Highway Safety Analysis for Potential Safety Improvements

US 97 Safety Assessment

Deschutes County, Oregon

Final Report

June 2015

Highway Safety Analysis for Potential Safety Improvements

US 97 Safety Assessment

Deschutes County, Oregon

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EXECUTIVE SUMMARY

Kittelson & Associates, Inc. (KAI) analyzed crash history and evaluated potential crash countermeasures on a 9-mile section of US 97 from the south Redmond city limits (milepost 124.40) to the north Bend city limits (milepost 133.39). This study identified near- and medium-term countermeasures that would cost less than a series of frontage roads that have been identified by ODOT as long-term alternatives. KAI applied quantitative safety evaluation methods to evaluate a range of countermeasures to improve safety along the corridor. The findings and recommendations of the study are summarized below.

FINDINGS

Roadway Characteristics

US 97 is a four-lane rural highway with a posted speed limit of 55 miles per hour (mph). The two travel lanes in each direction are separated by a 10-foot paved median. The study area is shown in **Figure 1**. The typical cross-section consists of two travel lanes in each direction (12 feet in width), shoulders of 8 to 10 feet in width, and a paved center median of 10 feet in width. The roadway is fairly straight with only a few large horizontal curves in the study area. Driveway density is highest within 0.50-mile of the City of Bend and City of Redmond limits, in the transition sections from rural to urban areas. One grade-separated crossing is provided at Deschutes Junction; all other public and private accesses are at-grade.

Historical Crash Analysis

Over the five-year study period (2009-2013), 108 crashes were reported on the US 97 study corridor from milepost (MP) 124.40 to 133.39. A summary of the most-relevant crash trends is provided below.

- Crash types varied throughout the corridor. The three most common crash types were rear-end (25 crashes), fixed object (16 crashes), and sideswipe-meeting (15 crashes).
- 12 reported crashes were fatal or severe injury (injury A) crashes. 37 crashes resulted in a moderate or minor injury (injury B or C), and 59 crashes resulted in property damage only.
- Of the 12 fatal or injury A crashes,
  - Fifty percent were head-on crashes, sideswipe meeting crashes, or turning movement crashes – crash types that could be corrected by a median.
  - Fifty percent occurred during dark, dawn, or dusk light conditions.
- The most commonly-reported crash cause was “speed too fast for conditions.”
- Almost 42 percent of all reported crashes involved snow, ice, or wet roadways.

Field Observations

Field observations were conducted in December 2014 during daylight and dark light conditions. A team consisting of ODOT, Deschutes County, Oregon State Police, and consultants participated in the field visit. Observations from this field visit are summarized below.

- Traffic volumes were higher during the peak hours, making it difficult to find gaps in both directions of traffic to complete a left-turn from the minor street approach to US 97.
- Vehicles were observed using the 10-foot striped median to complete two-stage left turns from minor-street approaches onto US 97.
- During night-time conditions, it was difficult to see approaching intersections.
- The team discussed that right-turn deceleration lanes and right-turn acceleration lanes would be beneficial at key intersections due to the high traffic volumes and speeds.
- One bicyclist was observed riding along US 97.
- Rock outcroppings were located along the corridor, approximately 30 feet from the edge of the roadway shoulder.
- Driveways are located throughout the corridor, with higher density within 0.50-mile of the City of Bend and City of Redmond limits.

CONCLUSIONS

KAI prioritized projects aimed at reducing fatal and Injury A crashes as Short-term, Medium-term, or Median projects. Median projects were phased separately from other countermeasures due to the impacts to public and private accesses along the corridor. If a median is carried forward for implementation, ODOT will develop an outreach plan and document key access management principles, as defined in OAR 734-051-7010 and 734-051-1065.

The median projects include U-turn treatments to maintain access to driveways along the corridor that would otherwise be restricted by a median. While a preliminary J-turn concept has been discussed and preliminary design concept is included in this report, there are several other viable designs that provide for safe u-turning maneuvers. More information on design of unsignalized J-turn intersections on state highways is provided in NCHRP Report 745: *Left-Turn Accommodations at Unsignalized Intersections*. Additional information on the safety and operational effect of U-turns at unsignalized median openings is provided in NCHRP Report 524: Safety of U-Turns at Unsignalized Median Openings.

Each group of projects and their estimated benefit-cost ratios are summarized in **Table 1**, **Table 2**, and **Table 3**. While the magnitude of these B/C ratios may change upon refining the cost estimates, the priority for implementation is not expected to change.

Table 1 Short-Term Projects

Location	Annual Observed Crash Frequency	Annual Predicted Crash Frequency	Annual Expected Crash Frequency	Short-Term Project Countermeasures	Project CMF	20-Year Crash Reduction	Preliminary 20-Yr Cost Estimate**	Expected Annual Comprehensive Crash Cost Reduction (Benefit)	Benefit / Cost Ratio*
Redmond City Limits to Quarry Ln	3.2	6.5	5.1	▪ Install speed feedback signs in transition zones; ▪ Inlaid Raised Pavement Markers	82%	19.1	$ 32,000	$ 157,100	61.2
Quarry Ln	0.2	0.6	0.5	▪ Increase sight distance; ▪ Median on minor street approach; ▪ Intersection lighting	82%	1.8	$ 28,000	$ 14,500	6.5
Quarry Ln to 61st Street	5	9.2	7.4	▪ Inlaid Raised Pavement Markers	93%	11.0	$ 14,000	$ 90,500	80.6
61st Street	1.2	0.7	0.8	▪ Intersection lighting; ▪ Median on minor street approach	50%	7.8	$ 27,000	$ 64,500	29.8
61st Street to Deschutes Jct.	1.4	6.1	4.1	▪ Inlaid Raised Pavement Markers	93%	6.0	$ 9,000	$ 49,600	68.7
Deschutes Jct.	1.4	0.7	0.8	▪ Restripe merge	99%	0.0	$ 14,000	$ 500	0.1
Deschutes Jct. to Ft Thompson Ln	5.8	7.8	7.0	▪ Inlaid Raised Pavement Markers;	93%	10.3	$ 14,000	$ 85,200	75.8
Ft Thompson Ln	0.6	0.9	0.8	▪ None	N/A	0.0	$ -	$ -	--
Ft Thompson Ln to Bend City Limits	2.8	3.9	3.4	▪ Install speed feedback signs in transition zones; ▪ Inlaid Raised Pavement Markers	82%	12.6	$ 27,000	$ 103,800	47.9
Total	21.6	36.4	30.1			68.6	$ 165,000	$ 565,000	42.7

**B/C Ratios reflect a uniform series present worth factor of 12.46 for a 20-year life span. B/C Ratio = (Annual Benefits X Present Worth Factor)/(Estimated Project Cost)*
Note: All costs presented are Present Value Costs ($) over the 20-year analysis period.
***Cost estimates exclude any right-of-way impacts or costs.*

Table 2 Medium-Term Projects

Location	Annual Observed Crash Frequency	Annual Predicted Crash Frequency	Annual Expected Crash Frequency	Medium-Term Project Countermeasures	Project CMF	20-Year Crash Reduction	Preliminary 20-Yr Cost Estimate**	Expected Annual Comprehensive Crash Cost Reduction (Benefit)	Benefit / Cost Ratio
Redmond City Limits to Quarry Ln	3.2	6.5	5.1	▪ None	N/A	N/A	N/A	N/A	N/A
Quarry Ln	0.2	0.6	0.5	▪ Deceleration Lane	93%	0.7	$ 188,000	$ 5,700	0.4
Quarry Ln to 61st Street	5	9.2	7.4	▪ Segment Lighting; ▪ Increase clear zone (Reduce RHR)	85%	22.1	$ 1,413,000	$ 182,200	1.6
61st Street	1.2	0.7	0.8	▪ Acceleration Lane; ▪ Deceleration Lane	83%	2.7	$ 376,000	$ 22,400	0.7
61st Street to Deschutes Jct.	1.4	6.1	4.1	▪ Increase clear zone (Reduce RHR)	94%	4.9	$ 58,000	$ 40,000	8.6
Deschutes Jct.	1.4	0.7	0.8	▪ None	N/A	N/A	N/A	$ -	N/A
Deschutes Jct. to Ft Thompson Ln	5.8	7.8	7.0	▪ Increase clear zone (Reduce RHR)	94%	8.4	$ 58,000	$ 69,000	14.8
Ft Thompson Ln	0.6	0.9	0.8	• Intersection lighting; • Median on minor street approach	51%	8.2	$27,000	$ 67,800	31.3
Ft Thompson Ln to Bend City Limits	2.8	3.9	3.4	▪ Segment Lighting	96%	2.5	$ 466,000	$ 20,700	0.6
Total	**21.6**	**36.4**	**30.1**			**49.5**	**$ 2,586,000**	**$ 407,700**	**2.0**

**B/C Ratios reflect a uniform series present worth factor of 12.46 for a 20-year life span. B/C Ratio = (Annual Benefits X Present Worth Factor)/(Estimated Project Cost)*
Note: All costs presented are Present Value Costs ($) over the 20-year analysis period.
***Cost estimates exclude any right-of-way impacts or costs.*

Table 3 Median Alternatives and Phasing

Phase	Start and End MP	Number of U-Turns Included	Project Cost ($)**	Project Benefit ($)	B/C Ratio
Phase 1	130.181 – 132.04 (MP 132.04 to Deschutes Junction)	One	$1.5 million	$4.23 million	2.9
Phase 2	128.578 – 130.181 (Deschutes Junction to 61st Street)	One	$1.6 million	$3.00 million	1.9
Phase 3	124.40 – 128.578 (61st Street to Redmond City Limits)	Two	$3.7 million	$8.36 million	2.3
Phase 4	132.04 – 133.39 (Phase 1 Median to Bend City Limits)	Two	$2.2 million	$2.97 million	1.4

Note: All costs presented are Present Value Costs ($) over the 20-year analysis period.
***Cost estimates assume a concrete barrier median type and J-turn treatment for a conservative analysis. Cost estimates exclude any right-of-way impacts or costs. More details about the cost differences among median types are provided in **Appendix F**.*

Details of each countermeasure by location and project category are provided in the Project Prioritization section under Section 5 of this report. When implementing the proposed countermeasures, KAI suggests:

- Consider implementation of Short-term projects first. They are the most cost-effective and generally do not require additional right-of-way or impact to adjacent properties.
- Consider implementing the Median projects in phases. Phases 1 and 2 could be implemented with two U-turn treatments, when funding becomes available. Phases 1 and 2 address high-crash locations while also minimizing the number of access points impacted by the median. Precede implementation of median and U-turn treatments with a public education campaign, and provide signage to educate drivers how to safely use the U-turn treatment.
- Medium-term projects are cost-effective, but require greater investment than short-term projects. They have potential to impact right-of-way, which would delay implementation.
- Pending successful implementation of Median Phases 1 and 2, Phases 3 and 4 could be implemented, when funding becomes available.

Section 2
Introduction

INTRODUCTION

The Oregon Department of Transportation (ODOT) has requested Kittelson & Associates, Inc. (KAI) to conduct a safety assessment of a 9-mile section of US 97, from the south Redmond city limits (milepost 124.40) to the north Bend city limits (milepost 133.39).

PROJECT DESCRIPTION

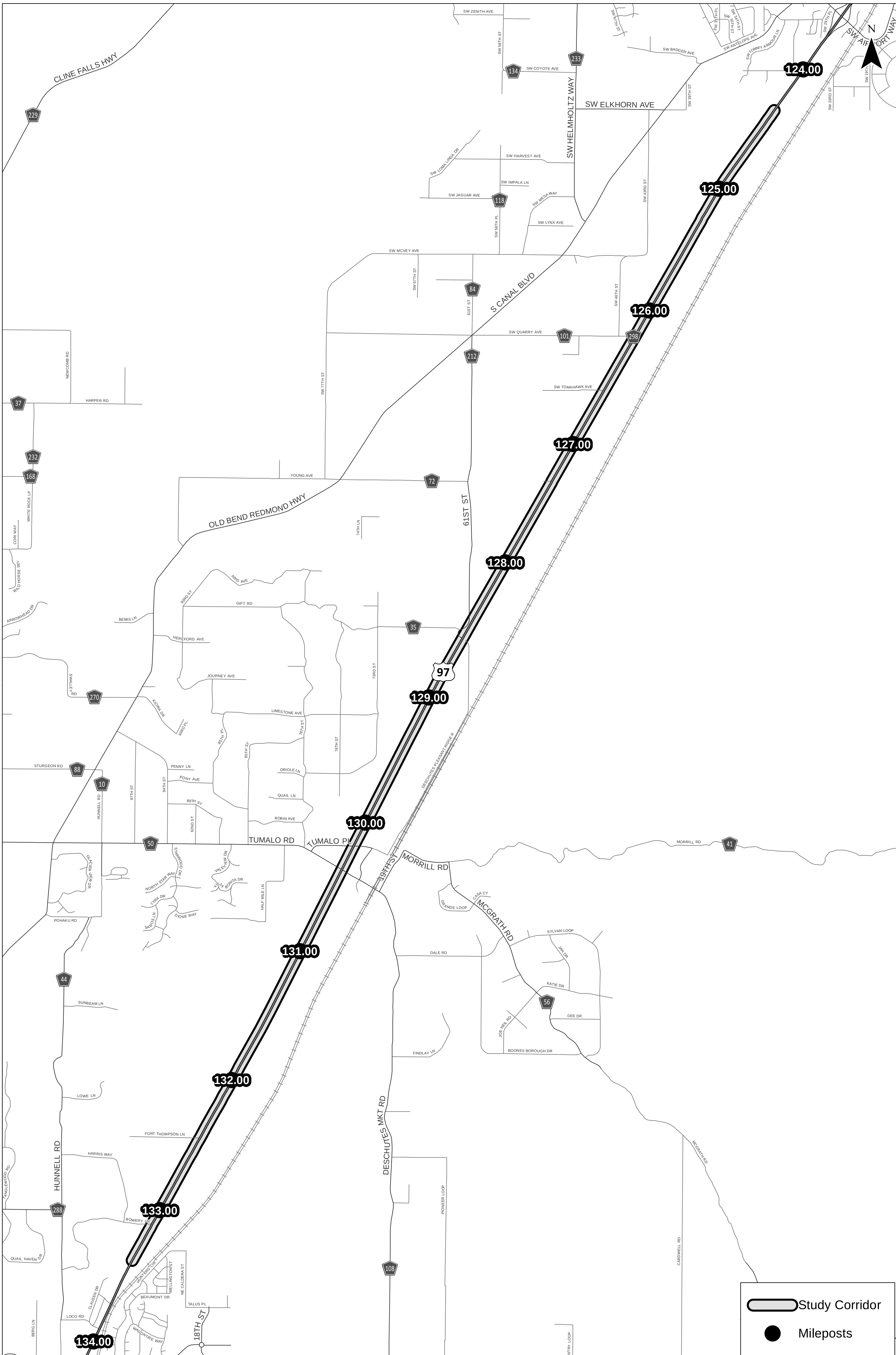
The goals of the US 97 Safety Assessment are to:

- Improve public safety through an evaluation of crash trends and contributing factors,
- Identify effective safety countermeasures, and
- Prioritize projects through a benefit-cost analysis.

This assessment focused on identifying low- and medium-cost countermeasures that could be implemented in the near-term (within approximately 5 years) and medium-term (within approximately 5-15 years). This analysis considers five years of the corridor's historical crash data and applies HSM crash prediction methods on the roadway segments and at the major intersections. These methods remove statistical bias often inherent in crash analysis, due to the random nature of crashes. KAI identified a range of crash countermeasures (low-to-medium cost) and used their documented effectiveness to compare the benefits (expected reduction in crash severity and frequency) to the estimated construction cost (dollars) in a benefit-cost analysis. Based on this analysis, KAI made suggestions for a series of potential corridor safety improvements.

STUDY AREA

The study corridor is a rural four-lane principal arterial running from the south Redmond city limits (MP 124.40) to the north Bend city limits (MP 133.39). The limits of the study are depicted in **Figure 1**.



Study Corridor
US 97, MP 124.40 - 133.39
Deschutes County, Oregon

Figure
1

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Kittelson & Associates, Inc.
Transportation Engineering/Planning

Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: Oregon Department of Transportation

Section 3
Existing Conditions

EXISTING CONDITIONS

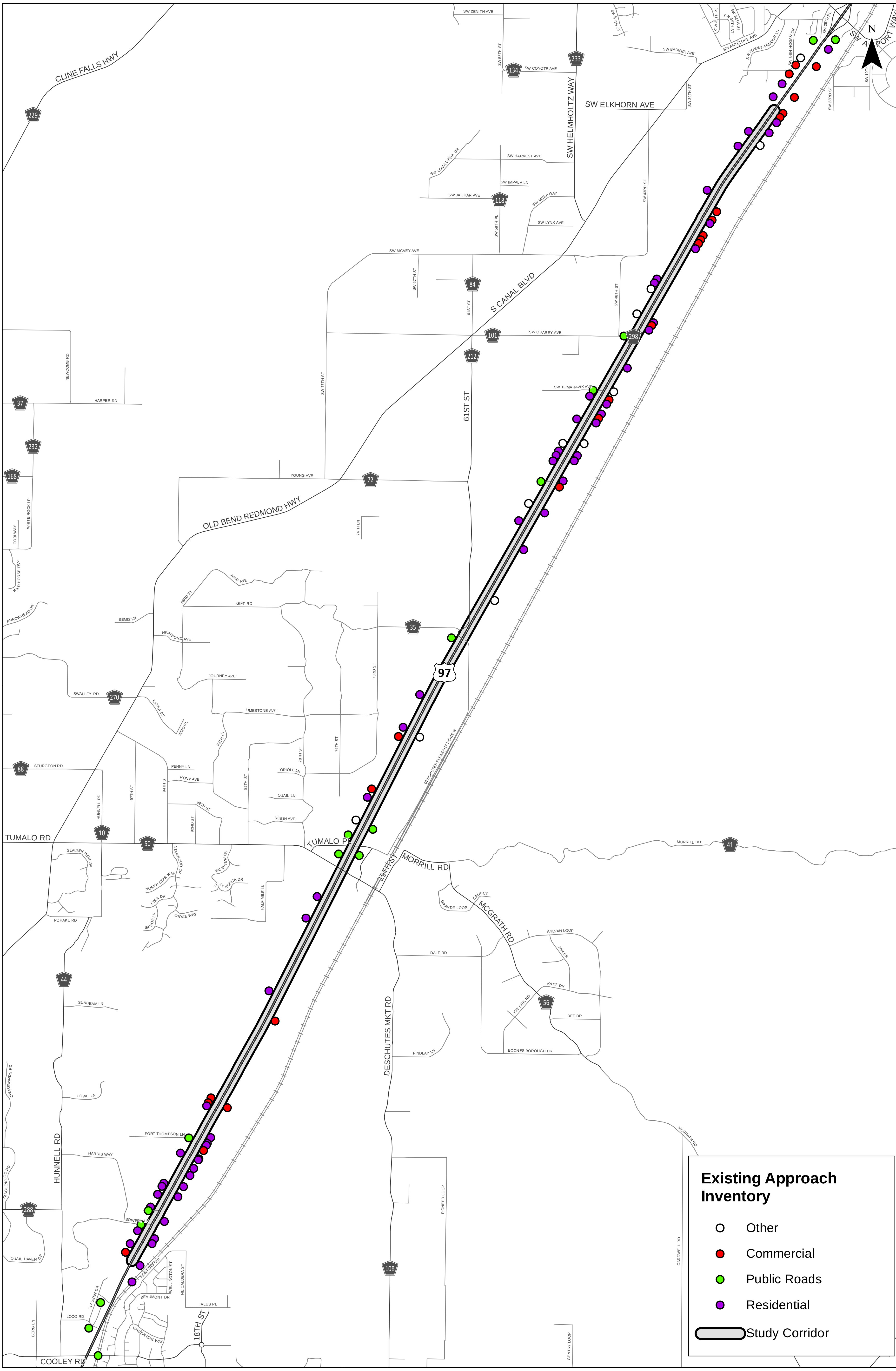
The existing conditions analysis identifies factors influencing crash potential, including: traffic characteristics, historical crash analysis, and field observations.

ROADWAY CHARACTERISTICS

US 97 is a rural four-lane principal arterial running north-south within the study area. US 97 serves as a major statewide and regional connection. The highway runs from California to Washington through Central Oregon, with trucks accounting for approximately seven percent of the annual average daily traffic. The study corridor serves as the primary connection between Bend and Redmond, carrying commuter traffic between the cities daily. There are limited alternatives to the north-south corridor.

US 97 provides access to residential, commercial, and industrial properties (including several owned by Central Oregon Irrigation District (COID). **Figure 2** shows the locations of the approaches on US 97, based on ODOT's records. Additional properties may have the rights to access even if no access currently exists. The highest functionally-classified roads that intersect US 97 are Deschutes Market Road, 61st Street (Gift Road), and Quarry Avenue. All public and private accesses are at-grade, except the rural grade-separated interchange at Deschutes Market Road. Deschutes Market Road is a Rural Arterial east of the highway and a Rural Collector west of the highway. 61st Street is a Rural Collector, and Quarry Avenue is a Local Street.

As shown in **Figure 3**, the typical cross-section of US 97 in the study area includes two 12-foot travel lanes in each direction, separated by a 10-foot wide striped median. Shoulder widths average approximately 8-feet throughout the corridor. Centerline and shoulder rumble strips are provided throughout the study corridor. The pavement widens slightly at the intersection with 61st Street to accommodate a northbound left-turn lane.



Study Corridor & Approaches
US 97, MP 124.40 - 133.39
Deschutes County, Oregon

Figure
2

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Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: Oregon Department of Transportation

Figure 3 US 97 Typical Section

TRAFFIC CHARACTERISTICS

Traffic data was inventoried from ODOT's Automated Traffic Recording (ATR) stations, ODOT's TransGIS website, and the Deschutes County Transportation System Plan. New data was not obtained for the purposes of this study. The most-recent traffic count data is summarized in **Table 4**.

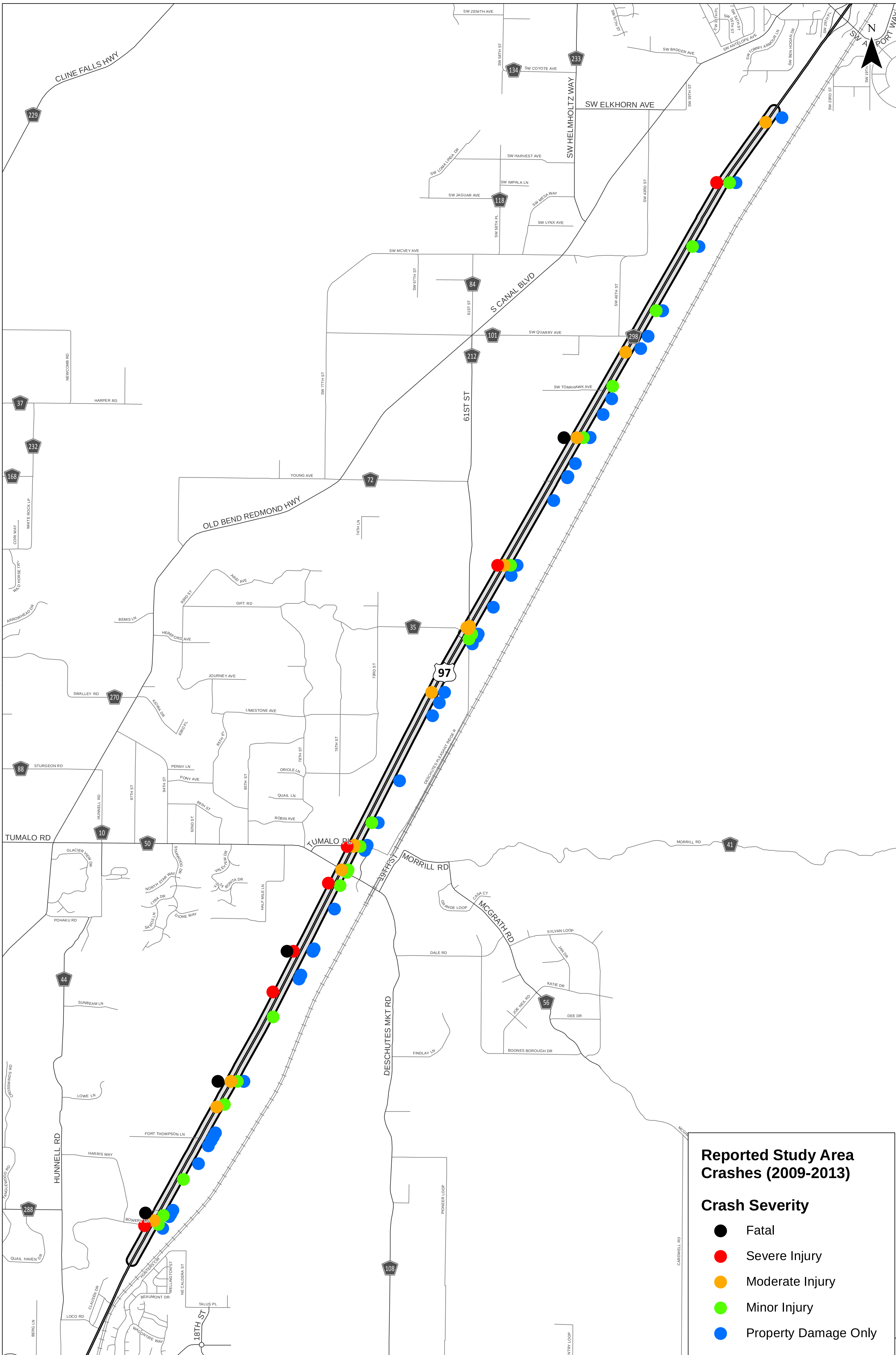
Table 4 Study Area Available Traffic Volumes

Location	Date	AADT	Truck AADT	Source
US 97, at Deschutes Junction	2013	26,700	2,196	TransGIS
US 97, at Quarry Avenue	2013	27,500	2,632	TransGIS
Deschutes Junction, East Leg	2013	3,816	N/A	TransGIS
Deschutes Junction, West Leg	2013	3,697	N/A	TransGIS

Traffic volumes were not available for the majority of the intersections along the corridor. Field observations indicated that volumes of turning vehicles at intersections were highest at Deschutes Junction, followed by 61st Street and then by Quarry Avenue. In the absence of available hourly volumes, field observations also confirmed the peaking characteristics of the traffic during the a.m. and p.m. peak hours when drivers are commuting between Bend and Redmond.

HISTORICAL CRASH ANALYSIS

KAI conducted a review of the crash history over a 5-year study period, from 2009 through 2013. Crash data and crash reports were provided by ODOT. A summary table of all reported crashes over the study period is provided in **Appendix A**. Over the study period (2009 through 2013), 108 crashes were reported on the US 97 study corridor from MP 124.40 to 133.39. A corridor crash map showing the location and severity of each crash is provided in **Figure 4**.



Crash Severity
US 97, MP 124.40 - 133.39
Deschutes County, Oregon

Figure
4

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Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: Oregon Department of Transportation

Over the five-year study period, 108 crashes were reported on the US 97 study corridor. The crashes were spread throughout the corridor, with the highest frequency occurring at intersections and full milepost numbers. The high frequency at full milepost numbers is likely associated with rounding during the reporting of each crash as there are no geometric changes at each full milepost.

Frequency and Severity

The crash severity distribution of the US 97 study corridor crashes is summarized in **Table 5. Table 6** compares the average annual crash rates for the last five years to the statewide average crash rate for rural principal arterials. Compared to the typical crash rates of similar roads in Oregon, the study section of US 97 had lower crash rates. Although the crash rates were not above statewide averages, there are opportunities to reduce the frequency of fatal and severe-injury crashes.

Table 5 Crash Severity Distribution

<table>
<tr><th>Corridor / Class</th><th>Property Damage Only</th><th>Minor Injury</th><th>Moderate Injury</th><th>Severe Injury</th><th>Fatality</th></tr>
<tr><td rowspan="2">US 97 Crashes (2009-2013)</td><td>59
54.6%</td><td>23
21.3%</td><td>14
13.0%</td><td>8
7.4%</td><td>4
3.7%</td></tr>
<tr><td>59
54.6%</td><td colspan="3">45
41.7%</td><td>4
3.7%</td></tr>
</table>

Table 6 Crash Rate Comparison

Crash Rate Type*	Study Corridor Average Crash Rate	Statewide Average Crash Rate for Rural Principal Arterials (2013)
Overall Average Crash Rate (crashes per million VMT)	0.2426	0.72
Fatal and Severe Injury Crash Rate (Crashes per 100 million VMT)	2.6959	5.23
Fatal Crash Rate (Crashes per 100 million VMT)	0.8986	1.72

Note: *Oregon crash rates obtained from 2013 Oregon Crash Rate Book.*

**Crash rate calculations are based on an average AADT of 27,100 for the 9-mile US 97 study corridor.*

Time

The crash frequency and severity are depicted by year and by month in **Figure 5** and **Figure 6**, respectively. Reported crashes ranged between 12 and 33 per year over the study period. Severe crashes – crashes resulting in a severe injury or fatality – typically ranged between two and four per year, with the exception of zero severe crashes in 2013.

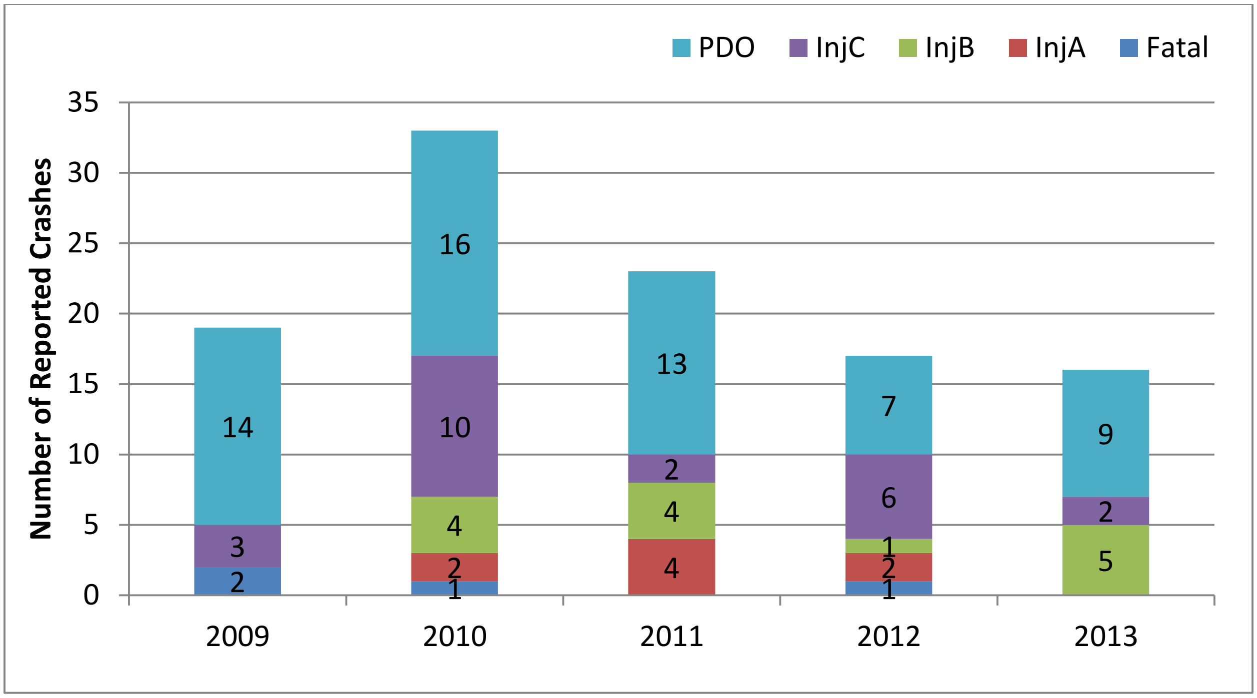


Figure 5 Crash Frequency and Severity by Year (2009 – 2013)

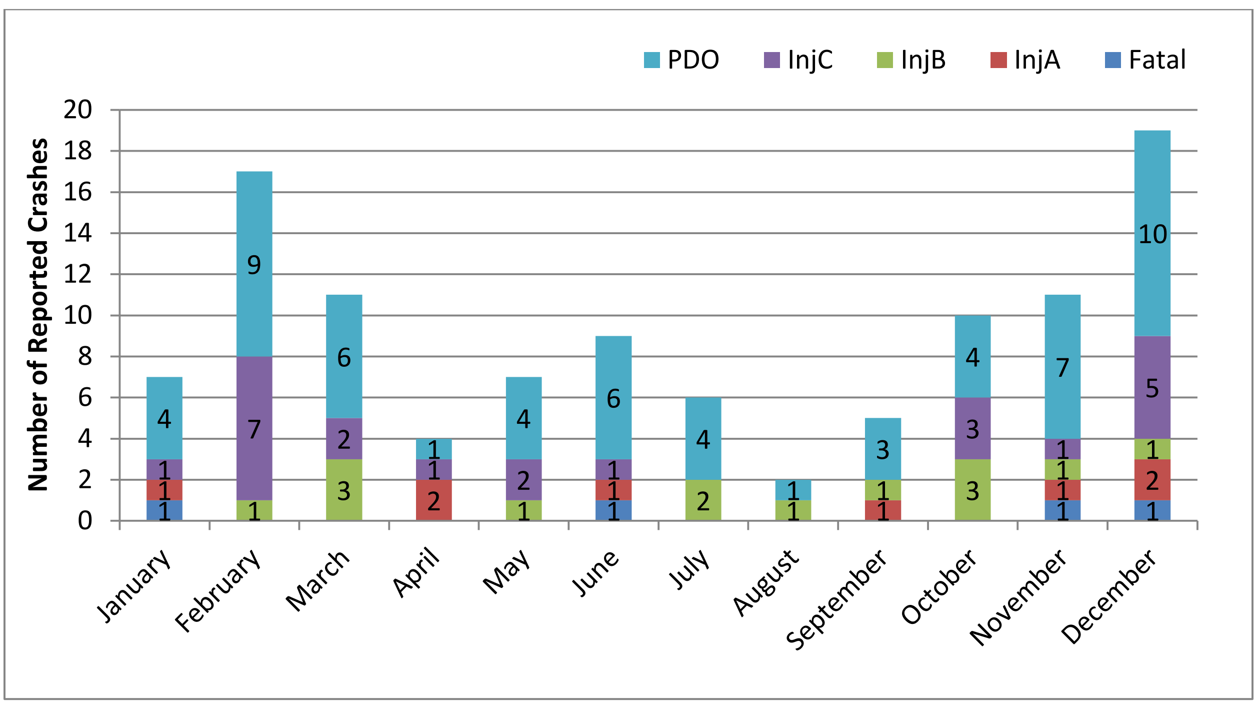


Figure 6 Crash Frequency and Severity by Month (2009 – 2013)

Collision Type

Table 7 summarizes the collision types over the study corridor. Crash frequency and severity by collision type is depicted in **Figure 7**. The severe crashes, those resulting in a fatality or severe injury, included three run-off road crashes, two turning-movement crashes, four crashes involving vehicles traveling opposite directions, two rear-end crashes, and one pedestrian crash. The crash type by corridor location is summarized in **Figure 8**.

Table 7 Collision Type (2009 – 2013)

	Total Crashes		Fatal and Severe Injury Crashes	
Collision Type	**Frequency**	**Percent**	**Frequency**	**Percent**
Run-Off Road	19	17.6	3	25.0
Turning Movement or Angle	11	10.2	2	16.7
Head On	3	2.8	2	16.7
Sideswipe, Meeting	15	13.9	2	16.7
Sideswipe, Overtaking	11	10.2	--	--
Rear End	25	23.0	2	16.7
Overturned	10	9.3	--	--
Animal	12	11.1	--	--
Pedestrian	2	1.9	1	8.2
Total Crashes	**108**	**100%**	**12**	**100%**

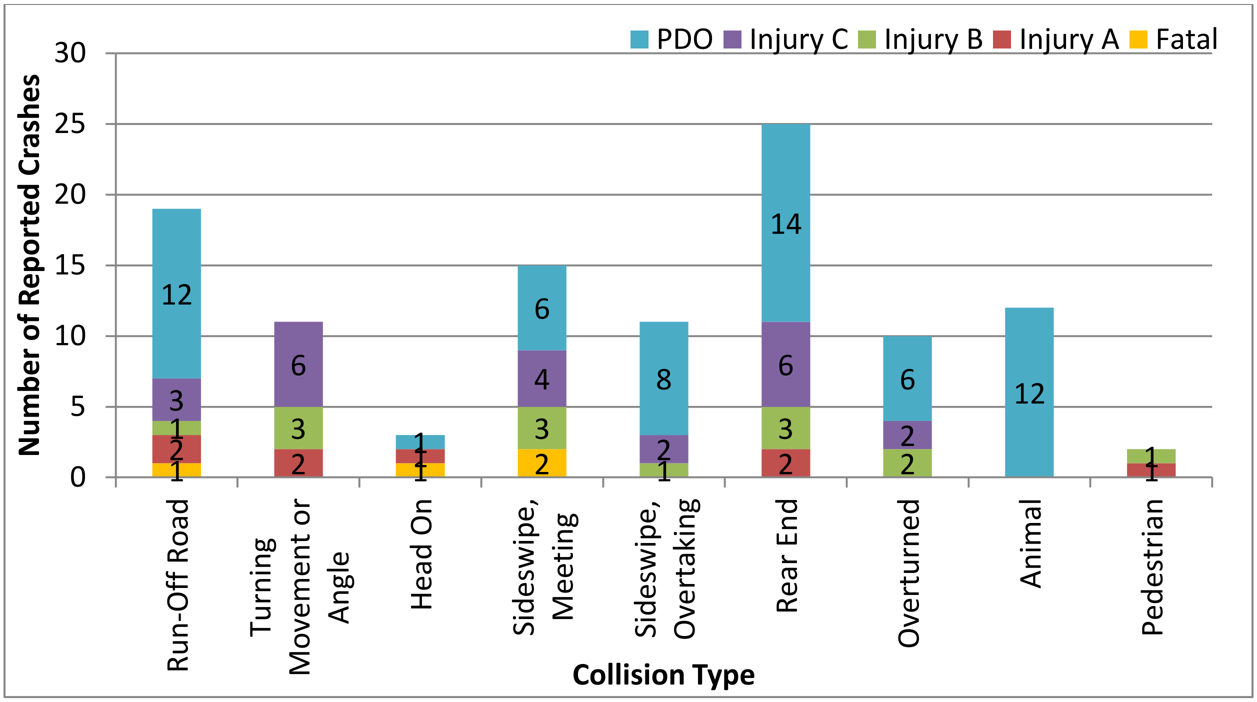
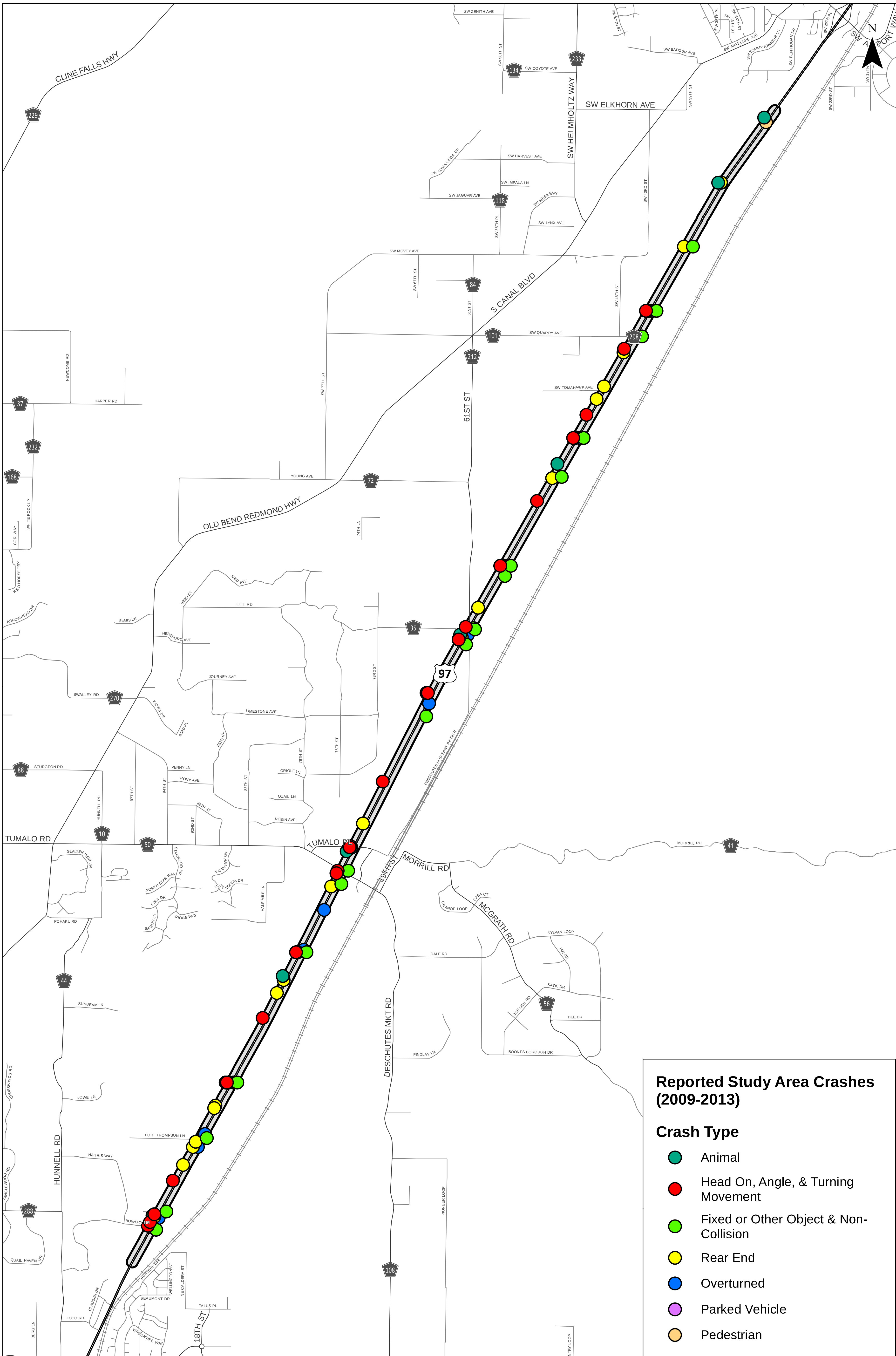


Figure 7 Crash Severity by Collision Type (2009 – 2013)



Crash Types
US 97, MP 124.40 - 133.39
Deschutes County, Oregon

Figure **8**

Kittelson & Associates, Inc.
Transportation Engineering/Planning

Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: Oregon Department of Transportation

Lighting

Figure 9 displays the distribution of crash lighting conditions relative to crash severity, and **Figure 10** displays the distribution of lighting conditions across the corridor. Fifty percent of the reported crashes occurred in non-daylight conditions (dusk, dawn, or dark). Fifty percent of fatal and severe injury crashes occurred during non-daylight conditions.

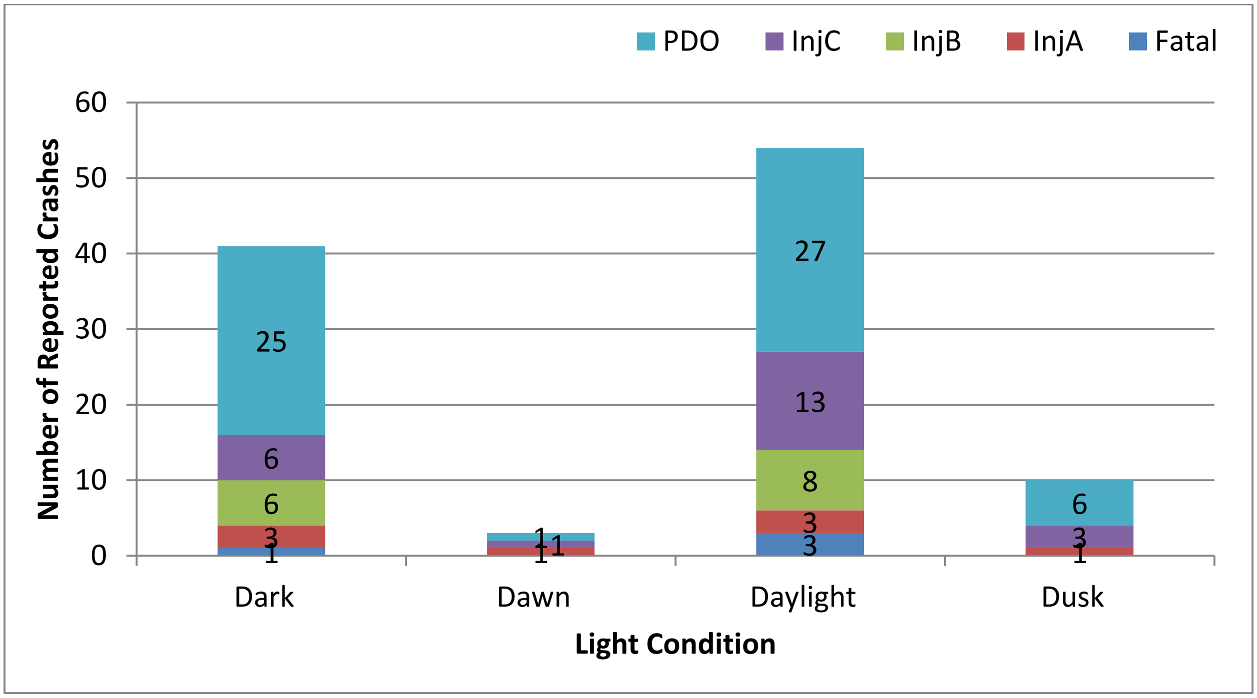
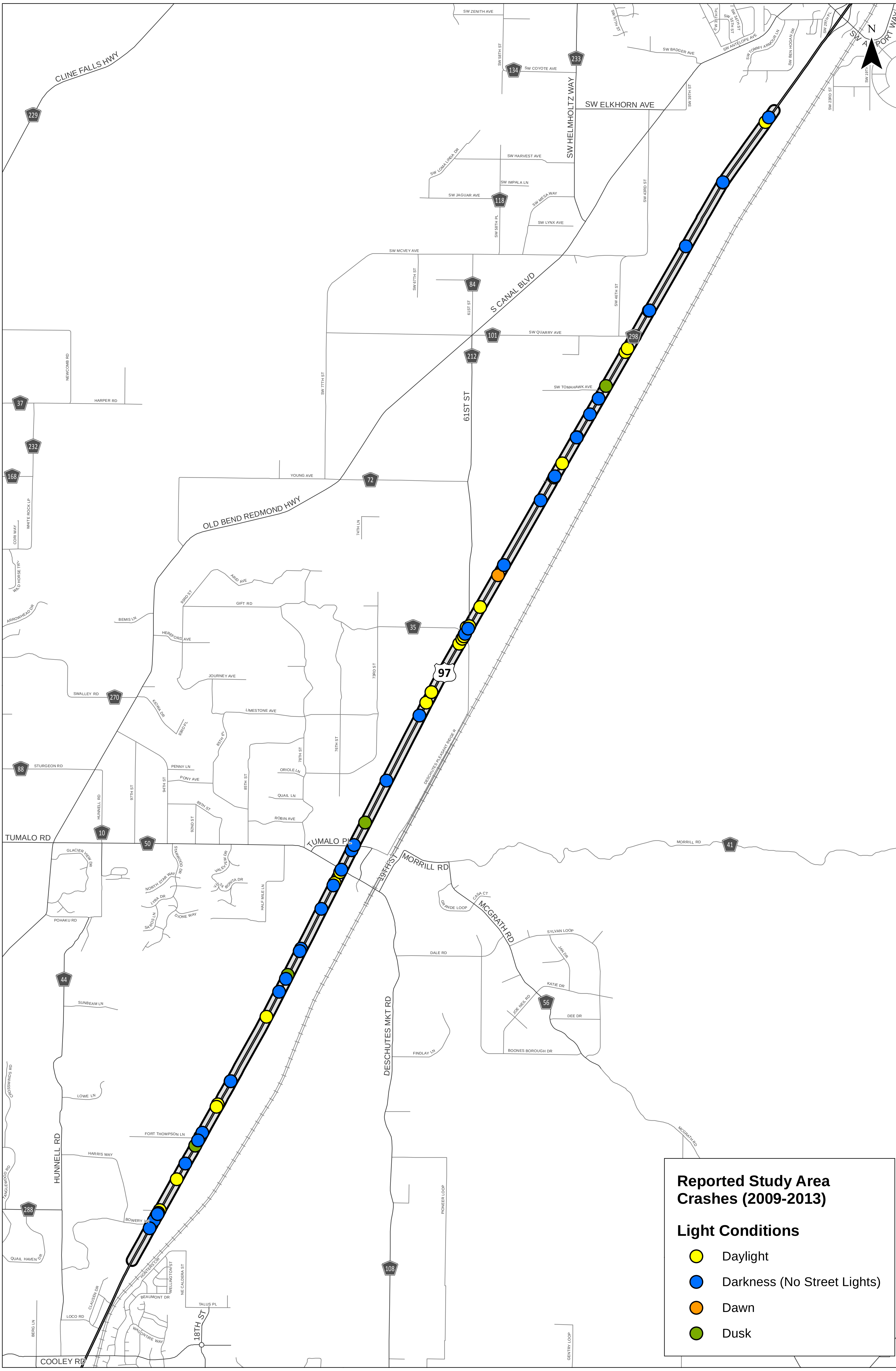


Figure 9 Lighting Conditions and Crash Severity (2009 – 2013)



Light Conditions for Reported Crashes (2009 - 2013)
US 97, MP 124.40 - 133.39
Deschutes County, Oregon

Figure
10

Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: Oregon Department of Transportation

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Roadway Conditions

Figure 11 shows the distribution of roadway conditions at the time of the crash and the severity of the crashes. Forty-five crashes (42 percent) occurred on roadways categorized as snow, ice, or wet. However, 67 percent of fatal and severe injury crashes occurred on dry roadways. **Figure 12** shows that the snow, ice, and wet roadway crashes occurred throughout the corridor.

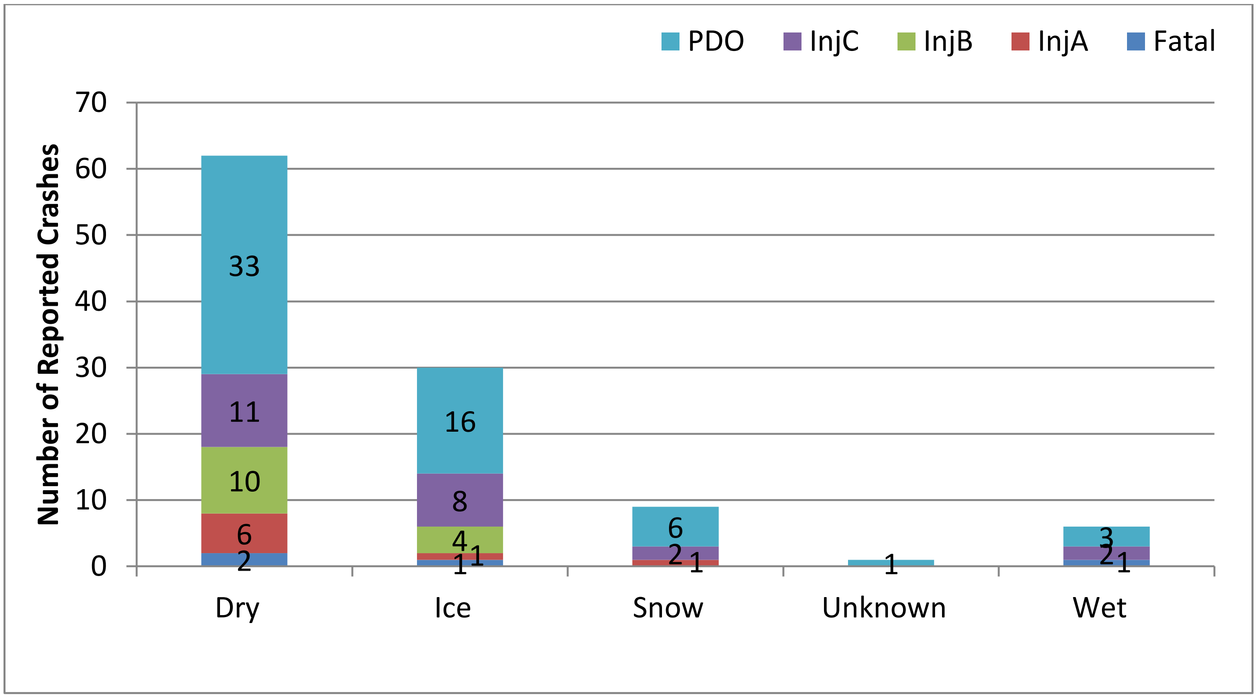
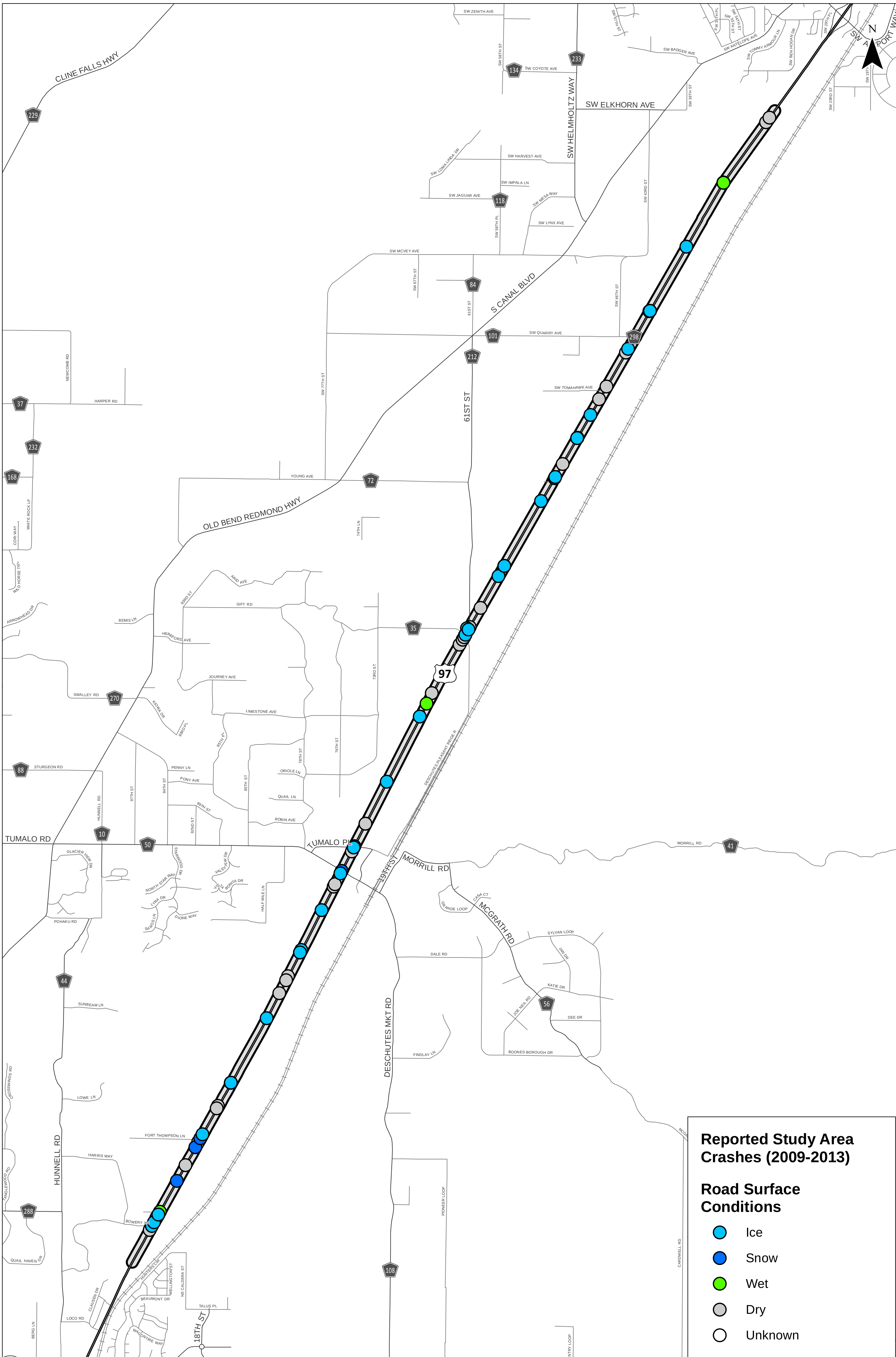


Figure 11 Roadway Conditions and Crash Severity (2009 – 2013)



Roadway Conditions for Reported Crashes (2009 - 2013)
US 97, MP 124.40 - 133.39
Deschutes County, Oregon

Figure 12

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TRANSPORTATION ENGINEERING/PLANNING

Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: Oregon Department of Transportation

Other Factors

Other factors noted in the crash data included excess speed and alcohol use. These factors were found to occur in the following proportion of reported crashes over the study period:

- Excess Speed – "Too fast for conditions" was the most commonly reported crash cause in the crash reports. Not all crash reports included a crash cause, and crash reports can indicate multiple crash causes. Thirty-six crashes indicated speed was a factor. The second most commonly reported crash cause was "Other," with 14 crashes, and "Followed too closely," with 11 crashes. Speed "too fast for conditions" does not necessarily indicate drivers exceeding the posted speed limit; conditions may create a situation in which vehicles need to travel below the speed limit in some cases such as inclement weather.
- Alcohol Use – Crash reports indicate alcohol was involved in 9 of the reported crashes.

FIELD OBSERVATIONS

KAI, ODOT, and Deschutes County conducted a field review of the corridor on December 18, 2014 and December 19, 2014. Team members reviewed the crash history prior to the field visit and drove the corridor several times in daylight and dark conditions. Participants stopped to observe the key intersections along the corridor including Bowery Lane, Deschutes Junction, 61st Street, and Quarry Lane. The purpose of the field review was to identify and document the presence and condition of existing facilities and make observations regarding traffic and safety issues. The following provides the findings of the field review.

Observations related to geometric design elements are summarized below.

- Bicycles
    - One bicyclist was observed riding along the study corridor during the visit.
- Roadway Segment Observations
    - It was difficult to find a gap in major-street traffic to complete a left-turn from the minor street. Vehicles were observed using the 10-foot wide striped median to complete two-stage left-turns.
    - Rock outcroppings are located throughout the corridor approximately 30 feet from the edge of the roadway shoulder.
- Intersection Observations
    - One tree restricts intersection sight distance at the intersection of US 97/Quarry Lane.

- Traffic turning onto US 97 at Deschutes Market Road has an acceleration lane with a merge, but many vehicles continue to stop rather than making the turn and then merging onto US 97 from the east.
- During dark lighting conditions it is difficult to identify intersections in advance – there are limited visual cues to identify intersections.
- 61st Street has a northbound left-turn lane from US 97; no other major-street left-turn lanes are provided on the study segment.

Section 4
Potential Crash Countermeasures

POTENTIAL CRASH COUNTERMEASURES

Potential crash countermeasures were considered to reduce crash potential on the corridor, based on field observations and crash analysis.

COUNTERMEASURE TOOLBOX

Prior to identifying improvements for specific locations along the corridor, a variety of potential crash countermeasure improvements were defined being appropriate to the context of this corridor. This Toolbox of Countermeasures was identified from the Federal Highway Administration (FHWA) Crash Modification Factor (CMF) Clearinghouse, the *Highway Safety Manual* (HSM), FHWA's *Two Low-Cost Safety Concepts for Two-Way Stop-Controlled, Rural Intersection on High-Speed Two-Lane, Two-Way Roadways* (FHWA-HRT-08-063), and ODOT's Approved CMF list, among others. The countermeasures are described within the following categories: roadway, roadside, signage, intersection, and lighting.

Roadway Improvements – the roadway category consists of improvements implemented within the roadway's traveled cross-section effecting roadway segment driver behavior and/or traffic operations. The countermeasures identified are designed to reduce roadway/lane departures through increased driver awareness and pavement marking retroreflectivity. One example roadway improvement is inlaid raised pavement markers (RPM), an example of which is provided in **Figure 13**. The spacing of RPMs can be decreased on approaches to intersections to provide visual warning to drivers. Another example is a raised median, which may take the form of a concrete barrier or a cable median barrier.

Figure 13 Example of Inlaid (Recessed) Raised Pavement Markers
(Source: http://safety.fhwa.dot.gov/roadwaysafetyawards/2013/)

Roadside Improvements – the roadside category consists of improvements implemented within the right-of-way, but outside the normal traveled cross-section. These improvements include improving the roadside design by removing fixed objects in the clear zone and widening the clear zone. Roadside improvements are intended to improve the recoverability of roadway departures and/or reduce the severity of roadway departure crashes.

Signage Improvements – the proposed signage improvements involve installing advanced warning signs prior to key intersections, installing signs with higher grade retroreflectivity, installing larger signs, and installing speed feedback signs in transition areas between urban and rural areas. **Figure 14** shows an example of a speed feedback sign.

Figure 14 Example of Speed Feedback Sign
(Source: http://safety.fhwa.dot.gov/local_rural/training/fhwasa010413spmgmt/)

Intersection Improvements – the intersection category consists of various improvements at specific intersections primarily intended to improve the safety of intersection maneuvers and to increase driver awareness at and on approach to intersections. Intersection improvements include enhanced signage and markings such as larger stop signs, additional stop signs, and a median on the minor street; increasing sight distance at an intersection; installing left-turn lanes; installing or lengthening right-turn deceleration lanes; and installing or lengthening right-turn acceleration lanes.

Lighting – the lighting category consists of additional illumination at intersections and on some segments identified by the crash analysis. The segments are based on locations with the highest percentages of crashes that occurred during dark lighting conditions. The additional lighting would help improve the visibility of the roadway and key intersections at night. These improvements are intended to reduce the number of roadway departure crashes and intersection crashes in dark and dusk lighting conditions.

Table 8 summarizes all countermeasures identified for consideration on the corridor.

Table 8 US 97 Corridor Toolbox of Crash Countermeasures

Countermeasure Category	Common Crash Types	Crash Countermeasures
Roadway	• Run-Off Road • Fixed Object • Overturned Vehicle • Head-On • Non-Daylight Conditions	• Install Inlaid Raised Pavement Markers • Install Raised Median with U-turn to Provide Access to Driveways
Roadside	• Run-Off Road • Fixed Object • Overturned Vehicle	• Improve Roadside Design by Increasing Clear Zone Width
Signage	• Intersection Crashes • Speed-Involved Crashes	• Install Intersection Ahead Warning Signs • Replace Signs with Higher Retroreflectivity or Larger Signs • Install Speed Feedback Signs
Intersection	• Rear-End • Left-Turning • Angle	• Increase Intersection Sight Distance • Install Low-Cost Signing and Marking Treatments, including Minor Street Median • Install Right-Turn Deceleration Lane • Install Left-Turn Lane • Install Right-Turn Acceleration Lane • Restripe Merge
Lighting	• Run-Off Road • Fixed Object • Animal Crashes • Non-Daylight Conditions	• Install Intersection Lighting • Illumination along Key Segments

CRASH MODIFICATION FACTORS

KAI identified crash modification factors (CMFs) for each countermeasure, where available. CMFs were identified from the ODOT Approved List[1], from the HSM, or the FHWA CMF Clearinghouse database. The FHWA CMF Clearinghouse is maintained by the University of North Carolina Highway Safety Research Center at the following web address: http://www.cmfclearinghouse.org/. A CMF is a multiplicative factor used to compute the expected number of crashes after implementing a given

[1] ODOT references Crash Reduction Factors, instead of Crash Modification Factors. CRFs are related to CMFs by the following equation: CRF=1-CMF.

countermeasure at a specific site. CMFs have been developed for a variety of countermeasures through decades of safety research; however, CMFs are not available for all countermeasures.

The ODOT list of approved CMFs is intended to provide consistency among projects; it does not prohibit other countermeasures and CMFs from being evaluated. The supporting information provides details about the area(s) a CMF applies to, applicable crash type(s), applicable severity type(s), standard error (if available), and a star rating. The star rating system is managed by the FHWA and denotes the CMF's quality on a one-to-five scale, where five indicates the highest or most reliable rating. CMFs with the highest star ratings were prioritized for use in this analysis, when possible. CMFs with lower star-ratings were used for several countermeasures where no other information was available. These lower-rated CMFs are generally more indicative of a crash reduction trend and should not be heavily relied on for specific crash reduction approximation.

A CMF having a standard error indicates a statistical level of confidence in that countermeasure's effectiveness to reduce crashes. However, standard errors are not included with all CMFs in the CMF Clearinghouse. Therefore, for consistency in this analysis, the average CMF is used for each countermeasure, but it is recognized that each countermeasure's effectiveness to reduce crashes may vary among different locations.

A detailed list of countermeasures and applicable CMFs is provided in **Appendix B**. More information on the development and application of CMFs is available in Part D of the HSM.

COUNTERMEASURE APPLICATION

The potential improvements within the Countermeasure Toolbox were applied to specific locations taking into consideration the context of the corridor, crash types reported over the 5-year study period, and contributing factors identified by crash analysis and field reviews. The result was a collection of location-based projects ranging in cost and expected effectiveness. **Table 9** summarizes the potential improvements for the specific locations discussed above. As shown, a comprehensive range of countermeasures was identified to address the reported crashes and reduce the potential for future crashes. The following section describes the evaluation process applied to prioritize projects based on expected cost-effectiveness.

Table 9 Potential Countermeasure Improvements by Location

Location	Potential Countermeasures
Redmond City Limits to Quarry Ln	▪ Install speed feedback signs in transition zones; ▪ Inlaid Raised Pavement Markers ▪ Raised Median
Quarry Ln	▪ Increase Sight Distance; ▪ Median on minor street approach ▪ Intersection lighting ▪ Right turn Deceleration Lane
Quarry Ln to 61st Street	▪ Inlaid Raised Pavement Markers ▪ Segment Lighting ▪ Increase clear zone (Reduce Roadside Hazard Rating) ▪ Raised Median
61st Street	▪ Intersection lighting ▪ Median on minor street approach ▪ Right turn Deceleration Lane ▪ Acceleration Lane
61st Street to Deschutes Jct.	▪ Inlaid Raised Pavement Markers ▪ Increase clear zone (Reduce RHR from 2 to 1) ▪ Raised Median
Deschutes Jct.	▪ Restripe Merge
Deschutes Jct. to Ft Thompson Ln	▪ Inlaid Raised Pavement Markers ▪ Increase clear zone (Reduce RHR from 2 to 1) ▪ Raised Median
Ft Thompson Ln	▪ Intersection lighting; ▪ Median on minor street approach
Ft Thompson Ln to Bend City Limits	▪ Install speed feedback signs in transition zone; ▪ Inlaid Raised Pavement Markers ▪ Segment Lighting ▪ Raised Median

*Note: The shading is used to help differentiate between locations (shaded – intersections; non-shaded – roadway segments)

Section 5
Improvement Alternatives Analysis

IMPROVEMENT ALTERNATIVES ANALYSIS

Countermeasures identified in Section 4 were grouped into projects at each intersection and within each segment. The expected crash reduction potential of countermeasures (as indicated by CMFs described in Section 4 and provided in **Appendix B**) was used to establish initial project groups. Crash prediction methods from the HSM were applied to conduct benefit-cost analysis and to establish a prioritized list of projects based on expected cost-effectiveness. The result is a list of Short- and Medium-term projects, with the most cost-effective treatments included in the Short-term project group.

This analysis is intended to identify and prioritize alternative safety projects through a planning-level analysis. Therefore, this analysis reflects planning-level cost estimates that are used to inform a relative comparison of benefit-cost between alternatives. The findings of this analysis will identify relative priorities for implementation; the prioritized projects should be scoped and more detailed cost estimates should be prepared to revise the B/C ratios prior to making final funding decisions.

BENEFIT

The benefit of the countermeasures is quantified in terms of the annual cost savings to society associated with a reduction in crashes after implementation. The benefit is calculated by estimating the number of crashes reduced by a proposed countermeasure (or group of countermeasures) and associating a societal cost to those reduced crashes. The methods applied to estimate and quantify the benefits of countermeasures at intersections and segments along the study corridor are described below.

Crash Prediction

Crash prediction tools and methods from the HSM were applied to estimate the expected crash frequency within the study corridor, with and without countermeasures. The fundamental purpose for using the HSM crash prediction method is to compensate for the randomness in crash occurrence. Crashes include a human component not directly related to geometry or presence of certain roadway features. Any given set of crash data for a period of time will reflect randomness in crash frequency not related to changes to the roadway. The HSM method for predicting the expected average annual crash frequency applies the Empirical Bayes (EB) method to remove statistical bias.

Method

Crash frequency and severity is predicted using safety performance functions (SPFs). SPFs are regression equations estimating the frequency and severity of crashes based on multiple factors, including intersection geometry, lane configuration, and traffic volume. SPFs are based on national research and are intended to reflect a range of driver and roadway characteristics. The SPFs were calibrated to reflect variations between conditions in Oregon and other states studied to develop the

SPFs. Variations could include driver characteristics, roadway design, terrain, and other factors associated with geometry, human factors, and driving environment. Calibration factors were obtained from *Calibrating the Highway Safety Manual Predictive Methods for Oregon Highways,* Final Report SPR 684 OTREC-RR-12-02.

Predicting crashes for a No-Build scenario (existing and future) estimates the expected number of crashes assuming only traffic volume varies between years. The expected number of crashes serves as a baseline crash estimate for comparison with the project alternatives.

SPFs for rural multilane undivided highways were obtained from Chapter 11 of the HSM and applied to determine existing crash prediction estimates for roadway segments and intersections. The rural multilane undivided highways model was the most appropriate because the divided highway model does not account for a flush median that exists on US 97. For the purpose of this study, it was assumed the traffic volumes will not change with implementation of safety improvements.

Predicted average crash frequency was computed using ODOT-calibrated spreadsheet tools designed to implement the HSM crash prediction methodology. The tools implement the EB procedure to establish an “expected” average crash frequency based on observed crash history and “predicted” average crash frequency. The application of the EB procedure produces the most reliable long-term expected average number of crashes.

Intersections were analyzed using the methodology from Chapter 11 of the HSM, with the exception of Deschutes Junction. Because this intersection functions as an interchange, it was evaluated using ISATe software, which applies the methodology developed in NCHRP 17-45, *Safety Prediction Methodology and Analysis Tool for Freeways and Interchanges*.

No-Build Crash Prediction Results

The expected number of crashes is summarized in **Table 10** by intersection and segment.

Table 10 No-Build Annual Crash History and Prediction Estimates

Location	Observed Annual Number of Crashes	Predicted Number of Crashes per Year	Expected Number of Crashes per Year
Redmond City Limits to Quarry Ln	3.2	6.5	5.2
Quarry Ln / US 97	0.2	0.6	0.5
Quarry Ln to 61st Street	5.0	9.2	7.4
61st Street / US 97	1.2	0.7	0.8
61st Street to Deschutes Jct.	1.4	6.1	4.1
Deschutes Jct. / US 97	1.4	0.7	0.8
Deschutes Jct. to Ft Thompson Ln	5.8	7.8	7.0
Ft Thompson Ln / US 97	0.6	1.0	0.8
Ft Thompson Ln to Bend City Limits	2.8	2.1	3.4
Total	***21.6***	***34.7***	***30.0***

As shown in **Table 10**, if no changes are made to the existing roadway and volumes remain similar to those recorded in 2014, approximately 30.0 crashes are expected per year. This indicates approximately 8.3 crashes more crashes are expected per year for similar facilities in Oregon than were observed over the study period. Detailed spreadsheets documenting the existing crash prediction analyses are provided in **Appendix C**.

Build Crash Prediction Results

The No-Build expected crash frequency was used as the baseline for comparison of multiple projects. The expected number of crashes over the 20-year analysis period was multiplied by the project CMF (i.e., the expected change in crashes associated with each project).

The purpose of this report is to provide a relative comparison in crash reduction between various alternatives; therefore, 2014 volumes are consistently applied to predict crashes for all build alternatives.

CMFs are multiplicative, indicating that when more than one countermeasure is applied at a location, the combined project CMF is the product of the individual countermeasure CMFs. The combined project CMF was applied to the expected No-Build number of crashes to predict the number of crashes estimated to occur if the project is implemented. This method assumes traffic volumes are equal to those in the No-Build scenario and that no significant changes, other than the proposed countermeasures, are made to US 97 that would substantially impact the number of crashes.

Some CMFs only apply to specific crash types. For example, the CMF for installing intersection lighting applies only to non-daylight crashes. These CMFs were only applied to the ratio of observed crashes of the designated type relative to the total crashes observed on the corridor.

Where countermeasures do not have quantifiable estimates of effectiveness, no quantitative reductions were applied. Therefore, the benefit-cost ratios may be considered conservative estimates.

Cost of Crashes

The benefit of each alternative was calculated by applying a cost to the crashes reduced. The cost per crash reduced was developed based on the crash severity breakdown of the corridor and the economic value per crash by severity from ODOT's Benefit/Cost spreadsheet tool. Based on that tool, the following economic values were assumed for each crash severity:

- Fatal Crash: $1,170,000
- Injury A Crash: $1,170,000
- Injury B Crash: $70,600
- Injury C Crash: $70,600
- Property Damage Only Crash: $19,400

The weighted average cost based on the crash severity distribution of the five year crash history for the study corridor resulted in an average cost of $164,785 per crash reduced. After the CMFs are applied to estimate the number of crashes reduced per year, the 20-year present value cost of crashes is calculated using a uniform series present worth factor of 12.46, as instructed by the ODOT Highway Safety Projects Benefit/Cost Analysis Worksheet. The safety "benefit" of the countermeasures is calculated as the difference in present value crash costs between No-Build and Build scenarios.

COST OF IMPROVEMENTS

Planning-level cost estimates were calculated for the potential countermeasures identified in **Table 9**. Cost estimates were based on costs listed in the ODOT CMF list and unit costs developed from the ODOT bid items when possible. A contingency of 40 percent was applied to each estimate. The cost estimates do not include any assumptions or cost for right-of-way impacts. The cost estimates will be revised through ODOT's project scoping process. A summary table of the potential countermeasures and planning-level cost estimates is provided in **Appendix D.**

The proposed countermeasures have varying design life. For example, most roadway construction projects will have a 20-year design life. However, a shorter design life was assumed for treatments such as pavement markings (10 years), raised pavement markers (5 years), and signage (10 years). Countermeasures with a shorter design life were assumed to be replaced as-needed over the 20-year analysis period. The following assumptions were used for the service life of the countermeasures (all others assume a 20-year lifespan):

- Speed feedback signs (10 years);
- Inlaid raised pavement markers (5 years);
- Signing and striping improvements, including median on minor street approach (10 years); and
- Restriping merge area (5 years).

PROJECT PRIORITIZATION

Projects were grouped into three categories such that the projects with the relatively highest effectiveness (i.e., greatest crash reduction per dollar spent) are included in the higher priority categories. The project categories are described as follows:

- Short-term projects are the most cost-effective and do not require additional right-of-way or public outreach.
- Medium-term projects are generally higher cost than short-term projects and tend to involve a greater degree of construction activity.
- Median projects are presented as a separate category because these projects involve the construction of a median along the highway and a U-Turn treatment to accommodate access to driveways and intersections. These projects involve higher costs and are more likely to impact right-of-way than short- or medium-term projects. These projects may require additional steps prior to implementation.

Some countermeasures may be included in both short- and medium-term categories, depending on its effectiveness at specific locations. Benefit-cost ratios were provided for each group of projects.

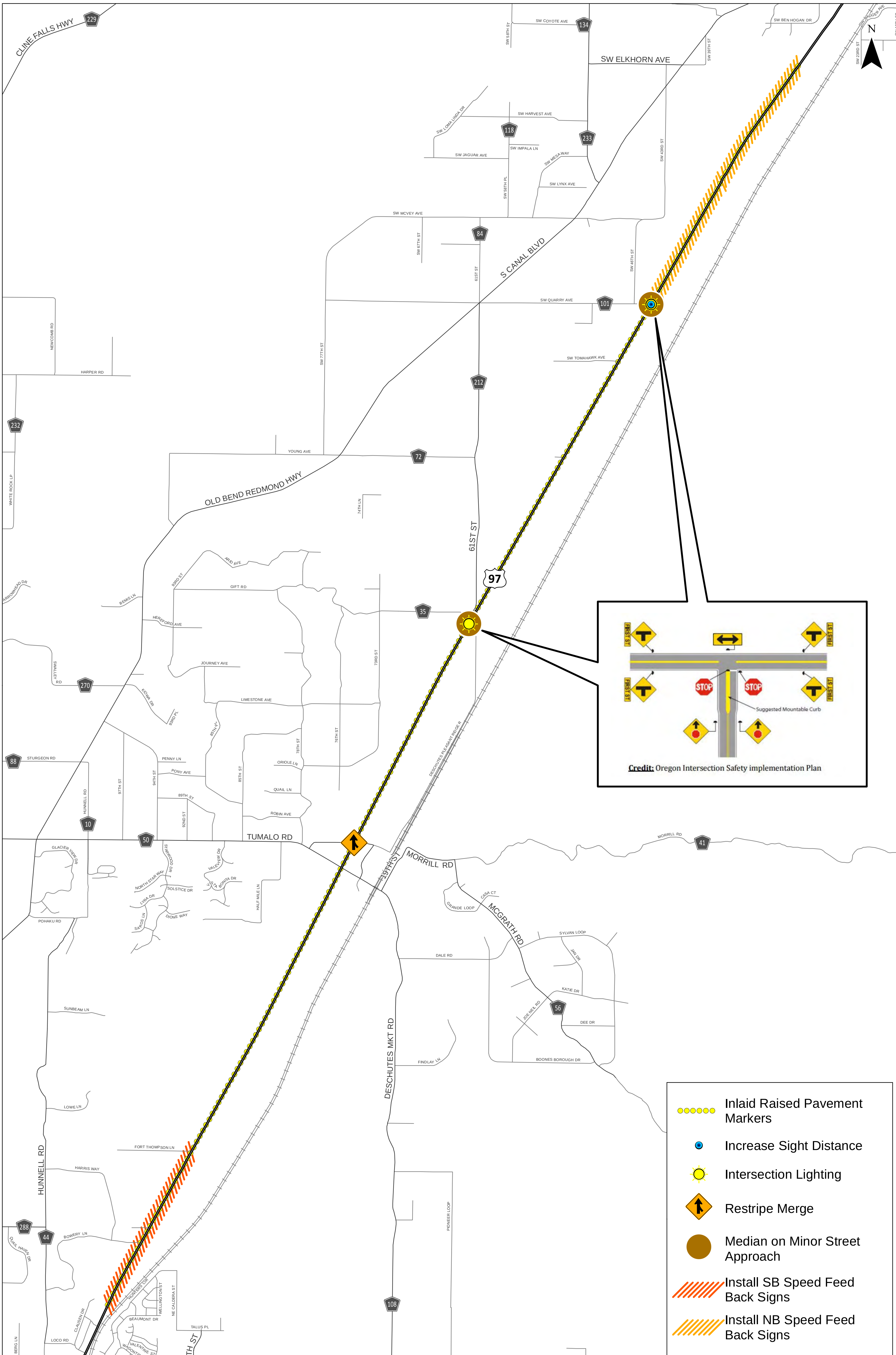
Short-Term Projects

Short-term projects are highly effective safety countermeasures implemented within the next five years at a relatively low cost. These include speed feedback signs, inlaid raised pavement markers, improving sight distance, intersection lighting, and enhanced signing and striping, including a median, on the minor street approach. **Table 11** summarizes the benefit-cost analysis for the short-term projects. **Figure 15** illustrates the proposed locations of the short-term, low-cost projects along the corridor.

Table 11 Short-Term Projects Benefit-Cost Summary

Location	Annual Observed Crash Frequency	Annual Predicted Crash Frequency	Annual Expected Crash Frequency	Short-Term Project Countermeasures	Project CMF	20-Year Crash Reduction	Preliminary 20-Yr Cost Estimate**	Expected Annual Comprehensive Crash Cost Reduction (Benefit)	Benefit / Cost Ratio*
Redmond City Limits to Quarry Ln	3.2	6.5	5.1	▪ Install speed feedback signs in transition zones; ▪ Inlaid Raised Pavement Markers	82%	19.1	$ 32,000	$ 157,100	61.2
Quarry Ln	0.2	0.6	0.5	▪ Increase Sight Distance; ▪ Median on minor street approach; ▪ Intersection lighting	82%	1.8	$ 28,000	$ 14,500	6.5
Quarry Ln to 61st Street	5	9.2	7.4	▪ Inlaid Raised Pavement Markers	93%	11.0	$ 14,000	$ 90,500	80.6
61st Street	1.2	0.7	0.8	▪ Intersection lighting; ▪ Median on minor street approach	50%	7.8	$ 27,000	$ 64,500	29.8
61st Street to Deschutes Jct.	1.4	6.1	4.1	▪ Inlaid Raised Pavement Markers	93%	6.0	$ 9,000	$ 49,600	68.7
Deschutes Jct.	1.4	0.7	0.8	▪ Restripe Merge	99%	0.0	$ 14,000	$ 500	0.1
Deschutes Jct. to Ft Thompson Ln	5.8	7.8	7.0	▪ Inlaid Raised Pavement Markers;	93%	10.3	$ 14,000	$ 85,200	75.8
Ft Thompson Ln	0.6	0.9	0.8	▪ None	N/A	0.0	$ -	$ -	--
Ft Thompson Ln to Bend City Limits	2.8	3.9	3.4	▪ Install speed feedback signs in transition zones; ▪ Inlaid Raised Pavement Markers	82%	12.6	$ 27,000	$ 103,800	47.9
Total Short-Term Projects	21.6	36.4	30.1			68.6	$ 165,000	$ 565,000	42.7

**B/C Ratios reflect a uniform series present worth factor of 12.46 for a 20-year life span. B/C Ratio = (Annual Benefits X Present Worth Factor)/(Estimated Project Cost)*
***Cost estimates exclude any right-of-way impacts or costs.*



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Short Term Countermeasuers
Deschutes County, Oregon

Figure
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Data Source: Oregon Department of Transportation

As shown in **Table 11** and **Figure 15**, the short-term projects may be implemented for approximately $165,000 and have a cumulative benefit-cost ratio of 42.7.

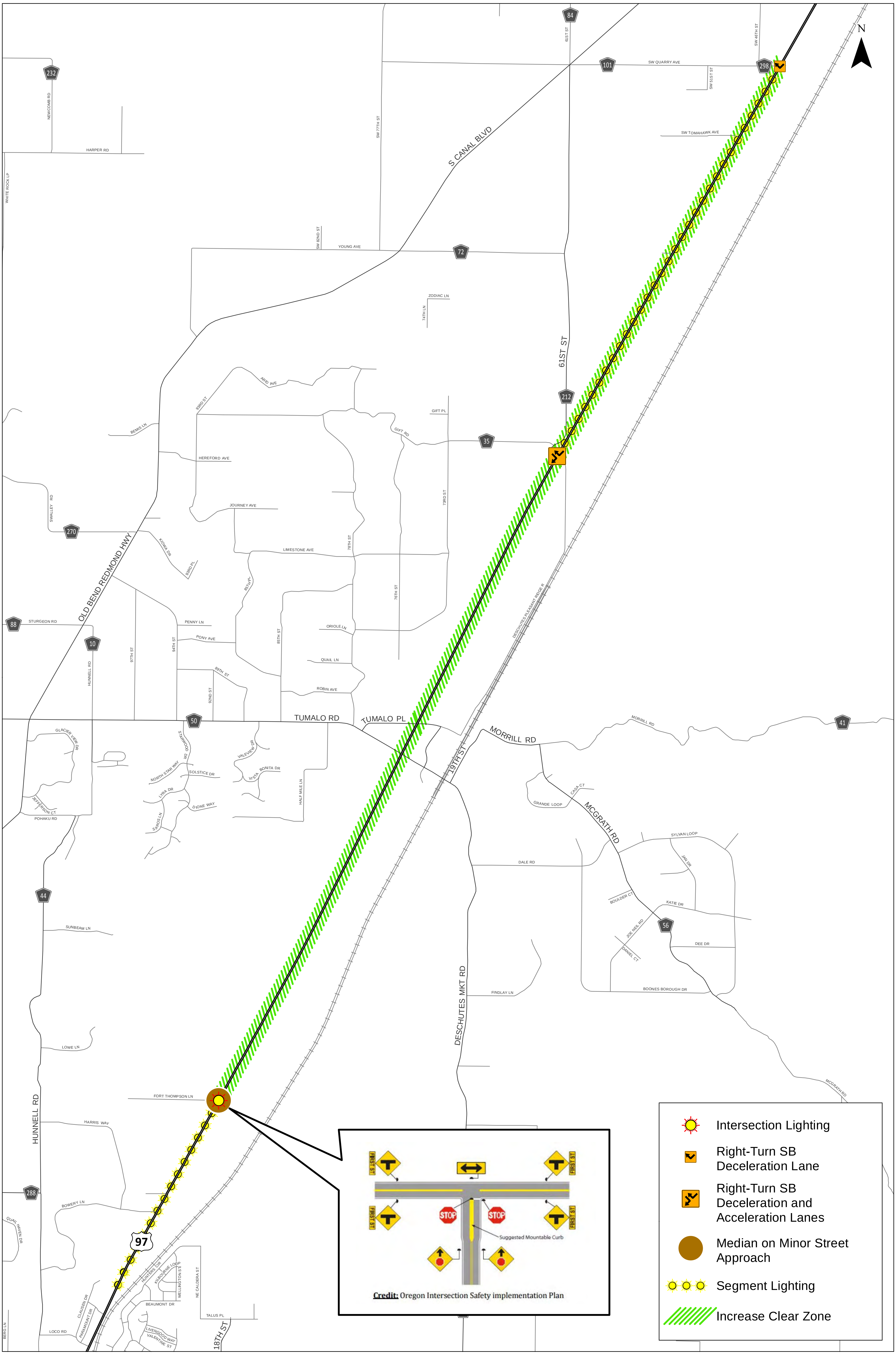
Medium-term Projects

Medium-term projects are generally higher cost and tend to involve a greater degree of construction activity than short-term projects. Segment lighting, clear zone improvements projects, acceleration lanes, and deceleration lanes were classified as medium-term projects for this corridor. **Table 12** summarizes benefit-cost analysis for the medium-term projects. **Figure 16** illustrates the proposed locations of the medium-term projects along the corridor.

Table 12 Medium-Term Projects Benefit-Cost Summary

Location	Annual Observed Crash Frequency	Annual Predicted Crash Frequency	Annual Expected Crash Frequency	Medium-term Project Countermeasures	Project CMF	20-Year Crash Reduction	Preliminary 20-Yr Cost Estimate**	Expected Annual Comprehensive Crash Cost Reduction (Benefit)	Benefit / Cost Ratio*
Redmond City Limits to Quarry Ln	3.2	6.5	5.1	▪ None	N/A	N/A	N/A	N/A	N/A
Quarry Ln	0.2	0.6	0.5	▪ Deceleration Lane	93%	0.7	$ 188,000	$ 5,700	0.4
Quarry Ln to 61st Street	5	9.2	7.4	▪ Segment Lighting; ▪ Increase clear zone (Reduce RHR)	85%	22.1	$ 1,413,000	$ 182,200	1.6
61st Street	1.2	0.7	0.8	▪ Acceleration Lane; ▪ Deceleration Lane	83%	2.7	$ 376,000	$ 22,400	0.7
61st Street to Deschutes Jct.	1.4	6.1	4.1	▪ Increase clear zone (Reduce RHR)	94%	4.9	$ 58,000	$ 40,000	8.6
Deschutes Jct.	1.4	0.7	0.8	▪ None	N/A	N/A	N/A	$ -	N/A
Deschutes Jct. to Ft Thompson Ln	5.8	7.8	7.0	▪ Increase clear zone (Reduce RHR)	94%	8.4	$ 58,000	$ 69,000	14.8
Ft Thompson Ln	0.6	0.9	0.8	• Intersection lighting; • Median on minor street approach	51%	8.2	$27,000	$ 67,800	31.3
Ft Thompson Ln to Bend City Limits	2.8	3.9	3.4	▪ Segment Lighting	96%	2.5	$ 466,000	$ 20,700	0.6
Total Medium-Term	**21.6**	**36.4**	**30.1**			**49.5**	**$ 2,586,000**	**$ 407,700**	**2.0**

**B/C Ratios reflect a uniform series present worth factor of 12.46 for a 20-year life span. B/C Ratio = (Annual Benefits X Present Worth Factor)/(Estimated Project Cost)*
***Cost estimates exclude any right-of-way impacts or costs.*



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Medium-Term Countermeasures
Deschutes County, Oregon

Figure
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Data Source: Oregon Department of Transportation

Median Projects and Alternatives

In order to address the median cross-over crashes, a raised median was evaluated. Fifty percent of all fatal and severe injury crashes in the study corridor were median cross-over or turning movement crashes. The median installation would restrict access at driveways and intersections to right-in, right-out for the length of the median. Therefore, this project includes U-turn treatments at median openings.

While there are many effective forms of U-turn treatments for rural high-speed roadways, a J-turn treatment was assumed for the purpose of this analysis, and cost estimates reflect a J-turn treatment. However, future analysis could evaluate different U-turn treatments to identify a preferred treatment. J-turns have been shown to be effective at reducing crashes by consolidating turning movements at multiple locations at one location and enhancing the crossing location to raise awareness of the conflict point. A Missouri study found J-turns in conjunction with median turn restrictions resulted in a decrease of 34.8 percent in all crashes and 53.7 percent in fatal and injury crashes.[2] For the purpose of this analysis, the cost estimates for each J-turn assumes the location will be illuminated to increase visibility during dark lighting conditions. **Appendix E** illustrates a conceptual design of a J-turn concept along US 97.

There were no sections of the study corridor where a substantial length of median could be installed without impacting driveways at a reasonable cost. Therefore, phased implementation is recommended to prioritize implementation along segments of the study corridor where median installation provides the greatest reduction in crash frequency while minimizing impacts to existing accesses. **Figure 18** illustrates the location of each median phase and the U-turns associated with each Phase. The figure also illustrates the location of driveways along the corridor and the locations of target crash types (head-on, sideswipe meeting, and turning movement crashes between 2009 and 2013).

As shown in **Figure 18**, phased implementation of median could begin near Deschutes Junction where there is the lowest driveway density. In general, driveway density is lower in the mid-section of the study corridor and increases towards the City limits. Further study is needed to design each U-turn treatment, which will need to account for distance to driveways, ability to accommodate acceleration lanes, and available right-of-way.

The following sections describe the four phases proposed for the median alternative. The analysis presented in this section provides the benefit/cost analysis using cost estimates for the concrete barrier median type. The concrete barrier is expected to have a higher cost than a cable barrier and is presented here to provide a conservative analysis. **Appendix F** provides a comparison in benefit/cost analyses for the two median types. ODOT will conduct additional analysis of median types before selecting a preferred barrier type.

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[2] Edara, et al. *Evaluation of J-turn Intersection Design Performance in Missouri*. December 2013.

Phase I Median Alternative

The Phase 1 median alternative includes approximately 1.86 miles of median extending from approximately MP 130.18 to Deschutes Junction. One J-turn near the southern end of the segment (near MP 130.18), or alternate U-turn treatment, is recommended to serve southbound traffic. Deschutes Junction will serve as the U-turn opportunity for northbound traffic.

The benefit-cost analysis for Phase 1 is summarized in **Table 13**. Phase 1 has the highest benefit-cost ratio of all four phases.

Table 13 Median Phase 1 Benefit-Cost Summary

Countermeasures	Project Cost ($)*	Project Benefit ($)	B/C Ratio
Median and J-Turn	$1,500,000	$4,300,000	2.9

Note: All costs presented are Present Value Costs ($) over the 20-year analysis period.
**Cost estimates exclude any right-of-way impacts or costs.*

Phase 2 Median Alternative

Phase 2 of the median alternative includes approximately 1.60 miles of median extending from Deschutes Junction north to the intersection at 61st Street. One J-turn, or alternate U-turn treatment, will serve northbound traffic on the northern end of the segment. The J-turn at this location should be further evaluated to determine if an alternative treatment could be installed off of the highway on 61st Street in place of a J-turn. An aerial image of the intersection of US 97/61st Street is shown in **Figure 17**. The existing northbound left-turn from US 97 onto 61st Street should be maintained to accommodate the left-turning traffic at this location.

The benefit-cost analysis for Phase 2 is summarized in **Table 14.**

Figure 17 Aerial Image of US 97/61st Street

Table 14 Median Phase 2 Benefit-Cost Summary

Countermeasures	Project Cost ($)*	Project Benefit ($)	B/C Ratio
Median and J-Turn	$1,600,000	$3,000,000	1.9

Note: All costs presented are Present Value Costs ($) over the 20-year analysis period.
**Cost estimates exclude any right-of-way impacts or costs.*

Phase 3 Median Alternative

Phase 3 of the median alternative includes approximately 4.18 miles of median extending from 61st Street north to the Redmond City Limits. One U-turn opportunity should be provided for northbound traffic, and one should be provided for southbound traffic. The design of Phase 3 should further evaluate the placement of the U-turns. The northbound U-turn may need to be located south of the end of the median in order to fit the U-turn between driveways. If needed, the interchange at Yew Avenue can provide an alternate U-turn opportunity for residents and businesses located north of the last U-turn treatment.

The benefit-cost analysis for Phase 3 is summarized in **Table 15.**

Table 15 Phase 3 Benefit-Cost Summary

Countermeasures	Project Cost ($)*	Project Benefit ($)	B/C Ratio
Median and J-Turns	$3,700,000	$8,400,000	2.3

Note: All costs presented are Present Value Costs ($) over the 20-year analysis period.
**Cost estimates exclude any right-of-way impacts or costs.*

Phase 4 Median Alternative

Phase 4 of the median alternative includes approximately 1.35 miles of median extending from the Bend City Limits to approximately MP 132.04. One U-turn opportunity should be provided for northbound traffic, and one should be provided for southbound traffic. The design of the Phase 4 project should further evaluate the placement of the U-turns.

The benefit-cost analysis for Phase 4 is summarized in **Table 16.** The cost estimates include two J-turns, although future analysis may be needed to finalize the appropriate treatment.

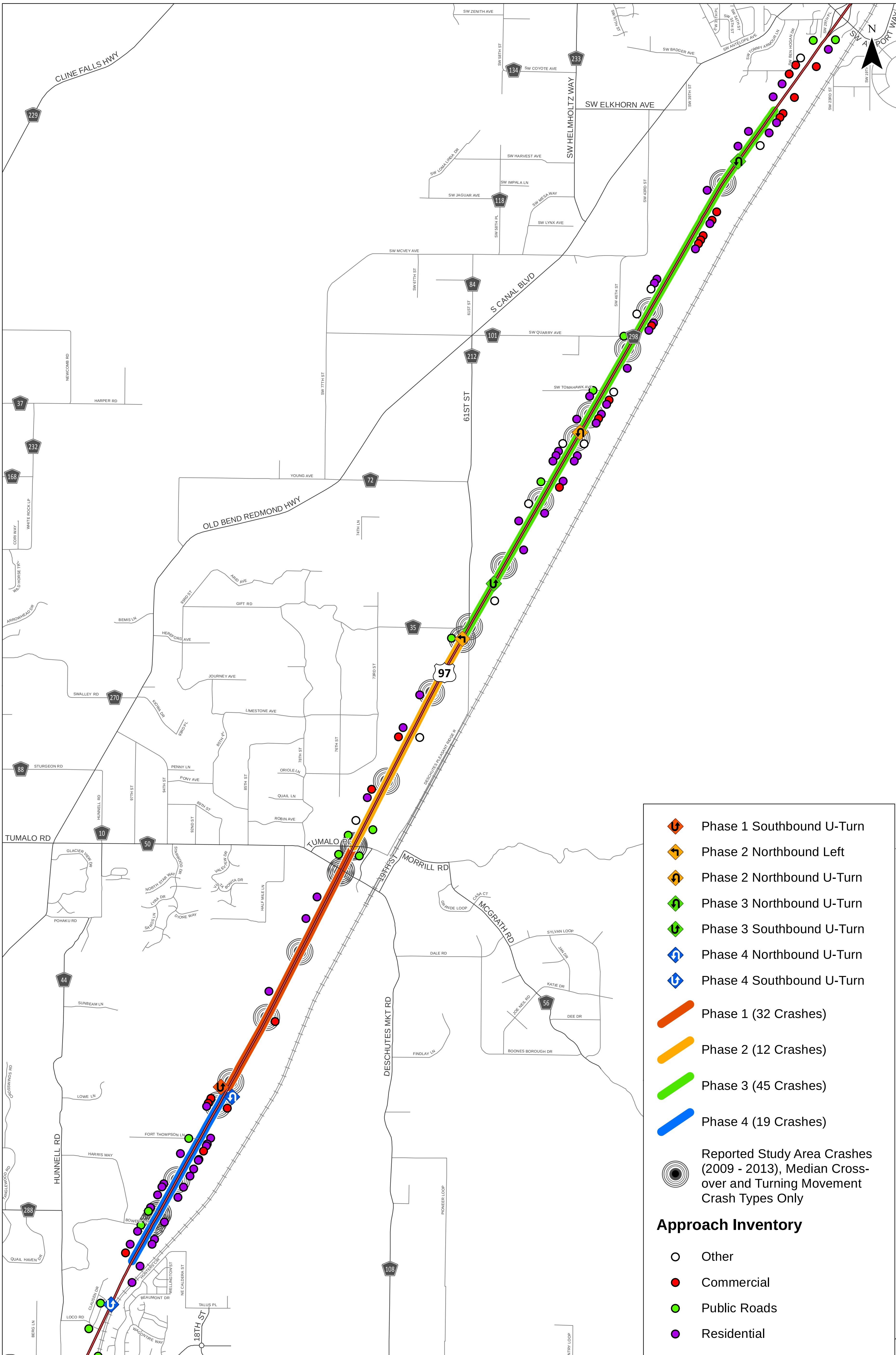
Table 16 Phase 4 Median Benefit-Cost Summary

Countermeasures	Project Cost ($)*	Project Benefit ($)	B/C Ratio
Median and U-turns	$2,200,000	$3,000,000	1.4

Note: All costs presented are Present Value Costs ($) over the 20-year analysis period.
**Cost estimates exclude any right-of-way impacts or costs.*

Median Suggestions

Based on the four phases of median presented in this section, Phase 1 has the highest benefit-cost ratio and the smallest number of driveways impacted by the median. Phase 2 also has a small number of driveways impacted. Therefore, Phases 1 and 2 could be implemented together to minimize construction costs and the number of attenuators needed if a concrete barrier is installed. KAI recommends that this project be monitored by ODOT to determine the success of the project at reducing crashes, the reception of the project by the community, and the usage of the U-turn treatments by the public. Implementation of J-turns or other U-turn treatments should be accompanied with an educational campaign and signage to promote driver understanding and improve driver expectation.



Median Phasing Concept
US 97, MP 124.40 - 133.39
Deschutes County, Oregon

Figure 18

Kittelson & Associates, Inc.
Transportation Engineering/Planning

Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: Oregon Department of Transportation

Section 6
Findings and Conclusions

FINDINGS AND CONCLUSIONS

Kittelson & Associates, Inc. (KAI) analyzed crash history and evaluated potential crash countermeasures on a 9-mile section of US 97 from the south Redmond city limits (milepost 124.40) to the north Bend city limits (milepost 133.39). This study identified near- and medium-term countermeasures that would cost less than a series of frontage roads that have been identified by ODOT as long-term alternatives. KAI applied quantitative safety evaluation methods to evaluate a range of countermeasures to improve safety along the corridor. The findings and recommendations of the study are summarized below.

FINDINGS

Roadway Characteristics

US 97 is a four-lane rural highway with a posted speed limit of 55 miles per hour (mph). The two travel lanes in each direction are separated by a 10-foot paved median. The study area is shown in **Figure 1**. The typical cross-section consists of two travel lanes in each direction (12 feet in width), shoulders of 8 to 10 feet in width, and a paved center median of 10 feet in width. The roadway is fairly straight with only a few large horizontal curves in the study area. Driveway density is highest within 0.50-mile of the City of Bend and City of Redmond limits, in the transition sections from rural to urban areas. One grade-separated crossing is provided at Deschutes Junction; all other public and private accesses are at-grade.

Historical Crash Analysis

Over the five-year study period (2009-2013), 108 crashes were reported on the US 97 study corridor from milepost (MP) 124.40 to 133.39. A summary of the most-relevant crash trends is provided below.

- Crash types varied throughout the corridor. The three most common crash types were rear-end (25 crashes), fixed object (16 crashes), and sideswipe-meeting (15 crashes).
- 12 reported crashes were fatal or severe injury (injury A) crashes. 37 crashes resulted in a moderate or minor injury (injury B or C), and 59 crashes resulted in property damage only.
- Of the 12 fatal or injury A crashes,
    - Fifty percent were head-on crashes, sideswipe meeting crashes, or turning movement crashes – crash types that could be corrected by a median.
    - Fifty percent occurred during dark, dawn, or dusk light conditions.
- The most commonly-reported crash cause was “speed too fast for conditions.”
- Almost 42 percent of all reported crashes involved snow, ice, or wet roadways.

Field Observations

Field observations were conducted in December 2014 during daylight and dark light conditions. A team consisting of ODOT, Deschutes County, Oregon State Police, and consultants participated in the field visit. Observations from this field visit are summarized below.

- Traffic volumes were higher during the peak hours, making it difficult to find gaps in both directions of traffic to complete a left-turn from the minor street approach to US 97.
- Vehicles were observed using the 10-foot striped median to complete two-stage left turns from minor-street approaches onto US 97.
- During night-time conditions, it was difficult to see approaching intersections.
- The team discussed that right-turn deceleration lanes and right-turn acceleration lanes would be beneficial at key intersections due to the high traffic volumes and speeds.
- One bicyclist was observed riding along US 97.
- Rock outcroppings were located along the corridor, approximately 30 feet from the edge of the roadway shoulder.
- Driveways are located throughout the corridor, with higher density within 0.50-mile of the City of Bend and City of Redmond limits.

CONCLUSIONS

KAI prioritized projects aimed at reducing fatal and Injury A crashes as Short-term, Medium-term, or Median projects. Median projects were phased separately from other countermeasures due to the impacts to public and private accesses along the corridor. If a median is carried forward for implementation, ODOT will develop an outreach plan and document key access management principles, as defined in OAR 734-051-7010 and 734-051-1065.

The median projects include U-turn treatments to maintain access to driveways along the corridor that would otherwise be restricted by a median. While a preliminary J-turn concept has been discussed and preliminary design concept is included in this report, there are several other viable designs that provide for safe u-turning maneuvers. More information on design of unsignalized J-turn intersections on state highways is provided in NCHRP Report 745: *Left-Turn Accommodations at Unsignalized Intersections*. Additional information on the safety and operational effect of U-turns at unsignalized median openings is provided in NCHRP Report 524: *Safety of U-Turns at Unsignalized Median Openings*.

Each group of projects and their estimated benefit-cost ratios are summarized in **Table 17**, **Table 18**, and **Table 19**. While the magnitude of these B/C ratios may change upon refining the cost estimates, the priority for implementation is not expected to change.

Table 17 Short-Term Projects

Location	Annual Observed Crash Frequency	Annual Predicted Crash Frequency	Annual Expected Crash Frequency	Short-Term Project Countermeasures	Project CMF	20-Year Crash Reduction	Preliminary 20-Yr Cost Estimate**	Expected Annual Comprehensive Crash Cost Reduction (Benefit)	Benefit / Cost Ratio*
Redmond City Limits to Quarry Ln	3.2	6.5	5.1	▪ Install speed feedback signs in transition zones; ▪ Inlaid Raised Pavement Markers	82%	19.1	$ 32,000	$ 157,100	61.2
Quarry Ln	0.2	0.6	0.5	▪ Increase sight distance; ▪ Median on minor street approach; ▪ Intersection lighting	82%	1.8	$ 28,000	$ 14,500	6.5
Quarry Ln to 61st Street	5	9.2	7.4	▪ Inlaid Raised Pavement Markers	93%	11.0	$ 14,000	$ 90,500	80.6
61st Street	1.2	0.7	0.8	▪ Intersection lighting; ▪ Median on minor street approach	50%	7.8	$ 27,000	$ 64,500	29.8
61st Street to Deschutes Jct.	1.4	6.1	4.1	▪ Inlaid Raised Pavement Markers	93%	6.0	$ 9,000	$ 49,600	68.7
Deschutes Jct.	1.4	0.7	0.8	▪ Restripe merge	99%	0.0	$ 14,000	$ 500	0.1
Deschutes Jct. to Ft Thompson Ln	5.8	7.8	7.0	▪ Inlaid Raised Pavement Markers;	93%	10.3	$ 14,000	$ 85,200	75.8
Ft Thompson Ln	0.6	0.9	0.8	▪ None	N/A	0.0	$ -	$ -	--
Ft Thompson Ln to Bend City Limits	2.8	3.9	3.4	▪ Install speed feedback signs in transition zones; ▪ Inlaid Raised Pavement Markers	82%	12.6	$ 27,000	$ 103,800	47.9
Total	**21.6**	**36.4**	**30.1**			**68.6**	**$ 165,000**	**$ 565,000**	**42.7**

**B/C Ratios reflect a uniform series present worth factor of 12.46 for a 20-year life span. B/C Ratio = (Annual Benefits X Present Worth Factor)/(Estimated Project Cost)*
Note: All costs presented are Present Value Costs ($) over the 20-year analysis period.
***Cost estimates exclude any right-of-way impacts or costs.*

Table 18 Medium-Term Projects

Location	Annual Observed Crash Frequency	Annual Predicted Crash Frequency	Annual Expected Crash Frequency	Medium-Term Project Countermeasures	Project CMF	20-Year Crash Reduction	Preliminary 20-Yr Cost Estimate**	Expected Annual Comprehensive Crash Cost Reduction (Benefit)	Benefit / Cost Ratio
Redmond City Limits to Quarry Ln	3.2	6.5	5.1	▪ None	N/A	N/A	N/A	N/A	N/A
Quarry Ln	0.2	0.6	0.5	▪ Deceleration Lane	93%	0.7	$ 188,000	$ 5,700	0.4
Quarry Ln to 61st Street	5	9.2	7.4	▪ Segment Lighting; ▪ Increase clear zone (Reduce RHR)	85%	22.1	$ 1,413,000	$ 182,200	1.6
61st Street	1.2	0.7	0.8	▪ Acceleration Lane; ▪ Deceleration Lane	83%	2.7	$ 376,000	$ 22,400	0.7
61st Street to Deschutes Jct.	1.4	6.1	4.1	▪ Increase clear zone (Reduce RHR)	94%	4.9	$ 58,000	$ 40,000	8.6
Deschutes Jct.	1.4	0.7	0.8	▪ None	N/A	N/A	N/A	$ -	N/A
Deschutes Jct. to Ft Thompson Ln	5.8	7.8	7.0	▪ Increase clear zone (Reduce RHR)	94%	8.4	$ 58,000	$ 69,000	14.8
Ft Thompson Ln	0.6	0.9	0.8	• Intersection lighting; • Median on minor street approach	51%	8.2	$27,000	$ 67,800	31.3
Ft Thompson Ln to Bend City Limits	2.8	3.9	3.4	▪ Segment Lighting	96%	2.5	$ 466,000	$ 20,700	0.6
Total	**21.6**	**36.4**	**30.1**			**49.5**	**$ 2,586,000**	**$ 407,700**	**2.0**

**B/C Ratios reflect a uniform series present worth factor of 12.46 for a 20-year life span. B/C Ratio = (Annual Benefits X Present Worth Factor)/(Estimated Project Cost)*
Note: All costs presented are Present Value Costs ($) over the 20-year analysis period.
***Cost estimates exclude any right-of-way impacts or costs.*

Table 19 Median Alternatives and Phasing

Phase	Start and End MP	Number of U-Turns Included	Project Cost ($)**	Project Benefit ($)	B/C Ratio
Phase 1	130.181 – 132.04 (MP 132.04 to Deschutes Junction)	One	$1.5 million	$4.23 million	2.9
Phase 2	128.578 – 130.181 (Deschutes Junction to 61st Street)	One	$1.6 million	$3.00 million	1.9
Phase 3	124.40 – 128.578 (61st Street to Redmond City Limits)	Two	$3.7 million	$8.36 million	2.3
Phase 4	132.04 – 133.39 (Phase 1 Median to Bend City Limits)	Two	$2.2 million	$2.97 million	1.4

Note: All costs presented are Present Value Costs ($) over the 20-year analysis period.
Cost estimates assume a concrete barrier median type and J-turn treatment for a conservative analysis. Cost estimates exclude any right-of-way impacts or costs. More details about the cost differences among median types are provided in* ***Appendix F*.*

Based on the results of the analysis, summarized in Section 5 of this report, KAI makes the following suggestions:

- Consider implementation of Short-term projects first. They are the most cost-effective and generally do not require additional right-of-way or impact to adjacent properties.
- Consider implementing the Median projects in phases. Phases 1 and 2 could be implemented with two U-turn treatments, when funding becomes available. Phases 1 and 2 address high-crash locations while also minimizing the number of access points impacted by the median. Precede implementation of median and U-turn treatments with a public education campaign, and provide signage to educate drivers how to safely use the U-turn treatment.
- Medium-term projects are cost-effective, but require greater investment than short-term projects. They have potential to impact right-of-way, which would delay implementation.
- Pending successful implementation of Median Phases 1 and 2, Phases 3 and 4 could be implemented, when funding becomes available.

Appendix A
Historical Crash Analysis

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING
Highway 004 ALL ROAD TYPES, MP 124.4 to 133.39, Both Add and Non-Add mileage, 01/01/2009 to 12/31/2013
Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION VEHICLE (PARTICIPANT)	EVENT CRASH	EVENT VEHICLE	EVENT PARTICIPANT	CAUSE CRASH	CAUSE VEHICLE	CAUSE PARTICIPANT
01558 NO RPT	N	N	N	N	N	11/08/2013 Friday 5P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 124.46		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DARK	ANIMAL OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	48	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	035-Deer Or Elk	035-Deer Or Elk		12-Other (not Driver Err)	00-No Code	12-Other (not Driver Err)
00874 STATE	N	N	N	N	N	07/09/2013 Tuesday 9A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 124.50		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	PED PED INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	35	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)				02-Failed Yield ROW	00-No Code	00-No Code
																0	0	STRGHT E -W	1	PED	INJB	28	M		ROAD	028-No ROW	(037-Cross Between Inter)						02-Failed Yield ROW
00554 COUNTY	N	N	N	N	N	05/11/2010 Tuesday 4P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 125.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	S-1TURN TURN INJ	1	NONE 0 PRVTE PSNGR CAR	TURN-L N -E	1	DRVR	INJC	86	F	OR-Y OR<25		014-Impropr Start Fr Stop 028-No ROW	000-No Action (000-No Action)				02-Failed Yield ROW 05-Drove Wrong Side	00-No Code	02-Failed Yield ROW 05-Drove Wrong Side
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJC	40	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00835 NONE	N	N	N	N	N	06/28/2011 Tuesday 11A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 125.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	UNK UNK DAY	ANIMAL OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT UN-UN	1	DRVR	NONE	67	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	035-Deer Or Elk	035-Deer Or Elk		12-Other (not Driver Err)	00-No Code	12-Other (not Driver Err)
01554 STATE	N	Y	N	N	N	11/16/2012 Friday 11P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 125.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLD DRY DARK	S-STRGHT REAR INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJB	23	M	OR-Y OR<25		042-FailSlowForSlowVeh	000-No Action (000-No Action)	010-Subseq Overturn			07-Followed too Closely	00-No Code	07-Followed too Closely
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJB	46	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
																			2	PSNG	INJA	70	M			000-No Error	(000-No Action)						00-No Code
																			3	PSNG	INJA	73	F			000-No Error	(000-No Action)						00-No Code
01472 STATE	N	N	N	N	N	11/18/2010 Thursday 9A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 125.00		ALLEY UN 04	(NONE) (4)	N UNKNOWN	N N N	SNOW WET DAY	S-1STOP REAR INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJC	25	F	OR-Y OR<25		026-Faild Avoid Stop Veh	000-No Action (000-No Action)				27-Inattention	00-No Code	27-Inattention
																2	NONE 0 PRVTE PSNGR CAR	STOP S -N	1	DRVR	INJC	37	F	OR-Y OR<25		000-No Error	011-Stop In Traf-No Lturn (000-No Action)					00-No Code	00-No Code
																3	NONE 0 PRVTE PSNGR CAR	STOP S -N	1	DRVR	NONE	82	M	OR-Y OR<25		000-No Error	012-Stop For Left Turn (000-No Action)					00-No Code	00-No Code
01822 STATE	N	N	N	N	N	12/27/2010 Monday 5P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 125.00		STRGHT UN 05	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DUSK	S-1TURN TURN INJ	1	NONE 0 PRVTE PSNGR CAR	U-TURN S -S	1	DRVR	INJB	85	M	OR-Y OR<25		052-Careless Driving 008-Illegal U-Turn 045-Improper Lane Chng	000-No Action (000-No Action)				32-Careless Driving 08-Improper Turn	00-No Code	32-Careless Driving 08-Improper Turn
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJA	67	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
																			2	PSNG	INJA	66	M			000-No Error	(000-No Action)						00-No Code
01140 STATE	Y	Y	N	N	N	07/22/2012 Sunday 9P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 125.50		STRGHT UN 01	(NONE) (4)	N UNKNOWN	Y N N	CLR DRY DARK	FIX OBJ FIX PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	35	M	OR-Y OR<25		081-Ran Off Road	000-No Action (000-No Action)	061-Mailbox 010-Subseq Overturn	061-Mailbox 010-Subseq Overturn		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING
Highway 004 ALL ROAD TYPES, MP 124.4 to 133.39, Both Add and Non-Add mileage, 01/01/2009 to 12/31/2013
Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION VEHICLE (PARTICIPANT)	EVENT CRASH	EVENT VEHICLE	EVENT PARTICIPANT	CAUSE CRASH	CAUSE VEHICLE	CAUSE PARTICIPANT
01847 STATE	Y	N	N	N	N	12/29/2010 Wednesday 7P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 125.50		STRGHT UN 04	(NONE) (4)	N UNKNOWN	N N N	SNOW ICE DARK	S-STRGHT SS-O INJ	1	NONE 1 PRVTE SEMI TOW	STRGHT N -S	1	DRVR	NONE	30	M	OTH-Y N-RES		000-No Error	022-Struck Obj Prior Coll (000-No Action)	013-Forced By Impact			01-Too Fast For Cond	00-No Code	00-No Code
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJC	25	M	OR-Y OR<25		080-Fail To MaintainLane 039-Drive On Wrong Side	000-No Action (017-Lost Control)		124-Slide b/c of surface 013-Forced By Impact			00-No Code	01-Too Fast For Cond
																3	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJC	40	F	OR-Y OR<25		000-No Error	022-Struck Obj Prior Coll (000-No Action)					00-No Code	00-No Code
																4	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJC	45	F	OR-Y OR<25		000-No Error	022-Struck Obj Prior Coll (000-No Action)					00-No Code	00-No Code
00326 NO RPT	Y	N	N	N	N	02/26/2009 Thursday 9A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 126.00		STRGHT UN 01	(NONE) (4)	N UNKNOWN	Y N N	CLR ICE DAY	O-STRGHT SS-M PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	54	M	OR-Y OR>25		047-Violation Basic Rule 080-Fail To MaintainLane	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		01-Too Fast For Cond 05-Drove Wrong Side	00-No Code	01-Too Fast For Cond 05-Drove Wrong Side
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -UN	1	DRVR	NONE	29	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01358 COUNTY	N	N	N	N	N	10/02/2013 Wednesday 8A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 126.00		STRGHT UN 01	(NONE) (4)	N UNKNOWN	Y N N	CLR DRY DAY	FIX OBJ FIX PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	50	F	OR-Y OR<25		081-Ran Off Road	000-No Action (028-Physical Illness)	061-Mailbox	061-Mailbox		16-Driver sleepy	00-No Code	16-Driver sleepy
01684 COUNTY	Y	N	N	N	N	12/02/2013 Monday 8A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 126.00		STRGHT UN 01	(NONE) (4)	N UNKNOWN	Y N N	RAIN WET DAY	OVERTURN NCOL INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJC	45	F	OR-Y OR<25		081-Ran Off Road	000-No Action (000-No Action)	124-Slide b/c of surface 079-Cut Slope/Ditch	124-Slide b/c of surface 079-Cut Slope/Ditch		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
01435 NONE	N	N	N	N	N	11/11/2010 Thursday 5P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 126.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DUSK	S-1STOP REAR PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	36	F	OR-Y OR<25		026-Faild Avoid Stop Veh	000-No Action (000-No Action)				07-Followed too Closely	00-No Code	07-Followed too Closely
																			2	PSNG	NO<5	1	M			000-No Error	(000-No Action)						00-No Code
																			3	PSNG	NO<5	1	F			000-No Error	(000-No Action)						00-No Code
																2	NONE 0 PRVTE PSNGR CAR	STOP S -N	1	DRVR	NONE	41	F	OR-Y OR<25		000-No Error	011-Stop In Traf-No Lturn (000-No Action)					00-No Code	00-No Code
01521 STATE	Y	N	N	N	N	10/18/2013 Friday 7P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 126.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	Y N N	CLR DRY DARK	PRKD MV REAR INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	21	M	OR-Y OR<25		051-Reckless Driving 081-Ran Off Road 031-Passing Wrong Side	000-No Action (000-No Action)	092-Phantom Vehicle	092-Phantom Vehicle		33-Reckless Driving 31-Speed Racing 06-Improper Overtaking	00-No Code	33-Reckless Driving 31-Speed Racing 06-Improper Overtaking
																2	NONE 0 PRVTE PSNGR CAR	PRKD-P S -N	1	PRKD	INJC	42	M			000-No Error	008-Parallel Parking (000-No Action)					00-No Code	00-No Code
00170 STATE	N	Y	N	N	N	02/11/2010 Thursday 12A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 126.00		STRGHT UN 08	(NONE) (4)	N UNKNOWN	Y N N	CLD DRY DARK	FIX OBJ FIX INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJC	26	F	OR-Y OR<25		051-Reckless Driving 080-Fail To MaintainLane 081-Ran Off Road	000-No Action (000-No Action)	088-Fence/Building	088-Fence/Building		33-Reckless Driving 05-Drove Wrong Side	00-No Code	33-Reckless Driving 05-Drove Wrong Side
																			2	PSNG	INJC	19	F			000-No Error	(000-No Action)						00-No Code

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING
Highway 004 ALL ROAD TYPES, MP 124.4 to 133.39, Both Add and Non-Add mileage, 01/01/2009 to 12/31/2013
Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION	EVENT			CAUSE		
																											VEHICLE (PARTICIPANT)	CRASH	VEHICLE	PARTICIPANT	CRASH	VEHICLE	PARTICIPANT
00113 COUNTY	Y	N	N	N	N	01/25/2009 Sunday 12P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 126.00		STRGHT S 05	(NONE) (4)	N NONE	Y N N	SNOW ICE DAY	S-STRGHT OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	17	M	OR-Y OR<25		047-Violation Basic Rule 080-Fail To MaintainLane	000-No Action (017-Lost Control)	124-Slide b/c of surface	124-Slide b/c of surface		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	25	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01509 COUNTY	N	Y	N	N	N	11/11/2012 Sunday 6P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 126.20		INTER UN 05	3-LEG () 0 ()	N STOP SIGN	Y N N	CLD DRY DUSK	FIX OBJ FIX PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT W -E	1	DRVR	NONE	46	F	OR-Y OR<25		081-Ran Off Road	000-No Action (000-No Action)	088-Fence/Building	088-Fence/Building		03-Passed Stop Sign	00-No Code	03-Passed Stop Sign
00300 COUNTY	Y	N	N	N	N	03/08/2013 Friday 6A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 126.30		STRGHT UN 04	(NONE) (4)	N UNKNOWN	N N N	SNOW ICE DAY	O-STRGHT SS-M PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	44	M	OR-Y OR<25		081-Ran Off Road	000-No Action (000-No Action)	124-Slide b/c of surface 093-Cellphone-Police	124-Slide b/c of surface	093-Cellphone-Police	01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	48	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00986 COUNTY	N	N	N	N	N	08/17/2010 Tuesday 8P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 126.33		STRGHT S 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	S-1STOP REAR INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJB	19	F	OR-Y OR<25		052-Careless Driving 042-FailSlowForSlowVeh	000-No Action (000-No Action)				32-Careless Driving	00-No Code	32-Careless Driving
																2	NONE 1 PRVTE SEMI TOW	STRGHT N -S	1	DRVR	NONE	61	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00387 COUNTY	N	N	N	N	N	03/27/2010 Saturday 8P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 126.60		STRGHT UN 03	(NONE) (4)	N NONE	N N N	CLR DRY DUSK	S-STRGHT REAR INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	62	M	OR-Y OR<25		042-FailSlowForSlowVeh	000-No Action (000-No Action)				07-Followed too Closely	00-No Code	07-Followed too Closely
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	75	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
																			2	PSNG	INJC	20	F			000-No Error	(000-No Action)						00-No Code
01304 STATE	Y	N	N	N	N	09/27/2011 Tuesday 9P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 126.70		STRGHT UN 03	(NONE) (4)	N NONE	N N N	CLR DRY DARK	S-1STOP REAR PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	32	F	OR-Y OR<25		052-Careless Driving 042-FailSlowForSlowVeh 080-Fail To MaintainLane	000-No Action (000-No Action)	010-Subseq Overturn 087-Fire/Explosion	087-Fire/Explosion		32-Careless Driving 30-Speeding 27-Inattention	00-No Code	32-Careless Driving 30-Speeding 27-Inattention
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	49	F	SUSP OR<25		000-No Error	000-No Action (000-No Action)		010-Subseq Overturn			00-No Code	00-No Code
00912 NO RPT	N	N	N	N	N	02/26/2009 Thursday 5A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 126.82		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	SNOW ICE DARK	O-STRGHT SS-M PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	39	M	OR-Y OR<25		080-Fail To MaintainLane	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		05-Drove Wrong Side	00-No Code	05-Drove Wrong Side
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	39	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01636 COUNTY	Y	N	N	N	N	12/04/2010 Saturday 10P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 127.00		STRGHT UN 01	(DIVMD) (4)	N UNKNOWN	Y N N	SNOW ICE DARK	FIX OBJ FIX PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	30	M	OR-Y OR<25		080-Fail To MaintainLane 081-Ran Off Road	000-No Action (017-Lost Control)	124-Slide b/c of surface 079-Cut Slope/Ditch 010-Subseq Overturn	124-Slide b/c of surface 079-Cut Slope/Ditch 010-Subseq Overturn		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING
Highway 004 ALL ROAD TYPES, MP 124.4 to 133.39, Both Add and Non-Add mileage, 01/01/2009 to 12/31/2013
Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION VEHICLE (PARTICIPANT)	EVENT CRASH	EVENT VEHICLE	EVENT PARTICIPANT	CAUSE CRASH	CAUSE VEHICLE	CAUSE PARTICIPANT
00298 NO RPT	Y	N	N	N	N	02/27/2012 Monday 10A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 127.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR ICE DAY	S-STRGHT REAR INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	56	F	OR-Y OR<25		042-FailSlowForSlowVeh	000-No Action (000-No Action)	124-Slide b/c of surface 013-Forced By Impact	124-Slide b/c of surface		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJC	49	F	OR-Y OR<25		000-No Error	022-Struck Obj Prior Coll (000-No Action)		013-Forced By Impact			00-No Code	00-No Code
																3	NONE 0 PUBLC PSNGR CAR	STOP N -S	1	DRVR	NONE	0	UNK	UNK UNK		000-No Error	011-Stop In Traf-No Lturn (000-No Action)					00-No Code	00-No Code
00001 STATE	Y	N	N	N	N	01/02/2009 Friday 7A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 127.00		STRGHT UN 04	(NONE) (4)	N UNKNOWN	N N N	CLD ICE DAY	O-STRGHT SS-M FAT	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	KILL	16	F	OR-Y OR<25		047-Violation Basic Rule 080-Fail To MaintainLane	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		01-Too Fast For Cond 05-Drove Wrong Side 07-Followed too Closely	00-No Code	01-Too Fast For Cond 05-Drove Wrong Side
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJB	33	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)		124-Slide b/c of surface			00-No Code	00-No Code
																3	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJC	46	M	OR-Y OR<25		026-Faild Avoid Stop Veh	000-No Action (000-No Action)		124-Slide b/c of surface			00-No Code	07-Followed too Closely
01769 STATE	N	N	N	N	N	12/19/2010 Sunday 2P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 127.00		STRGHT UN 05	(NONE) (4)	N UNKNOWN	N N N	SNOW SNO DAY	S-STRGHT REAR PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	25	M	OR-Y OR>25		042-FailSlowForSlowVeh 043-Following Too Close	000-No Action (000-No Action)	089-Refer Other Crash			07-Followed too Closely	00-No Code	07-Followed too Closely
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	41	M	OR-Y OR>25		000-No Error	006-Slowed Down (000-No Action)					00-No Code	00-No Code
01485 CITY	Y	Y	N	N	N	10/26/2013 Saturday 1A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 127.00		STRGHT UN 06	(NONE) (4)	N UNKNOWN	Y N N	CLR DRY DARK	OVERTURN NCOL INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJB	23	M	OR-Y OR<25		081-Ran Off Road	000-No Action (000-No Action)				01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
00127 COUNTY	N	N	N	N	N	01/17/2009 Saturday 12A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 127.00		STRGHT N 05	(NONE) (4)	N UNKNOWN	N N N	FOG DRY DARK	S-STRGHT REAR PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	20	M	OR-Y OR<25		052-Careless Driving	000-No Action (025-Driver Sleepy/Asleep)				32-Careless Driving 16-Driver sleepy	00-No Code	32-Careless Driving 16-Driver sleepy
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	61	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01417 NONE	N	N	N	N	N	11/08/2010 Monday 9A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 127.20		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	ANIMAL OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	35	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	035-Deer Or Elk	035-Deer Or Elk		12-Other (not Driver Err)	00-No Code	12-Other (not Driver Err)
01870 STATE	Y	N	N	N	N	12/30/2010 Thursday 2A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 127.30		STRGHT UN 08	(NONE) (4)	N UNKNOWN	Y N N	SNOW ICE DARK	FIX OBJ FIX PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	21	M	OR-Y OR<25		080-Fail To MaintainLane 081-Ran Off Road	000-No Action (017-Lost Control)	124-Slide b/c of surface 079-Cut Slope/Ditch 010-Subseq Overturn	124-Slide b/c of surface 079-Cut Slope/Ditch 010-Subseq Overturn		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
00723 NONE	N	N	N	N	N	06/10/2013 Monday 12P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 127.31		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	S-STRGHT REAR PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	58	M	OR-Y OR<25		042-FailSlowForSlowVeh	000-No Action (000-No Action)				16-Driver sleepy	00-No Code	16-Driver sleepy
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	37	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING
Highway 004 ALL ROAD TYPES, MP 124.4 to 133.39, Both Add and Non-Add mileage, 01/01/2009 to 12/31/2013
Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION VEHICLE (PARTICIPANT)	EVENT CRASH	EVENT VEHICLE	EVENT PARTICIPANT	CAUSE CRASH	CAUSE VEHICLE	CAUSE PARTICIPANT
00261 NO RPT	Y	N	N	N	N	02/23/2011 Wednesday 9P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 127.49		STRGHT UN 04	(NONE) (4)	N UNKNOWN	N N N	CLR ICE DARK	O-STRGHT HEAD PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	58	M	OTH-Y N-RES		080-Fail To MaintainLane 047-Violation Basic Rule	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		05-Drove Wrong Side 01-Too Fast For Cond	00-No Code	05-Drove Wrong Side 01-Too Fast For Cond
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	36	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01457 COUNTY	Y	N	N	N	N	10/30/2011 Sunday 5A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.00		STRGHT UN 01	(NONE) (4)	N UNKNOWN	Y N N	CLR DRY DARK	PRKD MV REAR INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJB	20	F	OR-Y OR<25		050-Excessive Speed 080-Fail To MaintainLane 026-Faild Avoid Stop Veh	000-No Action (025-Driver Sleepy/Asleep)				16-Driver sleepy 30-Speeding	00-No Code	16-Driver sleepy 30-Speeding
																2	NONE 0 PRVTE PSNGR CAR	PRKD-P N -S	0														
01715 COUNTY	Y	N	N	N	N	12/16/2012 Sunday 9A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.00		STRGHT UN 01	(NONE) (4)	N UNKNOWN	Y N N	CLD ICE DAY	FIX OBJ FIX INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJC	28	F	OTH-Y N-RES		081-Ran Off Road	000-No Action (000-No Action)	124-Slide b/c of surface 088-Fence/Building 062-Tree/Stump	124-Slide b/c of surface 088-Fence/Building 062-Tree/Stump		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
01768 STATE	N	N	N	N	N	12/19/2010 Sunday 11A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLD SNO DAY	S-STRGHT SS-O PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	47	F	OR-Y OR>25		080-Fail To MaintainLane	000-No Action (017-Lost Control)	124-Slide b/c of surface	124-Slide b/c of surface		10-Other Driver Error	00-No Code	10-Other Driver Error
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	45	M	OR-Y OR<25		000-No Error	022-Struck Obj Prior Coll (000-No Action)					00-No Code	00-No Code
00534 STATE	N	N	N	N	N	04/20/2011 Wednesday 5A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAWN	ANGL-OTH TURN INJ	1	NONE 0 PRVTE MTRCYCLE	TURN-R E -N	1	DRVR	INJA	60	M	OR-Y OR<25		028-No ROW	032-Parked Off Roadway (000-No Action)	001-Fell/Jumped frm Veh 013-Forced By Impact 010-Subseq Overturn	013-Forced By Impact	001-Fell/Jumped frm Veh	02-Failed Yield ROW	00-No Code	02-Failed Yield ROW
																2	NONE 1 PRVTE SEMI TOW	STRGHT S -N	1	DRVR	NONE	46	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
																3	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	33	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)		010-Subseq Overturn			00-No Code	00-No Code
01821 STATE	Y	N	N	N	N	12/26/2012 Wednesday 8A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.00		STRGHT UN 05	(NONE) (4)	N UNKNOWN	N N N	CLD ICE DAY	O-STRGHT SS-M PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	42	F	OR-Y OR<25		047-Violation Basic Rule 080-Fail To MaintainLane	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		01-Too Fast For Cond 05-Drove Wrong Side	00-No Code	01-Too Fast For Cond 05-Drove Wrong Side
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	55	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00792 COUNTY	N	N	N	N	N	06/27/2009 Saturday 11A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.00		STRGHT UN 06	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	S-1STOP REAR PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	26	F	OR-Y OR<25		026-Faild Avoid Stop Veh	000-No Action (000-No Action)				07-Followed too Closely	00-No Code	07-Followed too Closely
																2	NONE 0 PRVTE PSNGR CAR	STOP S -N	1	DRVR	NONE	88	M	OR-Y OR<25		000-No Error	011-Stop In Traf-No Lturn (000-No Action)					00-No Code	00-No Code
00249 COUNTY	Y	N	N	N	N	02/17/2009 Tuesday 6A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.08		STRGHT UN 01	(NONE) (4)	N UNKNOWN	Y N N	SNOW ICE DAWN	FIX OBJ FIX PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	36	M	OR-Y OR<25		047-Violation Basic Rule 081-Ran Off Road	000-No Action (000-No Action)	124-Slide b/c of surface 010-Subseq Overturn 088-Fence/Building	124-Slide b/c of surface 010-Subseq Overturn 088-Fence/Building		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING
Highway 004 ALL ROAD TYPES, MP 124.4 to 133.39, Both Add and Non-Add mileage, 01/01/2009 to 12/31/2013
Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION VEHICLE (PARTICIPANT)	EVENT CRASH	EVENT VEHICLE	EVENT PARTICIPANT	CAUSE CRASH	CAUSE VEHICLE	CAUSE PARTICIPANT
00882 COUNTY	N	N	N	N	N	07/07/2011 Thursday 1P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.33		STRGHT UN 03	(NONE) (4)	N NONE	N N N	CLR DRY DAY	S-1STOP REAR PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	39	F	OR-Y OR>25		026-Faild Avoid Stop Veh	000-No Action (000-No Action)	013-Forced By Impact			07-Followed too Closely	00-No Code	07-Followed too Closely
																2	NONE 0 PRVTE PSNGR CAR	STOP N -S	1	DRVR	NONE	66	M	OTH-Y N-RES		000-No Error	011-Stop In Traf-No Lturn (000-No Action)		013-Forced By Impact			00-No Code	00-No Code
																3	NONE 0 PRVTE PSNGR CAR	STOP N -S	1	DRVR	NONE	31	F	OR-Y OR<25		000-No Error	011-Stop In Traf-No Lturn (000-No Action)					00-No Code	00-No Code
00609 COUNTY	N	N	N	N	N	05/18/2013 Saturday 10A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.48		STRGHT UN 04	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	O-1TURN TURN INJ	1	NONE 0 PRVTE PSNGR CAR	TURN-L S -W	1	DRVR	NONE	79	M	OR-Y OR<25		052-Careless Driving 004-LT In Front OfOncmg	000-No Action (000-No Action)				32-Careless Driving	00-No Code	32-Careless Driving
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJB	33	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00352 STATE	Y	N	N	N	N	03/22/2013 Friday 5A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.50		STRGHT UN 01	(NONE) (4)	N UNKNOWN	Y N N	SNOW ICE DARK	FIX OBJ FIX INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJB	43	F	OR-Y OR<25		081-Ran Off Road	000-No Action (000-No Action)	079-Cut Slope/Ditch 010-Subseq Overturn	079-Cut Slope/Ditch 010-Subseq Overturn		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
00905 STATE	N	N	N	N	N	07/12/2010 Monday 12A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.54		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DARK	ANIMAL OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	46	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	035-Deer Or Elk	035-Deer Or Elk		12-Other (not Driver Err)	00-No Code	12-Other (not Driver Err)
00485 COUNTY	Y	N	N	N	N	04/04/2012 Wednesday UNK	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.54		STRGHT N 07	(NONE) (4)	N UNKNOWN	Y N N	CLD ICE DARK	OVERTURN NCOL INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJC	42	M	OR-Y OR<25		080-Fail To MaintainLane	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
00790 NO RPT	Y	N	N	N	N	06/10/2011 Friday 4P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.56		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	S-STRGHT REAR PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	0	M	UNK UNK		042-FailSlowForSlowVeh	000-No Action (000-No Action)				01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	36	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00098 NONE	N	N	N	N	N	01/21/2010 Thursday 12P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.58		STRGHT UN 04	(NONE) (2)	N UNKNOWN	N N N	CLR DRY DAY	O-STRGHT SS-M INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	55	M	OR-Y OR<25		080-Fail To MaintainLane	000-No Action (000-No Action)				05-Drove Wrong Side	00-No Code	05-Drove Wrong Side
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJC	25	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
																			2	PSNG	INJC	30	F			000-No Error	(000-No Action)						00-No Code

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING
Highway 004 ALL ROAD TYPES, MP 124.4 to 133.39, Both Add and Non-Add mileage, 01/01/2009 to 12/31/2013
Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION VEHICLE (PARTICIPANT)	EVENT CRASH	EVENT VEHICLE	EVENT PARTICIPANT	CAUSE CRASH	CAUSE VEHICLE	CAUSE PARTICIPANT
00711 COUNTY	N	N	N	N	N	06/13/2010 Sunday 5P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.58		INTER CN 03	CROSS () 0 ()	N STOP SIGN	N N N	CLR DRY DAY	ANGL-OTH TURN INJ	1	NONE 0 PRVTE PSNGR CAR	TURN-L W -N	1	DRVR	NONE	75	M	OR-Y OR<25		021-Disrg Stop Sign	000-No Action (000-No Action)				03-Passed Stop Sign	00-No Code	03-Passed Stop Sign
																			2	PSNG	INJC	73	M			000-No Error	(000-No Action)						00-No Code
																			3	PSNG	INJC	59	M			000-No Error	(000-No Action)						00-No Code
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	24	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00736 NO RPT	N	N	N	N	N	06/07/2009 Sunday 2P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 128.62		STRGHT UN 04	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	OTH OBJ OTH PDO	1	NONE 1 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	72	M	OTH-Y N-RES		000-No Error	000-No Action (000-No Action)	025-Wheel Came Off	025-Wheel Came Off		25-Tire Failure	25-Tire Failure	00-No Code
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	39	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01186 STATE	N	N	N	N	N	09/24/2010 Friday 7P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 129.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	ANIMAL OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	26	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	035-Deer Or Elk	035-Deer Or Elk		12-Other (not Driver Err)	00-No Code	12-Other (not Driver Err)
01067 STATE	N	Y	Y	N	N	07/24/2013 Wednesday 6A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 129.00		STRGHT UN 03	(NONE) (4)	N NONE	N N N	CLR DRY DAY	O-1TURN TURN INJ	1	NONE 0 PRVTE PSNGR CAR	U-TURN N -N	1	DRVR	INJB	21	M	OR-Y OR<25		008-Illegal U-Turn	000-No Action (000-No Action)				08-Improper Turn	00-No Code	08-Improper Turn
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJB	23	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00370 COUNTY	Y	N	N	N	N	03/29/2010 Monday 10A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 129.08		STRGHT UN 01	(NONE) (4)	N UNKNOWN	Y N N	CLD WET DAY	OVERTURN NCOL PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	27	M	OR-Y OR<25		081-Ran Off Road 047-Violation Basic Rule	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
00400 COUNTY	Y	N	N	N	N	03/31/2010 Wednesday 11P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 129.18		STRGHT UN 01	(NONE) (4)	N UNKNOWN	Y N N	CLD ICE DARK	FIX OBJ FIX PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	48	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	124-Slide b/c of surface 061-Mailbox	124-Slide b/c of surface 061-Mailbox		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
00432 NO RPT	Y	N	N	N	N	03/22/2012 Thursday 5A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 129.68		STRGHT UN 04	(NONE) (4)	N UNKNOWN	N N N	CLR ICE DARK	O-STRGHT SS-M PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	28	M	OR-Y OR<25		080-Fail To MaintainLane	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		05-Drove Wrong Side 01-Too Fast For Cond	00-No Code	05-Drove Wrong Side 01-Too Fast For Cond
																2	NONE 1 PRVTE SEMI TOW	STRGHT S -N	1	DRVR	NONE	0	UNK	UNK UNK		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00417 STATE	N	N	N	N	N	03/30/2011 Wednesday 8P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DUSK	S-STRGHT REAR INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	26	M	OR-Y OR<25		042-FailSlowForSlowVeh	000-No Action (000-No Action)				27-Inattention	00-No Code	27-Inattention
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJC	39	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING
Highway 004 ALL ROAD TYPES, MP 124.4 to 133.39, Both Add and Non-Add mileage, 01/01/2009 to 12/31/2013
Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION VEHICLE (PARTICIPANT)	EVENT CRASH	EVENT VEHICLE	EVENT PARTICIPANT	CAUSE CRASH	CAUSE VEHICLE	CAUSE PARTICIPANT
00658 STATE	Y	N	N	N	N	05/29/2013 Wednesday 8A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	S-1STOP REAR PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	47	M	OR-Y OR<25		026-Faild Avoid Stop Veh	000-No Action (000-No Action)				01-Too Fast For Cond 07-Followed too Closely	00-No Code	01-Too Fast For Cond 07-Followed too Closely
																2	NONE 0 PRVTE PSNGR CAR	STOP N -S	1	DRVR	NONE	27	F	OR-Y OR<25		000-No Error	011-Stop In Traf-No Lturn (000-No Action)					00-No Code	00-No Code
01086 NO RPT	N	N	N	N	N	08/12/2011 Friday 9P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.17		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DARK	ANIMAL OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	31	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	035-Deer Or Elk	035-Deer Or Elk		12-Other (not Driver Err)	00-No Code	12-Other (not Driver Err)
																			2	PSNG	NO<5	3	F			000-No Error	(000-No Action)						00-No Code
01481 STATE	Y	N	N	N	N	11/20/2010 Saturday 1P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.17		INTER E 05	CROSS () 0 ()	N UNKNOWN	N N N	CLR DRY DAY	ANGL-OTH TURN INJ	1	NONE 0 PRVTE PSNGR CAR	TURN-R S -E	1	DRVR	INJC	29	M	OR-Y OR<25		051-Reckless Driving 080-Fail To MaintainLane	000-No Action (000-No Action)				33-Reckless Driving 05-Drove Wrong Side 01-Too Fast For Cond	00-No Code	33-Reckless Driving 05-Drove Wrong Side 01-Too Fast For Cond
																2	NONE 0 PRVTE PSNGR CAR	STOP E -W	1	DRVR	INJB	56	M	OR-Y OR<25		000-No Error	011-Stop In Traf-No Lturn (000-No Action)					00-No Code	00-No Code
00521 COUNTY	N	N	Y	N	N	04/25/2011 Monday 9A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.18		INTER UN 06	CROSS () 0 ()	N UNKNOWN	N N N	CLD SNO DAY	O-STRGHT HEAD INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJB	21	F	OR-Y OR<25		080-Fail To MaintainLane 039-Drive On Wrong Side	000-No Action (000-No Action)	013-Forced By Impact			16-Driver sleepy 05-Drove Wrong Side	00-No Code	16-Driver sleepy 05-Drove Wrong Side
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJA	36	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)		013-Forced By Impact			00-No Code	00-No Code
																3	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJB	43	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01288 COUNTY	N	Y	N	N	N	10/01/2010 Friday 5P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.18		INTER N 05	CROSS () 0 ()	N NONE	N N N	CLR DRY DAY	S-STRGHT SS-O INJ	1	NONE 0 PRVTE MTRCYCLE	STRGHT S -N	1	DRVR	INJB	57	M	OR-Y OR<25		031-Passing Wrong Side	000-No Action (000-No Action)				06-Improper Overtaking	00-No Code	06-Improper Overtaking
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	0	UNK	UNK UNK		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00304 STATE	Y	N	N	N	N	02/26/2009 Thursday 6A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.18		INTER CN 02	3-LEG () 2 ()	N STOP SIGN	N N N	SNOW ICE DAWN	ANGL-OTH TURN INJ	1	NONE 0 PRVTE PSNGR CAR	TURN-R E -N	1	DRVR	INJC	53	F	OR-Y OR<25		047-Violation Basic Rule 080-Fail To MaintainLane	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	46	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01865 COUNTY	Y	N	N	N	N	12/30/2010 Thursday 1P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.19		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	S-1STOP REAR PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	39	F	OR-Y OR<25		026-Faild Avoid Stop Veh	001-Skidded (000-No Action)	089-Refer Other Crash 079-Cut Slope/Ditch			01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
																2	NONE 0 PRVTE PSNGR CAR	STOP N -S	1	DRVR	NONE	47	M	OR-Y OR<25		000-No Error	011-Stop In Traf-No Lturn (000-No Action)					00-No Code	00-No Code
00753 NO RPT	N	N	N	N	N	06/11/2011 Saturday UNK	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.23		STRGHT S 03	(RSDMD) (4)	N UNKNOWN	N N N	CLR DRY DARK	ANIMAL OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	23	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	035-Deer Or Elk	035-Deer Or Elk		12-Other (not Driver Err)	00-No Code	12-Other (not Driver Err)

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING
Highway 004 ALL ROAD TYPES, MP 124.4 to 133.39, Both Add and Non-Add mileage, 01/01/2009 to 12/31/2013
Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION VEHICLE (PARTICIPANT)	EVENT CRASH	EVENT VEHICLE	EVENT PARTICIPANT	CAUSE CRASH	CAUSE VEHICLE	CAUSE PARTICIPANT
00317 COUNTY	Y	N	N	N	N	02/29/2012 Wednesday 7A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.38		STRGHT UN 01	 (NONE) (4)	N UNKNOWN	Y N N	CLD SNO DAY	FIX OBJ FIX INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJC	26	M	OR-Y OR<25		081-Ran Off Road	000-No Action (000-No Action)	124-Slide b/c of surface 045-Wall	124-Slide b/c of surface 045-Wall		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
00418 STATE	N	N	N	N	N	03/30/2011 Wednesday 7P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.38		STRGHT UN 04	 (NONE) (4)	N UNKNOWN	N N N	CLD DRY DARK	O-STRGHT SS-M INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJB	17	M	OR-Y OR<25		080-Fail To MaintainLane	000-No Action (028-Physical Illness)				05-Drove Wrong Side 16-Driver sleepy	00-No Code	16-Driver sleepy
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJC	47	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00323 COUNTY	Y	N	N	N	N	02/29/2012 Wednesday 7A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.40		STRGHT UN 04	 (NONE) (4)	N UNKNOWN	N N N	SNOW ICE DAY	O-STRGHT SS-M INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	35	F	OR-Y OR<25		080-Fail To MaintainLane	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		01-Too Fast For Cond 05-Drove Wrong Side	00-No Code	01-Too Fast For Cond 05-Drove Wrong Side
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJC	32	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00097 STATE	Y	N	N	N	N	01/20/2011 Thursday 3P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.48		STRGHT UN 07	 (NONE) (4)	N UNKNOWN	Y N N	CLR DRY DAY	FIX OBJ FIX INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJA	78	M	OR-Y OR<25		081-Ran Off Road	000-No Action (000-No Action)	088-Fence/Building 079-Cut Slope/Ditch 096-Berm	088-Fence/Building 079-Cut Slope/Ditch 096-Berm		16-Driver sleepy 01-Too Fast For Cond	00-No Code	16-Driver sleepy 01-Too Fast For Cond
01323 COUNTY	N	Y	N	N	N	10/21/2010 Thursday 7P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.50		STRGHT UN 00	 (NONE) (4)	N UNKNOWN	N N N	CLR DRY DARK	S-STRGHT SS-O INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	56	M	OR-Y OR<25		045-Improper Lane Chng	000-No Action (000-No Action)				06-Improper Overtaking	00-No Code	06-Improper Overtaking
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJC	56	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00318 COUNTY	Y	N	N	N	N	02/29/2012 Wednesday 5A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.68		STRGHT UN 07	 (NONE) (4)	N NONE	Y N N	CLD ICE DARK	OVERTURN NCOL PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	42	M	OR-Y OR<25		081-Ran Off Road 080-Fail To MaintainLane	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
01746 STATE	N	N	N	N	N	12/25/2009 Friday 9P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 130.98		STRGHT UN 06	 (NONE) 0 (4)	N UNKNOWN	Y N N	FOG ICE DARK	OVERTURN NCOL PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	23	M	OR-Y OR<25		080-Fail To MaintainLane	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		10-Other Driver Error	00-No Code	10-Other Driver Error
01875 COUNTY	Y	N	N	N	N	12/30/2010 Thursday 5A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 131.00		STRGHT UN 01	 (NONE) (4)	N UNKNOWN	Y N N	CLD ICE DARK	FIX OBJ FIX INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJA	17	F	OR-Y OR<25		080-Fail To MaintainLane 081-Ran Off Road	000-No Action (017-Lost Control)	124-Slide b/c of surface 079-Cut Slope/Ditch 010-Subseq Overturn	124-Slide b/c of surface 079-Cut Slope/Ditch 010-Subseq Overturn		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
01928 COUNTY	N	N	N	N	N	11/24/2009 Tuesday 2P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 131.00		STRGHT UN 03	 (NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	O-STRGHT SS-M FAT	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJB	47	M	OR-Y OR<25		080-Fail To MaintainLane	000-No Action (000-No Action)	010-Subseq Overturn	010-Subseq Overturn		05-Drove Wrong Side	00-No Code	05-Drove Wrong Side
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJC	74	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)		010-Subseq Overturn			00-No Code	00-No Code
																3	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	KILL	69	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)		010-Subseq Overturn			00-No Code	00-No Code

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING
Highway 004 ALL ROAD TYPES, MP 124.4 to 133.39, Both Add and Non-Add mileage, 01/01/2009 to 12/31/2013
Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION VEHICLE (PARTICIPANT)	EVENT CRASH	EVENT VEHICLE	EVENT PARTICIPANT	CAUSE CRASH	CAUSE VEHICLE	CAUSE PARTICIPANT
01435 NO RPT	N	N	N	N	N	10/05/2009 Monday 12P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 131.00		STRGHT UN 03	(NONE) (2)	N UNKNOWN	N N N	CLR DRY DAY	S-1STOP REAR PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	55	F	OR-Y OR<25		026-Faild Avoid Stop Veh	000-No Action (000-No Action)				07-Followed too Closely	00-No Code	07-Followed too Closely
																2	NONE 0 PRVTE PSNGR CAR	STOP N -S	1	DRVR	NONE	0	F	OTH-Y N-RES		000-No Error	011-Stop In Traf-No Lturn (000-No Action)					00-No Code	00-No Code
00420 STATE	N	N	N	N	N	03/30/2011 Wednesday 8P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 131.00		STRGHT UN 03	(NONE) (2)	N UNKNOWN	N N N	CLR DRY DUSK	S-1STOP REAR PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	52	F	OR-Y OR<25		026-Faild Avoid Stop Veh	000-No Action (000-No Action)				07-Followed too Closely	00-No Code	07-Followed too Closely
																2	NONE 0 PRVTE PSNGR CAR	STOP S -N	1	DRVR	NONE	59	M	OR-Y OR<25		000-No Error	011-Stop In Traf-No Lturn (000-No Action)					00-No Code	00-No Code
00607 COUNTY	N	N	Y	N	N	05/07/2012 Monday 10A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 131.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	S-STRGHT REAR PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	53	M	OR-Y OR<25		042-FailSlowForSlowVeh	000-No Action (000-No Action)				07-Followed too Closely	00-No Code	07-Followed too Closely
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	22	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01221 NO RPT	N	N	N	N	N	09/28/2009 Monday 7P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 131.18		STRGHT UN 06	(NONE) 0 (4)	N UNKNOWN	N N N	CLR DRY DUSK	ANIMAL OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	75	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	035-Deer Or Elk	035-Deer Or Elk		12-Other (not Driver Err)	00-No Code	12-Other (not Driver Err)
00292 NONE	N	N	N	N	N	03/01/2010 Monday 7P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 131.21		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DARK	S-STRGHT SS-O PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	0	M	OR-Y OR<25		045-Improper Lane Chng	000-No Action (000-No Action)				06-Improper Overtaking	00-No Code	06-Improper Overtaking
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	28	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01254 STATE	Y	N	N	N	N	09/20/2012 Thursday 8P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 131.31		STRGHT UN 05	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DARK	S-STRGHT REAR INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJC	44	F	OTH-Y N-RES		047-Violation Basic Rule 042-FailSlowForSlowVeh	001-Skidded (000-No Action)	010-Subseq Overturn	010-Subseq Overturn		01-Too Fast For Cond 07-Followed too Closely	00-No Code	01-Too Fast For Cond 07-Followed too Closely
																			2	PSNG	INJB	34	F			000-No Error	(000-No Action)						00-No Code
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJA	19	M	OR-Y OR<25		047-Violation Basic Rule 043-Following Too Close	006-Slowed Down (000-No Action)					00-No Code	01-Too Fast For Cond 07-Followed too Closely
00294 COUNTY	Y	N	N	N	N	02/27/2012 Monday 11A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 131.50		STRGHT UN 04	(NONE) (4)	N UNKNOWN	N N N	SNOW ICE DAY	O-STRGHT SS-M INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJC	38	M	OR-Y OR<25		080-Fail To MaintainLane	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		05-Drove Wrong Side 01-Too Fast For Cond	00-No Code	05-Drove Wrong Side 01-Too Fast For Cond
																1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	PSNG	INJC	50	F			000-No Error	000-No Action (000-No Action)		124-Slide b/c of surface			00-No Code	00-No Code
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	55	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
																			2	PSNG	NONE	44	F			000-No Error	(000-No Action)						00-No Code

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING
Highway 004 ALL ROAD TYPES, MP 124.4 to 133.39, Both Add and Non-Add mileage, 01/01/2009 to 12/31/2013
Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION VEHICLE (PARTICIPANT)	EVENT CRASH	EVENT VEHICLE	EVENT PARTICIPANT	CAUSE CRASH	CAUSE VEHICLE	CAUSE PARTICIPANT
00236 COUNTY	Y	N	N	N	N	02/19/2011 Saturday 9A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 132.00		STRGHT UN 01	(NONE) (4)	N UNKNOWN	Y N N	SNOW ICE DAY	OVERTURN NCOL INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJB	24	M	OR-Y OR<25		081-Ran Off Road	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
00422 STATE	Y	N	N	N	N	04/20/2010 Tuesday 6P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 132.00		STRGHT UN 03	(NONE) 0 (4)	N UNKNOWN	N N N	RAIN WET DAY	S-1STOP REAR PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	27	F	OR-Y OR<25		026-Faild Avoid Stop Veh 052-Careless Driving 047-Violation Basic Rule	000-No Action (025-Driver Sleepy/Asleep)				16-Driver sleepy 32-Careless Driving 01-Too Fast For Cond	00-No Code	16-Driver sleepy 32-Careless Driving 01-Too Fast For Cond
																2	NONE 0 PRVTE PSNGR CAR	STOP N -S	1	DRVR	NONE	25	M	OR-Y OR<25		000-No Error	011-Stop In Traf-No Lturn (000-No Action)					00-No Code	00-No Code
00233 COUNTY	Y	N	N	N	N	02/19/2011 Saturday 12P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 132.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	SNOW SNO DAY	S-STRGHT SS-O PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	25	F	OR-Y OR<25		080-Fail To MaintainLane 081-Ran Off Road	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
																			2	PSNG	NO<5	3	M			000-No Error	(000-No Action)						00-No Code
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	49	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00690 NO RPT	N	N	N	N	N	05/30/2011 Monday 1P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 132.00		STRGHT UN 03	(NONE) (2)	N UNKNOWN	N N N	CLR DRY DAY	ANIMAL OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	51	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	035-Deer Or Elk	035-Deer Or Elk		12-Other (not Driver Err)	00-No Code	12-Other (not Driver Err)
00429 STATE	N	N	N	N	N	03/22/2012 Thursday 5A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 132.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLR ICE DARK	O-STRGHT SS-M INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJC	22	M	OR-Y OR<25		080-Fail To MaintainLane	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		05-Drove Wrong Side	00-No Code	05-Drove Wrong Side
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJB	53	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01689 STATE	N	N	N	N	N	12/03/2013 Tuesday 9A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 132.00		STRGHT UN 03	(NONE) (4)	N UNKNOWN	N N N	CLD SNO DAY	ANIMAL OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	35	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	035-Deer Or Elk	035-Deer Or Elk		12-Other (not Driver Err)	00-No Code	12-Other (not Driver Err)
01700 NO RPT	N	N	N	N	N	12/13/2010 Monday 6P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 132.00		STRGHT UN 04	(DIVMD) (4)	N UNKNOWN	N N N	CLR DRY DARK	S-STRGHT SS-O PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	0	F	UNK UNK		045-Improper Lane Chng	000-No Action (000-No Action)				13-Improper Lane Chng	00-No Code	13-Improper Lane Chng
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	48	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01702 STATE	N	N	N	N	N	12/13/2010 Monday 5P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 132.00		STRGHT UN 04	(DIVMD) (4)	N UNKNOWN	N N N	CLR DRY DARK	S-1STOP REAR INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	21	F	OR-Y OR>25		043-Following Too Close 026-Faild Avoid Stop Veh	000-No Action (000-No Action)	089-Refer Other Crash			07-Followed too Closely	00-No Code	07-Followed too Closely
																2	NONE 0 PRVTE PSNGR CAR	STOP N -S	1	DRVR	INJC	25	M	OR-Y OR<25		000-No Error	011-Stop In Traf-No Lturn (000-No Action)					00-No Code	00-No Code
																			2	PSNG	INJC	19	F			000-No Error	(000-No Action)						00-No Code

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING
Highway 004 ALL ROAD TYPES, MP 124.4 to 133.39, Both Add and Non-Add mileage, 01/01/2009 to 12/31/2013
Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION VEHICLE (PARTICIPANT)	EVENT CRASH	EVENT VEHICLE	EVENT PARTICIPANT	CAUSE CRASH	CAUSE VEHICLE	CAUSE PARTICIPANT
00260 NONE	N	N	N	N	N	02/19/2009 Thursday 8A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 132.00		STRGHT UN 05	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	NON-COLL NCOL PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	0	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	028-Load Shifted	028-Load Shifted		12-Other (not Driver Err)	00-No Code	12-Other (not Driver Err)
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	31	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01607 COUNTY	N	N	N	N	N	11/28/2011 Monday 5P	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 132.00		STRGHT UN 05	(NONE) (4)	N UNKNOWN	N N N	CLR DRY DARK	ANIMAL OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	55	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	035-Deer Or Elk	035-Deer Or Elk		12-Other (not Driver Err)	00-No Code	12-Other (not Driver Err)
00675 STATE	Y	N	N	N	N	06/04/2012 Monday 2A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 132.00		STRGHT UN 08	(NONE) (4)	N UNKNOWN	Y N N	RAIN WET DARK	FIX OBJ FIX FAT	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJB	62	M	OTH-Y N-RES		047-Violation Basic Rule 080-Fail To MaintainLane 081-Ran Off Road	000-No Action (017-Lost Control)	072-Other Wall 010-Subseq Overturn 001-Fell/Jumped frm Veh	124-Slide b/c of surface 072-Other Wall 010-Subseq Overturn		01-Too Fast For Cond 05-Drove Wrong Side	00-No Code	01-Too Fast For Cond 05-Drove Wrong Side
																			2	PSNG	KILL	42	F			000-No Error	(000-No Action)			001-Fell/Jumped frm Veh			00-No Code
																			3	PSNG	INJB	8	M			000-No Error	(000-No Action)						00-No Code
01347 COUNTY	N	N	N	N	N	10/16/2009 Friday 7A	Deschutes	1-Undiv Hwy or +Mile of Div Hwy 02-Rur Pr Art - Oth 0-Mainline 0-Reg Mile 132.18		STRGHT UN 04	(NONE) (5)	N UNKNOWN	N N N	CLR DRY DAY	S-1TURN TURN INJ	1	NONE 1 PRVTE SEMI TOW	U-TURN S -S	1	DRVR	NONE	43	M	OTH-Y N-RES		008-Illegal U-Turn	051-Enter From Off Road (000-No Action)				08-Improper Turn	00-No Code	08-Improper Turn
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJC	22	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01282 STATE	N	N	N	N	N	09/22/2011 Thursday 8A	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 132.20		STRGHT UN 03	(NONE) (4)	N NONE	N N N	CLR DRY DAY	S-1STOP REAR INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJB	26	F	OR-Y OR<25		026-Faild Avoid Stop Veh	000-No Action (000-No Action)				07-Followed too Closely	00-No Code	07-Followed too Closely
																			2	PSNG	INJB	27	F			000-No Error	(000-No Action)						00-No Code
																2	NONE 0 PRVTE PSNGR CAR	STOP S -N	1	DRVR	INJC	39	F	OR-Y OR<25		000-No Error	011-Stop In Traf-No Lturn (000-No Action)					00-No Code	00-No Code
																			2	PSNG	INJC	32	F			000-No Error	(000-No Action)						00-No Code
																			3	PSNG	INJC	39	F			000-No Error	(000-No Action)						00-No Code
00040 COUNTY	Y	N	N	N	N	01/07/2010 Thursday 6A	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 132.40		STRGHT UN 01	(RSDMD) (4)	N UNKNOWN	Y N N	FOG ICE DARK	OVERTURN NCOL PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	34	M	OR-Y OR<25		081-Ran Off Road 047-Violation Basic Rule	000-No Action (000-No Action)	088-Fence/Building	088-Fence/Building		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
00235 COUNTY	Y	N	N	N	N	02/19/2011 Saturday 5P	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 132.43		INTER UN 06	3-LEG () 0 ()	N UNKNOWN	Y N N	SNOW SNO DUSK	FIX OBJ FIX PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	32	M	OR-Y OR<25		081-Ran Off Road	000-No Action (000-No Action)	124-Slide b/c of surface 061-Mailbox 072-Other Wall	124-Slide b/c of surface 061-Mailbox 072-Other Wall		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond

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Highway 004 ALL ROAD TYPES, MP 124.4 to 133.39, Both Add and Non-Add mileage, 01/01/2009 to 12/31/2013
Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION VEHICLE (PARTICIPANT)	EVENT CRASH	EVENT VEHICLE	EVENT PARTICIPANT	CAUSE CRASH	CAUSE VEHICLE	CAUSE PARTICIPANT
01669 CITY	N	N	N	N	N	11/27/2013 Wednesday 5A	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 132.46		STRGHT UN 03	 (NONE) (4)	N UNKNOWN	N N N	CLR DRY DARK	S-STRGHT SS-O PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	19	M	OR-Y OR<25		080-Fail To MaintainLane	000-No Action (000-No Action)				16-Driver sleepy	00-No Code	16-Driver sleepy
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	49	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01377 STATE	Y	N	N	N	N	10/05/2013 Saturday 5P	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 132.50		STRGHT UN 01	 (NONE) (4)	N UNKNOWN	Y N N	CLR DRY DAY	OVERTURN NCOL PDO	1	NONE 1 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	56	M	OR-Y OR<25		081-Ran Off Road	000-No Action (000-No Action)	022-Trailer Conn Broke	022-Trailer Conn Broke		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
01812 NO RPT	Y	N	N	N	N	12/29/2009 Tuesday 5P	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 132.50		STRGHT UN 06	 (NONE) 0 (4)	N UNKNOWN	N N N	SNOW SNO DUSK	S-STRGHT SS-O PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	0	M	UNK OR<25		032-Passing On Tangent 047-Violation Basic Rule	000-No Action (000-No Action)	124-Slide b/c of surface	124-Slide b/c of surface		06-Improper Overtaking 01-Too Fast For Cond	00-No Code	06-Improper Overtaking 01-Too Fast For Cond
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	46	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00029 COUNTY	N	N	N	N	N	01/15/2009 Thursday 4P	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 132.64		STRGHT N 04	 (NONE) (4)	N UNKNOWN	N N N	CLR DRY DARK	S-STRGHT SS-O PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	28	M	OR-Y OR<25		045-Improper Lane Chng	000-No Action (000-No Action)				13-Improper Lane Chng	00-No Code	13-Improper Lane Chng
																			2	PSNG	NO<5	1	F			000-No Error	(000-No Action)						00-No Code
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	65	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00307 COUNTY	Y	N	N	N	N	02/26/2009 Thursday 9A	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 132.76		STRGHT UN 01	 (NONE) (4)	N UNKNOWN	Y N N	SNOW SNO DAY	O-STRGHT SS-M INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	42	F	OTH-Y N-RES		047-Violation Basic Rule	000-No Action (000-No Action)	124-Slide b/c of surface 061-Mailbox	124-Slide b/c of surface 061-Mailbox		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJC	28	M	OR-Y OR>25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00631 COUNTY	N	N	N	N	N	05/31/2010 Monday 7A	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 133.00		STRGHT UN 01	 (NONE) (4)	N UNKNOWN	Y N N	RAIN WET DAY	FIX OBJ FIX PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	31	M	OR-Y OR<25		081-Ran Off Road	000-No Action (025-Driver Sleepy/Asleep)	061-Mailbox	061-Mailbox		16-Driver sleepy	00-No Code	16-Driver sleepy
01845 STATE	N	N	N	N	N	12/30/2010 Thursday 12P	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 133.02		STRGHT UN 03	 (NONE) (4)	N UNKNOWN	N N N	CLR DRY DAY	O-STRGHT HEAD FAT	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	KILL	19	M	OR-Y OR<25		080-Fail To MaintainLane	000-No Action (000-No Action)				05-Drove Wrong Side	00-No Code	05-Drove Wrong Side
																			2	PSNG	INJB	19	F			000-No Error	(000-No Action)						00-No Code
																			3	PSNG	INJC	1	M			000-No Error	(000-No Action)						00-No Code
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	INJB	52	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code

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Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION VEHICLE (PARTICIPANT)	EVENT CRASH	EVENT VEHICLE	EVENT PARTICIPANT	CAUSE CRASH	CAUSE VEHICLE	CAUSE PARTICIPANT
00224 STATE	Y	N	N	N	N	02/19/2011 Saturday 8P	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 133.02		STRGHT UN 04	 (NONE) (4)	N UNKNOWN	N N N	SNOW ICE DARK	O-STRGHT SS-M PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	47	M	OR-Y OR<25		080-Fail To MaintainLane 081-Ran Off Road	000-No Action (000-No Action)	124-Slide b/c of surface 079-Cut Slope/Ditch	124-Slide b/c of surface 079-Cut Slope/Ditch		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
																			2	PSNG	NO<5	1	M			000-No Error	(000-No Action)						00-No Code
																2	NONE 0 PRVTE SEMI TOW	STRGHT S -N	1	DRVR	NONE	69	M	OTH-Y N-RES		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01628 CITY	N	N	N	N	N	11/19/2013 Tuesday 4A	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 133.03		STRGHT UN 03	 (NONE) (4)	N UNKNOWN	N N N	CLR DRY DARK	ANIMAL OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	26	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	035-Deer Or Elk	035-Deer Or Elk		12-Other (not Driver Err)	00-No Code	12-Other (not Driver Err)
00553 STATE	N	N	N	N	N	05/02/2011 Monday 1P	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 133.04		STRGHT UN 03	 (NONE) (4)	N UNKNOWN	N N Y	CLR DRY DAY	S-1TURN TURN INJ	1	NONE 0 PRVTE PSNGR CAR	TURN-L N -E	1	DRVR	INJC	21	F	OR-Y OR<25		024-Disrg Siren/Emerg V 028-No ROW	000-No Action (000-No Action)				02-Failed Yield ROW	00-No Code	02-Failed Yield ROW
																			2	PSNG	NO<5	1	UNK			000-No Error	(000-No Action)						00-No Code
																			3	PSNG	NONE	0	UNK			000-No Error	(000-No Action)						00-No Code
																2	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	NONE	46	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
01337 STATE	Y	N	N	N	N	10/13/2009 Tuesday 10P	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 133.05		STRGHT UN 07	 (NONE) (4)	N UNKNOWN	Y N N	CLR ICE DARK	OVERTURN OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	46	F	OR-Y OR<25		080-Fail To MaintainLane 081-Ran Off Road	001-Skidded (017-Lost Control)	124-Slide b/c of surface	124-Slide b/c of surface		01-Too Fast For Cond	00-No Code	01-Too Fast For Cond
01696 STATE	N	N	N	N	N	12/13/2010 Monday 5P	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 133.08		STRGHT UN 05	 (NONE) (4)	N UNKNOWN	N N N	CLD ICE DARK	O-STRGHT SS-M INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT N -S	1	DRVR	INJB	60	F	OR-Y OR<25		080-Fail To MaintainLane 039-Drive On Wrong Side	000-No Action (028-Physical Illness)				10-Other Driver Error	00-No Code	10-Other Driver Error
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	32	M	OR-Y OR<25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
																			2	PSNG	NO<5	1	M			000-No Error	(000-No Action)						00-No Code
																			3	PSNG	NO<5	3	F			000-No Error	(000-No Action)						00-No Code
01623 NONE	N	N	N	N	N	12/03/2010 Friday 4P	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 133.11		ALLEY UN 06	 (NONE) (4)	N UNKNOWN	N N N	FOG ICE DUSK	ANGL-OTH TURN INJ	1	NONE 0 PRVTE PSNGR CAR	TURN-L E -S	1	DRVR	INJC	32	M	OR-Y OR<25		028-No ROW	018-Ent Frm Alley/Dwy (000-No Action)				02-Failed Yield ROW	00-No Code	02-Failed Yield ROW
																2	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	42	F	OR-Y OR>25		000-No Error	000-No Action (000-No Action)					00-No Code	00-No Code
00736 COUNTY	N	N	N	N	N	06/09/2011 Thursday 6P	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 133.12		STRGHT UN 03	 (NONE) (4)	N NONE	N N N	CLR DRY DAY	PED PED INJ	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	19	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)				02-Failed Yield ROW	00-No Code	12-Other (not Driver Err)
																0	 0	STRGHT W -E	1	PED	INJA	19	F		ROAD	057-X-Between Intsctions	(000-No Action)						00-No Code

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Highway 004 ALL ROAD TYPES, MP 124.4 to 133.39, Both Add and Non-Add mileage, 01/01/2009 to 12/31/2013
Total Crash Records = 108
*******CRASH DE-CODER V4.1.3 PRC REPORT PRINTABLE EQUIVALENT*******

SER # INVEST	SPEED	ALCOHOL	DRUG	SCH ZONE	WORK ZONE	DATE DAY TIME	COUNTY CITY URB AREA	RD # FUNCTIONAL CLASS COMPONENT MILEAGE TYPE MILEPOINT	CONN # FIRST STREET SECOND STREET	RD CHAR DIRECT LOCTN	INT-TYP (MEDIAN) LEGS (# LANES)	INT-REL TRAF-CONTL	OFF RD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	VEHICLE #	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PARTC #	PARTC TYPE	INJURY SEVERITY	AGE	SEX	LICNS RES	PED LOCATION	ERROR	ACTION VEHICLE (PARTICIPANT)	EVENT CRASH	EVENT VEHICLE	EVENT PARTICIPANT	CAUSE CRASH	CAUSE VEHICLE	CAUSE PARTICIPANT
00926 NONE	N	N	N	N	N	07/21/2012 Saturday 4A	Deschutes BEND UA	1-Undiv Hwy or +Mile of Div Hwy 14-Urb Prin Art - Oth 0-Mainline 0-Reg Mile 133.14		STRGHT UN 03	 (NONE) (4)	N UNKNOWN	N N N	CLR DRY DARK	OTH OBJ OTH PDO	1	NONE 0 PRVTE PSNGR CAR	STRGHT S -N	1	DRVR	NONE	50	F	OR-Y OR<25		000-No Error	000-No Action (000-No Action)	067-Slide/Rocks On Rd	067-Slide/Rocks On Rd		12-Other (not Driver Err)	00-No Code	12-Other (not Driver Err)

Appendix B
Countermeasure Crash Modification Factors (CMFs)

Reference ID	Project ID	Site	Future No Build Expected Crashes (Total Crashes/Year)	Alternative	Countermeasures	Proportion of CMF Target Crash Type	Low	High	CMF Average
S1	1.01	Redmond City Limits to Quarry Ln	5.15	1	Install speed feedback signs in transition zones	100%	20%	88%	88%
S1	1.02	Redmond City Limits to Quarry Ln	5.15	1	Inlaid Raised Pavement Markers	49%	94%	105%	93%
S1	1.03	Redmond City Limits to Quarry Ln	5.15	M3	Median	100%	n/a	n/a	70%
I1	2.01	Quarry Ln	0.49	1	Increase Sight Distance	100%	28%	104%	52%
I1	2.02	Quarry Ln	0.49	1	Intersection lighting	53%	88%	99%	80%
I1	2.03	Quarry Ln	0.49	4	Deceleration Lane	100%	81%	105%	93%
I1	2.04	Quarry Ln	1.26	M3	Restrict left turns, provide J-Turn for NB & SB	100%	n/a	n/a	65%
I1	2.05	Quarry Ln	0.49	1	Median on minor street approach	100%	64%	100%	75%
S2	3.00	Quarry Ln to 61st Street	7.41	1	Inlaid Raised Pavement Markers	49%	94%	105%	93%
S2	3.01	Quarry Ln to 61st Street	7.41	M3	Median - Jersey Barrier	100%	n/a	n/a	70%
S2	3.03	Quarry Ln to 61st Street	7.41	4	Segment Lighting	13%	95%	98%	91%
S2	3.04	Quarry Ln to 61st Street	7.41	4	Increase clear zone (Reduce RHR from 2 to 1)	100%	n/a	n/a	94%
I2	4.00	61st Street	0.79	4	Accel Lane(s)	100%	79%	99%	89%
I2	4.01	61st Street	0.79	4	Decel Lane(s)	100%	81%	105%	93%
I2	4.02	61st Street	0.79	1	Intersection lighting	53%	88%	99%	67%
I2	4.03	61st Street	0.79	1	Median on minor street approach	100%	64%	100%	75%
I2	4.04	61st Street	0.41	M2	Restrict left turns, provide J-Turn for NB	100%	n/a	n/a	65%
S3	5.00	61st Street to Deschutes Jct.	4.06	1	Inlaid Raised Pavement Markers	49%	94%	105%	93%
S3	5.01	61st Street to Deschutes Jct.	4.06	M2	Median - Jersey Barrier	100%	n/a	n/a	70%
S3	5.03	61st Street to Deschutes Jct.	4.06	4	Increase clear zone (Reduce RHR from 2 to 1)	100%	n/a	n/a	94%
I3	6.02	Deschutes Jct.	0.84	1	Restripe Merge	100%	100%	100%	100%
S4	7.00	Deschutes Jct. to Ft Thompson Ln	6.97	1	Inlaid Raised Pavement Markers	49%	94%	105%	93%
S4-ph2	7.04	Deschutes Jct. to Ft Thompson Ln - PHASE 2 (MP 130.23 - 131.495)	2.13	M1	Median - Jersey Barrier	100%	n/a	n/a	70%
S4-ph2	4.04	Deschutes Jct. to Ft Thompson Ln - PHASE 2 (MP 130.23 - 131.495)	0.61	M1	Restrict left turns, provide J-Turn for NB	100%	n/a	n/a	65%
S4-ph3	7.06	Deschutes Jct. to Ft Thompson Ln - PHASE 3 (MP 132.29 - 132.04)	0.70	M4	Median - Jersey Barrier	100%	n/a	n/a	70%
S4-ph1	7.01	Deschutes Jct. to Ft Thompson Ln - PHASE 1 (MP 131.495 - 132.04)	3.92	M1	Median - Jersey Barrier	100%	n/a	n/a	70%
S4	7.03	Deschutes Jct. to Ft Thompson Ln	6.97	4	Increase clear zone (Reduce RHR from 2 to 1)	100%	n/a	n/a	94%
I4	8.00	Ft Thompson Ln	0.83	4	Intersection lighting	53%	88%	99%	67%
I4	8.01	Ft Thompson Ln	0.83	4	Median on minor street approach	100%	64%	100%	75%
I4	8.02	Ft Thompson Ln	0.41	M4	Restrict left turns, provide J-Turn for SB & NB	100%	n/a	n/a	65%
S5	9.00	Ft Thompson Ln to Bend City Limits	3.40	1	Install speed feedback signs in transition zones	100%	20%	88%	88%
S5	9.01	Ft Thompson Ln to Bend City Limits	3.40	1	Inlaid Raised Pavement Markers	49%	94%	105%	93%
S5	9.02	Ft Thompson Ln to Bend City Limits	3.40	M4	Landscaped Median	100%	n/a	n/a	70%
S5	9.03	Ft Thompson Ln to Bend City Limits	3.40	4	Segment Lighting	13%	95%	98%	96%

Appendix C
No-Build
Crash Prediction Analyses

Worksheet 3A -- Predicted and Observed Crashes by Severity and Site Type Using the Site-Specific EB Method

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Site type	**Predicted average crash frequency (crashes/year)**			**Observed crashes,** $N_{observed}$ (crashes/year)	**Overdispersion Parameter, k**	**Weighted adjustment, w**	**Expected average crash frequency,**
	$N_{predicted}$ (TOTAL)	$N_{predicted}$ (FI)	$N_{predicted}$ (PDO)			Equation A-5 from Part C Appendix	Equation A-4 from Part C Appendix
ROADWAY SEGMENTS							
Segment 1	6.501	3.585	2.916	3.2	0.107	0.590	5.147
Segment 2	9.232	5.091	4.141	5	0.082	0.569	7.407
Segment 3	6.074	3.349	2.724	1.4	0.125	0.569	4.058
Segment 4 (total)	7.750	4.284	3.466	5.8	0.087	0.598	6.966
Segment 4, Phase 1	4.539	2.509	2.030	3	0.148	0.598	3.920
Segment 4, Phase 1	1.956	1.081	0.875	2.4	0.344	0.598	2.134
Segment 4, Phase 3	0.897	0.496	0.401	0.4	0.749	0.598	0.697
Segment 5	3.881	2.125	1.756	2.8	0.208	0.553	3.398
Segment 6						1.000	0.000
Segment 7						1.000	0.000
Segment 8						1.000	0.000
INTERSECTIONS							
Intersection 1	0.566	0.230	0.335	0.2	0.460	0.794	0.490
Intersection 2	0.663	0.281	0.382	1.2	0.460	0.766	0.789
Intersection 3	0.670	0.352	0.461	1.4	0.460	0.764	0.842
Intersection 4	0.935	0.432	0.503	0.6	0.494	0.684	0.829
Intersection 5						1.000	0.000
Intersection 6						1.000	0.000
Intersection 7						1.000	0.000
Intersection 8						1.000	0.000
COMBINED (sum of column)	43.665	23.817	19.991	27.4	--	--	36.678

Note: The breakdown of FI and PDO relies on the observed severity distribution of crashes throughout the study corridor.

Note: N predicted relies on ISATe analysis.

Worksheet 2A -- General Information and Input Data for Rural Multilane Highway Intersections

General Information		Location Information	
Analyst	AJG	Roadway	US 97
Agency or Company	KAI	Intersection	Intersection at MP 126.2 (Quarry)
Date Performed	01/30/14	Jurisdiction	ODOT
		Analysis Year	2014

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 4ST, 4SG)		--	3ST
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ = 78,300 (veh/day)	--	27,500
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ = 23,000 (veh/day)	--	500
Intersection skew angle (degrees)		0	29
Number of non-STOP-controlled approaches with left-turn lanes (0, 1, 2)		0	0
Number of non-STOP-controlled approaches with right-turn lanes (0, 1, 2, 3, or 4)		0	0
Intersection lighting (present/not present)		Not Present	Not Present
Calibration Factor, C_i		1.00	0.15

Worksheet 2B -- Crash Modification Factors for Rural Multilane Highway Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Crash Severity Level	CMF for Intersection Skew Angle (CMF_{1i}) from Equations 11-18 or 11-20 and 11-19 or 11-21	CMF for Left-Turn Lanes (CMF_{2i}) from Table 11-22	CMF for Right-Turn Lanes (CMF_{3i}) from Table 11-23	CMF for Lighting (CMF_{4i}) from Equation 11-22	Combined CMF (CMF_{COMB}) (2)*(3)*(4)*(5)
Total	1.08	1.00	1.00	1.00	1.08
Fatal and Injury (FI)	1.09	1.00	1.00	1.00	1.09

Note: The 4-leg Signalized Intersection (4SG) models do not have base conditions and so can only be used for estimation purposes. As a result, there are not CMFs provided for the 4SG condition.

Worksheet 2C -- Intersection Crashes for Rural Multilane Highway Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients from Table 11-7 or 11-8			$N_{spf\ int}$	Overdispersion Parameter, k	Combined CMFs	Calibration Factor, C_i	Predicted average crash frequency, $N_{predicted\ int}$
	a	b	c or d (4SG)	from Equation 11-11 or 11-12	from Table 11-7 or 11-8	from (6) of Worksheet 2B		(3)*(5)*(6)
Total	-12.526	1.204	0.236	3.483	0.460	1.08	0.15	0.566
Fatal and Injury (FI)	-12.664	1.107	0.272	1.408	0.569	1.09	0.15	0.230
Fatal and Injury[a] (FI[a])	-11.989	1.013	0.228	0.805	0.566	1.09	0.15	0.132
Property Damage Only (PDO)	--	--	--	--	--	--	--	$(7)_{TOTAL} - (7)_{FI}$ 0.335

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Multilane Highway Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collision Type	Proportion of Collision Type$_{(TOTAL)}$	$N_{predicted\ int\ (TOTAL)}$ (crashes/year)	Proportion of Collision Type$_{(FI)}$	$N_{predicted\ int\ (FI)}$ (crashes/year)	Proportion of Collision Type (FI[a])	$N_{predicted\ int}$ (FI[a]) (crashes/year)	Proportion of Collision Type (PDO)	$N_{predicted\ int\ (PDO)}$ (crashes/year)
	from Table 11-9	$(7)_{TOTAL}$ from Worksheet 2C	from Table 11-9	$(7)_{FI}$ from Worksheet 2C	from Table 11-9	$(7)_{FI}$[a] from Worksheet 2C	from Table 11-9	$(7)_{PDO}$ from Worksheet 2C
Total	0.999	0.566	1.000	0.230	1.001	0.132	1.001	0.335
		$(2)*(3)_{TOTAL}$		$(4)x(5)_{FI}$		$(6)*(7)_{FI}$[a]		$(8)*(9)_{PDO}$
Head-on collision	0.007	0.004	0.009	0.002	0.014	0.002	0.004	0.001
Sideswipe collision	0.010	0.006	0.009	0.002	0.010	0.001	0.013	0.004
Rear-end collision	0.245	0.139	0.264	0.061	0.167	0.022	0.217	0.073
Angle collision	0.045	0.025	0.070	0.016	0.076	0.010	0.017	0.006
Single-vehicle collision	0.119	0.067	0.117	0.027	0.129	0.017	0.121	0.041
Other collision	0.573	0.324	0.531	0.122	0.605	0.080	0.629	0.211

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 2E -- Summary Results for Rural Multilane Highway Intersections

(1)	(2)
Crash severity level	Predicted average crash frequency (crashes / year)
	(7) from Worksheet 2C
Total	0.6
Fatal and Injury (FI)	0.2
Fatal and Injury[a] (FI[a])	0.1
Property Damage Only (PDO)	0.3

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 2A -- General Information and Input Data for Rural Multilane Highway Intersections

General Information		Location Information	
Analyst	AJG	Roadway	US 97
Agency or Company	KAI	Intersection	Intersection at MP 128.58 (61st/Gift)
Date Performed	01/30/14	Jurisdiction	ODOT
		Analysis Year	2014

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 4ST, 4SG)		--	3ST
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ = 78,300 (veh/day)	--	27,500
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ = 23,000 (veh/day)	--	1,200
Intersection skew angle (degrees)		0	3
Number of non-STOP-controlled approaches with left-turn lanes (0, 1, 2)		0	0
Number of non-STOP-controlled approaches with right-turn lanes (0, 1, 2, 3, or 4)		0	0
Intersection lighting (present/not present)		Not Present	Not Present
Calibration Factor, C_i		1.00	0.15

Worksheet 2B -- Crash Modification Factors for Rural Multilane Highway Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Crash Severity Level	CMF for Intersection Skew Angle (CMF_{1i}) from Equations 11-18 or 11-20 and 11-19 or 11-21	CMF for Left-Turn Lanes (CMF_{2i}) from Table 11-22	CMF for Right-Turn Lanes (CMF_{3i}) from Table 11-23	CMF for Lighting (CMF_{4i}) from Equation 11-22	Combined CMF (CMF_{COMB}) (2)*(3)*(4)*(5)
Total	1.03	1.00	1.00	1.00	1.03
Fatal and Injury (FI)	1.05	1.00	1.00	1.00	1.05

Note: The 4-leg Signalized Intersection (4SG) models do not have base conditions and so can only be used for estimation purposes. As a result, there are not CMFs provided for the 4SG condition.

Worksheet 2C -- Intersection Crashes for Rural Multilane Highway Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients** from Table 11-7 or 11-8			**$N_{spf\ int}$**	**Overdispersion Parameter, k**	**Combined CMFs** from (6) of Worksheet 2B	**Calibration Factor, C_i**	**Predicted average crash frequency, $N_{predicted\ int}$**
	a	b	c or d (4SG)	from Equation 11-11 or 11-12	from Table 11-7 or 11-8			(3)*(5)*(6)
Total	-12.526	1.204	0.236	4.282	0.460	1.03	0.15	0.663
Fatal and Injury (FI)	-12.664	1.107	0.272	1.786	0.569	1.05	0.15	0.281
Fatal and Injury[a] (FI^a)	-11.989	1.013	0.228	0.983	0.566	1.05	0.15	0.155
Property Damage Only (PDO)	--	--	--	--	--	--	--	$(7)_{TOTAL} - (7)_{FI}$ 0.382

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Multilane Highway Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collision Type	**Proportion of Collision Type$_{(TOTAL)}$**	**$N_{predicted\ int\ (TOTAL)}$ (crashes/year)**	**Proportion of Collision Type$_{(FI)}$**	**$N_{predicted\ int\ (FI)}$ (crashes/year)**	**Proportion of Collision Type (FI^a)**	**$N_{predicted\ int}$ (FI^a) (crashes/year)**	**Proportion of Collision Type (PDO)**	**$N_{predicted\ int\ (PDO)}$ (crashes/year)**
	from Table 11-9	$(7)_{TOTAL}$ from Worksheet 2C	from Table 11-9	$(7)_{FI}$ from Worksheet 2C	from Table 11-9	$(7)_{FI}^{a}$ from Worksheet 2C	from Table 11-9	$(7)_{PDO}$ from Worksheet 2C
Total	0.999	0.663	1.000	0.281	1.001	0.155	1.001	0.382
		$(2)*(3)_{TOTAL}$		$(4)x(5)_{FI}$		$(6)*(7)_{FI}^{a}$		$(8)*(9)_{PDO}$
Head-on collision	0.007	0.005	0.009	0.003	0.014	0.002	0.004	0.002
Sideswipe collision	0.010	0.007	0.009	0.003	0.010	0.002	0.013	0.005
Rear-end collision	0.245	0.163	0.264	0.074	0.167	0.026	0.217	0.083
Angle collision	0.045	0.030	0.070	0.020	0.076	0.012	0.017	0.006
Single-vehicle collision	0.119	0.079	0.117	0.033	0.129	0.020	0.121	0.046
Other collision	0.573	0.380	0.531	0.149	0.605	0.094	0.629	0.240

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 2E -- Summary Results for Rural Multilane Highway Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency (crashes / year)**
	(7) from Worksheet 2C
Total	0.7
Fatal and Injury (FI)	0.3
Fatal and Injury[a] (FI^a)	0.2
Property Damage Only (PDO)	0.4

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 2A -- General Information and Input Data for Rural Multilane Highway Intersections			
General Information		**Location Information**	
Analyst	AJG	Roadway	US 97
Agency or Company	KAI	Intersection	Intersection at MP 132.44 (Ft Thompson)
Date Performed	01/30/14	Jurisdiction	ODOT
		Analysis Year	2014

Input Data		**Base Conditions**	**Site Conditions**
Intersection type (3ST, 4ST, 4SG)		--	4ST
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ = 78,300 (veh/day)	--	29,950
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ = 7,400 (veh/day)	--	100
Intersection skew angle (degrees)		0	12
Number of non-STOP-controlled approaches with left-turn lanes (0, 1, 2)		0	0
Number of non-STOP-controlled approaches with right-turn lanes (0, 1, 2, 3, or 4)		0	0
Intersection lighting (present/not present)		Not Present	Not Present
Calibration Factor, C_i		1.00	0.39

Worksheet 2B -- Crash Modification Factors for Rural Multilane Highway Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Crash Severity Level	CMF for Intersection Skew Angle (CMF_{1i}) from Equations 11-18 or 11-20 and 11-19 or 11-21	CMF for Left-Turn Lanes (CMF_{2i}) from Table 11-22	CMF for Right-Turn Lanes (CMF_{3i}) from Table 11-23	CMF for Lighting (CMF_{4i}) from Equation 11-22	Combined CMF (CMF_{COMB}) (2)*(3)*(4)*(5)
Total	1.08	1.00	1.00	1.00	1.08
Fatal and Injury (FI)	1.09	1.00	1.00	1.00	1.09

Note: The 4-leg Signalized Intersection (4SG) models do not have base conditions and so can only be used for estimation purposes. As a result, there are not CMFs provided for the 4SG condition.

Worksheet 2C -- Intersection Crashes for Rural Multilane Highway Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients** from Table 11-7 or 11-8			**$N_{spf\ int}$**	**Overdispersion Parameter, k**	**Combined CMFs** from (6) of Worksheet 2B	**Calibration Factor, C_i**	**Predicted average crash frequency, $N_{predicted\ int}$**
	a	b	c or d (4SG)	from Equation 11-11 or 11-12	from Table 11-7 or 11-8			(3)*(5)*(6)
Total	-10.008	0.848	0.448	2.216	0.494	1.08	0.39	0.935
Fatal and Injury (FI)	-11.554	0.888	0.525	1.017	0.742	1.09	0.39	0.432
Fatal and Injury[a] (FI^a)	-10.734	0.828	0.412	0.739	0.655	1.09	0.39	0.314
Property Damage Only (PDO)	--	--	--	--	--	--	--	$(7)_{TOTAL} - (7)_{FI}$ 0.503

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Multilane Highway Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collision Type	**Proportion of Collision Type$_{(TOTAL)}$**	**$N_{predicted\ int\ (TOTAL)}$ (crashes/year)**	**Proportion of Collision Type$_{(FI)}$**	**$N_{predicted\ int\ (FI)}$ (crashes/year)**	**Proportion of Collision Type (FI^a)**	**$N_{predicted\ int}$ (FI^a) (crashes/year)**	**Proportion of Collision Type (PDO)**	**$N_{predicted\ int\ (PDO)}$ (crashes/year)**
	from Table 11-9	$(7)_{TOTAL}$ from Worksheet 2C	from Table 11-9	$(7)_{FI}$ from Worksheet 2C	from Table 11-9	$(7)_{FI}^a$ from Worksheet 2C	from Table 11-9	$(7)_{PDO}$ from Worksheet 2C
Total	1.000	0.935	1.000	0.432	1.001	0.314	1.001	0.503
		$(2)^*(3)_{TOTAL}$		$(4)x(5)_{FI}$		$(6)^*(7)_{FI}^a$		$(8)^*(9)_{PDO}$
Head-on collision	0.005	0.005	0.008	0.003	0.014	0.004	0.000	0.000
Sideswipe collision	0.009	0.008	0.006	0.003	0.005	0.002	0.015	0.008
Rear-end collision	0.149	0.139	0.152	0.066	0.086	0.027	0.146	0.073
Angle collision	0.380	0.355	0.427	0.184	0.466	0.146	0.318	0.160
Single-vehicle collision	0.055	0.051	0.052	0.022	0.054	0.017	0.058	0.029
Other collision	0.402	0.376	0.355	0.153	0.376	0.118	0.464	0.233

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 2E -- Summary Results for Rural Multilane Highway Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency (crashes / year)**
	(7) from Worksheet 2C
Total	0.9
Fatal and Injury (FI)	0.4
Fatal and Injury[a] (FI^a)	0.3
Property Damage Only (PDO)	0.5

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1A -- General Information and Input Data for Rural Multilane Roadway Segments			
General Information		**Location Information**	
Analyst	AJG	Roadway	US 97
Agency or Company	KAI	Roadway Section	MP 124.4 to 126.15 (Redmond to Quarry)
Date Performed	01/30/14	Jurisdiction	ODOT
		Analysis Year	2013

Input Data		Base Conditions	Site Conditions
Roadway type (divided / undivided)		Undivided	Undivided
Length of segment, L (mi)		--	1.75
AADT (veh/day)	$AADT_{MAX}$ = 33,200 (veh/day)	--	27,500
Lane width (ft)		12	12
Shoulder width (ft) - right shoulder width for divided		6	8
Shoulder type - right shoulder type for divided		Paved	Paved
Median width (ft) - for divided only		30	Not Applicable
Side Slopes - for undivided only		1:7 or flatter	1:7 or Flatter
Lighting (present/not present)		Not Present	Not Present
Auto speed enforcement (present/not present)		Not Present	Not Present
Calibration Factor, Cr		1.00	0.37

Worksheet 1B (b) -- Crash Modification Factors for Rural Multilane Undivided Roadway Segments					
(1)	(2)	(3)	(4)	(5)	(6)
CMF for Lane Width	CMF for Shoulder Width	CMF for Side Slopes	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1ru	*CMF 2ru*	*CMF 3ru*	*CMF 4ru*	*CMF 5ru*	*CMF comb*
from Equation 11-13	from Equation 11-14	from Table 11-14	from Equation 11-15	from Section 11.7.1	(1)*(2)*(3)*(4)*(5)
1.00	0.94	1.00	1.00	1.00	0.94

Worksheet 1C (b) -- Roadway Segment Crashes for Rural Multilane Undivided Roadway Segments								
(1)	(2)			(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients** from Table 11-3			**N spf rs(u)**	**Overdispersion Parameter, k**	**Combined CMFs** (6) from Worksheet 1B (b)	**Calibration Factor, Cr**	**Predicted average crash frequency, $N_{predicted\ rs(u)}$**
	a	b	c	from Equation 11-7	from Equation 11-8			(3)*(5)*(6)
Total	-9.653	1.176	1.675	18.683	0.107	0.94	0.37	6.501
Fatal and Injury (FI)	-9.410	1.094	1.796	10.303	0.095	0.94	0.37	3.585
Fatal and Injury[a] (FI[a])	-8.577	0.938	2.003	4.810	0.077	0.94	0.37	1.674
Property Damage Only (PDO)	--	--	--	--	--	--	--	$(7)_{TOTAL} - (7)_{FI}$ 2.916

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1D (b) -- Crashes by Severity Level and Collision Type for Rural Multilane Undivided Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collision Type	**Proportion of Collision Type$_{(TOTAL)}$**	**$N_{predicted\ rs(u)\ (TOTAL)}$ (crashes/year)**	**Proportion of Collision Type$_{(FI)}$**	**$N_{predicted\ rs(u)\ (FI)}$ (crashes/year)**	**Proportion of Collision Type (FI[a])**	**$N_{predicted\ rs(u)}$ (FI[a]) (crashes/year)**	**Proportion of Collision Type (PDO)**	**$N_{predicted\ rs(u)\ (PDO)}$ (crashes/year)**
	from Table 11-4	$(7)_{TOTAL}$ from Worksheet 1C (b)	from Table 11-4	$(7)_{FI}$ from Worksheet 1C (b)	from Table 11-4	$(7)_{FI}$[a] from Worksheet 1C (b)	from Table 11-4	$(7)_{PDO}$ from Worksheet 1C (b)
Total	1.000	6.501	0.999	3.585	1.000	1.674	1.000	2.916
		$(2)*(3)_{TOTAL}$		$(4)x(5)_{FI}$		$(6)*(7)_{FI}$ [a]		$(8)*(9)_{PDO}$
Head-on collision	0.040	0.260	0.083	0.298	0.118	0.198	0.012	0.035
Sideswipe collision	0.148	0.962	0.101	0.362	0.097	0.162	0.178	0.519
Rear-end collision	0.305	1.983	0.339	1.215	0.194	0.325	0.283	0.825
Angle collision	0.014	0.091	0.024	0.086	0.032	0.054	0.008	0.023
Single-vehicle collision	0.390	2.535	0.375	1.344	0.473	0.792	0.399	1.164
Other collision	0.103	0.670	0.077	0.276	0.086	0.144	0.120	0.350

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1E -- Summary Results for Rural Multilane Roadway Segments			
(1)	(2)	(3)	(4)
Crash severity level	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(7) from Worksheet 1C (a) or (b)		(2)/(3)
Total	6.5	1.8	3.7
Fatal and Injury (FI)	3.6	1.8	2.0
Fatal and Injury[a] (FI[a])	1.7	1.8	1.0
Property Damage Only (PDO)	2.9	1.8	1.7

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1A -- General Information and Input Data for Rural Multilane Roadway Segments			
General Information		**Location Information**	
Analyst	AJG	Roadway	US 97
Agency or Company	KAI	Roadway Section	MP 126.25 to 128.53 (Quarry to 61st)
Date Performed	01/30/14	Jurisdiction	ODOT
		Analysis Year	2013

Input Data		**Base Conditions**	**Site Conditions**
Roadway type (divided / undivided)		Undivided	Undivided
Length of segment, L (mi)		--	2.28
AADT (veh/day)	$AADT_{MAX}$ = 33,200 (veh/day)	--	27,500
Lane width (ft)		12	12
Shoulder width (ft) - right shoulder width for divided		6	8
Shoulder type - right shoulder type for divided		Paved	Paved
Median width (ft) - for divided only		30	Not Applicable
Side Slopes - for undivided only		1:7 or flatter	1:5
Lighting (present/not present)		Not Present	Not Present
Auto speed enforcement (present/not present)		Not Present	Not Present
Calibration Factor, Cr		1.00	0.37

Worksheet 1B (b) -- Crash Modification Factors for Rural Multilane Undivided Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for Lane Width	CMF for Shoulder Width	CMF for Side Slopes	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1ru	*CMF 2ru*	*CMF 3ru*	*CMF 4ru*	*CMF 5ru*	*CMF comb*
from Equation 11-13	from Equation 11-14	from Table 11-14	from Equation 11-15	from Section 11.7.1	(1)*(2)*(3)*(4)*(5)
1.00	0.94	1.09	1.00	1.00	1.03

Worksheet 1C (b) -- Roadway Segment Crashes for Rural Multilane Undivided Roadway Segments

(1)	(2)			(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**			**N spf rs(u)**	**Overdispersion Parameter, k**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, $N_{predicted\ rs(u)}$**
	from Table 11-3					(6) from Worksheet 1B (b)		
	a	b	c	from Equation 11-7	from Equation 11-8			(3)*(5)*(6)
Total	-9.653	1.176	1.675	24.341	0.082	1.03	0.37	9.232
Fatal and Injury (FI)	-9.410	1.094	1.796	13.423	0.073	1.03	0.37	5.091
Fatal and Injury[a] (FI[a])	-8.577	0.938	2.003	6.267	0.059	1.03	0.37	2.377
Property Damage Only (PDO)	--	--	--	--	--	--	--	$(7)_{TOTAL} - (7)_{FI}$ 4.141

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1D (b) -- Crashes by Severity Level and Collision Type for Rural Multilane Undivided Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collision Type	**Proportion of Collision $Type_{(TOTAL)}$**	**$N_{predicted\ rs(u)\ (TOTAL)}$ (crashes/year)**	**Proportion of Collision $Type_{(FI)}$**	**$N_{predicted\ rs(u)\ (FI)}$ (crashes/year)**	**Proportion of Collision Type (FI[a])**	**$N_{predicted\ rs(u)}$ (FI[a]) (crashes/year)**	**Proportion of Collision Type (PDO)**	**$N_{predicted\ rs(u)\ (PDO)}$ (crashes/year)**
	from Table 11-4	$(7)_{TOTAL}$ from Worksheet 1C (b)	from Table 11-4	$(7)_{FI}$ from Worksheet 1C (b)	from Table 11-4	$(7)_{FI}$[a] from Worksheet 1C (b)	from Table 11-4	$(7)_{PDO}$ from Worksheet 1C (b)
Total	1.000	9.232	0.999	5.091	1.000	2.377	1.000	4.141
		$(2)*(3)_{TOTAL}$		$(4)x(5)_{FI}$		$(6)*(7)_{FI}$[a]		$(8)*(9)_{PDO}$
Head-on collision	0.040	0.369	0.083	0.423	0.118	0.281	0.012	0.050
Sideswipe collision	0.148	1.366	0.101	0.514	0.097	0.231	0.178	0.737
Rear-end collision	0.305	2.816	0.339	1.726	0.194	0.461	0.283	1.172
Angle collision	0.014	0.129	0.024	0.122	0.032	0.076	0.008	0.033
Single-vehicle collision	0.390	3.601	0.375	1.909	0.473	1.124	0.399	1.652
Other collision	0.103	0.951	0.077	0.392	0.086	0.204	0.120	0.497

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1E -- Summary Results for Rural Multilane Roadway Segments

(1)	(2)	(3)	(4)
Crash severity level	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(7) from Worksheet 1C (a) or (b)		(2)/(3)
Total	9.2	2.3	4.0
Fatal and Injury (FI)	5.1	2.3	2.2
Fatal and Injury[a] (FI[a])	2.4	2.3	1.0
Property Damage Only (PDO)	4.1	2.3	1.8

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1A -- General Information and Input Data for Rural Multilane Roadway Segments			
General Information		**Location Information**	
Analyst	AJG	Roadway	US 97
Agency or Company	KAI	Roadway Section	MP 128.63 to 130.13 (61st to Deschutes Jct)
Date Performed	01/30/14	Jurisdiction	ODOT
		Analysis Year	2013

Input Data		**Base Conditions**	**Site Conditions**
Roadway type (divided / undivided)		Undivided	Undivided
Length of segment, L (mi)		--	1.5
AADT (veh/day)	$AADT_{MAX}$ = 33,200 (veh/day)	--	27,500
Lane width (ft)		12	12
Shoulder width (ft) - right shoulder width for divided		6	8
Shoulder type - right shoulder type for divided		Paved	Paved
Median width (ft) - for divided only		30	Not Applicable
Side Slopes - for undivided only		1:7 or flatter	1:5
Lighting (present/not present)		Not Present	Not Present
Auto speed enforcement (present/not present)		Not Present	Not Present
Calibration Factor, Cr		1.00	0.37

Worksheet 1B (b) -- Crash Modification Factors for Rural Multilane Undivided Roadway Segments					
(1)	(2)	(3)	(4)	(5)	(6)
CMF for Lane Width	CMF for Shoulder Width	CMF for Side Slopes	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1ru	*CMF 2ru*	*CMF 3ru*	*CMF 4ru*	*CMF 5ru*	*CMF comb*
from Equation 11-13	from Equation 11-14	from Table 11-14	from Equation 11-15	from Section 11.7.1	(1)*(2)*(3)*(4)*(5)
1.00	0.94	1.09	1.00	1.00	1.03

Worksheet 1C (b) -- Roadway Segment Crashes for Rural Multilane Undivided Roadway Segments								
(1)	(2)			(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients** from Table 11-3			**N spf rs(u)**	**Overdispersion Parameter, k**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, $N_{predicted\ rs(u)}$**
	a	b	c	from Equation 11-7	from Equation 11-8	(6) from Worksheet 1B (b)		(3)*(5)*(6)
Total	-9.653	1.176	1.675	16.014	0.125	1.03	0.37	6.074
Fatal and Injury (FI)	-9.410	1.094	1.796	8.831	0.111	1.03	0.37	3.349
Fatal and Injury[a] (FI[a])	-8.577	0.938	2.003	4.123	0.090	1.03	0.37	1.564
Property Damage Only (PDO)	--	--	--	--	--	--	--	$(7)_{TOTAL} - (7)_{FI}$ 2.724

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1D (b) -- Crashes by Severity Level and Collision Type for Rural Multilane Undivided Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collision Type	**Proportion of Collision $Type_{(TOTAL)}$**	**$N_{predicted\ rs(u)\ (TOTAL)}$ (crashes/year)**	**Proportion of Collision $Type_{(FI)}$**	**$N_{predicted\ rs(u)\ (FI)}$ (crashes/year)**	**Proportion of Collision Type (FI[a])**	**$N_{predicted\ rs(u)}$ (FI[a]) (crashes/year)**	**Proportion of Collision Type (PDO)**	**$N_{predicted\ rs(u)\ (PDO)}$ (crashes/year)**
	from Table 11-4	$(7)_{TOTAL}$ from Worksheet 1C (b)	from Table 11-4	$(7)_{FI}$ from Worksheet 1C (b)	from Table 11-4	$(7)_{FI}^{a}$ from Worksheet 1C (b)	from Table 11-4	$(7)_{PDO}$ from Worksheet 1C (b)
Total	1.000	6.074	0.999	3.349	1.000	1.564	1.000	2.724
		$(2)*(3)_{TOTAL}$		$(4)x(5)_{FI}$		$(6)*(7)_{FI}^{a}$		$(8)*(9)_{PDO}$
Head-on collision	0.040	0.243	0.083	0.278	0.118	0.185	0.012	0.033
Sideswipe collision	0.148	0.899	0.101	0.338	0.097	0.152	0.178	0.485
Rear-end collision	0.305	1.853	0.339	1.135	0.194	0.303	0.283	0.771
Angle collision	0.014	0.085	0.024	0.080	0.032	0.050	0.008	0.022
Single-vehicle collision	0.390	2.369	0.375	1.256	0.473	0.740	0.399	1.087
Other collision	0.103	0.626	0.077	0.258	0.086	0.134	0.120	0.327

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1E -- Summary Results for Rural Multilane Roadway Segments			
(1)	(2)	(3)	(4)
Crash severity level	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(7) from Worksheet 1C (a) or (b)		(2)/(3)
Total	6.1	1.5	4.0
Fatal and Injury (FI)	3.3	1.5	2.2
Fatal and Injury[a] (FI[a])	1.6	1.5	1.0
Property Damage Only (PDO)	2.7	1.5	1.8

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1A -- General Information and Input Data for Rural Multilane Roadway Segments			
General Information		**Location Information**	
Analyst	AJG	Roadway	US 97
Agency or Company	KAI	Roadway Section	MP 130.23 to 132.29 (Deschutes Jct to Ft Thompson)
Date Performed	01/30/14	Jurisdiction	ODOT
		Analysis Year	2013

Input Data		**Base Conditions**	**Site Conditions**
Roadway type (divided / undivided)		Undivided	Undivided
Length of segment, L (mi)		--	2.16
AADT (veh/day)	$AADT_{MAX}$ = 33,200 (veh/day)	--	26,700
Lane width (ft)		12	12
Shoulder width (ft) - right shoulder width for divided		6	8
Shoulder type - right shoulder type for divided		Paved	Paved
Median width (ft) - for divided only		30	Not Applicable
Side Slopes - for undivided only		1:7 or flatter	1:7 or Flatter
Lighting (present/not present)		Not Present	Not Present
Auto speed enforcement (present/not present)		Not Present	Not Present
Calibration Factor, Cr		1.00	0.37

Worksheet 1B (b) -- Crash Modification Factors for Rural Multilane Undivided Roadway Segments					
(1)	(2)	(3)	(4)	(5)	(6)
CMF for Lane Width	CMF for Shoulder Width	CMF for Side Slopes	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1ru	*CMF 2ru*	*CMF 3ru*	*CMF 4ru*	*CMF 5ru*	*CMF comb*
from Equation 11-13	from Equation 11-14	from Table 11-14	from Equation 11-15	from Section 11.7.1	(1)*(2)*(3)*(4)*(5)
1.00	0.94	1.00	1.00	1.00	0.94

Worksheet 1C (b) -- Roadway Segment Crashes for Rural Multilane Undivided Roadway Segments								
(1)	(2)			(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients** from Table 11-3			**N spf rs(u)**	**Overdispersion Parameter, k**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, $N_{predicted\ rs(u)}$**
	a	b	c	from Equation 11-7	from Equation 11-8	(6) from Worksheet 1B (b)		(3)*(5)*(6)
Total	-9.653	1.176	1.675	22.273	0.087	0.94	0.37	7.750
Fatal and Injury (FI)	-9.410	1.094	1.796	12.312	0.077	0.94	0.37	4.284
Fatal and Injury[a] (FI[a])	-8.577	0.938	2.003	5.775	0.062	0.94	0.37	2.010
Property Damage Only (PDO)	--	--	--	--	--	--	--	$(7)_{TOTAL} - (7)_{FI}$ 3.466

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1D (b) -- Crashes by Severity Level and Collision Type for Rural Multilane Undivided Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collision Type	**Proportion of Collision $Type_{(TOTAL)}$**	**$N_{predicted\ rs(u)\ (TOTAL)}$ (crashes/year)**	**Proportion of Collision $Type_{(FI)}$**	**$N_{predicted\ rs(u)\ (FI)}$ (crashes/year)**	**Proportion of Collision Type (FI[a])**	**$N_{predicted\ rs(u)}$ (FI[a]) (crashes/year)**	**Proportion of Collision Type (PDO)**	**$N_{predicted\ rs(u)\ (PDO)}$ (crashes/year)**
	from Table 11-4	$(7)_{TOTAL}$ from Worksheet 1C (b)	from Table 11-4	$(7)_{FI}$ from Worksheet 1C (b)	from Table 11-4	$(7)_{FI}{}^{a}$ from Worksheet 1C (b)	from Table 11-4	$(7)_{PDO}$ from Worksheet 1C (b)
Total	1.000	7.750	0.999	4.284	1.000	2.010	1.000	3.466
		$(2)*(3)_{TOTAL}$		$(4)x(5)_{FI}$		$(6)*(7)_{FI}{}^{a}$		$(8)*(9)_{PDO}$
Head-on collision	0.040	0.310	0.083	0.356	0.118	0.237	0.012	0.042
Sideswipe collision	0.148	1.147	0.101	0.433	0.097	0.195	0.178	0.617
Rear-end collision	0.305	2.364	0.339	1.452	0.194	0.390	0.283	0.981
Angle collision	0.014	0.109	0.024	0.103	0.032	0.064	0.008	0.028
Single-vehicle collision	0.390	3.023	0.375	1.607	0.473	0.951	0.399	1.383
Other collision	0.103	0.798	0.077	0.330	0.086	0.173	0.120	0.416

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1E -- Summary Results for Rural Multilane Roadway Segments			
(1)	(2)	(3)	(4)
Crash severity level	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(7) from Worksheet 1C (a) or (b)		(2)/(3)
Total	7.8	2.2	3.6
Fatal and Injury (FI)	4.3	2.2	2.0
Fatal and Injury[a] (FI[a])	2.0	2.2	0.9
Property Damage Only (PDO)	3.5	2.2	1.6

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1A -- General Information and Input Data for Rural Multilane Roadway Segments			
General Information		**Location Information**	
Analyst	AJG	Roadway	US 97
Agency or Company	KAI	Roadway Section	MP 132.49 to 133.39 (Ft Thompson to Bend)
Date Performed	01/30/14	Jurisdiction	ODOT
		Analysis Year	2013

Input Data		Base Conditions	Site Conditions
Roadway type (divided / undivided)		Undivided	Undivided
Length of segment, L (mi)		--	0.9
AADT (veh/day)	$AADT_{MAX}$ = 33,200 (veh/day)	--	29,950
Lane width (ft)		12	12
Shoulder width (ft) - right shoulder width for divided		6	8
Shoulder type - right shoulder type for divided		Paved	Paved
Median width (ft) - for divided only		30	Not Applicable
Side Slopes - for undivided only		1:7 or flatter	1:6
Lighting (present/not present)		Not Present	Not Present
Auto speed enforcement (present/not present)		Not Present	Not Present
Calibration Factor, Cr		1.00	0.37

Worksheet 1B (b) -- Crash Modification Factors for Rural Multilane Undivided Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for Lane Width	CMF for Shoulder Width	CMF for Side Slopes	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1ru	*CMF 2ru*	*CMF 3ru*	*CMF 4ru*	*CMF 5ru*	*CMF comb*
from Equation 11-13	from Equation 11-14	from Table 11-14	from Equation 11-15	from Section 11.7.1	(1)*(2)*(3)*(4)*(5)
1.00	0.94	1.05	1.00	1.00	0.99

Worksheet 1C (b) -- Roadway Segment Crashes for Rural Multilane Undivided Roadway Segments

(1)	(2)			(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**			**N spf rs(u)**	**Overdispersion Parameter, k**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, $N_{predicted\ rs(u)}$**
	from Table 11-3					(6) from Worksheet 1B (b)		
	a	b	c	from Equation 11-7	from Equation 11-8			(3)*(5)*(6)
Total	-9.653	1.176	1.675	10.623	0.208	0.99	0.37	3.881
Fatal and Injury (FI)	-9.410	1.094	1.796	5.817	0.184	0.99	0.37	2.125
Fatal and Injury[a] (FI[a])	-8.577	0.938	2.003	2.680	0.150	0.99	0.37	0.979
Property Damage Only (PDO)	--	--	--	--	--	--	--	$(7)_{TOTAL} - (7)_{FI}$ 1.756

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1D (b) -- Crashes by Severity Level and Collision Type for Rural Multilane Undivided Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collision Type	**Proportion of Collision $Type_{(TOTAL)}$**	**$N_{predicted\ rs(u)\ (TOTAL)}$ (crashes/year)**	**Proportion of Collision $Type_{(FI)}$**	**$N_{predicted\ rs(u)\ (FI)}$ (crashes/year)**	**Proportion of Collision Type (FI[a])**	**$N_{predicted\ rs(u)}$ (FI[a]) (crashes/year)**	**Proportion of Collision Type (PDO)**	**$N_{predicted\ rs(u)\ (PDO)}$ (crashes/year)**
	from Table 11-4	$(7)_{TOTAL}$ from Worksheet 1C (b)	from Table 11-4	$(7)_{FI}$ from Worksheet 1C (b)	from Table 11-4	$(7)_{FI}^{a}$ from Worksheet 1C (b)	from Table 11-4	$(7)_{PDO}$ from Worksheet 1C (b)
Total	1.000	3.881	0.999	2.125	1.000	0.979	1.000	1.756
		$(2)*(3)_{TOTAL}$		$(4)x(5)_{FI}$		$(6)*(7)_{FI}^{a}$		$(8)*(9)_{PDO}$
Head-on collision	0.040	0.155	0.083	0.176	0.118	0.116	0.012	0.021
Sideswipe collision	0.148	0.574	0.101	0.215	0.097	0.095	0.178	0.313
Rear-end collision	0.305	1.184	0.339	0.721	0.194	0.190	0.283	0.497
Angle collision	0.014	0.054	0.024	0.051	0.032	0.031	0.008	0.014
Single-vehicle collision	0.390	1.514	0.375	0.797	0.473	0.463	0.399	0.701
Other collision	0.103	0.400	0.077	0.164	0.086	0.084	0.120	0.211

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1E -- Summary Results for Rural Multilane Roadway Segments

(1)	(2)	(3)	(4)
Crash severity level	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(7) from Worksheet 1C (a) or (b)		(2)/(3)
Total	3.9	0.9	4.3
Fatal and Injury (FI)	2.1	0.9	2.4
Fatal and Injury[a] (FI[a])	1.0	0.9	1.1
Property Damage Only (PDO)	1.8	0.9	2.0

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Appendix D
Improvement Costs

Reference ID	Project ID	Site	Length of Segment (miles)	Description of Countermeasure	Length of Countermeasure / # Units	Units	Unit Cost	Project Cost	Contingency	Total Estimated Cost
S1	1.01	Redmond City Limits to Quarry Ln	1.75	Install speed feedback signs in transition zones	1	ea	$7,500	$7,500	40%	$10,500
S1	1.02	Redmond City Limits to Quarry Ln	1.75	Inlaid Raised Pavement Markers	462	ea	$4	$1,940	40%	$2,717
S1	1.03	Redmond City Limits to Quarry Ln	1.75	Median - Concrete Barrier	9240	ft	$61	$647,640	40%	$906,696
I1	2.01	Quarry Ln	n/a	Increase Sight Distance	1	ea	$500	$500	40%	$700
I1	2.02	Quarry Ln	n/a	Intersection lighting	1	intersection	$15,000	$15,000	40%	$21,000
I1	2.03	Quarry Ln	n/a	Deceleration Lane	1	lane	$134,008	$134,008	40%	$187,611
I1	2.04	Quarry Ln	n/a	J-Turn (X2)	2	ea	$571,410	$1,142,820	40%	$1,599,948
I1	2.05	Quarry Ln	n/a	Median on minor street approach	1	ea	$1,000	$1,000	40%	$1,400
S2	3.00	Quarry Ln to 61st Street	2.28	Inlaid Raised Pavement Markers	601.92	ea	$4	$2,528	40%	$3,539
S2	3.01	Quarry Ln to 61st Street	2.28	Median - Concrete Barrier	12038.4	ft	$61	$818,342	40%	$1,145,679
S2	3.03	Quarry Ln to 61st Street	2.28	Segment Lighting	24.0768	500 ft	$35,000	$842,688	40%	$1,179,763
S2	3.04	Quarry Ln to 61st Street	2.28	Increase clear zone	4	outcroppings	$41,667	$166,667	40%	$233,333
I2	4.00	61st Street	n/a	Accel Lane(s)	1	lane	$134,008	$134,008	40%	$187,611
I2	4.01	61st Street	n/a	Decel Lane(s)	1	lane	$134,008	$134,008	40%	$187,611
I2	4.02	61st Street	n/a	Intersection lighting	1	ea	$15,000	$15,000	40%	$21,000
I2	4.03	61st Street	n/a	Median on minor street approach	1	ea	$1,000	$1,000	40%	$1,400
I2	4.04	61st Street	n/a	J-Turn (X1)	1	ea	$571,410	$571,410	40%	$799,974
S3	5.00	61st Street to Deschutes Jct.	1.5	Inlaid Raised Pavement Markers	396	ea	$4	$1,663	40%	$2,328
S3	5.01	61st Street to Deschutes Jct.	1.5	Median - Concrete Barrier	7920	ft	$61	$539,120	40%	$754,768
S3	5.03	61st Street to Deschutes Jct.	1.5	Increase clear zone	1	rock outcropping	$41,667	$41,667	40%	$58,333
I3	6.00	Deschutes Jct.	n/a	Accel Lane(s)	1	lane	$134,008	$134,008	40%	$187,611
I3	6.01	Deschutes Jct.	n/a	Decel Lane(s)	1	lane	$134,008	$134,008	40%	$187,611
I3	6.02	Deschutes Jct.	n/a	Restripe Merge	1200	ft	$2	$2,400	40%	$3,360
S4	7.00	Deschutes Jct. to Ft Thompson Ln	2.16	Inlaid Raised Pavement Markers	570.24	ea	$4	$2,395	40%	$3,353
S4	7.01	Deschutes Jct. to Ft Thompson Ln - PHASE 1 (MP 131.495 - 132.04)	0.545	Median - Concrete Barrier	2877.6	ft	$61	$231,534	40%	$324,147
S4	7.03	Deschutes Jct. to Ft Thompson Ln	2.16	Increase clear zone	1	rock outcropping	$41,667	$41,667	40%	$58,333
I4	8.00	Ft Thompson Ln	n/a	Intersection lighting	1	ea	$15,000	$15,000	40%	$21,000
I4	8.01	Ft Thompson Ln	n/a	Median on minor street approach	1	ea	$1,000	$1,000	40%	$1,400
I4	8.02	Ft Thompson Ln	n/a	J-Turn (X2)	2	ea	$571,410	$1,142,820	40%	$1,599,948
S5	9.00	Ft Thompson Ln to Bend City Limits	0.9	Install speed feedback signs in transition zones	1	ea	$7,500	$7,500	40%	$10,500
S5	9.01	Ft Thompson Ln to Bend City Limits	0.9	Inlaid Raised Pavement Markers	237.6	ea	$4	$998	40%	$1,397
S5	9.02	Ft Thompson Ln to Bend City Limits	0.9	Median - Concrete Barrier	4752	ft	$61	$345,872	40%	$484,221
S5	9.03	Ft Thompson Ln to Bend City Limits	0.9	Segment Lighting	9.504	500 ft	$35,000	$332,640	40%	$465,696

Appendix E Illustration of J-Turn Concept

J-Turn Concept
Deschutes County, Oregon

Figure
E-1

H:\projfile\18175 - US 97 Safety Plan\dwg\figure\18175_figure 01.cdr

Appendix F Median Type Comparison Costs

Median Barrier Cost Estimates

Kittelson & Associates, Inc. (KAI) prepared planning-level cost estimates to support evaluation of median barrier treatments on US 97: Mile Point (MP) 124.40 to 133.39. Two barrier types have been evaluated to reduce crash potential. *No modifications to the median or shoulder area are assumed to support the median installation.*

Concrete Median Barrier

Based on Oregon Department of Transportation (ODOT) bid items (2014), KAI estimated concrete barrier installation costs at $61 per linear foot (LF) *plus* $28,000 per narrow impact attenuator. There will be no modifications to the existing pavement in the median, but assumes the precast concrete barrier being pinned to the existing road surface. *However, if the concrete barrier is cast in place that requires excavation and asphalt surfacing in the median, then the unit price will increase by approximately $15-20 per LF.* The number of median barrier openings per phase determined the number of attenuators assumed per phase.

Assumptions:

- Concrete barrier pinned to existing asphalt surface
- Results in 4-foot inside shoulders
- No right-of-way (ROW) needs

Life Cycle Cost

There is limited maintenance costs associated with concrete barrier installations; however, if an impact attenuator is damaged, then it will likely be replaced with a new one.

Cable Barrier

A 3-cable design at test level 3 is estimated to cost $15/LF, including posts and end anchors. This estimate is based on National Cooperative Highway Research Program (NCHRP) Report 711 *Guidance for the Selection, Use, and Maintenance of Cable Barrier Systems*.

Assumptions:

- $60 per installed post and foundation at 6-foot spacing
- $2,500 per end anchor at 1,000-foot spacing
- No ROW needs

Life Cycle Cost

NCHRP Report 711 provides an analysis of life-cycle costs associated with installation, maintenance, repair, and disposal of cable median barrier. Values provided in Table 5.4 indicate annual life-cycle costs are only nominally greater than $15 per linear foot, if we assume a service life of 25 years and discount rate of 6%.

Taking into account the crash experience and maintenance logs associated with the cable median barrier on Mt. Hood Highway (US 26) from MP 30.56 to MP 31.31 and MP 31.55 to MP 32.32 indicates the life-cycle costs are higher than those estimated based on NCHRP Report 711 data.

The US 26 cable median barrier was installed in August 2007. In 2012 ODOT prepared a summary of maintenance and repair work associated with this cable barrier installation in "Year Four Update of the Mt. Hood Highway Cable Barrier System." The report indicates the narrow median increases the difficulty of repairing and maintaining the barrier. As of February 2012, "all repairs include only replacing damaged posts; no cable tensioning or cable replacement has been required. Replacing posts involves a couple of people; one who pulls out the damaged post and the other lifting the cable with an auto crane. Generally, more time is involved in setting up traffic control than in replacing the posts."

The ODOT report indicates repair work has cost approximately $69,000 over 53 months, which equates to an approximate annual cost of $10,275 per mile. Assuming equivalent costs to repair cable median barrier on US 97, and an annual discount rate of 6%, the cable median barrier installation and repair cost could be as high as $39.88/LF.

It should be noted the conceptual cost estimates provided in the US97 refinement plan includes 40% contingencies in addition to the estimates discussed in this memorandum.

Concrete Median Barrier Summary

Phase	**Benefit**	**Cost**	**B/C**
1	$340,000	$1.5 million	2.9
2	$235,000	$1.6 million	1.9
3	$671,000	$3.7 million	2.3
4	$238,000	$2.2 million	1.4

Note: A uniform series present worth factor of 12.46 is applied to account for a 20 year life cycle.

Cable Median Barrier Summary

Phase	**Benefit**	**Cost**	**B/C**
1	$340,000	$1.3 million	3.3
2	$235,000	$1.3 million	2.4
3	$671,000	$2.8 million	3.0
4	$238,000	$2.0 million	1.5

Note: A uniform series present worth factor of 12.46 is applied to account for a 20 year life cycle.