4-5. Screen 1 Summary Performance Results

Alternative	Planning Level Cost	Property Impacts	Traffic Impacts (Qualitative)	Rail Impacts	Agricultural Impacts	Construction Feasibility	Advanced to Screen 2
Alternative 1A							
Alternative 1B Option 1							X
Alternative 1B Option 2							
Alternative 1C							X
Alternative 1D							
Alternative 2							X
Alternative 3							



KEY TO RANKING
LOWER PERFORMING — HIGHER PERFORMING

Table 4-6. Screen 1 Detailed Performance Results

Alternative	Planning Level Cost	Property Impacts	Traffic Impacts (Qualitative)	Rail Impacts	Agricultural Impacts	Construction Feasibility	SCORE
Alternative 1A	• $25,000,000	• No impacts to access points to businesses on Old 99 • Some impacts to residential properties on Cook Road east of the railroad crossing	**Old 99/Cook Road** • Requires out-of-direction travel to complete NB Green Road to WB Cook Road movement and SB Green Road to EB Cook Road movement • Reduces vehicle volumes at Old 99 and Cook Road intersection • No traffic delay from train crossing events for vehicles on Cook Road **I-5 Interchange** • Additional delay for vehicles at the EB/WB approaches of the Cook Road/ I-5 off-ramp intersections due to signals	• Creates one additional at-grade rail crossing (2 total) • Rail crossings have smaller vehicle volumes	• Some impacts to agricultural property along Cook Road east of railroad crossing • Impacts to Scholten's Equipment, an agricultural support business	• Realignment of I-5 northbound ramps not feasible	16
Alternative 1B Option 1	• $23,000,000	• Circulation and access to gas station on southwest corner of Old 99/Cook Road could change • Some impacts to residential properties on Cook Road east of the railroad crossing	**Old 99/Cook Road** • Requires out-of-direction travel to complete NB Green Road to WB Cook Road movement and SB Green Road to EB Cook Road movement • Reduces vehicle volumes at Old 99 and Cook Road intersection • No traffic delay from train crossing events for vehicles on Cook Road • Roundabout on Old 99 could fail during train crossing event **I-5 Interchange** • Additional delay for vehicles at the EB/WB approaches of the Cook Road/I-5 off-ramp intersections due to signals	• Creates one additional at-grade rail crossing (2 total) • Rail crossings have smaller vehicle volumes	• Some impacts to agricultural property along Cook Road east of railroad crossing • Impacts to Scholten's Equipment, an agricultural support business	• Realignment of I-5 northbound ramps not feasible	15
Alternative 1B Option 2	• $26,000,000	• Circulation and access to gas station on southwest corner of Old 99/Cook Road could change • Some impacts to residential properties on Cook Road east of the railroad crossing	**Old 99/Cook Road** • Requires out-of-direction travel to complete NB Green Road to WB Cook Road movement and SB Green Road to EB Cook Road movement • Reduces vehicle volumes at Old 99 and Cook Road intersection • No traffic delay from train crossing events for vehicles on Cook Road • Roundabout on Old 99 could fail during train crossing event • Short (non-standard) lane change distances for WB vehicles between Old 99 and the I-5 northbound ramp	• Creates one additional at-grade rail crossing (two total) • Rail crossings have smaller vehicle volumes	• Some impacts to agricultural property along Cook Road east of railroad crossing • Impacts to Scholten's Equipment, an agricultural support business	• No construction feasibility concerns	18

Table 4-6. Screen 1 Detailed Performance Results (continued)

Alternative	Planning Level Cost	Property Impacts	Traffic Impacts (Qualitative)	Rail Impacts	Agricultural Impacts	Construction Feasibility	SCORE
Alternative 1C	• $16,000,000 • Lowest cost alternative	• No impacts to access points to businesses on Old 99 • Minor impacts to residential property on Cook Road east of the railroad crossing – walls reduce property impacts	**Old 99/Cook Road** • Reduces vehicle volumes at Old 99 and Cook Road intersection • Out of direction travel required for NB/SB Old 99 to EB Cook Road movements • Signage could be complicated to direct NB/SB Old 99 to EB Cook Road movements • Eliminates all delay associated with rail crossing events • Short (non-standard) lane change distances for WB vehicles between Old 99 and the I-5 northbound ramp	• Eliminates at-grade crossing	• No impacts to agricultural land in corridor • Impacts to Scholten's Equipment, an agricultural support business	• No feasibility concerns	25
Alternative 1D	• $28,000,000	• Major property impacts to commercial businesses (truck fueling stations/stops) on Old 99, including complete property take and relocation	**Old 99/Cook Road** • Reduces vehicle volumes at Old 99 and Cook Road intersection • Creates one additional intersection on Old 99 compared to existing • Eliminates all delay associated with rail crossing events **I-5 Interchange** • Additional delay for vehicles at the EB/WB approaches of the Cook Road/I-5 off-ramp intersections due to signals	• Eliminates at-grade crossing	• Some impacts to agricultural land on Cook Road east of the railroad crossing • Impacts to Scholten's Equipment, an agricultural support business	• Realignment of I-5 northbound ramps not feasible	15
Alternative 2	• $21,000,000	• Property impacts to parcels on Old 99 to provide frontage road required to maintain access and construct elevated intersection • Some property impacts to residential parcels on Cook Road east of the railroad crossing • Impacts to residences on the northeast side of the Cook Road/Old 99 intersection	**Old 99/Cook Road** • Through traffic on Cook Road interacts with traffic on Old 99, similar to existing conditions • Eliminates all delay associated with rail crossing events **I-5 Interchange** • Additional delay for vehicles at the EB/WB approaches of the Cook Road/I-5off-ramp intersections due to signals	• Eliminates at-grade crossing	• Impacts to agricultural land on Cook Road east of the railroad crossing • Impacts to Scholten's Equipment, an agricultural support business	• No feasibility concerns	22
Alternative 3	• $36,000,000 • Highest cost alternative	• Loss of vacant parcels to provide frontage road • Substantial impacts to parking and circulation on commercial properties north of Cook Road	**Old 99/Cook Road** • Through traffic on Cook Road interacts with traffic on Old 99, similar to existing conditions • Eliminates all delay associated with rail crossing events	• Eliminates at-grade crossing	• Impacts to agricultural land on Cook Road east of the railroad crossing • Substantial impacts to agricultural land on Old 99 north of Cook Road • Impacts to Scholten's Equipment, an agricultural support business	• Realignment of I-5 northbound ramps not feasible	12

4.2.8.2 Screen 2 Evaluation

Alternative 1B Option 2, Alternative 1C, and Alternative 2 were evaluated in further detail in Screen 2. The Screen 2 evaluation analyzed traffic operations for the three alternatives using SimTraffic and Sidra software. Each of the alternatives was analyzed using 2040 traffic volumes.

Alternative 1B Option 2 Operations Analysis

For this analysis, it was assumed that a roundabout would be provided at the intersection of Cook Road and the I-5 southbound off-ramp as well as the intersection of Cook Road and the I-5 northbound off-ramp. As summarized in Figure 4-8, and Table 4-7 all of the intersections under Alternative 1B Option 2 would operate with minimal delay in 2040 during the PM peak hour during typical conditions. However, during a rail crossing event, traffic operations at both of the I-5 off-ramps would be worse than shown due to congestion spilling back from the rail crossing. A rail crossing event would result in delay and queuing throughout the roadway network that could not be captured by Sidra. Traffic operations would likely be slightly better than traffic operations shown in Phase 1: Signals; most of the eastbound/westbound traffic on Cook Road would not be impacted by a rail crossing event but some traffic movements would continue to be delayed until the at-grade crossing opened again. This would result in additional delay at each of the roundabout intersections. .

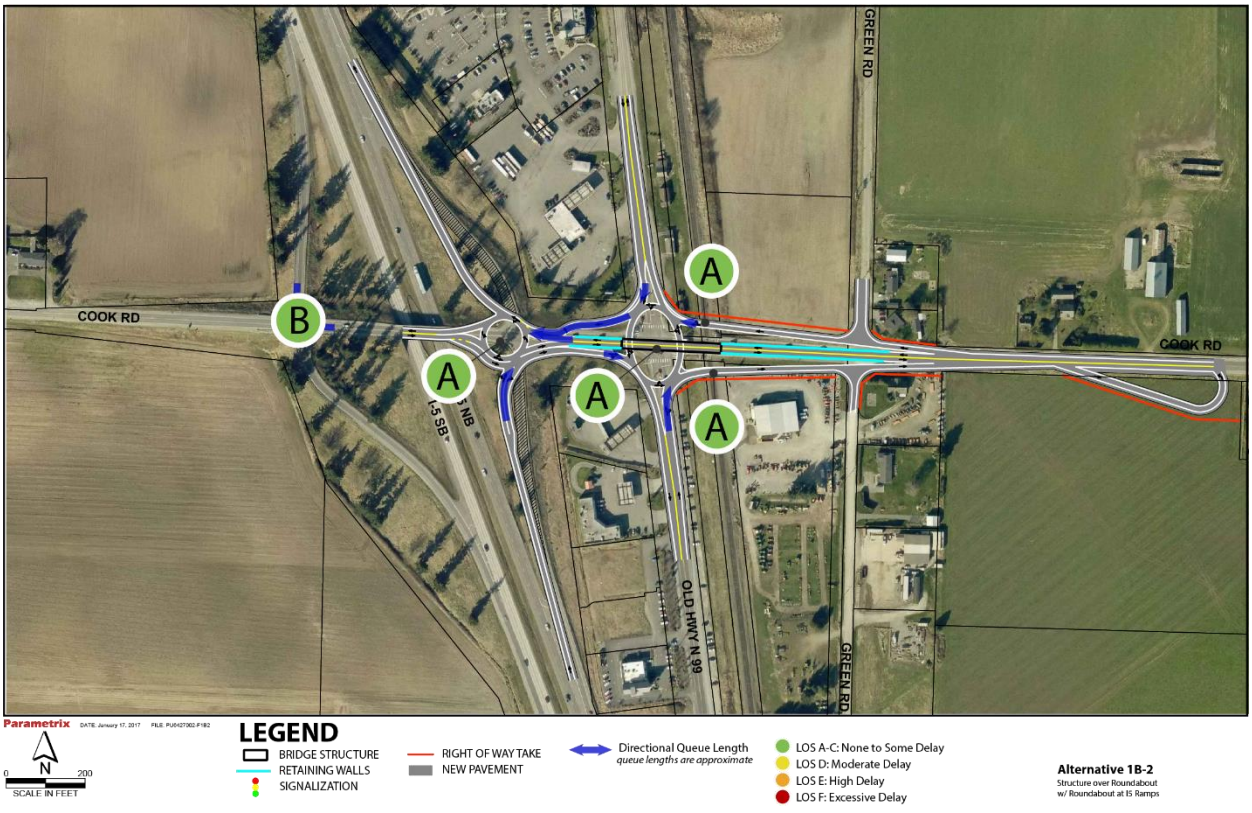


Figure 4-8. Alternative 1B Option 2 (2040) PM Peak Hour Intersection Operations

Table 4-7. PM Peak Hour Operations Results for Alternative 1B Option 2 (2040)

Location	LOS	Delay (sec)
Cook Road and Southbound Off-Ramp	B[#]	10[#]
Cook Road and Northbound Off-Ramp	A[#]	6[#]
Cook Road and Old Highway 99	A[#]	8[#]

[#] LOS and delay do not capture the effects of a train crossing event

Benefits and Trade-Offs

Alternative 1B Option 2 would reduce congestion and delay in the corridor. The majority of high traffic volume movements would also be grade separated from the rail line. However, this alternative has the largest planning level cost and includes short (non-standard) lane change distances in the westbound direction between Old Highway 99 and the northbound ramp terminus. Also, because two legs of the Old Highway 99 roundabout would interact with the rail line, the roundabout could fail during a long train crossing event. Vehicles needing to use an exit blocked by a train would queue within the roundabout, which could also prevent vehicles from entering the roundabout on other approaches. Because of this, delay and congestion at the I-5 off-ramps during a train crossing event would also be more than what is shown in Figure 4-8 and Table 4-7.

Alternative 1C Operations Analysis

For this analysis, it was assumed that a roundabout would be provided at the intersection of Cook Road and the I-5 southbound off-ramp as well as the intersection of Cook Road and the I-5 northbound off-ramp. All of the intersections under Alternative 1C would operate with minimal delay, as summarized in Figure 4-9 and Table 4-8. This is primarily because there would no longer be any interaction with the rail line. At the I-5 northbound off-ramp, there would be approximately 15 seconds of delay per vehicle during the PM peak hour. At the two intersections of Cook Road and Old Highway 99, there would be between approximately 1 second and 20 seconds of delay per vehicle during the PM peak hour. As described earlier, traffic connecting between Old Highway 99 and eastbound Cook Road and between westbound Cook Road and Old Highway 99 would use the roundabout at the I-5 northbound ramps. This would create some out of direction travel for vehicles making this connection.

Figure 4-9. Alternative 1C (2040) PM Peak Hour Intersection Operations

Table 4-8. PM Peak Hour Operations Results for Alternative 1C (2040)

Location	LOS	Delay (sec)
Cook Road and Southbound Off-Ramp	B	10
Cook Road and Northbound Off-Ramp	B	17
Cook Road and Old Highway 99 Off-Ramp	B	17
Cook Road and Old Highway 99 On-Ramp	A	1

Benefits and Trade-Offs

Alternative 1C would reduce congestion and delay in the corridor and grade separate all traffic movements from the rail line. This alternative also has the lowest planning level cost. However, some short (non-standard) lane change distances in the westbound direction between Old Highway 99 and the northbound ramp terminus would occur under this alternative. More advanced design efforts would be required to determine the construction feasibility of the roundabouts given their close proximity. There would also be some out of direction travel for vehicle movements to or from the east on Cook Road since no access ramps would be provided on the east side of Old Highway 99. This could be unintuitive for travelers in the corridor.

Alternative 2 Operations Analysis

Under Alternative 2, there would be minor to some delay at intersections in the Cook Road corridor, as summarized in Figure 4-10 and Table 4-9. At the I-5 northbound off-ramp, there would be approximately 11 seconds of delay per vehicle during the PM peak hour. At the I-5 southbound off-ramp, delay would be approximately 33 seconds per vehicle during the PM peak hour. At the intersection of Cook Road and Old Highway 99, vehicles would experience approximately 33 seconds of delay during the PM peak hour.

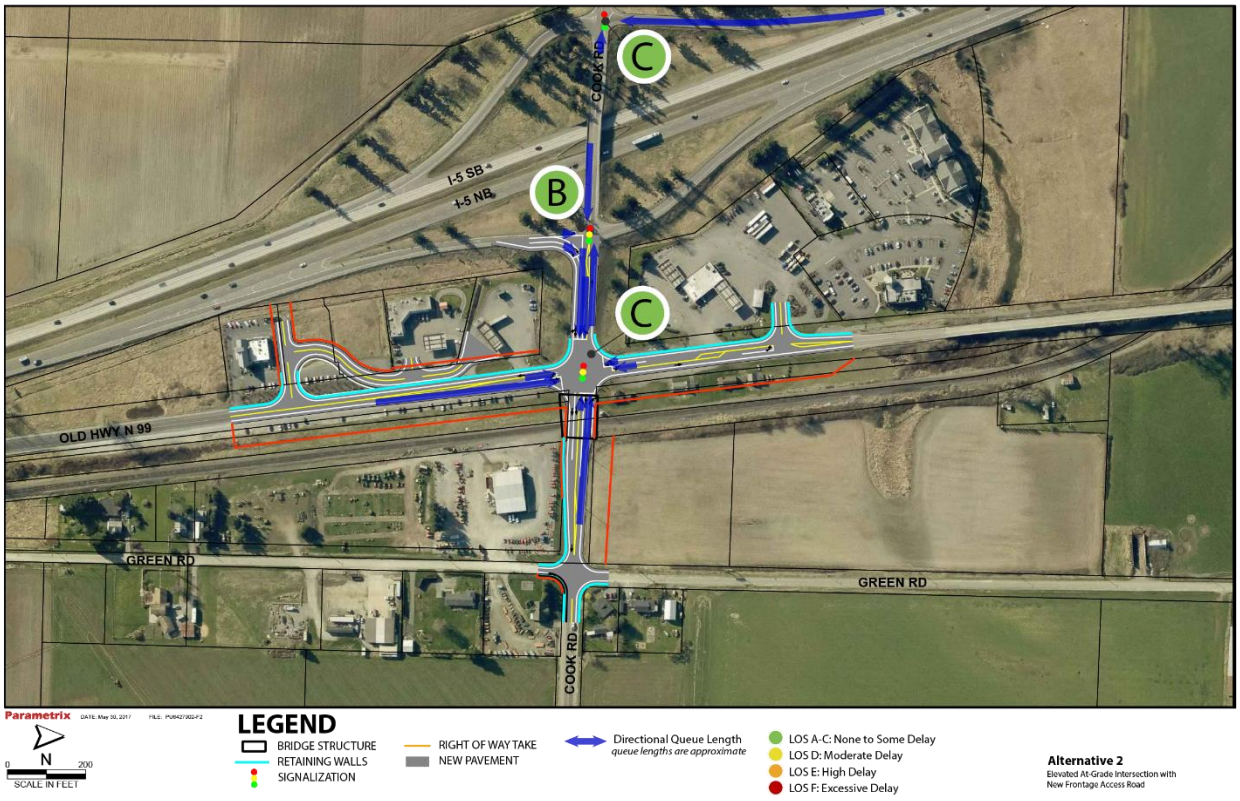


Figure 4-10. Alternative 2 (2040) PM Peak Hour Intersection Operations

Table 4-9. PM Peak Hour Operations Results for Alternative 2 (2040)

Location	LOS	Delay (sec)
Cook Road and Southbound Off-Ramp	C	33
Cook Road and Northbound Off-Ramp	B	11
Cook Road and Old Highway 99	C	33

Benefits and Trade-Offs

Alternative 2 would reduce congestion and delay in the corridor and grade separate all traffic movements from the rail line. This alternative would also have a roadway configuration that is the most similar and familiar to drivers currently using the corridor. However, there would be some impacts to businesses along Old Highway 99. The elevated structure would require the reorientation of access points to properties north and south of Cook Road, which could substantially alter how vehicles

maneuver within the property as well. Also, the overcrossing of the BNSF rail line located north of Cook Road on Old Highway 99 is at a higher grade than the access points to the properties. This would result in a series of elevation changes within a short span of right-of-way between Cook Road and the BNSF overpass.

Screen 2 Comparative Results

Table 4-10 and Table 4-11 summarize the results of the comparative evaluation for each of the alternatives. Green represents a higher, or better, performance, and orange represents a lower performance.

Table 4-10. Screen 2 Summary Performance Results

Alternative	Planning Level Cost	Property Impacts	Traffic Impacts	Rail Impacts	Agricultural Impacts
Alternative 1B Option 2					
Alternative 1C					
Alternative 2					

KEY TO RANKING
LOWER PERFORMING — HIGHER PERFORMING

KEY TO RANKING
LOWER PERFORMING — HIGHER PERFORMING

Table 4-11. Screen 2 Detailed Performance Results

Alternative	Planning Level Cost	Property Impacts	Traffic Impacts	Rail Impacts	Agricultural Impacts
Alternative 1B Option 2	• $26,000,000 • Highest cost alternative	• Circulation and access to gas station on southwest corner of Old 99/Cook Road could change • Some impacts to residential properties on Cook Road east of the railroad crossing, including a potential taking of a residential property	**Old 99/Cook Road** • Through traffic on Cook Road is grade-separated from Old 99 and rail crossing • No left-turn storage on Old 99 to store queues during a rail crossing event • Requires out-of-direction travel to complete NB Green Road to WB Cook Road movement and SB Green Road to EB Cook Road movement • During a rail crossing event, queues could spill out of roundabout and impact I-5 Interchange **I-5 Interchange** • I-5 southbound and northbound ramps operate with minimal delay, except during rail crossing events • Creates traffic short weaving section at the northbound ramp terminus	• Creates one additional at-grade rail crossing (two total) • Rail crossings have smaller vehicle volumes	• Some impacts to agricultural property along Cook Road east of railroad crossing • Impacts to Scholten's Equipment, an agricultural support business
Alternative 1C	• $17,000,000 • Lowest cost alternative	• Circulation and access to gas station on southwest corner of Old 99/Cook Road could change • Minor impacts to residential property on Cook Road east of the railroad crossing – walls reduce property impacts	**Old 99/Cook Road** • Intersections with Old 99/Cook Rd operate at LOS B or better during 2040 PM peak • Through traffic on Cook Road is grade-separated from Old 99 and rail crossing • Out-of-direction travel required for NB/SB Old 99 to EB Cook Road movements • Signage could be complicated to direct NB/SB Old 99 to EB Cook Road movements • Eliminates all delay associated with rail crossing events **I-5 Interchange** • I-5 southbound and northbound ramps operate with minimal delay • Creates a short weaving section at the northbound ramp terminus that may not be feasible	• Eliminates at-grade crossing	• No impacts to agricultural land in corridor • Impacts to Scholten's Equipment, an agricultural support business
Alternative 2	• $22,000,000	• Property impacts to parcels on Old 99 to provide frontage road required to maintain access and construct elevated intersection • Impacts to property access on Old 99 could be substantial • Some property impacts to residential parcels on Cook Road east of the railroad crossing and residential parcels to the northeast of the Cook Road/Old 99 intersection	**Old 99/Cook Road** • Through traffic on Cook Road interacts with traffic on Old 99, similar to existing conditions • Eliminates all delay associated with rail crossing events **I-5 Interchange** • I-5 southbound and northbound ramps operate with minimal to moderate delay	• Eliminates at-grade crossing	• Impacts to agricultural land on Cook Road east of the railroad crossing • Impacts to Scholten's Equipment, an agricultural support business

5. FUNDING STRATEGIES AND AGENCY COORDINATION

There are a number of funding sources at the federal and state level for grade separation projects. These sources are described below.

5.1 Federal Grant Programs

5.1.1 USDOT FASTLANE Program

The FASTLANE program provides dedicated, discretionary funding for projects that address critical freight issues throughout the nation. The FASTLANE program was established in the Fixing America's Surface Transportation (FAST) Act to fund critical freight and highway projects across the country. The FAST Act authorized the program at $4.5 billion for fiscal years (FY) 2016 through 2020. Eligible projects include railway-highway grade crossing or grade separation projects and highways and bridges on the National Highway Freight Network (NHFN) or the National Highway System (NHS). Railway-highway grade crossing or grade separation projects do not have to be on the NHFN or NHS. Eligible applicants for FASTLANE grants include, but are not limited to, states, MPOs, local governments, or other political subdivision of a State.

The most recent deadline for applications was December 15, 2016. There is currently no call for projects.

Additional information: https://www.transportation.gov/buildamerica/FASTLANEgrants

5.1.2 USDOT Transportation Investment Generating Economic Recovery (TIGER) Grant Program

The TIGER grant program is a highly competitive program that supports innovative projects, including multi-modal and multi-jurisdictional projects, which are difficult to fund through traditional federal programs. Eligible projects are capital project that include, but are not limited to highway or bridge projects and passenger and freight rail transportation projects. The FY 2016 TIGER grant program focused on capital projects that generate economic development and improve access to reliable, safe and affordable transportation for communities, both urban and rural. TIGER can provide capital funding directly to any public entity, including municipalities, counties, port authorities, tribal governments, or MPOs. The FY 2016 TIGER Program provided nearly $500 million to 40 grant recipients. There is currently no call for projects.

Additional information: https://www.transportation.gov/tiger

5.2 WSDOT Administered Federal Aid Programs

5.2.1 Surface Transportation Program (STP)

The STP, also known as the Surface Transportation Block Grant program (STBG), provides flexible funding that may be used by States and localities for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road. WSDOT allocates STP funds to Metropolitan Planning Organizations (MPOs) and County Lead Agencies for prioritizing and selecting projects that align with their regional priorities. Projects eligible for STP funding include highway and bridge construction and repair; transit capital projects; bicycle, pedestrian and

recreational trails; and construction of ferry boats and terminals. Currently, the regionally-managed portion of STBG funds is limited; this funding source could be used to fund a portion of the project.

Additional information: http://www.wsdot.wa.gov/LocalPrograms/ProgramMgmt/STP.htm

https://www.fhwa.dot.gov/specialfunding/stp/

5.2.2 Highway Safety Improvement Program:

The Highway Safety Improvement Program (HSIP) is funded from the 2016 FAST Act. The HSIP program requires that states program and spend safety funds according to their Strategic Highway Safety Plan. WSDOT administers Washington state's federal safety funds to jurisdictions in Washington State to use engineering countermeasures to reduce fatal and serious injury crashes in accordance with Washington State's Strategic Highway Safety Plan, "Target Zero." Relevant WSDOT funding programs from the HSIP include the County Safety Program and the Railroad-Highway Crossings Program.

Additional information: https://safety.fhwa.dot.gov/hsip/

http://www.wsdot.wa.gov/LocalPrograms/Traffic/FedSafety.htm

5.2.2.1 County Safety Program

The purpose of this program is to fund the design/preliminary engineering, right-of-way, and construction phases of projects that will use engineering countermeasures to reduce fatal and serious injury collisions on county roads in counties with a prioritized local road safety plan. The most recent application window closed May 31, 2017. This program is offered early in the year in each odd numbered year.

Additional information: http://www.wsdot.wa.gov/LocalPrograms/Traffic/FedSafety.htm

5.2.2.2 Railroad-Highway Crossings Program:

The goal of this program is to fund safety improvements to reduce the number of fatalities, injuries, and crashes at public grade crossings, which can also include the elimination of grade crossings. Funding is available for the installation of new crossing protective devices, upgrade of existing crossing signal devices, railroad crossing closures and pedestrian crossing improvements. Eligible Applicants include local agency owned roads with public crossings including roadways, bike trails and pedestrian paths.

WSDOT has announced the availability of approximately $12 million of Highway Safety Improvement Program federal funding that is set aside for the elimination of hazards at railway–highway crossings (23 USC 130). The most recent application window closed August 4, 2017.

Additional information: https://safety.fhwa.dot.gov/hsip/xings/
http://www.wsdot.wa.gov/LocalPrograms/ProgramMgmt/RailwayHighwaysCrossings.htm

5.3 State Funding Opportunities

5.3.1 State Rail Grant and Loan Programs

The state of Washington administers both a grant program (Freight Rail Assistance Program) and a loan program (Freight Rail Investment Bank) designed to support freight rail capital needs.

Additional information: http://www.wsdot.wa.gov/Freight/Rail/GrantandLoanPrograms

5.3.2 Freight Rail Assistance Program

The Freight Rail Assistance Program is a grant program open to applicants in both the public and private sector. This program is directed toward larger projects where it is difficult to gain a contribution and where the rail location or the project is of strategic importance to the local community and the state. This is a grant program and is open to cities, county rail districts, counties, economic development councils, port districts, and privately or publicly owned railroads. Projects must be shown to maintain or improve the freight rail system in the state and benefit the state's interests.

The legislature allocated approximately $7 million for projects during the 2017-2019 biennium. The 2016 application process for 2017-2019 biennium projects is now closed.

5.3.3 Freight Rail Investment Bank

The Freight Rail Investment Bank program is a loan program available to the public sector. This program is intended for either smaller projects or as a small part of a larger project, where state funds would enable the project to be completed.

The governor and state legislature allocated $5 million for the Freight Rail Investment Bank program during the 2017-2019 biennium. The loan maximum is $250,000, but could be higher depending on the amount of qualifying applications received and the caliber of proposed projects. Additionally, all applicants must provide a minimum 20 percent match. The 2016 application process for 2017-2019 biennium projects is closed.

5.3.4 Freight Mobility Strategic Investment Board

The Freight Mobility Strategic Investment Board designates, solicits, and selects freight projects that will enhance or mitigate the mobility of freight in Washington State. Eligible projects must be on a strategic freight corridor and be listed as part of a state or local transportation plan. WSDOT, cities, counties, and ports are eligible to apply. The Washington State Freight Mobility Strategic Investment Board is held accountable to create a comprehensive and coordinated state program to facilitate freight movement between and among local, national and international markets which enhances trade opportunities. The Board is also charged with finding alternatives that lessen the impact of the movement of freight on local communities. There is currently no call for projects.

Additional information: http://www.fmsib.wa.gov/

5.3.5 Rural Arterial Program

The Rural Arterial Program (RAP) is a road and bridge reconstruction funding program that counties compete for every two years within their respective regions. Taken from fuel tax revenues, the account generates approximately $40 million per biennium. The counties submit RAP projects based on safety, geometry, capacity and structural deficiencies.

Additional information: http://www.crab.wa.gov/funding/grants/rap/index.cfm

6. STUDY FINDINGS AND RECOMMENDATIONS

This study evaluated both interim and long-term solutions to address congestion and delay in the Cook Road corridor as well as to reduce conflicts between traffic and the BNSF rail line. Throughout the project, coordination between the stakeholders occurred to evaluate the alternatives and determine project outcomes as described in Chapter 3. The following findings and recommendations were developed through this study.

6.1 Finding 1: Traffic Congestion and Delay in the Corridor is and will Continue to be Problematic

As documented in Chapter 4 and confirmed by comments received at the public meeting, traffic congestion and operations in the Cook Road corridor are problematic. Vehicles experience high levels of delay that becomes worse during train crossing events. Additionally, traffic operations in the corridor result in vehicle queuing on the I-5 northbound off-ramp that can extend onto the I-5 mainline. This delay will increase over time as traffic volumes continue to grow in the corridor.

6.2 Finding 2: Conflicts Between Vehicles and the Rail Line Should be Addressed

This study, along with other studies completed throughout the state, have confirmed that there will likely be impacts to traffic delay and safety from increased train traffic in the future. The stakeholder group has determined that it is important to identify a solution to grade separate Cook Road from the BNSF mainline.

6.3 Recommendation 1: Short-term Alternatives in the Cook Road Corridor Should be Pursued to Address Congestion in the Near Future

A short-term solution to address congestion and delay in the corridor should be pursued. The recommended short-term solution, with support from the stakeholder group, would include the following:

- Signalize both the I-5 southbound and northbound ramp termini;
- Increase capacity on the I-5 northbound off-ramp; and
- Increase capacity on Cook Road between the I-5 Northbound ramps and Green Road.

As documented in Chapter 4, these improvements would reduce congestion and delay in the Cook Road corridor. However, they do not eliminate all of the forecasted traffic issues associated with increased rail traffic but are a practical step towards relieving congestion in the corridor.

6.4 Recommendation 2: Continue Refinement of the Long-term Alternatives to Grade Separate Cook Road

As described in Chapter 4, there are a number of substantial trade-offs associated with each of the long-term alternatives to grade-separate Cook Road over the BNSF rail line, including short distance lane changes on Cook Road between Old Highway 99 and the northbound ramps and direct impacts to property and property access. The stakeholder group recommended that additional refinement and vetting of the alternatives should be completed in order to move forward with one of the grade separation alternatives of Cook Road. Because each of the long-term alternatives were only developed to a conceptual level, additional refinement of the alternatives would include a three to five percent design effort to identify and address major tradeoffs. The early design effort would provide a better understanding of how impacts to property access and traffic operations could be reduced.