

Cowlitz County Strategic Risk-Based Assessment

developed using the

Systemic Safety Project Selection Tool

Cowlitz County Department of Public Works
June 2014

Introduction

Cowlitz County is committed to reducing fatalities and serious injury accidents on County maintained roads. As outlined in the [Target Zero Washington State Strategic Highway Safety Plan](#), identification of accident trends and contributing factors is key to implementing successful accident reduction strategies.

Reasons for Conducting Data Analysis

Cowlitz County collects detailed accident information and retains it over time. This allows us to return to the data and review it to determine if accident trends exist for some period of time. Additionally, the State of Washington has provided statewide accident data. With the two data sources, we can compare accident type incidents, predict where accidents may occur and work to reduce accident types exceeding the average rate of occurrence. Targeting accident types and connecting factors allows Cowlitz County to be efficient and cost-effective in identifying and implementing accident reduction strategies.

Washington State Target Zero Plan

Washington State's Target Zero plan highlights the importance of data driven accident reduction strategies. Through the Corridor Traffic Safety Program, low-cost, near-term projects can be identified which will improve roadway safety through systemic, meaningful action. As noted in the 2013 Target Zero plan "the greatest challenge in addressing fatalities and serious injuries on rural roads is the geographic randomness of collisions scattered over tens of thousands of miles."

Target Zero Priorities

Cowlitz County utilized the Target Zero Priority matrix to identify locations and specific strategies, for three priority levels.

- Priority Level 1: Contributing factors that are involved in 30% or more of fatality or serious injury accidents.
- Priority Level 2: Contributing factors that are involved in 10% or more of fatality or serious injury accidents.
- Priority Level 3: Contributing factors that are associated with less than 10% of fatality or serious injury accidents but are common factors that will improve traffic safety for all users.

Identification of Relevant Risk/Crash Types

Data sourcing

Data for the analysis was provided by WSDOT or was retrieved from the County Road Administration Board (CRAB) online system for dates January 1, 2008 through December 31, 2012. The data was entered from accident reports provided by the Cowlitz County Sheriff's Department or Washington State Patrol for accidents occurring in Cowlitz County.

Methodology

The three E's are being used to address safety topics: Education, Enforcement, Engineering. This report focuses on Engineering strategies, but also acknowledges that partnerships with law enforcement and

other public safety agencies can result in a real and beneficial safety gain for the targeted risk group, as well as other motorists.

System Accident Evaluation

Our data analysis began with data provided by Washington State Department of Transportation. Highlighted are factors that exceed the state average for accidents involving fatalities or serious injury accidents. By determining contributing factors, establishing a risk rating, and prioritizing sites with multiple features connected with higher risk rates, low cost safety projects can be targeted to provide the maximum benefit to the traveling public, reducing the risk of serious injury or fatality accidents on Cowlitz County roads.

The table below describes Washington State overall average percentage rates for the state, compared to the same accident types for only Cowlitz County. The table highlights areas where Cowlitz County’s rates exceed the average rates and point towards accident types and features, which Cowlitz County has investigated further. Priority Level 1 items are shown in bold.

Appendix A includes the 2008 – 2012 Cowlitz County Data that was provided by WSDOT. Areas highlighted in the data are those areas where the Cowlitz County data is overrepresented compared to the percentage of crashes in other Washington Counties or on all Washington Public Roads. Percentage of crashes from the WSDOT provided data that are overrepresented are also included in the table below (rows marked with * indicate that the data is not considered significantly different between the County and the Statewide averages or that the County percentage is less than the Statewide average):

Analysis of WSDOT data

Table 1 – Analysis based on WSDOT provided data.

	Fatal/Serious Injury Crashes Only		Total Crashes	
Overall Numbers	Statewide All Counties Average	Cowlitz County	Statewide All Counties Average	Cowlitz County
% of Alcohol Related Collisions	33.2	43.6	12.4	17.7
By Collision Type				
Hit Fixed Object	41.3	61.5	40.4	63.1
By Light Condition				
Dark – No Street Lights	*	*	22.3	31.3
By Junction Relationship				
Non-intersection	65.2	79.5	54.4	71.9
By Roadway Curvature				
Horizontal Curve	39.5	61.5	28.1	52.5
Vertical Curve	4.1	7.7	3.8	6.5
Hit Fixed Object Crashes Only – By Fixed Object Hit				
Ran over Embankment	*	*	6.9	11.2
Mail box	*	*	4.5	7.5

By Contributing Circumstance				
Exceeding Safe Stated Speed	25.5	33.8	*	*
Under Influence of Alcohol/Drugs	*	*	8.9	12.2
Over Centerline	*	*	9.3	12.2
Improper Passing	1.9	6.2	*	*
By Vehicle Type				
Motorcycle	15.7	25.5	2.1	3.3
By Speed Limit				
35	36.3	47.7	43.7	63.2
40	11.3	18.2	10.4	13.1

The WSDOT or state data was used in determining the contributing factors for each priority level as follows:

- Priority Level 1 – Contributing factors that are involved in 30% or more of fatality or serious injury accidents. These contributing factors are alcohol related collisions; hit fixed object, dry roadway, daylight, non-intersection, horizontal curve, exceeding safe/stated speed, passenger cars and 35 MPH roads.
- Priority Level 2 - Contributing factors that are involved in between 10% and 30% of fatality or serious injury accidents. These contributing factors are wet roadway surface, dark – no street lights, straight roadway (level and on grade), hit fixed object (tree/stump, ran over embankment, earth bank, fence, under influence of alcohol/drugs, light truck/SUV, motorcycle and 25 and 40 MPH roadways.
- Priority Level 3: Contributing factors that are involved in less than 10% of fatality or serious injury accidents but are common factors that will improve traffic safety for all users. These contributing factors include overturning, hitting other vehicles, hitting pedestrians, wildlife collisions, ice, dawn, dark – street lights off, intersection and driveway related, vertical curves, culverts and roadside ditches, mailboxes, utility poles, wood sign posts, concrete barriers, boulders and rock banks, over centerline, operating defective equipment, inattention/distraction, improper passing, headlight violation, failing to yield and improper turns as well as failing to yield to pedestrian/cyclist, heavy trucks and speed limits of 30, 45 and 50 mph.

Analysis of County Data

While it is important to consider the state data in order to determine the applicable risk factors, it is also important to note that small changes can skew the data and that factors unique to Cowlitz County also need to be considered. An example is that each increase or decrease of 1 fatal/serious injury is 2.6 percentage points. This raises the concern that there is not enough data to target the risk factors appropriately. Another concern are factors that are unique to Cowlitz County. Take, for instance, the crashes that occur on roads that are posted at 35 mph. While the state data shows this to be overrepresented, a review of the County data shows that of the County's 528.9 miles of road, 220.6 miles (41.7%) and 51% of the total traffic occurs on the County roads that are posted at 35 mph.

In order to determine the best risk factors to use, we analyzed County data that is stored in CRAB's mobility database, while also keeping in mind that the goal is to reduce the amount of fatal/serious

injury crashes that could occur anywhere on our system. The data is pulled from 916 total accidents, including 338 injury accidents and 9 fatalities on 528.9 miles of Cowlitz County roads system. Corresponding to the Washington State data, Cowlitz County analysis shows that curves represent a majority of both injury and fatality accidents at 58.8%. Of the nine fatalities during the study time period, 5 occurred in curves. Hit fixed object also is a significant contributing factor, with 7 of 9 fatalities occurring with an associated hit fixed object, which includes water (river or lake). The data analyzed by the County was also used to determine the possible contributing factors for each priority level. Note that the following is for all injury and fatality accidents, not just serious injury/fatality accidents:

- Priority Level 1 – Contributing factors that are involved in 30% or more of fatality or injury accidents. These contributing factors are hit fixed object, dry roadway, daylight and dark – no street lights, non-intersection, horizontal curve and straight, on a grade and level, and 35 MPH roads. In addition, these factors include a shoulder width of 2' or less and less than 1000 ADT.
- Priority Level 2 - Contributing factors that are involved in between 10% and 30% of fatality or serious injury accidents. These contributing factors are alcohol related collisions, exceeding safe/stated speed, wet roadway surface, snow-ice, dark – street lights, and 25 and 40 MPH roadways. In addition, these factors include shoulder widths greater than 2' and greater than 1000 ADT.
- Priority Level 3: Contributing factors that are associated with less than 10% of fatality or serious injury accidents but are common factors that will improve traffic safety for all users. These contributing factors include overturning, hitting other vehicles, dawn and dusk, dark – street lights off, intersection and driveway related, vertical curves, over centerline, improper passing and speed limits of 30, 45 and 50 mph. In addition, these factors include unpaved roads and ADT of less than 100.

Combining the state and county data, we have developed the following factors for the Priority levels:

- Priority Level 1 – Combined contributing factors that are involved in 30% or more of fatality or injury accidents. These contributing factors are alcohol related collisions, hit fixed object, dry roadway, daylight and dark-no street lights, non-intersection, horizontal curve and straight - on a grade and level, exceeding safe/stated speed, passenger cars, shoulder widths less than 2', 35 MPH posted speed and less than 1,000 ADT.

The factors that will be rated for Priority Level 1 will include non-intersection related segments of roads, roads with horizontal curves, shoulder widths of less than 2', 35 MPH speed and less than 1,000 ADT and the risk of severe injury/fatality. The risk of severe injury/fatality is based on the clear zone characteristics and if there is a history of accidents. Alcohol related collisions, dry roadway, daylight, straight, on a grade and level, and passenger cars will not be included in the priority rating. Alcohol related collisions should be addressed through enforcement and education. Dry roadways, daylight, straight, grade and level are characteristics that are not considered contributing factors to the collisions. While dark-no street lights, and exceeding safe/stated speed will not be rated, countermeasures selected will be appropriate for these factors.

Countermeasures to be proposed for the priority level 1 locations will include those that are appropriate for reducing run off the road accidents.

- Priority Level 2 - Contributing factors that are involved in between 10% and 30% of fatality or injury accidents. These contributing factors are wet roadway surface, dark – no street lights, straight roadway (level and on grade), hit fixed object (tree/stump, ran over embankment, earth bank, fence), under influence of alcohol/drugs, light truck/SUV, motorcycle, 25 and 40 MPH roadways, exceeding safe/stated speed, snow-ice, dark – street lights, shoulder widths greater than 2’ and greater than 1000 ADT.

The factors that will be considered in ratings for priority level 2 will include non-intersection, dark – no street lights, 25 and 40 mph roadways, shoulder widths greater than 2’ and greater than 1000 ADT. Alcohol related collisions should be addressed through enforcement and education. Straight roadway (level and grade) are not considered contributing factors to the collisions. While wet roadway surface, and snow/ice will not be rated, countermeasures selected will be selected with these factors in mind.

Countermeasures to be proposed for the priority level 2 locations will include those that are appropriate for reducing run off the road accidents.

- Priority Level 3: Contributing factors that are associated with less than 10% of fatality or injury accidents but are common factors that will improve traffic safety for all users. These contributing factors include overturning, hitting other vehicles, hitting pedestrians, wildlife collisions, ice, dark – street lights off, intersection and driveway related, vertical curves, run off the road (culverts and roadside ditches, mailboxes, utility poles, wood sign posts, concrete barriers, boulders and rock banks), over centerline, operating defective equipment, inattention/distraction, improper passing, headlight violation, failing to yield and improper turns as well as failing to yield to pedestrian/cyclist, heavy trucks, speed limits of 30, 45 and 50 mph, dawn and dusk, unpaved roads, pavement widths less than 20’, shoulder widths greater than 2’, and ADT of less than 100.

The factors that will be considered in ratings for priority level 3 will include vertical curves, intersections, runoff the road, speed limits of 30, 45 and 50, shoulder widths greater than 2’ and ADT of less than 100. The other factors not included for rating are considered to be enforcement/education/experience related such as ice, dawn/dusk, defective equipment, inattention/distraction, improper passing, over centerline, headlight violation, unpaved roads and failing to yield to a pedestrian/cyclist.

Evaluation of County Road System

Once the contributing factors have been determined, the next step in the plan is to evaluate the existing County road system to determine where the high risk factors currently occur and to determine the appropriate countermeasures to employ. Locations are then prioritized based on how many of the high risk factors are present. A priority array is prepared that includes the high risk factors and assigns a * if the risk factor is present. Factors that have not been evaluated are noted at ‘TBE’. The following tables contain the result of the road evaluation.

Green Mountain Road	4.2	10.25	*	*	*	*	TBE
Hendrickson Drive	0.2	0.88	x	*	*	*	TBE
Holcomb Road	0.49	4.35	*	*	*	*	*
Hooper	0	1.25	*	*	x	*	*
Kalama River Road	0.2	9	*	x	*	x	*
Kalama River Road	9	16.95	*	*	*	*	TBE
King Road	0	0.55	*	*	x	*	TBE
Kroll Road	0.05	1.47	*	*	*	*	x
Little Kalama River Road	2.72	7.24	*	*	*	*	TBE
McKee Road	0	1.97	*	*	*	*	*
Mill Creek Road	1.66	2.7	*	*	*	*	*
Oak Point Road	0	2.28	*	*	*	*	TBE
Pleasant Hill Road	0	3.19	*	*	*	*	*
Pleasant Hill Road	3.72	3.87	*	*	*	*	*
Pleasant Hill Road	4	4.08	*	*	*	*	*
Pleasant Hill Road	4.38	4.81	*	*	*	*	*
Powell Road	0.25	1.3	*	*	*	*	TBE
Ragland Road	0	1.6	*	*	*	*	*
Sandy Bend Road	0	0.22	*	*	*	*	TBE
Sandy Bend Road	0.38	2.63	*	*	*	*	TBE
Schaffran Road	0	2.65	*	*	*	*	TBE
Shirley Gordon Road	0.54	1.97	*	*	*	*	TBE
Si Town Road	0	1.04	*	*	*	*	TBE
Slide Creek Road	0	2.8	*	*	x	*	*
South Pekin Road	2.35	2.89	*	*	*	*	*
South Toutle Road	0	2	*	x	x	x	*

South Toutle Road	2.56	2.9	x	x	*	x	*
South Toutle Road	2.9	4.21	*	*	*	*	*
South Toutle Road	4.68	6.35	*	*	*	*	*
Spruce Creek Road	0.87	1.15	*	*	*	*	TBE
Studebaker Road	0	1.15	*	*	*	*	TBE
Studebaker Spur #2	0	0.63	*	*	*	*	TBE
Toutle Park Road	0.16	0.93	*	*	*	*	x
Toutle River Road	0	0.86	*	*	*	*	TBE
Willow Grove Road	4.14	4.3	*	*	*	*	x
Willow Grove Road	4.3	7.5	*	*	*	*	*

Priority Level 2

Only the roads that met each criteria were included in priority level 2.

Road and Milepost Range	Begin Milepost	End Milepost	No Street Lights	Shoulder Widths > 2'	25 and 40 MPH posted speed	> 1,000 ADT	Run off the Road Risk
PH 10	0.72	0.8	*	*	*	*	*
Rose Valley Road	0	0.61	*	*	*	*	*
Rose Valley Road	2.43	5.17	*	*	*	*	*
Whalen Road	1.49	1.97	*	*	*	*	*
Kalama River Road	2.39	2.59	*	*	*	*	*
South Toutle River Road	0	2	*	*	*	*	*
South Toutle River Road	2.56	2.9	*	*		*	*

Generally, the roads in Priority Level 2 were addressed in a recent High Risk Rural Roads Program Grant. The locations noted above had roadside delineation installed. No projects were selected from this category while the effectiveness of the roadside delineation is evaluated.

Priority Level 3

The following intersections were evaluated with Priority level 3.

Road and Milepost Range	Intersection	Vertical Curve	Pavement Width < 20'	Shoulder Widths > 2'	30, 45, and 50 MPH posted speed	< 100 ADT
South Cloverdal/Confer Intersection	*	*	*	*		
South Cloverdale/Martin's Way intersection	*	*		*		
Pacific Way	*			*		
Wren Loop Road/West Side Highway	*	*	*		*	

Selection of Countermeasures

When locations that are at higher risk of fatal/serious injury crashes have been determined, then low cost countermeasures that would be effective at reducing the risk are considered. Countermeasures have been evaluated through FHWA's crash modification factors (CMF) clearinghouse. The CMF clearinghouse contains safety countermeasures and the effectiveness at reducing crashes. If a CMF has a rating of less than 1 then it has been shown or is expected to reduce the quantity of crashes. For example, if the cmf is 0.80, then the amount of crashes would be expected to be 80% of the existing number of crashes. Another term used is crash reduction factor (crf), which is the percent reduction in crashes. For the cmf of 0.8 the crf is 0.2, which means the crashes are reduced by 20%.

The countermeasures considered as a part of this plan are as follows:

Objective	Countermeasure
Reduce Run of the Road occurrences	Delineation
	Roadway signing – Curve Warning signs and chevrons
	Improve Roadway geometry
Minimize severity of roadside departures	Install guardrail/traffic barrier with delineators
	Replace non-standard guardrail
	Widen clear zone
Reduce intersection related collisions	Remove/relocate objects in hazardous locations in the clear zone
	Install/upgrade signing and delineation
	Improve roadway geometry
	Improve sight distance

Project Priority Selection

The list below contains the project priorities with an estimated cost for each.

Priority 1: Install guardrail/5 star locations adjacent to waterways /Willow Grove Road, MP 4.30-MP 7.50/\$570,000

Priority 2: Install guardrail/5 star locations adjacent to waterways/South Pekin Road, MP 2.35 – 2.89/\$120,000

Priority 3: Install guardrail/3 and 4 star locations adjacent to waterways/Dike Road/\$590,000

Priority 4: Install guardrail/4 and 5 star locations – countywide/ \$530,000

Priority 5: Install Roadside Delineation/4 and 5 star locations countywide/\$260,000

Priority 6: Install and/or upgrade curve warning signs and chevrons/4 and 5 star locations/ countywide/\$110,000

Priority 7: Raise low guardrail and upgrade terminals/3-5 star locations/ Pleasant Hill Road and Kalama River Road/\$275,000

Priority 8: Intersection Improvements/reconstruct intersection/3 star locations/South Cloverdale-Confer intersection/\$355,000

Priority 9: Intersection Improvement/minor grade and alignment revisions, upgrade signing and striping/ 3 star locations/ South Cloverdale-Martin's Bluff intersection/\$85,000

Conclusion

A majority of the crashes in Cowlitz County are strongly associated with curves and often involve hitting a fixed object. Data propels Cowlitz County to seek low cost safety features that target the risk factors that have a higher rate of occurrence. County roads have been identified utilizing these specific risk criteria and prioritized towards roads with greater opportunity to mitigate risk. This plan should be updated every three years to evaluate the success of the program and to identify additional risk factors and employ new countermeasures as needed. In addition, criteria used to evaluate locations, such as ADT, should be updated concurrently.

Appendix A

WSDOT and County Data

2008-2012 County X Data	Fatal/Serious Injury Crashes Only										Total Crashes											
	All Public Roads		All Counties		County X						All Public Roads		All Counties		County X							
	2008-2012	%	2008-2012	%	2008-2012	%	2012	2011	2010	2009	2008	2008-2012	%	2008-2012	%	2008-2012	%	2012	2011	2010	2009	2008
Overall Numbers																						
Total # of Collisions	12,447		3,246		37		4	11	5	12	5	513,944		70,278		470		79	105	109	118	59
# of Fatal Collisions	2,190	17.6%	682	21.0%	8	21.6%	1	2	2	3	0	2,190	0.4%	682	1.0%	8	1.7%	1	2	2	3	0
# of Serious Injury Collisions	10,257	82.4%	2,564	79.0%	29	78.4%	3	9	3	9	5	10,257	2.0%	2,564	3.6%	29	6.2%	3	9	3	9	5
# of Alcohol-Related Collisions	3,268	26.3%	1,078	33.2%	7	18.9%	1	3	0	1	2	38,860	7.6%	8,700	12.4%	56	11.9%	8	11	11	18	8
Total # of Fatalities	2,375		732		9		1	2	2	4	0	2,375		732		9		1	2	2	4	0
Total # of Injuries	17,770		4,503		42		4	12	5	13	8	235,108		35,239		218		36	69	35	49	29
By Collision Type																						
Hit Fixed Object	3,439	27.6%	1,340	41.3%	21	56.8%	4	6	2	5	4	99,255	19.3%	28,374	40.4%	273	58.1%	40	65	64	70	34
Overturn	1,281	10.3%	424	13.1%	9	24.3%	0	2	3	3	1	14,764	2.9%	4,893	7.0%	77	16.4%	11	16	21	19	10
Wildlife	149	1.2%	78	2.4%	4	10.8%	0	2	0	2	0	9,262	1.8%	1,839	2.6%	45	9.6%	11	14	8	10	2
Head On	642	5.2%	182	5.6%	2	5.4%	0	0	0	2	0	2,896	0.6%	858	1.2%	7	1.5%	0	0	1	5	1
Angle (T)	1,369	11.0%	324	10.0%	1	2.7%	0	1	0	0	0	79,814	15.5%	9,440	13.4%	17	3.6%	6	4	4	3	0
Hit Parked Car	185	1.5%	33	1.0%	0	0.0%	0	0	0	0	0	33,799	6.6%	2,390	3.4%	8	1.7%	2	1	2	2	1
Sideswipe (Opposite Direction)	183	1.5%	58	1.8%	0	0.0%	0	0	0	0	0	3,693	0.7%	1,060	1.5%	8	1.7%	2	1	2	1	2
Sideswipe (Same Direction)	318	2.6%	74	2.3%	0	0.0%	0	0	0	0	0	47,595	9.3%	2,933	4.2%	5	1.1%	2	1	1	1	0
Rearend	1,169	9.4%	157	4.8%	0	0.0%	0	0	0	0	0	148,372	28.9%	10,515	15.0%	4	0.9%	0	0	0	2	2
Angle (Left Turn)	697	5.6%	126	3.9%	0	0.0%	0	0	0	0	0	28,023	5.5%	3,001	4.3%	3	0.6%	2	1	0	0	0
Hit Pedestrian	1,667	13.4%	208	6.4%	0	0.0%	0	0	0	0	0	8,927	1.7%	740	1.1%	3	0.6%	0	0	1	1	1
Hit Cyclist	678	5.4%	92	2.8%	0	0.0%	0	0	0	0	0	6,759	1.3%	618	0.9%	3	0.6%	0	1	1	1	0
Other	659	5.3%	148	4.6%	0	0.0%	0	0	0	0	0	30,673	6.0%	3,599	5.1%	17	3.6%	3	1	4	3	6
By Roadway Surface																						
Dry	9,085	73.0%	2,372	73.1%	33	89.2%	4	9	5	10	5	333,394	64.9%	43,160	61.4%	282	60.0%	53	61	61	70	37
Wet	2,644	21.2%	655	20.2%	2	5.4%	0	1	0	1	0	135,756	26.4%	17,955	25.5%	39	8.3%	7	8	13	8	3
Snow / Slush	241	1.9%	51	1.6%	1	2.7%	0	0	0	1	0	16,541	3.2%	2,791	4.0%	54	11.5%	2	12	16	18	6
Other	181	1.5%	51	1.6%	1	2.7%	0	1	0	0	0	10,969	2.1%	1,297	1.8%	14	3.0%	5	6	1	1	1
Ice	296	2.4%	117	3.6%	0	0.0%	0	0	0	0	0	17,284	3.4%	5,075	7.2%	81	17.2%	12	18	18	21	12
By Light Condition																						
Daylight	7,169	57.6%	1,753	54.0%	28	75.7%	3	7	5	9	4	334,748	65.1%	40,604	57.8%	287	61.1%	42	65	66	75	39
Dark - No Street Lights	2,014	16.2%	941	29.0%	5	13.5%	1	1	0	2	1	43,360	8.4%	15,673	22.3%	140	29.8%	32	25	33	35	15
Dawn	215	1.7%	66	2.0%	1	2.7%	0	0	0	1	0	9,469	1.8%	1,799	2.6%	13	2.8%	1	4	5	3	0
Other	109	0.9%	37	1.1%	3	8.1%	0	3	0	0	0	9,754	1.9%	1,073	1.5%	10	2.1%	2	7	0	1	0
Dusk	412	3.3%	122	3.8%	0	0.0%	0	0	0	0	0	14,114	2.7%	2,110	3.0%	11	2.3%	1	4	2	2	2
Dark - Street Lights On	2,418	19.4%	289	8.9%	0	0.0%	0	0	0	0	0	98,641	19.2%	8,121	11.6%	7	1.5%	0	0	3	2	2
Dark - Street Lights Off	110	0.9%	38	1.2%	0	0.0%	0	0	0	0	0	3,858	0.8%	898	1.3%	2	0.4%	1	0	0	0	1

2008-2012 County X Data	Fatal/Serious Injury Crashes Only										Total Crashes											
	All Public Roads		All Counties		County X					All Public Roads		All Counties		County X								
	2008-2012	%	2008-2012	%	2008-2012	%	2012	2011	2010	2009	2008	2008-2012	%	2008-2012	%	2008-2012	%	2012	2011	2010	2009	2008
By Junction Relationship																						
Non-Intersection (Not Related)	6,705	53.9%	2,117	65.2%	33	89.2%	3	9	5	11	5	230,934	44.9%	38,222	54.4%	385	81.9%	58	90	94	97	46
Intersection-Related	4,107	33.0%	711	21.9%	1	2.7%	0	1	0	0	0	207,667	40.4%	22,056	31.4%	38	8.1%	10	9	9	8	2
Driveway-Related	960	7.7%	212	6.5%	0	0.0%	0	0	0	0	0	50,371	9.8%	6,704	9.5%	23	4.9%	8	2	5	4	4
By Roadway Curvature																						
Horizontal Curve	3,353	26.9%	1,282	39.5%	27	73.0%	2	8	4	8	5	77,321	15.0%	19,729	28.1%	243	51.7%	30	59	59	63	32
Straight & Level	6,588	52.9%	1,397	43.0%	8	21.6%	2	2	1	3	0	322,235	62.7%	36,635	52.1%	129	27.4%	34	23	32	26	14
Straight & Grade	2,165	17.4%	441	13.6%	2	5.4%	0	1	0	1	0	95,899	18.7%	10,665	15.2%	81	17.2%	13	17	14	26	11
Vertical Curve	352	2.8%	132	4.1%	2	5.4%	0	1	1	0	0	10,912	2.1%	2,655	3.8%	16	3.4%	3	4	6	2	1
Unknown	123	1.0%	50	1.5%	0	0.0%	0	0	0	0	0	10,598	2.1%	1,491	2.1%	5	1.1%	0	3	0	1	1
Hit Fixed Object Crashes Only - By Fixed Object Hit																						
Roadway Ditch	339	9.9%	171	12.8%	5	23.8%	2	0	1	2	0	12,020	12.1%	5,533	19.5%	53	19.5%	5	11	21	12	4
Earth Bank	249	7.2%	103	7.7%	4	19.0%	0	3	0	1	0	5,398	5.4%	2,160	7.6%	31	11.4%	7	10	6	6	2
Tree / Stump (Stationary)	642	18.7%	334	24.9%	3	14.3%	1	1	0	0	1	9,828	9.9%	3,779	13.3%	42	15.4%	4	11	11	10	6
Ran Over Embankment	299	8.7%	136	10.1%	2	9.5%	0	0	1	0	1	4,085	4.1%	1,948	6.9%	34	12.5%	4	5	9	12	4
Boulder (Stationary)	55	1.6%	30	2.2%	2	9.5%	1	0	0	0	1	1,080	1.1%	452	1.6%	15	5.5%	4	3	2	5	1
Fence	214	6.2%	105	7.8%	1	4.8%	0	1	0	0	0	8,003	8.1%	3,146	11.1%	31	11.4%	5	7	7	8	4
Guardrail	247	7.2%	56	4.2%	1	4.8%	0	0	0	0	1	8,153	8.2%	1,349	4.8%	17	6.3%	3	2	2	4	6
Culvert	63	1.8%	47	3.5%	1	4.8%	0	1	0	0	0	785	0.8%	466	1.6%	8	2.9%	1	3	2	1	1
Retaining Wall	77	2.2%	18	1.3%	1	4.8%	0	0	0	1	0	2,001	2.0%	331	1.2%	6	2.2%	0	3	1	2	0
Rock Bank	49	1.4%	11	0.8%	1	4.8%	0	0	0	1	0	687	0.7%	100	0.4%	5	1.8%	0	0	0	4	1
Utility Pole	317	9.2%	146	10.9%	0	0.0%	0	0	0	0	0	7,402	7.5%	3,451	12.2%	6	2.2%	0	2	1	1	2
Wood Sign Post	88	2.6%	25	1.9%	0	0.0%	0	0	0	0	0	4,200	4.2%	949	3.3%	5	1.8%	1	3	0	1	0
Bridge Rail	68	2.0%	6	0.4%	0	0.0%	0	0	0	0	0	3,614	3.6%	200	0.7%	3	1.1%	1	2	0	0	0
Misc. Debris on Road	20	0.6%	4	0.3%	0	0.0%	0	0	0	0	0	1,201	1.2%	122	0.4%	3	1.1%	0	2	0	1	0
Mail Box	72	2.1%	49	3.7%	0	0.0%	0	0	0	0	0	2,477	2.5%	1,289	4.5%	2	0.7%	1	0	0	1	0
Fire Hydrant	17	0.5%	3	0.2%	0	0.0%	0	0	0	0	0	1,019	1.0%	202	0.7%	2	0.7%	1	0	0	0	1
Snow Bank	10	0.3%	4	0.3%	0	0.0%	0	0	0	0	0	740	0.7%	141	0.5%	2	0.7%	0	0	0	1	1
Fallen Rock / Tree	12	0.3%	4	0.3%	0	0.0%	0	0	0	0	0	401	0.4%	80	0.3%	2	0.7%	0	1	0	1	0
Utility Box	20	0.6%	9	0.7%	0	0.0%	0	0	0	0	0	910	0.9%	383	1.3%	1	0.4%	0	0	0	0	1
Building	28	0.8%	3	0.2%	0	0.0%	0	0	0	0	0	1,381	1.4%	193	0.7%	1	0.4%	0	0	1	0	0
Concrete Barrier	135	3.9%	5	0.4%	0	0.0%	0	0	0	0	0	7,884	7.9%	151	0.5%	1	0.4%	1	0	0	0	0
Metal Sign Post	35	1.0%	3	0.2%	0	0.0%	0	0	0	0	0	1,287	1.3%	139	0.5%	1	0.4%	1	0	0	0	0
Underside of Bridge	1	0.0%	0	0.0%	0	0.0%	0	0	0	0	0	276	0.3%	48	0.2%	1	0.4%	0	0	1	0	0

2008-2012 County X Data	Fatal/Serious Injury Crashes Only											Total Crashes										
	All Public Roads		All Counties		County X						All Public Roads		All Counties		County X							
	2008-2012	%	2008-2012	%	2008-2012	%	2012	2011	2010	2009	2008	2008-2012	%	2008-2012	%	2008-2012	%	2012	2011	2010	2009	2008
By Contributing Circumstance																						
Over Centerline	1,606	9.0%	619	12.8%	10	22.2%	3	3	2	2	0	21,156	3.4%	8,292	9.3%	92	17.8%	20	32	30	6	4
Under Influence of Alcohol / Drugs	3,178	17.7%	1,016	20.9%	8	17.8%	3	2	1	1	1	36,519	5.8%	7,936	8.9%	43	8.3%	7	9	12	10	5
Exceeding Safe / Stated Speed	3,682	20.6%	1,236	25.5%	7	15.6%	0	1	3	2	1	117,420	18.7%	20,090	22.4%	126	24.4%	16	19	34	36	21
Inattention / Distraction	1,587	8.9%	402	8.3%	3	6.7%	0	1	1	1	0	86,025	13.7%	12,716	14.2%	76	14.7%	9	19	15	24	9
Apparently Asleep	335	1.9%	90	1.9%	3	6.7%	0	1	0	2	0	8,210	1.3%	2,005	2.2%	22	4.3%	3	5	6	6	2
Operating Defective Equipment	382	2.1%	101	2.1%	1	2.2%	0	0	0	0	1	13,110	2.1%	2,239	2.5%	22	4.3%	3	4	6	2	7
Failing to Yield	1,949	10.9%	361	7.4%	1	2.2%	0	1	0	0	0	104,075	16.6%	9,864	11.0%	16	3.1%	5	5	2	2	2
Other	1,771	9.9%	424	8.7%	12	26.7%	1	2	0	5	4	71,376	11.4%	9,853	11.0%	90	17.4%	12	24	19	23	12
Improper Passing	272	1.5%	93	1.9%	0	0.0%	0	0	0	0	0	5,991	1.0%	1,492	1.7%	7	1.4%	2	1	1	1	2
Disregard Stop Sign	438	2.4%	171	3.5%	0	0.0%	0	0	0	0	0	11,316	1.8%	2,711	3.0%	6	1.2%	1	0	3	0	2
Improper Backing	26	0.1%	2	0.0%	0	0.0%	0	0	0	0	0	10,788	1.7%	1,063	1.2%	4	0.8%	4	0	0	0	0
Apparently Ill	200	1.1%	39	0.8%	0	0.0%	0	0	0	0	0	3,802	0.6%	747	0.8%	4	0.8%	2	0	1	0	1
Failing to Yield to Ped / Cyclist	816	4.6%	58	1.2%	0	0.0%	0	0	0	0	0	7,839	1.3%	462	0.5%	2	0.4%	0	0	0	2	0
Disregard Yield Sign	12	0.1%	3	0.1%	0	0.0%	0	0	0	0	0	882	0.1%	61	0.1%	2	0.4%	0	1	1	0	0
Following Too Close	521	2.9%	80	1.6%	0	0.0%	0	0	0	0	0	83,421	13.3%	5,957	6.7%	1	0.2%	0	0	0	0	1
Improper Turn	132	0.7%	23	0.5%	0	0.0%	0	0	0	0	0	16,785	2.7%	1,441	1.6%	1	0.2%	0	0	0	1	0
Apparently Fatigued	51	0.3%	11	0.2%	0	0.0%	0	0	0	0	0	1,758	0.3%	376	0.4%	1	0.2%	1	0	0	0	0
Failing to Signal	12	0.1%	5	0.1%	0	0.0%	0	0	0	0	0	683	0.1%	143	0.2%	1	0.2%	0	0	0	1	0
Improper Parking Location	15	0.1%	5	0.1%	0	0.0%	0	0	0	0	0	954	0.2%	135	0.2%	1	0.2%	0	0	0	1	0
By Vehicle Type																						
Motorcycle	2,459	12.8%	703	15.7%	20	47.6%	1	6	5	5	3	11,819	1.2%	2,320	2.1%	37	6.9%	8	10	6	7	6
Passenger Car	8,235	43.0%	1,797	40.1%	12	28.6%	1	4	0	6	1	499,063	52.7%	53,374	49.4%	204	38.1%	38	43	37	56	30
Light Truck / SUV	7,126	37.2%	1,735	38.7%	7	16.7%	2	2	1	2	0	372,041	39.3%	46,614	43.2%	254	47.4%	44	54	70	59	27
Heavy Truck	724	3.8%	115	2.6%	2	4.8%	0	1	0	0	1	28,951	3.1%	2,505	2.3%	26	4.9%	5	5	5	7	4
Other / Not Stated	480	2.5%	124	2.8%	1	2.4%	0	0	0	1	0	28,430	3.0%	2,491	2.3%	13	2.4%	0	1	5	3	4
School Bus	28	0.1%	7	0.2%	0	0.0%	0	0	0	0	0	1,841	0.2%	412	0.4%	2	0.4%	1	0	0	0	1
By Speed Limit																						
20 MPH	75	0.4%	10	0.2%	0	0.0%	0	0	0	0	0	5,268	0.7%	535	0.5%	2	0.4%	0	1	1	0	0
25 MPH	2,137	12.3%	369	8.8%	0	0.0%	0	0	0	0	0	135,462	16.8%	11,933	12.2%	47	9.4%	9	10	10	9	9
30 MPH	2,192	12.6%	136	3.2%	0	0.0%	0	0	0	0	0	142,121	17.6%	4,875	5.0%	4	0.8%	0	2	1	1	0
35 MPH	4,350	25.1%	1,519	36.3%	6	15.4%	1	1	1	3	0	224,655	27.8%	42,732	43.7%	99	19.8%	20	13	20	33	13
40 MPH	1,312	7.6%	474	11.3%	1	2.6%	0	0	1	0	0	49,421	6.1%	10,122	10.4%	13	2.6%	5	1	3	1	3
45 MPH	1,063	6.1%	444	10.6%	0	0.0%	0	0	0	0	0	34,008	4.2%	8,328	8.5%	1	0.2%	0	1	0	0	0
50 MPH	1,944	11.2%	1,057	25.2%	32	82.1%	3	11	4	11	3	40,596	5.0%	16,905	17.3%	330	66.1%	56	80	76	81	37
55 MPH	1,445	8.3%	167	4.0%	0	0.0%	0	0	0	0	0	28,713	3.6%	2,127	2.2%	3	0.6%	0	0	1	1	1

Cowlitz County Data 2008-2012

Injury and Fatal Collisions

Injury	338	97%
Fatal	9	3%
Total	347	100%

Horizontal Alignment

Curve	204	58.8%
Straight	140	40.3%
Unknown	3	0.9%
Total	347	100.0%

Vertical Alignment

Grade	163	47.0%
Level	154	44.4%
Hillcrest	10	2.9%
Sag	17	4.9%
Unknown	3	0.9%
Total	347	100.0%

Pavement Width

Unpaved	5	1.4%
Less than 20	8	2.3%
20-21.9	52	15.0%
22-23.9	74	21.3%
24-27.9	96	27.7%
28 and greater	112	32.3%
Total	347	100.0%

Pavement Width (w/ greater than 2' gravel shoulder)

Unpaved	-	
Less than 20	5	1.4%
20-21.9	20	5.8%
22-23.9	21	6.1%
24-27.9	36	10.4%
28 and greater	11	3.2%
Total	93	26.8%

Pavement Width (w/ less than 2' gravel shoulders)

Unpaved	-	
Less than 20	3	0.9%
20-21.9	32	9.2%
22-23.9	53	15.3%
24-27.9	60	17.3%
28 and greater	101	29.1%
Total	249	71.8%

Speed Limit

None	3	0.9%
25	41	11.8%
30	21	6.1%
35	183	52.7%
40	66	19.0%
45	31	8.9%
50	2	0.6%
Total	347	100.0%

ADT

0-49	8	2.3%
50-99	13	3.7%
100-249	42	12.1%
250-499	60	17.3%
500-999	68	19.6%
1000-199	70	20.2%
2000-620	86	24.8%
Total	347	100.0%

Road Condition

Dry	207	59.7%
Wet	103	29.7%
Snow/Ice	35	10.1%
Other	2	0.6%
Total	347	100.0%

Light

Dawn	5	1.4%
Daylight	199	57.3%
Dusk	8	2.3%
Dark - Str	11	3.2%
Dark	120	34.6%
Unknown	4	1.2%
Total	347	100.0%

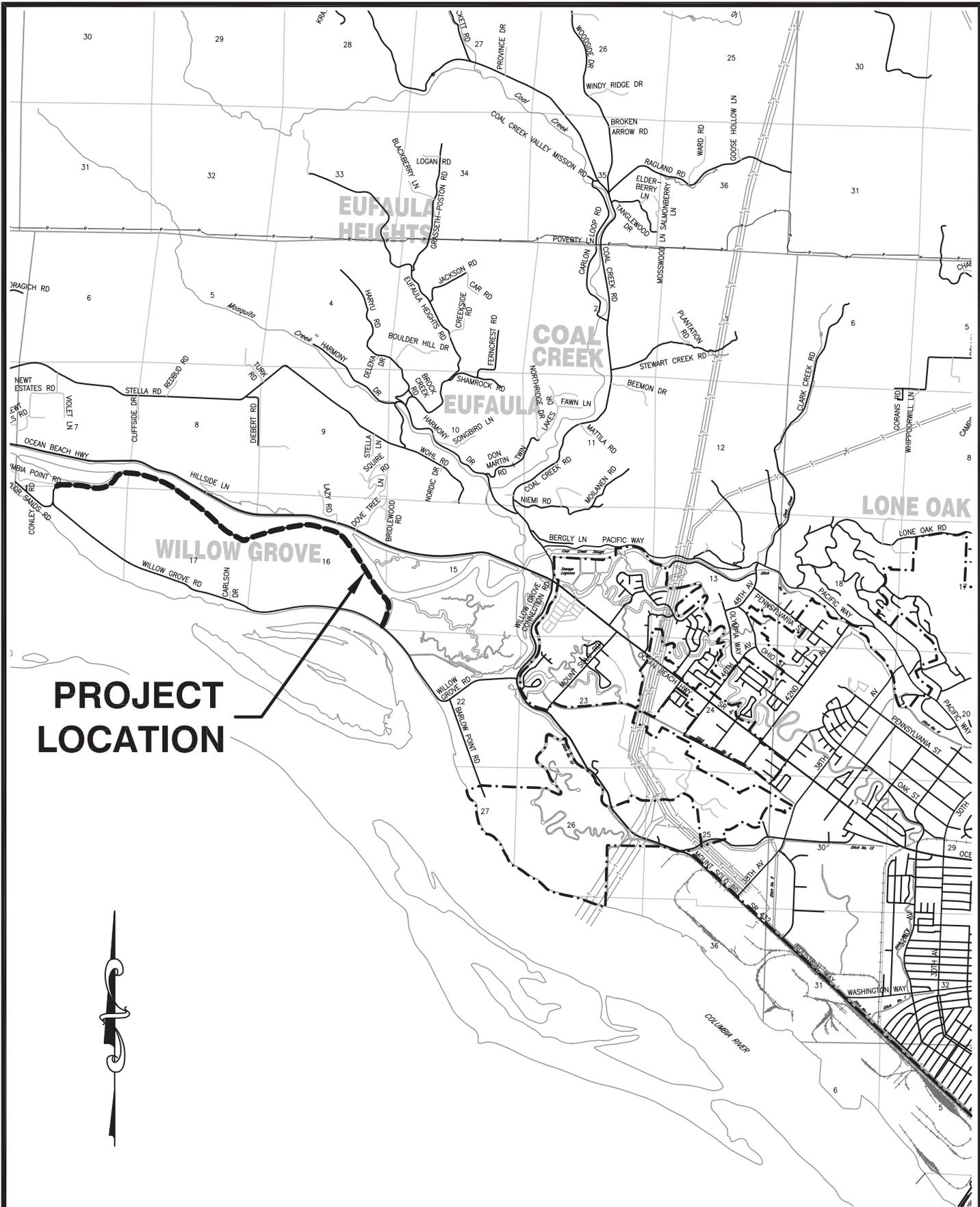
Collision Type

Hit Object	227	65.4%
Vehicle on	32	9.2%
Entering a	9	2.6%
Same dire	26	7.5%
Opposite	24	6.9%
Other	29	8.4%
Total	347	100.0%

Contributing Circumstance

Speed	99	28.5%
Influence	76	21.9%
Over Cent	16	4.6%
Improper	6	1.7%
Total	197	56.8%

Appendix B
Vicinity Maps



**PROJECT
LOCATION**

Willow Grove Rd

Proposed Guardrail Location



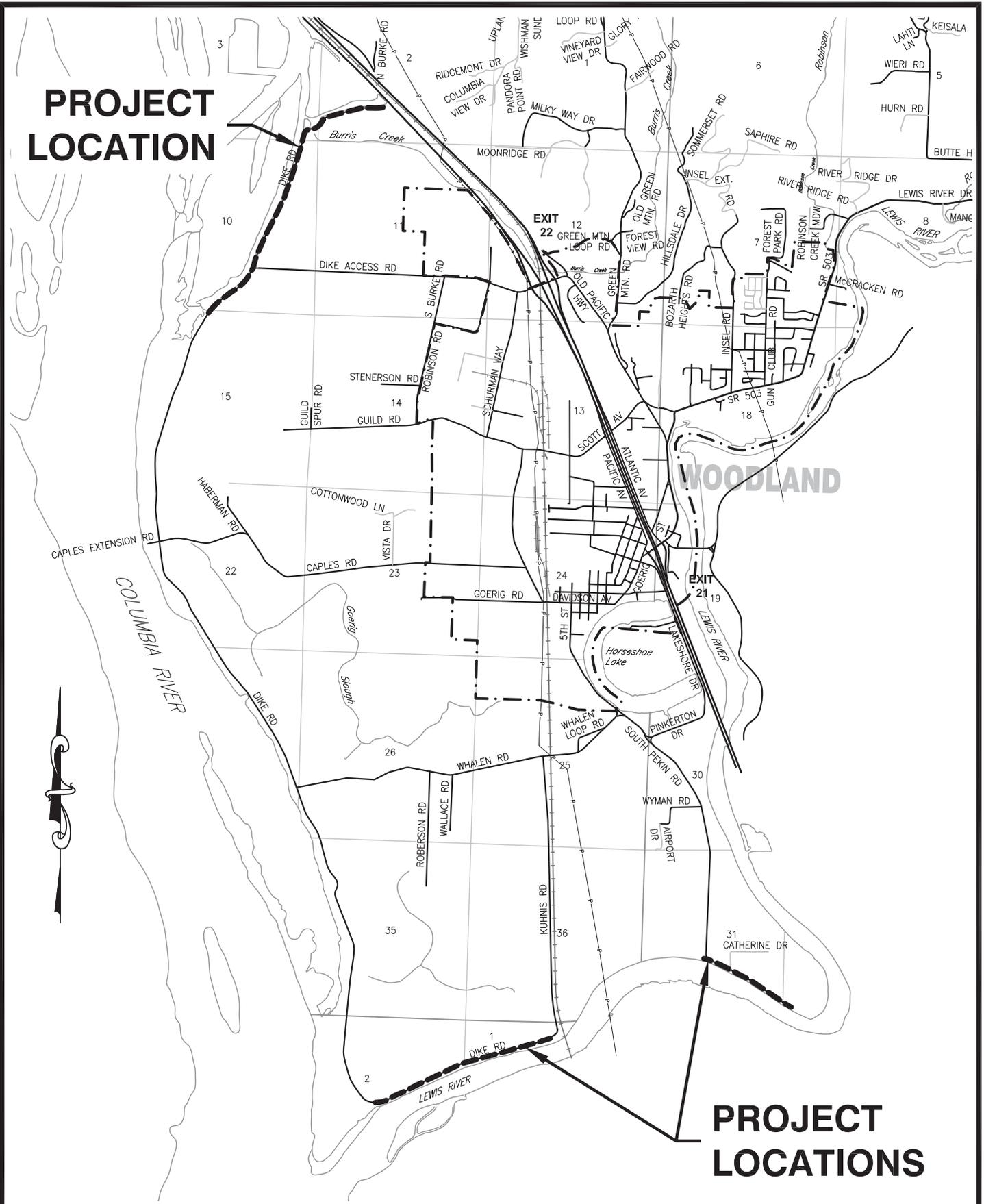
DEPARTMENT
OF PUBLIC
WORKS
1600-13th Avenue South
KELSO, WASHINGTON
98626

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DESIGNED BY
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DRAWN BY

APPROVED BY
6/14
DATE

PROJECT LOCATION



PROJECT LOCATIONS

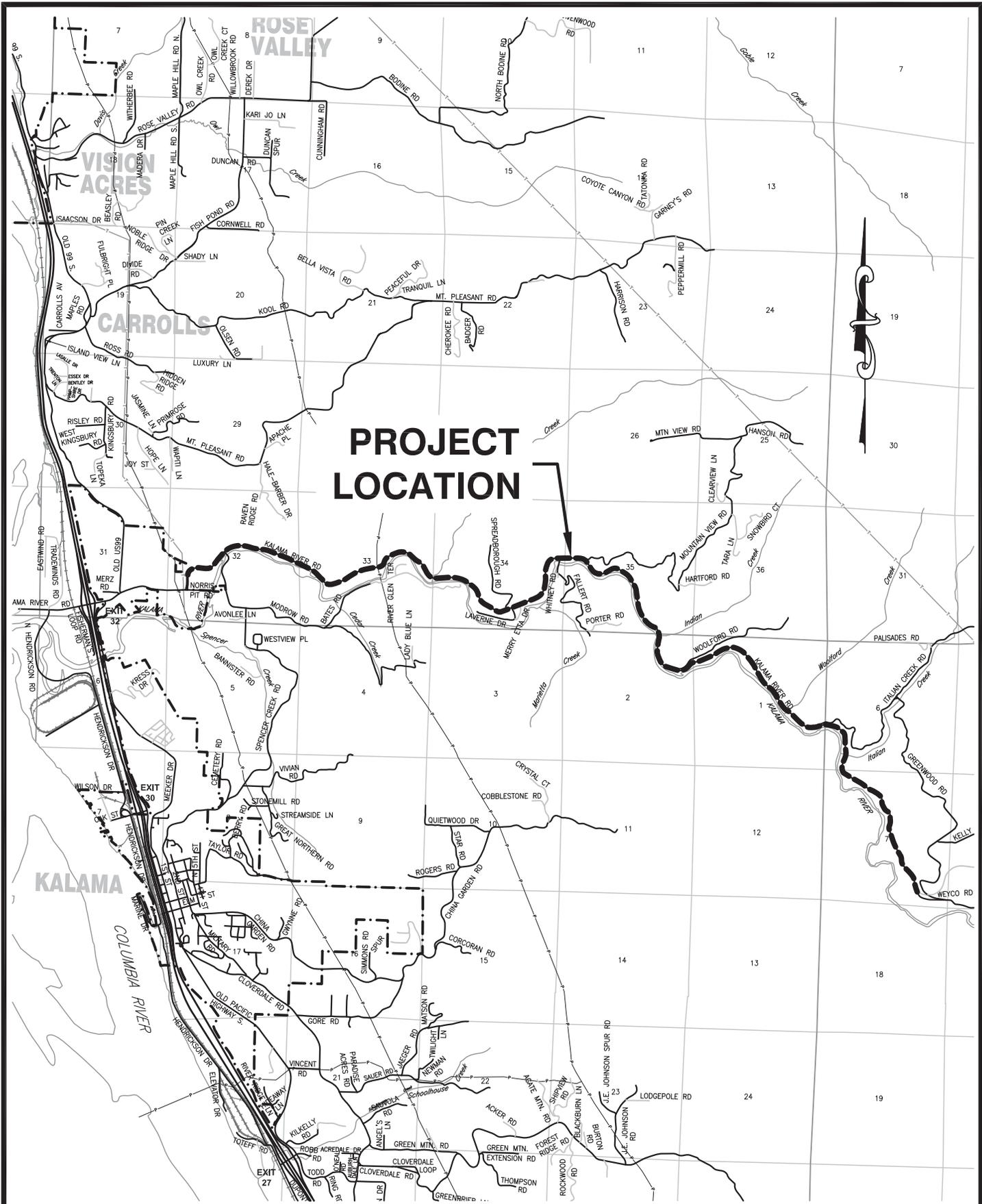
DESIGNED BY
SA
 DRAWN BY
 APPROVED BY
6/14
 DATE

Dike Road South Pekin Road Proposed Guardrail Location



DEPARTMENT
 OF PUBLIC
 WORKS
 1600-13th Avenue South
 KELSO, WASHINGTON
 98626

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PROJECT LOCATION

DESIGNED BY
SA
 DRAWN BY

APPROVED BY
6/14
 DATE

Kalama River Rd

Raise Guardrail

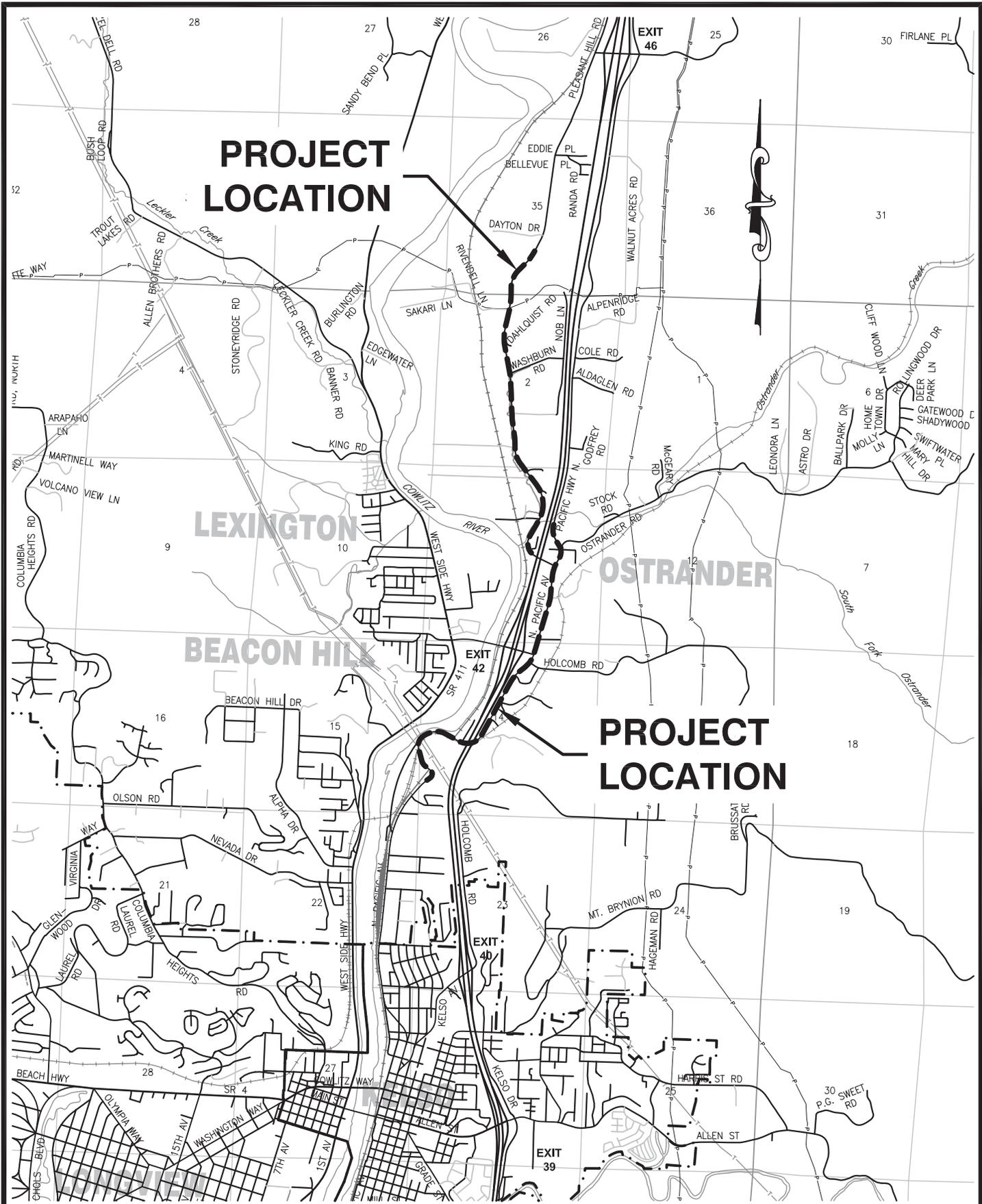
Upgrade Terminal Location



DEPARTMENT OF PUBLIC WORKS

1600-13th Avenue South
 KELSO, WASHINGTON
 98626

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**PROJECT
LOCATION**

**PROJECT
LOCATION**

LEXINGTON
BEACON HILL
OSTRANDER

**Pacific Avenue North
Pleasant Hill Road**

**Raise Guardrail
Upgrade Terminal Locations**



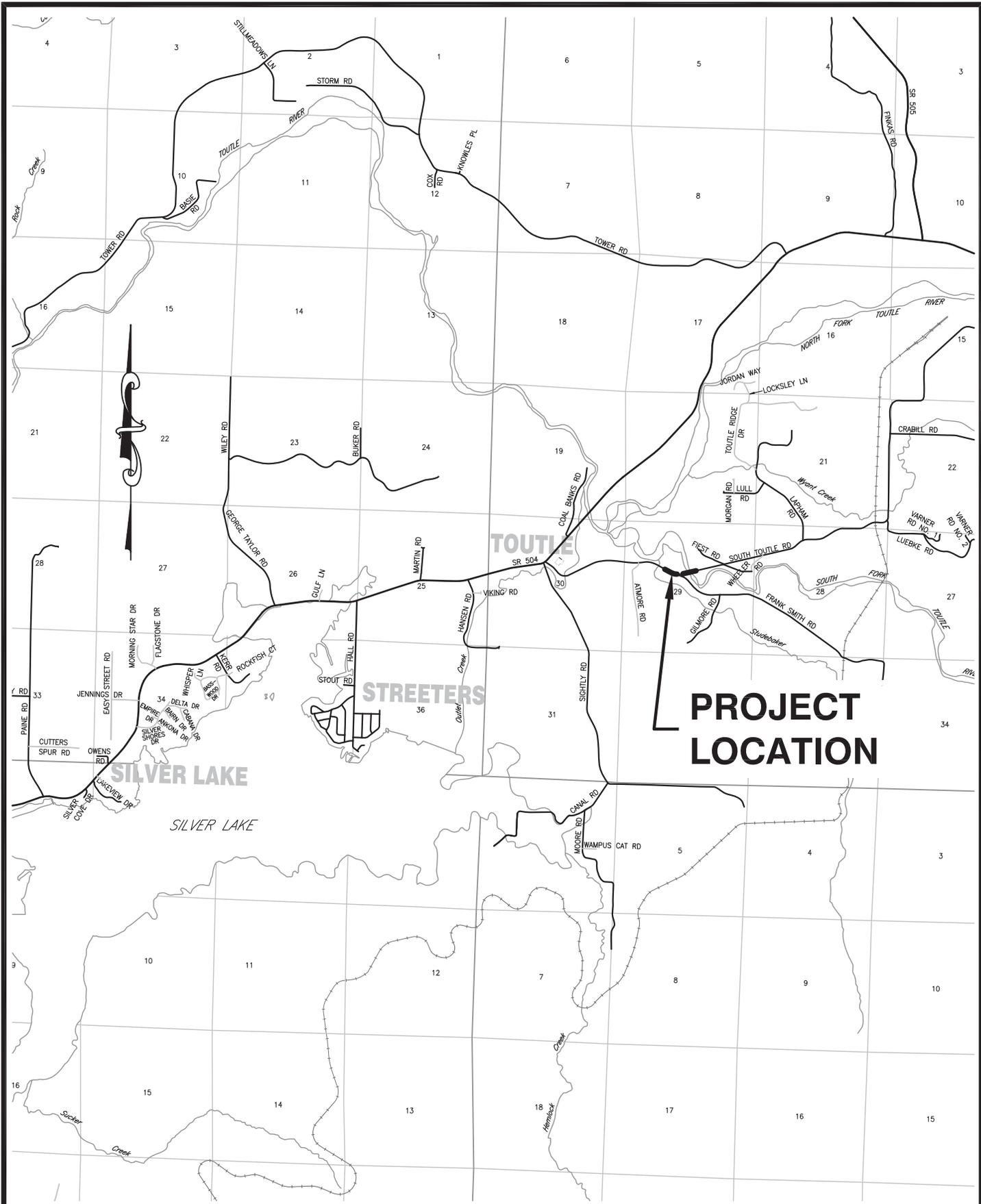
DEPARTMENT
OF PUBLIC
WORKS

1600-13th Avenue South
KELSO, WASHINGTON
98626

DESIGNED BY
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South Toutle Road

**Raise Guardrail
 Upgrade Terminal Locations**



DEPARTMENT
 OF PUBLIC
 WORKS

1600-13th Avenue South
 KELSO, WASHINGTON
 98626

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Appendix C
Cost Estimates

PROJECT: 2014 County Safety Program - Willow Grove Road guardrail

Preliminary Engineer's Estimate

6/30/2014

BID ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
1. MINOR CHANGES	FA	1	7,000.00	7,000.00
2. SPCC PLAN	LS	1	1,000.00	1,000.00
3. MOBILIZATION	LS	1	35,000.00	35,000.00
4. FLAGGERS AND SPOTTERS	HR	480	50.00	24,000.00
5. OTHER TEMPORARY TRAFFIC CONTROL	LS	1	10,000.00	10,000.00
6. FLEXIBLE GUIDE POST ON GUARDRAIL POST	EA	500	18.00	9,000.00
7. BEAM GUARDRAIL TYPE 1 - 6 FT LONG POSTS	LF	250	20.00	5,000.00
8. BEAM GUARDRAIL TYPE 1 - 8 FT LONG POSTS	LF	6975	23.00	160,425.00
9. BEAM GUARDRAIL TYPE 1 - 9 FT LONG POSTS	LF	5825	27.00	157,275.00
10. BEAM GUARDRAIL TYPE 1 - 11 FT LONG POSTS	LF	3375	30.00	101,250.00
11. BEAM GUARDRAIL NON-FLARED TERMINAL - TL2	EA	6	2,250.00	13,500.00
12. REMOVE EXISTING GUARDRAIL	LF	350	4.50	1,575.00
SUBTOTAL				525,025.00
Construction Engineering				20,000.00
State Services				5,000.00
GRAND TOTAL				<u>550,025.00</u>

PROJECT: 2014 County Safety Program - South Pekin Road guardrail

Preliminary Engineer's Estimate

6/30/2014

BID ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
1. SPCC PLAN	LS	1	500.00	500.00
2. MOBILIZATION	LS	1	6,000.00	6,000.00
3. FLAGGERS AND SPOTTERS	HR	120	50.00	6,000.00
4. OTHER TEMPORARY TRAFFIC CONTROL	LS	1	1,500.00	1,500.00
5. FLEXIBLE GUIDE POST ON GUARDRAIL POST	EA	25	18.00	450.00
6. BEAM GUARDRAIL TYPE 1 - 6 FT LONG POSTS	LF	750	20.00	15,000.00
7. BEAM GUARDRAIL TYPE 1 - 8 FT LONG POSTS	LF	750	23.00	17,250.00
8. BEAM GUARDRAIL TYPE 1 - 9 FT LONG POSTS	LF	800	27.00	21,600.00
9. BEAM GUARDRAIL TYPE 1 - 11 FT LONG POSTS	LF	500	30.00	15,000.00
10. BEAM GUARDRAIL NON-FLARED TERMINAL - TL2	EA	2	2,250.00	4,500.00
SUBTOTAL				87,800.00
Construction Engineering				10,000.00
State Services				2,500.00
GRAND TOTAL				<u><u>100,300.00</u></u>

PROJECT: 2014 County Safety Program - Dike Road guardrail

Preliminary Engineer's Estimate

6/30/2014

BID ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
1. SPCC PLAN	LS	1	500.00	500.00
2. MOBILIZATION	LS	1	35,000.00	35,000.00
3. FLAGGERS AND SPOTTERS	HR	480	50.00	24,000.00
4. OTHER TEMPORARY TRAFFIC CONTROL	LS	1	10,000.00	10,000.00
5. FLEXIBLE GUIDE POST ON GUARDRAIL POST	EA	100	18.00	1,800.00
6. BEAM GUARDRAIL TYPE 1 - 6 FT LONG POSTS	LF	3000	20.00	60,000.00
7. BEAM GUARDRAIL TYPE 1 - 8 FT LONG POSTS	LF	4000	23.00	92,000.00
8. BEAM GUARDRAIL TYPE 1 - 9 FT LONG POSTS	LF	7000	27.00	189,000.00
9. BEAM GUARDRAIL TYPE 1 - 11 FT LONG POSTS	LF	3500	30.00	105,000.00
10. BEAM GUARDRAIL NON-FLARED TERMINAL - TL2	EA	6	2,250.00	13,500.00
SUBTOTAL				530,800.00
Construction Engineering				20,000.00
State Services				5,000.00
GRAND TOTAL				<u>555,800.00</u>

PROJECT: 2014 County Safety Program - Countywide guardrail

Preliminary Engineer's Estimate

6/30/2014

BID ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
1. SPCC PLAN	LS	1	500.00	500.00
2. MOBILIZATION	LS	1	35,000.00	35,000.00
3. FLAGGERS AND SPOTTERS	HR	480	50.00	24,000.00
4. OTHER TEMPORARY TRAFFIC CONTROL	LS	1	10,000.00	10,000.00
5. FLEXIBLE GUIDE POST ON GUARDRAIL POST	EA	750	18.00	13,500.00
6. BEAM GUARDRAIL TYPE 1 - 6 FT LONG POSTS	LF	7500	20.00	150,000.00
7. BEAM GUARDRAIL TYPE 1 - 8 FT LONG POSTS	LF	5000	23.00	115,000.00
8. BEAM GUARDRAIL TYPE 1 - 9 FT LONG POSTS	LF	2000	27.00	54,000.00
9. BEAM GUARDRAIL TYPE 1 - 11 FT LONG POSTS	LF	0	30.00	-
10. BEAM GUARDRAIL NON-FLARED TERMINAL - TL2	EA	30	2,250.00	67,500.00
SUBTOTAL				469,500.00
Construction Engineering				25,000.00
State Services				5,000.00
GRAND TOTAL				<u>499,500.00</u>

PROJECT: 2014 County Safety Program - Roadside Delineation

Preliminary Engineer's Estimate

6/30/2014

BID ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
1. SPCC PLAN	LS	1	500.00	500.00
2. MOBILIZATION	LS	1	15,000.00	15,000.00
3. FLAGGERS AND SPOTTERS	HR	500	50.00	25,000.00
4. FLEXIBLE GUIDEPOSTS	EA	10000	18.00	180,000.00
SUBTOTAL				220,500.00
Construction Engineering				20,000.00
State Services				2,500.00
GRAND TOTAL				<u>243,000.00</u>

PROJECT: 2014 County Safety Program - Upgrade/Install Curve Signs/Chevrons

Preliminary Engineer's Estimate

6/30/2014

BID ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
1. SPCC PLAN	LS	1	500.00	500.00
2. MOBILIZATION	LS	1	7,500.00	7,500.00
3. FLAGGERS AND SPOTTERS	HR	500	50.00	25,000.00
4. CURVE SIGNS/CHEVRONS	EA	300	175.00	52,500.00
SUBTOTAL				85,500.00
Construction Engineering				12,500.00
State Services				2,500.00
GRAND TOTAL				<u>100,500.00</u>

PROJECT: 2014 County Safety Program - raise guardrail/upgrade terminals

Kalama River Road, South Toutle Road, Pleasant Hill Road, Pacific Avenue North

Preliminary Engineer's Estimate

6/30/2014

BID ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
1. SPCC PLAN	LS	1	500.00	500.00
2. MOBILIZATION	LS	1	15,000.00	15,000.00
3. FLAGGERS AND SPOTTERS	HR	300	50.00	15,000.00
4. OTHER TEMPORARY TRAFFIC CONTROL	LS	1	7,500.00	7,500.00
5. RAISE GUARDRAIL	LF	10000	10.00	100,000.00
6. BEAM GUARDRAIL NON-FLARED TERMINAL - TL2	EA	40	2,250.00	90,000.00

SUBTOTAL 228,000.00

Construction Engineering 20,000.00

State Services 2,500.00

GRAND TOTAL 250,500.00

South Cloverdale/Confer Road Intersection Improvement

Item	Approx Quantity		Description	Unit Price	Amount
1	1	Force Acct	Minor changes	\$ 7,500.00	\$ 7,500.00
2	1	Lump Sum	SPCC Plan	\$ 500.00	\$ 500.00
3	1	Lump Sum	Mobilization	\$ 20,000.00	\$ 20,000.00
4	640	Hours	Flaggers and Spotters	\$ 50.00	\$ 32,000.00
5	1	Lump Sum	Other Temporary Traffic Control	\$ 1,000.00	\$ 1,000.00
6	1	Lump Sum	Clearing and Grubbing	\$ 2,500.00	\$ 2,500.00
7	1	Lump Sum	Removal of Structures and Obstructions	\$ 1,500.00	\$ 1,500.00
8	3200	CY	Roadway Excav, Embank & Disp Incl. Haul	\$ 12.00	\$ 38,400.00
9	1235	CY	Rock Excavation Including Haul	\$ 60.00	\$ 74,100.00
10	25	CY	Unsuitable Foundation Excavation Incl. Haul	\$ 20.00	\$ 500.00
11	1	Lump Sum	Trimming and Cleanup	\$ 1,000.00	\$ 1,000.00
12	360	Tons	Structural Fill	\$ 20.00	\$ 7,200.00
13	2120	Tons	Crushed Surfacing Base Course	\$ 20.00	\$ 42,400.00
14	490	Tons	HMA Class 1/2" PG 64-22	\$ 110.00	\$ 53,900.00
15	40	Tons	HMA For Approach Class 1/2" PG 64-22	\$ 150.00	\$ 6,000.00
16	1	CALC	Asphalt Cost Price Adjustment	\$ -	\$ -
17	147	LF	CPE Storm Sewer Pipe, 12-inch Diameter	\$ 35.00	\$ 5,145.00
18	56	LF	CPE Storm Sewer Pipe, 18-inch Diameter	\$ 50.00	\$ 2,800.00
19	1	Lump Sum	Shoring or Extra Excavation Class B	\$ 500.00	\$ 500.00
20	1	LS	Seeding Fertilizing and Mulching	\$ 750.00	\$ 750.00
21	47	LF	Cement Concrete Curb and Gutter	\$ 75.00	\$ 3,525.00
22	2	EA	Mailbox Support Type 1	\$ 300.00	\$ 600.00
23	1	EA	Mailbox Support Type 2	\$ 1,000.00	\$ 1,000.00
24	1	LS	Permanent Signing	\$ 200.00	\$ 200.00
25	1736	LF	Paint Line	\$ 0.50	\$ 868.00
26	24	LF	Plastic Stop Line	\$ 25.00	\$ 600.00

Total	\$	304,488.00
Construction Engineering (15%)	\$	45,673.20
	\$	350,161.20

**South Cloverdale/Martins Bluff Road
Intersection Improvement**

Item	Approx Quantity		Description	Unit Price	Amount
1	1	Force Acct	Minor changes	\$ 2,500.00	\$ 2,500.00
2	1	Lump Sum	SPCC Plan	\$ 500.00	\$ 500.00
3	1	Lump Sum	Mobilization	\$ 5,000.00	\$ 5,000.00
4	160	Hours	Flaggers and Spotters	\$ 50.00	\$ 8,000.00
5	1	Lump Sum	Other Temporary Traffic Control	\$ 1,000.00	\$ 1,000.00
6	1	Lump Sum	Clearing and Grubbing	\$ 1,500.00	\$ 1,500.00
7	1	Lump Sum	Removal of Structures and Obstructions	\$ 1,500.00	\$ 1,500.00
8	200	CY	Roadway Excav, Embank & Disp Incl. Haul	\$ 20.00	\$ 4,000.00
9	100	CY	Rock Excavation Including Haul	\$ 60.00	\$ 6,000.00
10	25	CY	Unsuitable Foundation Excavation Incl. Haul	\$ 20.00	\$ 500.00
11	1	Lump Sum	Trimming and Cleanup	\$ 1,000.00	\$ 1,000.00
12	50	Tons	Structural Fill	\$ 20.00	\$ 1,000.00
13	500	Tons	Crushed Surfacing Base Course	\$ 20.00	\$ 10,000.00
14	180	Tons	HMA Class 1/2" PG 64-22	\$ 110.00	\$ 19,800.00
15	1	LS	Seeding Fertilizing and Mulching	\$ 750.00	\$ 750.00
16	1	LS	Permanent Signing	\$ 200.00	\$ 200.00
17	600	LF	Paint Line	\$ 0.50	\$ 300.00
18	24	LF	Plastic Stop Line	\$ 25.00	\$ 600.00

Total	\$	64,150.00
Construction Engineering (15%)	\$	9,622.50
	\$	73,772.50