

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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Project No. 18175.0

June 2015



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## Section 1

### Executive Summary

## 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                             | <ul style="list-style-type: none"><li>Install speed feedback signs in transition zones;</li><li>Inlaid Raised Pavement Markers</li></ul>        | 82%         | 19.1                    | \$ 32,000                         | \$ 157,100                                                   | 61.2                  |
| Quarry Ln                          | 0.2                             | 0.6                              | 0.5                             | <ul style="list-style-type: none"><li>Increase sight distance;</li><li>Median on minor street approach;</li><li>Intersection lighting</li></ul> | 82%         | 1.8                     | \$ 28,000                         | \$ 14,500                                                    | 6.5                   |
| Quarry Ln to 61st Street           | 5                               | 9.2                              | 7.4                             | <ul style="list-style-type: none"><li>Inlaid Raised Pavement Markers</li></ul>                                                                  | 93%         | 11.0                    | \$ 14,000                         | \$ 90,500                                                    | 80.6                  |
| 61st Street                        | 1.2                             | 0.7                              | 0.8                             | <ul style="list-style-type: none"><li>Intersection lighting;</li><li>Median on minor street approach</li></ul>                                  | 50%         | 7.8                     | \$ 27,000                         | \$ 64,500                                                    | 29.8                  |
| 61st Street to Deschutes Jct.      | 1.4                             | 6.1                              | 4.1                             | <ul style="list-style-type: none"><li>Inlaid Raised Pavement Markers</li></ul>                                                                  | 93%         | 6.0                     | \$ 9,000                          | \$ 49,600                                                    | 68.7                  |
| Deschutes Jct.                     | 1.4                             | 0.7                              | 0.8                             | <ul style="list-style-type: none"><li>Restripe merge</li></ul>                                                                                  | 99%         | 0.0                     | \$ 14,000                         | \$ 500                                                       | 0.1                   |
| Deschutes Jct. to Ft Thompson Ln   | 5.8                             | 7.8                              | 7.0                             | <ul style="list-style-type: none"><li>Inlaid Raised Pavement Markers;</li></ul>                                                                 | 93%         | 10.3                    | \$ 14,000                         | \$ 85,200                                                    | 75.8                  |
| Ft Thompson Ln                     | 0.6                             | 0.9                              | 0.8                             | <ul style="list-style-type: none"><li>None</li></ul>                                                                                            | N/A         | 0.0                     | \$ -                              | \$ -                                                         | --                    |
| Ft Thompson Ln to Bend City Limits | 2.8                             | 3.9                              | 3.4                             | <ul style="list-style-type: none"><li>Install speed feedback signs in transition zones;</li><li>Inlaid Raised Pavement Markers</li></ul>        | 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<br>Observed<br>Crash<br>Frequency | Annual<br>Predicted<br>Crash<br>Frequency | Annual<br>Expected<br>Crash<br>Frequency | Medium-Term Project Countermeasures                           | Project<br>CMF | 20-Year<br>Crash<br>Reduction | Preliminary 20-<br>Yr<br>Cost Estimate** | Expected<br>Annual<br>Comprehensive<br>Crash Cost<br>Reduction<br>(Benefit) | Benefit / Cost<br>Ratio |
|---------------------------------------|------------------------------------------|-------------------------------------------|------------------------------------------|---------------------------------------------------------------|----------------|-------------------------------|------------------------------------------|-----------------------------------------------------------------------------|-------------------------|
| Redmond City Limits<br>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<br>Street           | 5                                        | 9.2                                       | 7.4                                      | ▪ Segment Lighting;<br>▪ 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;<br>▪ Deceleration Lane                   | 83%            | 2.7                           | \$ 376,000                               | \$ 22,400                                                                   | 0.7                     |
| 61st Street to<br>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<br>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;<br>• Median on minor street approach | 51%            | 8.2                           | \$27,000                                 | \$ 67,800                                                                   | 31.3                    |
| Ft Thompson Ln to<br>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 61 <sup>st</sup> Street) | One                        | \$1.6 million        | \$3.00 million       | 1.9       |
| Phase 3 | 124.40 – 128.578 (61 <sup>st</sup> 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

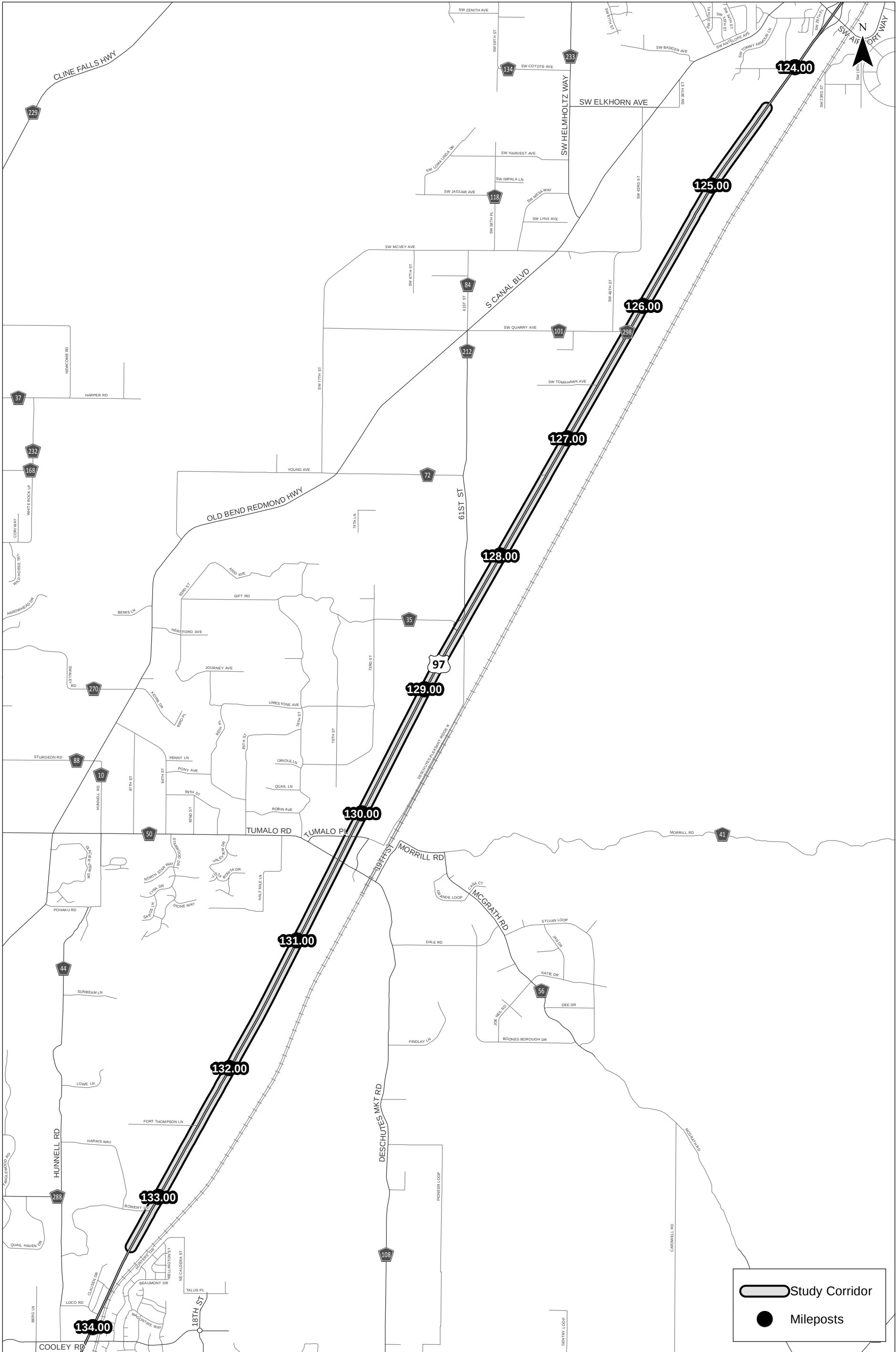
The goals of the US 97 Safety Assessment are to:

- 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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## Section 3

### Existing Conditions

## EXISTING CONDITIONS

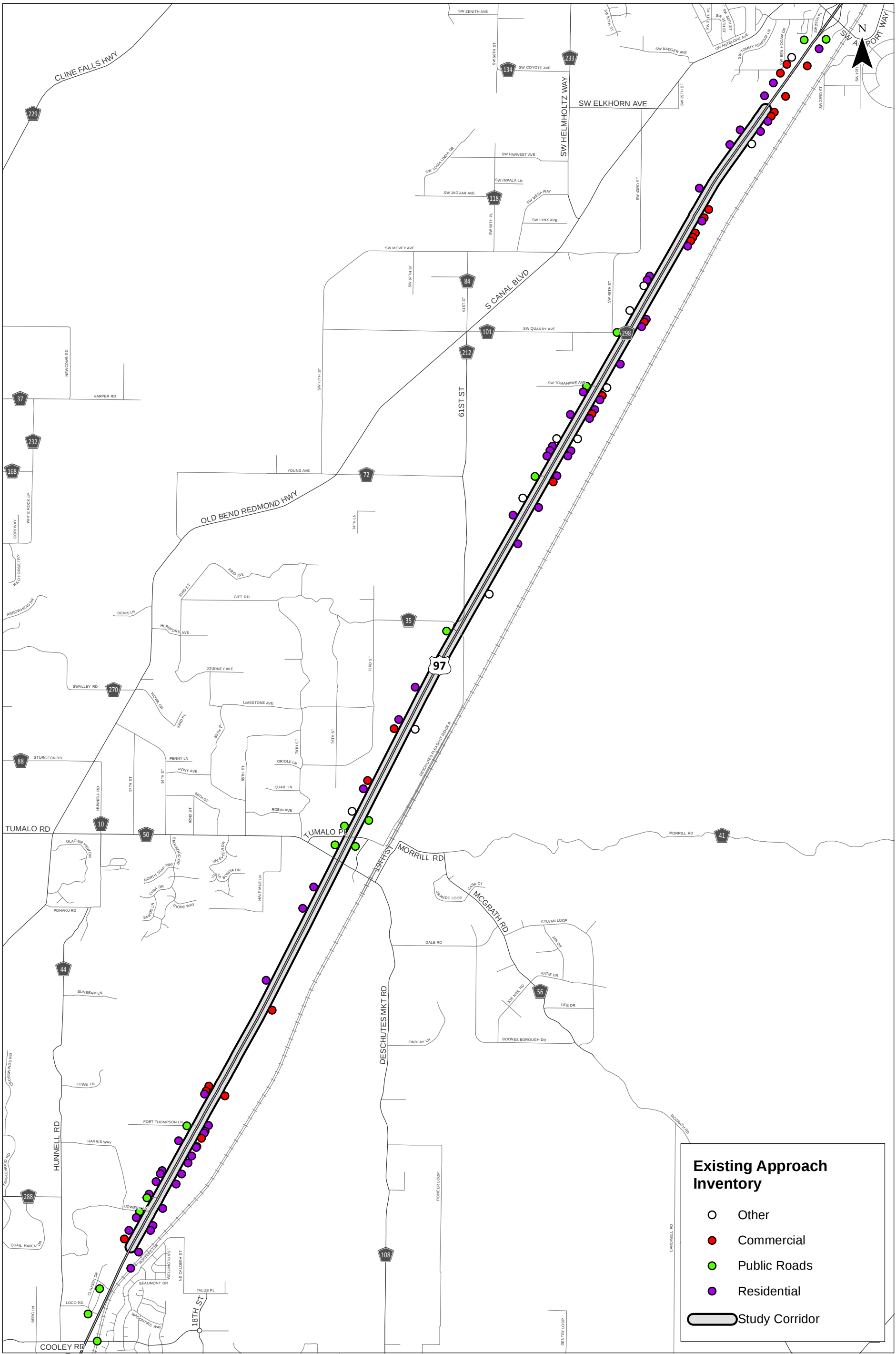
The existing conditions analysis identifies factors influencing crash potential, including: traffic characteristics, historical crash analysis, and field observations.

### 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, 61<sup>st</sup> 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. 61<sup>st</sup> 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 61<sup>st</sup> 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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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**.

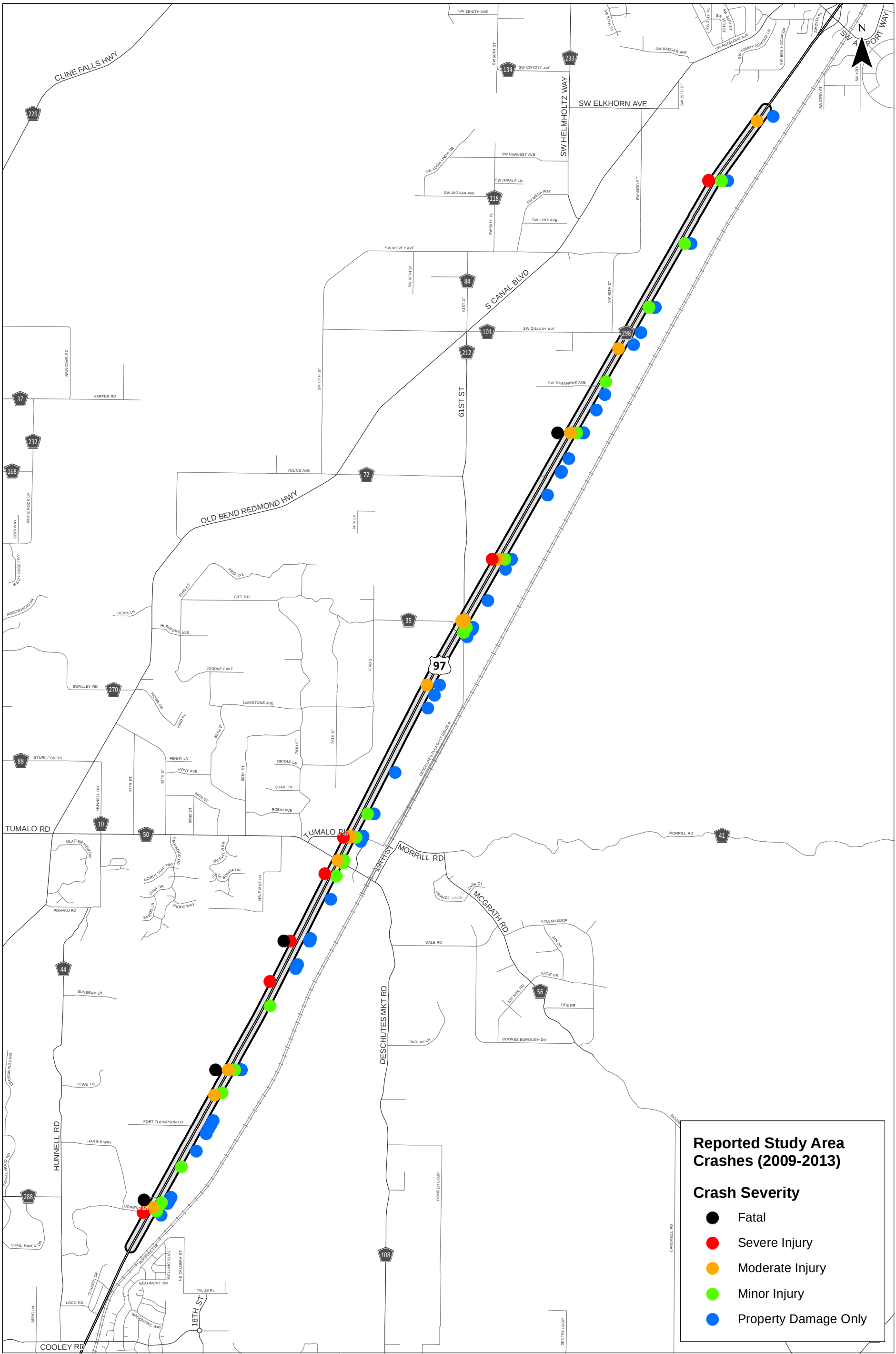
Table 4 Study Area Available Traffic Volumes

| 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 61<sup>st</sup> 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**

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

| Corridor / Class          | Property Damage Only | Minor Injury | Moderate Injury | Severe Injury | Fatality  |
|---------------------------|----------------------|--------------|-----------------|---------------|-----------|
| US 97 Crashes (2009-2013) | 59<br>54.6%          | 23<br>21.3%  | 14<br>13.0%     | 8<br>7.4%     | 4<br>3.7% |
|                           | 59<br>54.6%          | 45<br>41.7%  |                 |               | 4<br>3.7% |

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.

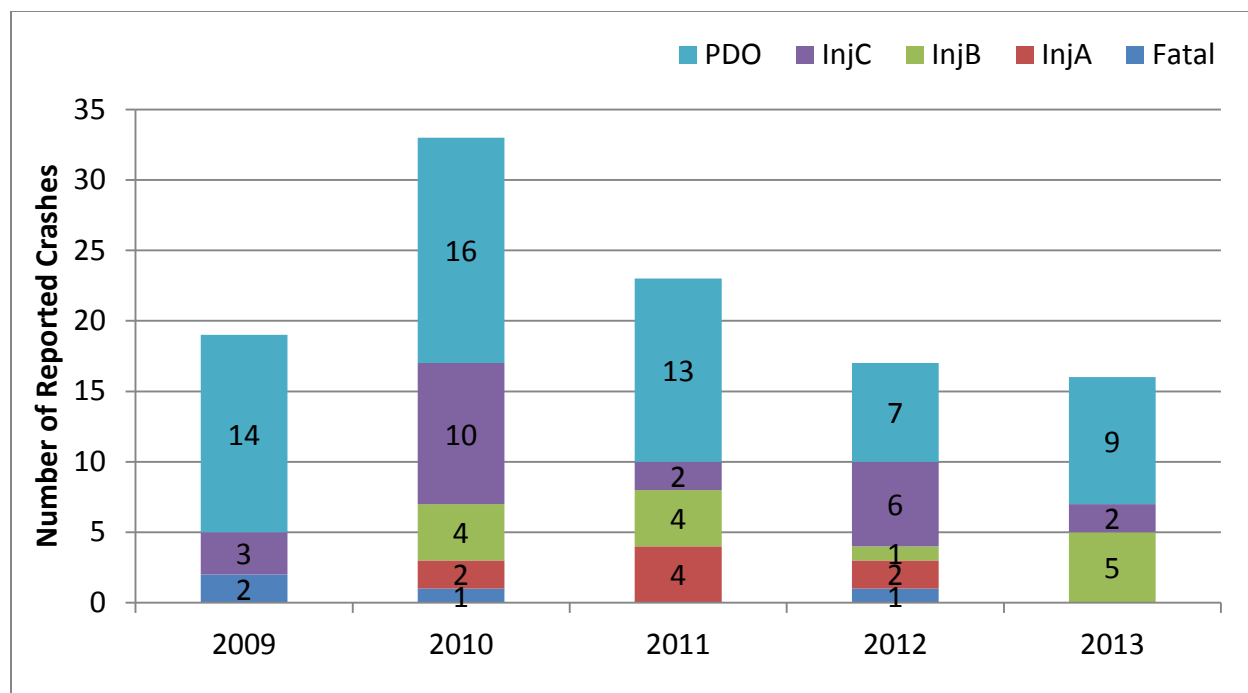


Figure 5 Crash Frequency and Severity by Year (2009 – 2013)

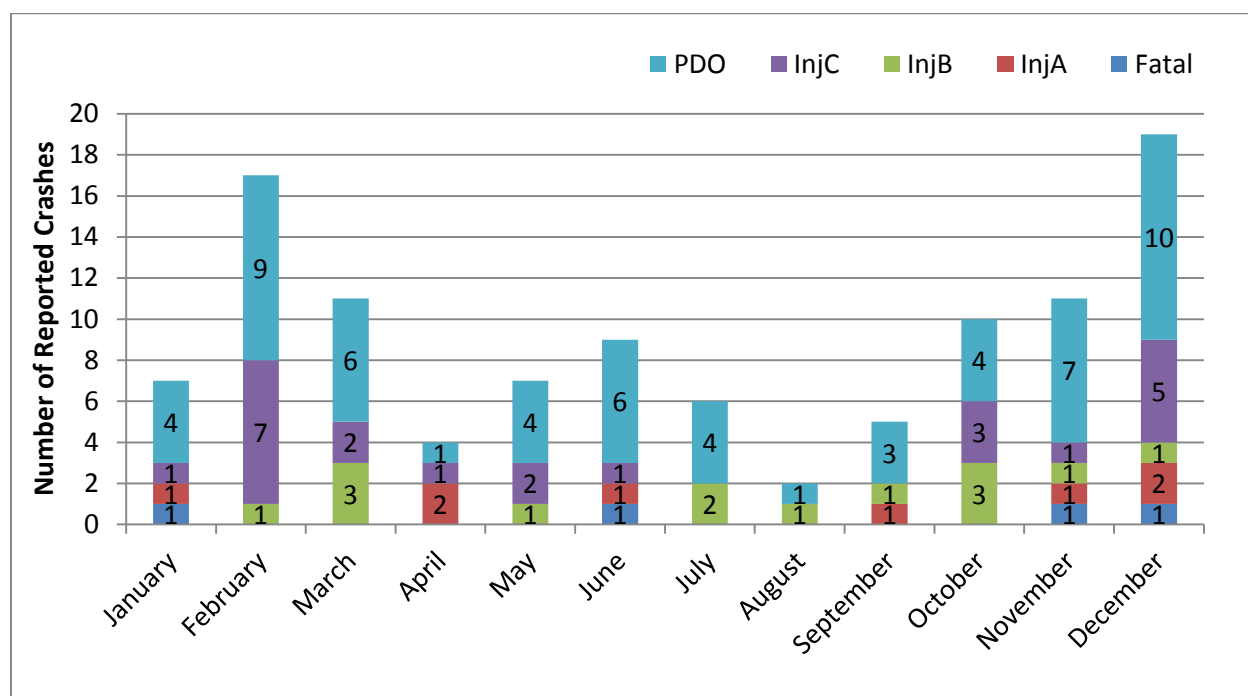


Figure 6 Crash Frequency and Severity by Month (2009 – 2013)

## 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)

| Collision Type            | Total Crashes |             | Fatal and Severe Injury Crashes |             |
|---------------------------|---------------|-------------|---------------------------------|-------------|
|                           | 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        |
| Overtaken                 | 10            | 9.3         | --                              | --          |
| Animal                    | 12            | 11.1        | --                              | --          |
| Pedestrian                | 2             | 1.9         | 1                               | 8.2         |
| <b>Total Crashes</b>      | <b>108</b>    | <b>100%</b> | <b>12</b>                       | <b>100%</b> |

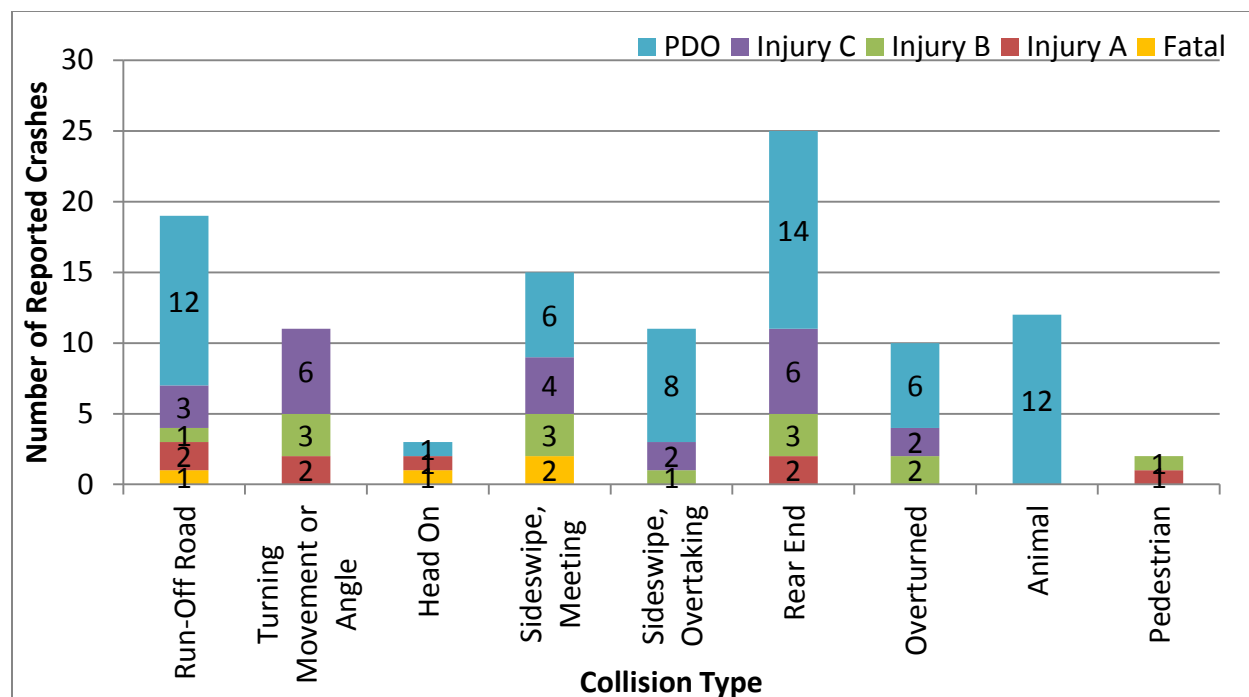
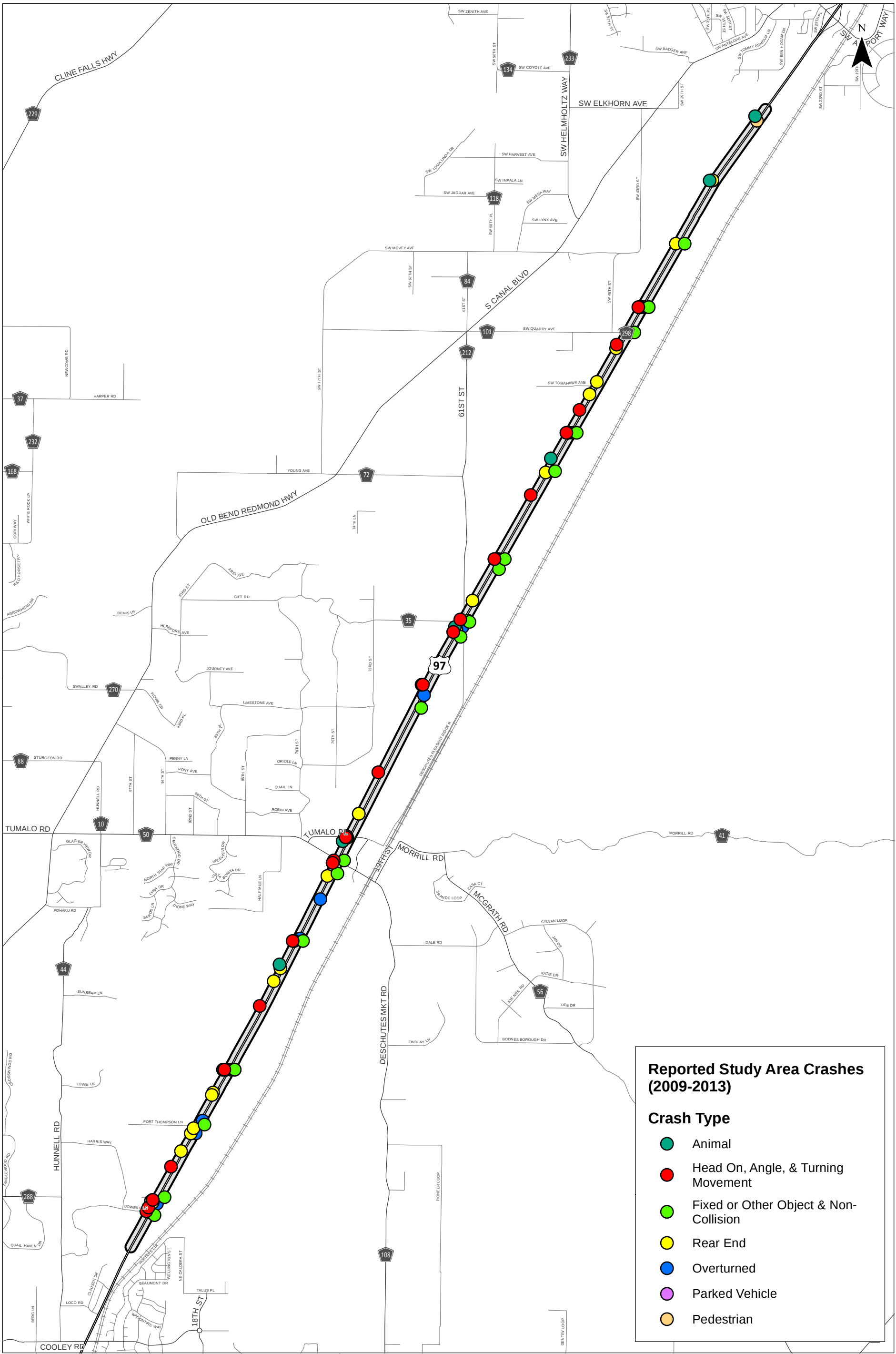


Figure 7 Crash Severity by Collision Type (2009 – 2013)



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

Figure  
**8**

## 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.

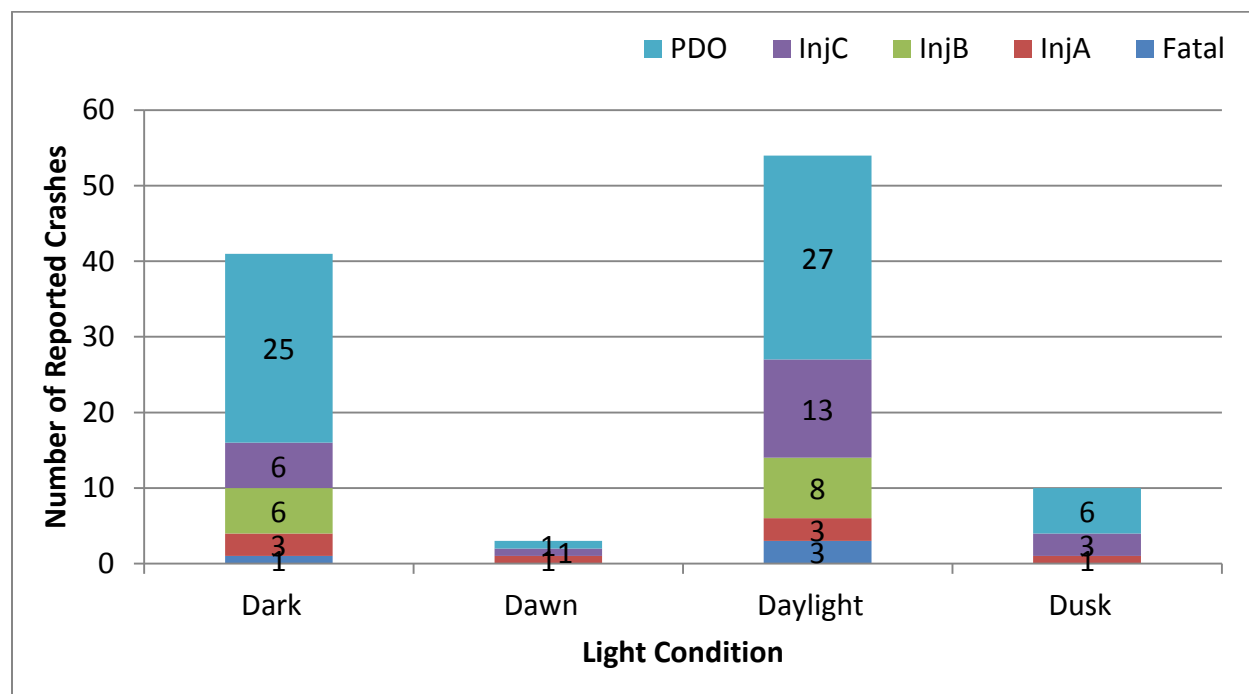
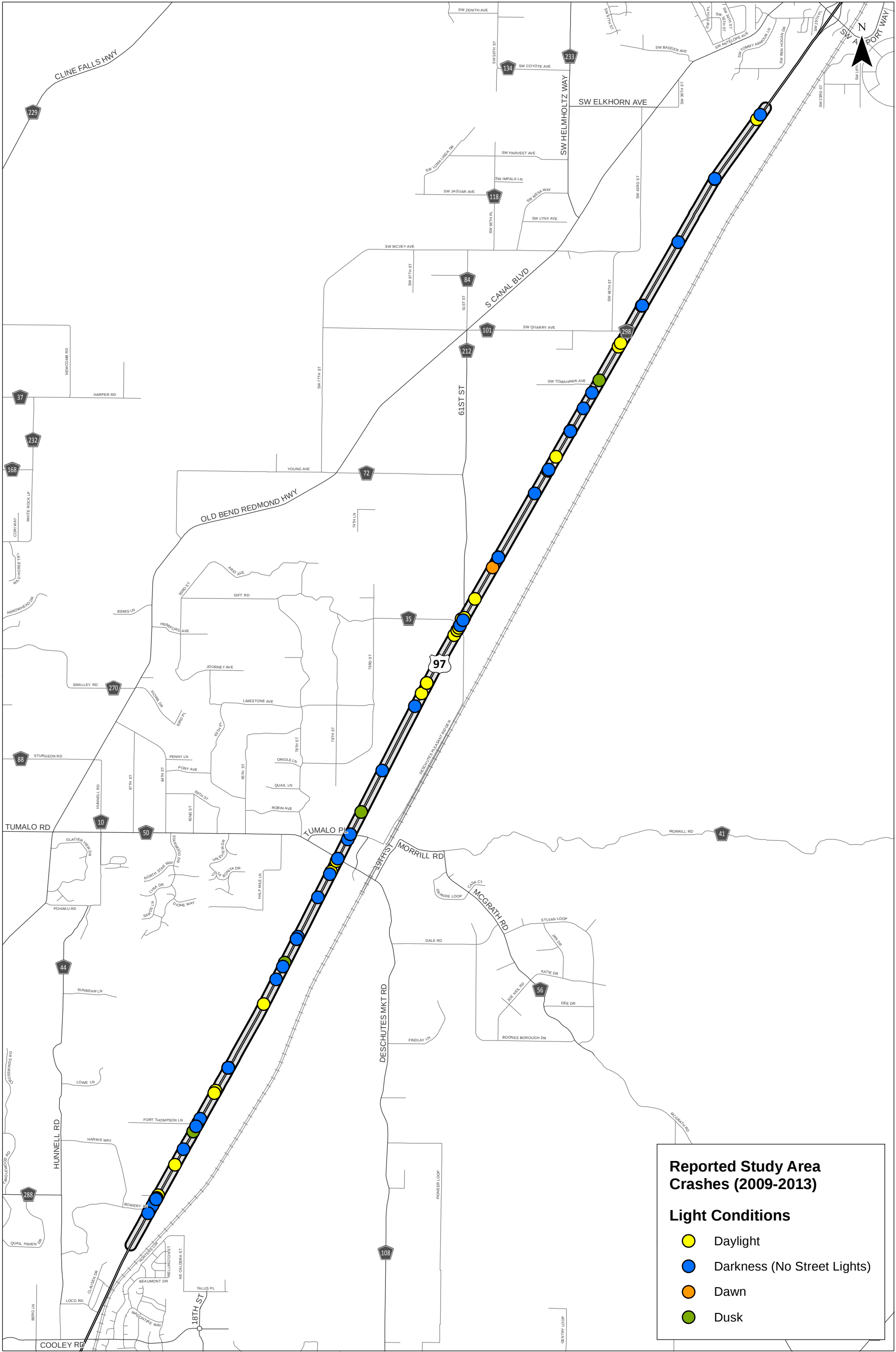


Figure 9 Lighting Conditions and Crash Severity (2009 – 2013)



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

Figure  
10

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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.

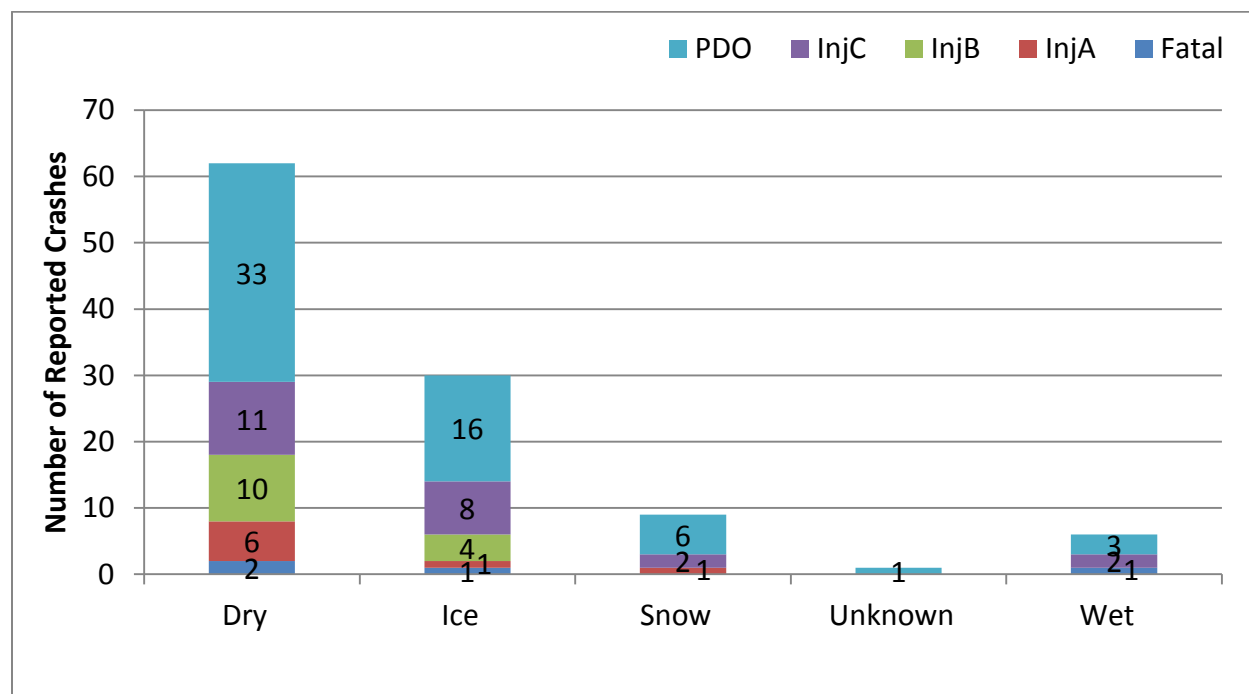
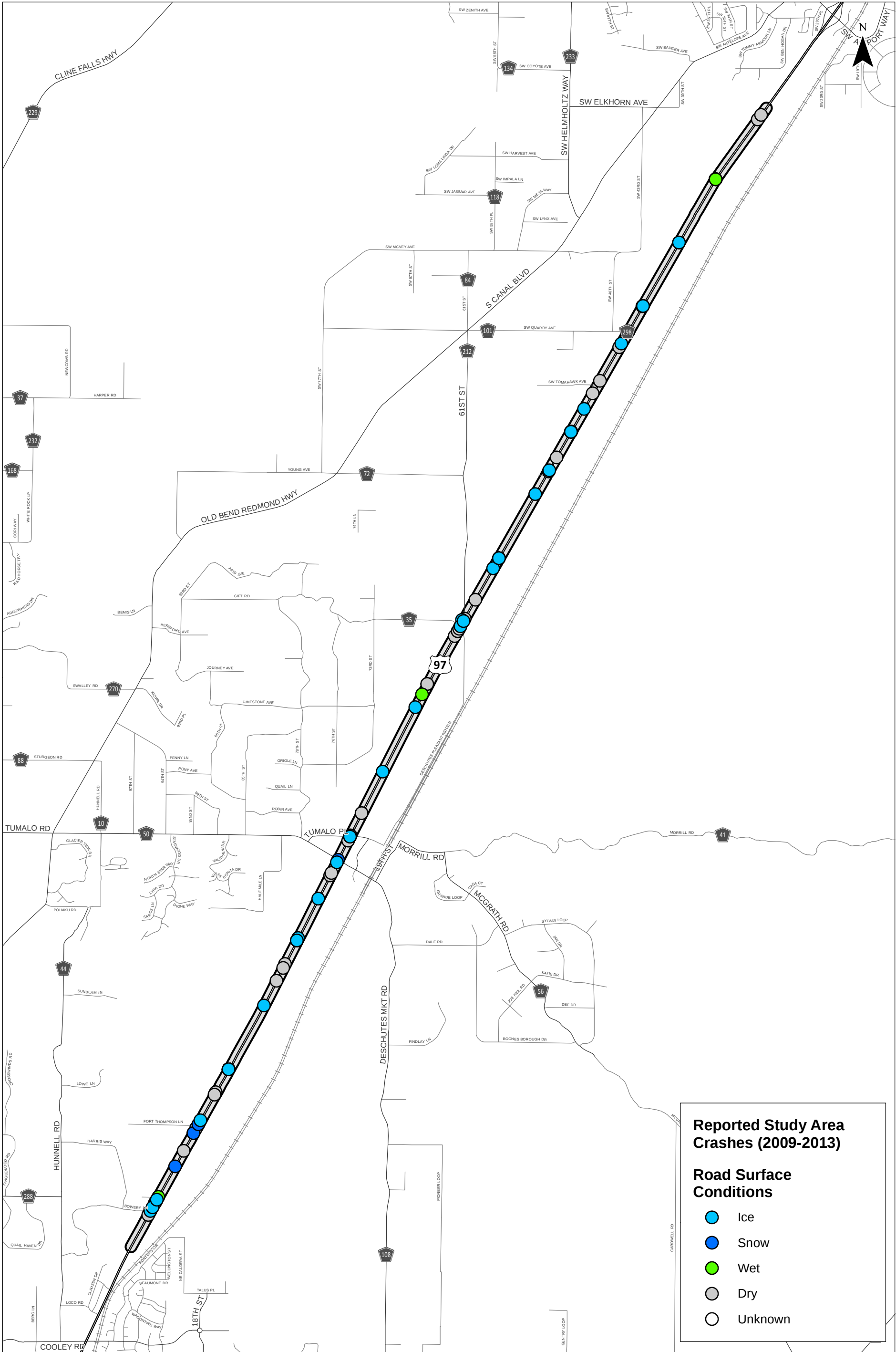


Figure 11 Roadway Conditions and Crash Severity (2009 – 2013)



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

Figure  
**12**

## 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, 61<sup>st</sup> 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.
- 61<sup>st</sup> 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/](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                 | <ul style="list-style-type: none"> <li>• Run-Off Road</li> <li>• Fixed Object</li> <li>• Overturned Vehicle</li> <li>• Head-On</li> <li>• Non-Daylight Conditions</li> </ul> | <ul style="list-style-type: none"> <li>• Install Inlaid Raised Pavement Markers</li> <li>• Install Raised Median with U-turn to Provide Access to Driveways</li> </ul>                                                                                                                                                                         |
| Roadside                | <ul style="list-style-type: none"> <li>• Run-Off Road</li> <li>• Fixed Object</li> <li>• Overturned Vehicle</li> </ul>                                                       | <ul style="list-style-type: none"> <li>• Improve Roadside Design by Increasing Clear Zone Width</li> </ul>                                                                                                                                                                                                                                     |
| Signage                 | <ul style="list-style-type: none"> <li>• Intersection Crashes</li> <li>• Speed-Involved Crashes</li> </ul>                                                                   | <ul style="list-style-type: none"> <li>• Install Intersection Ahead Warning Signs</li> <li>• Replace Signs with Higher Retroreflectivity or Larger Signs</li> <li>• Install Speed Feedback Signs</li> </ul>                                                                                                                                    |
| Intersection            | <ul style="list-style-type: none"> <li>• Rear-End</li> <li>• Left-Turning</li> <li>• Angle</li> </ul>                                                                        | <ul style="list-style-type: none"> <li>• Increase Intersection Sight Distance</li> <li>• Install Low-Cost Signing and Marking Treatments, including Minor Street Median</li> <li>• Install Right-Turn Deceleration Lane</li> <li>• Install Left-Turn Lane</li> <li>• Install Right-Turn Acceleration Lane</li> <li>• Restripe Merge</li> </ul> |
| Lighting                | <ul style="list-style-type: none"> <li>• Run-Off Road</li> <li>• Fixed Object</li> <li>• Animal Crashes</li> <li>• Non-Daylight Conditions</li> </ul>                        | <ul style="list-style-type: none"> <li>• Install Intersection Lighting</li> <li>• Illumination along Key Segments</li> </ul>                                                                                                                                                                                                                   |

## CRASH MODIFICATION FACTORS

KAI identified crash modification factors (CMFs) for each countermeasure, where available. CMFs were identified from the ODOT Approved List<sup>1</sup>, 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

<sup>1</sup> 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          | <ul style="list-style-type: none"> <li>▪ Install speed feedback signs in transition zones;</li> <li>▪ Inlaid Raised Pavement Markers</li> <li>▪ Raised Median</li> </ul>                               |
| Quarry Ln                                 | <ul style="list-style-type: none"> <li>▪ Increase Sight Distance;</li> <li>▪ Median on minor street approach</li> <li>▪ Intersection lighting</li> <li>▪ Right turn Deceleration Lane</li> </ul>       |
| Quarry Ln to 61 <sup>st</sup> Street      | <ul style="list-style-type: none"> <li>▪ Inlaid Raised Pavement Markers</li> <li>▪ Segment Lighting</li> <li>▪ Increase clear zone (Reduce Roadside Hazard Rating)</li> <li>▪ Raised Median</li> </ul> |
| 61 <sup>st</sup> Street                   | <ul style="list-style-type: none"> <li>▪ Intersection lighting</li> <li>▪ Median on minor street approach</li> <li>▪ Right turn Deceleration Lane</li> <li>▪ Acceleration Lane</li> </ul>              |
| 61 <sup>st</sup> Street to Deschutes Jct. | <ul style="list-style-type: none"> <li>▪ Inlaid Raised Pavement Markers</li> <li>▪ Increase clear zone (Reduce RHR from 2 to 1)</li> <li>▪ Raised Median</li> </ul>                                    |
| Deschutes Jct.                            | <ul style="list-style-type: none"> <li>▪ Restripe Merge</li> </ul>                                                                                                                                     |
| Deschutes Jct. to Ft Thompson Ln          | <ul style="list-style-type: none"> <li>▪ Inlaid Raised Pavement Markers</li> <li>▪ Increase clear zone (Reduce RHR from 2 to 1)</li> <li>▪ Raised Median</li> </ul>                                    |
| Ft Thompson Ln                            | <ul style="list-style-type: none"> <li>▪ Intersection lighting;</li> <li>▪ Median on minor street approach</li> </ul>                                                                                  |
| Ft Thompson Ln to Bend City Limits        | <ul style="list-style-type: none"> <li>▪ Install speed feedback signs in transition zone;</li> <li>▪ Inlaid Raised Pavement Markers</li> <li>▪ Segment Lighting</li> <li>▪ Raised Median</li> </ul>    |

\*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                                 |
| <b>Total</b>                       | <b>21.6</b>                       | <b>34.7</b>                          | <b>30.0</b>                         |

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

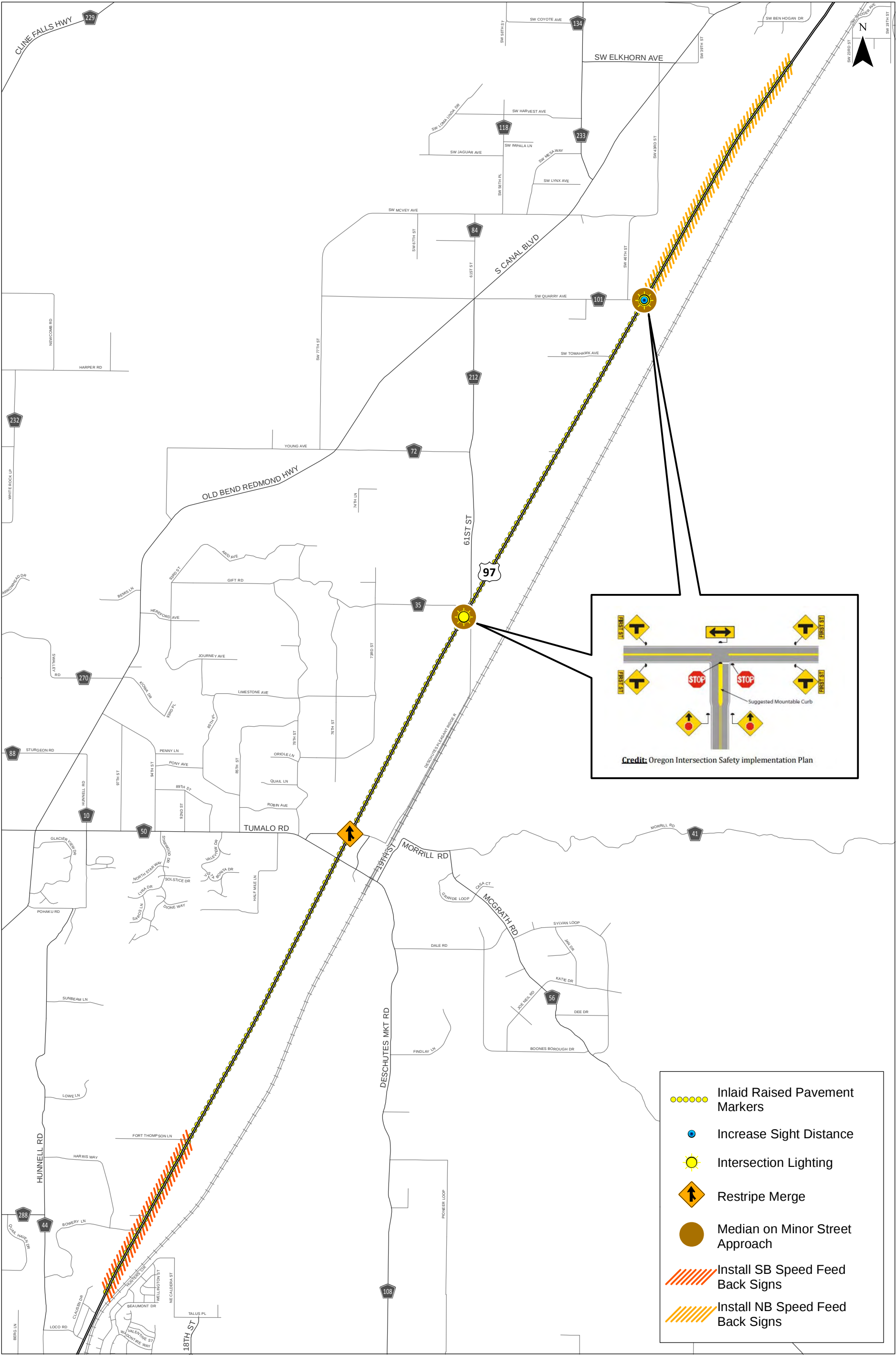
Short-term projects are highly effective safety countermeasures implemented within the next five years at a relatively low cost. These include speed feedback signs, inlaid raised pavement markers, improving sight distance, intersection lighting, and enhanced signing and striping, including a median, 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<br>Observed<br>Crash<br>Frequency | Annual<br>Predicted<br>Crash<br>Frequency | Annual<br>Expected<br>Crash<br>Frequency | Short-Term Project Countermeasures                                                                                                                    | Project CMF | 20-Year Crash<br>Reduction | Preliminary 20-Yr<br>Cost Estimate** | Expected Annual<br>Comprehensive<br>Crash Cost<br>Reduction<br>(Benefit) | Benefit / Cost<br>Ratio* |
|---------------------------------------|------------------------------------------|-------------------------------------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------|--------------------------------------|--------------------------------------------------------------------------|--------------------------|
| Redmond City Limits to<br>Quarry Ln   | 3.2                                      | 6.5                                       | 5.1                                      | <ul style="list-style-type: none"><li>▪ Install speed feedback signs in transition zones;</li><li>▪ Inlaid Raised Pavement Markers</li></ul>          | 82%         | 19.1                       | \$ 32,000                            | \$ 157,100                                                               | 61.2                     |
| Quarry Ln                             | 0.2                                      | 0.6                                       | 0.5                                      | <ul style="list-style-type: none"><li>▪ Increase Sight Distance;</li><li>▪ Median on minor street approach;</li><li>▪ Intersection lighting</li></ul> | 82%         | 1.8                        | \$ 28,000                            | \$ 14,500                                                                | 6.5                      |
| Quarry Ln to 61st Street              | 5                                        | 9.2                                       | 7.4                                      | <ul style="list-style-type: none"><li>▪ Inlaid Raised Pavement Markers</li></ul>                                                                      | 93%         | 11.0                       | \$ 14,000                            | \$ 90,500                                                                | 80.6                     |
| 61st Street                           | 1.2                                      | 0.7                                       | 0.8                                      | <ul style="list-style-type: none"><li>▪ Intersection lighting;</li><li>▪ Median on minor street approach</li></ul>                                    | 50%         | 7.8                        | \$ 27,000                            | \$ 64,500                                                                | 29.8                     |
| 61st Street to Deschutes<br>Jct.      | 1.4                                      | 6.1                                       | 4.1                                      | <ul style="list-style-type: none"><li>▪ Inlaid Raised Pavement Markers</li></ul>                                                                      | 93%         | 6.0                        | \$ 9,000                             | \$ 49,600                                                                | 68.7                     |
| Deschutes Jct.                        | 1.4                                      | 0.7                                       | 0.8                                      | <ul style="list-style-type: none"><li>▪ Restripe Merge</li></ul>                                                                                      | 99%         | 0.0                        | \$ 14,000                            | \$ 500                                                                   | 0.1                      |
| Deschutes Jct. to Ft<br>Thompson Ln   | 5.8                                      | 7.8                                       | 7.0                                      | <ul style="list-style-type: none"><li>▪ Inlaid Raised Pavement Markers;</li></ul>                                                                     | 93%         | 10.3                       | \$ 14,000                            | \$ 85,200                                                                | 75.8                     |
| Ft Thompson Ln                        | 0.6                                      | 0.9                                       | 0.8                                      | <ul style="list-style-type: none"><li>▪ None</li></ul>                                                                                                | N/A         | 0.0                        | \$ -                                 | \$ -                                                                     | --                       |
| Ft Thompson Ln to Bend<br>City Limits | 2.8                                      | 3.9                                       | 3.4                                      | <ul style="list-style-type: none"><li>▪ Install speed feedback signs in transition zones;</li><li>▪ Inlaid Raised Pavement Markers</li></ul>          | 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.



Short Term Countermeasures  
Deschutes County, Oregon

Figure  
15

0 2,000 4,000 Feet

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

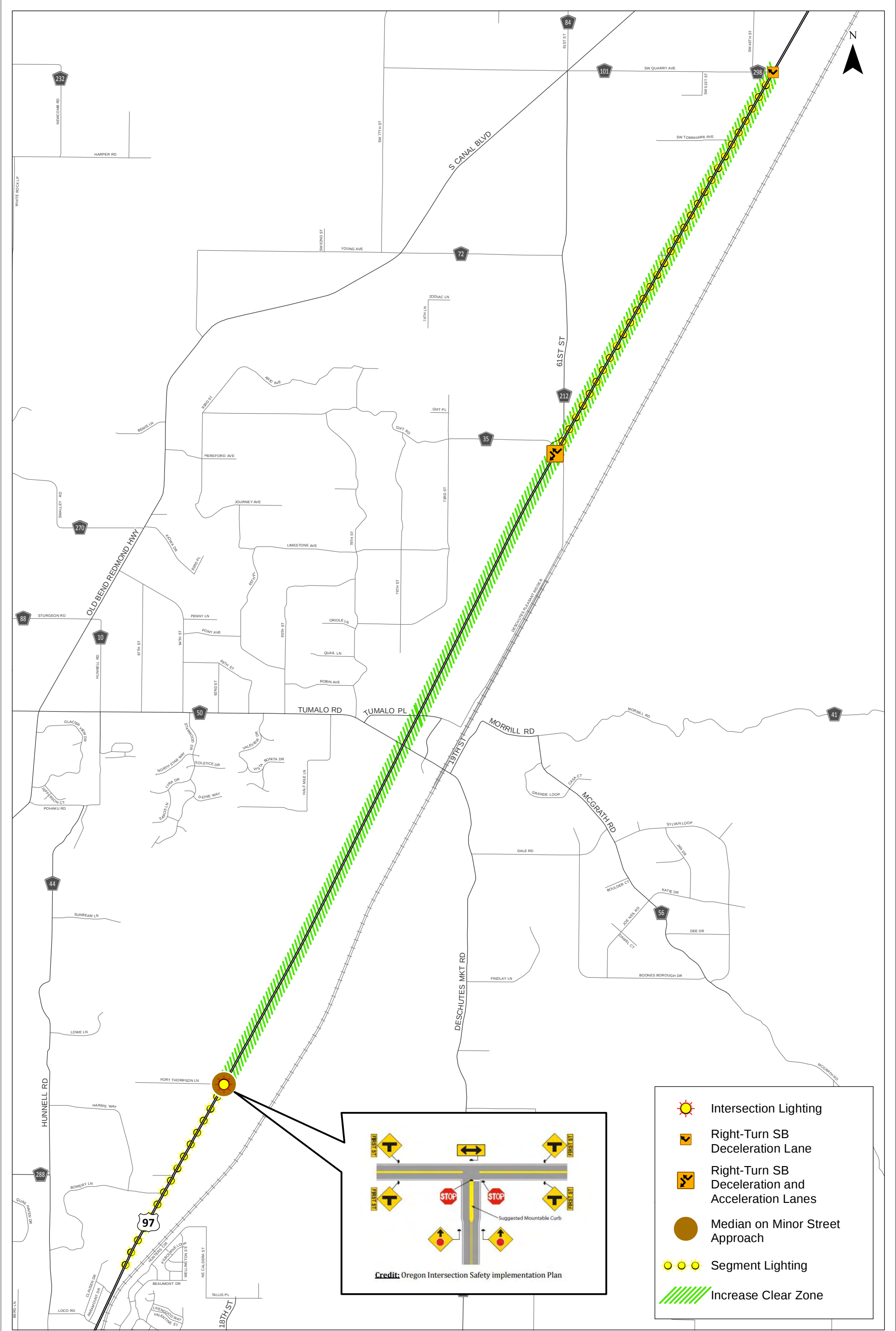
Medium-term projects are generally higher cost and tend to involve a greater degree of construction activity than short-term projects. Segment lighting, clear zone improvements projects, acceleration lanes, and deceleration lanes were classified as medium-term projects for this corridor. **Table 12** 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;<br>▪ 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;<br>▪ 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;<br>• 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.



Medium-Term Countermeasures  
Deschutes County, Oregon

Figure  
16

## 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.<sup>2</sup> 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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<sup>2</sup> Edara, et al. *Evaluation of J-turn Intersection Design Performance in Missouri*. December 2013.

### Phase 1 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 61<sup>st</sup> 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 61<sup>st</sup> Street in place of a J-turn. An aerial image of the intersection of US 97/61<sup>st</sup> Street is shown in **Figure 17**. The existing northbound left-turn from US 97 onto 61<sup>st</sup> 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 97/61<sup>st</sup> 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 61<sup>st</sup> 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

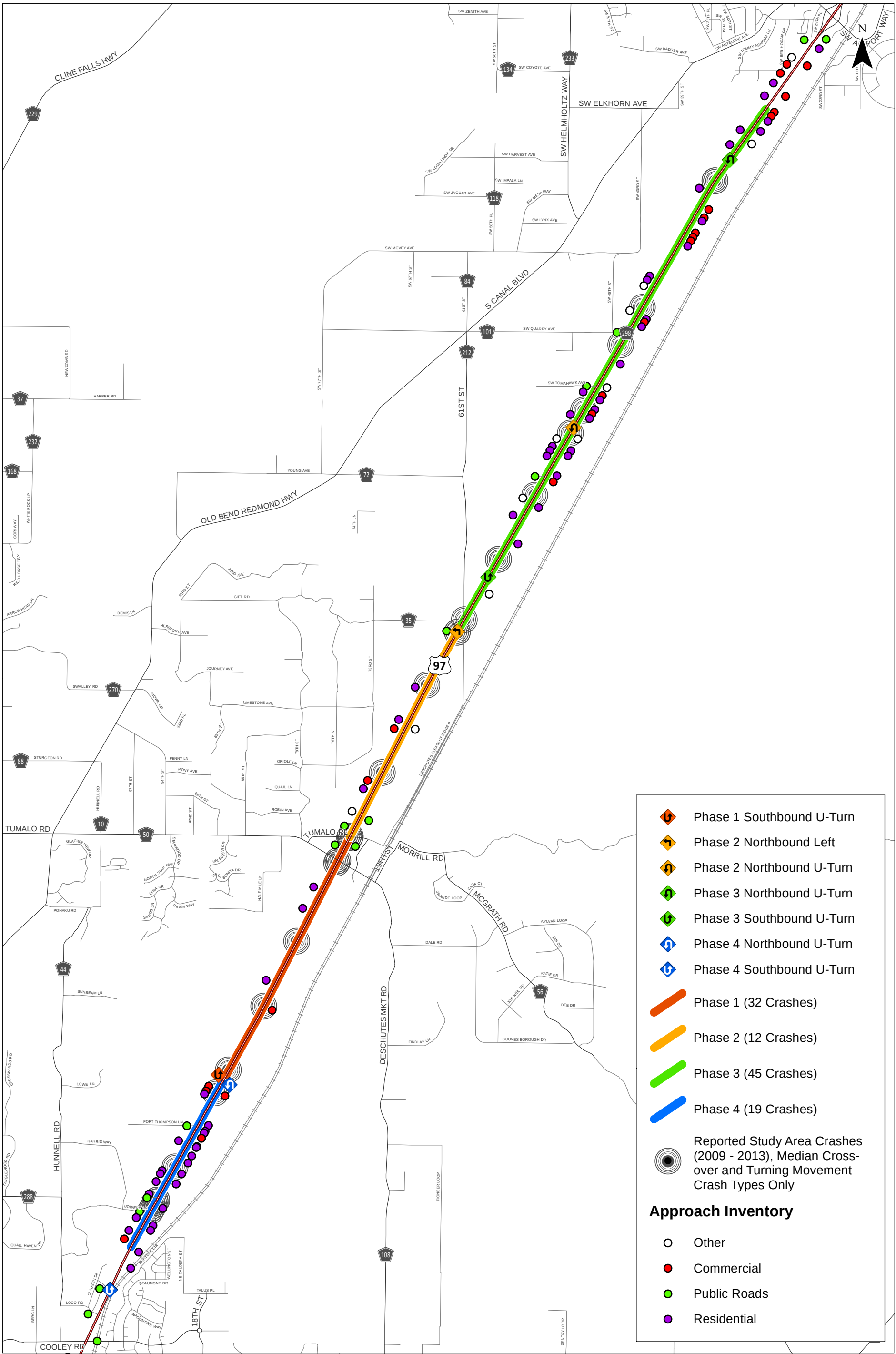
| Countermeasures    | Project Cost (\$)* | Project Benefit (\$) | B/C Ratio |
|--------------------|--------------------|----------------------|-----------|
| Median and U-turns | \$2,200,000        | \$3,000,000          | 1.4       |

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

H:\proj\18175 - US 97 Safety Plan\report figures\18175\_fig18\_median\_phases.mxd - openpdx - 2:44 PM 6/30/2015

## 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<br>Observed<br>Crash<br>Frequency | Annual<br>Predicted<br>Crash<br>Frequency | Annual<br>Expected<br>Crash<br>Frequency | Short-Term Project Countermeasures                                                                                                              | Project CMF | 20-Year Crash<br>Reduction | Preliminary 20-Yr<br>Cost Estimate** | Expected Annual<br>Comprehensive<br>Crash Cost<br>Reduction<br>(Benefit) | Benefit / Cost<br>Ratio* |
|---------------------------------------|------------------------------------------|-------------------------------------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------|--------------------------------------|--------------------------------------------------------------------------|--------------------------|
| Redmond City Limits to<br>Quarry Ln   | 3.2                                      | 6.5                                       | 5.1                                      | <ul style="list-style-type: none"><li>Install speed feedback signs in transition zones;</li><li>Inlaid Raised Pavement Markers</li></ul>        | 82%         | 19.1                       | \$ 32,000                            | \$ 157,100                                                               | 61.2                     |
| Quarry Ln                             | 0.2                                      | 0.6                                       | 0.5                                      | <ul style="list-style-type: none"><li>Increase sight distance;</li><li>Median on minor street approach;</li><li>Intersection lighting</li></ul> | 82%         | 1.8                        | \$ 28,000                            | \$ 14,500                                                                | 6.5                      |
| Quarry Ln to 61st Street              | 5                                        | 9.2                                       | 7.4                                      | <ul style="list-style-type: none"><li>Inlaid Raised Pavement Markers</li></ul>                                                                  | 93%         | 11.0                       | \$ 14,000                            | \$ 90,500                                                                | 80.6                     |
| 61st Street                           | 1.2                                      | 0.7                                       | 0.8                                      | <ul style="list-style-type: none"><li>Intersection lighting;</li><li>Median on minor street approach</li></ul>                                  | 50%         | 7.8                        | \$ 27,000                            | \$ 64,500                                                                | 29.8                     |
| 61st Street to Deschutes<br>Jct.      | 1.4                                      | 6.1                                       | 4.1                                      | <ul style="list-style-type: none"><li>Inlaid Raised Pavement Markers</li></ul>                                                                  | 93%         | 6.0                        | \$ 9,000                             | \$ 49,600                                                                | 68.7                     |
| Deschutes Jct.                        | 1.4                                      | 0.7                                       | 0.8                                      | <ul style="list-style-type: none"><li>Restripe merge</li></ul>                                                                                  | 99%         | 0.0                        | \$ 14,000                            | \$ 500                                                                   | 0.1                      |
| Deschutes Jct. to Ft<br>Thompson Ln   | 5.8                                      | 7.8                                       | 7.0                                      | <ul style="list-style-type: none"><li>Inlaid Raised Pavement Markers;</li></ul>                                                                 | 93%         | 10.3                       | \$ 14,000                            | \$ 85,200                                                                | 75.8                     |
| Ft Thompson Ln                        | 0.6                                      | 0.9                                       | 0.8                                      | <ul style="list-style-type: none"><li>None</li></ul>                                                                                            | N/A         | 0.0                        | \$ -                                 | \$ -                                                                     | --                       |
| Ft Thompson Ln to Bend<br>City Limits | 2.8                                      | 3.9                                       | 3.4                                      | <ul style="list-style-type: none"><li>Install speed feedback signs in transition zones;</li><li>Inlaid Raised Pavement Markers</li></ul>        | 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;<br>▪ 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;<br>▪ 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;<br>• 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 61 <sup>st</sup> Street) | One                        | \$1.6 million        | \$3.00 million       | 1.9       |
| Phase 3 | 124.40 – 128.578 (61 <sup>st</sup> 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 #<br>INVEST | SPEED | ALCOHOL | DRUG | SCH ZONE | WORK ZONE | DATE<br>DAY<br>TIME          | COUNTY<br>CITY<br>URB AREA | RD #<br>FUNCTIONAL CLASS<br>COMPONENT<br>MILEAGE TYPE<br>MILEPOINT                           | CONN #<br>FIRST STREET<br>SECOND STREET | RD CHAR<br>DIRECT<br>LOCTN | INT-TYP<br>(MEDIAN)<br>LEGS<br>(# LANES) | INT-REL<br>TRAF-CONTL | OFF RD<br>RND BT<br>DRVWY | WTHR<br>SURF<br>LIGHT | CRASH<br>COLL<br>SVRTY  | VEHICLE # | SPCL USE<br>TRLR QTY<br>OWNER<br>TYPE | MOVE<br>FROM<br>TO | PARTC # | PARTC TYPE | INJURY<br>SEVERITY | AGE | SEX | LICNS<br>RES  | PED<br>LOCATION                 | ERROR                                                                | ACTION                                       |       | EVENT                              |                                    |                                            | CAUSE                     |                                            |                           |
|-----------------|-------|---------|------|----------|-----------|------------------------------|----------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------|------------------------------------------|-----------------------|---------------------------|-----------------------|-------------------------|-----------|---------------------------------------|--------------------|---------|------------|--------------------|-----|-----|---------------|---------------------------------|----------------------------------------------------------------------|----------------------------------------------|-------|------------------------------------|------------------------------------|--------------------------------------------|---------------------------|--------------------------------------------|---------------------------|
|                 |       |         |      |          |           |                              |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |         |            |                    |     |     |               |                                 |                                                                      | VEHICLE<br>(PARTICIPANT)                     | CRASH | VEHICLE                            | PARTICIPANT                        | CRASH                                      | VEHICLE                   | PARTICIPANT                                |                           |
|                 |       |         |      |          |           |                              |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |         |            |                    |     |     |               |                                 |                                                                      |                                              |       |                                    |                                    |                                            |                           |                                            |                           |
| 01558<br>NO RPT | N     | N       | N    | N        | N         | 11/08/2013<br>Friday<br>5P   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>124.46 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLR<br>DRY<br>DARK    | ANIMAL<br>OTH<br>PDO    | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | NONE               | 48  | F   | OR-Y<br>OR<25 |                                 | 000-No Error                                                         | 000-No Action<br>(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<br>STATE  | N     | N       | N    | N        | N         | 07/09/2013<br>Tuesday<br>9A  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>124.50 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLR<br>DRY<br>DAY     | PED<br>PED<br>INJ       | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 35  | M   | OR-Y<br>OR<25 |                                 | 000-No Error                                                         | 000-No Action<br>(000-No Action)             |       |                                    |                                    | 02-Failed Yield ROW                        | 00-No Code                | 00-No Code                                 |                           |
|                 |       |         |      |          |           |                              |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 0         | 0                                     | STRGHT<br>E -W     | 1       | PED        | INJB               | 28  | M   |               | ROAD                            | 028-No ROW<br>(037-Cross Between Inter)                              |                                              |       |                                    | 02-Failed Yield ROW                |                                            |                           |                                            |                           |
| 00554<br>COUNTY | N     | N       | N    | N        | N         | 05/11/2010<br>Tuesday<br>4P  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>125.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLR<br>DRY<br>DAY     | S-1TURN<br>TURN<br>INJ  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | TURN-L<br>N -E     | 1       | DRVR       | INJC               | 86  | F   | OR-Y<br>OR<25 |                                 | 014-Imprpr Start Fr Stop<br>028-No ROW                               | 000-No Action<br>(000-No Action)             |       |                                    |                                    | 02-Failed Yield ROW<br>05-Drove Wrong Side | 00-No Code                | 02-Failed Yield ROW<br>05-Drove Wrong Side |                           |
|                 |       |         |      |          |           |                              |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | INJC               | 40  | M   | OR-Y<br>OR<25 |                                 | 000-No Error                                                         | 000-No Action<br>(000-No Action)             |       |                                    | 00-No Code                         |                                            | 00-No Code                |                                            |                           |
| 00835<br>NONE   | N     | N       | N    | N        | N         | 06/28/2011<br>Tuesday<br>11A | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>125.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | UNK<br>UNK<br>DAY     | ANIMAL<br>OTH<br>PDO    | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>UN-UN    | 1       | DRVR       | NONE               | 67  | F   | OR-Y<br>OR<25 |                                 | 000-No Error                                                         | 000-No Action<br>(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<br>STATE  | N     | Y       | N    | N        | N         | 11/16/2012<br>Friday<br>11P  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>125.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLD<br>DRY<br>DARK    | S-STRGHT<br>REAR<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | INJB               | 23  | M   | OR-Y<br>OR<25 |                                 | 042-FailSlowForSlowVeh                                               | 000-No Action<br>(000-No Action)             |       | 010-Subseq Overturn                |                                    | 07-Followed too Closely                    | 00-No Code                | 07-Followed too Closely                    |                           |
|                 |       |         |      |          |           |                              |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | INJB               | 46  | M   | OR-Y<br>OR<25 |                                 | 000-No Error                                                         | 000-No Action<br>(000-No Action)             |       |                                    | 00-No Code                         |                                            | 00-No Code                |                                            |                           |
|                 |       |         |      |          |           |                              |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    | 2       | PSNG       | INJA               | 70  | M   |               | 000-No Error<br>(000-No Action) |                                                                      |                                              |       |                                    |                                    | 00-No Code                                 |                           |                                            |                           |
| 01472<br>STATE  | N     | N       | N    | N        | N         | 11/18/2010<br>Thursday<br>9A | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>125.00 |                                         | ALLEY<br>UN<br>04          | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | SNOW<br>WET<br>DAY    | S-1STOP<br>REAR<br>INJ  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | INJC               | 25  | F   | OR-Y<br>OR<25 |                                 | 026-Faild Avoid Stop Veh                                             | 000-No Action<br>(000-No Action)             |       |                                    |                                    | 27-Inattention                             | 00-No Code                | 27-Inattention                             |                           |
|                 |       |         |      |          |           |                              |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STOP<br>S -N       | 1       | DRVR       | INJC               | 37  | F   | OR-Y<br>OR<25 |                                 | 000-No Error                                                         | 011-Stop In Traf-No Lturn<br>(000-No Action) |       |                                    | 00-No Code                         |                                            | 00-No Code                |                                            |                           |
|                 |       |         |      |          |           |                              |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 3         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STOP<br>S -N       | 1       | DRVR       | NONE               | 82  | M   | OR-Y<br>OR<25 |                                 | 000-No Error                                                         | 012-Stop For Left Turn<br>(000-No Action)    |       |                                    | 00-No Code                         |                                            | 00-No Code                |                                            |                           |
| 01822<br>STATE  | N     | N       | N    | N        | N         | 12/27/2010<br>Monday<br>5P   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>125.00 |                                         | STRGHT<br>UN<br>05         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLR<br>DRY<br>DUSK    | S-1TURN<br>TURN<br>INJ  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | U-TURN<br>S -S     | 1       | DRVR       | INJB               | 85  | M   | OR-Y<br>OR<25 |                                 | 052-Careless Driving<br>008-Illegal U-Turn<br>045-Improper Lane Chng | 000-No Action<br>(000-No Action)             |       |                                    |                                    | 32-Careless Driving<br>08-Improper Turn    | 00-No Code                | 32-Careless Driving<br>08-Improper Turn    |                           |
|                 |       |         |      |          |           |                              |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | INJA               | 67  | F   | OR-Y<br>OR<25 |                                 | 000-No Error                                                         | 000-No Action<br>(000-No Action)             |       |                                    | 00-No Code                         |                                            | 00-No Code                |                                            |                           |
|                 |       |         |      |          |           |                              |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    | 2       | PSNG       | INJA               | 66  | M   |               | 000-No Error<br>(000-No Action) |                                                                      |                                              |       |                                    |                                    | 00-No Code                                 |                           |                                            |                           |
| 01140<br>STATE  | Y     | Y       | N    | N        | N         | 07/22/2012<br>Sunday<br>9P   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>125.50 |                                         | STRGHT<br>UN<br>01         | (NONE )<br>(4)                           | N<br>UNKNOWN          | Y<br>N                    | CLR<br>DRY<br>DARK    | FIX OBJ<br>FIX<br>PDO   | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | NONE               | 35  | M   | OR-Y<br>OR<25 |                                 | 081-Ran Off Road                                                     | 000-No Action<br>(000-No Action)             |       | 061-Mailbox<br>010-Subseq Overturn | 061-Mailbox<br>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 #<br>INVEST | SPEED | ALCOHOL | DRUG | SCH ZONE | DATE<br>DAY<br>TIME | COUNTY<br>CITY<br>URB AREA    | RD #<br>FUNCTIONAL CLASS<br>COMPONENT<br>MILEAGE TYPE<br>MILEPOINT | CONN #<br>FIRST STREET<br>SECOND STREET                                                      | RD CHAR<br>DIRECT<br>LOCTN | INT-TYP<br>(MEDIAN)<br>LEGS<br>(# LANES) | INT-REL<br>TRAF-CONTL | OFF RD<br>RDNDBT<br>DRVWY | WTHR<br>SURF<br>LIGHT | CRASH<br>COLL<br>SVRTY  | VEHICLE # | SPCL USE<br>TLRL QTY<br>OWNER<br>TYPE | MOVE<br>FROM<br>TO | PART # | PART TYPE | INJURY<br>SEVERITY | AGE | SEX | LICNS<br>RES   | PED<br>LOCATION | ERROR                                                                | ACTION                                       | EVENT                                            |                                                 |                                                                  | CAUSE                   |                                                                  |             |
|-----------------|-------|---------|------|----------|---------------------|-------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------|----------------------------|------------------------------------------|-----------------------|---------------------------|-----------------------|-------------------------|-----------|---------------------------------------|--------------------|--------|-----------|--------------------|-----|-----|----------------|-----------------|----------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------|-------------------------|------------------------------------------------------------------|-------------|
|                 |       |         |      |          |                     |                               |                                                                    |                                                                                              |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                      | VEHICLE<br>(PARTICIPANT)                     | CRASH                                            | VEHICLE                                         | PARTICIPANT                                                      | CRASH                   | VEHICLE                                                          | PARTICIPANT |
| 01847<br>STATE  | Y     | N       | N    | N        | N                   | 12/29/2010<br>Wednesday<br>7P | Deschutes                                                          | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>125.50 | STRGHT<br>UN<br>04         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | SNOW<br>ICE<br>DARK   | S-STRGHT<br>SS-O<br>INJ | 1         | NONE<br>1<br>PRVTE<br>SEMI TOW        | STRGHT<br>N-S      | 1      | DRVR      | NONE               | 30  | M   | OTH-Y<br>N-RES |                 | 000-No Error                                                         | 022-Struck Obj Prior Coll<br>(000-No Action) | 013-Forced By Impact                             |                                                 | 01-Too Fast For Cond                                             | 00-No Code              | 00-No Code                                                       |             |
|                 |       |         |      |          |                     |                               |                                                                    |                                                                                              |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N-S      | 1      | DRVR      | INJC               | 25  | M   | OR-Y<br>OR<25  |                 | 080-Fail To MaintainLane<br>039-Drive On Wrong Side                  | 000-No Action<br>(017-Lost Control)          | 124-Slide b/c of surface<br>013-Forced By Impact |                                                 | 00-No Code                                                       |                         | 01-Too Fast For Cond                                             |             |
|                 |       |         |      |          |                     |                               |                                                                    |                                                                                              |                            |                                          |                       |                           |                       |                         | 3         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S-N      | 1      | DRVR      | INJC               | 40  | F   | OR-Y<br>OR<25  |                 | 000-No Error                                                         | 022-Struck Obj Prior Coll<br>(000-No Action) |                                                  |                                                 | 00-No Code                                                       |                         | 00-No Code                                                       |             |
|                 |       |         |      |          |                     |                               |                                                                    |                                                                                              |                            |                                          |                       |                           |                       |                         | 4         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S-N      | 1      | DRVR      | INJC               | 45  | F   | OR-Y<br>OR<25  |                 | 000-No Error                                                         | 022-Struck Obj Prior Coll<br>(000-No Action) |                                                  |                                                 | 00-No Code                                                       |                         | 00-No Code                                                       |             |
| 00326<br>NO RPT | Y     | N       | N    | N        | N                   | 02/26/2009<br>Thursday<br>9A  | Deschutes                                                          | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>126.00 | STRGHT<br>UN<br>01         | (NONE )<br>(4)                           | N<br>UNKNOWN          | Y<br>N                    | CLR<br>ICE<br>DAY     | O-STRGHT<br>SS-M<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N-S      | 1      | DRVR      | NONE               | 54  | M   | OR-Y<br>OR>25  |                 | 047-Violation Basic Rule<br>080-Fail To MaintainLane                 | 000-No Action<br>(000-No Action)             | 124-Slide b/c of surface                         | 124-Slide b/c of surface                        | 01-Too Fast For Cond<br>05-Drove Wrong Side                      | 00-No Code              | 01-Too Fast For Cond<br>05-Drove Wrong Side                      |             |
|                 |       |         |      |          |                     |                               |                                                                    |                                                                                              |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S-UN     | 1      | DRVR      | NONE               | 29  | M   | OR-Y<br>OR<25  |                 | 000-No Error                                                         | 000-No Action<br>(000-No Action)             |                                                  |                                                 | 00-No Code                                                       |                         | 00-No Code                                                       |             |
| 01358<br>COUNTY | N     | N       | N    | N        | N                   | 10/02/2013<br>Wednesday<br>8A | Deschutes                                                          | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>126.00 | STRGHT<br>UN<br>01         | (NONE )<br>(4)                           | N<br>UNKNOWN          | Y<br>N                    | CLR<br>DRY<br>DAY     | FIX OBJ<br>FIX<br>PDO   | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N-S      | 1      | DRVR      | NONE               | 50  | F   | OR-Y<br>OR<25  |                 | 081-Ran Off Road                                                     | 000-No Action<br>(028-Physical Illness)      | 061-Mailbox                                      | 061-Mailbox                                     | 16-Driver sleepy                                                 | 00-No Code              | 16-Driver sleepy                                                 |             |
| 01684<br>COUNTY | Y     | N       | N    | N        | N                   | 12/02/2013<br>Monday<br>8A    | Deschutes                                                          | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>126.00 | STRGHT<br>UN<br>01         | (NONE )<br>(4)                           | N<br>UNKNOWN          | Y<br>N                    | RAIN<br>WET<br>DAY    | OVERTURN<br>NCOL<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N-S      | 1      | DRVR      | INJC               | 45  | F   | OR-Y<br>OR<25  |                 | 081-Ran Off Road                                                     | 000-No Action<br>(000-No Action)             | 124-Slide b/c of surface<br>079-Cut Slope/Ditch  | 124-Slide b/c of surface<br>079-Cut Slope/Ditch | 01-Too Fast For Cond                                             | 00-No Code              | 01-Too Fast For Cond                                             |             |
| 01435<br>NONE   | N     | N       | N    | N        | N                   | 11/11/2010<br>Thursday<br>5P  | Deschutes                                                          | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>126.00 | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLR<br>DRY<br>DUSK    | S-1STOP<br>REAR<br>PDO  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S-N      | 1      | DRVR      | NONE               | 36  | F   | OR-Y<br>OR<25  |                 | 026-Faild Avoid Stop Veh                                             | 000-No Action<br>(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<br>0<br>PRVTE<br>PSNGR CAR       | STOP<br>S-N        | 1      | DRVR      | NONE               | 41  | F   | OR-Y<br>OR<25  |                 | 000-No Error                                                         | 011-Stop In Traf-No Ltum<br>(000-No Action)  |                                                  |                                                 | 00-No Code                                                       |                         | 00-No Code                                                       |             |
| 01521<br>STATE  | Y     | N       | N    | N        | N                   | 10/18/2013<br>Friday<br>7P    | Deschutes                                                          | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>126.00 | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | Y<br>N                    | CLR<br>DRY<br>DARK    | PRKD MV<br>REAR<br>INJ  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S-N      | 1      | DRVR      | NONE               | 21  | M   | OR-Y<br>OR<25  |                 | 051-Reckless Driving<br>081-Ran Off Road<br>031-Passing Wrong Side   | 000-No Action<br>(000-No Action)             | 092-Phantom Vehicle                              | 092-Phantom Vehicle                             | 33-Reckless Driving<br>31-Speed Racing<br>06-Improper Overtaking | 00-No Code              | 33-Reckless Driving<br>31-Speed Racing<br>06-Improper Overtaking |             |
|                 |       |         |      |          |                     |                               |                                                                    |                                                                                              |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | PRKD-P<br>S-N      | 1      | PRKD      | INJC               | 42  | M   |                |                 | 000-No Error                                                         | 008-Parallel Parking<br>(000-No Action)      |                                                  |                                                 | 00-No Code                                                       |                         | 00-No Code                                                       |             |
| 00170<br>STATE  | N     | Y       | N    | N        | N                   | 02/11/2010<br>Thursday<br>12A | Deschutes                                                          | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>126.00 | STRGHT<br>UN<br>08         | (NONE )<br>(4)                           | N<br>UNKNOWN          | Y<br>N                    | CLD<br>DRY<br>DARK    | FIX OBJ<br>FIX<br>INJ   | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S-N      | 1      | DRVR      | INJC               | 26  | F   | OR-Y<br>OR<25  |                 | 051-Reckless Driving<br>080-Fail To MaintainLane<br>081-Ran Off Road | 000-No Action<br>(000-No Action)             | 088-Fence/Building                               | 088-Fence/Building                              | 33-Reckless Driving<br>05-Drove Wrong Side                       | 00-No Code              | 33-Reckless Driving<br>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 #<br>INVEST | SPEED | ALCOHOL | DRUG | SCH ZONE | WORK ZONE | DATE<br>DAY<br>TIME           | COUNTY<br>CITY<br>URB AREA | RD #<br>FUNCTIONAL CLASS<br>COMPONENT<br>MILEAGE TYPE<br>MILEPOINT                           | CONN #<br>FIRST STREET<br>SECOND STREET | RD CHAR<br>DIRECT<br>LOCTN | INT-TYP<br>(MEDIAN)<br>LEGS<br>(# LANES) | INT-REL<br>TRAF-CONTL | OFF RD<br>RND BT<br>DRVWY | WTHR<br>SURF<br>LIGHT | CRASH<br>COLL<br>SVRTY  | VEHICLE # | SPCL USE<br>TRLR QTY<br>OWNER<br>TYPE | MOVE<br>FROM<br>TO | PARTC # | PARTC TYPE | INJURY<br>SEVERITY | AGE | SEX | LICNS<br>RES  | PED<br>LOCATION | ERROR                                                                      | ACTION                              | EVENT                                                                  |                                                                        |                      | CAUSE                                                |            |                                                      |  |             |
|-----------------|-------|---------|------|----------|-----------|-------------------------------|----------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------|------------------------------------------|-----------------------|---------------------------|-----------------------|-------------------------|-----------|---------------------------------------|--------------------|---------|------------|--------------------|-----|-----|---------------|-----------------|----------------------------------------------------------------------------|-------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------|----------------------|------------------------------------------------------|------------|------------------------------------------------------|--|-------------|
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |         |            |                    |     |     |               |                 |                                                                            | VEHICLE<br>(PARTICIPANT)            | CRASH                                                                  | VEHICLE                                                                |                      | PARTICIPANT                                          | CRASH      | VEHICLE                                              |  | PARTICIPANT |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |         |            |                    |     |     |               |                 |                                                                            |                                     |                                                                        |                                                                        |                      |                                                      |            |                                                      |  |             |
| 00113<br>COUNTY | Y     | N       | N    | N        | N         | 01/25/2009<br>Sunday<br>12P   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>126.00 |                                         | STRGHT<br>S<br>05          | (NONE )<br>(4)                           | N<br>NONE             | Y<br>N<br>N               | SNOW<br>ICE<br>DAY    | S-STRGHT<br>OTH<br>PDO  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 17  | M   | OR-Y<br>OR<25 |                 | 047-Violation Basic Rule<br>080-Fail To MaintainLane                       | 000-No Action<br>(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<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 25  | M   | OR-Y<br>OR<25 |                 | 000-No Error                                                               | 000-No Action<br>(000-No Action)    |                                                                        |                                                                        |                      | 00-No Code                                           | 00-No Code |                                                      |  |             |
| 01509<br>COUNTY | N     | Y       | N    | N        | N         | 11/11/2012<br>Sunday<br>6P    | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>126.20 |                                         | INTER<br>UN<br>05          | 3-LEG<br>( )<br>0<br>( )                 | N<br>STOP SIGN        | Y<br>N<br>N               | CLD<br>DRY<br>DUSK    | FIX OBJ<br>FIX<br>PDO   | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>W -E     | 1       | DRVR       | NONE               | 46  | F   | OR-Y<br>OR<25 |                 | 081-Ran Off Road                                                           | 000-No Action<br>(000-No Action)    | 088-Fence/Building                                                     | 088-Fence/Building                                                     |                      | 03-Passed Stop Sign                                  | 00-No Code | 03-Passed Stop Sign                                  |  |             |
| 00300<br>COUNTY | Y     | N       | N    | N        | N         | 03/08/2013<br>Friday<br>6A    | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>126.30 |                                         | STRGHT<br>UN<br>04         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N<br>N               | SNOW<br>ICE<br>DAY    | O-STRGHT<br>SS-M<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | NONE               | 44  | M   | OR-Y<br>OR<25 |                 | 081-Ran Off Road                                                           | 000-No Action<br>(000-No Action)    | 124-Slide b/c of surface<br>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<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 48  | M   | OR-Y<br>OR<25 |                 | 000-No Error                                                               | 000-No Action<br>(000-No Action)    |                                                                        |                                                                        |                      | 00-No Code                                           | 00-No Code |                                                      |  |             |
| 00986<br>COUNTY | N     | N       | N    | N        | N         | 08/17/2010<br>Tuesday<br>8P   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>126.33 |                                         | STRGHT<br>S<br>03          | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N<br>N               | CLR<br>DRY<br>DAY     | S-1STOP<br>REAR<br>INJ  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | INJB               | 19  | F   | OR-Y<br>OR<25 |                 | 052-Careless Driving<br>042-FailSlowForSlowVeh                             | 000-No Action<br>(000-No Action)    |                                                                        |                                                                        |                      | 32-Careless Driving                                  | 00-No Code | 32-Careless Driving                                  |  |             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>1<br>PRVTE<br>SEMI TOW        | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 61  | M   | OR-Y<br>OR<25 |                 | 000-No Error                                                               | 000-No Action<br>(000-No Action)    |                                                                        |                                                                        |                      | 00-No Code                                           | 00-No Code |                                                      |  |             |
| 00387<br>COUNTY | N     | N       | N    | N        | N         | 03/27/2010<br>Saturday<br>8P  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>126.60 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>NONE             | N<br>N<br>N               | CLR<br>DRY<br>DUSK    | S-STRGHT<br>REAR<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 62  | M   | OR-Y<br>OR<25 |                 | 042-FailSlowForSlowVeh                                                     | 000-No Action<br>(000-No Action)    |                                                                        |                                                                        |                      | 07-Followed too Closely                              | 00-No Code | 07-Followed too Closely                              |  |             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 75  | M   | OR-Y<br>OR<25 |                 | 000-No Error                                                               | 000-No Action<br>(000-No Action)    |                                                                        |                                                                        |                      | 00-No Code                                           | 00-No Code |                                                      |  |             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    | 2       | PSNG       | INJC               | 20  | F   |               |                 | 000-No Error                                                               | (000-No Action)                     |                                                                        |                                                                        |                      | 00-No Code                                           | 00-No Code |                                                      |  |             |
| 01304<br>STATE  | Y     | N       | N    | N        | N         | 09/27/2011<br>Tuesday<br>9P   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>126.70 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>NONE             | N<br>N<br>N               | CLR<br>DRY<br>DARK    | S-1STOP<br>REAR<br>PDO  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | NONE               | 32  | F   | OR-Y<br>OR<25 |                 | 052-Careless Driving<br>042-FailSlowForSlowVeh<br>080-Fail To MaintainLane | 000-No Action<br>(000-No Action)    | 010-Subseq Overturn<br>087-Fire/Explosion                              | 087-Fire/Explosion                                                     |                      | 32-Careless Driving<br>30-Speeding<br>27-Inattention | 00-No Code | 32-Careless Driving<br>30-Speeding<br>27-Inattention |  |             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | NONE               | 49  | F   | SUSP<br>OR<25 |                 | 000-No Error                                                               | 000-No Action<br>(000-No Action)    |                                                                        | 010-Subseq Overturn                                                    |                      | 00-No Code                                           | 00-No Code |                                                      |  |             |
| 00912<br>NO RPT | N     | N       | N    | N        | N         | 02/26/2009<br>Thursday<br>5A  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>126.82 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N<br>N               | SNOW<br>ICE<br>DARK   | O-STRGHT<br>SS-M<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 39  | M   | OR-Y<br>OR<25 |                 | 080-Fail To MaintainLane                                                   | 000-No Action<br>(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<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | NONE               | 39  | M   | OR-Y<br>OR<25 |                 | 000-No Error                                                               | 000-No Action<br>(000-No Action)    |                                                                        |                                                                        |                      | 00-No Code                                           | 00-No Code |                                                      |  |             |
| 01636<br>COUNTY | Y     | N       | N    | N        | N         | 12/04/2010<br>Saturday<br>10P | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>127.00 |                                         | STRGHT<br>UN<br>01         | (DIVMD)<br>(4)                           | N<br>UNKNOWN          | Y<br>N<br>N               | SNOW<br>ICE<br>DARK   | FIX OBJ<br>FIX<br>PDO   | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 30  | M   | OR-Y<br>OR<25 |                 | 080-Fail To MaintainLane<br>081-Ran Off Road                               | 000-No Action<br>(017-Lost Control) | 124-Slide b/c of surface<br>079-Cut Slope/Ditch<br>010-Subseq Overturn | 124-Slide b/c of surface<br>079-Cut Slope/Ditch<br>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 #<br>INVEST | SPEED | ALCOHOL | DRUG | SCH ZONE | WORK ZONE | DATE<br>DAY<br>TIME         | COUNTY<br>CITY<br>URB AREA | RD #<br>FUNCTIONAL CLASS<br>COMPONENT<br>MILEAGE TYPE<br>MILEPOINT                           | CONN #<br>FIRST STREET<br>SECOND STREET | RD CHAR<br>DIRECT<br>LOCTN | INT-TYP<br>(MEDIAN)<br>LEGS<br>(# LANES) | RD<br>INT-REL<br>TRAF-CONTL | OFF RD<br>RDNDBT<br>DRVWY | WTHR<br>SURF<br>LIGHT | CRASH<br>COLL<br>SVRVTY | VEHICLE # | SPCL USE<br>TRLR QTY<br>OWNER<br>TYPE | MOVE<br>FROM<br>TO | PARTC # | PARTC TYPE | INJURY<br>SEVERITY | AGE | SEX | LICNS<br>RES  | RED<br>LOCATION | ERROR                  | ACTION                           |                                                  | EVENT                    |             |                      | CAUSE      |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|                 |       |         |      |          |           |                             |                            |                                                                                              |                                         |                            |                                          |                             |                           |                       |                         |           |                                       |                    |         |            |                    |     |     |               |                 |                        |                                  |                                                  |                          |             |                      |            |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 00298<br>NO RPT | Y     | N       | N    | N        | N         | 02/27/2012<br>Monday<br>10A | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>127.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N           | N<br>N<br>N               | CLR<br>ICE<br>DAY     | S-STRGHT<br>REAR<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 56  | F   | OR-Y<br>OR<25 |                 | 042-FailSlowForSlowVeh | 000-No Action<br>(000-No Action) | 124-Slide b/c of surface<br>013-Forced By Impact | 124-Slide b/c of surface |             | 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 #<br>INVEST | SPEED | ALCOHOL | DRUG | SCH ZONE | WORK ZONE | DATE<br>DAY<br>TIME           | COUNTY<br>CITY<br>URB AREA | RD #<br>FUNCTIONAL CLASS<br>COMPONENT<br>MILEAGE TYPE<br>MILEPOINT                           | CONN #<br>FIRST STREET<br>SECOND STREET | RD CHAR<br>DIRECT<br>LOCTN | INT-TYP<br>(MEDIAN)<br>LEGS<br>(# LANES) | INT-REL<br>TRAF-CONTL | OFF RD<br>RND BT<br>DRVWY | WTHR<br>SURF<br>LIGHT | CRASH<br>COLL<br>SVRTY  | VEHICLE # | SPCL USE<br>TRLR QTY<br>OWNER<br>TYPE | MOVE<br>FROM<br>TO | PART # | PART TYPE | INJURY<br>SEVERITY | AGE | SEX | LICNS<br>RES   | PED<br>LOCATION | ERROR                                                                       | ACTION                                       | EVENT                                                                  |                                                                  |                                 | CAUSE                                       |                                 |                                             |
|-----------------|-------|---------|------|----------|-----------|-------------------------------|----------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------|------------------------------------------|-----------------------|---------------------------|-----------------------|-------------------------|-----------|---------------------------------------|--------------------|--------|-----------|--------------------|-----|-----|----------------|-----------------|-----------------------------------------------------------------------------|----------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------|---------------------------------------------|---------------------------------|---------------------------------------------|
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                             | VEHICLE<br>(PARTICIPANT)                     | CRASH                                                                  | VEHICLE                                                          | PARTICIPANT                     | CRASH                                       | VEHICLE                         | PARTICIPANT                                 |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                             |                                              |                                                                        |                                                                  |                                 |                                             |                                 |                                             |
| 00261<br>NO RPT | Y     | N       | N    | N        | N         | 02/23/2011<br>Wednesday<br>9P | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>127.49 |                                         | STRGHT<br>UN<br>04         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLR<br>ICE<br>DARK    | O-STRGHT<br>HEAD<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 58  | M   | OTH-Y<br>N-RES |                 | 080-Fail To MaintainLane<br>047-Violation Basic Rule                        | 000-No Action<br>(000-No Action)             | 124-Slide b/c of surface                                               | 124-Slide b/c of surface                                         |                                 | 05-Drove Wrong Side<br>01-Too Fast For Cond | 00-No Code                      | 05-Drove Wrong Side<br>01-Too Fast For Cond |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                             |                                              |                                                                        |                                                                  |                                 |                                             |                                 |                                             |
| 01457<br>COUNTY | Y     | N       | N    | N        | N         | 10/30/2011<br>Sunday<br>5A    | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.00 |                                         | STRGHT<br>UN<br>01         | (NONE )<br>(4)                           | N<br>UNKNOWN          | Y<br>N                    | CLR<br>DRY<br>DARK    | PRKD MV<br>REAR<br>INJ  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | INJB               | 20  | F   | OR-Y<br>OR<25  |                 | 050-Excessive Speed<br>080-Fail To MaintainLane<br>026-Falld Avoid Stop Veh | 000-No Action<br>(025-Driver Sleepy/Asleep)  |                                                                        |                                                                  | 16-Driver sleepy<br>30-Speeding | 00-No Code                                  | 16-Driver sleepy<br>30-Speeding |                                             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                             |                                              |                                                                        |                                                                  |                                 |                                             |                                 |                                             |
| 01715<br>COUNTY | Y     | N       | N    | N        | N         | 12/16/2012<br>Sunday<br>9A    | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.00 |                                         | STRGHT<br>UN<br>01         | (NONE )<br>(4)                           | N<br>UNKNOWN          | Y<br>N                    | CLD<br>ICE<br>DAY     | FIX OBJ<br>FIX<br>INJ   | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | INJC               | 28  | F   | OTH-Y<br>N-RES |                 | 081-Ran Off Road                                                            | 000-No Action<br>(000-No Action)             | 124-Slide b/c of surface<br>088-Fence/Building<br>062-Tree/Stump       | 124-Slide b/c of surface<br>088-Fence/Building<br>062-Tree/Stump |                                 | 01-Too Fast For Cond                        | 00-No Code                      | 01-Too Fast For Cond                        |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                             |                                              |                                                                        |                                                                  |                                 |                                             |                                 |                                             |
| 01768<br>STATE  | N     | N       | N    | N        | N         | 12/19/2010<br>Sunday<br>11A   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLD<br>SNO<br>DAY     | S-STRGHT<br>SS-O<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 47  | F   | OR-Y<br>OR>25  |                 | 080-Fail To MaintainLane                                                    | 000-No Action<br>(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                       |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                             |                                              |                                                                        |                                                                  |                                 |                                             |                                 |                                             |
| 00534<br>STATE  | N     | N       | N    | N        | N         | 04/20/2011<br>Wednesday<br>5A | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLR<br>DRY<br>DAWN    | ANGL-OTH<br>TURN<br>INJ | 1         | NONE<br>0<br>PRVTE<br>MTRCYCLE        | TURN-R<br>E -N     | 1      | DRVR      | INJA               | 60  | M   | OR-Y<br>OR<25  |                 | 028-No ROW                                                                  | 032-Parked Off Roadway<br>(000-No Action)    | 001-Fell/Jumped frm Veh<br>013-Forced By Impact<br>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<br>1<br>PRVTE<br>SEMI TOW        | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 46  | M   | OR-Y<br>OR<25  |                 | 000-No Error                                                                | 000-No Action<br>(000-No Action)             |                                                                        |                                                                  |                                 | 00-No Code                                  | 00-No Code                      |                                             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                             |                                              |                                                                        |                                                                  |                                 |                                             |                                 |                                             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 3         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 33  | F   | OR-Y<br>OR<25  |                 | 000-No Error                                                                | 000-No Action<br>(000-No Action)             | 010-Subseq Overturn                                                    |                                                                  |                                 | 00-No Code                                  | 00-No Code                      |                                             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                             |                                              |                                                                        |                                                                  |                                 |                                             |                                 |                                             |
| 01821<br>STATE  | Y     | N       | N    | N        | N         | 12/26/2012<br>Wednesday<br>8A | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.00 |                                         | STRGHT<br>UN<br>05         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLD<br>ICE<br>DAY     | O-STRGHT<br>SS-M<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 42  | F   | OR-Y<br>OR<25  |                 | 047-Violation Basic Rule<br>080-Fail To MaintainLane                        | 000-No Action<br>(000-No Action)             | 124-Slide b/c of surface                                               | 124-Slide b/c of surface                                         |                                 | 01-Too Fast For Cond<br>05-Drove Wrong Side | 00-No Code                      | 01-Too Fast For Cond<br>05-Drove Wrong Side |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                             |                                              |                                                                        |                                                                  |                                 |                                             |                                 |                                             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 55  | F   | OR-Y<br>OR<25  |                 | 000-No Error                                                                | 000-No Action<br>(000-No Action)             |                                                                        |                                                                  |                                 | 00-No Code                                  | 00-No Code                      |                                             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                             |                                              |                                                                        |                                                                  |                                 |                                             |                                 |                                             |
| 00792<br>COUNTY | N     | N       | N    | N        | N         | 06/27/2009<br>Saturday<br>11A | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.00 |                                         | STRGHT<br>UN<br>06         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLR<br>DRY<br>DAY     | S-1STOP<br>REAR<br>PDO  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 26  | F   | OR-Y<br>OR<25  |                 | 026-Falld Avoid Stop Veh                                                    | 000-No Action<br>(000-No Action)             |                                                                        |                                                                  | 07-Followed too Closely         | 00-No Code                                  | 07-Followed too Closely         |                                             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                             |                                              |                                                                        |                                                                  |                                 |                                             |                                 |                                             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STOP<br>S -N       | 1      | DRVR      | NONE               | 88  | M   | OR-Y<br>OR<25  |                 | 000-No Error                                                                | 011-Stop In Traf-No Lturn<br>(000-No Action) |                                                                        |                                                                  | 00-No Code                      | 00-No Code                                  |                                 |                                             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                             |                                              |                                                                        |                                                                  |                                 |                                             |                                 |                                             |
| 00249<br>COUNTY | Y     | N       | N    | N        | N         | 02/17/2009<br>Tuesday<br>6A   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.08 |                                         | STRGHT<br>UN<br>01         | (NONE )<br>(4)                           | N<br>UNKNOWN          | Y<br>N                    | SNOW<br>ICE<br>DAWN   | FIX OBJ<br>FIX<br>PDO   | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 36  | M   | OR-Y<br>OR<25  |                 | 047-Violation Basic Rule<br>081-Ran Off Road                                | 000-No Action<br>(000-No Action)             | 124-Slide b/c of surface<br>010-Subseq Overturn<br>088-Fence/Building  | 124-Slide b/c of surface<br>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 #<br>INVEST | SPEED | ALCOHOL | DRUG | SCH ZONE | WORK ZONE | DATE<br>DAY<br>TIME            | COUNTY<br>CITY<br>URB AREA | RD #<br>FUNCTIONAL CLASS<br>COMPONENT<br>MILEAGE TYPE<br>MILEPOINT                           | CONN #<br>FIRST STREET<br>SECOND STREET | RD CHAR<br>DIRECT<br>LOCTN | INT-TYP<br>(MEDIAN)<br>LEGS<br>(# LANES) | INT-REL<br>TRAF-CONTL | OFF RD<br>RND BT<br>DRVWY | WTHR<br>SURF<br>LIGHT | CRASH<br>COLL<br>SVRTY  | VEHICLE # | SPCL USE<br>TRLR QTY<br>OWNER<br>TYPE | MOVE<br>FROM<br>TO              | PARTC #       | PARTC TYPE | INJURY<br>SEVERITY | AGE  | SEX | LICNS<br>RES  | PED<br>LOCATION                 | ERROR                                           | ACTION                           | EVENT                                        |                                            |                           | CAUSE                |                           |             |
|-----------------|-------|---------|------|----------|-----------|--------------------------------|----------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------|------------------------------------------|-----------------------|---------------------------|-----------------------|-------------------------|-----------|---------------------------------------|---------------------------------|---------------|------------|--------------------|------|-----|---------------|---------------------------------|-------------------------------------------------|----------------------------------|----------------------------------------------|--------------------------------------------|---------------------------|----------------------|---------------------------|-------------|
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                                 |               |            |                    |      |     |               |                                 |                                                 | VEHICLE<br>(PARTICIPANT)         | CRASH                                        | VEHICLE                                    | PARTICIPANT               | CRASH                | VEHICLE                   | PARTICIPANT |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                                 |               |            |                    |      |     |               |                                 |                                                 |                                  |                                              |                                            |                           |                      |                           |             |
| 00882<br>COUNTY | N     | N       | N    | N        | N         | 07/07/2011<br>Thursday<br>1P   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.33 |                                         | STRGHT<br>UN<br>03         | (NONE)<br>(4)                            | N<br>NONE             | N<br>N<br>N               | CLR<br>DRY<br>DAY     | S-1STOP<br>REAR<br>PDO  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N-S                   | 1             | DRVR       | NONE               | 39   | F   | OR-Y<br>OR>25 |                                 | 026-Faild Avoid Stop Veh                        | 000-No Action<br>(000-No Action) | 013-Forced By Impact                         |                                            | 07-Followed too Closely   | 00-No Code           | 07-Followed too Closely   |             |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           | 2                                     | NONE<br>0<br>PRVTE<br>PSNGR CAR | STOP<br>N-S   | 1          | DRVR               | NONE | 66  | M             | OTH-Y<br>N-RES                  |                                                 | 000-No Error                     | 011-Stop In Traf-No Lturn<br>(000-No Action) | 013-Forced By Impact                       |                           | 00-No Code           | 00-No Code                |             |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           | 3                                     | NONE<br>0<br>PRVTE<br>PSNGR CAR | STOP<br>N-S   | 1          | DRVR               | NONE | 31  | F             | OR-Y<br>OR<25                   |                                                 | 000-No Error                     | 011-Stop In Traf-No Lturn<br>(000-No Action) |                                            |                           | 00-No Code           | 00-No Code                |             |
| 00609<br>COUNTY | N     | N       | N    | N        | N         | 05/18/2013<br>Saturday<br>10A  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.48 |                                         | STRGHT<br>UN<br>04         | (NONE)<br>(4)                            | N<br>UNKNOWN          | N<br>N<br>N               | CLR<br>DRY<br>DAY     | O-1TURN<br>TURN<br>INJ  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | TURN-L<br>S-W                   | 1             | DRVR       | NONE               | 79   | M   | OR-Y<br>OR<25 |                                 | 052-Careless Driving<br>004-LT In Front OfOncmg | 000-No Action<br>(000-No Action) |                                              | 32-Careless Driving                        | 00-No Code                | 32-Careless Driving  |                           |             |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           | 2                                     | NONE<br>0<br>PRVTE<br>PSNGR CAR | STRGHT<br>N-S | 1          | DRVR               | INJB | 33  | M             | OR-Y<br>OR<25                   |                                                 | 000-No Error                     | 000-No Action<br>(000-No Action)             |                                            |                           | 00-No Code           | 00-No Code                |             |
| 00352<br>STATE  | Y     | N       | N    | N        | N         | 03/22/2013<br>Friday<br>5A     | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.50 |                                         | STRGHT<br>UN<br>01         | (NONE)<br>(4)                            | N<br>UNKNOWN          | Y<br>N<br>N               | SNOW<br>ICE<br>DARK   | FIX OBJ<br>FIX<br>INJ   | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S-N                   | 1             | DRVR       | INJB               | 43   | F   | OR-Y<br>OR<25 |                                 | 081-Ran Off Road                                | 000-No Action<br>(000-No Action) | 079-Cut Slope/Ditch<br>010-Subseq Overturn   | 079-Cut Slope/Ditch<br>010-Subseq Overturn | 01-Too Fast For Cond      | 00-No Code           | 01-Too Fast For Cond      |             |
| 00905<br>STATE  | N     | N       | N    | N        | N         | 07/12/2010<br>Monday<br>12A    | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.54 |                                         | STRGHT<br>UN<br>03         | (NONE)<br>(4)                            | N<br>UNKNOWN          | N<br>N<br>N               | CLR<br>DRY<br>DARK    | ANIMAL<br>OTH<br>PDO    | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S-N                   | 1             | DRVR       | NONE               | 46   | F   | OR-Y<br>OR<25 |                                 | 000-No Error                                    | 000-No Action<br>(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<br>COUNTY | Y     | N       | N    | N        | N         | 04/04/2012<br>Wednesday<br>UNK | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.54 |                                         | STRGHT<br>N<br>07          | (NONE)<br>(4)                            | N<br>UNKNOWN          | Y<br>N<br>N               | CLD<br>ICE<br>DARK    | OVERTURN<br>NCOL<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S-N                   | 1             | DRVR       | INJC               | 42   | M   | OR-Y<br>OR<25 |                                 | 080-Fail To MaintainLane                        | 000-No Action<br>(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<br>NO RPT | Y     | N       | N    | N        | N         | 06/10/2011<br>Friday<br>4P     | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.56 |                                         | STRGHT<br>UN<br>03         | (NONE)<br>(4)                            | N<br>UNKNOWN          | N<br>N<br>N               | CLR<br>DRY<br>DAY     | S-STRGHT<br>REAR<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S-N                   | 1             | DRVR       | NONE               | 0    | M   | UNK<br>UNK    |                                 | 042-FailSlowForSlowVeh                          | 000-No Action<br>(000-No Action) |                                              | 01-Too Fast For Cond                       | 00-No Code                | 01-Too Fast For Cond |                           |             |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           | 2                                     | NONE<br>0<br>PRVTE<br>PSNGR CAR | STRGHT<br>S-N | 1          | DRVR               | NONE | 36  | F             | OR-Y<br>OR<25                   |                                                 | 000-No Error                     | 000-No Action<br>(000-No Action)             |                                            |                           | 00-No Code           | 00-No Code                |             |
| 00098<br>NONE   | N     | N       | N    | N        | N         | 01/21/2010<br>Thursday<br>12P  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.58 |                                         | STRGHT<br>UN<br>04         | (NONE)<br>(2)                            | N<br>UNKNOWN          | N<br>N<br>N               | CLR<br>DRY<br>DAY     | O-STRGHT<br>SS-M<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N-S                   | 1             | DRVR       | NONE               | 55   | M   | OR-Y<br>OR<25 |                                 | 080-Fail To MaintainLane                        | 000-No Action<br>(000-No Action) |                                              | 05-Drove Wrong Side                        | 00-No Code                | 05-Drove Wrong Side  |                           |             |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           | 2                                     | NONE<br>0<br>PRVTE<br>PSNGR CAR | STRGHT<br>S-N | 1          | DRVR               | INJC | 25  | F             | OR-Y<br>OR<25                   |                                                 | 000-No Error                     | 000-No Action<br>(000-No Action)             |                                            |                           | 00-No Code           | 00-No Code                |             |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       | 2                               | PSNG          | INJC       | 30                 | F    |     |               | 000-No Error<br>(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 #<br>INVEST | SPEED | ALCOHOL | DRUG | SCH ZONE | WORK ZONE | DATE<br>DAY<br>TIME            | COUNTY<br>CITY<br>URB AREA | RD #<br>FUNCTIONAL CLASS<br>COMPONENT<br>MILEAGE TYPE                                        | CONN #<br>FIRST STREET<br>SECOND STREET | RD CHAR<br>DIRECT<br>LOCTN | INT-TYP<br>(MEDIAN)<br>LEGS<br>(# LANES) | INT-REL<br>TRAF-CONTL | OFF RD<br>RDNDBT<br>DRVWY | WTHR<br>SURF<br>LIGHT | CRASH<br>COLL<br>SVRTY  | VEHICLE # | SPCL USE<br>TLRL QTY<br>OWNER<br>TYPE | MOVE<br>FROM<br>TO | PART # | PART TYPE | INJURY<br>SEVERITY | AGE | SEX               | LICNS<br>RES   | PED<br>LOCATION                 | ERROR                                        | ACTION                           |                                         | EVENT                                   |             |                                             | CAUSE           |                                             |  |
|-----------------|-------|---------|------|----------|-----------|--------------------------------|----------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------|------------------------------------------|-----------------------|---------------------------|-----------------------|-------------------------|-----------|---------------------------------------|--------------------|--------|-----------|--------------------|-----|-------------------|----------------|---------------------------------|----------------------------------------------|----------------------------------|-----------------------------------------|-----------------------------------------|-------------|---------------------------------------------|-----------------|---------------------------------------------|--|
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |                   |                |                                 |                                              | VEHICLE<br>(PARTICIPANT)         | CRASH                                   | VEHICLE                                 | PARTICIPANT | CRASH                                       | VEHICLE         | PARTICIPANT                                 |  |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |                   |                |                                 |                                              |                                  |                                         |                                         |             |                                             |                 |                                             |  |
| 00711<br>COUNTY | N     | N       | N    | N        | N         | 06/13/2010<br>Sunday<br>5P     | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.58 |                                         | INTER<br>CN<br>03          | CROSS<br>( )<br>0<br>( )                 | N<br>STOP SIGN        | N<br>N                    | CLR<br>DRY<br>DAY     | ANGL-OTH<br>TURN<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | TURN-L<br>W -N     | 1      | DRVR      | NONE               | 75  | M                 | OR-Y<br>OR<25  |                                 | 021-Disrg Stop Sign                          | 000-No Action<br>(000-No Action) |                                         | 03-Passed Stop Sign                     | 00-No Code  | 03-Passed Stop Sign                         |                 |                                             |  |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    | 2      | PSNG      | INJC               | 73  | M                 |                |                                 | 000-No Error<br>(000-No Action)              |                                  |                                         |                                         |             | 00-No Code                                  |                 |                                             |  |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    | 3      | PSNG      | INJC               | 59  | M                 |                |                                 | 000-No Error<br>(000-No Action)              |                                  |                                         |                                         |             | 00-No Code                                  |                 |                                             |  |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 24  | F                 | OR-Y<br>OR<25  |                                 | 000-No Error<br>(000-No Action)              | 000-No Action<br>(000-No Action) |                                         | 00-No Code                              |             | 00-No Code                                  |                 |                                             |  |
| 00736<br>NO RPT | N     | N       | N    | N        | N         | 06/07/2009<br>Sunday<br>2P     | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>128.62 |                                         | STRGHT<br>UN<br>04         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N<br>N               | CLR<br>DRY<br>DAY     | OTH OBJ<br>OTH<br>PDO   | 1         | NONE<br>1<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 72  | M                 | OTH-Y<br>N-RES |                                 | 000-No Error<br>(000-No Action)              | 000-No Action<br>(000-No Action) | 025-Wheel Came Off                      | 025-Wheel Came Off                      |             | 25-Tire Failure                             | 25-Tire Failure | 00-No Code                                  |  |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 39  | F                 | OR-Y<br>OR<25  |                                 | 000-No Error<br>(000-No Action)              | 000-No Action<br>(000-No Action) |                                         |                                         | 00-No Code  |                                             | 00-No Code      |                                             |  |
| 01186<br>STATE  | N     | N       | N    | N        | N         | 09/24/2010<br>Friday<br>7P     | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>129.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N<br>N               | CLR<br>DRY<br>DAY     | ANIMAL<br>OTH<br>PDO    | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 26  | F                 | OR-Y<br>OR<25  |                                 | 000-No Error<br>(000-No Action)              | 000-No Action<br>(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<br>STATE  | N     | Y       | Y    | N        | N         | 07/24/2013<br>Wednesday<br>6A  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>129.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>NONE             | N<br>N<br>N               | CLR<br>DRY<br>DAY     | O-1TURN<br>TURN<br>INJ  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | U-TURN<br>N -N     | 1      | DRVR      | INJB               | 21  | M                 | OR-Y<br>OR<25  |                                 | 008-Illegal U-Turn<br>(000-No Action)        | 000-No Action<br>(000-No Action) |                                         | 08-Improper Turn                        | 00-No Code  | 08-Improper Turn                            |                 |                                             |  |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | INJB               | 23  | M                 | OR-Y<br>OR<25  |                                 | 000-No Error<br>(000-No Action)              | 000-No Action<br>(000-No Action) |                                         |                                         | 00-No Code  |                                             | 00-No Code      |                                             |  |
| 00370<br>COUNTY | Y     | N       | N    | N        | N         | 03/29/2010<br>Monday<br>10A    | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>129.08 |                                         | STRGHT<br>UN<br>01         | (NONE )<br>(4)                           | N<br>UNKNOWN          | Y<br>N<br>N               | CLD<br>WET<br>DAY     | OVERTURN<br>NCOL<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 27  | M                 | OR-Y<br>OR<25  |                                 | 081-Ran Off Road<br>047-Violation Basic Rule | 000-No Action<br>(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<br>COUNTY | Y     | N       | N    | N        | N         | 03/31/2010<br>Wednesday<br>11P | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>129.18 |                                         | STRGHT<br>UN<br>01         | (NONE )<br>(4)                           | N<br>UNKNOWN          | Y<br>N<br>N               | CLD<br>ICE<br>DARK    | FIX OBJ<br>FIX<br>PDO   | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 48  | F                 | OR-Y<br>OR<25  |                                 | 000-No Error<br>(000-No Action)              | 000-No Action<br>(000-No Action) | 124-Slide b/c of surface<br>061-Mailbox | 124-Slide b/c of surface<br>061-Mailbox |             | 01-Too Fast For Cond                        | 00-No Code      | 01-Too Fast For Cond                        |  |
| 00432<br>NO RPT | Y     | N       | N    | N        | N         | 03/22/2012<br>Thursday<br>5A   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>129.68 |                                         | STRGHT<br>UN<br>04         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N<br>N               | CLR<br>ICE<br>DARK    | O-STRGHT<br>SS-M<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 28  | M                 | OR-Y<br>OR<25  |                                 | 080-Fail To MaintainLane                     | 000-No Action<br>(000-No Action) | 124-Slide b/c of surface                | 124-Slide b/c of surface                |             | 05-Drove Wrong Side<br>01-Too Fast For Cond | 00-No Code      | 05-Drove Wrong Side<br>01-Too Fast For Cond |  |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>1<br>PRVTE<br>SEMI TOW        | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 0   | UNK<br>UNK<br>UNK |                | 000-No Error<br>(000-No Action) | 000-No Action<br>(000-No Action)             |                                  |                                         | 00-No Code                              |             | 00-No Code                                  |                 |                                             |  |
| 00417<br>STATE  | N     | N       | N    | N        | N         | 03/30/2011<br>Wednesday<br>8P  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N<br>N               | CLR<br>DRY<br>DUSK    | S-STRGHT<br>REAR<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 26  | M                 | OR-Y<br>OR<25  |                                 | 042-FailSlowForSlowVeh                       | 000-No Action<br>(000-No Action) |                                         | 27-Inattention                          | 00-No Code  | 27-Inattention                              |                 |                                             |  |
|                 |       |         |      |          |           |                                |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | INJC               | 39  | F                 | OR-Y<br>OR<25  |                                 | 000-No Error<br>(000-No Action)              | 000-No Action<br>(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 #<br>INVEST | SPEED | ALCOHOL | DRUG | SCH ZONE | WORK ZONE | DATE<br>DAY<br>TIME           | COUNTY<br>CITY<br>URB AREA | RD #<br>FUNCTIONAL CLASS<br>COMPONENT<br>MILEAGE TYPE<br>MILEPOINT                           | CONN #<br>FIRST STREET<br>SECOND STREET | RD CHAR<br>DIRECT<br>LOCTN | INT-TYP<br>(MEDIAN)<br>LEGS<br>(# LANES) | INT-REL<br>TRAF-CONTL | OFF RD<br>RND BT<br>DRVWY | WTHR<br>SURF<br>LIGHT | CRASH<br>COLL<br>SVRTY  | VEHICLE # | SPCL USE<br>TRLR QTY<br>OWNER<br>TYPE | MOVE<br>FROM<br>TO | PARTC # | PARTC TYPE | INJURY<br>SEVERITY | AGE  | SEX               | LICNS<br>RES  | PED<br>LOCATION | ERROR                                                | ACTION                                       | EVENT                                        |                          |                                                                    | CAUSE                     |                                                                    |                           |
|-----------------|-------|---------|------|----------|-----------|-------------------------------|----------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------|------------------------------------------|-----------------------|---------------------------|-----------------------|-------------------------|-----------|---------------------------------------|--------------------|---------|------------|--------------------|------|-------------------|---------------|-----------------|------------------------------------------------------|----------------------------------------------|----------------------------------------------|--------------------------|--------------------------------------------------------------------|---------------------------|--------------------------------------------------------------------|---------------------------|
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |         |            |                    |      |                   |               |                 |                                                      | VEHICLE<br>(PARTICIPANT)                     | CRASH                                        | VEHICLE                  | PARTICIPANT                                                        | CRASH                     | VEHICLE                                                            | PARTICIPANT               |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |         |            |                    |      |                   |               |                 |                                                      |                                              |                                              |                          |                                                                    |                           |                                                                    |                           |
| 00658<br>STATE  | Y     | N       | N    | N        | N         | 05/29/2013<br>Wednesday<br>8A | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLR<br>DRY<br>DAY     | S-1STOP<br>REAR<br>PDO  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 47   | M                 | OR-Y<br>OR<25 |                 | 026-Faild Avoid Stop Veh                             | 000-No Action<br>(000-No Action)             |                                              |                          | 01-Too Fast For Cond<br>07-Followed too Closely                    | 00-No Code                | 01-Too Fast For Cond<br>07-Followed too Closely                    |                           |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STOP<br>N -S       | 1       | DRVR       | NONE               | 27   | F                 | OR-Y<br>OR<25 |                 | 000-No Error                                         | 011-Stop In Traf-No Lturn<br>(000-No Action) |                                              |                          | 00-No Code                                                         | 00-No Code                |                                                                    |                           |
| 01086<br>NO RPT | N     | N       | N    | N        | N         | 08/12/2011<br>Friday<br>9P    | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.17 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLR<br>DRY<br>DARK    | ANIMAL<br>OTH<br>PDO    | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     |         | 2          | PSNG               | NO<5 | 3                 | F             | OR-Y<br>OR<25   |                                                      | 000-No Error                                 | 000-No Action<br>(000-No Action)             | 035-Deer Or Elk          | 035-Deer Or Elk                                                    | 12-Other (not Driver Err) | 00-No Code                                                         | 12-Other (not Driver Err) |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |         |            |                    |      |                   |               |                 |                                                      |                                              |                                              |                          |                                                                    | 00-No Code                |                                                                    |                           |
| 01481<br>STATE  | Y     | N       | N    | N        | N         | 11/20/2010<br>Saturday<br>1P  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.17 |                                         | INTER<br>E<br>05           | CROSS<br>(<br>0<br>)                     | N<br>UNKNOWN          | N<br>N                    | CLR<br>DRY<br>DAY     | ANGL-OTH<br>TURN<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | TURN-R<br>S -E     | 1       | DRVR       | INJC               | 29   | M                 | OR-Y<br>OR<25 |                 | 051-Reckless Driving<br>080-Fail To MaintainLane     | 000-No Action<br>(000-No Action)             |                                              |                          | 33-Reckless Driving<br>05-Drove Wrong Side<br>01-Too Fast For Cond | 00-No Code                | 33-Reckless Driving<br>05-Drove Wrong Side<br>01-Too Fast For Cond |                           |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STOP<br>E -W       | 1       | DRVR       | INJB               | 56   | M                 | OR-Y<br>OR<25 |                 | 000-No Error                                         | 011-Stop In Traf-No Lturn<br>(000-No Action) |                                              |                          | 00-No Code                                                         | 00-No Code                |                                                                    |                           |
| 00521<br>COUNTY | N     | N       | Y    | N        | N         | 04/25/2011<br>Monday<br>9A    | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.18 |                                         | INTER<br>UN<br>06          | CROSS<br>(<br>0<br>)                     | N<br>UNKNOWN          | N<br>N                    | CLD<br>SNO<br>DAY     | O-STRGHT<br>HEAD<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | INJB               | 21   | F                 | OR-Y<br>OR<25 |                 | 080-Fail To MaintainLane<br>039-Drive On Wrong Side  | 000-No Action<br>(000-No Action)             | 013-Forced By Impact                         |                          | 16-Driver sleepy<br>05-Drove Wrong Side                            | 00-No Code                | 16-Driver sleepy<br>05-Drove Wrong Side                            |                           |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | INJA               | 36   | F                 | OR-Y<br>OR<25 |                 | 000-No Error                                         | 000-No Action<br>(000-No Action)             | 013-Forced By Impact                         |                          | 00-No Code                                                         | 00-No Code                |                                                                    |                           |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 3         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | INJB               | 43   | F                 | OR-Y<br>OR<25 |                 | 000-No Error                                         | 000-No Action<br>(000-No Action)             |                                              |                          | 00-No Code                                                         | 00-No Code                |                                                                    |                           |
| 01288<br>COUNTY | N     | Y       | N    | N        | N         | 10/01/2010<br>Friday<br>5P    | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.18 |                                         | INTER<br>N<br>05           | CROSS<br>(<br>0<br>)                     | N<br>NONE             | N<br>N                    | CLR<br>DRY<br>DAY     | S-STRGHT<br>SS-O<br>INJ | 1         | NONE<br>0<br>PRVTE<br>MTRCYCLE        | STRGHT<br>S -N     | 1       | DRVR       | INJB               | 57   | M                 | OR-Y<br>OR<25 |                 | 031-Passing Wrong Side                               | 000-No Action<br>(000-No Action)             |                                              |                          | 06-Improper Overtaking                                             | 00-No Code                | 06-Improper Overtaking                                             |                           |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | NONE               | 0    | UNK<br>UNK<br>UNK |               | 000-No Error    | 000-No Action<br>(000-No Action)                     |                                              |                                              | 00-No Code               | 00-No Code                                                         |                           |                                                                    |                           |
| 00304<br>STATE  | Y     | N       | N    | N        | N         | 02/26/2009<br>Thursday<br>6A  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.18 |                                         | INTER<br>CN<br>02          | 3-LEG<br>(<br>2<br>)                     | N<br>STOP SIGN        | N<br>N                    | SNOW<br>ICE<br>DAWN   | ANGL-OTH<br>TURN<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | TURN-R<br>E -N     | 1       | DRVR       | INJC               | 53   | F                 | OR-Y<br>OR<25 |                 | 047-Violation Basic Rule<br>080-Fail To MaintainLane | 000-No Action<br>(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<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | NONE               | 46   | M                 | OR-Y<br>OR<25 |                 | 000-No Error                                         | 000-No Action<br>(000-No Action)             |                                              |                          | 00-No Code                                                         | 00-No Code                |                                                                    |                           |
| 01865<br>COUNTY | Y     | N       | N    | N        | N         | 12/30/2010<br>Thursday<br>1P  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.19 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLR<br>DRY<br>DAY     | S-1STOP<br>REAR<br>PDO  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 39   | F                 | OR-Y<br>OR<25 |                 | 026-Faild Avoid Stop Veh                             | 001-Skidded<br>(000-No Action)               | 089-Refer Other Crash<br>079-Cut Slope/Ditch | 01-Too Fast For Cond     | 00-No Code                                                         | 01-Too Fast For Cond      |                                                                    |                           |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STOP<br>N -S       | 1       | DRVR       | NONE               | 47   | M                 | OR-Y<br>OR<25 |                 | 000-No Error                                         | 011-Stop In Traf-No Lturn<br>(000-No Action) |                                              |                          | 00-No Code                                                         | 00-No Code                |                                                                    |                           |
| 00753<br>NO RPT | N     | N       | N    | N        | N         | 06/11/2011<br>Saturday<br>UNK | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.23 |                                         | STRGHT<br>S<br>03          | (RSDMD)<br>(4)                           | N<br>UNKNOWN          | N<br>N                    | CLR<br>DRY<br>DARK    | ANIMAL<br>OTH<br>PDO    | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | NONE               | 23   | F                 | OR-Y<br>OR<25 |                 | 000-No Error                                         | 000-No Action<br>(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 #<br>INVEST | SPEED | ALCOHOL | DRUG | SCH ZONE | WORK ZONE | DATE<br>DAY<br>TIME           | COUNTY<br>CITY<br>URB AREA | RD #<br>FUNCTIONAL CLASS<br>COMPONENT<br>MILEAGE TYPE<br>MILEPOINT                           | CONN #<br>FIRST STREET<br>SECOND STREET | RD CHAR<br>DIRECT<br>LOCTN | INT-TYP<br>(MEDIAN)<br>LEGS<br>(# LANES) | INT-REL<br>TRAF-CONTL | OFF RD<br>RND BT<br>DRVWY | WTHR<br>SURF<br>LIGHT | CRASH<br>COLL<br>SVR TY | VEHICLE # | SPCL USE<br>TRLR QTY<br>OWNER<br>TYPE | MOVE<br>FROM<br>TO | PARTC # | PARTC TYPE | INJURY<br>SEVERITY | AGE | SEX | LICNS<br>RES  | PED<br>LOCATION | ERROR                                        | ACTION                                  | EVENT                                                                 |                                                                       |                                         | CAUSE                                       |                        |                                             |
|-----------------|-------|---------|------|----------|-----------|-------------------------------|----------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------|------------------------------------------|-----------------------|---------------------------|-----------------------|-------------------------|-----------|---------------------------------------|--------------------|---------|------------|--------------------|-----|-----|---------------|-----------------|----------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------|---------------------------------------------|------------------------|---------------------------------------------|
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |         |            |                    |     |     |               |                 |                                              | VEHICLE<br>(PARTICIPANT)                | CRASH                                                                 | VEHICLE                                                               | PARTICIPANT                             | CRASH                                       | VEHICLE                | PARTICIPANT                                 |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |         |            |                    |     |     |               |                 |                                              |                                         |                                                                       |                                                                       |                                         |                                             |                        |                                             |
| 00317<br>COUNTY | Y     | N       | N    | N        | N         | 02/29/2012<br>Wednesday<br>7A | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.38 |                                         | STRGHT<br>UN<br>01         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | Y<br>N<br>N               | CLD<br>SNO<br>DAY     | FIX OBJ<br>FIX<br>INJ   | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | INJC               | 26  | M   | OR-Y<br>OR<25 |                 | 081-Ran Off Road                             | 000-No Action<br>(000-No Action)        | 124-Slide b/c of surface<br>045-Wall                                  | 124-Slide b/c of surface<br>045-Wall                                  |                                         | 01-Too Fast For Cond                        | 00-No Code             | 01-Too Fast For Cond                        |
| 00418<br>STATE  | N     | N       | N    | N        | N         | 03/30/2011<br>Wednesday<br>7P | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.38 |                                         | STRGHT<br>UN<br>04         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | N<br>N<br>N               | CLD<br>DRY<br>DARK    | O-STRGHT<br>SS-M<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | INJB               | 17  | M   | OR-Y<br>OR<25 |                 | 080-Fail To MaintainLane                     | 000-No Action<br>(028-Physical Illness) |                                                                       |                                                                       | 05-Drove Wrong Side<br>16-Driver sleepy | 00-No Code                                  | 16-Driver sleepy       |                                             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | INJC               | 47  | M   | OR-Y<br>OR<25 |                 | 000-No Error                                 | 000-No Action<br>(000-No Action)        |                                                                       |                                                                       |                                         | 00-No Code                                  | 00-No Code             |                                             |
| 00323<br>COUNTY | Y     | N       | N    | N        | N         | 02/29/2012<br>Wednesday<br>7A | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.40 |                                         | STRGHT<br>UN<br>04         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | N<br>N<br>N               | SNOW<br>ICE<br>DAY    | O-STRGHT<br>SS-M<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 35  | F   | OR-Y<br>OR<25 |                 | 080-Fail To MaintainLane                     | 000-No Action<br>(000-No Action)        | 124-Slide b/c of surface                                              | 124-Slide b/c of surface                                              |                                         | 01-Too Fast For Cond<br>05-Drove Wrong Side | 00-No Code             | 01-Too Fast For Cond<br>05-Drove Wrong Side |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | INJC               | 32  | M   | OR-Y<br>OR<25 |                 | 000-No Error                                 | 000-No Action<br>(000-No Action)        |                                                                       |                                                                       |                                         | 00-No Code                                  | 00-No Code             |                                             |
| 00097<br>STATE  | Y     | N       | N    | N        | N         | 01/20/2011<br>Thursday<br>3P  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.48 |                                         | STRGHT<br>UN<br>07         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | Y<br>N<br>N               | CLR<br>DRY<br>DAY     | FIX OBJ<br>FIX<br>INJ   | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | INJA               | 78  | M   | OR-Y<br>OR<25 |                 | 081-Ran Off Road                             | 000-No Action<br>(000-No Action)        | 088-Fence/Building<br>079-Cut Slope/Ditch<br>096-Berm                 | 088-Fence/Building<br>079-Cut Slope/Ditch<br>096-Berm                 |                                         | 16-Driver sleepy<br>01-Too Fast For Cond    | 00-No Code             | 16-Driver sleepy<br>01-Too Fast For Cond    |
| 01323<br>COUNTY | N     | Y       | N    | N        | N         | 10/21/2010<br>Thursday<br>7P  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.50 |                                         | STRGHT<br>UN<br>00         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | N<br>N<br>N               | CLR<br>DRY<br>DARK    | S-STRGHT<br>SS-O<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | NONE               | 56  | M   | OR-Y<br>OR<25 |                 | 045-Improper Lane Chng                       | 000-No Action<br>(000-No Action)        |                                                                       |                                                                       | 06-Improper Overtaking                  | 00-No Code                                  | 06-Improper Overtaking |                                             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | INJC               | 56  | M   | OR-Y<br>OR<25 |                 | 000-No Error                                 | 000-No Action<br>(000-No Action)        |                                                                       |                                                                       |                                         | 00-No Code                                  | 00-No Code             |                                             |
| 00318<br>COUNTY | Y     | N       | N    | N        | N         | 02/29/2012<br>Wednesday<br>5A | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.68 |                                         | STRGHT<br>UN<br>07         | (NONE )<br>(4)                           | N<br>NONE<br>N        | Y<br>N<br>N               | CLD<br>ICE<br>DARK    | OVERTURN<br>NCOL<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 42  | M   | OR-Y<br>OR<25 |                 | 081-Ran Off Road<br>080-Fail To MaintainLane | 000-No Action<br>(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<br>STATE  | N     | N       | N    | N        | N         | 12/25/2009<br>Friday<br>9P    | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>130.98 |                                         | STRGHT<br>UN<br>06         | (NONE )<br>0<br>(4)                      | N<br>UNKNOWN<br>N     | Y<br>N<br>N               | FOG<br>ICE<br>DARK    | OVERTURN<br>NCOL<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | NONE               | 23  | M   | OR-Y<br>OR<25 |                 | 080-Fail To MaintainLane                     | 000-No Action<br>(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<br>COUNTY | Y     | N       | N    | N        | N         | 12/30/2010<br>Thursday<br>5A  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>131.00 |                                         | STRGHT<br>UN<br>01         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | Y<br>N<br>N               | CLD<br>ICE<br>DARK    | FIX OBJ<br>FIX<br>INJ   | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | INJA               | 17  | F   | OR-Y<br>OR<25 |                 | 080-Fail To MaintainLane<br>081-Ran Off Road | 000-No Action<br>(017-Lost Control)     | 124-Slide b/c of surface<br>079-Cut Slope/Ditch<br>010-Subseq Overtum | 124-Slide b/c of surface<br>079-Cut Slope/Ditch<br>010-Subseq Overtum |                                         | 01-Too Fast For Cond                        | 00-No Code             | 01-Too Fast For Cond                        |
| 01928<br>COUNTY | N     | N       | N    | N        | N         | 11/24/2009<br>Tuesday<br>2P   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>131.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | N<br>N<br>N               | CLR<br>DRY<br>DAY     | O-STRGHT<br>SS-M<br>FAT | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | INJB               | 47  | M   | OR-Y<br>OR<25 |                 | 080-Fail To MaintainLane                     | 000-No Action<br>(000-No Action)        | 010-Subseq Overtum                                                    | 010-Subseq Overtum                                                    |                                         | 05-Drove Wrong Side                         | 00-No Code             | 05-Drove Wrong Side                         |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | INJC               | 74  | F   | OR-Y<br>OR<25 |                 | 000-No Error                                 | 000-No Action<br>(000-No Action)        |                                                                       | 010-Subseq Overtum                                                    |                                         | 00-No Code                                  | 00-No Code             |                                             |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 3         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1       | DRVR       | KILL               | 69  | F   | OR-Y<br>OR<25 |                 | 000-No Error                                 | 000-No Action<br>(000-No Action)        |                                                                       | 010-Subseq Overtum                                                    |                                         | 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 #<br>INVEST | SPEED<br>O | ALCOHOL<br>DRUG | SCH ZONE<br>WORK ZONE | DATE<br>DAY<br>TIME | COUNTY<br>CITY<br>URB AREA    | RD #<br>FUNCTIONAL CLASS<br>COMPONENT<br>MILEAGE TYPE | CONN #<br>FIRST STREET<br>SECOND STREET | RD CHAR<br>DIRECT<br>LOCTN | INT-TYP<br>(MEDIAN)<br>LEGS<br>(# LANES) | INT-REL<br>TRAF-CONTL | OFF RD<br>RND BT<br>DRVWY | WTHR<br>SURF<br>LIGHT | CRASH<br>COLL<br>SVRTY  | VEHICLE # | SPCL USE<br>TLRL QTY<br>OWNER<br>TYPE | MOVE<br>FROM<br>TO | PART # | PART TYPE | INJURY<br>SEVERITY | AGE | SEX | LICNS<br>RES   | PED<br>LOCATION | ERROR                                              | ACTION                                      | EVENT                    |                          |                                                 | CAUSE                   |                                                 |             |
|-----------------|------------|-----------------|-----------------------|---------------------|-------------------------------|-------------------------------------------------------|-----------------------------------------|----------------------------|------------------------------------------|-----------------------|---------------------------|-----------------------|-------------------------|-----------|---------------------------------------|--------------------|--------|-----------|--------------------|-----|-----|----------------|-----------------|----------------------------------------------------|---------------------------------------------|--------------------------|--------------------------|-------------------------------------------------|-------------------------|-------------------------------------------------|-------------|
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                    | VEHICLE<br>(PARTICIPANT)                    | CRASH                    | VEHICLE                  | PARTICIPANT                                     | CRASH                   | VEHICLE                                         | PARTICIPANT |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                    |                                             |                          |                          |                                                 |                         |                                                 |             |
| 01435<br>NO RPT | N          | N               | N                     | N                   | 10/05/2009<br>Monday<br>12P   | Deschutes                                             |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(2)                           | N<br>UNKNOWN<br>N     | N<br>N                    | CLR<br>DRY<br>DAY     | S-1STOP<br>REAR<br>PDO  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 55  | F   | OR-Y<br>OR<25  |                 | 026-Faild Avoid Stop Veh                           | 000-No Action<br>(000-No Action)            |                          | 07-Followed too Closely  | 00-No Code                                      | 07-Followed too Closely |                                                 |             |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                    |                                             |                          |                          |                                                 |                         |                                                 |             |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STOP<br>N -S       | 1      | DRVR      | NONE               | 0   | F   | OTH-Y<br>N-RES |                 | 000-No Error                                       | 011-Stop In Traf-No Ltum<br>(000-No Action) |                          | 00-No Code               | 00-No Code                                      |                         |                                                 |             |
| 00420<br>STATE  | N          | N               | N                     | N                   | 03/30/2011<br>Wednesday<br>8P | Deschutes                                             |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(2)                           | N<br>UNKNOWN<br>N     | N<br>N                    | CLR<br>DRY<br>DUSK    | S-1STOP<br>REAR<br>PDO  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 52  | F   | OR-Y<br>OR<25  |                 | 026-Faild Avoid Stop Veh                           | 000-No Action<br>(000-No Action)            |                          | 07-Followed too Closely  | 00-No Code                                      | 07-Followed too Closely |                                                 |             |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                    |                                             |                          |                          |                                                 |                         |                                                 |             |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STOP<br>S -N       | 1      | DRVR      | NONE               | 59  | M   | OR-Y<br>OR<25  |                 | 000-No Error                                       | 011-Stop In Traf-No Ltum<br>(000-No Action) |                          | 00-No Code               | 00-No Code                                      |                         |                                                 |             |
| 00607<br>COUNTY | N          | N               | Y                     | N                   | 05/07/2012<br>Monday<br>10A   | Deschutes                                             |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | N<br>N                    | CLR<br>DRY<br>DAY     | S-STRGHT<br>REAR<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 53  | M   | OR-Y<br>OR<25  |                 | 042-FailSlowForSlowVeh                             | 000-No Action<br>(000-No Action)            |                          | 07-Followed too Closely  | 00-No Code                                      | 07-Followed too Closely |                                                 |             |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                    |                                             |                          |                          |                                                 |                         |                                                 |             |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 22  | M   | OR-Y<br>OR<25  |                 | 000-No Error                                       | 000-No Action<br>(000-No Action)            |                          | 00-No Code               | 00-No Code                                      |                         |                                                 |             |
| 01221<br>NO RPT | N          | N               | N                     | N                   | 09/28/2009<br>Monday<br>7P    | Deschutes                                             |                                         | STRGHT<br>UN<br>06         | (NONE )<br>0<br>(4)                      | N<br>UNKNOWN<br>N     | N<br>N                    | CLR<br>DRY<br>DUSK    | ANIMAL<br>OTH<br>PDO    | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 75  | F   | OR-Y<br>OR<25  |                 | 000-No Error                                       | 000-No Action<br>(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<br>NONE   | N          | N               | N                     | N                   | 03/01/2010<br>Monday<br>7P    | Deschutes                                             |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | N<br>N                    | CLR<br>DRY<br>DARK    | S-STRGHT<br>SS-O<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 0   | M   | OR-Y<br>OR<25  |                 | 045-Improper Lane Chng                             | 000-No Action<br>(000-No Action)            |                          | 06-Improper Overtaking   | 00-No Code                                      | 06-Improper Overtaking  |                                                 |             |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                    |                                             |                          |                          |                                                 |                         |                                                 |             |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 28  | M   | OR-Y<br>OR<25  |                 | 000-No Error                                       | 000-No Action<br>(000-No Action)            |                          | 00-No Code               | 00-No Code                                      |                         |                                                 |             |
| 01254<br>STATE  | Y          | N               | N                     | N                   | 09/20/2012<br>Thursday<br>8P  | Deschutes                                             |                                         | STRGHT<br>UN<br>05         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | N<br>N                    | CLR<br>DRY<br>DARK    | S-STRGHT<br>REAR<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | INJC               | 44  | F   | OTH-Y<br>N-RES |                 | 047-Violation Basic Rule<br>042-FailSlowForSlowVeh | 001-Skidded<br>(000-No Action)              | 010-Subseq Overtum       | 010-Subseq Overtum       | 01-Too Fast For Cond<br>07-Followed too Closely | 00-No Code              | 01-Too Fast For Cond<br>07-Followed too Closely |             |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                    |                                             |                          |                          |                                                 |                         |                                                 |             |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                    |                                             |                          |                          |                                                 |                         |                                                 |             |
| 00294<br>COUNTY | Y          | N               | N                     | N                   | 02/27/2012<br>Monday<br>11A   | Deschutes                                             |                                         | STRGHT<br>UN<br>04         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | N<br>N                    | SNOW<br>ICE<br>DAY    | O-STRGHT<br>SS-M<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | INJC               | 38  | M   | OR-Y<br>OR<25  |                 | 080-Fail To MaintainLane                           | 000-No Action<br>(000-No Action)            | 124-Slide b/c of surface | 124-Slide b/c of surface | 05-Drove Wrong Side<br>01-Too Fast For Cond     | 00-No Code              | 05-Drove Wrong Side<br>01-Too Fast For Cond     |             |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                    |                                             |                          |                          |                                                 |                         |                                                 |             |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                    |                                             |                          |                          |                                                 |                         |                                                 |             |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                    |                                             |                          |                          |                                                 |                         |                                                 |             |
|                 |            |                 |                       |                     |                               |                                                       |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 55  | M   | OR-Y<br>OR<25  |                 | 000-No Error                                       | 000-No Action<br>(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 #<br>INVEST | SPEED | ALCOHOL | DRUG | SCH ZONE | WORK ZONE | DATE<br>DAY<br>TIME           | COUNTY<br>CITY<br>URB AREA | RD #<br>FUNCTIONAL CLASS<br>COMPONENT<br>MILEAGE TYPE<br>MILEPOINT                           | CONN #<br>FIRST STREET<br>SECOND STREET | RD CHAR<br>DIRECT<br>LOCTN | INT-TYP<br>(MEDIAN)<br>LEGS<br>(# LANES) | INT-REL<br>TRAF-CONTL | OFF RD<br>RND BT<br>DRVWY | WTHR<br>SURF<br>LIGHT | CRASH<br>COLL<br>SVRTY  | VEHICLE # | SPCL USE<br>TRLR QTY<br>OWNER<br>TYPE | MOVE<br>FROM<br>TO | PARTC # | PARTC TYPE | INJURY<br>SEVERITY | AGE | SEX | LICNS<br>RES  | PED<br>LOCATION | ERROR                                                                        | ACTION                                       |       | EVENT                    |                          |                                                                 | CAUSE                     |                                                                 |                           |
|-----------------|-------|---------|------|----------|-----------|-------------------------------|----------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------|------------------------------------------|-----------------------|---------------------------|-----------------------|-------------------------|-----------|---------------------------------------|--------------------|---------|------------|--------------------|-----|-----|---------------|-----------------|------------------------------------------------------------------------------|----------------------------------------------|-------|--------------------------|--------------------------|-----------------------------------------------------------------|---------------------------|-----------------------------------------------------------------|---------------------------|
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |         |            |                    |     |     |               |                 |                                                                              | VEHICLE<br>(PARTICIPANT)                     | CRASH | VEHICLE                  |                          | PARTICIPANT                                                     | CRASH                     | VEHICLE                                                         | PARTICIPANT               |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    |         |            |                    |     |     |               |                 |                                                                              |                                              |       |                          |                          |                                                                 |                           |                                                                 |                           |
| 00236<br>COUNTY | Y     | N       | N    | N        | N         | 02/19/2011<br>Saturday<br>9A  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.00 |                                         | STRGHT<br>UN<br>01         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | Y<br>N                    | SNOW<br>ICE<br>DAY    | OVERTURN<br>NCOL<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N - S    | 1       | DRVR       | INJB               | 24  | M   | OR-Y<br>OR<25 |                 | 081-Ran Off Road                                                             | 000-No Action<br>(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<br>STATE  | Y     | N       | N    | N        | N         | 04/20/2010<br>Tuesday<br>6P   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | N<br>N                    | RAIN<br>WET<br>DAY    | S-1STOP<br>REAR<br>PDO  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N - S    | 1       | DRVR       | NONE               | 27  | F   | OR-Y<br>OR<25 |                 | 026-Faild Avoid Stop Veh<br>052-Careless Driving<br>047-Violation Basic Rule | 000-No Action<br>(025-Driver Sleepy/Asleep)  |       |                          |                          | 16-Driver sleepy<br>32-Careless Driving<br>01-Too Fast For Cond | 00-No Code                | 16-Driver sleepy<br>32-Careless Driving<br>01-Too Fast For Cond |                           |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STOP<br>N - S      | 1       | DRVR       | NONE               | 25  | M   | OR-Y<br>OR<25 |                 | 000-No Error                                                                 | 011-Stop In Traf-No Lturn<br>(000-No Action) |       |                          |                          | 00-No Code                                                      |                           | 00-No Code                                                      |                           |
| 00233<br>COUNTY | Y     | N       | N    | N        | N         | 02/19/2011<br>Saturday<br>12P | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | N<br>N                    | SNOW<br>SNO<br>DAY    | S-STRGHT<br>SS-O<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N - S    | 1       | DRVR       | NONE               | 25  | F   | OR-Y<br>OR<25 |                 | 080-Fail To MaintainLane<br>081-Ran Off Road                                 | 000-No Action<br>(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<br>(000-No Action)                                              |                                              |       |                          |                          |                                                                 | 00-No Code                |                                                                 |                           |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N - S    | 1       | DRVR       | NONE               | 49  | F   | OR-Y<br>OR<25 |                 | 000-No Error                                                                 | 000-No Action<br>(000-No Action)             |       |                          |                          | 00-No Code                                                      |                           | 00-No Code                                                      |                           |
| 00690<br>NO RPT | N     | N       | N    | N        | N         | 05/30/2011<br>Monday<br>1P    | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(2)                           | N<br>UNKNOWN<br>N     | N<br>N                    | CLR<br>SNO<br>DAY     | ANIMAL<br>OTH<br>PDO    | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S - N    | 1       | DRVR       | NONE               | 51  | M   | OR-Y<br>OR<25 |                 | 000-No Error                                                                 | 000-No Action<br>(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<br>STATE  | N     | N       | N    | N        | N         | 03/22/2012<br>Thursday<br>5A  | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | N<br>N                    | CLR<br>ICE<br>DARK    | O-STRGHT<br>SS-M<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S - N    | 1       | DRVR       | INJC               | 22  | M   | OR-Y<br>OR<25 |                 | 080-Fail To MaintainLane                                                     | 000-No Action<br>(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<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N - S    | 1       | DRVR       | INJB               | 53  | M   | OR-Y<br>OR<25 |                 | 000-No Error                                                                 | 000-No Action<br>(000-No Action)             |       |                          |                          | 00-No Code                                                      |                           | 00-No Code                                                      |                           |
| 01689<br>STATE  | N     | N       | N    | N        | N         | 12/03/2013<br>Tuesday<br>9A   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.00 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>UNKNOWN<br>N     | N<br>N                    | CLD<br>SNO<br>DAY     | ANIMAL<br>OTH<br>PDO    | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N - S    | 1       | DRVR       | NONE               | 35  | M   | OR-Y<br>OR<25 |                 | 000-No Error                                                                 | 000-No Action<br>(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<br>NO RPT | N     | N       | N    | N        | N         | 12/13/2010<br>Monday<br>6P    | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.00 |                                         | STRGHT<br>UN<br>04         | (DIVMD)<br>(4)                           | N<br>UNKNOWN<br>N     | N<br>N                    | CLR<br>DRY<br>DARK    | S-STRGHT<br>SS-O<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N - S    | 1       | DRVR       | NONE               | 0   | F   | UNK<br>UNK    |                 | 045-Improper Lane Chng                                                       | 000-No Action<br>(000-No Action)             |       |                          |                          | 13-Improper Lane Chng                                           | 00-No Code                | 13-Improper Lane Chng                                           |                           |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N - S    | 1       | DRVR       | NONE               | 48  | M   | OR-Y<br>OR<25 |                 | 000-No Error                                                                 | 000-No Action<br>(000-No Action)             |       |                          |                          | 00-No Code                                                      |                           | 00-No Code                                                      |                           |
| 01702<br>STATE  | N     | N       | N    | N        | N         | 12/13/2010<br>Monday<br>5P    | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.00 |                                         | STRGHT<br>UN<br>04         | (DIVMD)<br>(4)                           | N<br>UNKNOWN<br>N     | N<br>N                    | CLR<br>DRY<br>DARK    | S-1STOP<br>REAR<br>INJ  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N - S    | 1       | DRVR       | NONE               | 21  | F   | OR-Y<br>OR>25 |                 | 043-Following Too Close<br>026-Faild Avoid Stop Veh                          | 000-No Action<br>(000-No Action)             |       | 089-Refer Other Crash    |                          | 07-Followed too Closely                                         | 00-No Code                | 07-Followed too Closely                                         |                           |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STOP<br>N - S      | 1       | DRVR       | INJC               | 25  | M   | OR-Y<br>OR<25 |                 | 000-No Error                                                                 | 011-Stop In Traf-No Lturn<br>(000-No Action) |       |                          |                          | 00-No Code                                                      |                           | 00-No Code                                                      |                           |
|                 |       |         |      |          |           |                               |                            |                                                                                              |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                    | 2       | PSNG       | INJC               | 19  | F   |               |                 | 000-No Error<br>(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 #<br>INVEST | SPEED | ALCOHOL | DRUG | SCH ZONE | WORK ZONE | DATE<br>DAY<br>TIME          | COUNTY<br>CITY<br>URB AREA | RD #<br>FUNCTIONAL CLASS<br>COMPONENT<br>MILEAGE TYPE<br>MILEPOINT                             | CONN #<br>FIRST STREET<br>SECOND STREET | RD CHAR<br>DIRECT<br>LOCTN | INT-TYP<br>(MEDIAN)<br>LEGS<br>(# LANES) | INT-REL<br>TRAF-CONTL | OFF RD<br>RDNBT<br>DRVWY | WTHR<br>SURF<br>LIGHT | CRASH<br>COLL<br>SVRTY  | VEHICLE # | SPCL USE<br>TRLR QTY<br>OWNER<br>TYPE | MOVE<br>FROM<br>TO | PART # | PART TYPE | INJURY<br>SEVERITY | AGE | SEX | LICNS<br>RES   | PED<br>LOCATION | ERROR                                                                    | ACTION                                      | EVENT                                                           |                                                                  |                                             | CAUSE      |                                             |             |
|-----------------|-------|---------|------|----------|-----------|------------------------------|----------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------|------------------------------------------|-----------------------|--------------------------|-----------------------|-------------------------|-----------|---------------------------------------|--------------------|--------|-----------|--------------------|-----|-----|----------------|-----------------|--------------------------------------------------------------------------|---------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------|------------|---------------------------------------------|-------------|
|                 |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                          |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                          | VEHICLE<br>(PARTICIPANT)                    | CRASH                                                           | VEHICLE                                                          | PARTICIPANT                                 | CRASH      | VEHICLE                                     | PARTICIPANT |
|                 |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                          |                       |                         |           |                                       |                    |        |           |                    |     |     |                |                 |                                                                          |                                             |                                                                 |                                                                  |                                             |            |                                             |             |
| 00260<br>NONE   | N     | N       | N    | N        | N         | 02/19/2009<br>Thursday<br>8A | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.00   |                                         | STRGHT<br>UN<br>05         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N<br>N              | CLR<br>DRY<br>DAY     | NON-COLL<br>NCOL<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 0   | M   | OR-Y<br>OR<25  |                 | 000-No Error                                                             | 000-No Action<br>(000-No Action)            | 028-Load Shifted                                                | 028-Load Shifted                                                 | 12-Other (not Driver Err)                   | 00-No Code | 12-Other (not Driver Err)                   |             |
|                 |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                          |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 31  | M   | OR-Y<br>OR<25  |                 | 000-No Error                                                             | 000-No Action<br>(000-No Action)            |                                                                 |                                                                  |                                             | 00-No Code | 00-No Code                                  |             |
| 01607<br>COUNTY | N     | N       | N    | N        | N         | 11/28/2011<br>Monday<br>5P   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.00   |                                         | STRGHT<br>UN<br>05         | (NONE )<br>(4)                           | N<br>UNKNOWN          | N<br>N<br>N              | CLR<br>DRY<br>DARK    | ANIMAL<br>OTH<br>PDO    | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 55  | F   | OR-Y<br>OR<25  |                 | 000-No Error                                                             | 000-No Action<br>(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<br>STATE  | Y     | N       | N    | N        | N         | 06/04/2012<br>Monday<br>2A   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.00   |                                         | STRGHT<br>UN<br>08         | (NONE )<br>(4)                           | N<br>UNKNOWN          | Y<br>N<br>N              | RAIN<br>WET<br>DARK   | FIX OBJ<br>FIX<br>FAT   | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | INJB               | 62  | M   | OTH-Y<br>N-RES |                 | 047-Violation Basic Rule<br>080-Fail To MaintainLane<br>081-Ran Off Road | 000-No Action<br>(017-Lost Control)         | 072-Other Wall<br>010-Subseq Overtum<br>001-Fell/Jumped frm Veh | 124-Slide b/c of surface<br>072-Other Wall<br>010-Subseq Overtum | 01-Too Fast For Cond<br>05-Drove Wrong Side | 00-No Code | 01-Too Fast For Cond<br>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<br>COUNTY | N     | N       | N    | N        | N         | 10/16/2009<br>Friday<br>7A   | Deschutes                  | 1-Undiv Hwy or +Mile of Div Hwy<br>02-Rur Pr Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.18   |                                         | STRGHT<br>UN<br>04         | (NONE )<br>(5)                           | N<br>UNKNOWN          | N<br>N<br>N              | CLR<br>DRY<br>DAY     | S-1TURN<br>TURN<br>INJ  | 1         | NONE<br>1<br>PRVTE<br>SEMI TOW        | U-TURN<br>S -S     | 1      | DRVR      | NONE               | 43  | M   | OTH-Y<br>N-RES |                 | 008-Illegal U-Turn                                                       | 051-Enter From Off Road<br>(000-No Action)  |                                                                 |                                                                  | 08-Improper Turn                            | 00-No Code | 08-Improper Turn                            |             |
|                 |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                          |                       |                         | 2         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | INJC               | 22  | M   | OR-Y<br>OR<25  |                 | 000-No Error                                                             | 000-No Action<br>(000-No Action)            |                                                                 |                                                                  |                                             | 00-No Code | 00-No Code                                  |             |
| 01282<br>STATE  | N     | N       | N    | N        | N         | 09/22/2011<br>Thursday<br>8A | Deschutes<br><br>BEND UA   | 1-Undiv Hwy or +Mile of Div Hwy<br>14-Urb Prin Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.20 |                                         | STRGHT<br>UN<br>03         | (NONE )<br>(4)                           | N<br>NONE             | N<br>N<br>N              | CLR<br>DRY<br>DAY     | S-1STOP<br>REAR<br>INJ  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | INJB               | 26  | F   | OR-Y<br>OR<25  |                 | 026-Faild Avoid Stop Veh                                                 | 000-No Action<br>(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<br>0<br>PRVTE<br>PSNGR CAR       | STOP<br>S -N       | 1      | DRVR      | INJC               | 39  | F   | OR-Y<br>OR<25  |                 | 000-No Error                                                             | 011-Stop In Traf-No Ltum<br>(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<br>COUNTY | Y     | N       | N    | N        | N         | 01/07/2010<br>Thursday<br>6A | Deschutes<br><br>BEND UA   | 1-Undiv Hwy or +Mile of Div Hwy<br>14-Urb Prin Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.40 |                                         | STRGHT<br>UN<br>01         | (RSDMD)<br>(4)                           | N<br>UNKNOWN          | Y<br>N<br>N              | FOG<br>ICE<br>DARK    | OVERTURN<br>NCOL<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1      | DRVR      | NONE               | 34  | M   | OR-Y<br>OR<25  |                 | 081-Ran Off Road<br>047-Violation Basic Rule                             | 000-No Action<br>(000-No Action)            | 088-Fence/Building                                              | 088-Fence/Building                                               | 01-Too Fast For Cond                        | 00-No Code | 01-Too Fast For Cond                        |             |
| 00235<br>COUNTY | Y     | N       | N    | N        | N         | 02/19/2011<br>Saturday<br>5P | Deschutes<br><br>BEND UA   | 1-Undiv Hwy or +Mile of Div Hwy<br>14-Urb Prin Art - Oth<br>0-Mainline<br>0-Reg Mile<br>132.43 |                                         | INTER<br>UN<br>06          | 3-LEG<br>( )<br>0<br>( )                 | N<br>UNKNOWN          | Y<br>N<br>N              | SNOW<br>SNO<br>DUSK   | FIX OBJ<br>FIX<br>PDO   | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S     | 1      | DRVR      | NONE               | 32  | M   | OR-Y<br>OR<25  |                 | 081-Ran Off Road                                                         | 000-No Action<br>(000-No Action)            | 124-Slide b/c of surface<br>061-Mailbox<br>072-Other Wall       | 124-Slide b/c of surface<br>061-Mailbox<br>072-Other Wall        | 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 #<br>INVEST  | SPEED | ALCOHOL | DRUG | SCH ZONE | WORK ZONE | DATE<br>DAY<br>TIME          | COUNTY<br>CITY<br>URB AREA | RD #<br>FUNCTIONAL CLASS<br>COMPONENT<br>MILEAGE TYPE                                          | CONN #<br>FIRST STREET<br>SECOND STREET | RD CHAR<br>DIRECT<br>LOCTN | INT-TYP<br>(MEDIAN)<br>LEGS<br>(# LANES) | INT-REL<br>TRAF-CONTL | OFF RD<br>RDNDBT<br>DRVWY | WTHR<br>SURF<br>LIGHT | CRASH<br>COLL<br>SVRTY  | VEHICLE # | SPCL USE<br>TRLR QTY<br>OWNER<br>TYPE | MOVE<br>FROM<br>TO              | PART #         | PART TYPE | INJURY<br>SEVERITY | AGE  | SEX | LICNS<br>RES  | PED<br>LOCATION | ERROR                                               | ACTION                                   |                                                 | EVENT                                           |                           |            | CAUSE                     |             |  |
|------------------|-------|---------|------|----------|-----------|------------------------------|----------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------|------------------------------------------|-----------------------|---------------------------|-----------------------|-------------------------|-----------|---------------------------------------|---------------------------------|----------------|-----------|--------------------|------|-----|---------------|-----------------|-----------------------------------------------------|------------------------------------------|-------------------------------------------------|-------------------------------------------------|---------------------------|------------|---------------------------|-------------|--|
|                  |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                                 |                |           |                    |      |     |               |                 |                                                     | VEHICLE<br>(PARTICIPANT)                 | CRASH                                           | VEHICLE                                         | PARTICIPANT               | CRASH      | VEHICLE                   | PARTICIPANT |  |
|                  |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                                 |                |           |                    |      |     |               |                 |                                                     |                                          |                                                 |                                                 |                           |            |                           |             |  |
| 00224<br>STATE   | Y     | N       | N    | N        | N         | 02/19/2011<br>Saturday<br>8P | Deschutes<br><br>BEND UA   | 1-Undiv Hwy or +Mile of Div Hwy<br>14-Urb Prin Art - Oth<br>0-Mainline<br>0-Reg Mile<br>133.02 |                                         | STRGHT<br>UN<br>04         | (NONE )<br><br>(4)                       | N<br>UNKNOWN          | N<br>N                    | SNOW<br>ICE<br>DARK   | O-STRGHT<br>SS-M<br>PDO | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S                  | 1              | DRVR      | NONE               | 47   | M   | OR-Y<br>OR<25 |                 | 080-Fail To MaintainLane<br>081-Ran Off Road        | 000-No Action<br>(000-No Action)         | 124-Slide b/c of surface<br>079-Cut Slope/Ditch | 124-Slide b/c of surface<br>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<br><br>(000-No Action)                 |                                          |                                                 |                                                 |                           |            | 00-No Code                |             |  |
|                  |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                           |                       |                         |           | 2                                     | NONE<br>0<br>PRVTE<br>SEMI TOW  | STRGHT<br>S -N | 1         | DRVR               | NONE | 69  | M             | OTH-Y<br>N-RES  |                                                     | 000-No Error<br><br>(000-No Action)      | 000-No Action<br>(000-No Action)                |                                                 |                           | 00-No Code | 00-No Code                |             |  |
| 01628<br>CITY    | N     | N       | N    | N        | N         | 11/19/2013<br>Tuesday<br>4A  | Deschutes<br><br>BEND UA   | 1-Undiv Hwy or +Mile of Div Hwy<br>14-Urb Prin Art - Oth<br>0-Mainline<br>0-Reg Mile<br>133.03 |                                         | STRGHT<br>UN<br>03         | (NONE )<br><br>(4)                       | N<br>UNKNOWN          | N<br>N                    | CLR<br>DRY<br>DARK    | ANIMAL<br>OTH<br>PDO    | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N                  | 1              | DRVR      | NONE               | 26   | M   | OR-Y<br>OR<25 |                 | 000-No Error<br><br>(000-No Action)                 | 000-No Action<br>(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<br>STATE   | N     | N       | N    | N        | N         | 05/02/2011<br>Monday<br>1P   | Deschutes<br><br>BEND UA   | 1-Undiv Hwy or +Mile of Div Hwy<br>14-Urb Prin Art - Oth<br>0-Mainline<br>0-Reg Mile<br>133.04 |                                         | STRGHT<br>UN<br>03         | (NONE )<br><br>(4)                       | N<br>UNKNOWN          | N<br>N<br>Y               | CLR<br>DRY<br>DAY     | S-1TURN<br>TURN<br>INJ  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | TURN-L<br>N -E                  | 1              | DRVR      | INJC               | 21   | F   | OR-Y<br>OR<25 |                 | 024-Disrg Siren/Emerg V<br>028-No ROW               | 000-No Action<br>(000-No Action)         |                                                 |                                                 | 02-Failed Yield ROW       | 00-No Code | 02-Failed Yield ROW       |             |  |
|                  |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                                 | 2              | PSNG      | NO<5               | 1    | UNK |               |                 | 000-No Error<br><br>(000-No Action)                 |                                          |                                                 |                                                 |                           |            | 00-No Code                |             |  |
|                  |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                                 | 3              | PSNG      | NONE               | 0    | UNK |               |                 | 000-No Error<br><br>(000-No Action)                 |                                          |                                                 |                                                 |                           |            | 00-No Code                |             |  |
|                  |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                           |                       |                         |           | 2                                     | NONE<br>0<br>PRVTE<br>PSNGR CAR | STRGHT<br>N -S | 1         | DRVR               | NONE | 46  | M             | OR-Y<br>OR<25   |                                                     | 000-No Error<br><br>(000-No Action)      | 000-No Action<br>(000-No Action)                |                                                 |                           | 00-No Code | 00-No Code                |             |  |
| 01337<br>STATE   | Y     | N       | N    | N        | N         | 10/13/2009<br>Tuesday<br>10P | Deschutes<br><br>BEND UA   | 1-Undiv Hwy or +Mile of Div Hwy<br>14-Urb Prin Art - Oth<br>0-Mainline<br>0-Reg Mile<br>133.05 |                                         | STRGHT<br>UN<br>07         | (NONE )<br><br>(4)                       | N<br>UNKNOWN          | Y<br>N<br>N               | CLR<br>ICE<br>DARK    | OVERTURN<br>OTH<br>PDO  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N                  | 1              | DRVR      | NONE               | 46   | F   | OR-Y<br>OR<25 |                 | 080-Fail To MaintainLane<br>081-Ran Off Road        | 001-Skidded<br>(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<br>STATE   | N     | N       | N    | N        | N         | 12/13/2010<br>Monday<br>5P   | Deschutes<br><br>BEND UA   | 1-Undiv Hwy or +Mile of Div Hwy<br>14-Urb Prin Art - Oth<br>0-Mainline<br>0-Reg Mile<br>133.08 |                                         | STRGHT<br>UN<br>05         | (NONE )<br><br>(4)                       | N<br>UNKNOWN          | N<br>N                    | CLD<br>ICE<br>DARK    | O-STRGHT<br>SS-M<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>N -S                  | 1              | DRVR      | INJB               | 60   | F   | OR-Y<br>OR<25 |                 | 080-Fail To MaintainLane<br>039-Drive On Wrong Side | 000-No Action<br>(028-Physical Illness)  |                                                 |                                                 | 10-Other Driver Error     | 00-No Code | 10-Other Driver Error     |             |  |
|                  |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                           |                       |                         |           | 2                                     | NONE<br>0<br>PRVTE<br>PSNGR CAR | STRGHT<br>S -N | 1         | DRVR               | NONE | 32  | M             | OR-Y<br>OR<25   |                                                     | 000-No Error<br><br>(000-No Action)      | 000-No Action<br>(000-No Action)                |                                                 |                           | 00-No Code | 00-No Code                |             |  |
|                  |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                                 | 2              | PSNG      | NO<5               | 1    | M   |               |                 | 000-No Error<br><br>(000-No Action)                 |                                          |                                                 |                                                 |                           |            | 00-No Code                |             |  |
|                  |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                           |                       |                         |           |                                       |                                 | 3              | PSNG      | NO<5               | 3    | F   |               |                 | 000-No Error<br><br>(000-No Action)                 |                                          |                                                 |                                                 |                           |            | 00-No Code                |             |  |
| 01623<br>NONE    | N     | N       | N    | N        | N         | 12/03/2010<br>Friday<br>4P   | Deschutes<br><br>BEND UA   | 1-Undiv Hwy or +Mile of Div Hwy<br>14-Urb Prin Art - Oth<br>0-Mainline<br>0-Reg Mile<br>133.11 |                                         | ALLEY<br>UN<br>06          | (NONE )<br><br>(4)                       | N<br>UNKNOWN          | N<br>N<br>N               | FOG<br>ICE<br>DUSK    | ANGL-OTH<br>TURN<br>INJ | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | TURN-L<br>E -S                  | 1              | DRVR      | INJC               | 32   | M   | OR-Y<br>OR<25 |                 | 028-No ROW                                          | 018-Ent Frm Alley/Dwy<br>(000-No Action) |                                                 |                                                 | 02-Failed Yield ROW       | 00-No Code | 02-Failed Yield ROW       |             |  |
|                  |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                           |                       |                         |           | 2                                     | NONE<br>0<br>PRVTE<br>PSNGR CAR | STRGHT<br>S -N | 1         | DRVR               | NONE | 42  | F             | OR-Y<br>OR>25   |                                                     | 000-No Error<br><br>(000-No Action)      | 000-No Action<br>(000-No Action)                |                                                 |                           | 00-No Code | 00-No Code                |             |  |
| 00736<br>COUNTRY | N     | N       | N    | N        | N         | 06/09/2011<br>Thursday<br>6P | Deschutes<br><br>BEND UA   | 1-Undiv Hwy or +Mile of Div Hwy<br>14-Urb Prin Art - Oth<br>0-Mainline<br>0-Reg Mile<br>133.12 |                                         | STRGHT<br>UN<br>03         | (NONE )<br><br>(4)                       | N<br>NONE             | N<br>N<br>N               | CLR<br>DRY<br>DAY     | PED<br>PED<br>INJ       | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N                  | 1              | DRVR      | NONE               | 19   | F   | OR-Y<br>OR<25 |                 | 000-No Error<br><br>(000-No Action)                 | 000-No Action<br>(000-No Action)         |                                                 |                                                 | 02-Failed Yield ROW       | 00-No Code | 12-Other (not Driver Err) |             |  |
|                  |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                           |                       |                         |           | 0                                     | 0                               | STRGHT<br>W -E | 1         | PED                | INJA | 19  | F             | ROAD            | 057-X-Between Intscions<br><br>(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 #<br>INVEST | SPEED | ALCOHOL | DRUG | SCH ZONE | WORK ZONE | DATE<br>DAY<br>TIME          | COUNTY<br>CITY<br>URB AREA | RD #<br>FUNCTIONAL CLASS<br>COMPONENT<br>MILEAGE TYPE<br>MILEPOINT                             | CONN #<br>FIRST STREET<br>SECOND STREET | RD CHAR<br>DIRECT<br>LOCTN | INT-TYP<br>(MEDIAN)<br>LEGS<br>(# LANES) | INT-REL<br>TRAF-CONTL | OFF RD<br>RND BT<br>DRVWY | WTHR<br>SURF<br>LIGHT | CRASH<br>COLL<br>SVRTY | VEHICLE # | SPCL USE<br>TRLR QTY<br>OWNER<br>TYPE | MOVE<br>FROM<br>TO | PARTC # | PARTC TYPE | INJURY<br>SEVERITY | AGE | SEX | LICNS<br>RES  | PED<br>LOCATION | ERROR        | ACTION                           |       | EVENT                 |                       |       | CAUSE                     |             |                           |
|-----------------|-------|---------|------|----------|-----------|------------------------------|----------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------|------------------------------------------|-----------------------|---------------------------|-----------------------|------------------------|-----------|---------------------------------------|--------------------|---------|------------|--------------------|-----|-----|---------------|-----------------|--------------|----------------------------------|-------|-----------------------|-----------------------|-------|---------------------------|-------------|---------------------------|
|                 |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                           |                       |                        |           |                                       |                    |         |            |                    |     |     |               |                 |              | VEHICLE<br>(PARTICIPANT)         | CRASH | VEHICLE               | PARTICIPANT           | CRASH | VEHICLE                   | PARTICIPANT |                           |
|                 |       |         |      |          |           |                              |                            |                                                                                                |                                         |                            |                                          |                       |                           |                       |                        |           |                                       |                    |         |            |                    |     |     |               |                 |              |                                  |       |                       |                       |       |                           |             |                           |
| 00926<br>NONE   | N     | N       | N    | N        | N         | 07/21/2012<br>Saturday<br>4A | Deschutes<br><br>BEND UA   | 1-Undiv Hwy or +Mile of Div Hwy<br>14-Urb Prin Art - Oth<br>0-Mainline<br>0-Reg Mile<br>133.14 |                                         | STRGHT<br>UN<br>03         | (NONE )<br><br>(4)                       | N<br><br>UNKNOWN      | N<br><br>N                | CLR<br>DRY<br>DARK    | OTH OBJ<br>OTH<br>PDO  | 1         | NONE<br>0<br>PRVTE<br>PSNGR CAR       | STRGHT<br>S -N     | 1       | DRVR       | NONE               | 50  | F   | OR-Y<br>OR<25 |                 | 000-No Error | 000-No Action<br>(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<br>Crashes (Total<br>Crashes/Year) | Alternative | Countermeasures                                  | Proportion of CMF<br>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<br>(crashes/year) |                             |                                 | Observed<br>crashes,<br>N <sub>observed</sub><br>(crashes/year) | Overdispersion<br>Parameter, k | Weighted<br>adjustment, w               | Expected<br>average crash<br>frequency. |
|                          | N <sub>predicted</sub><br>(TOTAL)                   | N <sub>predicted</sub> (FI) | N <sub>predicted</sub><br>(PDO) |                                                                 |                                | Equation A-5<br>from Part C<br>Appendix | Equation A-4<br>from Part C<br>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 <sub>major</sub> (veh/day)                                                   | AADT <sub>MAX</sub> = 78,300 (veh/day) | --              | 27,500                            |  |  |
| AADT <sub>minor</sub> (veh/day)                                                   | AADT <sub>MAX</sub> = 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 <sub>i</sub>                                                |                                        | 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 <sub>11</sub> )<br>from Equations 11-18 or 11-20 and 11-19 or 11-21 | CMF for Left-Turn Lanes (CMF <sub>21</sub> )<br>from Table 11-22 | CMF for Right-Turn Lanes (CMF <sub>31</sub> )<br>from Table 11-23 | CMF for Lighting (CMF <sub>41</sub> )<br>from Equation 11-22 | Combined CMF (CMF <sub>COMB</sub> )<br>(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        |       |              | N <sub>sp int</sub> | Overdispersion Parameter, k | Combined CMFs<br>from (6) of<br>Worksheet 2B | Calibration<br>Factor, C <sub>i</sub> | Predicted average crash frequency,<br>N <sub>predicted int</sub><br>(3) * (5) * (6) |
|                            | from Table 11-7 or 11-8 |       |              |                     |                             |                                              |                                       |                                                                                     |
|                            | a                       | b     | c or d (4SG) |                     |                             |                                              |                                       |                                                                                     |
| 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* (FI*)    | -11.989                 | 1.013 | 0.228        | 0.805               | 0.566                       | 1.09                                         | 0.15                                  | 0.132                                                                               |
| Property Damage Only (PDO) | --                      | --    | --           | --                  | --                          | --                                           | --                                    | (7) <sub>TOTAL</sub> - (7) <sub>FI</sub><br>0.335                                   |

NOTE: <sup>a</sup> 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 <sub>TOTAL</sub> | N <sub>predicted int</sub> (TOTAL) (crashes/year) | Proportion of Collision Type <sub>FBI</sub> | N <sub>predicted int</sub> (FI) (crashes/year) | Proportion of Collision Type (FI) <sup>a</sup> | N <sub>predicted int</sub> (FI) <sup>a</sup> (crashes/year) | Proportion of Collision Type (PDO) | N <sub>predicted int</sub> (PDO) (crashes/year) |
|                          | from Table 11-9                               | (7) <sub>TOTAL</sub> from Worksheet 2C            | from Table 11-9                             | (7) <sub>FI</sub> from Worksheet 2C            | from Table 11-9                                | (7) <sub>FI</sub> <sup>a</sup> from Worksheet 2C            | from Table 11-9                    | (7) <sub>PDO</sub> from Worksheet 2C            |
| Total                    | 0.999                                         | 0.566                                             | 1.000                                       | 0.230                                          | 1.001                                          | 0.132                                                       | 1.001                              | 0.335                                           |
|                          |                                               | (2)*(3) <sub>TOTAL</sub>                          |                                             | (4)x(5) <sub>FI</sub>                          |                                                | (6)*(7) <sub>FI</sub> <sup>a</sup>                          |                                    | (8)*(9) <sub>PDO</sub>                          |
| 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: <sup>a</sup> 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

| Worksheet 2C – 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 <sup>a</sup> (FI <sup>a</sup> )                         | 0.1                                                |
| Property Damage Only (PDO)                                               | 0.3                                                |

NOTE: <sup>a</sup> 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 Intersection Jurisdiction Analysis Year |                 | US 97                                 |
| Agency or Company                                                                            | KAI      |                                        |                                                 |                 | Intersection at MP 128.58 (61st/Gift) |
| Date Performed                                                                               | 01/30/14 |                                        |                                                 |                 | ODOT 2014                             |
| Input Data                                                                                   |          |                                        | Base Conditions                                 | Site Conditions |                                       |
| Intersection type (3ST, 4ST, 4SG)                                                            |          |                                        | --                                              | 3ST             |                                       |
| AADT <sub>major</sub> (veh/day)                                                              |          | AADT <sub>MAX</sub> = 78,300 (veh/day) | --                                              | 27,500          |                                       |
| AADT <sub>minor</sub> (veh/day)                                                              |          | AADT <sub>MAX</sub> = 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 <sub>i</sub>                                                           |          |                                        | 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 <sub>i1</sub> )<br>from Equations 11-18 or 11-20 and 11-19 or 11-21 | CMF for Left-Turn Lanes<br>(CMF <sub>2i</sub> )<br>from Table 11-22 | CMF for Right-Turn Lanes<br>(CMF <sub>3i</sub> )<br>from Table 11-23 | CMF for Lighting<br>(CMF <sub>4i</sub> )<br>from Equation 11-22 | Combined CMF (CMF <sub>COMB</sub> )<br>(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)<br>Crash Severity Level                                                    | (2)                     |       |              | (3)                          | (4)                         | (5)                      | (6)                                | (7)                                               |
|                                                                                | SPF Coefficients        |       |              | N <sub>spt int</sub>         | Overdispersion Parameter, k | Combined CMFs            | Calibration Factor, C <sub>i</sub> | Predicted average crash frequency                 |
|                                                                                | from Table 11-7 or 11-8 |       |              |                              |                             |                          |                                    |                                                   |
|                                                                                | 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 | N <sub>predicted int</sub>         |                                                   |
| Total                                                                          | -12.526                 | 1.204 | 0.236        | 4.282                        | 0.460                       | 1.03                     | 0.15                               | (3)*(5)*(6)<br>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 <sup>a</sup> (FI <sup>a</sup> )                               | -11.989                 | 1.013 | 0.228        | 0.983                        | 0.566                       | 1.05                     | 0.15                               | 0.155                                             |
| Property Damage Only (PDO)                                                     | --                      | --    | --           | --                           | --                          | --                       | --                                 | (7) <sub>TOTAL</sub> - (7) <sub>FI</sub><br>0.382 |

NOTE: <sup>a</sup> 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<br>Collision<br>Type <sub>TOTAL</sub> | N <sub>predicted int</sub> (TOTAL)<br>(crashes/year) | Proportion of<br>Collision<br>Type <sub>FI</sub> | N <sub>predicted int</sub> (FI) (crashes/year) | Proportion of<br>Collision Type (FI <sup>a</sup> ) | N <sub>predicted int</sub> (FI <sup>a</sup> )<br>(crashes/year) | Proportion of<br>Collision Type<br>(PDO) | N <sub>predicted int</sub> (PDO) (crashes/year) |
|                                                                                                        | from Table 11-9                                     | (7) <sub>TOTAL</sub> from Worksheet 2C               | from Table 11-9                                  | (7) <sub>FI</sub> from Worksheet 2C            | from Table 11-9                                    | (7) <sub>FI</sub> from Worksheet 2C                             | from Table 11-9                          | (7) <sub>PDO</sub> from Worksheet 2C            |
| Total                                                                                                  | 0.999                                               | 0.663                                                | 1.000                                            | 0.281                                          | 1.001                                              | 0.155                                                           | 1.001                                    | 0.382                                           |
|                                                                                                        |                                                     | (2)*(3) <sub>TOTAL</sub>                             |                                                  | (4)x(5) <sub>FI</sub>                          |                                                    | (6)*(7) <sub>FI</sub> <sup>a</sup>                              |                                          | (8)*(9) <sub>PDO</sub>                          |
| 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: <sup>a</sup> 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 <sup>a</sup> (FI <sup>a</sup> )                          | 0.2                                                |
| Property Damage Only (PDO)                                                | 0.4                                                |

NOTE: <sup>a</sup> 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 Intersection<br>Jurisdiction<br>Analysis Year |                 | US 97                                   |
| Agency or Company                                                                            | KAI      |                                        |                                                       |                 | Intersection at MP 132.44 (Ft Thompson) |
| Date Performed                                                                               | 01/30/14 |                                        |                                                       |                 | ODOT<br>2014                            |
| Input Data                                                                                   |          |                                        | Base Conditions                                       | Site Conditions |                                         |
| Intersection type (3ST, 4ST, 4SG)                                                            |          |                                        | --                                                    | 4ST             |                                         |
| AADT <sub>major</sub> (veh/day)                                                              |          | AADT <sub>MAX</sub> = 78,300 (veh/day) | --                                                    | 29,950          |                                         |
| AADT <sub>minor</sub> (veh/day)                                                              |          | AADT <sub>MAX</sub> = 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 <sub>i</sub>                                                           |          |                                        | 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 <sub>i1</sub> )<br>from Equations 11-18 or 11-20 and 11-19 or 11-21 | CMF for Left-Turn Lanes<br>(CMF <sub>2i</sub> )<br>from Table 11-22 | CMF for Right-Turn Lanes<br>(CMF <sub>3i</sub> )<br>from Table 11-23 | CMF for Lighting<br>(CMF <sub>4i</sub> )<br>from Equation 11-22 | Combined CMF (CMF <sub>COMB</sub> )<br>(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)<br>Crash Severity Level                                                    | (2)                     |       |              | (3)                          | (4)                         | (5)                      | (6)                                | (7)                                               |
|                                                                                | SPF Coefficients        |       |              | N <sub>spt int</sub>         | Overdispersion Parameter, k | Combined CMFs            | Calibration Factor, C <sub>i</sub> | Predicted average crash frequency                 |
|                                                                                | from Table 11-7 or 11-8 |       |              |                              |                             |                          |                                    |                                                   |
|                                                                                | 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 |                                    | N <sub>predicted int</sub><br>(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 <sup>a</sup> (FI <sup>a</sup> )                               | -10.734                 | 0.828 | 0.412        | 0.739                        | 0.655                       | 1.09                     | 0.39                               | 0.314                                             |
| Property Damage Only (PDO)                                                     | --                      | --    | --           | --                           | --                          | --                       | --                                 | (7) <sub>TOTAL</sub> - (7) <sub>FI</sub><br>0.503 |

NOTE: <sup>a</sup> 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<br>Collision<br>Type <sub>TOTAL</sub> | N <sub>predicted int</sub> (TOTAL)<br>(crashes/year) | Proportion of<br>Collision<br>Type <sub>FI</sub> | N <sub>predicted int</sub> (FI) (crashes/year) | Proportion of<br>Collision Type (FI <sup>a</sup> ) | N <sub>predicted int</sub> (FI <sup>a</sup> )<br>(crashes/year) | Proportion of<br>Collision Type<br>(PDO) | N <sub>predicted int</sub> (PDO) (crashes/year) |
|                                                                                                        | from Table 11-9                                     | (7) <sub>TOTAL</sub> from Worksheet 2C               | from Table 11-9                                  | (7) <sub>FI</sub> from Worksheet 2C            | from Table 11-9                                    | (7) <sub>FI</sub> <sup>a</sup> from<br>Worksheet 2C             | from Table 11-9                          | (7) <sub>PDO</sub> from Worksheet 2C            |
| Total                                                                                                  | 1.000                                               | 0.935                                                | 1.000                                            | 0.432                                          | 1.001                                              | 0.314                                                           | 1.001                                    | 0.503                                           |
|                                                                                                        |                                                     | (2)*(3) <sub>TOTAL</sub>                             |                                                  | (4)x(5) <sub>FI</sub>                          |                                                    | (6)*(7) <sub>FI</sub> <sup>a</sup>                              |                                          | (8)*(9) <sub>PDO</sub>                          |
| 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: <sup>a</sup> 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)<br>(7) from Worksheet 2C |
| Total                                                                     | 0.9                                                                         |
| Fatal and Injury (FI)                                                     | 0.4                                                                         |
| Fatal and Injury <sup>a</sup> (FI <sup>a</sup> )                          | 0.3                                                                         |
| Property Damage Only (PDO)                                                | 0.5                                                                         |

NOTE: <sup>a</sup> 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 <sub>MAX</sub> = | 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 1 <sub>ru</sub>                                                                           | CMF 2 <sub>ru</sub>    | CMF 3 <sub>ru</sub> | CMF 4 <sub>ru</sub> | CMF 5 <sub>ru</sub>                 | 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 |       |       | N spf rs(u) | Overdispersion<br>Parameter, k | Combined CMFs<br>(6) from Worksheet<br>1B (b) | Calibration<br>Factor, Cr | Predicted average crash<br>frequency, N <sub>predicted rs(u)</sub><br>(3)*(5)*(6) |
|                                                                                            | from Table 11-3  |       |       |             |                                |                                               |                           |                                                                                   |
|                                                                                            |                  | a     | b     | c           | from Equation 11-7             | from Equation 11-8                            |                           |                                                                                   |
| 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 <sup>a</sup> (FI <sup>a</sup> )                                           | -8.577           | 0.938 | 2.003 | 4.810       | 0.077                          | 0.94                                          | 0.37                      | 1.674                                                                             |
| Property Damage Only (PDO)                                                                 | --               | --    | --    | --          | --                             | --                                            | --                        | (7) <sub>TOTAL</sub> - (7) <sub>FI</sub><br>2.916                                 |

NOTE: <sup>a</sup> 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 <sub>TOTAL</sub> | N <sub>predicted rs(u)</sub> (TOTAL)<br>(crashes/year) | Proportion of Collision Type <sub>FI</sub> | N <sub>predicted rs(u)</sub> (FI)<br>(crashes/year) | Proportion of Collision Type <sub>FI<sup>a</sup></sub> | N <sub>predicted rs(u)</sub> (FI <sup>a</sup> )<br>(crashes/year) | Proportion of Collision Type <sub>PDO</sub> | N <sub>predicted rs(u)</sub> (PDO)<br>(crashes/year) |
|                                                                                                                 | from Table 11-4                               | (7) <sub>TOTAL</sub> from Worksheet 1C (b)             | from Table 11-4                            | (7) <sub>FI</sub> from Worksheet 1C (b)             | from Table 11-4                                        | (7) <sub>FI<sup>a</sup></sub> from Worksheet 1C (b)               | from Table 11-4                             | (7) <sub>PDO</sub> from Worksheet 1C (b)             |
| Total                                                                                                           | 1.000                                         | 6.501                                                  | 0.999                                      | 3.585                                               | 1.000                                                  | 1.674                                                             | 1.000                                       | 2.916                                                |
|                                                                                                                 |                                               | (2)*(3) <sub>TOTAL</sub>                               |                                            | (4)*(5) <sub>FI</sub>                               |                                                        | (6)*(7) <sub>FI<sup>a</sup></sub>                                 |                                             | (8)*(9) <sub>PDO</sub>                               |
| 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: <sup>a</sup> 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 <sup>a</sup> (FI <sup>a</sup> )                     | 1.7                                              | 1.8                         | 1.0                          |
| Property Damage Only (PDO)                                           | 2.9                                              | 1.8                         | 1.7                          |

NOTE: <sup>a</sup> 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                                                                                 | A/JG                                   |  | 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 <sub>MAX</sub> = 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 1 <sub>ru</sub>                                                                           | CMF 2 <sub>ru</sub>    | CMF 3 <sub>ru</sub> | CMF 4 <sub>ru</sub> | CMF 5 <sub>ru</sub>                 | 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<br>Parameter, k | Combined CMFs<br>(6) from Worksheet<br>1B (b) | Calibration<br>Factor, Cr | Predicted average crash<br>frequency, N <sub>predicted rs(u)</sub><br>(3)*(5)*(6) |
|                                                                                            | from Table 11-3  |       |       |             |                                |                                               |                           |                                                                                   |
|                                                                                            |                  | a     | b     | c           | from Equation 11-7             | from Equation 11-8                            |                           |                                                                                   |
| 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 <sup>a</sup> (FI <sup>a</sup> )                                           | -8.577           | 0.938 | 2.003 | 6.267       | 0.059                          | 1.03                                          | 0.37                      | 2.377                                                                             |
| Property Damage Only (PDO)                                                                 | --               | --    | --    | --          | --                             | --                                            | --                        | (7) <sub>TOTAL</sub> - (7) <sub>FI</sub><br>4.141                                 |

NOTE: <sup>a</sup> 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 <sub>TOTAL</sub> | N <sub>predicted rs(u)</sub> (TOTAL)<br>(crashes/year) | Proportion of Collision Type <sub>FI</sub> | N <sub>predicted rs(u)</sub> (FI)<br>(crashes/year) | Proportion of Collision Type <sub>FI<sup>a</sup></sub> | N <sub>predicted rs(u)</sub> (FI <sup>a</sup> )<br>(crashes/year) | Proportion of Collision Type <sub>PDO</sub> | N <sub>predicted rs(u)</sub> (PDO)<br>(crashes/year) |
|                                                                                                                 | from Table 11-4                               | (7) <sub>TOTAL</sub> from Worksheet 1C (b)             | from Table 11-4                            | (7) <sub>FI</sub> from Worksheet 1C (b)             | from Table 11-4                                        | (7) <sub>FI<sup>a</sup></sub> from Worksheet 1C (b)               | from Table 11-4                             | (7) <sub>PDO</sub> from Worksheet 1C (b)             |
| Total                                                                                                           | 1.000                                         | 9.232                                                  | 0.999                                      | 5.091                                               | 1.000                                                  | 2.377                                                             | 1.000                                       | 4.141                                                |
|                                                                                                                 |                                               | (2)*(3) <sub>TOTAL</sub>                               |                                            | (4)*(5) <sub>FI</sub>                               |                                                        | (6)*(7) <sub>FI<sup>a</sup></sub>                                 |                                             | (8)*(9) <sub>PDO</sub>                               |
| 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: <sup>a</sup> 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 <sup>a</sup> (FI <sup>a</sup> )                     | 2.4                                              | 2.3                         | 1.0                          |
| Property Damage Only (PDO)                                           | 4.1                                              | 2.3                         | 1.8                          |

NOTE: <sup>a</sup> 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 <sub>MAX</sub> = 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 1 <sub>ru</sub>                                                                           | CMF 2 <sub>ru</sub>    | CMF 3 <sub>ru</sub> | CMF 4 <sub>ru</sub> | CMF 5 <sub>ru</sub>                 | 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 <sub>predicted rs(u)</sub> |
|                                                                                            | from Table 11-3  |       |       |             |                             | (6) from Worksheet |                        |                                                                 |
|                                                                                            | a                | b     | c     |             |                             | 1B (b)             |                        |                                                                 |
| 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 <sup>a</sup> (FI <sup>a</sup> )                                           | -8.577           | 0.938 | 2.003 | 4.123       | 0.090                       | 1.03               | 0.37                   | 1.564                                                           |
| Property Damage Only (PDO)                                                                 | --               | --    | --    | --          | --                          | --                 | --                     | (7) <sub>TOTAL</sub> - (7) <sub>FI</sub>                        |
|                                                                                            |                  |       |       |             |                             |                    |                        | 2.724                                                           |

NOTE: <sup>a</sup> 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 <sub>TOTAL</sub> | N <sub>predicted rs(u)</sub> (TOTAL)<br>(crashes/year) | Proportion of Collision Type <sub>FI</sub> | N <sub>predicted rs(u)</sub> (FI)<br>(crashes/year) | Proportion of Collision Type <sub>FI<sup>a</sup></sub> | N <sub>predicted rs(u)</sub> (FI <sup>a</sup> )<br>(crashes/year) | Proportion of Collision Type <sub>PDO</sub> | N <sub>predicted rs(u)</sub> (PDO)<br>(crashes/year) |
|                                                                                                                 | from Table 11-4                               | (7) <sub>TOTAL</sub> from Worksheet 1C (b)             | from Table 11-4                            | (7) <sub>FI</sub> from Worksheet 1C (b)             | from Table 11-4                                        | (7) <sub>FI<sup>a</sup></sub> from Worksheet 1C (b)               | from Table 11-4                             | (7) <sub>PDO</sub> from Worksheet 1C (b)             |
| Total                                                                                                           | 1.000                                         | 6.074                                                  | 0.999                                      | 3.349                                               | 1.000                                                  | 1.564                                                             | 1.000                                       | 2.724                                                |
|                                                                                                                 |                                               | (2)*(3) <sub>TOTAL</sub>                               |                                            | (4)*(5) <sub>FI</sub>                               |                                                        | (6)*(7) <sub>FI<sup>a</sup></sub>                                 |                                             | (8)*(9) <sub>PDO</sub>                               |
| 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: <sup>a</sup> 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 <sup>a</sup> (FI <sup>a</sup> )                     | 1.6                                              | 1.5                         | 1.0                          |
| Property Damage Only (PDO)                                           | 2.7                                              | 1.5                         | 1.8                          |

NOTE: <sup>a</sup> 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 <sub>MAX</sub> = | 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 1 <sub>ru</sub>                                                                           | CMF 2 <sub>ru</sub>    | CMF 3 <sub>ru</sub> | CMF 4 <sub>ru</sub> | CMF 5 <sub>ru</sub>                 | 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 |       |       | N spf rs(u) | Overdispersion<br>Parameter, k | Combined CMFs<br>(6) from Worksheet<br>1B (b) | Calibration<br>Factor, Cr | Predicted average crash<br>frequency, N <sub>predicted</sub> rs(u) |
|                                                                                            | from Table 11-3  |       |       |             |                                |                                               |                           |                                                                    |
|                                                                                            |                  | a     | b     | c           | from Equation 11-7             | from Equation 11-8                            |                           |                                                                    |
| 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 <sup>a</sup> (FI <sup>a</sup> )                                           | -8.577           | 0.938 | 2.003 | 5.775       | 0.062                          | 0.94                                          | 0.37                      | 2.010                                                              |
| Property Damage Only (PDO)                                                                 | --               | --    | --    | --          | --                             | --                                            | --                        | (7) <sub>TOTAL</sub> - (7) <sub>FI</sub>                           |
|                                                                                            |                  |       |       |             |                                |                                               |                           | 3.466                                                              |

NOTE: <sup>a</sup> 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 <sub>TOTAL</sub> | N <sub>predicted rs(u)</sub> (TOTAL) (crashes/year) | Proportion of Collision Type <sub>FI</sub> | N <sub>predicted rs(u)</sub> (FI) (crashes/year) | Proportion of Collision Type (FI <sup>a</sup> ) | N <sub>predicted rs(u)</sub> (FI <sup>a</sup> ) (crashes/year) | Proportion of Collision Type (PDO) | N <sub>predicted rs(u)</sub> (PDO) (crashes/year) |
|                                                                                                                 | from Table 11-4                               | (7) <sub>TOTAL</sub> from Worksheet 1C (b)          | from Table 11-4                            | (7) <sub>FI</sub> from Worksheet 1C (b)          | from Table 11-4                                 | (7) <sub>FI</sub> <sup>a</sup> from Worksheet 1C (b)           | from Table 11-4                    | (7) <sub>PDO</sub> from Worksheet 1C (b)          |
| Total                                                                                                           | 1.000                                         | 7.750                                               | 0.999                                      | 4.284                                            | 1.000                                           | 2.010                                                          | 1.000                              | 3.466                                             |
|                                                                                                                 |                                               | (2)*(3) <sub>TOTAL</sub>                            |                                            | (4)*(5) <sub>FI</sub>                            |                                                 | (6)*(7) <sub>FI</sub> <sup>a</sup>                             |                                    | (8)*(9) <sub>PDO</sub>                            |
| 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: <sup>a</sup> 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 <sup>a</sup> (FI <sup>a</sup> )                     | 2.0                                              | 2.2                         | 0.9                          |
| Property Damage Only (PDO)                                           | 3.5                                              | 2.2                         | 1.6                          |

NOTE: <sup>a</sup> 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 <sub>MAX</sub> = | 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 1 <sub>ru</sub>                                                                           | CMF 2 <sub>ru</sub>    | CMF 3 <sub>ru</sub> | CMF 4 <sub>ru</sub> | CMF 5 <sub>ru</sub>                 | 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<br>Parameter, k | Combined CMFs<br>(6) from Worksheet<br>1B (b) | Calibration<br>Factor, Cr | Predicted average crash<br>frequency, N <sub>predicted rs(u)</sub> |
|                                                                                            | from Table 11-3  |       |       |             |                                |                                               |                           |                                                                    |
|                                                                                            |                  | a     | b     | c           | from Equation 11-7             | from Equation 11-8                            |                           |                                                                    |
| 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 <sup>a</sup> (FI <sup>a</sup> )                                           | -8.577           | 0.938 | 2.003 | 2.680       | 0.150                          | 0.99                                          | 0.37                      | 0.979                                                              |
| Property Damage Only (PDO)                                                                 | --               | --    | --    | --          | --                             | --                                            | --                        | (7) <sub>TOTAL</sub> - (7) <sub>FI</sub>                           |
|                                                                                            |                  |       |       |             |                                |                                               |                           | 1.756                                                              |

NOTE: <sup>a</sup> 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 <sub>TOTAL</sub> | N <sub>predicted rs(u)</sub> (TOTAL) (crashes/year) | Proportion of Collision Type <sub>FI</sub> | N <sub>predicted rs(u)</sub> (FI) (crashes/year) | Proportion of Collision Type (FI <sup>a</sup> ) | N <sub>predicted rs(u)</sub> (FI <sup>a</sup> ) (crashes/year) | Proportion of Collision Type (PDO) | N <sub>predicted rs(u)</sub> (PDO) (crashes/year) |
|                                                                                                                 | from Table 11-4                               | (7) <sub>TOTAL</sub> from Worksheet 1C (b)          | from Table 11-4                            | (7) <sub>FI</sub> from Worksheet 1C (b)          | from Table 11-4                                 | (7) <sub>FI</sub> <sup>a</sup> from Worksheet 1C (b)           | from Table 11-4                    | (7) <sub>PDO</sub> from Worksheet 1C (b)          |
| Total                                                                                                           | 1.000                                         | 3.881                                               | 0.999                                      | 2.125                                            | 1.000                                           | 0.979                                                          | 1.000                              | 1.756                                             |
|                                                                                                                 |                                               | (2)*(3) <sub>TOTAL</sub>                            |                                            | (4)*(5) <sub>FI</sub>                            |                                                 | (6)*(7) <sub>FI</sub> <sup>a</sup>                             |                                    | (8)*(9) <sub>PDO</sub>                            |
| 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: <sup>a</sup> 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 <sup>a</sup> (FI <sup>a</sup> )                     | 1.0                                              | 0.9                         | 1.1                          |
| Property Damage Only (PDO)                                           | 1.8                                              | 0.9                         | 2.0                          |

NOTE: <sup>a</sup> 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**

## 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.