

## **V. CORRIDOR AND ALTERNATE ROUTES SAFETY ANALYSES**

This section summarizes the safety analyses performed for State Highway 97 (SH 97) Corridor Study located in unincorporated Kootenai County and within the City of Harrison, Idaho. Collision histories were reviewed to determine where improvements may be warranted. Further analyses were performed to assist in determining and prioritizing the potential roadway improvements within the study area according to the collision rates and number of accidents that occurred within the milepost for the study period. These analyses provide an understanding to East Side Highway District, the Idaho Transportation Department, and Kootenai County of the impact of land use (residential or other development) within the study area.

### **SAFETY ANALYSIS**

The ITD Office of Highway Operations and Safety maintains accident histories for SH 97. Collision histories were obtained for a timeframe extending between 2001 and 2006 between mileposts 60.63 and 96.43. Data such as accident severity (property damage only, injury accidents, fatality accidents, and accident type (rear-end, head-on, overturn, etc.)) were available and is summarized per milepost of the highway, and are presented in the following sections. In addition, the rate of accidents was related in terms of the number of accidents occurring per hundred million of vehicle miles traveled. These rates were compared with Idaho state averages for similar highways to determine whether an unusual collision/safety issue exists.

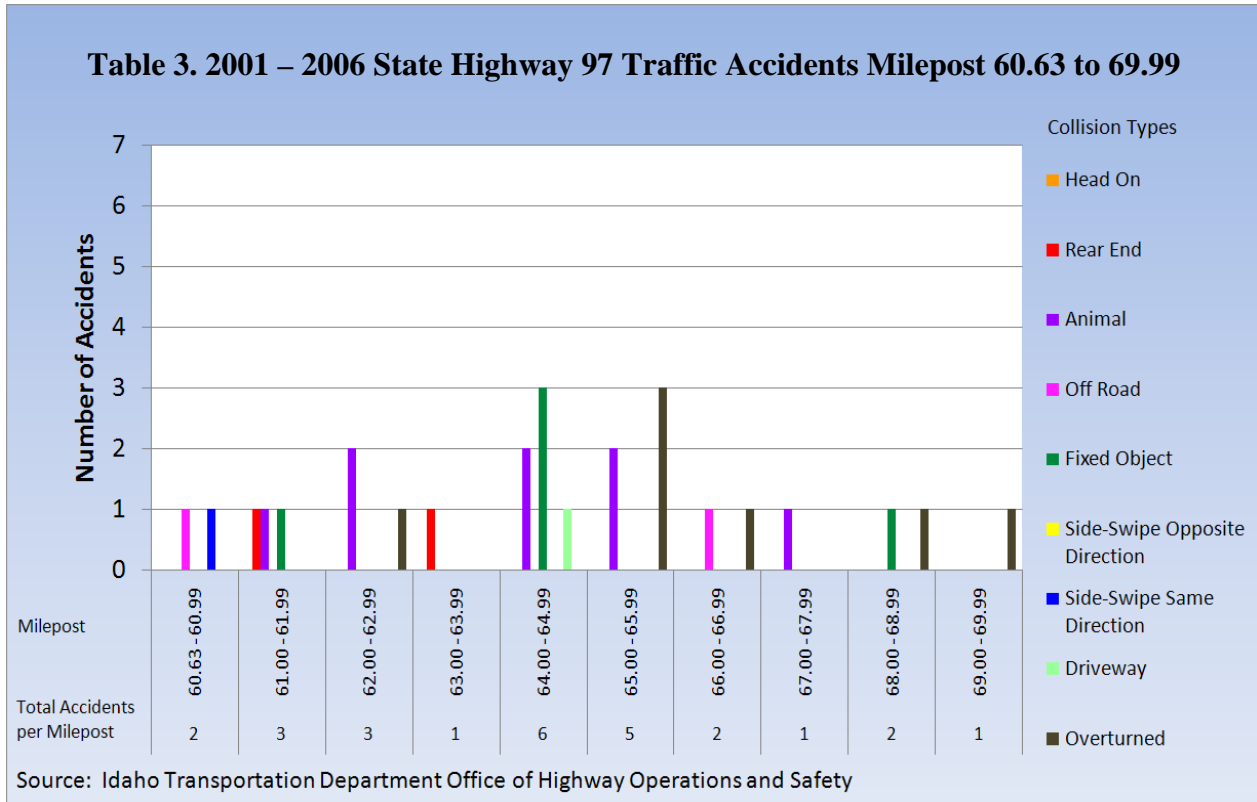
On State Highway 97 for the study timeframe, there were a total of 160 reported accidents between 2001 and 2006 according to ITD safety data. The data shows the number of accidents per milepost by type within the study area. For each accident, numerous injuries or fatalities can occur even though it is counted as one accident.

For the same time-period, accident data for the alternate routes were summarized. For the six alternate routes (Burma, Carlin Bay, Asbury, East Thompson Lake, Gozzer, and Gotham Bay Roads) and the two other locations (SH 3/SH 97 junction only and Half Round Bay Road) 29 accidents were reported.

Unfortunately, a number of accidents occur on any roadway that are not reported. This accident data is not available and is not included in this data summary. For this time-period, there was one fatality on SH 97 and none on the alternate routes. Accident data summaries are contained in the appendices of this report.

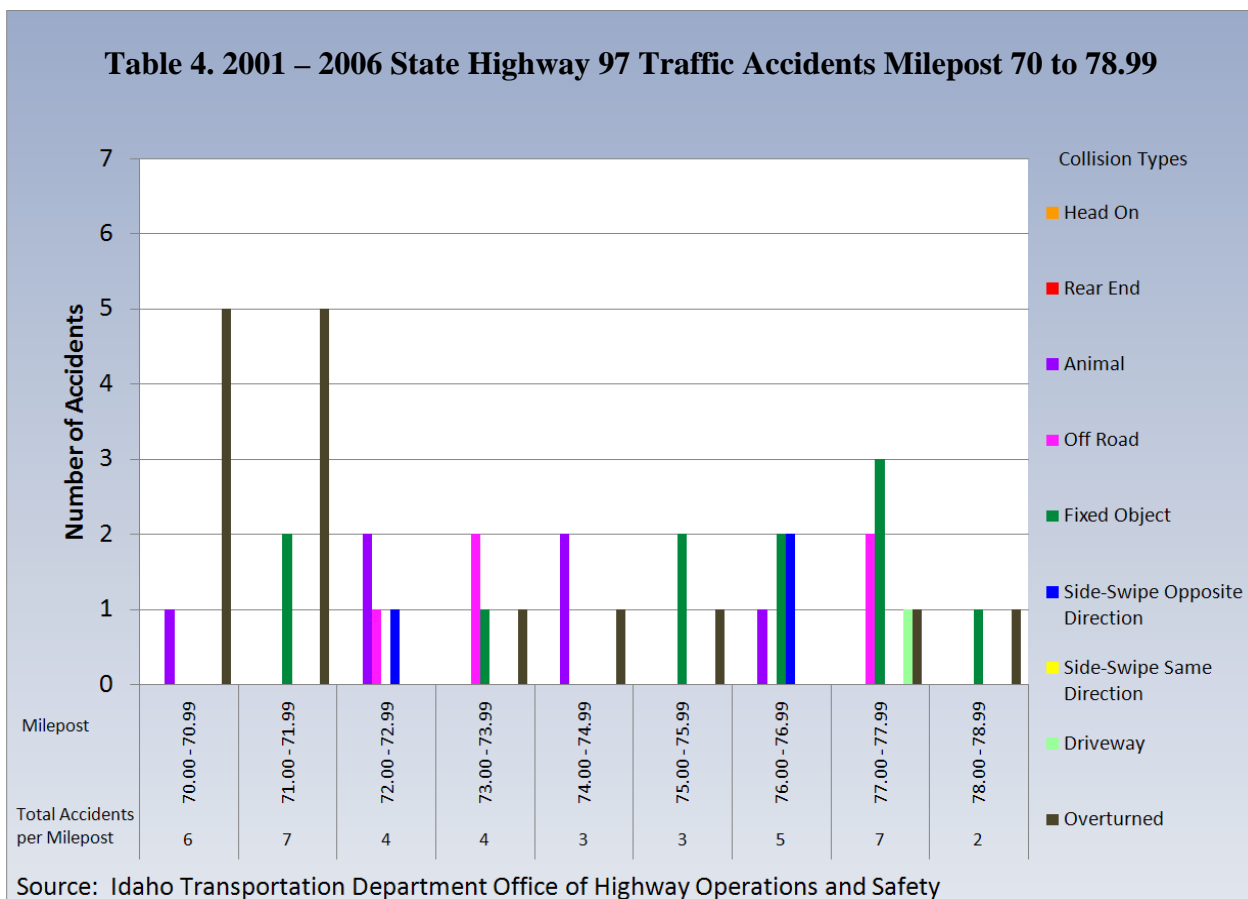
### Milepost 60.63 to 69.99

A total of 26 accidents occurred within this segment (Table 3) for the study period. The majority of the accidents that occurred were animal related accidents, with overturned vehicles the second most common accident. This segment of the highway corridor is characterized as rolling terrain with farming being the predominant land use. This segment also includes the city of Harrison.



### Milepost 70.0 to 78.99

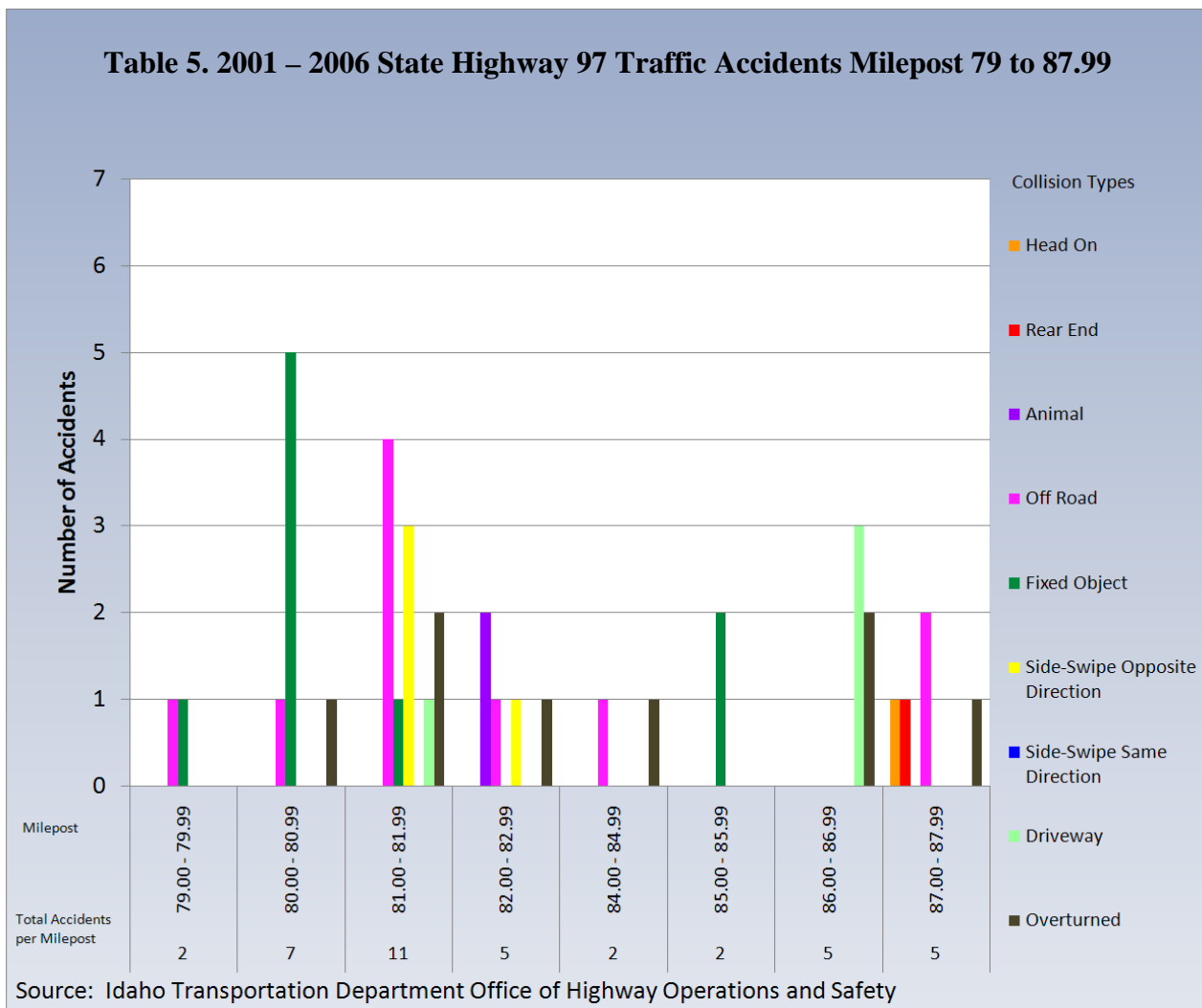
Between milepost 70.0 and 78.99 (Table 4), a total of 41 accidents occurred within the study period. The majority of the accidents (15) resulted in overturned vehicles for this segment. Mileposts 70, 71, 72, and 77 have extreme horizontal curves, which may be a contributing factor to a higher number of incidents occurring within these mileposts. The second most common accident (11) were fixed object related. This segment begins at the Coeur d’Alene River and ends at Carlin Bay. The terrain within this segment includes several tight radii curves as well as the grade changes associated with the Powderhorn Bay Hill grades.



### Milepost 79.0 to 87.99

Between milepost 79.0 and 87.99 (Table 5), most of the accidents occurred at milepost 81 with eleven accidents. Within this milepost, there are several significant horizontal curves, which may contribute to the higher accident occurrence. The majority of the accidents that occurred were fixed object related and off-road accidents, with overturned vehicle accidents the third most common accident type. Within this segment, there was one fatality located in milepost 81. This segment includes the area north of Carlin Bay to the Arrow Point area. The terrain has several tight curve radii and some intersections have sight distance issues.

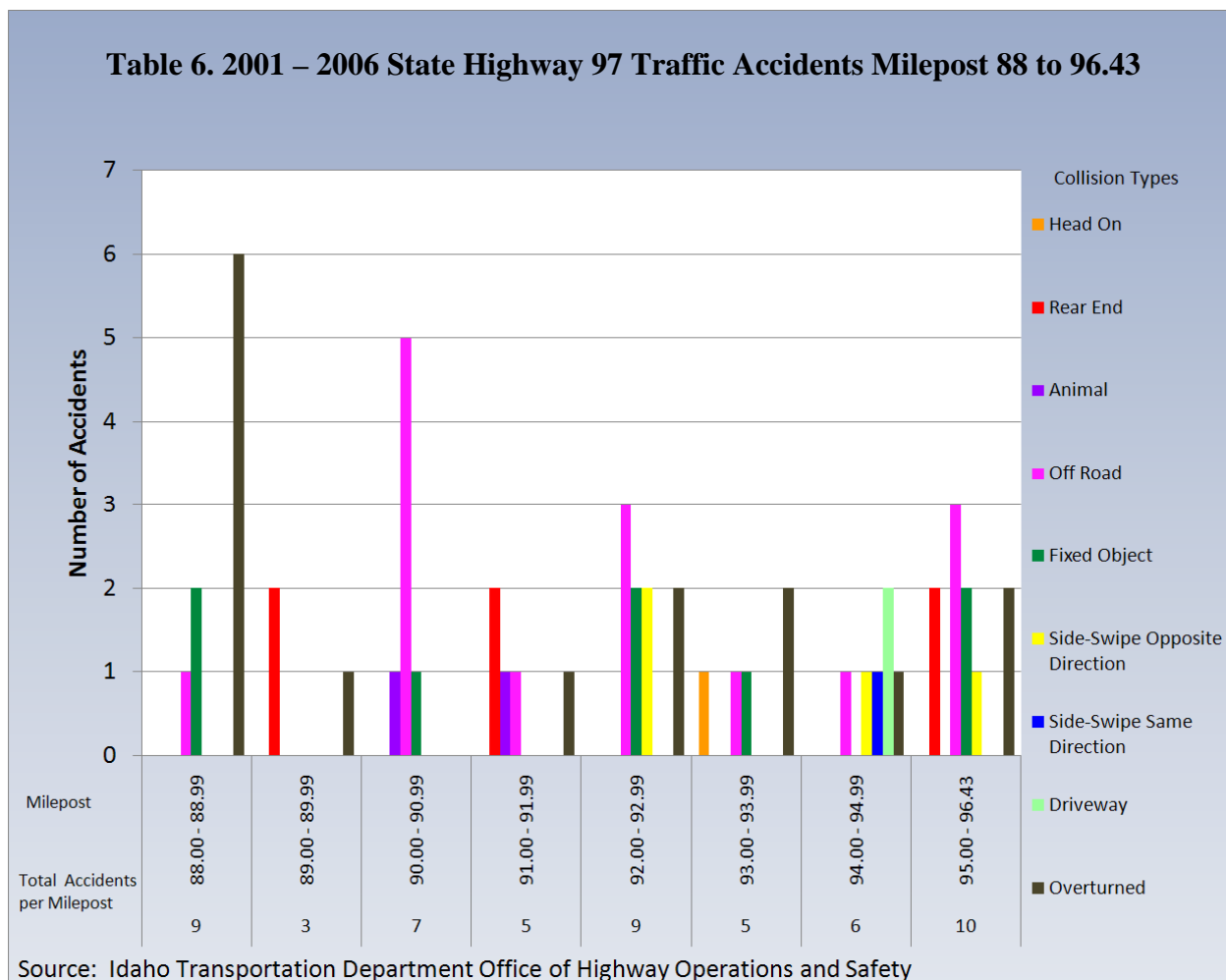
**Table 5. 2001 – 2006 State Highway 97 Traffic Accidents Milepost 79 to 87.99**



Source: Idaho Transportation Department Office of Highway Operations and Safety

### Milepost 88.0 to 96.43

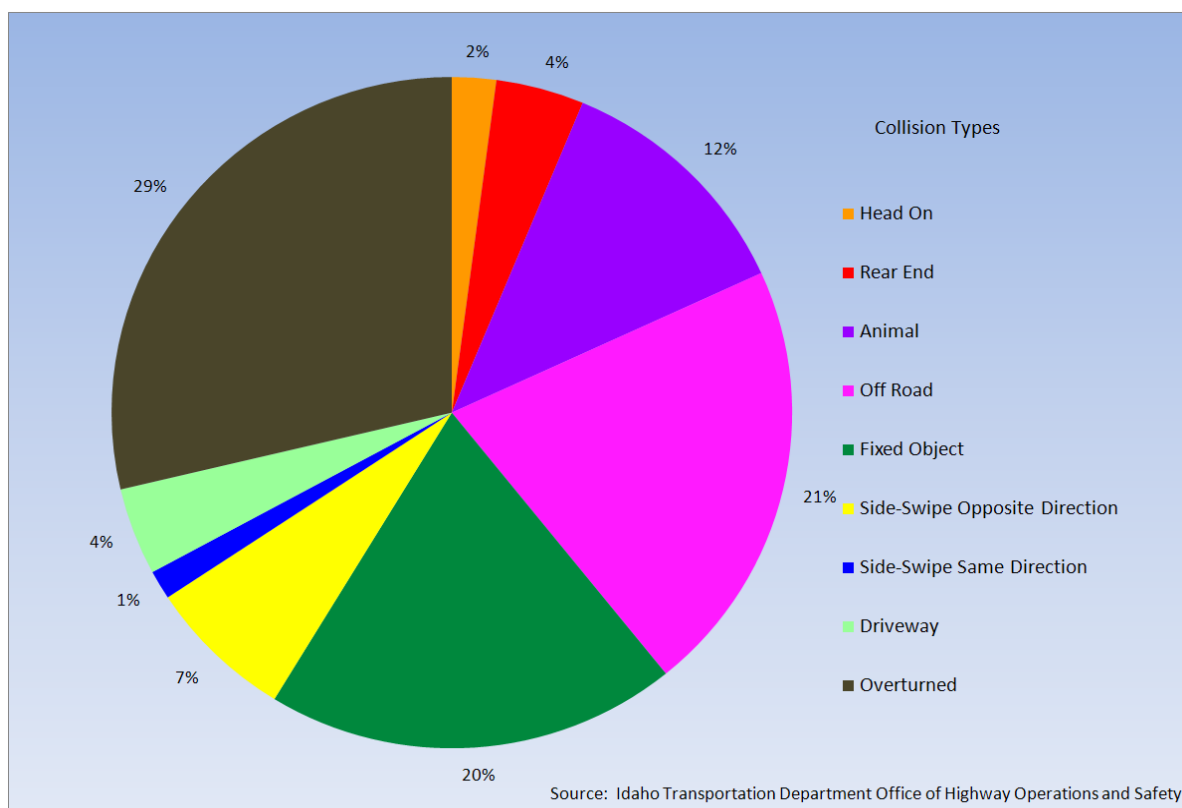
Within this segment (Table 6), 65 percent of the accidents occur at mileposts 88, 90, 92, and 95 through 96.43. The majority of the accidents were overturned vehicle accidents, with vehicles off the road as the second most common accident. Milepost 88 is located between Arrow Point and Neachen Bay and has several tight curve radii and sight distance issues. Milepost 90 includes the Burma Road intersection. Milepost 92 is at the top of the Beauty Bay hill and has several intersections in close proximity. Mileposts 95 and 96 include a boat ramp area and the Interstate 90 junction. The terrain within this segment includes significant horizontal and vertical grade changes as well as tight curve radii.



**Summary**

Overall, for the years 2001 through 2006 over the entire study section of SH 97 (Table 7), 29 percent of the total number crashes occurred with overturned vehicles, 21 percent were vehicles resulting off the roadway, and 20 percent occurred with crashes with fixed objects. According to the Institute of Transportation Engineers, Transportation Engineering Handbook (5<sup>th</sup> Edition, 1999) common reasons for these accident types are inadequate shoulders, narrow lanes, inadequate lighting, slippery surfaces, and abrupt horizontal and vertical alignment changes. These reasons are borne out by the majority of accidents indicating that vehicles are leaving the road. There was one fatality for the time-period.

**Table 7. 2001 – 2006 State Highway 97 Total Accidents**

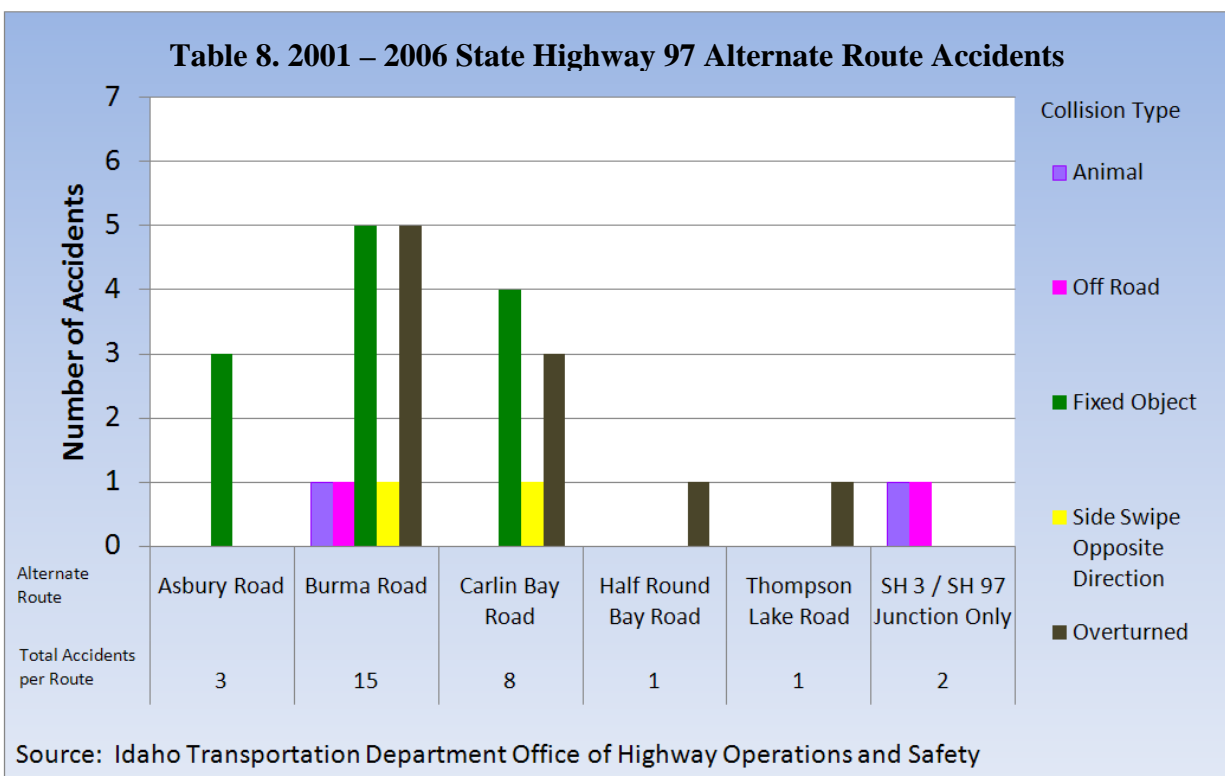


**Alternate Roads**

Other roadways connecting to State Highway 97 were analyzed and evaluated for safety for the 2001 through 2006 time-period as alternate routes (Table 8): Burma Road, Carlin Bay Road, Asbury Road, Half Round Bay Road, Gozzer Road, Gotham Bay Road, and East Thompson Lake Road. Half Round Bay Road was not considered as an alternate route for the study, but was included in the accident data review. Accident data for the State Highway 3/State Highway 97 junction only was also reviewed. The alternate routes are listed in order of most to least reported accidents.

- **Burma Road** had fifteen accidents between milepost 100.3 to 104.25. Most accidents were due to drivers trying to negotiate curves with speeds too fast for conditions. These vehicles either hit a tree or overturned. There were no fatalities and six injuries.
- The second highest accident incidence was on **Carlin Bay Road** with eight accidents. Most of these accidents were caused by vehicles trying to negotiate a curve and were left of the centerline with speeds too fast for the conditions, or inattention. Most of the vehicles either hit a tree or overturned and there were no fatalities and one injury.
- The next highest accident location was **Asbury Road** with three accidents. These vehicles were also trying to negotiate a curve and all three vehicles hit a tree. Their speed was generally too fast for the conditions. There were no fatalities or injuries.
- There was one accident on **Half Round Bay Road and Thompson Lake Road**. In the Half Round Bay Road accident, the vehicle overturned trying to negotiate a curve due to inattention. In the Thompson Lake Road accident, the vehicle overturned due to improper backing. There were no injuries or fatalities with these two accidents.
- There were no accidents reported on **Gozzer Road, or Gotham Bay Road**.

There were two accidents at the **State Highway 3/State Highway 97 junction** between mileposts 95.428 and 96.628. Both accidents were trying to negotiate curves and one accident was caused by their speed being too fast for the conditions, and the other accident was caused by an animal. There were no fatalities or injuries. The junction has skewed intersection angles and includes historic signage and a Kootenai County solid waste site, which contributes to turning vehicle movements.



## COLLISION RATES

A collision rate is a means for gauging the safety of a highway or highway segment based on a computation of the number of accidents per 100 million vehicle miles traveled. The equation for this calculation/evaluation is provided as follows:

$$\text{Collision Rate} = \frac{\text{Number of Accidents} * 100,000,000 \text{ miles}}{\text{Average Daily Traffic} * 365 \text{ Days/Year} * \text{Length of Segment}}$$

Collisions were reviewed on a per milepost basis for SH 97. Accident rates can be compared with two different thresholds (intersection and corridor level – accidents per million vehicle miles traveled and accidents per 100 million vehicle miles traveled, respectively) to identify where potential high accident areas of the highway may exist. The ITD Office of Highway Operations and Safety provide annual collision statistics for state highways. For the years between 2001 through 2006, “Non-interstate highways” (for all speed zones) have an average overall corridor accident rate of 179.42 collisions per million vehicle miles traveled. For non-interstate roadways, generally the lower the speed limit the higher the collision rate is for those roadways. For the years between 2001 through 2006, the State Highway 97 corridor experienced 248.38 accidents per 100 million vehicle miles traveled. Thus, (in general comparisons) if milepost collision rates for segments of SH 97, or the entire analysis extents of the highway (corridor), exceed this threshold, then a potential safety issue may exist for the highway.

However, it may be more appropriate to study the SH 97 corridor, as it does have a unique distinction of scenic byway. The accident rate for the entire SH 97 corridor was determined, representing a statistical base or average of conditions on the highway. If certain segments of the highway are noted to experience collision rates that exceed the overall threshold, then this segment could be categorized as having a potential safety issue based on more relevant data. Table 9 provides a summary of accident severity (property damage only, injury, or fatality) and calculated accident rates for SH 97 milepost segments.

**Table 9. Severity and Collision Rate Summaries for SH 97 - 2001 through 2006**

Milepost Range		Accident Severity			Total Accident s	ADT	Average Accidents per Year	Segment Collision Rate
Start	End	PDO	Injury	Fatality				
60.63	60.99	0	2	0	2	1,000	0.3	228.31
61.00	61.99	3	0	0	3	670	0.5	206.52
62.00	62.99	2	1	0	3	670	0.5	206.52
63.00	63.99	0	1	0	1	670	0.2	82.61
64.00	64.99	4	2	0	6	670	1.0	413.04
65.00	65.99	4	1	0	5	670	0.8	330.44
66.00	66.99	1	1	0	2	670	0.3	123.91
67.00	67.99	1	0	0	1	610	0.2	90.73
68.00	68.99	2	0	0	2	460	0.3	180.48
69.00	69.99	0	1	0	1	460	0.2	120.32

<b>Table 9. (continued) Severity and Collision Rate Summaries for SH 97</b>								
Milepost Range		Accident Severity			Total Accident s	ADT	Average Accidents per Year	Segment Collision Rate
Start	End	PDO	Injury	Fatality				
70.00	70.99	3	3	0	6	400	1.0	691.85
71.00	71.99	2	5	0	7	460	1.2	721.93
72.00	72.99	3	1	0	4	460	0.7	421.13
73.00	73.99	2	2	0	4	460	0.7	421.13
74.00	74.99	3	0	0	3	460	0.5	300.80
75.00	75.99	2	1	0	3	460	0.5	300.80
76.00	76.99	0	5	0	5	460	0.8	481.29
77.00	77.99	5	2	0	7	460	1.2	721.93
78.00	78.99	2	0	0	2	600	0.3	138.37
79.00	79.99	1	1	0	2	600	0.3	138.37
80.00	80.99	5	2	0	7	600	1.2	553.48
81.00	81.99	4	6	1	11	600	1.8	830.22
82.00	82.99	4	1	0	5	600	0.8	368.99
83.00	83.99	0	0	0	0	600	0.0	0.00
84.00	84.99	1	1	0	2	1,000	0.3	83.02
85.00	85.99	1	1	0	2	1,000	0.3	83.02
86.00	86.99	3	2	0	5	1,000	0.8	221.39
87.00	87.99	1	4	0	5	1,000	0.8	221.39
88.00	88.99	3	6	0	9	1,000	1.5	415.11
89.00	89.99	1	2	0	3	1,000	0.5	138.37
90.00	90.99	6	1	0	7	1,300	1.2	255.45
91.00	91.99	4	1	0	5	1,300	0.8	170.30
92.00	92.99	5	4	0	9	1,300	1.5	319.32
93.00	93.99	1	4	0	5	1,300	0.8	170.30
94.00	94.99	4	2	0	6	1,300	1.0	212.88
95.00	95.99	4	6	0	10	2,000	1.7	235.23
96.00	96.43	0	0	0	0	1,400	0.0	0.00
<b>Corridor Average Total</b>		<b>87</b>	<b>72</b>	<b>1</b>	<b>160</b>	<b>802</b>	<b>26.7</b>	<b>254.78</b>

Source: Idaho Transportation Department - Office of Highway Operations and Safety

As shown, the SH 97 collision rate for the milepost segments averaged 254.78 accidents per 100 million vehicle miles traveled (2001 – 2006) exceeds that of the 179.42 accidents per 100 million vehicle miles traveled noted for non-interstate highways throughout Idaho between 2001 - 2006 (based on the data from the ITD Office of Highway Safety). Thus, a higher than average collision rate does exist for the highway.

For the study time-period, 24 out of 37 highway segments examined do have remarkably higher collision rates that exceed the SH 97 average. The highest and most significant with two to four

times the average exceptions occur at mileposts 81, 71, 77, 70, and 80. These should be considered higher accident areas of the highway.

### **MILEPOST IMPROVEMENT RANKINGS**

Based on field observation, accidents, and public and agency input; a list of improvements were developed for each milepost. The improvements were ranked for high and medium priority for implementation based on the existence of a higher than average collision rate per hundred million vehicle miles traveled for other non-interstate roadways in Idaho. Table 10 lists the collision rate, number of accidents, and the improvements associated with each milepost. This table identifies the highest ranking of potential roadway improvements.

<b>Table 10. SH 97 High Ranking Potential Roadway Improvements</b>			
<b>Milepost</b>	<b>Segment Collision Rate</b>	<b>Accidents</b>	<b>Improvements</b>
81.00 – 81.99	830.22	11	Road Widening Guardrail Driveway Approach Improvements Pullout Intersection Improvements Develop On-Road Parking Policy
71.00 – 71.99	721.93	7	Road Widening Guardrails East Point Road Improvement Powderhorn Ranch Entry Road / Intersection Improvement Curve Widening Culvert Extension
77.00 – 77.99	721.93	7	Road Widening Guardrail Brushing Signage Driveway Approach Improvement Pedestrian Crossing
70.00 – 70.99	691.85	6	Road Widening Guardrail Intersection Realignments Begin Alternate Route Thompson Lake Road to Asbury Road
80.00 – 80.99	553.48	7	Road Widening Guardrail Brushing
76.00 – 76.99	481.29	5	Brushing Road Widening Guardrails Culvert Improvements

**Table 10. (continued) SH 97 High Ranking Potential Roadway Improvements**

<b>Milepost</b>	<b>Segment Collision Rate</b>	<b>Accidents</b>	<b>Improvements</b>
72.00 – 72.99	421.13	4	Pullout Improvement Guardrail Roadway Widening
73.00 – 73.99	421.13	4	Road Widening Guardrail Brushing Pullout Improvement
88.00 – 88.99	415.11	9	Curve and Roadway Realignment Guardrail Roadway Widening Pedestrian Crossing
64.00 – 64.99	413.04	6	Approach Improvements Intersection Improvements
82.00 – 82.99	368.99	5	Brushing Pullout Improvements Intersection Improvements Road Widening Guardrail Walking Path
65.00 – 65.99	330.44	5	Signage Passing Lanes Intersection Improvements
92.00 – 92.99	319.32	9	Roadway and Curve Realignment Curve Widening Scenic Pullout Signage Guardrail Road Widening
74.00 – 74.99	300.80	3	Road Intersection Improvement Road Widening Guardrail
75.00 – 75.99	300.80	3	Approach Improvement Road Widening Guardrail Pullout Improvements Half Round Bay Road Intersection Improvements
90.00 – 90.99	255.45	7	Signage Intersection Improvements with Turn Lanes at Burma Road Intersection Improvements at Caribou Ridge Road

Table 11 identifies the medium ranking of potential roadway improvements by collision rates and number of accidents.

<b>Table 11. SH 97 Medium Ranking Potential Roadway Improvements</b>			
<b>Milepost</b>	<b>Segment Collision Rate</b>	<b>Accidents</b>	<b>Improvements</b>
95.00 – 95.99	235.23	10	Road Realignment / Widening Slope Excavation Curve Radius Enlargement
60.63 – 60.99	228.31	2	Approach Improvement Reconstruct Intersection
86.00 – 86.99	221.39	5	Roadway Widening Guardrail Gozzer Road / SH 97 Intersection Improvements Turn Lane Improvements
87.00 – 87.99	221.39	5	Intersection and Turn Lane Improvements at Arrow Point Arrow Point Intersection Lighting Guardrail Roadway Widening Secondary Access and Mailbox Pullout Improvements Arrow Road / Yacht Club Access Road Intersection Improvements
94.00 – 94.99	212.88	6	Signage Curve Widening with Rockfall Ditch
61.00 – 61.99	206.52	3	Approach Improvement East O’Gara Road Intersection Improvement Turn Lanes Brushing
62.00 – 62.99	206.52	3	Approach Improvements Intersection Improvements
68.00 – 68.99	180.48	2	Access Road Improvements Auxiliary Parking Area at Old School Urban Streetscape Improvements Signage
91.00 – 91.99	170.30	5	Signage Intersection Realignment Albion Road / Canadian Way Eastbound Passing Lane Roadway and Curve Realignment

**Table 11. (continued) SH 97 Medium Ranking Potential Roadway Improvements**

<b>Milepost</b>	<b>Segment Collision Rate</b>	<b>Accidents</b>	<b>Improvements</b>
93.00 – 93.99	170.30	5	Curve and Road Widening Guardrail Slope Excavation Rockfall Protection Bridge Replacement Curve Realignment Pullout Reconstruction Intersection Realignment
78.00 – 78.99	138.37	2	Road Widening Guardrail Intersection Improvement for Asbury Road Approach Pedestrian Crossing Signage
79.00 – 79.99	138.37	2	Improve Driveway Approach Roadway Widening Guardrail Improve Sight Distance Improve Driveway Approach Road Widening Guardrail Pedestrian Crossing Intersection Improvements Pullout Reconstruction
89.00 – 89.99	138.37	3	Signage Road Realignment Pullout Intersection Improvements Passing Lane
66.00 – 66.99	123.91	2	Pullout Road Widening Guardrail Intersection Improvements
69.00 – 69.99	120.32	1	Signage
67.00 – 67.99	90.73	1	Pullout Intersection Improvement Road Widening Guardrail

<b>Table 11. (continued) SH 97 Medium Ranking Potential Roadway Improvements</b>			
<b>Milepost</b>	<b>Segment Collision Rate</b>	<b>Accidents</b>	<b>Improvements</b>
84.00 – 84.99	83.02	2	Roadway Widening Guardrail Intersection Reconstruction
85.00 – 85.99	83.02	2	Roadway Widening Guardrail Approach Improvement Lighting and Pedestrian Crossing Improvement Pullout and Intersection Improvement
63.00 – 63.99	82.61	1	Approach Improvements Intersection Widening Improvements Right of Way Issues
83.00 – 83.99	0.00	0	Widen Roadway and Curves Guardrail Intersection Improvements Roadway Parking Signage Brushing
96.00 – 96.43	0.00	0	Signage Guardrail Pullout Illumination

Table 12 identifies the alternate routes and the SH 3/SH 97 junction (only) by the ranking of the number of accidents and potential roadway improvements.

<b>Table 12. Alternate Route Ranking Potential Roadway Improvements</b>	
<b>Location</b>	<b>Improvements</b>
<b>15 Accidents – High Priority</b>	
Burma Road	Intersection Improvements Grade Reduction Roadway Reconstruction Road Widening Partial Guardrail Straighten “S” Curves Resurface Roadway Major Earthwork / Drainage / Slope Consideration

<b>Table 12. (continued) Alternate Route Ranking Potential Roadway Improvements</b>	
<b>Location</b>	<b>Improvements</b>
<b>8 Accidents – High Priority</b>	
Carlin Bay Road	Intersection Improvements Road Reconstruction Curve Realignment
<b>3 Accidents – Medium Priority</b>	
Asbury Road	Road Realignment Reconstruct Roadway Intersection Realignment Intersection Improvement
<b>2 Accidents – Medium Priority</b>	
SH 3/SH 97 Junction	Junction Intersections Realignment Acceleration and Deceleration Lanes Illumination
<b>1 Accident – Medium Priority</b>	
Half Round Bay Road	Widen Roadway and Curves Intersection Improvements Pullout Reconstruction Brushing
East Thompson Lake Road	Intersection Improvements Commercial Approach Rock Excavation Guardrail Approach Improvements Curve Widening Intersection Improvements Roadway Reconstruction
<b>0 Accidents – Medium Priority</b>	
Gozzer Road	Roadway Reconstruction Resurface Roadway
Gotham Bay Road	Intersection Improvements Roadway Improvements Reconstruct Roadway

## CONCLUSION

As shown, two-thirds of the SH 97 milepost segments collision rates exceed that of the 179.42 state average per hundred million vehicle miles traveled for other non-interstate highways in Idaho. Thus, a higher than average collision rate does exist for the highway. The roadway improvements identified in this report provide for safety improvements such as roadway widening, improving intersection angles and shoulders, addressing horizontal and vertical curve issues, and safety improvements.

## **RECOMMENDATIONS**

Overall, for the entire study section of SH 97, 29 percent of the total number crashes occurred with overturned vehicles, 21 percent occurred with crashes with fixed objects, and 20 percent were vehicles resulting off the roadway between the years 2001 and 2006. The common reasons for these accident types are inadequate shoulders, narrow lanes, inadequate lighting, slippery surfaces, and abrupt horizontal and vertical alignment changes.

According to the Institute of Transportation Engineers, Transportation Engineering Handbook (5<sup>th</sup> Edition, 1999) improvements for these accident types include, but are not necessarily limited to: additional or improved warning signs (larger and more reflective); grooved shoulder pavement; wider shoulders; provision of guardrail; reduced speed limits; the construction of wider travel or passing lanes; installation of reflector markers; improved clear zones; and flatten slopes and ditches (including super elevation).

Projects reflecting these types of improvements have been identified for both the State Highway 97 corridor as well as the Alternates Routes. In seeking funding for these improvements, the higher than average collision rates indicates that improvements are needed.

Implementation of projects should be evaluated based on the priority ranking for collision rates, number of accidents, and location of the development project.