Appendix D. Traffic Safety Report

US 85 PEL
SAFETY ASSESSMENT

Prepared for:

Colorado Department of Transportation
Region 4
10601 West 10th Street
Greeley, CO 80634
970/350-2148 or 970/350-2163

Prepared by:

Felsburg Holt & Ullevig
6300 South Syracuse Way, Suite 600
Centennial, CO 80111
303/721-1440

Project Manager: Dave Hattan
Project Engineer:

FHU Reference No. 112196-01

March 2016

TABLE OF CONTENTS

Page

List of Appendices

List of Tables

List of Figures

The safety assessment for US 85 analyzed the corridor by segments and by individual intersections. The analysis process generated much the same safety information which summarized as the following:

Segments (Seven Total)

The study corridor was divided in seven segments. Each segment was further divided in between two and seven sub-segments. The first page for each segment provides the following information:

- A Vicinity Map showing the divisions into sub-segments
- A table showing the number and types of crashes in each sub-segment
- Safety Performance Function graphs showing total crashes and severe crashes (fatal and injury) for rural sub-segments only

The summary of the analyses for each sub-segment of the corridor generally includes the following information:

- A pie chart showing the types of non-intersection crashes
- A pie chart for fixed object type crashes when they were determined to be higher than expected.

Intersections

There are a total of 112 intersections through the study corridor along US 85. There are 24 intersections that are signalized, and all were analyzed for safety concerns. Of the 88 unsignalized intersections, 66 were found to have less than five crashes over the five-year study period and were not analyzed since four or fewer crashes would not show any correctable patterns. Thus, a total of 46 intersections were analyzed. The summary of safety conditions for each intersection that was studied generally includes the following information:

- An aerial photograph of the intersection and its environs
- Safety Performance Function graphs showing total crashes and severe crashes (fatal and injury) for urban, signalized intersections only
- A pie chart showing the types of all intersection and intersection-related crashes

List of Acronyms

AADT	annual average daily traffic
ADT	average daily traffic
CDOT	Colorado Department of Transportation
CPMPY	crashes per mile per year
CR	County Road
DSMD	dynamic speed message display
EX	Expressway
I-	Interstate
LOSS	Levels of Service of Safety
MP	Milepost
mph	miles per hour
PDO	property damage only
PEL	Planning Environmental Linkage
SPF	Safety Performance Function
UPRR	Union Pacific Railroad
US	United States Highway

A Statement of Philosophy

The efficient and responsible investment of resources in addressing safety problems is a difficult task. Since crashes occur on all highways in use, it is inappropriate to say of any highway that it is safe. However, it is correct to say that highways can be built to be safer or less safe. Road safety is a matter of degree. When making decisions affecting road safety, it is critical to understand that expenditure of limited available funds on improvements in places where it prevents few injuries and saves few lives can mean that injuries will occur and lives will be lost by not spending them in places where more crashes could have been prevented[1]. It is the Colorado Department of Transportation's (CDOT's) objective to maximize crash reduction within the limitations of available budgets by making road safety improvements at locations where it does the most good or prevents the most crashes.

INTRODUCTION

The primary intent of this project is to provide information, as related to safety, for the Planning Environmental Linkage (PEL) study of United States Highway (US) 85. The study area begins at the divide of US 85 and Interstate (I) 76 and extends to north of the Town of Nunn (approximately 20 miles south of the Wyoming border). In addition, the study includes the interchange of US 85 with US 34A in south Greeley. Two segments of US 85 are included:

- US 85C Milepost (MP) 226.80 – MP 265.76
- US 85L MP 265.85 – MP 290.00

As an element of the PEL study, an opportunity exists for the detection of safety problems and the recommendation of selected improvements at locations where it is justified by crash experience.

The scope of this report is as follows:

- Assess the magnitude and nature of the safety problem within the project limits.
- Relate crash causality to roadway geometrics, roadside features, traffic control devices, traffic operations, and driver behavior and vehicle type.
- Suggest cost-effective counter measures to address identified problems.
- Provide guidance on how to maximize crash reduction within the scope of a PEL Study project.

This report is based on the analysis of five years of crash history. Regions 1 and 4 are advised to verify, through field survey, the information included in this report regarding physical features and roadside characteristics in the study area.

[1] Hauer, E. (1999) Safety Review of Highway 407: Confronting Two Myths. TRB

SITE LOCATION

This study addresses a section of US 85 in Adams and Weld Counties. On the south, US 85C is classified as an Urban Expressway from MP 226.80 to MP 238.24 (Commerce City and Brighton area), from MP 241.58 to MP 242.85 (Fort Lupton) and also from MP 261.42 to MP 265.76 (LaSalle, Evans and Greeley area). US 85C is classified as a Rural Expressway in the remainder of the corridor (a short section between Brighton and Fort Lupton and then a longer section from Fort Lupton to LaSalle).

US 85L is classified as an Urban Expressway from MP 265.85 (south Greeley) to MP 273.00 (Lucerne). Between MP 23.01 and 290.00 (just north of Nunn), US 85L is classified as Rural Minor Arterial.

SITE CONDITIONS

US 85C

The following observations relating to the southern section of the study corridor were made from viewing OTIS and Google StreetView video logs and during a field visit:

- There are two northbound and two southbound through lanes through this section.
- The through lanes along US 85C are approximately 12-feet wide in both directions
- There is a depressed median of varying width along US 85C through much of the corridor with a raised-curb median in spot locations. These spot locations are primarily major signalized intersections including SH 44 (104th Avenue), 120th Avenue, Bromley Lane, 42nd Street, 37th Street, and 31st Street. There is a raised, hard surface median through Gilcrest (County Road [CR] 40 to Ash Street) and through LaSalle (from north of CR 48 to north of 1st Street).
- With the exception of a concrete median barrier through the SH 52 interchange in Fort Lupton, there is a continuous cable barrier (except for median breaks) in the depressed median between CR 2 and CR 30. Intersections with CR 6, CR 8, CR 14.5, and CR 22.5 have cable barrier in a flush, paved median.
- Because of differing auxiliary lane configurations, both inside and outside shoulder widths vary considerably along this section. Auxiliary lanes exist at signalized, stop-controlled, and uncontrolled intersections for turning, acceleration, and deceleration movements. Left-turn lanes are approximately 12-feet wide.
- Rumble strips have been placed along outside shoulders through appropriate sections.
- The posted speed limit on US 85C along much of this section is 65 miles per hour (mph) except for reductions to 55 mph at signalized intersections. Speed limit is 50 mph between Denver Street and CR 2 in north Brighton, through Platteville, through Gilcrest, and between LaSalle and Evans. It is posted at 40 mph through LaSalle and at 45 mph in Evans.
- The asphalt surface appears to be in relatively good condition through most of the study corridor.
- The pavement striping is generally in good condition.

US 85L

The following observations relating to the northern section of the study corridor were made viewing OTIS and Google StreetView video logs and during a field visit:

- There are two northbound and two southbound through lanes through the southern portion—from MP 265.85 in south Greeley to MP 280.27 in north Ault. US 85L is a two-lane undivided facility from north Ault (MP 280.27) to the northern boundary of the study (MP 290.00).
- The through lanes along US 85L are approximately 12-feet wide in both directions.
- There is a depressed median of varying width along US 85L from Greeley through Ault. In Greeley (from MP 266.34 to MP 268.05, there is a flush, paved median with curb and gutter on the outside of both shoulders.
- Through Eaton, there are several different treatments for the four-lane roadway:
    - From Collins Street (MP 275.5) to Collins Street (MP 275.59), there is a raised median and curb and gutter along the shoulder.
    - From Collins Street to 5th Street (MP 276.07), parallel parking is allowed along the shoulder.
    - From 5th Street to CR 37 (MP 276.86), there is a raised median but no curb and gutter along the shoulders.
- Through Ault, there is a raised median and curb and gutter along the shoulders between B Street (MP 279.58) and 2nd Street (MP 279.84). There is a flush median with curb and gutter from 2nd Street to Jackie Ann Street (MP 280.27). There is no curb and gutter north of Jackie Ann Street and US 85L begins a transition to a two-lane undivided roadway.
- Because of differing auxiliary lane configurations, both inside and outside shoulder widths vary considerably along both two-lane and four-lane sections. Much of the corridor has narrow (approximately two feet wide) outside shoulders. Auxiliary lanes exist at signalized and stop-controlled intersections for turning, acceleration, and deceleration movements. Left-turn lanes are approximately 12-feet wide.
- The posted speed limit on US 85L along much of this section is 65 mph except for reductions to 55 mph at signalized intersections. Speed limit is 50 mph in the northbound direction and 45 mph in the southbound direction in Greeley south of the Cache La Poudre River (MP 268.05). Between 5th Street and O Street, the speed limit is 55 mph. Through Eaton and Ault, it is 35 mph. The speed limit is 40 mph through both Pierce and Nunn.
- The asphalt surface appears to be in relatively good condition through most of the study corridor south of CR 78. At approximately MP 277.5, the southbound roadway shows obvious signs of distress while the northbound roadway is in fair condition with regular transverse cracking until MP 278.8 where there is more evidence of distress. This more or less continues through the rest of the four-lane roadway (MP 280.27). The two-lane undivided roadway (MP 280.27 to MP 290.00) is in fair condition.
- There are inside and outside shoulder rumble strips on southbound US 85L between MP 276.86 and MP 279.58.
- The pavement striping is generally in good condition.

CRASH HISTORY AND PROBLEM ANALYSIS

Crash history for the five-year period, January 1, 2008 through December 31, 2012, was examined between MP 226.80 and MP 265.76 on US 85C and between MP 265.85 and MP 290.00 on US 85L to locate crash clusters and identify crash causes.

Table 1 summarizes the number of crashes for entire study area (US 85C & US 85L) over the five-year study period. As can be seen in this table, the total number of crashes from year to year varies during the five-year study period. There were 1,661 property damage only (PDO) crashes, 672 injury crashes and 23 fatal crashes within the study area.

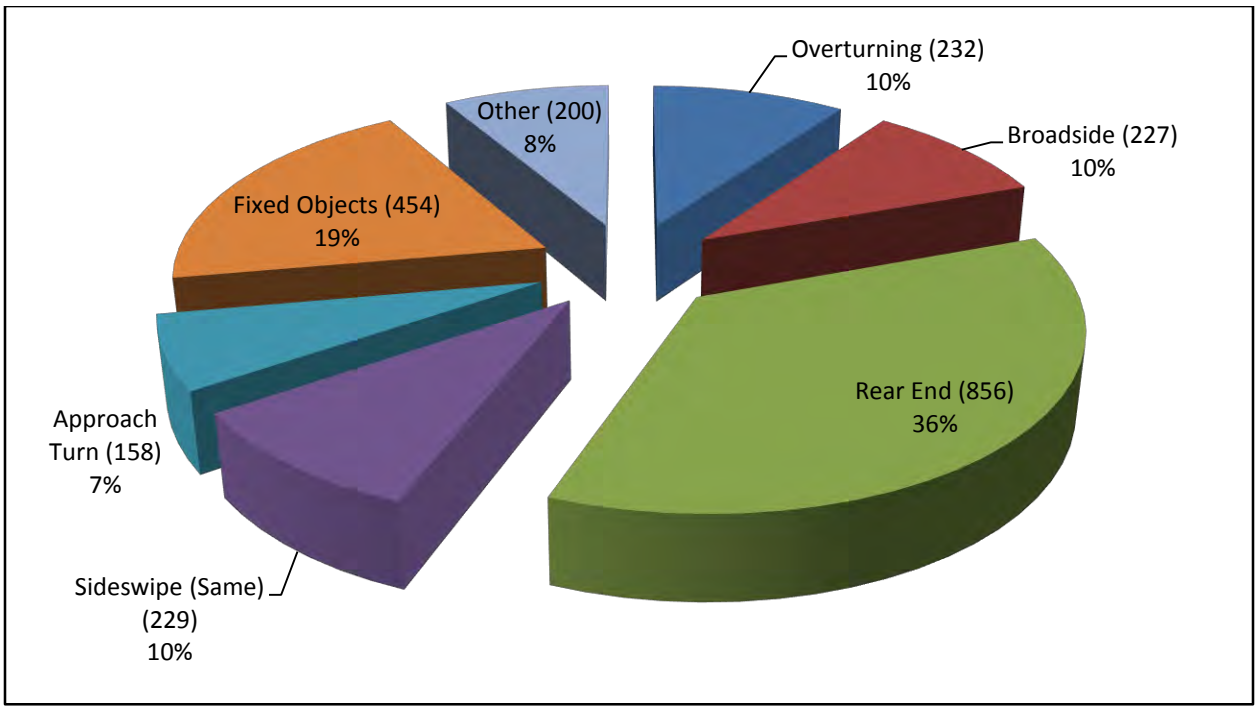
Table 1
Number of Crashes
US 85C MP 226.80 – MP 265.76 & US 85L MP 265.85 – MP 290.00

Period	Number of Crashes			
	Prop. Damage Only	Injury	Fatality	Total
01/01/2008 – 12/31/2008	287	114	9	410
01/01/2009 – 12/31/2009	316	158	5	479
01/01/2010 – 12/31/2010	327	121	6	454
01/01/2011 – 12/31/2011	309	141	1	451
01/01/2012 – 12/31/2012	422	138	2	562
Total (01/01/2009 – 12/31/2013)	**1,661**	**672**	**23**	**2,356**
Overall 5-Year Average per Year	**332.2**	**134.4**	**4.6**	**471.2**

Overall Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 2,356 reported crashes on the US 85 within the project limits. **Figure 1** presents a graphical representation of crash types for the study area of US 85. Rear end type crashes (36%) were the predominant crash type followed by fixed object type crashes (19%), broadside type crashes (10%), overturning type crashes (10%), and sideswipe same direction type crashes (10%). The crash summary sheet listings are presented in the **Appendix**.

Figure 1
Crash Types (2008 through 2012)
US 85C MP 226.80 – MP 265.76
US 85L MP 265.85 – MP 290.00



Safety Performance Functions Methodology

The assessment of the magnitude of safety problems on highway segments has been refined through the use of Safety Performance Functions (SPF) developed and calibrated to reflect conditions along Colorado State Highways. The SPF reflects the complex relationship between traffic exposure measured in annual average daily traffic (AADT) and crash count for a unit of road section measured in crashes per mile per year (CPMPY) or for an intersection, measured in crashes per year. The SPF models provide an estimate of the normal or expected crash frequency and severity for a range of AADT among similar facilities. Two kinds of SPFs were calibrated. The first addresses the total number of crashes, and the second looks only at more serious crashes involving an injury or fatality. Together they allow an assessment of the magnitude of the safety problem from the frequency and severity standpoint.

All of the dataset preparation was performed using the CDOT crash databases. Crash history for each facility was prepared using the most recent five years of available crash data.

Development of the SPF lends itself well to the conceptual formulation of the Levels of Service of Safety (LOSS). The concept of level of service uses qualitative measures that characterize safety of a roadway segment in reference to its expected performance and severity. If the level of safety predicted by the SPF represents a normal or expected number of crashes at a specific level of average daily traffic (ADT), then the degree of deviation from the normal can be stratified to represent specific levels of safety.

LOSS-I – Indicates low potential for crash reduction
LOSS-II – Indicates low to moderate potential for crash reduction
LOSS-III – Indicates moderate to high potential for crash reduction
LOSS-IV – Indicates high potential for crash reduction

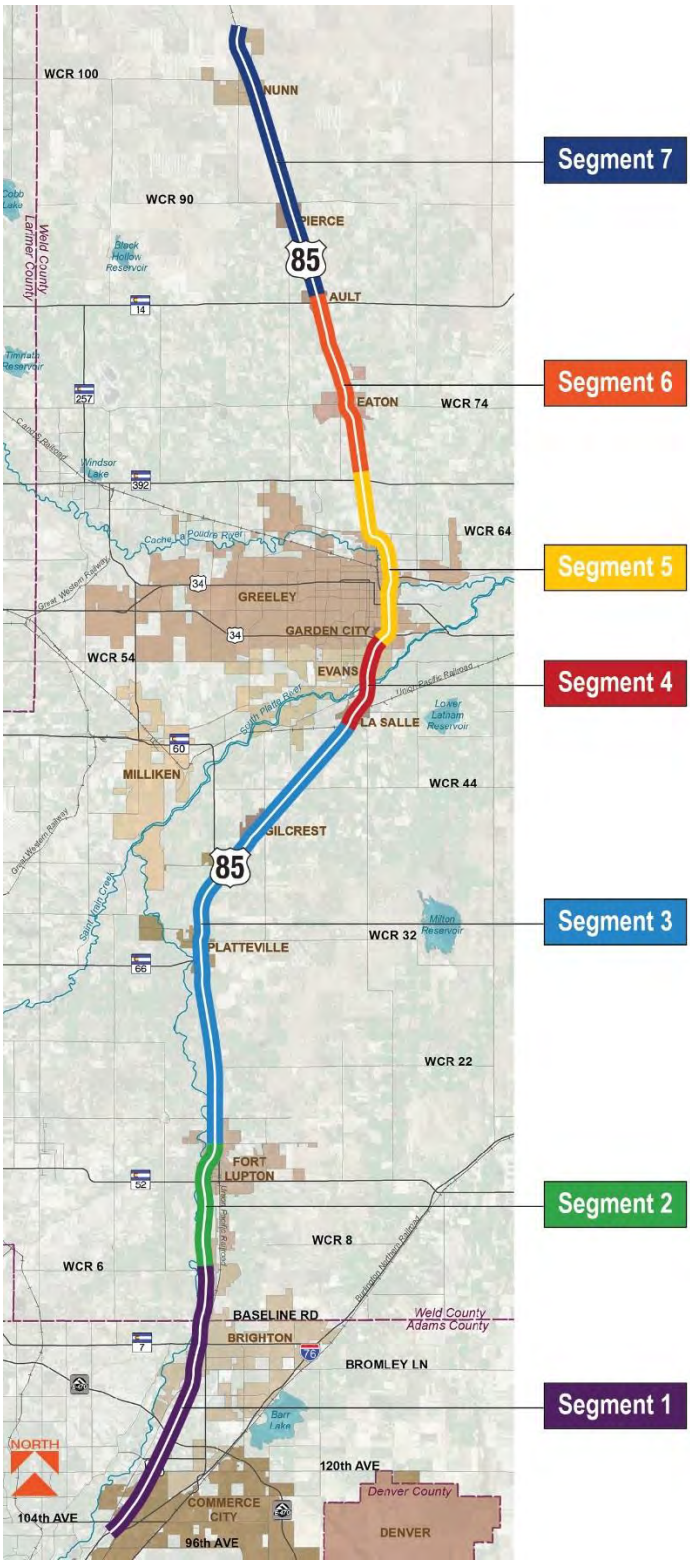
Gradual change in the degree of deviation of the LOSS boundary line from the fitted model mean reflects the observed increase of variability in crashes as ADT increases. LOSS reflects how a segment of roadway or intersection is performing in relation to its expected crash frequency at a specific level of ADT. It only provides a crash frequency comparison with the expected norm. It does not, however, provide any information related to the nature of the safety problem itself. If a safety problem is present, LOSS will only describe its magnitude from a frequency standpoint. The nature of the problem is determined through diagnostic analysis using direct diagnostics and pattern recognition techniques.

The above described SPF methodology was used in the analysis of the rural roadway segments and unban intersections within the study area. The results of these analyses are discussed in more detail in the following sections.

Segment Crash Analysis

The study area is divided into seven segments. Each segment has different roadway classifications and characteristics including urban and rural areas. The segmentation for US 85C and US 85L are presented graphically on **Figure 2**.

Figure 2
Study Area



Segment 1: US 85C MP 226.80 – MP 238.32

Segment 1 begins at the southern limit of the study corridor (MP 226.80) near I-76 and extends to the north Brighton Urban Area boundary (MP 238.32), which is approximately 1,200 feet north of Weld CR 6. During the five-year study period there were 439 non-intersection crashes reported within Segment 1. This segment is classified as an urban, four-lane rolling (U-4-R) facility, and it has an access category of Expressway (EX). **Figure 3** shows Segment 1 in relation to the study area. Segment 1 is 11.52 miles long and was broken into five sub-segments for the detailed analyses. **Table 2** displays the divisions and crash summaries for each sub-segment.

Figure 3
Segment 1 Vicinity Map
US 85C (MP 226.80 – MP 238.32)

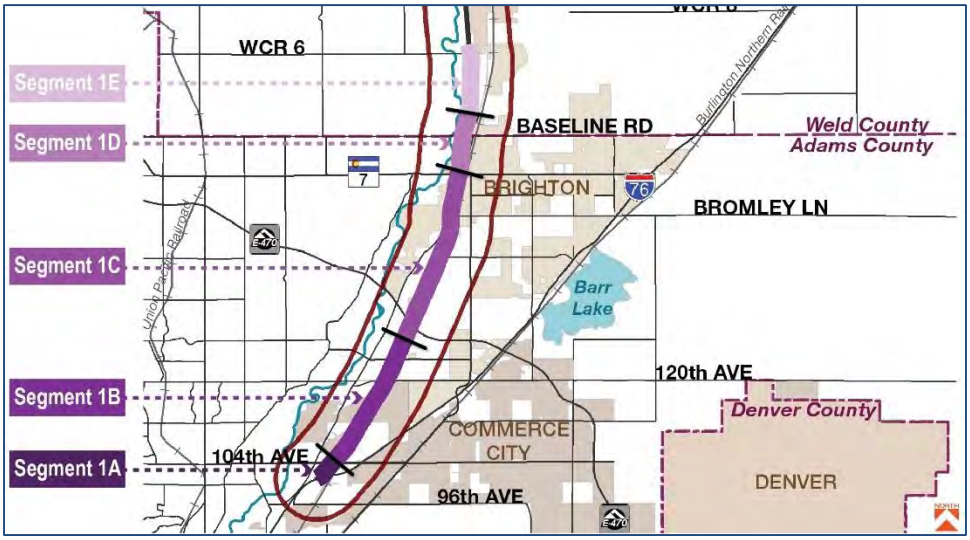


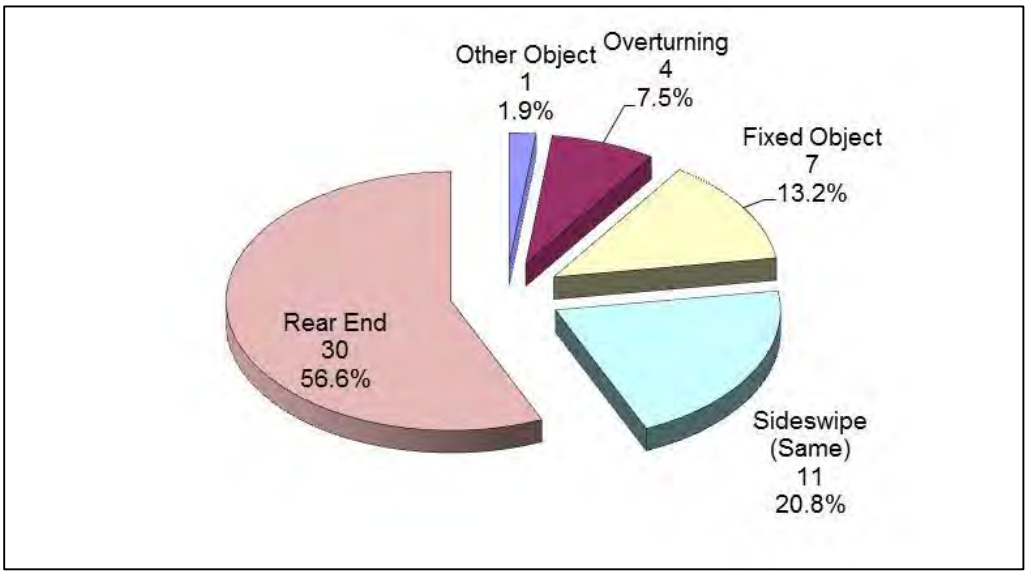
Table 2
Number of Non-Intersection Crashes – Segment 1 (2008 through 2012)
US 85C (MP 226.80 – MP 238.32)

Sub-Segment Descriptions	Mile Points	Number of Crashes			
		PDO	INJ	FAT	TOTAL
1A – Commerce City Limit (CL)	MP 226.80 – MP 227.47	43	10	0	53
1B – Commerce City CL Nome Street Interchange	MP 227.48 – MP 230.86	96	35	0	131
1C – City of Brighton CL & SH 7/Bridge Street Interchange	MP 230.87 – MP 235.19	125	41	3	169
1D – City of Brighton Urban Area Start	MP 235.20 – MP 236.62	34	12	0	46
1E – City of Brighton Urban Area End	MP 236.63 – MP 238.32	23	16	1	40

Segment 1A (MP 226.80 – MP 227.47)

Segment 1A begins at the southern limit of the study corridor (MP 226.80) near I-76 and extends north to approximately 400 feet north of the SH 44 (104th Avenue) intersection. There were a total of 53 non-intersection crashes along this sub-segment of 85C: 43 PDO crashes and 10 injury crashes. **Figure 4** presents a graphical representation of the non-intersection crash types for this sub-segment. Rear end type crashes (56.6%) were the predominant crash type followed by sideswipe (same direction) type crashes (20.8%).

Figure 4
Non-Intersection Crash Types
(Segment 1A: MP 226.80 – MP 227.47)



Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of roadway. A review of the rear end crash history indicated that there were 19 crashes northbound, nine crashes southbound, and two crashes eastbound. Road conditions for rear end type crashes showed that 29 of the 30 were dry road conditions. This crash pattern seen above is related to the high volumes, congestion, and higher speed at the signalized intersection (SH 44) north of the US 85C/I-76A interchange. It is recommended to consider repositioning the northbound flashing warning sign of the upcoming signalized intersection further south on US 85C. Repositioning location could be considered before going under the I-76A bridge that obstructs the view of the upcoming intersection. Additionally, consideration for a southbound flashing warning sign of the upcoming signalized intersection north of the intersection is recommended.

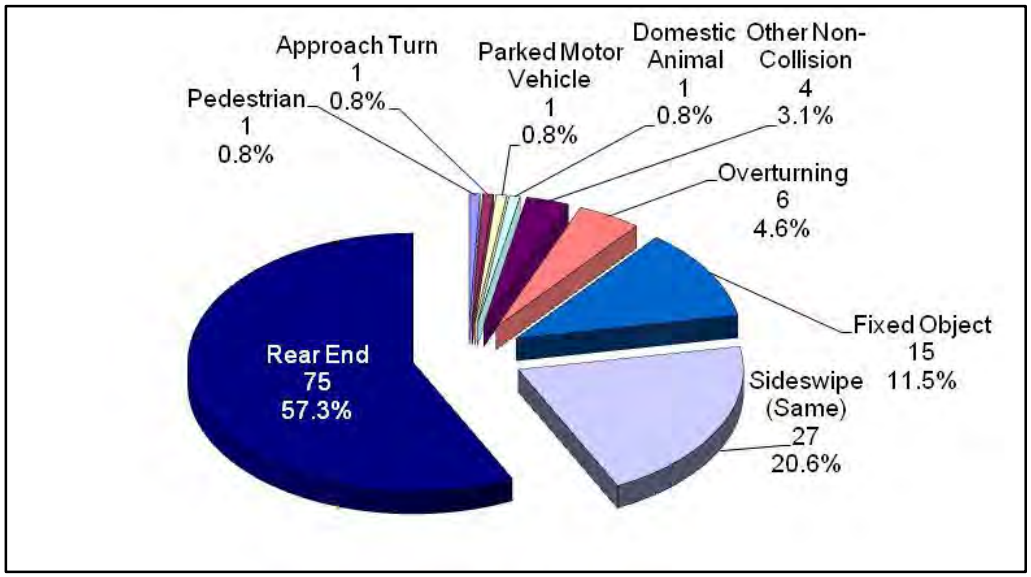
The frequency of sideswipe (same direction) type crashes was higher than expected for this type of roadway. A review of the sideswipe (same direction) type crashes indicated there were three crashes northbound and eight crashes southbound. Ten of the 11 crashes occurred in dry roadway conditions. The sideswipe (same direction) type crashes occurred throughout Segment 1A. A review of the crash history indicates that there is no current pattern to the sideswipe (same direction) type crashes. There are no suggestions for improvement at this time.

Although there is no significant pattern of off-road left or head-on crashes, it is recommended that a cable rail median barrier be considered due to the high volumes and narrow median.

Segment 1B (MP 227.48 – MP 230.86)

Segment 1B begins to approximately 420 feet north of the SH 44 (104th Avenue) intersection and extends north to midway between the 124th and 132nd Avenue intersections. There were a total of 131 non-intersection crashes along this sub-segment of 85C: 96 PDO crashes and 35 injury crashes. **Figure 5** presents a graphical representation of the non-intersection crash types for this sub-segment. Rear end type crashes (57.3%) were the predominant crash type followed by sideswipe (same direction) type crashes (20.6%).

Figure 5
Non-Intersection Crash Types
(Segment 1B: MP 227.48 – MP 230.86)



Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of roadway. A review of the rear end crash history indicated that there were 33 crashes northbound, 41 crashes southbound, and one crash westbound. Road conditions for rear end type crashes showed that 70 of the 75 were dry road conditions. This crash pattern is related to the high volumes, congestion, and higher speeds near the signalized intersections within the study area. Signalized intersections with US 85C within this segment are: 112th Avenue, 120th Avenue, and 124th Avenue with 120th Avenue having slightly fewer crashes than the other two intersections. Recommendations for these intersections can be found in the intersection portion of the report.

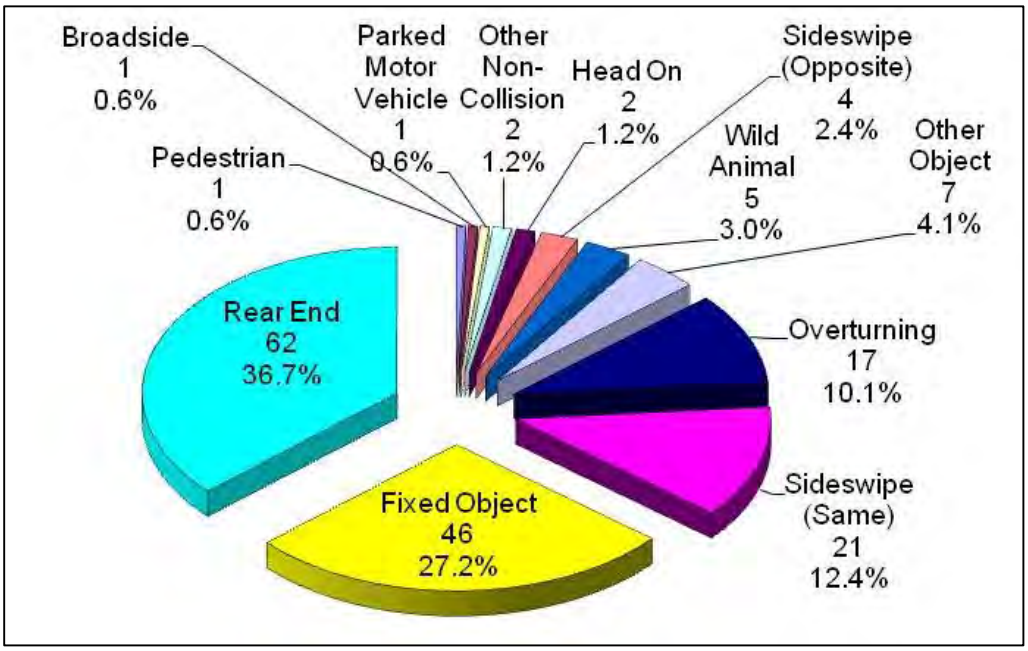
The frequency of sideswipe (same direction) type crashes was higher than expected for this type of roadway. A review of the sideswipe (same direction) type crashes indicated there were 14 crashes northbound and 13 crashes southbound. Twenty-six of the 27 crashes occurred in dry roadway conditions. The sideswipe (same direction) type crashes were throughout Segment 1B. A review of the crash history indicates that there is no current pattern to the sideswipe (same direction) type crashes. There are no suggestions for improvement at this time.

Although there is no significant pattern of off-road left or head-on crashes, it is recommended that a cable rail median barrier be considered due to the high volumes and narrow median.

Segment 1C (MP 230.87 – MP 235.19)

Segment 1C begins midway between the 124th and 132nd Avenue intersections and extends north to approximately 400 feet north of the center of the SH 7 interchange. There were a total of 169 non-intersection crashes along this sub-segment of US 85C: 125 PDO crashes, 41 injury crashes and three fatal crashes. **Figure 6** presents a graphical representation of the non-intersection crash types for this sub-segment. Rear end type crashes (36.7%) were the predominant crash type followed by fixed object type crashes (27.2%) and sideswipe (same direction) type crashes (12.4%).

Figure 6
Non-Intersection Crash Types
(Segment 1C: MP 230.87 – MP 235.19)



Fatal Crashes

There were three fatal crashes that occurred in Segment 1C (MP 230.87 – MP 235.19).

The first crash occurred at MP 233.31 on August 23, 2011 north of the intersection of 144th Avenue. The crash occurred in dry, daylight conditions. Vehicle #1 was traveling southbound on US 85C and was in the inside lane. Vehicle #1 made an abrupt turn into the center median, crossed into the northbound traffic, and collided with Vehicle #2. Vehicle #3 was behind Vehicle #2, and the crash debris hit the vehicle. Vehicle #4 was also traveling northbound and was broadsided by Vehicle #1. Vehicle #1 driver was not wearing a seatbelt and was the fatality in the crash. No drugs or alcohol were reported. There was no barrier between northbound and southbound traffic. Vehicles #2 and #4 were trucks. No cause was listed for the crash. No crash pattern was found, but potential remedial are suggested in the following discussion.

The second crash occurred at MP 233.92 on November 6, 2012 south of the intersection of Bromley Lane. The crash occurred in dry, daylight conditions. Vehicle #1 was traveling southbound on US 85, the driver attempting to pass slower traffic by changing lanes. As Vehicle #1 was attempting to change lanes, Vehicle #2 changed lanes into the lane Vehicle #1 was currently occupying. Vehicle #1 swerved back into its original lane but lost control and went into the center median. The vehicle rolled over twice before coming to a stop. Vehicle #2 was not hit but returned to the scene of the crash. Vehicle #1 was going 70 mph in a 65 mph speed zone. The cause of the crashes was cited to be reckless and aggressive driving. No drugs or alcohol were involved. The fatality was one of the passengers in Vehicle #1. No crash pattern was found, but potential remedial are suggested in the following discussion.

The third crash occurred at MP 234.49 on October 29, 2008 south of the SH 7 interchange. The crash occurred in dry, dark, unlighted conditions. A pedestrian was attempting to cross US 85C eastbound at approximately Jessup Street which does not have access to US 85C (approximately 0.5 mile north of Bromley Lane). Pedestrian ran in front of Vehicle #2, Vehicle #2 was not able to stop in time and stuck the pedestrian on the passenger side of the vehicle. Pedestrian was suspected for drugs and/or alcohol and was the fatality. No crash pattern was found.

Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of roadway. A review of the rear end crash history indicated that there were 33 crashes northbound and 29 crashes southbound. Road conditions for rear end type crashes showed that 56 of the 62 were dry road conditions. This crash pattern seen above is related to the high traffic volumes, congestion, and higher speeds near the signalized intersections at 136th Avenue and Bromley Lane. Recommendations for these two intersections can be found in a later section of this report.

The frequency of sideswipe (same direction) type crashes was higher than expected for this type of roadway. A review of the sideswipe (same direction) type crashes indicated there were 14 crashes northbound and seven crashes southbound. Nineteen of the 21 crashes occurred in dry roadway conditions. The sideswipe (same direction) type crashes were throughout Segment 1C. A review of the crash history indicates that there is no current pattern to the sideswipe (same direction) type crashes. There are no suggestions for improvement at this time.

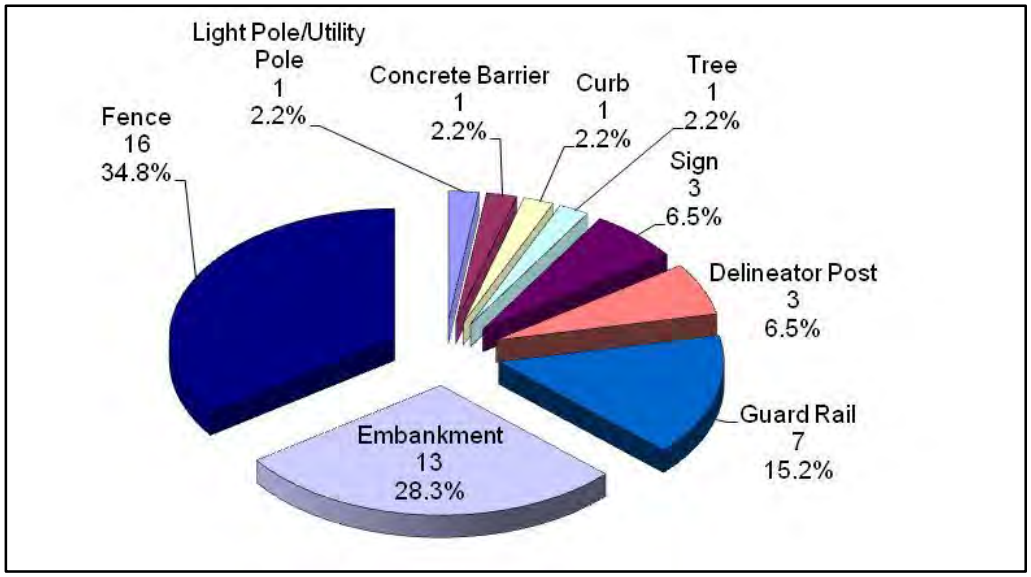
The frequencies of off-road, off-road right, and off-road left crashes were higher than expected for this type of roadway. For Segment 1C, these types of crashes involved fixed object crashes (46—higher than expected), overturning crashes (17 including one fatality—higher than expected), sideswipe (opposite) (4 including one fatality), and head on (2). This sub-segment already has outside shoulder rumble strips. Due to the relatively narrow median and number of cars crossing or ending up in the median, a cable rail median barrier should be considered for this sub-segment.

The frequency of overturning type crashes was higher than expected for this type of roadway. A review of the overturning type crashes indicated there were eight crashes northbound and nine crashes southbound. Twelve of the 17 occurred on dry roadway conditions. The overturning type crashes were throughout Segment 1C. Only four of the 17 were documented of traveling over the posted speed limit. Eleven of the 17 occurred in daylight lighting conditions.

A review of the crash history indicates that there is no current locational pattern.

The frequency of fixed object type crashes was higher than expected for this type of roadway. A review of the fixed object type crashes indicated that 22 crashes occurred northbound and 24 crashes occurred southbound. Only 21 of the 46 crashes occurred with dry roadway conditions. The fixed object type crashes occurred throughout Segment 1C. It can be seen in **Figure 7** of the fixed object type crashes, fence type crashes (34.6%) were the predominant crash type followed by embankment type crashes (28.3%). In addition to considering a cable rail barrier in the median, it is recommended that the clear zone for all roadside obstacles be reviewed in the field.

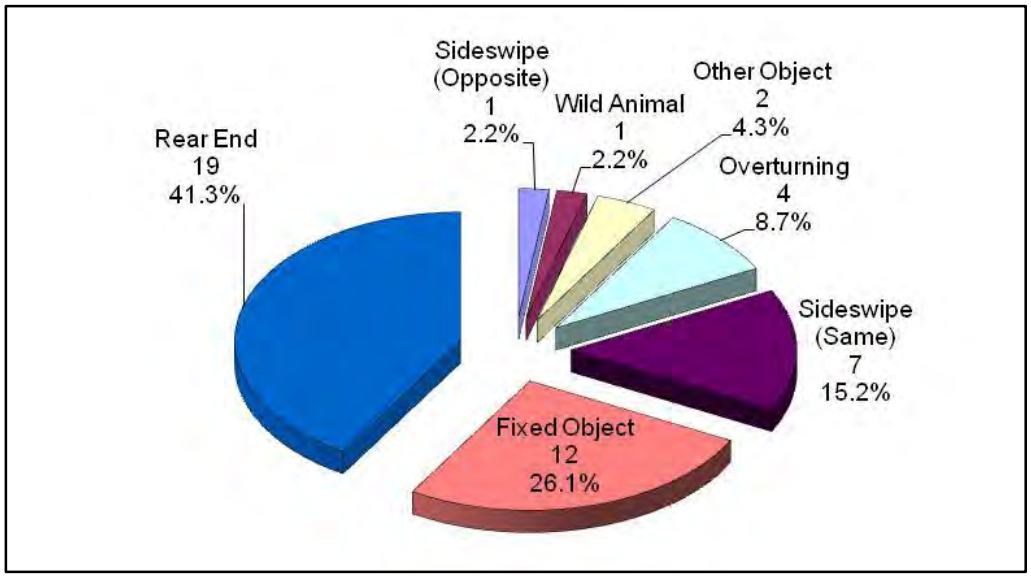
Figure 7
Fixed Object Crash Types
(Segment 1C: MP 230.87 – MP 235.19)



Segment 1D (MP 235.20 – MP 236.62)

Segment 1D begins just north of the center of the SH 7 interchange and extends north to approximately 400 feet north of the intersection with CR 2.5. There were a total of 46 non-intersection crashes along this sub-segment of US 85C: 34 PDO crashes and 12 injury crashes. **Figure 8** presents a graphical representation of the non-intersection crash types for this sub-segment. Rear end type crashes (41.3%) were the predominant crash type followed by fixed object type crashes (26.1%) and sideswipe (same direction) type crashes (15.2%).

Figure 8
Non-Intersection Crash Types
(Segment 1D: MP 235.20 – MP 236.62)



Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of roadway. A review of the rear end crash history indicated that there were 13 crashes northbound and six crashes southbound. Road conditions for rear end type crashes showed that 17 of the 19 were dry road conditions. Fifteen of the 19 crashes occurred during daylight lighting conditions. A review of the locations of the crashes indicated a pattern related to signalized intersections but not any in particular. However, recommendations for intersections can be found in the intersection portion of this report.

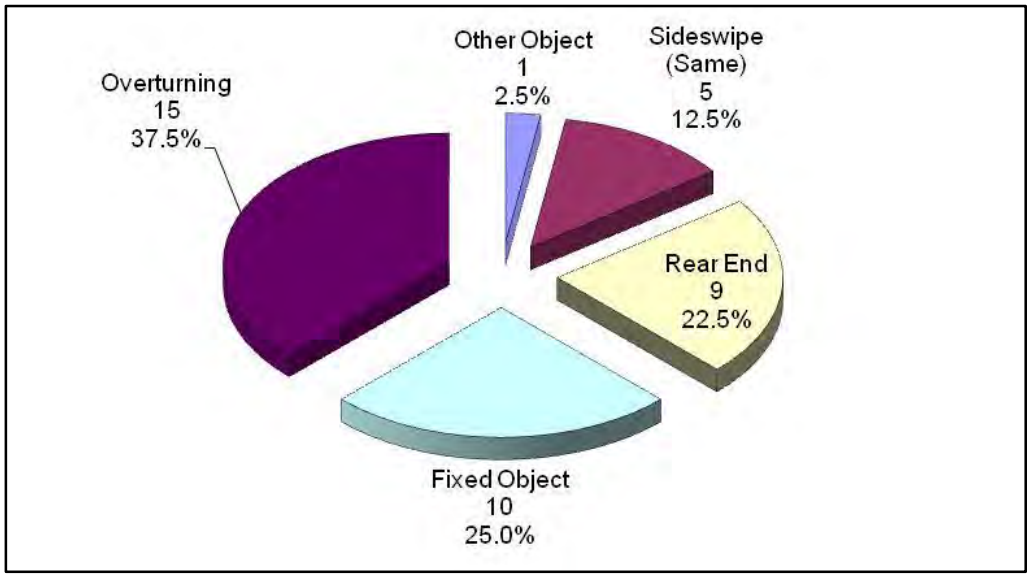
The frequency of fixed object type crashes was higher than expected for this type of roadway. A review of the fixed object type crashes indicated that seven of the 12 fixed object crashes were fence related crashes. Of the fence type crashes, three occurred northbound and four crashes occurred southbound. Only two of the seven crashes occurred with dry roadway conditions. Two occurred at MP 236.00 near the intersection of 168th Avenue and three at MP 236.33 north of 168th Avenue. No pattern was found for the fixed object type crashes, but it is recommended to review the existing snow/ice removal procedures to ensure current procedures are sufficient.

Although there is no significant pattern of off-road left or head-on crashes, it is recommended that a cable rail median barrier be considered south of CR 2 due to the high volumes and narrow median.

Segment 1E (MP 236.63 – MP 238.32)

Segment 1E begins 400 feet north of the intersection with CR 2.5 and extends north to approximately 1,200 feet north of CR 6 (the north Brighton Urban Area boundary). There were a total of 40 non-intersection crashes along this sub-segment of US 85C: 23 PDO crashes, 16 injury crashes, and one fatal crash. **Figure 9** presents a graphical representation of the non-intersection crash types for this sub-segment. Overturning type crashes (37.5%) were the predominant crash type followed by fixed object type crashes (25.0%) and rear end type crashes (22.5%).

Figure 9
Non-Intersection Crash Types
(Segment 1E: MP 236.63 – MP 238.32)



Fatal Crashes

There was one fatal crash that occurred in Segment 1E at MP 237.41 on August 15, 2009 north of the intersection of CR 4. The crash occurred in dry, daylight conditions. Vehicle #1 was traveling southbound on US 85C in the left through lane and stopped to attempt a U-turn in a median crossover (no signs were posted in the median). Vehicle #2 was also in the southbound left through lane and rear-ended Vehicle #1. Alcohol was suspected in both drivers of the vehicles. Vehicle #2 driver was the fatality. No crash pattern found.

Observations / Recommendations

The frequency of overturning type crashes was higher than expected for this type of roadway. A review of the overturning type crashes indicated there were eight crashes northbound and seven crashes southbound. Twelve of the 15 occurred on dry roadway conditions. The overturning type crashes were throughout Segment 1E. None of the overturning type crashes were documented to be traveling over the posted speed limit of 65 mph. Eight of the 15 occurred in daylight lighting conditions. Nine of the crashes resulting in the vehicle leaving the left side of the road; four went off the right side. A review of the crash history indicates that these crashes occurred throughout the sub-segment. It should be noted that a cable rail median barrier has been constructed recently. This could reduce the number of vehicles that depart into the median and overturn. There are no further suggestions for improvement at this time.

The frequency of rear end type crashes was higher than expected for this type of roadway. A review of the rear end crash history indicated that there were three crashes northbound and six crashes southbound. Road conditions for rear end type crashes showed that all nine crashes were dry road conditions. Eight of the nine crashes occurred during daylight lighting conditions. A review of the crash history indicates that there is no current pattern and there are no suggestions for improvement at this time.

Segment 2: US 85C MP 238.33 – MP 243.00

Segment 2 begins at the north Brighton Urban Area boundary (MP 238.33), which is approximately 1,200 feet north of Weld CR 6 and extends north to approximately one-third mile north of CR 14.5 (14th Street in Fort Lupton – MP 243.00). During the five-year study period, there were 137 non-intersection crashes reported within Segment 2. The south sub-segment (2A) is classified as a rural, four-lane rolling (U-4-R) facility while the northern sub-segment (2B) is classified as an urban, four-lane rolling (U-4-R) facility. The entire Segment has an access category of EX. **Figure 10** shows US 85C Segment 2 in relation to the study area. **Table 3** displays the divisions and crash summaries for each sub-segment.

Figure 10
Segment 2 Vicinity Map
US 85C (MP 238.33 – MP 243.00)

Table 3
Number of Non-Intersection Crashes – Segment 2
US 85C (MP 238.33 – MP 243.00)

Sub-Segment Descriptions	Mile Points	Number of Crashes			
		PDO	INJ	FAT	TOTAL
2A – Fort Lupton CL Start & Fort Lupton Interchange	MP 238.33 – MP 241.58	65	27	2	94
2B – Fort Lupton CL End	MP 241.59 – MP 243.00	31	12	0	43

Since Segment 2A is classified as a rural, four-lane rolling (U-4-R) facility, SPFs have been calibrated by CDOT. **Figure 11** shows that frequency of total crashes over the five-year study period indicates a high potential for crash reduction (LOSS IV). **Figure 12** shows that the severity of crashes is about the mean for this roadway type (LOSS II-III).

Figure 11
Segment 2A (MP 238.33 - MP 241.58) – Total Crashes per Year
Rural Flat and Rolling Four-Lane Divided Highway

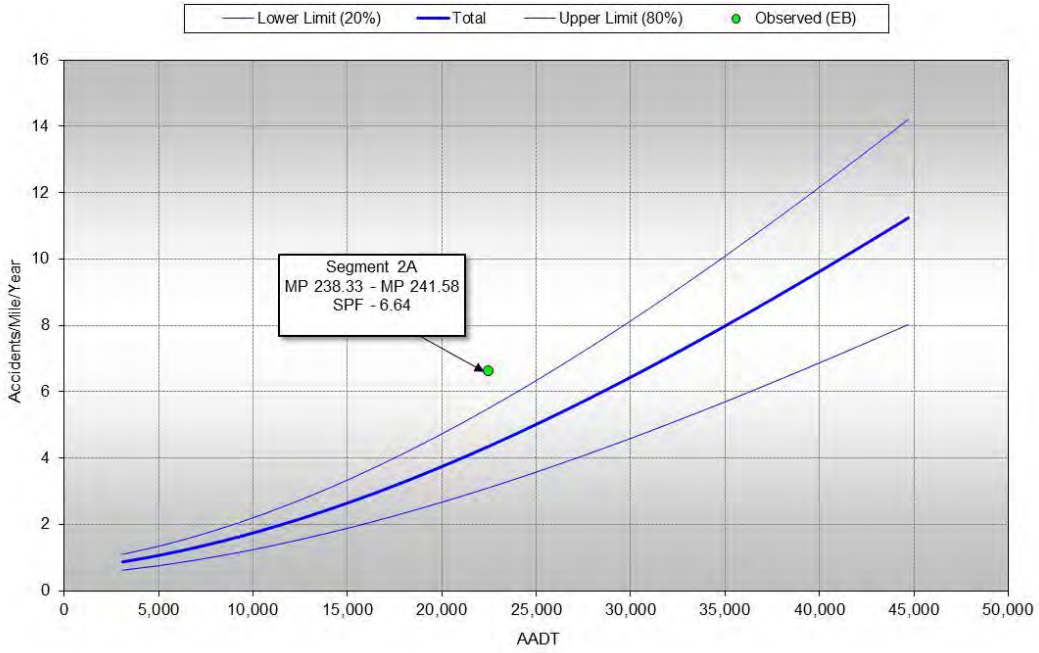
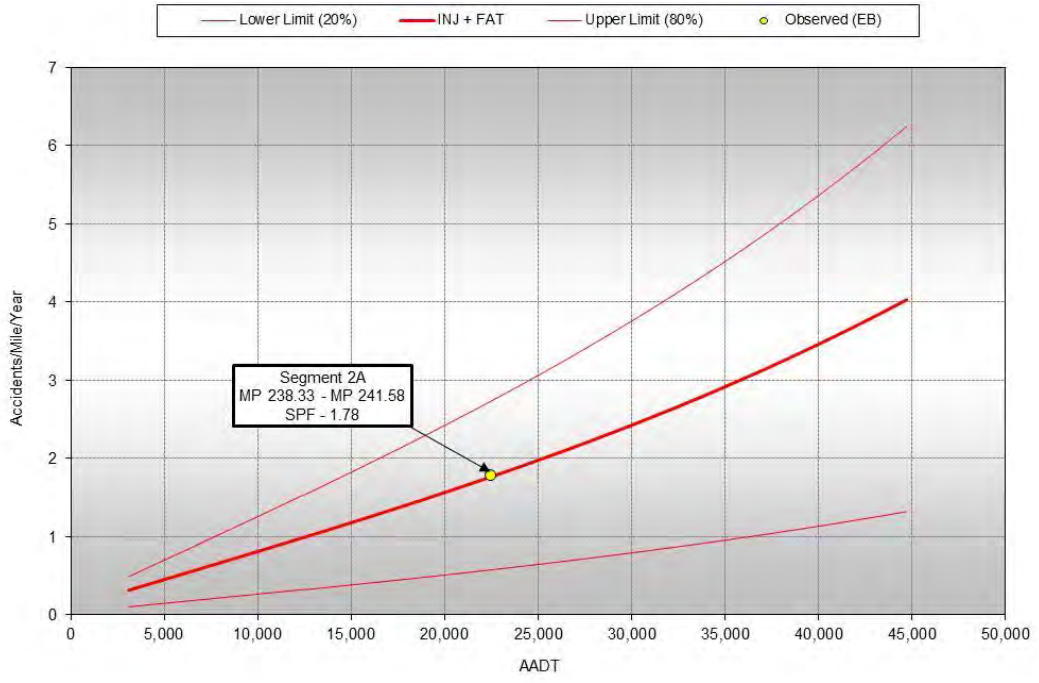


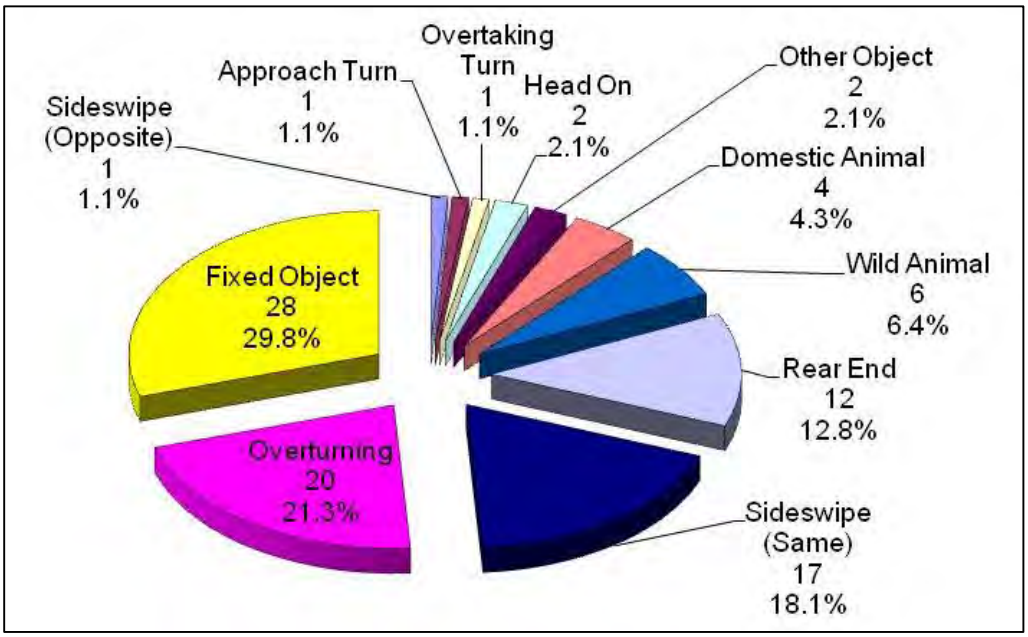
Figure 12
Segment 2A (MP 238.33 - MP 241.58) – Injury & Fatal Crashes per Year
Rural Flat and Rolling Four-Lane Divided Highway



Segment 2A (MP 238.33 – MP 241.58)

Segment 2A begins approximately 1,200 feet north of CR 6 (the north Brighton Urban Area boundary) and extends north to the center of the SH 52A interchange (MP 241.58). There were a total of 94 non-intersection crashes along this sub-segment of US 85C: 65 PDO crashes, 27 injury crashes and two fatal crashes. **Figure 13** presents a graphical representation of the non-intersection crash types for this sub-segment. Fixed object type crashes (29.8%) were the predominant crash type followed by overturning type crashes (21.3%) and sideswipe (same direction) type crashes (18.1%).

Figure 13
Non-Intersection Crash Types
(Segment 2A: MP 238.33 – MP 241.58



Fatal Crashes

There were two fatal crashes that occurred in Segment 2A (MP 238.33 – MP 241.58).

The first fatal crash occurred at MP 238.38 on March 2, 2008 just north of CR 6.25. The crash occurred in dry, dark, unlighted, and windy conditions. Vehicle #1 was traveling northbound on US 85C when the driver over-corrected and skidded across the northbound lanes, across the median and into the southbound lanes. Then Vehicle #1 drove off the right side of the roadway and collided with a delineator post. The vehicle was reported to be going at the speed limit. Alcohol was suspected, no seat belt and the driver was ejected from the vehicle. No crash pattern was found. It should be noted that a cable rail has been constructed in the median in this area since this crash occurred.

The second fatal crash occurred at MP 241.1 on June 6, 2008 south of the SH 52A interchange. The crash occurred in dry, daylight conditions. Vehicle #1 was traveling southbound on US 85C attempting a lane change from right to left; however, there was a vehicle occupying the left lane. The driver overcorrected to the left, and Vehicle #1 rotated counter-clockwise, went through the median and began rolling over. Additionally, a second vehicle traveling northbound collided with the driver's side of Vehicle #1 while the vehicle was still in motion of the rolling over. No alcohol or drugs were suspected. Both vehicles were going the speed limit. The fatality was one of the passengers in Vehicle #1. No crash pattern was found. It should be noted that a cable rail has been constructed in the median in this area since this crash occurred.

Observations / Recommendations

The frequency of overturning type crashes was higher than expected for this type of roadway. A review of the overturning type crashes indicated there were nine crashes northbound and 11 crashes southbound. Twelve of the 20 occurred on dry roadway conditions. The overturning type crashes were throughout Segment 2A. Only one of the overturning type crashes were documented to be traveling over the posted speed limit of 65 mph. Thirteen of the 20 occurred in daylight lighting conditions. A review of the crash history indicates that there is no current pattern. It should be noted that a cable rail median barrier has been constructed recently. This could reduce the number of vehicles that depart into the median and overturn. It is recommended to review the existing snow/ice removal procedures to ensure existing procedures are sufficient. It should be noted that a cable rail has been constructed in the median in this segment since this crash occurred.

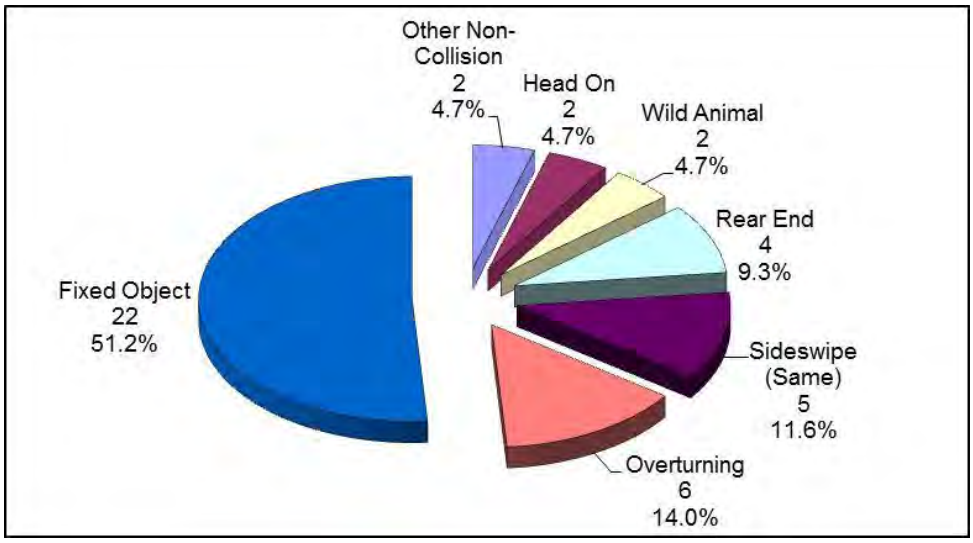
The frequency of sideswipe (same direction) type crashes was higher than expected for this type of roadway. A review of the sideswipe (same direction) type crashes indicated there were seven crashes northbound and ten crashes southbound. Thirteen of the 17 crashes occurred in dry roadway conditions. The sideswipe (same direction) type crashes were throughout Segment 2A. A review of the crash history indicates that there is no current pattern to the sideswipe (same direction) type crashes. There are no suggestions for improvement at this time.

The frequency of embankment type crashes was higher than expected for this type of roadway. A review of the embankment type crashes indicated there were five crashes northbound and six crashes southbound. Seven of the 11 crashes occurred in dry roadway conditions. Only four crashes occurred in daylight lighting conditions. The embankment type crashes were throughout Segment 2A. A review of the crash history indicates that there is no current pattern, and there are no further suggestions for improvement at this time.

Segment 2B (MP 241.59 – MP 243.00)

Segment 2B begins near the center of the SH 52A interchange (MP 241.59) and extends north to approximately one-third mile north of CR 14.5 (14th Street in Fort Lupton – MP 243.00). There were a total of 43 non-intersection crashes along this sub-segment of US 85C: 31 PDO crashes and 12 injury crashes. **Figure 14** presents a graphical representation of the non-intersection crash types for this sub-segment. Fixed object type crashes (51.2%) were the predominant crash type followed by overturning type crashes (14.0%) and sideswipe (same direction) type crashes (11.6%).

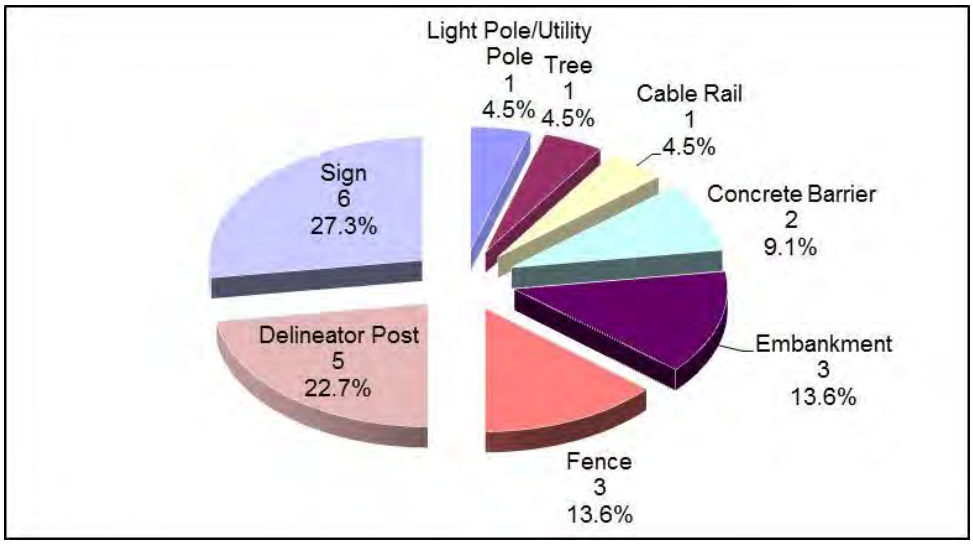
Figure 14
Non-Intersection Crash Types
(Segment 2B: MP 241.59 – MP 243.00)



Observations / Recommendations

The frequency of fixed object type crashes was higher than expected for this type of roadway. A review of the fixed object type crashes indicated that 14 crashes occurred northbound and eight crashes occurred southbound. Only 11 of the 22 crashes occurred with dry roadway conditions. The fixed object type crashes were throughout Segment 2B. It can be seen in **Figure 15** that of the fixed object type crashes, sign type crashes (27.3%) were the predominant crash type followed by delineator post type crashes (22.7%). A review of the crash history indicates that there is no current pattern. It should be noted that this segment has barriers in the median (either concrete Type 7 or cable rail) as well as rumble strips along the outside shoulders.

Figure 15
Fixed Object Crash Types
(Segment 2B: MP 241.59 – MP 243.00)



Segment 3: US 85C MP 243.01 – MP 262.00

Segment 3 begins approximately one-third mile north of CR 14.5 (14th Street in Fort Lupton – MP 243.00) and extends north to approximately 600 feet north of the Union Pacific Railroad (UPRR) overpass in south LaSalle (MP 262.00). During the five-year study period there were 307 non-intersection crashes reported within Segment 3. This segment is classified as a rural, four-lane rolling (R-4-R) facility, and it has an access category of EX. **Figure 16** shows the US 85C Segment 3 in relation to the study area. Segment 3 is 18.99 miles and it was broken into seven sub-segments for the detailed analyses. **Table 4** displays the divisions and crash summaries for each sub-segment.

Figure 16
Segment 3 Vicinity Map
US 85C (MP 243.01 – MP 262.00)

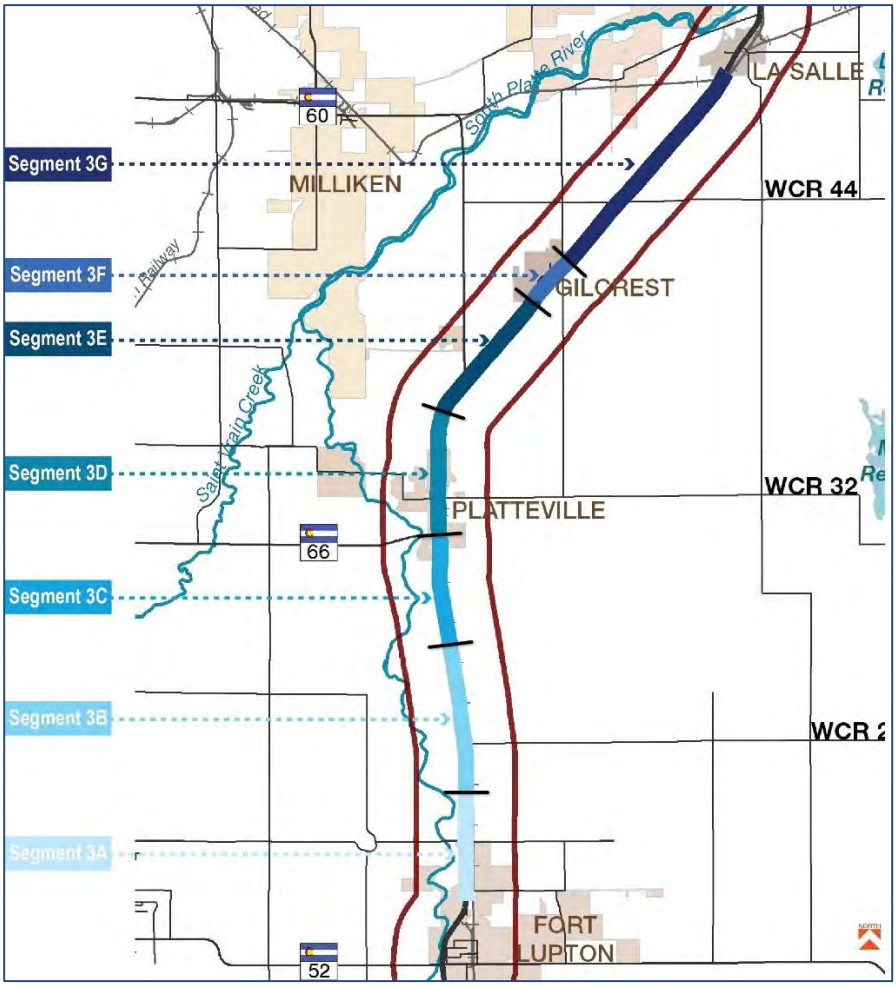


Table 4
Number of Non-Intersection Crashes – Segment 3
US 85C (MP 243.01 – MP 262.00)

Sub-Segment Descriptions	Mile Points	Number of Crashes			
		PDO	INJ	FAT	TOTAL
3A – North of Fort Lupton LC – Colorado Road (CR) 20	MP 243.01 – MP 245.19	37	13	2	52
3B – CR 20 – CR 26	MP 245.20 – MP 248.20	42	25	3	70
3C – CR 26 – Platteville CL Start	MP 248.21 – MP 250.64	17	14	1	32
3D – City of Platteville	MP 250.65 – MP 253.00	19	9	0	28
3E – Platteville CL End – Gilcrest CL Start	MP 253.01 – MP 255.91	22	16	0	38
3F – Town of Gilcrest	MP 255.92 – MP 257.00	8	1	0	9
3G – Gilchrest CL End – Greeley Urban Area Start	MP 257.01 – MP 262.00	50	28	0	78

Since Segment 3 is classified as a rural, four-lane rolling (U-4-R) facility, SPFs have been calibrated by CDOT. **Figure 17** shows that the frequency of total crashes over the five-year study period indicates a high potential for crash reduction (LOSS IV) for Segments 3A and 3B and a moderate to high potential for crash reduction (LOSS III) for Segment 3G. **Figure 18** shows that the severity of crashes indicates a moderate to high potential for crash reduction (LOSS III) for Segment 3B.

Figure 17
Segment 3 (MP 243.01 – MP 262.00) – Total Crashes per Year
Rural Flat and Rolling Four-Lane Divided Highway

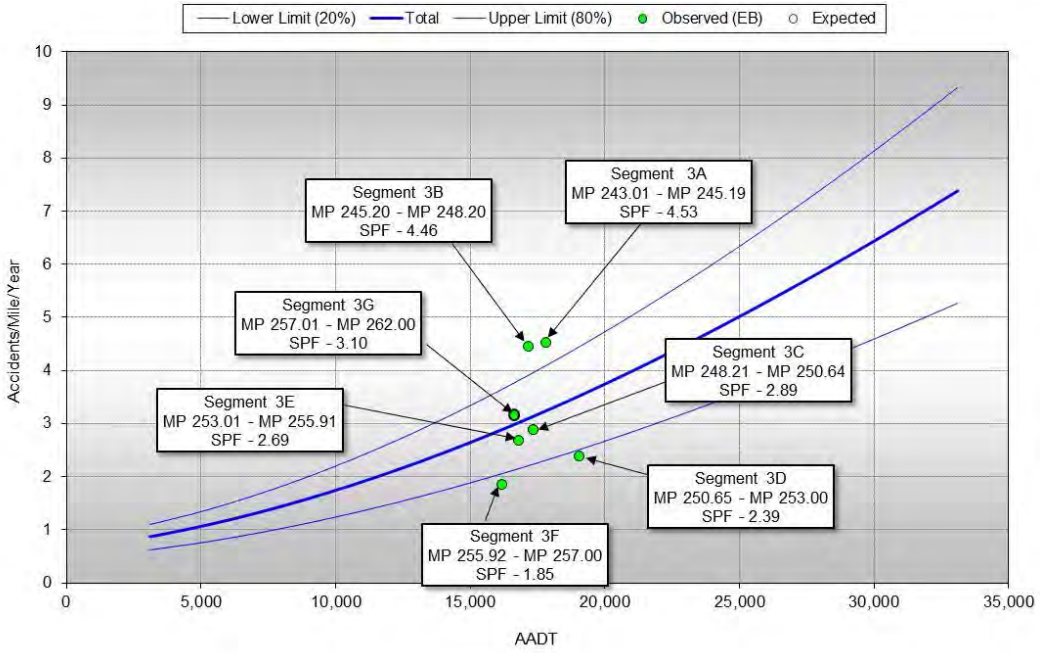
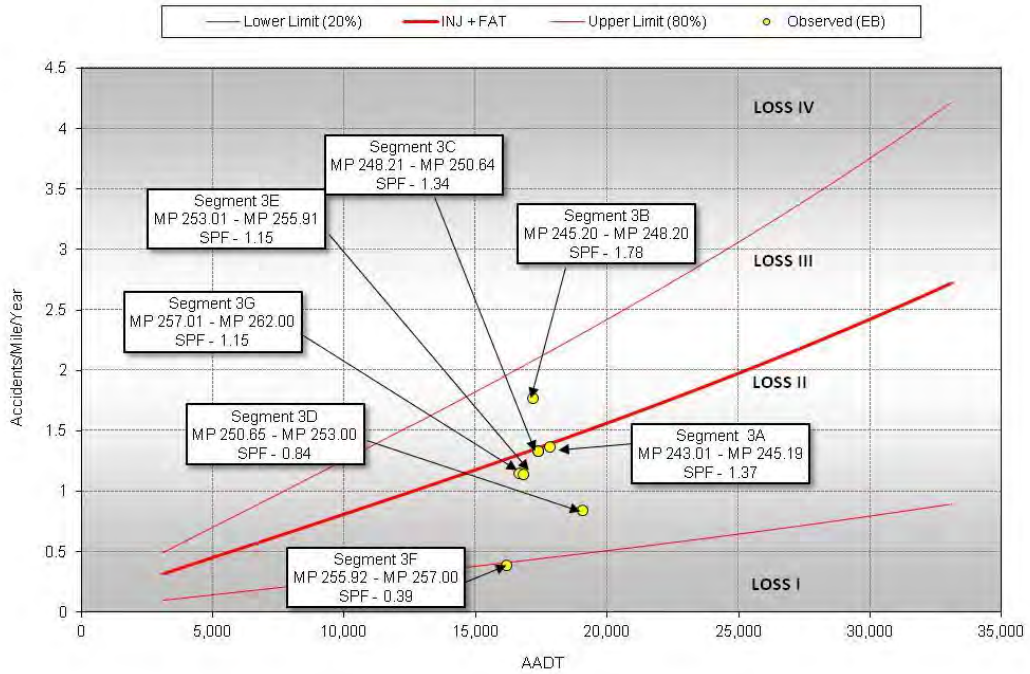


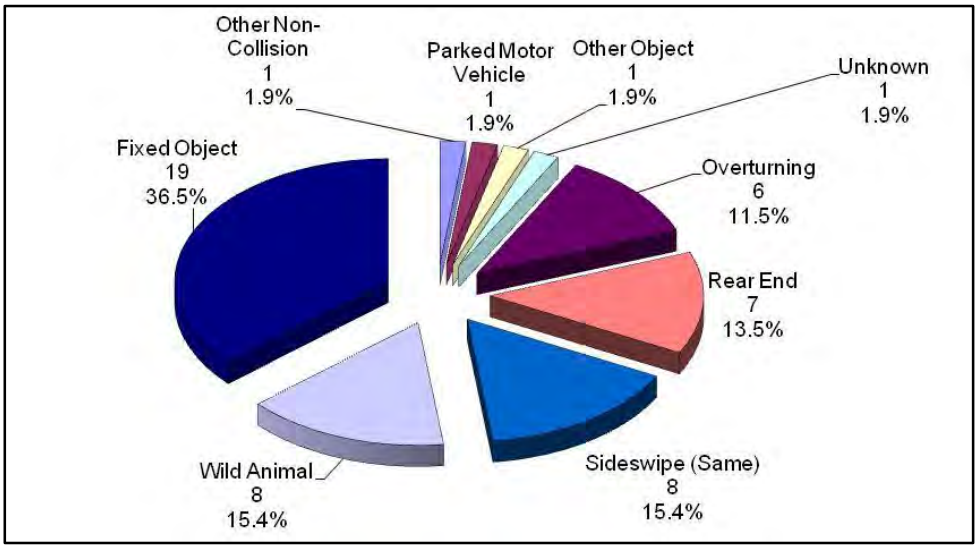
Figure 18
Segment 3 (MP 243.01 – MP 262.00) – Injury & Fatal Crashes per Year
Rural Flat and Rolling Four-Lane Divided Highway



Segment 3A (MP 243.01 – MP 245.19)

Segment 3A begins approximately one-third mile north (MP 243.01) of CR 14.5 (14th Street in Fort Lupton) and extends north to the CR 20 intersection (MP 245.19). There were a total of 52 non-intersection crashes along this sub-segment of US 85C: 37 PDO crashes, 13 injury crashes and two fatal crashes. **Figure 19** presents a graphical representation of the non-intersection crash types for this sub-segment. Fixed object type crashes (36.5%) were the predominant crash type followed by wild animal type crashes (15.4%) and sideswipe (same direction) type crashes (15.4%).

Figure 19
Non-Intersection Crash Types
(Segment 3A: MP 243.01 – MP 245.19)



Fatal Crashes

There were two fatal crashes that occurred in Segment 3A (MP 243.01 – MP 245.19).

The first fatal crash occurred at MP 243.33 on July 20, 2008 north of the intersection with CR 16. The crash occurred in dry roadway conditions in the daytime. Vehicle #1 was traveling northbound on US 85C in the left through lane. Vehicle #2 was ahead of Vehicle #1 in the same lane. Vehicle #1 collided with the passenger side rear corner of Vehicle #2 in a rear end collision, then continued north across the right lane and right shoulder before coming to a stop at the east roadway edge facing south. Vehicle #2 came to a stop in the left lane facing north after being hit by Vehicle #1. Vehicle #1 was traveling 75 mph in a 65 mph (or 45 mph construction zone) before striking Vehicle #2. The crash was noted to be careless driver and distracted/other. Both driver and passenger in Vehicle #1 were ejected and the passenger was the fatality. No alcohol or drugs were suspected. No crash pattern was found.

The second fatal crash occurred at MP 243.41 on July 14, 2010 north of the intersection with CR 16. The crash occurred in dry roadway conditions in the night. Vehicle #1 was traveling northbound on US 85C and was changed lanes from right to left. Vehicle #1 then collided with Vehicle #2 in a sideswipe same direction crash. Both vehicles ran off the left side of the roadway into the center median. Neither vehicle was reported to be speeding. Vehicle #2 was suspected of alcohol use. Both driver and passenger of Vehicle #2 were ejected and the fatality

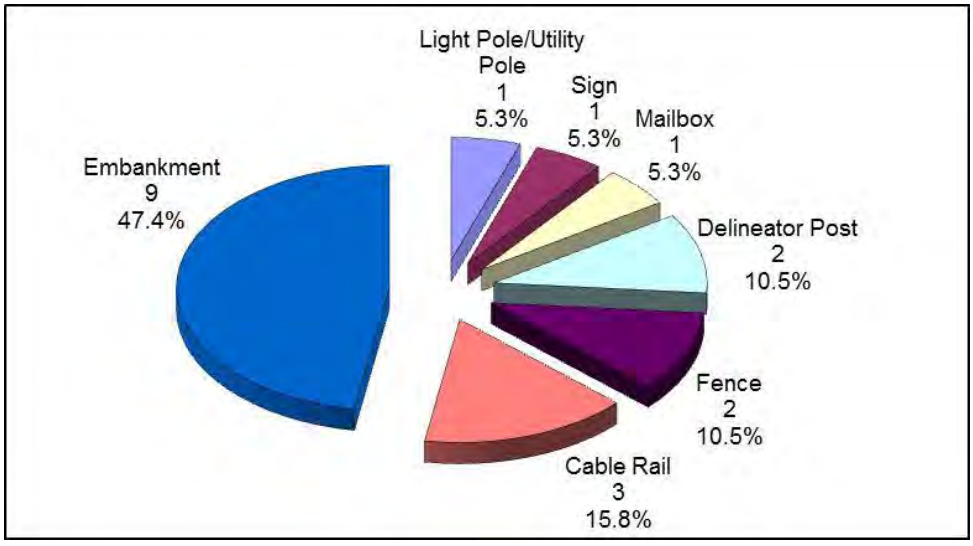
was in Vehicle #2. Driver of Vehicle #1 was cited for a lane violation but there was no apparent contributing factor. No crash pattern was found.

Observations / Recommendations

The frequency of sideswipe (same direction) type crashes was higher than expected for this type of roadway. A review of the sideswipe (same direction) type crashes indicated there were five crashes northbound and three crashes southbound. Five of the crashes occurred in dry roadway conditions. The sideswipe (same direction) type crashes were throughout Segment 3A. A review of the crash history indicates that there is no current pattern to the sideswipe (same direction) type crashes. There are no suggestions for improvement at this time.

The frequency of fixed object type crashes was higher than expected for this type of roadway. It can be seen in **Figure 20** of the fixed object type crashes, embankment type crashes (47.4%) were the predominant crash type. Of those embankment crashes, one crash occurred northbound and eight crashes occurred southbound. Three of the nine crashes occurred with dry roadway conditions. Five of the crashes occurred during icy roadway conditions. Overall, there was a concentration of crashes between MP 243.9 and MP 244.0. A review of these crashes as well as all fixed object crashes in Segment 3A indicates that there is no current pattern to the crashes. There are no suggestions for improvement at this time.

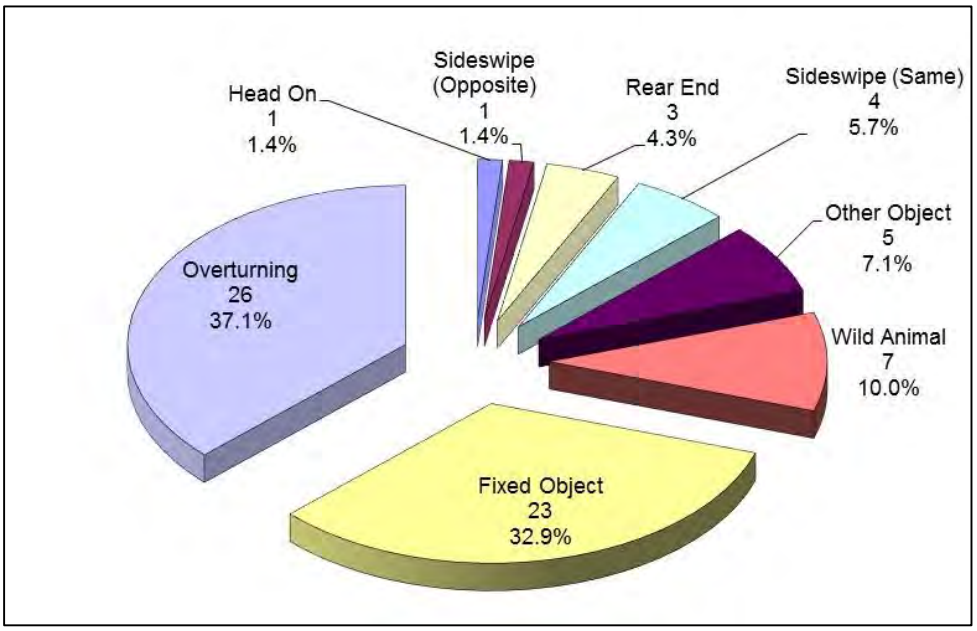
Figure 20
Fixed Object Crash Types
(Segment 3A: MP 243.01 – MP 245.19)



Segment 3B (MP 245.20 – MP 248.20)

Segment 3B begins at the CR 20 intersection (MP 245.20) and extends north to the CR 26 intersection (MP 248.20). There were a total of 70 non-intersection crashes along this sub-segment of US 85C: 42 PDO crashes, 25 injury crashes and three fatal crashes. **Figure 21** presents a graphical representation of the non-intersection crash types for this sub-segment. Overturning type crashes (37.1%) were the predominant crash type followed by fixed object type crashes (32.9%) and wild animal type crashes (10.0%).

Figure 21
Non-Intersection Crash Types
(Segment 3B: MP 245.20 – MP 248.20)



Fatal Crashes

There were three fatal crashes that occurred in Segment 3B (MP 245.20 – MP 248.20).

The first fatal crash occurred at MP 246.01 on February 28, 2009 south of the intersection with CR 22. The crash occurred in dry roadway conditions at night. Vehicle #1 was traveling southbound on US 85C. Vehicle #1 ran off the left side of the roadway into the center median and collided with a delineator post. Vehicle #1 continued in the center median and overturned, rotating two and a half times before coming to a rest. The driver was ejected from the vehicle and was the resulting fatality. Alcohol was listed as the cause of the crash. No crash pattern was found.

The second fatal crash occurred at MP 246.02 on March 2, 2008 south of the intersection with CR 22. The crash occurred in dry roadway conditions at night. Vehicle #1 was traveling southbound on US 85C. Vehicle #1 ran off the left side of the roadway into the center median and collided with a highway sign. Vehicle #1 rolled ¾ times and partially ejected the driver. The driver was the resulting fatality. Alcohol was listed as the cause of the crash. No crash pattern was found.

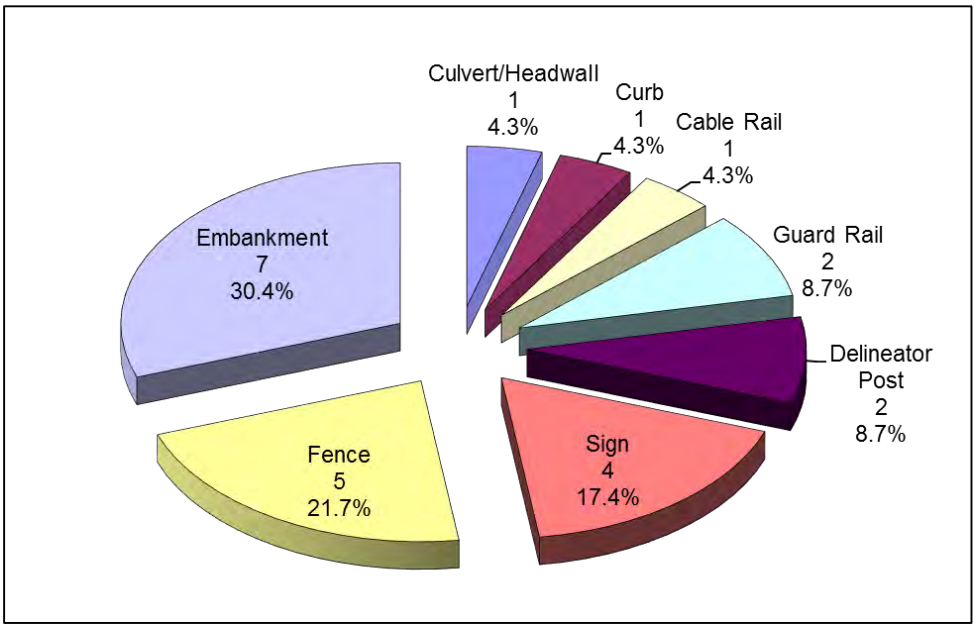
The first third crash occurred at MP 247.58 on March 30, 2009 south of the intersection with CR 24.5. The crash occurred in icy roadway conditions in the dawn or dusk. Vehicle #1 was traveling northbound on US 85C in the left through lane and Vehicle #2 was traveling southbound on US 85C Vehicle #1 lost control, crossed over the median, and collided with the side of Vehicle #2 in a side swipe opposite direction crash. No alcohol or drugs were suspected. No crash pattern was found.

Observations / Recommendations

The frequency of overturning type crashes was higher than expected for this type of roadway. A review of the overturning type crashes indicated there were 12 crashes northbound and 16 crashes southbound. Twenty of the crashes occurred in dry roadway conditions. The overturning type crashes were throughout Segment 3B. A review of the crash history indicates that there were concentrations of crashes at MP 246.0 (four crashes) and between MP 246.8 and MP 247.0 (ten crashes). There were four crashes (one fatal and three injury) at MP 240.0—all occurred at night with dry roads, two were alcohol-related, one driver fell asleep, and one had an illness. At the northerly area (MP 246.8 and MP 247.0), the only identifiable pattern was eight went off the road on the left. It should be noted that this sub-segment has rumble strips along the outside shoulders, and a cable rail barrier has recently been constructed in the median. The barrier should help reduce the number and severity of overturning crashes into the median. Thus, there are no further suggestions for improvement at this time.

The frequency of fixed object type crashes was higher than expected for this type of roadway. It can be seen in **Figure 22** of the fixed object type crashes, embankment type crashes (30.4%) were the predominant crash type. Of those embankment crashes, six crashes occurred northbound, and one crash occurred southbound. Five of the seven crashes occurred with dry roadway conditions. Two of the crashes occurred during icy roadway conditions. Five of the fixed object crashes were fence type crashes. A review of the crash history indicates that there is no current pattern to the fixed object type crashes. At this time, there are no suggestions for improvement beyond the recently installed cable rail median barrier.

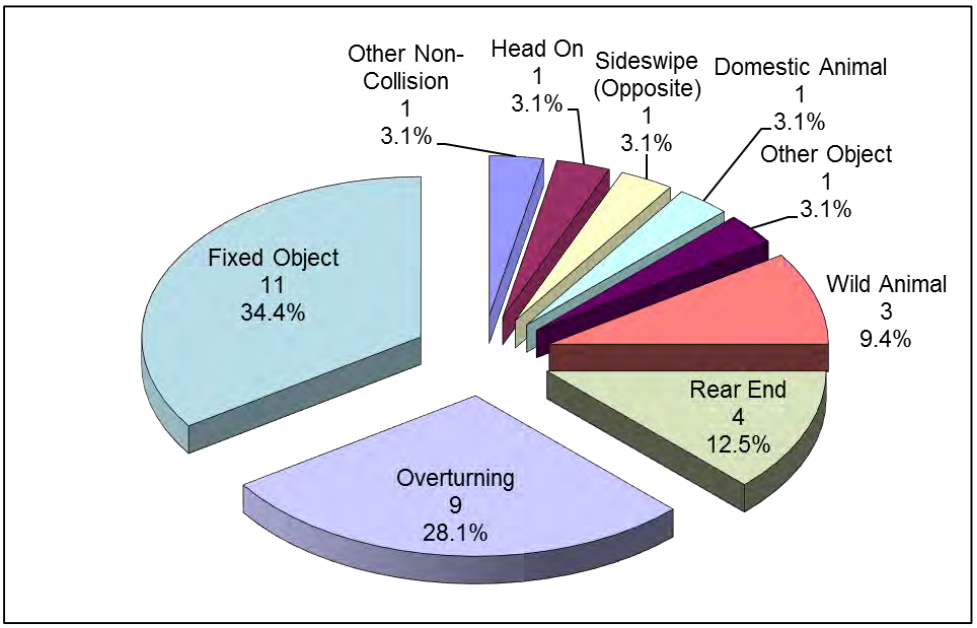
Figure 22
Fixed Object Crash Types
(Segment 3B: MP 245.20 – MP 248.20)



Segment 3C (MP 248.21 – MP 250.64)

Segment 3C begins at the CR 26 intersection (MP 248.21) and extends north to the intersection with SH 66 (MP 250.64). There were a total of 32 non-intersection crashes along this sub-segment of US 85C: 17 PDO crashes, 14 injury crashes and one fatal crash. **Figure 23** presents a graphical representation of the non-intersection crash types for this sub-segment. Fixed object type crashes (34.4%) were the predominant crash type followed by overturning type crashes (28.1%) and rear end type crashes (12.5%).

Figure 23
Non-Intersection Crash Types
(Segment 3C: MP 248.21 – MP 250.64)



Fatal Crash

There was one fatal crash that occurred in Segment 3C (MP 248.21 – MP 250.64).

The fatal crash occurred at MP 248.45 on December 19, 2010 north of the intersection with CR 26. The crash occurred in dry roadway conditions in the daytime. Vehicle #1 was traveling southbound on US 85C, and Vehicle #2 was traveling northbound on US 85C Vehicle #1 crossed over the center grass median and entered the northbound roadway. Vehicle #1 collided head-on with Vehicle #2, and then continued northeast before going off the edge of the east roadway. No alcohol or drugs were suspected. No crash pattern was found.

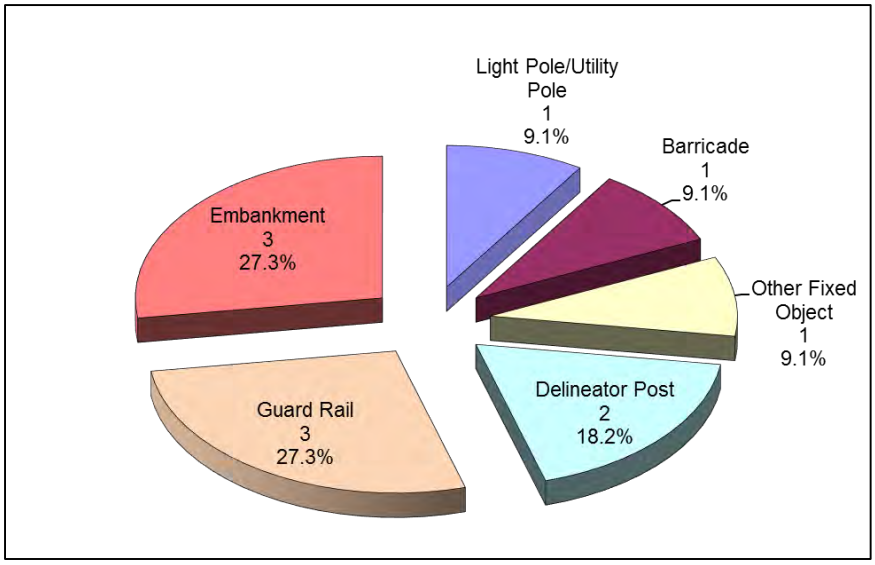
Observations / Recommendations

The frequency of overturning type crashes was higher than expected for this type of roadway. A review of the overturning type crashes indicated there were eight crashes northbound and one crashes southbound. Eight of the crashes occurred in dry roadway conditions. Seven of the nine overturning type crashes occurred south of CR 28 between MP 248.80 and MP 249.10, which is a straight section of road. It should be noted that this sub-segment has rumble strips along the outside shoulders, and a cable rail barrier has recently been constructed in the median.

There are no further suggestions for improvement at this time.

The frequency of fixed object type crashes was higher than expected for this type of roadway. It can be seen in **Figure 24** of the fixed object type crashes, embankment type crashes (27.3%) were the predominant crash type. Of those embankment crashes, two crashes occurred northbound and one crash occurred southbound. All three of the crashes occurred during dry roadway conditions. Three of the fixed object crashes were guardrail type crashes. A review of the crash history indicates that there is no current pattern to the fixed object type crashes. There are no suggestions for improvement at this time.

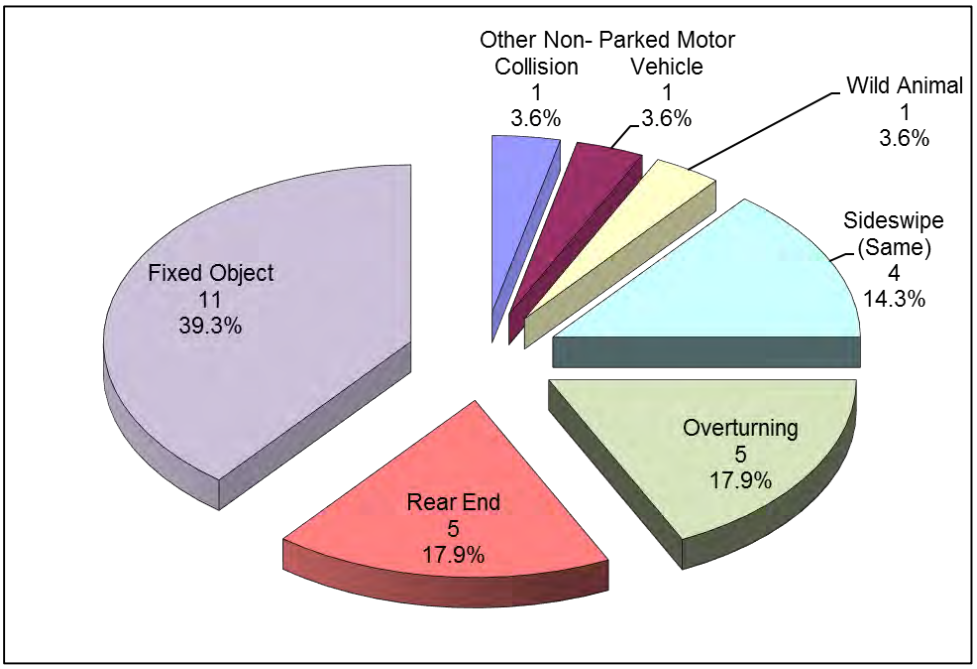
Figure 24
Fixed Object Crash Types
(Segment 3C: MP 248.21 – MP 250.64)



Segment 3D (MP 250.65 – MP 253.00)

Segment 3D begins at the intersection with SH 66 (MP 250.65) in Platteville and extends north to approximately one-quarter mile south (MP 253.00) of the intersection with CR 36. There were a total of 28 non-intersection crashes along this sub-segment of US 85C: 19 PDO crashes and 9 injury crashes. **Figure 25** presents a graphical representation of the non-intersection crash types for this sub-segment. Fixed object type crashes (39.3%) were the predominant crash type followed by rear end type crashes (17.9%) and overturning type crashes (17.9%).

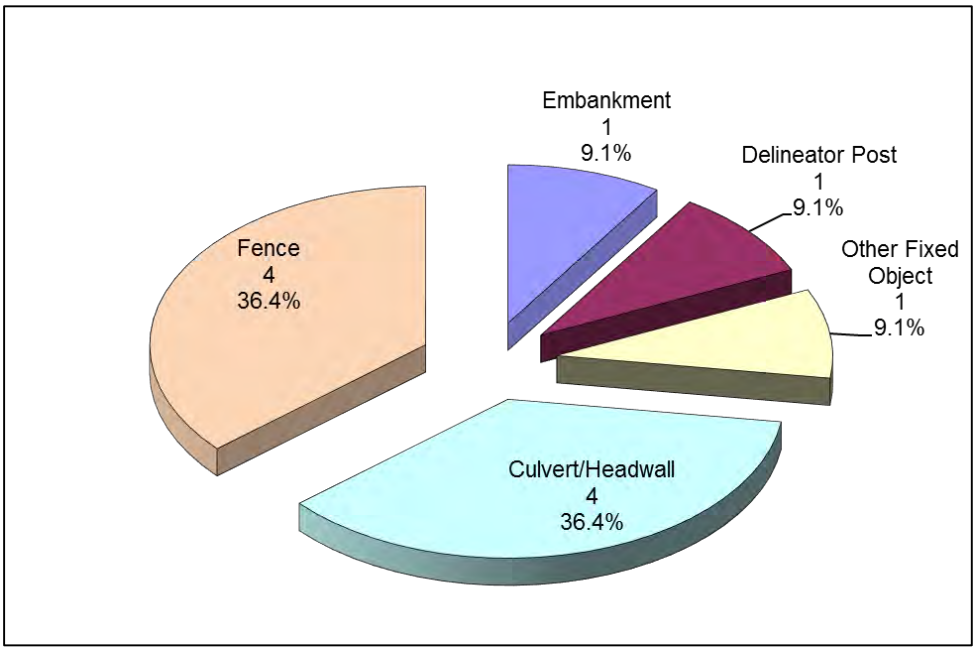
Figure 25
Non-Intersection Crash Types
(Segment 3D: MP 250.65 – MP 253.00)



Observations / Recommendations

The frequency of fixed object type crashes was higher than expected for this type of roadway. It can be seen in **Figure 26** of the fixed object type crashes, fence type crashes (36.4%) and culvert/headwall type crashes were the predominant crash types. Of the fence crashes, three crashes occurred northbound, and one crash occurred southbound. All four of the fence type crashes occurred during snowy/icy/slushy roadway conditions. Of the culvert/headwall type crashes, three crashes occurred northbound, and one crash occurred southbound. Only one of the culvert/headwall type crashes occurred during dry roadway conditions. A review of the crash history indicates that there is no current pattern to the fixed object type crashes. There are no suggestions for improvement at this time.

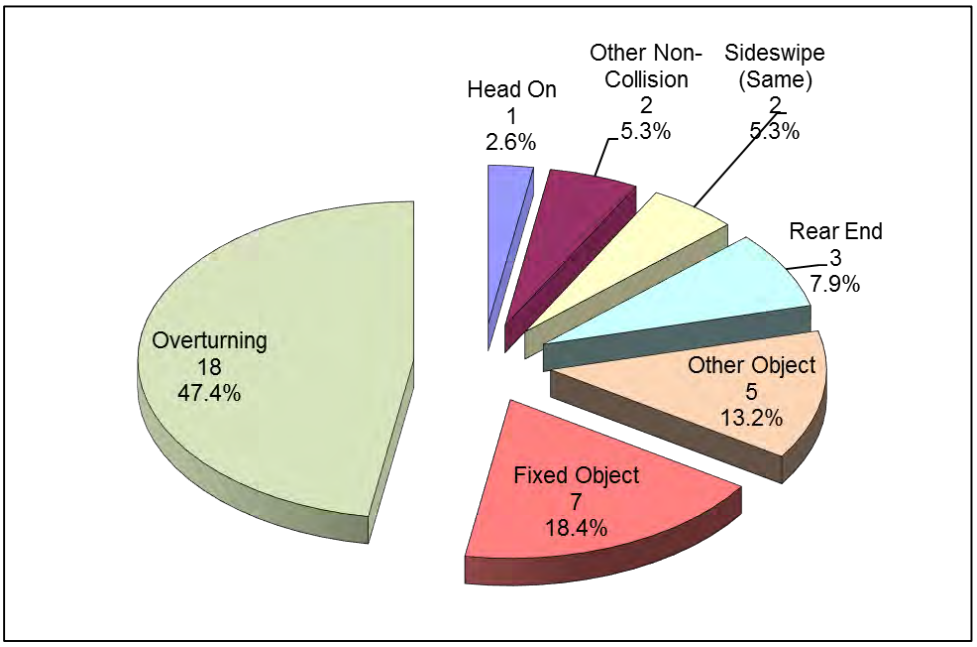
Figure 26
Fixed Object Crash Types
(Segment 3D: MP 250.65 – MP 253.00)



Segment 3E (MP 253.01 – MP 255.91)

Segment 3E begins approximately one-quarter mile south (MP 253.01) of the intersection with CR 36 and extends north to the intersection with CR 40 (MP 255.91). There were a total of 38 non-intersection crashes along this sub-segment of US 85C: 22 PDO crashes and 16 injury crashes. **Figure 27** presents a graphical representation of the non-intersection crash types for this sub-segment. Overturning type crashes (47.4%) were the predominant crash type followed by fixed object type crashes (18.4%) and other object type crashes (13.2%).

Figure 27
Non-Intersection Crash Types
(Segment 3E: MP 253.01 – MP 255.91)

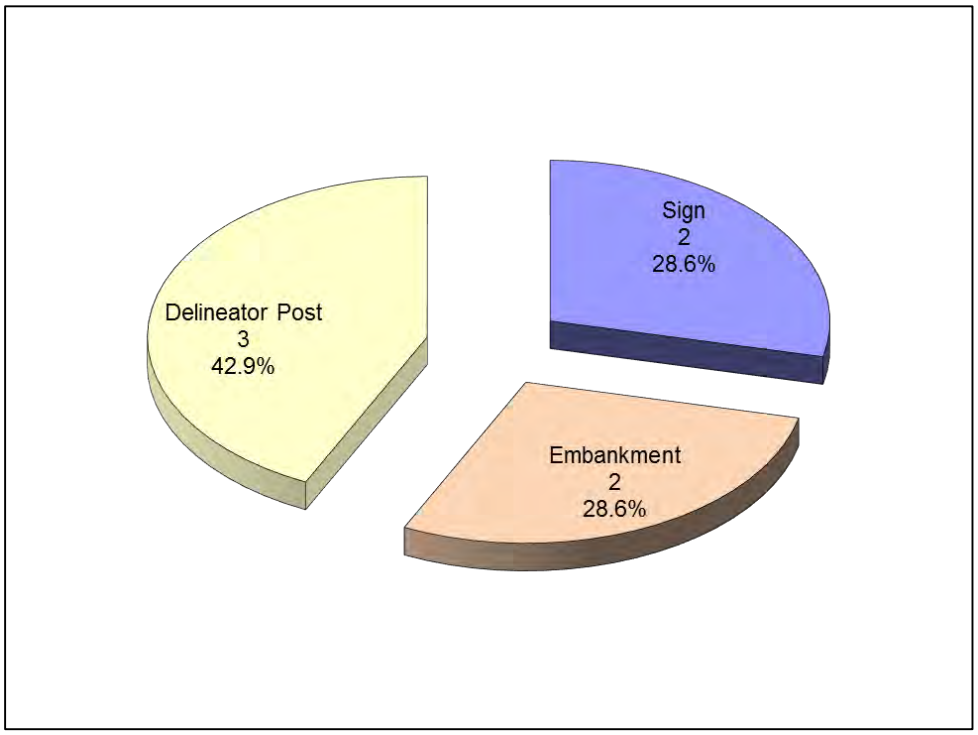


Observations / Recommendations

The frequency of overturning type crashes was higher than expected for this type of roadway. A review of the overturning type crashes indicated there were 12 crashes northbound and six crashes southbound. Seven of the crashes occurred in dry roadway conditions. Eleven of the 18 vehicles that overturned went off the left side of the road. These crashes occurred throughout Segment 3E. It should be noted that this sub-segment has rumble strips along the outside shoulders, and a cable rail barrier has recently been constructed in the median. The barrier should help reduce the number and severity of overturning crashes into the median. Thus, there are no further suggestions for improvement at this time.

The frequency of fixed object type crashes was higher than expected for this type of roadway. It can be seen in **Figure 28** of the fixed object type crashes, delineator post crashes (42.9%) were the predominant crash type. Of the delineator crashes, two crashes occurred northbound, and one crash occurred southbound. Two of the crashes occurred during dry roadway conditions. A review of the crash history indicates that there is no current pattern to the fixed object type crashes. There are no suggestions for improvement at this time.

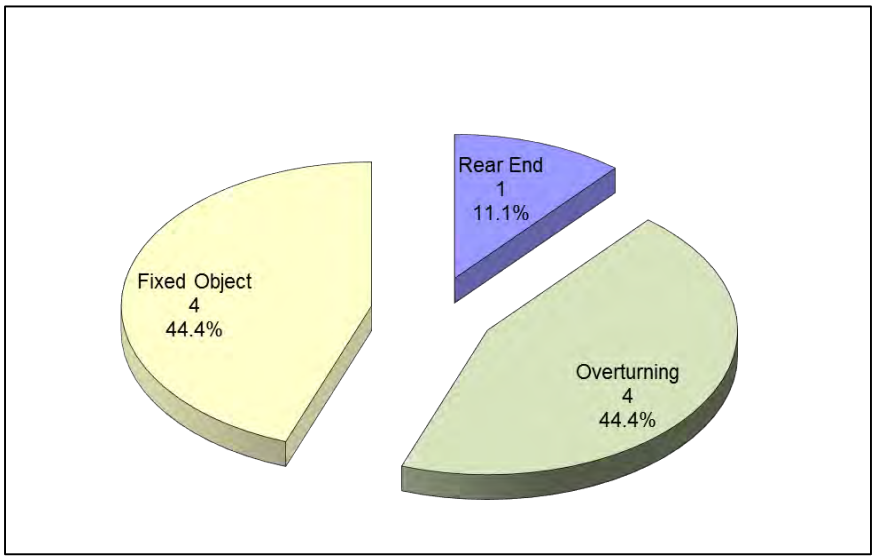
Figure 28
Fixed Object Crash Types
(Segment 3E: MP 253.01 – MP 255.91)



Segment 3F (MP 255.92 – MP 257.00)

Segment 3F begins at the intersection with CR 40 (MP 255.92) and extends north to approximately one-quarter mile south (MP 257.00) of the intersection with CR 42. There were a total of nine non-intersection crashes along this sub-segment of US 85C: eight PDO crashes and one injury crash. **Figure 29** presents a graphical representation of the non-intersection crash types for this sub-segment. Fixed object type crashes (44.4%) and overturning type crashes (44.4%) were the predominant crash types.

Figure 29
Non-Intersection Crash Types
(Segment 3F: MP 255.92 – MP 257.00)



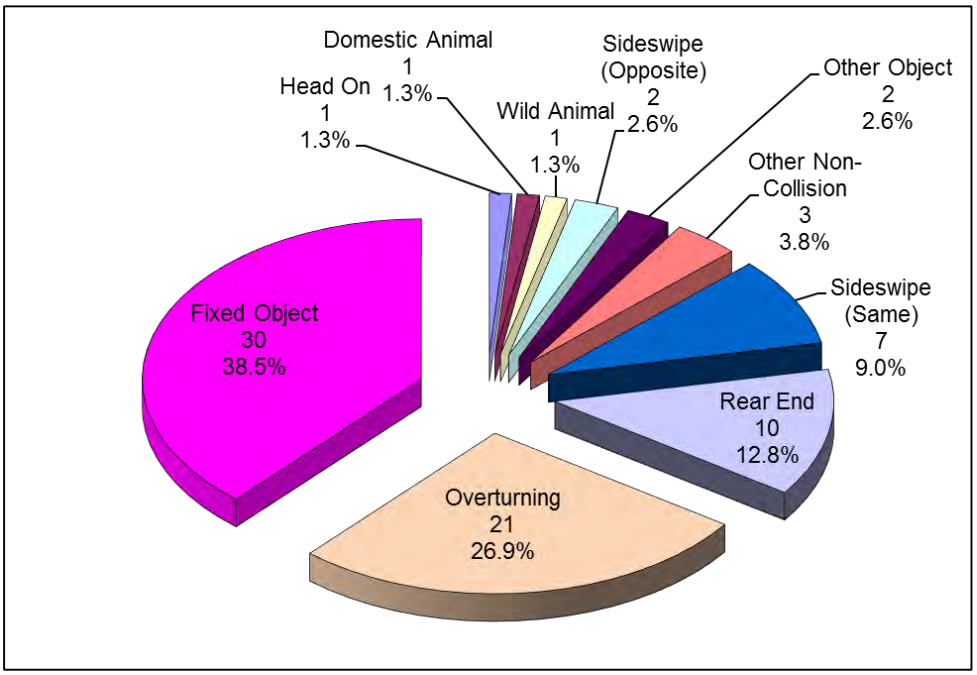
Observations / Recommendations

Although the frequency of crashes was not higher than expected for this type of roadway, and four of each fixed object overturning crashes in a five-year period is not considered a pattern. Therefore, there are no suggestions for improvement at this time.

Segment 3G (MP 257.01 – MP 262.00)

Segment 3G begins approximately one-quarter mile south (MP 257.01) of the intersection with CR 42 and extends north to approximately 600 feet north (MP 262.00) of the UPRR overpass in south LaSalle. There were a total of 78 non-intersection crashes along this sub-segment of US 85C: 50 PDO crashes and 28 injury crashes. **Figure 30** presents a graphical representation of the non-intersection crash types for this sub-segment. Fixed object type crashes (38.5%) were the predominant crash type followed by overturning type crashes (26.9%) and rear end type crashes (12.9%).

Figure 30
Non-Intersection Crash Types
(Segment 3G: MP 257.01 – MP 262.00)

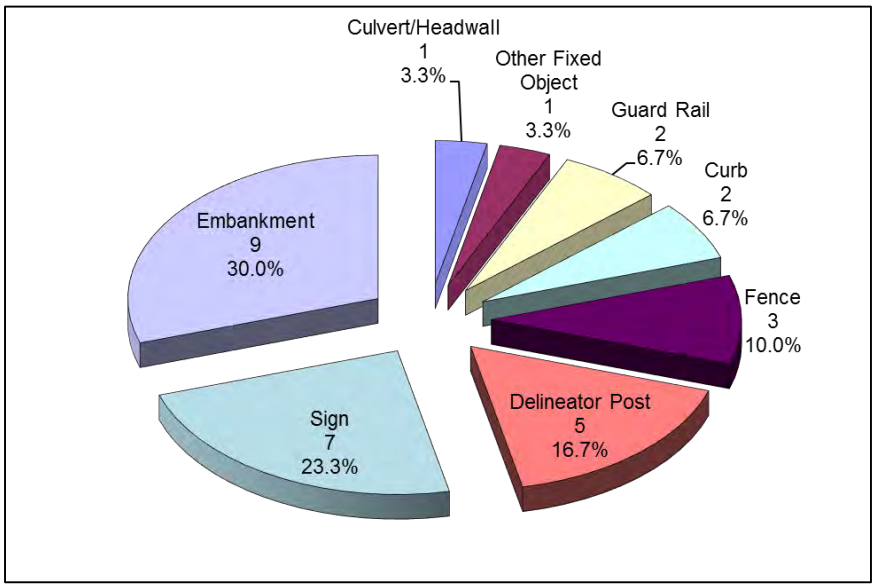


Observations / Recommendations

The frequency of overturning type crashes was higher than expected for this type of roadway. A review of the overturning type crashes indicated there were 14 crashes northbound, six crashes southbound, and one crash westbound. Thirteen of the crashes occurred in dry roadway conditions. Twelve of the 21 vehicles that overturned went off the left side of the road; six went off the right side. These crashes occurred throughout Segment 3G. It should be noted that this sub-segment has rumble strips along the outside shoulders, and a cable rail barrier has recently been constructed in the median. The barrier should help reduce the number and severity of overturning crashes into the median. Thus, there are no further suggestions for improvement at this time.

The frequency of fixed object type crashes was higher than expected for this type of roadway. It can be seen in **Figure 31** of the fixed object type crashes, embankment type crashes (30.0%) were the predominant crash type. Of those embankment crashes, six crashes occurred northbound, and three crashes occurred southbound. Seven of the crashes occurred during dry roadway conditions. Seven of the fixed object crashes were sign type crashes. A review of the crash history indicates that the crashes occurred throughout the sub-segment, although there were concentrations between MP 258.69 and MP 258.76 (6 crashes – 3 off left) as well as at MP 261.3 (4 crashes – 3 off left). The cable rail barrier that was recently been constructed in the median should reduce the likelihood of these crashes becoming more serious. There are no further suggestions for improvement at this time.

Figure 31
Non-Intersection Crash Types
(Segment 3G: MP 257.01 – MP 262.00)



Segment 4: US 85C MP 262.01 – MP 265.76

Segment 4 begins approximately 600 feet north (MP 262.01) of the UPRR overpass in south LaSalle and extends to approximately 2,300 feet north (MP 265.76) of the intersection with 31st Street in Evans at the interchange with SH 34. During the five-year study period there were 68 non-intersection crashes reported within the segment. This segment is classified as an urban, four-lane rolling (U-4-R) facility, and it has an access category of EX. **Figure 32** shows the US 85C Segment 4 in relation to the study area. Segment 4 is 3.75 miles and it was broken into two sub-segments for the detailed analyses. **Table 5** displays the divisions and crash summaries for each sub-segment.

Figure 32
Segment 4 Vicinity Map
US 85C (MP 238.33 – MP 243.00)

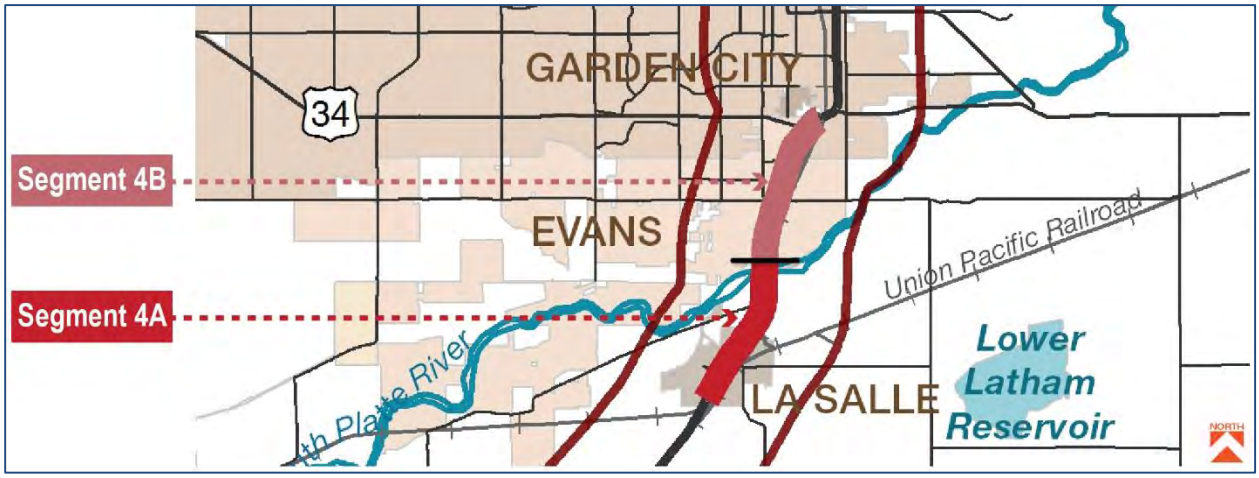


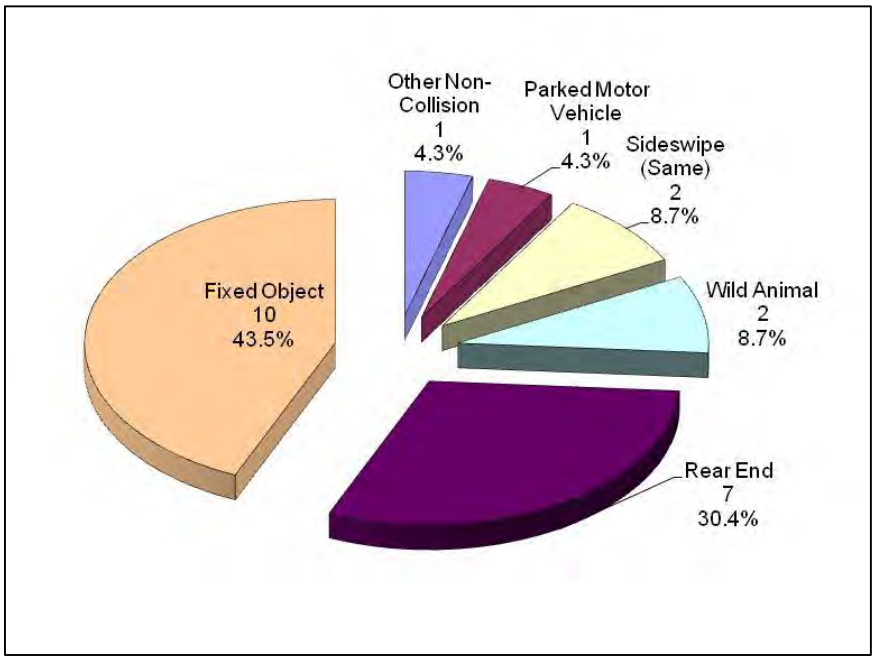
Table 5
Number of Non-Intersection Crashes – Segment 4
US 85C (MP 262.01 – MP 265.76)

Sub-Segment Descriptions	Mile Points	Number of Crashes			
		PDO	INJ	FAT	TOTAL
4A – Greeley Urban (Town of La Salle)	MP 262.01 – MP 263.80	16	7	0	23
4B – Greeley Urban Area (City of Evans) – US 34 Interchange	MP 263.81 – MP 265.76	31	13	1	45

Segment 4A (MP 262.01 – 263.80)

Segment 4A begins approximately 600 feet north (MP 262.00) of the UPRR overpass in south LaSalle and extends north to approximately 1,900 feet north (MP 263.80) of CR 52, the southern portion of the South Platte River crossing. There were a total of 23 non-intersection crashes along this sub-segment of US 85C: 16 PDO crashes and 7 injury crashes along this US 85C segment. **Figure 33** presents a graphical representation of the non-intersection crash types for this sub-segment. Fixed object type crashes (43.5%) were the predominant crash type followed by rear end type crashes (30.4%).

Figure 33
Non-Intersection Crash Types
(Segment 4A: MP 262.01 – MP 263.80)

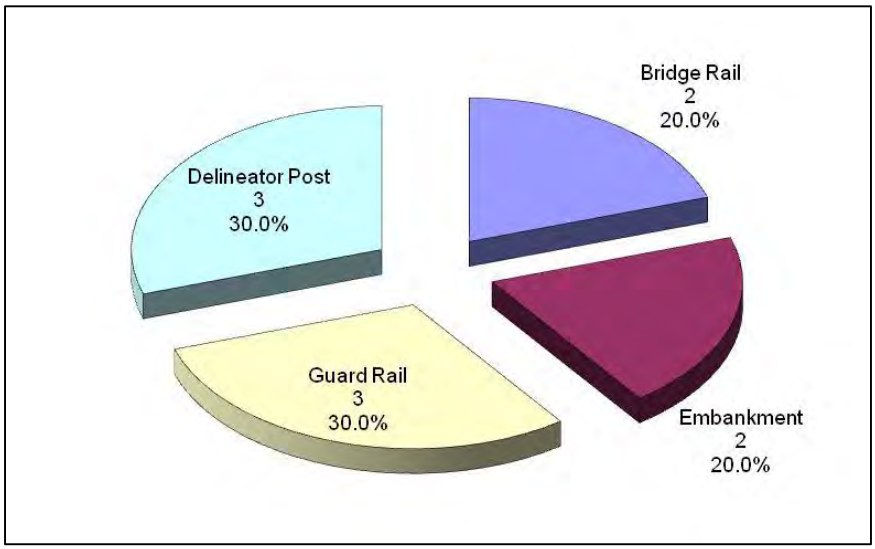


Observations / Recommendations

There were no significant crash types in this segment of US 85C. However, it is worth noting that the fixed object type crashes had 10 crashes of which only five occurred on dry roadway conditions. Directionally, seven crashes were northbound and three crashes were southbound.

The fixed object type crashes were primarily concentrated near the southern portion of the bridge over the South Platte River. It can be seen in **Figure 34** of the fixed object type crashes, guard rail type crashes (30.0%) and delineator post type crashes (30.0%)were the predominant crash type followed by bridge rail and embankment (each 20%). Guardrail and bridge rail are normally designed and located to prevent crashes that are more serious. Based on a review of the crash history, it is recommended that the existing snow/ice removal procedures be reviewed to ensure existing procedures are sufficient.

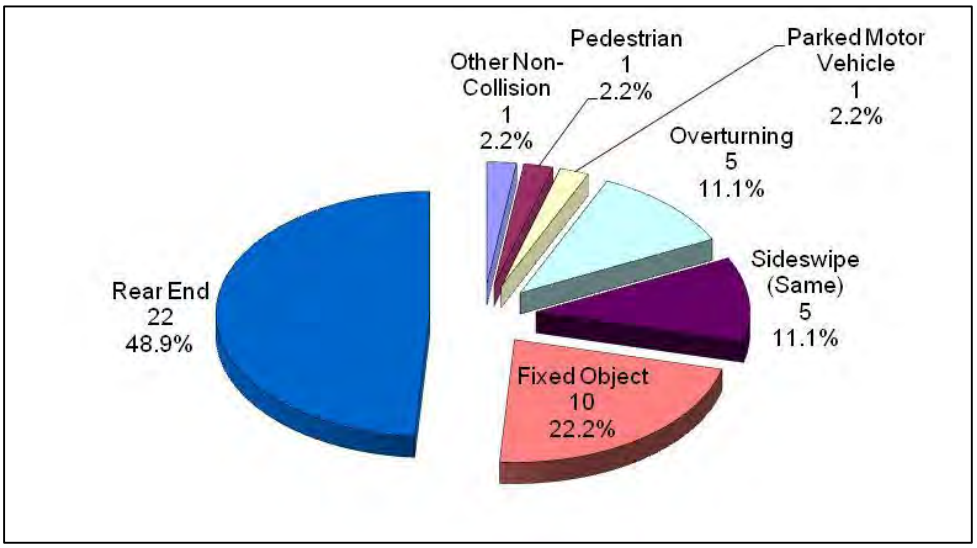
Figure 34
Fixed Object Crash Types
(Segment 4A: MP 262.01 – MP 263.80)



Segment 4B (MP 263.81 – 265.76)

Segment 4B lies begins approximately 1,600 feet south (MP 263.81) of the intersection with 42nd Street and extends north to the interchange with US 34 (MP 263.81). There were a total of 45 non-intersection crashes along this sub-segment of US 85C: 31 PDO crashes, 13 injury crashes and one fatal crash. **Figure 35** presents a graphical representation of the non-intersection crash types for this sub-segment. Rear end type crashes (48.9%) were the predominant crash type followed by fixed object type crashes (22.2%).

Figure 35
Non-Intersection Crash Types
(Segment 4B: MP 263.81 – MP 265.76)



Fatal Crashes

There was one fatal crash that occurred within Segment 4B. The crash occurred at MP 264.54 on February 20, 2010 south of the intersection of 37th Street. The crash occurred in dry dark-unlighted conditions. Vehicle #1 was traveling northbound (approximately 0.25 mile south of 37th Street) struck a pedestrian that was walking southbound along US 85C. The pedestrian was suspected of alcohol intoxication and was the fatality. No cause was noted. No crash pattern was found.

Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of roadway. A review of the rear end crash history indicated that there were 14 crashes northbound, six crashes southbound, one crash eastbound, and one crash westbound. Road conditions for rear end type crashes showed that 20 of the 22 crashes were dry road conditions. Eighteen of the 22 crashes occurred during daylight lighting conditions. This crash pattern could be related to close approximate to intersections within the segment. A review of the crash history indicates that there is no current pattern, and there are no suggestions for improvement at this time. Reference the intersection section of this report for additional recommendations within this sub-segment of US 85C.

Segment 5: US 85L MP 265.85 – MP 273.00

Segment 5 begins near the UPRR overpasses (MP 265.85) within the interchange with US 34 and extends to approximately one-half mile north (MP 273.00) of the intersection with SH 392/CR 68. During the five-year study period there were 113 non-intersection crashes reported within the segment. This segment is classified as an urban, four-lane rolling (U-4-R) facility, and it has an access category of EX. **Figure 36** shows the US 85L Segment 5 in relation to the study area. Segment 5 is 7.15 miles, and it was broken into two sub-segments for the detailed analyses. **Table 6** displays the divisions and crash summaries for each sub-segment.

Figure 36
Segment 5 Vicinity Map
US 85L (MP 265.85 – MP 273.00)

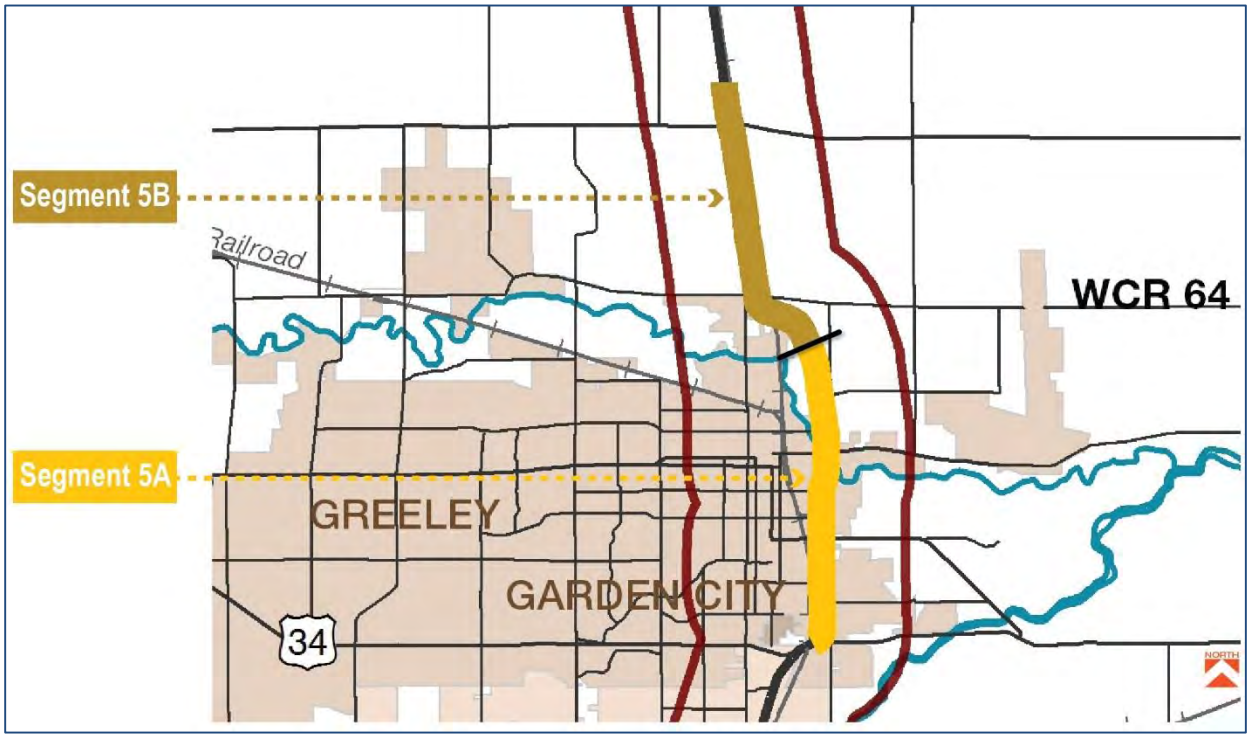


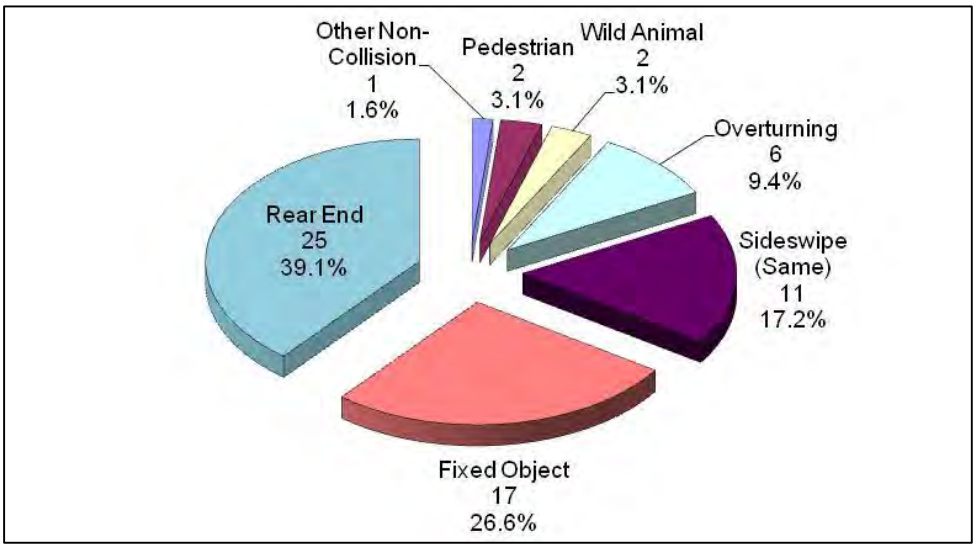
Table 6
Number of Non-Intersection Crashes – Segment 5
US 85L (MP 265.85 – MP 273.00)

Sub-Segment Descriptions	Mile Points	Number of Crashes			
		PDO	INJ	FAT	TOTAL
5A – City of Greeley	MP 265.85 – MP 269.50	49	14	1	64
5B – City of Greeley	MP 269.51 – MP 273.00	30	18	1	49

Segment 5A (MP 265.85 – 269.50)

Segment 5A begins near the UPRR overpasses within the interchange with US 34 (MP 265.85) and extends north to one-mile north of the intersection with 5th Street (MP 268.49) in Greeley. There were a total of 64 non-intersection crashes along this sub-segment of US 85L: 49 PDO crashes, 14 injury crashes and one fatal crash. **Figure 37** presents a graphical representation of the non-intersection crash types for this sub-segment. Rear end type crashes (39.1%) were the predominant crash type followed by fixed object type crashes (26.6%).

Figure 37
Non-Intersection Crash Types
(Segment 5A: MP 265.85 – MP 269.50)



Fatal Crashes

The fatal crash occurred on August 29, 2010 at MP 266.02, north of the US 34 interchange. The crash occurred in dry daylight conditions. Vehicle #1 (a motorcycle) was traveling southbound on the exit ramp from US 85C to westbound US 34 and collided with the guardrail on the curve in the ramp. Vehicle #1 was reported to be traveling 60 mph in a 45 mph ramp. Alcohol and drugs was suspected for both the driver and passenger of Vehicle #1. No crash pattern was found.

Observations / Recommendations

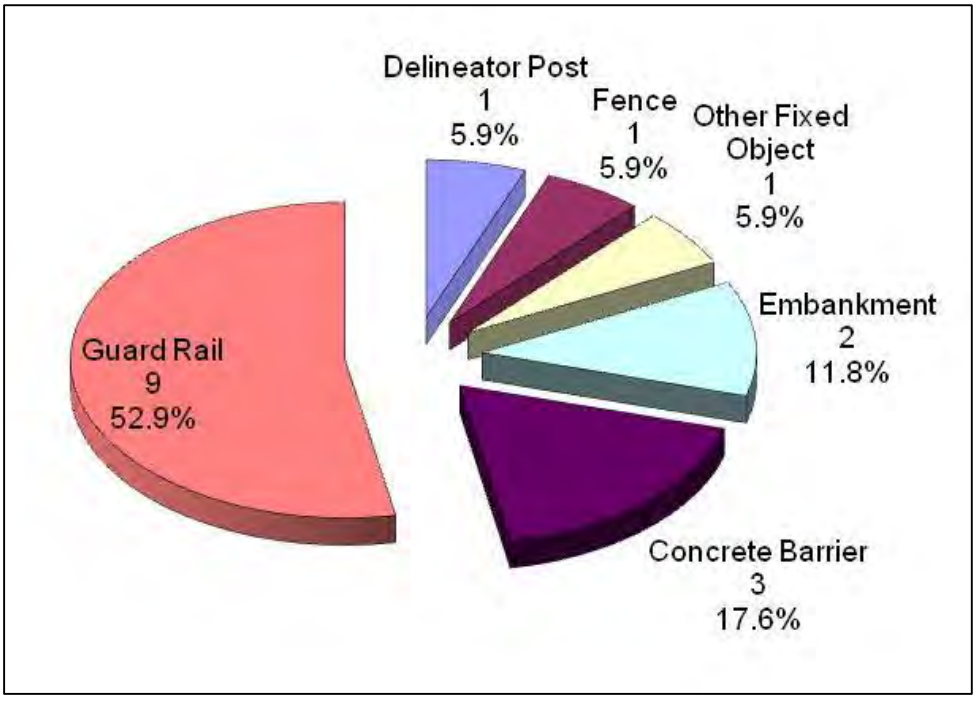
The frequency of rear end type crashes was higher than expected for this type of roadway. A review of the rear end crash history indicated that there were nine crashes northbound and 16 crashes southbound. Road conditions for rear end type crashes showed that 22 of the 25 crashes were dry road conditions. Eighteen of the 25 crashes occurred during daylight lighting conditions. This crash pattern seen above could be related to close approximate to intersections within the segment. A review of the crash history indicates that there is no current pattern, and there are no suggestions for improvement at this time. Reference the intersection section of this report for additional recommendations within this sub-segment of US 85L.

The frequency of sideswipe (same direction) type crashes was higher than expected for this type of roadway. A review of the sideswipe (same direction) type crashes indicated there were seven crashes northbound and four crashes southbound. All 11 of the crashes occurred in dry

roadway conditions. The sideswipe (same direction) type crashes were located throughout Segment 5A. A review of the crash history indicates that there is no current pattern to the sideswipe (same direction) type crashes. There are no suggestions for improvement at this time.

The frequency of fixed object type crashes was higher than expected for this type of roadway. It can be seen in **Figure 38** of the fixed object type crashes, guardrail type crashes (52.9%) were the predominant crash type followed by concrete barrier type crashes (17.6%). A review of the guard type crashes indicated that eight of the nine crashes occurred north of the US 85/US 34 interchange. Of those guardrail crashes, one crash occurred northbound and eight crashes occurred southbound. Seven of the nine crashes occurred with dry roadway conditions. Four of the vehicles were noted as exceeding the posted speed limit (45 mph). Guardrail and concrete barrier are normally designed and located to prevent crashes that are more serious. It is recommended that a solar powered dynamic speed message display (DSMD – radar) be considered near the beginning of the curves to warn drivers that they are exceeding the speed limit.

Figure 38
Fixed Object Crash Types
(Segment 5A: MP 265.85 – MP 269.50)

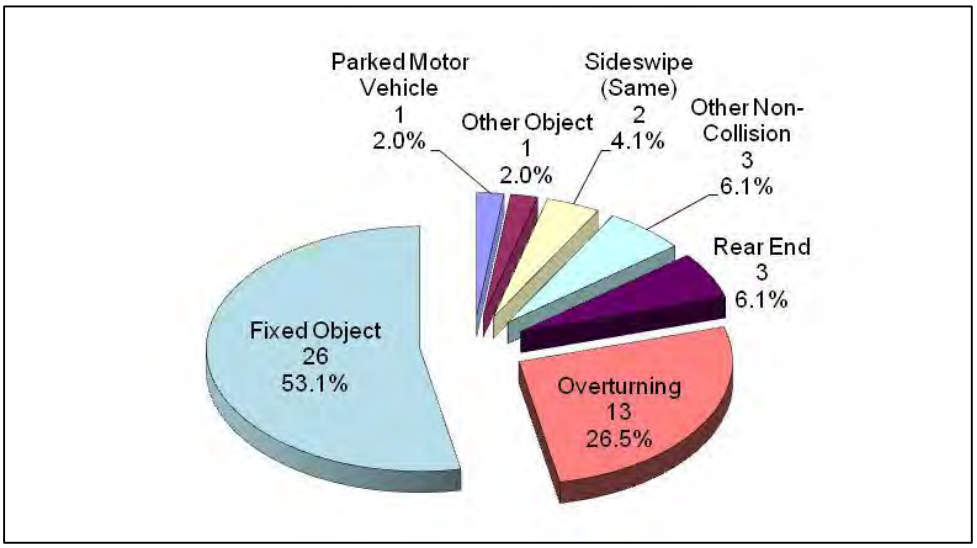


Although there is no significant pattern of off-road left or head-on crashes, it is recommended that a cable rail median barrier be considered due to the high volumes and narrow median from MP 268.7 to the north. Rumble strips should be considered for both inside and outside shoulders through this section (and shoulders widened if necessary).

Segment 5B (MP 269.51 – 273.00)

Segment 5B begins one-mile north of the intersection with 5th Street (MP 268.49) in Greeley and extends north to approximately the mid-point (MP 273.00) between CR 68 and 70. There were a total of 49 non-intersection crashes along this sub-segment of US 85L: 30 PDO crashes, 18 injury crashes and one fatal crash. **Figure 39** presents a graphical representation of the non-intersection crash types for this sub-segment. Fixed object type crashes (53.1%) were the predominant crash type followed by overturning type crashes (26.5%).

Figure 39
Non-Intersection Crash Types
(Segment 5B: MP 269.51 – 273.00)



Fatal Crashes

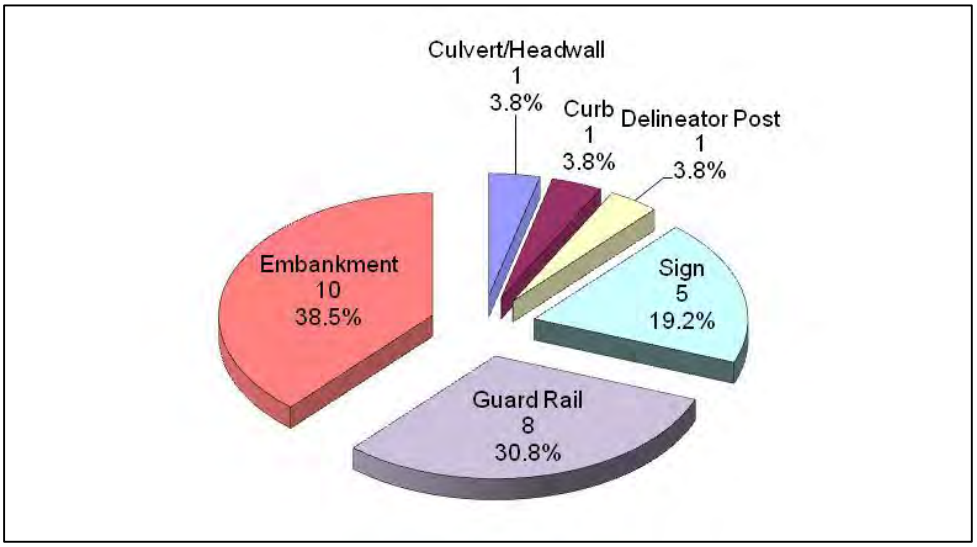
The fatal crash occurred on August 15, 2008 at MP 270.41, north of the US 85G Business route split. The crash occurred during wet roadway conditions at 19:45. Vehicle #1 was traveling northbound on US 85G Bypass. Vehicle #1 lost control on the wet roads and traveled into the center median hitting a traffic sign. Driver was the fatality. No alcohol or drugs were suspected. Vehicle was noted to be going 5 mph over the speed limit of 55 mph. No crash pattern was found.

Observations / Recommendations

The frequency of off-road, off-road right, and off-road left crashes were higher than expected for this type of roadway; there were 42 crashes with these outcomes. There were dry road conditions when slightly more than half (23) of the crashes occurred. There were approximately equal numbers during daylight versus dark, dawn, or dusk, and the directional split between northbound and southbound crashes was nearly equal. It is recommended that cable rail median barrier be considered to help reduce the number and severity of crashes into the median due to the high number of vehicles leaving the roadway. Rumble strips should be considered for outside shoulders (which should be widened as necessary to accommodate rumble strips).

The frequency of fixed object type crashes was higher than expected for this type of roadway. It can be seen in **Figure 40** of the fixed object type crashes, embankment type crashes (38.5%) were the predominant crash type followed by guardrail type crashes (30.8%).

Figure 40
Fixed Object Crash Types
(Segment 5B: MP 269.51 – 273.00)



A review of the embankment type crashes indicated that two crashes occurred northbound and eight crashes occurred southbound. Six of the ten crashes occurred with dry roadway conditions. Only three of the crashes occurred during daylight conditions. Six of the ten crashes occurred between MP 272.63 and MP 273.00, just to the north of CR 68. As mentioned previously, rumble strips should be specifically considered between MP 272.63 and MP 273.00 for both inside and outside shoulders. Outside shoulders should be widened as necessary to accommodate rumble strips. A variable message sign (VMS) for each direction that is tied into pavement conditions sensors to warn drivers of slippery conditions should be considered through this section.

A review of the guardrail type crashes indicated that three crashes occurred northbound and five crashes occurred southbound. Half of the eight crashes occurred during daylight lighting conditions. Only one of the eight occurred with dry roadway conditions. Seven of the eight guardrail crashes occurred between MP 270.22 and MP 270.35 (the location relatively tight curves in both directions and a long bridge in the southbound direction). It is recommended the existing snow/ice removal procedures be reviewed to ensure existing procedures are sufficient.

The frequency of overturning type crashes was higher than expected for this type of roadway. A review of the overturning type crashes indicated there were eight crashes northbound, four crashes southbound, and one eastbound. Ten of the 13 occurred on dry roadway conditions. Six of the ten overturning type crashes were located between MP 272.78 to MP 273.00. Of the six, none were indicated to be going over the posted speed limit of 65 mph. Three of the six that occurred in close proximity of each other occurred in daylight lighting conditions. The previously mentioned cable rail barrier, rumble strips, and review of existing snow/ice removal procedures should also help reduce the number and severity of overturning crashes.

Segment 6: US 85L MP 273.01 – MP 280.27

Segment 6 begins approximately one-half mile north of the intersection with SH 392/CR 68 (MP 273.01) and extends north to the intersection with Jackie Ann Street and 1st Street (MP 280.27) in Ault. During the five-year study period there were 50 non-intersection crashes reported within the segment: 35 PDO crashes and 15 injury crashes. This segment is classified as a rural, four-lane rolling (U-4-R) facility, and it has an access category of EX, except for short Nor-Rural Regional Highway (NR-A) or Non-Rural Arterial (NR-B) sections in Eaton and Ault. **Figure 41** shows the US 85L Segment 6 in relation to the study area. Segment 6 is 7.26 miles, and it was broken into four sub-segments for the detailed analyses. **Table 7** displays the divisions and crash summaries for each sub-segment.

Figure 41
Segment 6 Vicinity Map
US 85L (MP 273.01 – MP 280.27)

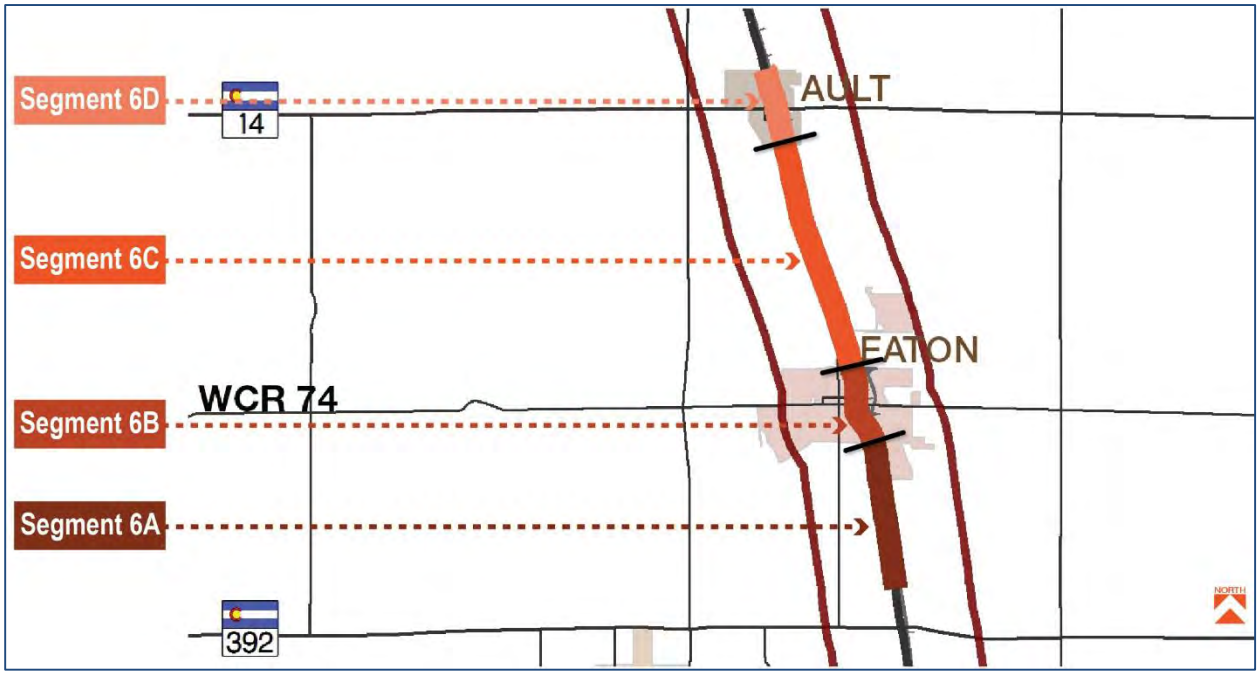


Table 7
Number of Non-Intersection Crashes – Segment 6
US 85L (MP 273.01 – MP 280.27)

Sub-Segment Descriptions	Mile Points	Number of Crashes			
		PDO	INJ	FAT	TOTAL
6A – Rural – South of Eaton	MP 273.01 – MP 275.00	13	8	0	21
6B – Town of Eaton	MP 275.01 – MP 276.10	13	2	0	15
6C – Rural – South of Ault	MP 276.11 – MP 279.26	5	5	0	10
6D – Town of Ault	MP 279.27 – MP 280.27	4	0	0	4

Since Segment 6 is classified as a rural, four-lane rolling (U-4-R) facility, SPFs have been calibrated by CDOT. **Figure 42** shows that the frequency of total crashes over the five-year study period indicates a high potential for crash reduction (LOSS IV) for Segment 6B and a moderate to high potential for crash reduction (LOSS III) for Segment 6A. **Figure 43** shows that the severity of crashes indicates a low to moderate potential for crash reduction (LOSS III) for all sub-segments of Segment 6.

Figure 42
Segment 6 (MP 273.01 – MP 280.27) – Total Crashes per Year
Rural Flat and Rolling Four-Lane Divided Highway

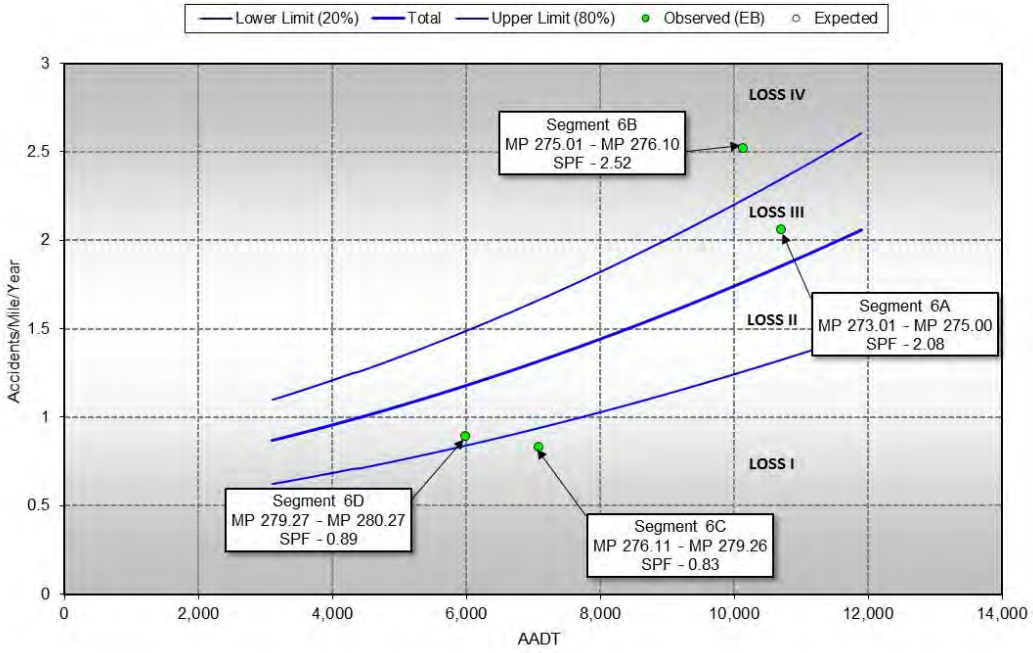
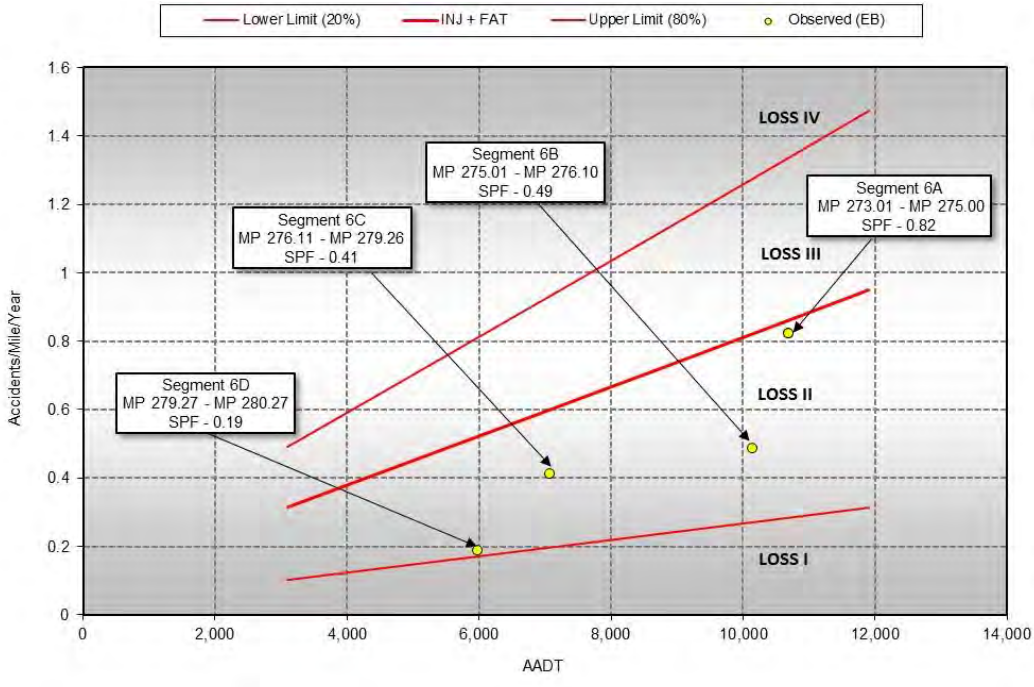


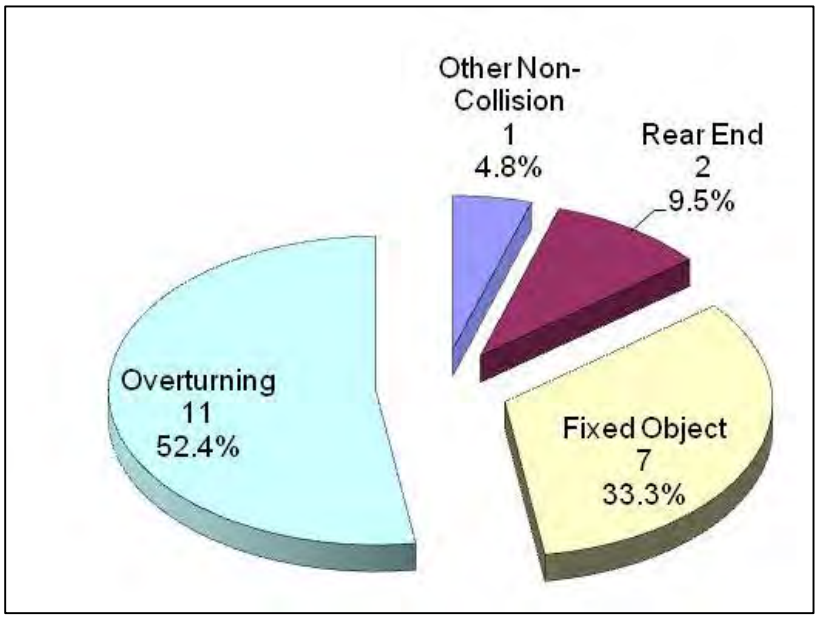
Figure 43
Segment 6 (MP 273.01 – MP 280.27) – Injury & Fatal Crashes per Year
Rural Flat and Rolling Four-Lane Divided Highway



Segment 6A (MP 273.01 – MP 275.00)

Segment 6A begins near the mid-point between CR 68 and 70 (MP 273.00) and extends north to approximately 1,150 feet south (MP 275.00) of Colorado Parkway in Eaton. There were a total of 21 non-intersection crashes along this sub-segment of US 85L: 13 PDO crashes and eight injury crashes. **Figure 44** presents a graphical representation of the non-intersection crash types for this sub-segment. Overturning type crashes (52.4%) were the predominant crash type followed by fixed object type crashes (33.3%).

Figure 44
Non-Intersection Crash Types
(Segment 6A: MP 273.01 – MP 275.00)



Observations / Recommendations

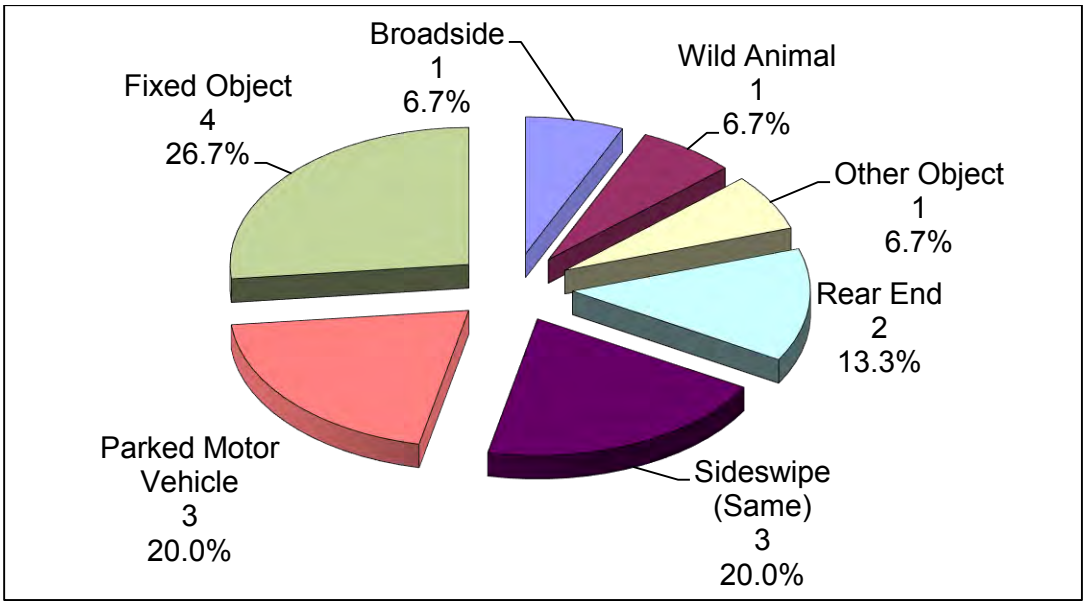
The frequency of overturning type crashes was higher than expected for this type of roadway. A review of the overturning type crashes indicated there were eight crashes northbound and three crashes southbound. Five of the 11 crashes occurred on icy/slushy roadway conditions. Five of the 11 overturning type crashes were located between MP 273.47 to MP 273.50 (the vicinity of the intersection with CR 70). Of the five crashes at that location, only one was indicated to be going over the posted speed limit of 65 mph. Two of the five that occurred in daylight lighting conditions and only one crash was in dry roadway conditions. The southbound roadway appears to have adequate outside shoulder width and some sections have rumble strips. It is recommended that CDOT consider widening the northbound outside shoulder so that rumble strips can be constructed along the entire sub-segment. While off-left crashes are not noted as significant, it is recommended that a cable rail median barrier be considered throughout the sub-segment. It is also recommended to review the existing snow/ice removal procedures to ensure existing procedures are sufficient.

The frequency of crashes in dark-unlighted conditions was higher than expected for this type of roadway. Eleven of the 21 crashes were in dark-unlighted conditions. The crashes were throughout the Segment 6A with two clusters of crashes, MP 273.02 – MP 273.10 (4 crashes) and MP 273.47 – MP 273.51 (4 crashes). It is recommended to review the retroreflectivity of all signs, delineator posts, and pavement markings to make sure they meet standards.

Segment 6B (MP 275.01 – MP 276.10)

Segment 6B approximately 1,150 feet south (MP 275.00) of Colorado Parkway in Eaton and extends north to the intersection of 5th Street (MP 276.10) in Eaton. There were a total of 15 non-intersection crashes along this sub-segment of US 85L: 13 PDO crashes and two injury crashes. **Figure 45** presents a graphical representation of the non-intersection crash types for this sub-segment. Overturning type crashes (26.7%) were the predominant crash type followed by parked motor vehicle type crashes (20.0% and sideswipe (same direction) type crashes (20.0%).

Figure 45
Non-Intersection Crash Types
(Segment 6B: MP 275.01 – MP 276.10)



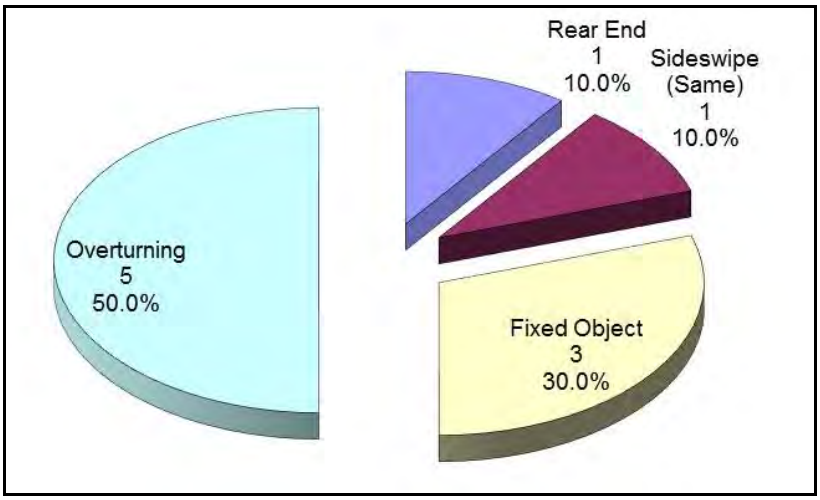
Observations / Recommendations

A review of the crash history indicates that there are no significant patterns to crashes along Segment 6B. There are no suggestions for improvement at this time.

Segment 6C (MP 276.11 – MP 279.26)

Segment 6C begins at the intersection of 5th Street (MP 276.11) in Eaton and extends north to approximately 1,900 feet south (MP 279.26) of B Street in Ault. There were a total of 10 non-intersection crashes along this sub-segment of US 85L: five PDO crashes and five injury crashes. **Figure 46** presents a graphical representation of the non-intersection crash types for this sub-segment. Overturning type crashes (50.0%) were the predominant crash type followed by fixed object type crashes (30.0%).

Figure 46
Non-Intersection Crash Types
(Segment 6C: MP 276.11 – MP 279.26)



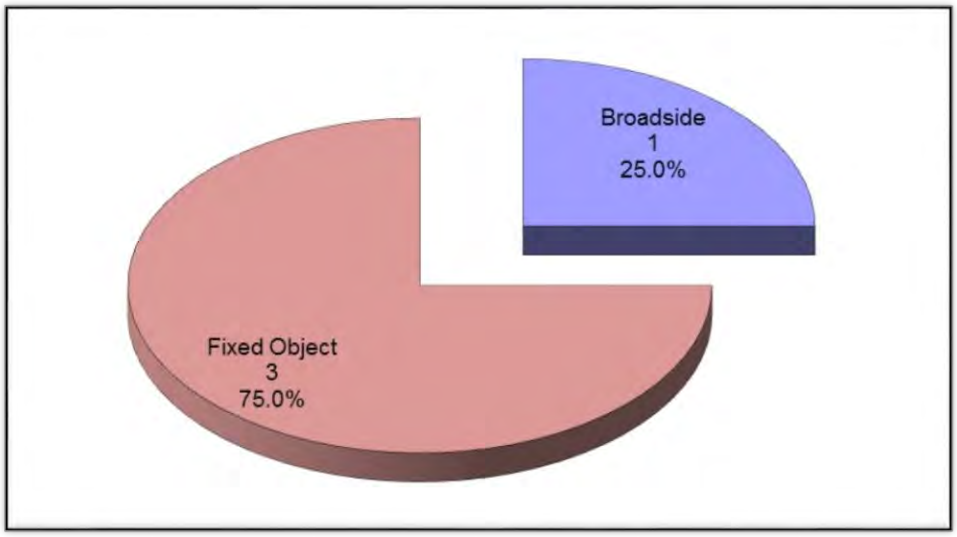
Observations / Recommendations

Although the frequency of overturning type crashes was not higher than expected for this type of roadway, a review of the overturning type crashes indicated some concern. All five of the crashes were northbound. Four of the five crashes occurred on dry roadway conditions. Alcohol was involved in two of crashes. These five crashes were spread through Segment 6C. The southbound roadway appears to have adequate outside shoulder width with rumble strips installed. It is recommended that CDOT consider widening the northbound outside shoulder so that rumble strips can be constructed. North of CR 37 (MP 276.86), US 85L returns to the cross section with a depressed median. While off-left crashes are not noted as significant, it is recommended that a cable rail median barrier be considered through this section.

Segment 6D (MP 279.27 – MP 280.27)

Segment 6D begins approximately 1,900 feet south of B Street (MP 279.62) and extends north to the intersection with Jackie Ann Street and 1st Avenue (MP 280.27) in Ault. There were a total of four non-intersection crashes along this sub-segment of US 85L: all four were PDO crashes. **Figure 47** presents a graphical representation of the non-intersection crash types for this sub-segment. Fixed object type crashes (75.0%) were the predominant crash type followed by a broadside type crash (25.0%).

Figure 47
Non-Intersection Crash Types
(Segment 6D: MP 279.27 – MP 280.27)



Observations / Recommendations

Although the frequency of fixed object type crashes was higher than expected for this type of roadway, three crashes in a five-year period is not considered a pattern.

The most southerly one-quarter mile of this sub-section has a cross section with a depressed median. The southbound roadway appears to have adequate outside shoulder width with rumble strips installed. It is recommended that CDOT consider widening the northbound outside shoulder so that rumble strips can be constructed. While off-left crashes are not noted as significant, it is recommended that a cable rail median barrier be considered through this section with a depressed median.

Segment 7: US 85L MP 280.28 – MP 290.00

Segment 7 begins at the intersection with Jackie Ann Street and 1st Street (MP 280.28) in Ault and extends north to one-mile north (MP 290.00) of the intersection with CR 100. During the five-year study period there were 34 non-intersection crashes reported within the segment: 27 PDO crashes and 7 injury crashes. This segment is classified as a rural, two-lane rolling (R-2-R) facility, and it has an access category of EX, except for a short Non-Rural Arterial (NR-B) section through Nunn. **Figure 48** shows the US 85L Segment 7 in relation to the study area. Segment 7 is 9.72 miles long, and it was broken into two sub-segments for the detailed analyses. **Table 8** displays the divisions and crash summaries for each sub-segment.

Figure 48
Segment 7 Vicinity Map
US 85L (MP 280.2873.01 – MP 280.27)

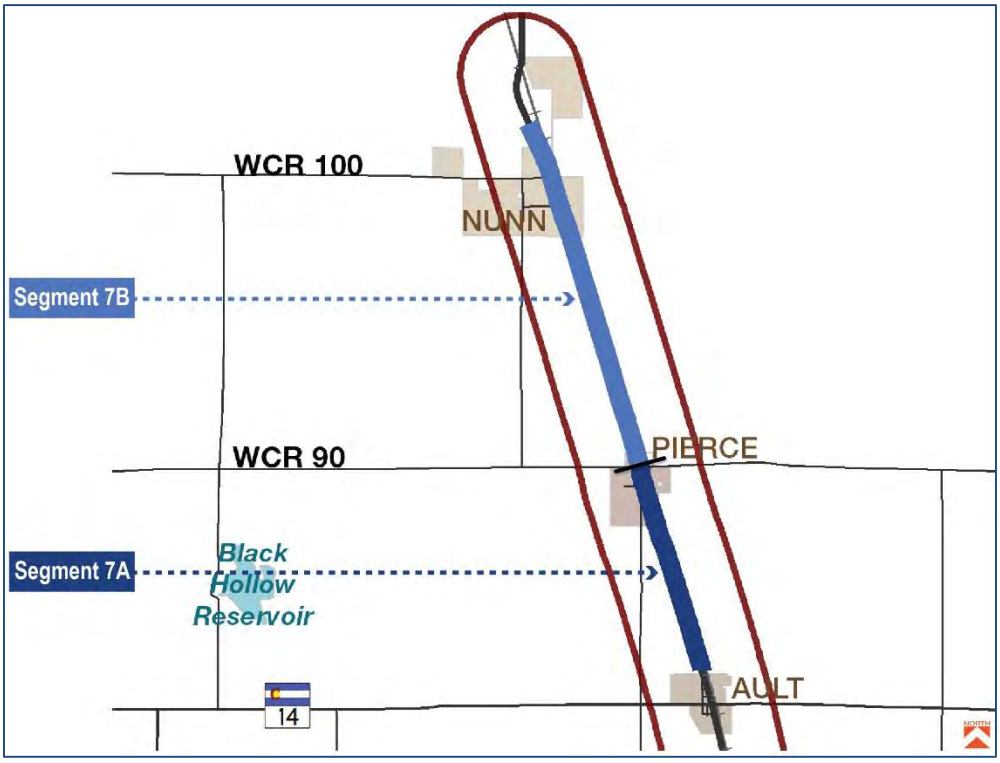


Table 8
Number of Non-Intersection Crashes – Segment 7
US 85L (MP 280.28 – MP 290.00)

Sub-Segment Descriptions	Mile Points	Number of Crashes			
		PDO	INJ	FAT	TOTAL
7A – Town of Pierce	MP 280.28 – MP 283.90	12	3	0	15
7B – Town of Nunn	MP 283.91 – MP 290.00	15	4	0	19

Since Segment 7 is classified as a rural, two-lane rolling (U-2-R) facility, SPFs have been calibrated by CDOT. **Figure 49** shows that the frequency of total crashes over the five-year study period indicates a low to moderate potential for crash reduction (LOSS II) for both Segments 7A and 7B. **Figure 50** also shows that the severity of crashes indicates a low to moderate potential for crash reduction (LOSS II) for both Segments 7A and 7B.

Figure 49
Segment 7 (MP 280.28 – MP 290.00) – Total Crashes per Year
Rural Flat and Rolling 2-Lane Divided Highway

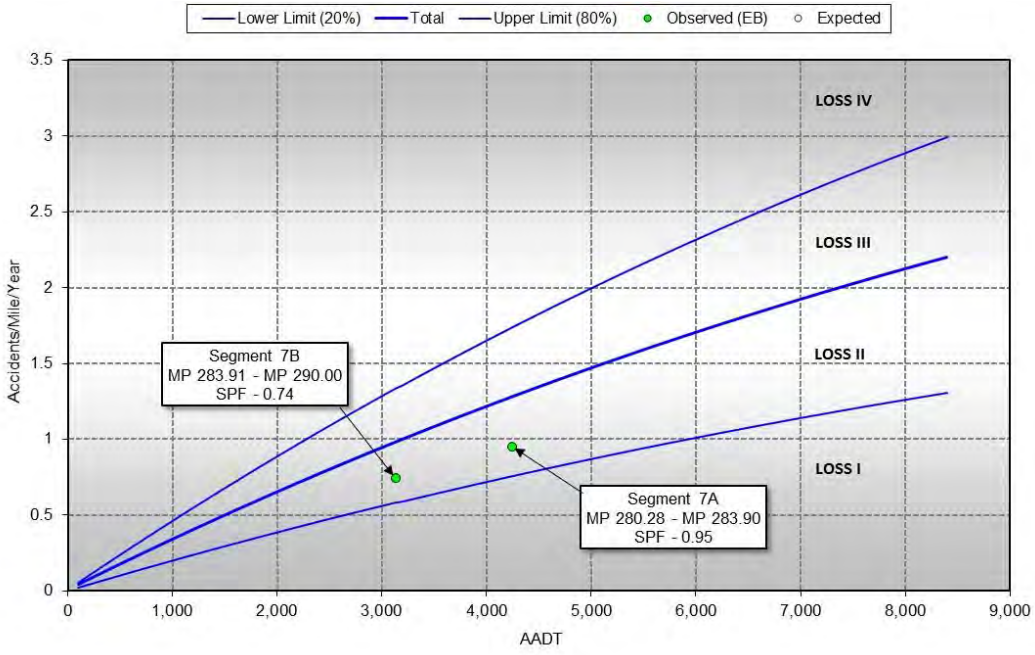
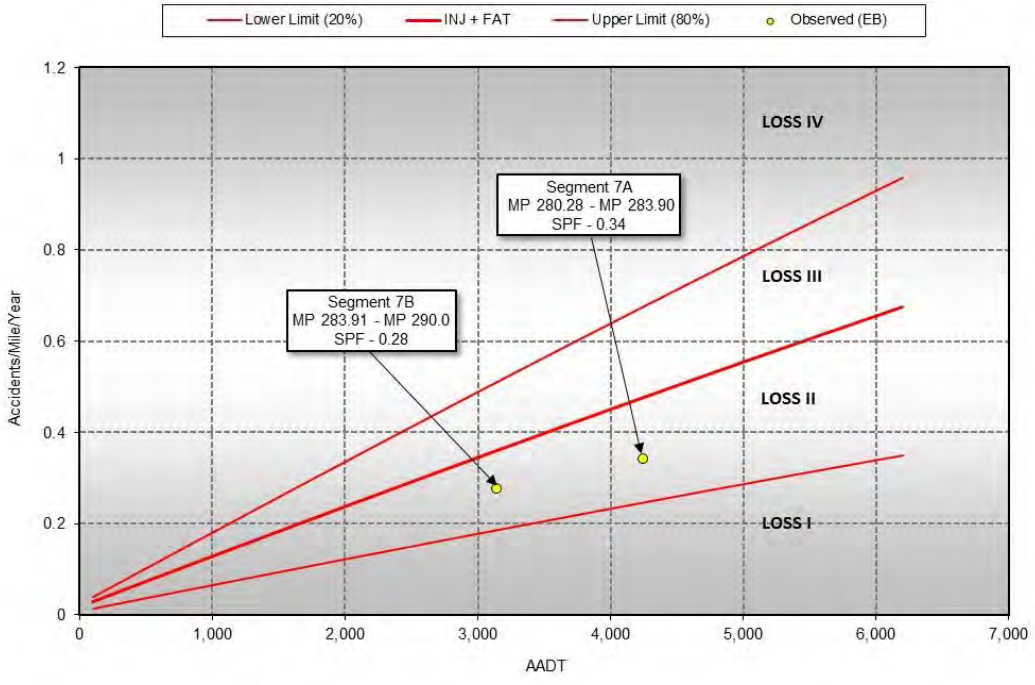


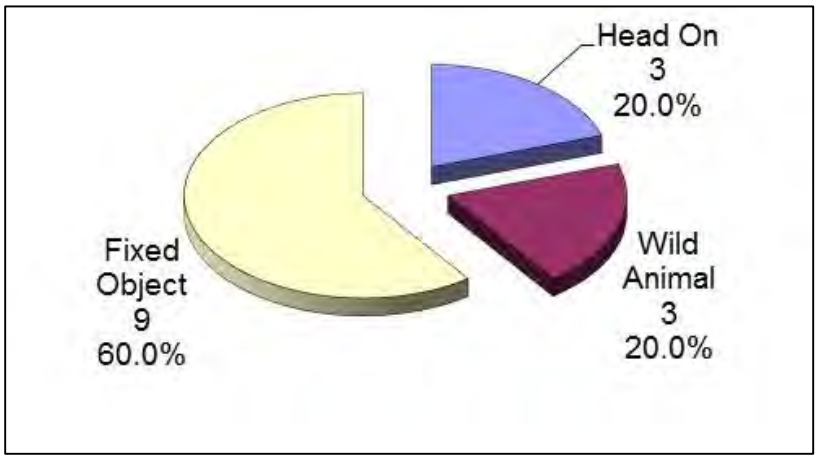
Figure 50
Segment 7 (MP 280.28 – MP 290.00) – Injury and Fatal Crashes per Year
Rural Flat and Rolling 2-Lane Divided Highway



Segment 7A (MP 280.28 – MP 283.90)

Segment 7A begins at the intersection with Jackie Ann Street and 1st Avenue (MP 280.28) in Ault and extends north to the intersection of CR 90 (MP 283.90) in Pierce. There were a total of 15 non-intersection crashes along this sub-segment of US 85L: 12 PDO crashes and two injury crashes. **Figure 51** presents a graphical representation of the non-intersection crash types for this sub-segment. Fixed object type crashes (60.0%) were the predominant crash type followed by head-on and wild animal type crashes (20.0% each).

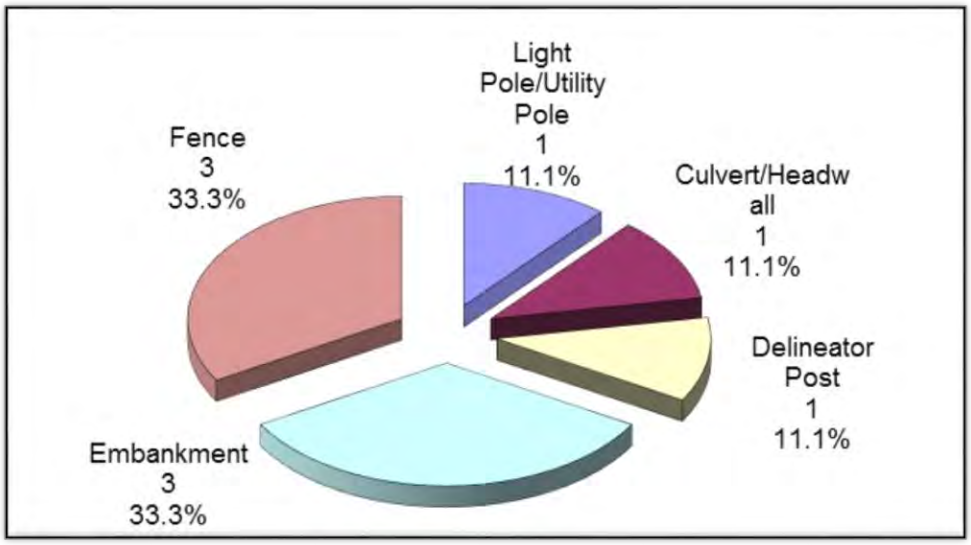
Figure 51
Non-Intersection Crash Types
(Segment 7A: MP 280.28 – MP 283.90)



Observations / Recommendations

The frequency of fixed object type crashes was higher than expected for this type of roadway. It can be seen in **Figure 52** of the fixed object type crashes, fence and embankment type crashes (33.3% each) were the predominant crash type. A review of the fixed object type crashes indicated that eight of the nine crashes occurred between MP 280.5 and MP 281.50. Of these crashes, six crashes occurred northbound and three crashes occurred southbound. Four of the nine crashes occurred with dry roadway conditions. In addition, off-road and off-road right type crashes were higher than expected for this type of roadway. Outside of Pierce or where there is adjacent residential development, it is recommended that CDOT consider widening the shoulders sufficiently so that outside rumble strips can be constructed for both directions. In addition, a centerline rumble strip should also be considered through this sub-segment, as it might help both head-on and off-road left type crashes.

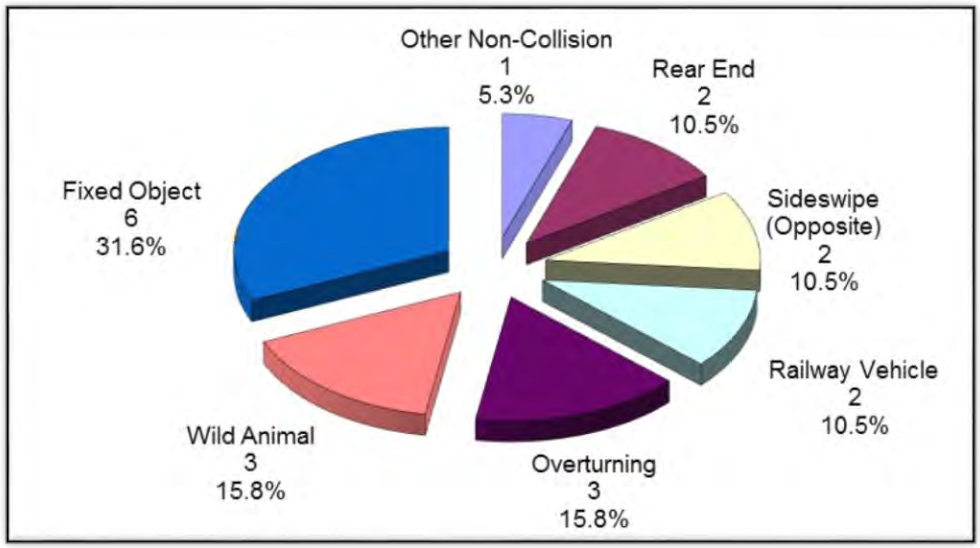
Figure 52
Fixed Object Crash Types
(Segment 7A: MP 280.28 – MP 283.90)



Segment 7B (MP 283.91 – MP 290.00)

Segment 7B begins intersection of CR 90 (MP 283.90) in Pierce and extends north to one-mile north (MP 290.00) of the intersection with CR 100. There were a total of 19 non-intersection crashes along this sub-segment of US 85L: 15 PDO crashes and four injury crashes. **Figure 53** presents a graphical representation of the non-intersection crash types for this sub-segment. Fixed object type crashes (31.6%) were the predominant crash type followed by wild animal and overturning type crashes (15.8% each).

Figure 53
Non-Intersection Crash Types
(Segment 7B: MP 283.91 – MP 290.00)



Observations / Recommendations

A review of the crash history indicates that there are no significant patterns to crashes along Segment 7B.

Outside of Nunn or where there is adjacent residential development, it is recommended that CDOT consider widening the shoulders sufficiently so that outside rumble strips can be constructed for both directions. A wider shoulder has been constructed north of CR 100 (MP 289.15) to the end of Segment 7B. Rumble strips should be installed here also. In addition, a centerline rumble strip should also be considered through this sub-segment, as it might help both sideswipe (opposite) and off-road left type crashes.

Intersection Crash Analysis

The magnitude of safety problems at intersections can also be assessed through the use of SPFs. The SPF reflects the complex relationship between exposure (measured in ADT on all legs of the intersection) and the crash count for an intersection measured in crashes per year. The SPF models provide an estimate of the normal or expected crash frequency and severity for a range of ADT among similar intersection facilities.

All of the dataset preparation was performed using the CDOT crash databases. Crash history for each intersection was prepared using the most recent five years of available crash data.

As previously discussed in the segment evaluation, if the level of safety predicted by the SPF represents a normal or expected number of crashes at a specific level of ADT, then the degree of deviation from the norm can be stratified to represent specific levels of safety.

LOSS-I – Indicates low potential for crash reduction
LOSS-II – Indicates better than expected safety performance
LOSS-III – Indicates less than expected safety performance
LOSS-IV – Indicates high potential for crash reduction

Table 9 shows the location and number of crashes at the intersections along the study corridor. There are 112 intersections with 24 intersections signalized within the 63.11 miles of US 85 study area. Fifty-seven of those are adjacent to railroad crossings. In urban areas, there are 20 signalized intersections and 16 unsignalized intersections. In rural areas, there are four signalized intersections and 72 unsignalized intersections.

Only intersections with five (one per year) or more crashes are studied in detail in the following section of the report. The above described SPF intersection analysis methodology was used in the analysis of the signalized intersections in urban areas along the study segment. The results of these analyses are discussed in more detail in the following section.

Table 9
Intersection Related Crashes by Location

Intersection By Cross Street with US 85	MP	Legs	Signalized	Crash Total
SH 44 A/104th Avenue	227.39	4	Yes	115
Long Peak Drive	227.91	3	No	8
112th Avenue	228.57	4	Yes	7
120th Avenue	229.76	4	Yes	67
SH 22A/124th Avenue	230.29	4	Yes	40
132nd Avenue	231.38	4	No	5
136th Avenue	231.93	4	Yes	35
144th Avenue	233.04	4	No	18
Bromley Lane	234.09	4	Yes	91
Denver Street	235.60	4	No	12
CR 2/168th Avenue	236.03	4	Yes	46
CR 2.5	236.55	3	No	8
CR 4	237.06	3	No	4
CR 6	238.09	4	Yes	6
CR 6.25/6.5	238.33	4	No	3
CR 8	239.08	4	No	14
CR 14.5/14th Street	242.66	4	Yes	26
CR 16	243.21	3	No	9
CR 18	244.21	4	No	23
CR 18.5	244.70	3	No	3
CR 20	245.21	4	No	1
CR 22	246.21	4	No	12
CR 25.5	246.33	3	No	0
CR 22.5	246.71	4	No	5
CR 24	247.19	4	No	2
CR 24.5	247.70	4	No	1
CR 26	248.20	4	No	1
CR 28	249.22	4	No	10
CR 30	250.25	3	No	2
SH 66	250.65	4	Yes	27
Marion Avenue	251.06	4	No	2
CR 32	251.22	4	Yes	30
CR 34	252.23	4	No	3
CR 36	253.27	4	No	5
SH 60/CR 27	253.81	3	No	6
CR 38	254.60	4	No	2
CR 29/CR 38.5	255.26	4	No	0
CR 40	255.91	4	No	0
Main Street	256.55	4	No	2
CR 31	256.86	4	No	3

Intersection By Cross Street with US 85	MP	Legs	Signalized	Crash Total
CR 42	257.26	4	Yes	7
CR 33	258.37	4	No	1
CR 44	258.60	4	No	28
CR 46/CR 35	259.93	4	No	8
CR 48 W	261.32	3	No	3
CR 37/CR 48 E	261.42	4	No	3
Sunset Drive	262.47	4	No	0
1st Avenue/SH 375	262.63	4	Yes	7
2nd Avenue	262.72	4	No	1
3rd Avenue	262.81	4	No	0
4th Avenue	262.90	4	No	0
5th Avenue	262.99	4	No	5
1st Street	263.13	3	No	2
SH 394/CR 52	263.44	4	No	8
42nd Street	264.11	4	Yes	32
39th Street	264.48	4	No	1
CR 54/37th Street	264.71	4	Yes	39
31st Street	265.19	4	Yes	42
22nd Street	266.65	4	Yes	49
18th Street/ US 34	267.18	4	Yes	36
16th Street	267.44	4	Yes	41
13th Street	267.77	4	Yes	12
8th Street/SH 263A	268.22	4	Yes	32
5th Street	268.49	4	Yes	15
O Street	270.43	3	No	7
11th Avenue	271.19	3	No	6
CR 66	271.48	4	No	4
CR 68/SH 392A	272.48	4	Yes	48
CR 70	273.50	4	No	3
CR 72	274.50	4	No	4
Colorado Parkway	275.22	4	No	0
Orchard Street	275.49	3	No	1
CR 74 + Collins Street	275.59	4	Yes	13
1st Street	275.65	4	No	0
2nd Street	275.76	4	No	0
3rd Street	275.87	3	No	0
4th Street	275.96	3	No	0
5th Street	276.07	4	No	2
7th Street	276.35	3	No	0
CR 76	276.62	4	No	5
CR 37	276.86	4	No	0
CR 78	277.74	4	No	1

Intersection By Cross Street with US 85	MP	Legs	Signalized	Crash Total
CR 80	278.74	4	No	2
B Street	279.62	3	No	1
A Street	279.69	3	No	1
SH 14C	279.76	4	Yes	10
2nd Street	279.84	3	No	1
3rd Street	279.91	4	No	1
Allison Street	280.02	3	No	0
Fry Street	280.08	3	No	0
Jackie Ann Street	280.26	4	No	0
1st Avenue	280.28	3	No	0
CR 84	280.83	4	No	2
CR 86	281.87	4	No	2
CR 88	282.91	4	No	3
Main Street	283.61	4	No	0
Shafer Avenue	283.67	4	No	0
Park Avenue	283.79	4	No	0
CR 90	283.89	4	No	3
CR 92	284.81	4	No	0
CR 94	285.83	4	No	1
CR 96	286.86	4	No	4
CR 98	287.84	4	No	2
8th Court	288.23	3	No	0
7th Street	288.29	3	No	0
6th Street	288.31	3	No	0
5th Street	288.41	3	No	0
4th Street	288.53	4	No	2
3rd Street	288.60	3	No	0
Logan Avenue	288.65	3	No	0
2nd Street	288.68	3	No	0
CR 100	289.00	4	No	6

US 85C / SH 44 (104th Avenue) (MP 227.39 & MP 1.80)

The intersection of US 85C and SH 44 (104th Avenue) is a four-leg, divided, signalized intersection just north of I-76 in Commerce City. The east and west approaches have dual left-turn lanes with one through lane on each approach. The north and south approaches have single left-turn lanes with two through lanes on both approaches. Right-turn lanes are provided on all four approaches to the intersection with right-turn acceleration lanes on all but the east leg. The posted speed limit on US 85C is 45 mph and 35 mph on SH 44 (104th Avenue). **Figure 54** shows an aerial view of the intersection.

Figure 54
Aerial Photo: US 85C / SH 44 (104th Avenue) (MP 227.39 & MP 1.80)

Safety Performance Function Analysis

For the intersection of US 85C with SH 44 (104th Avenue), **Figure 55** shows that the frequency of total crashes over the five-year study period indicates a moderate to high potential for crash reduction (LOSS III) for a four-lane divided signalized four-leg intersection. **Figure 56** shows that the severity of crashes also indicates a moderate to high potential for crash reduction (LOSS III).

Figure 55
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (SH 44 [104th Avenue])
Minor AADT = 13,700

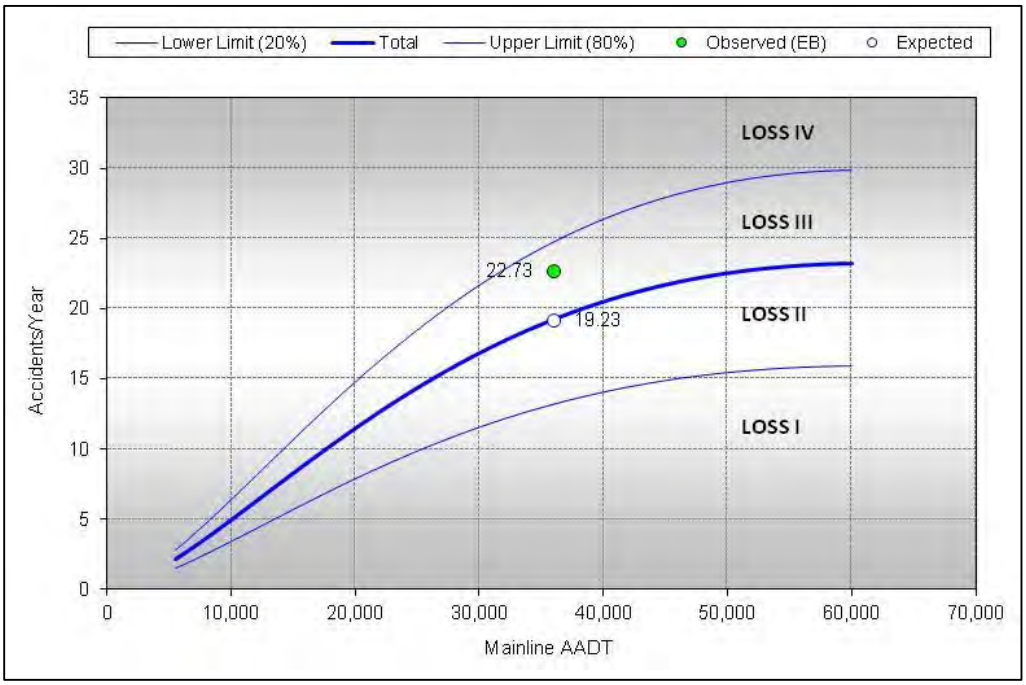
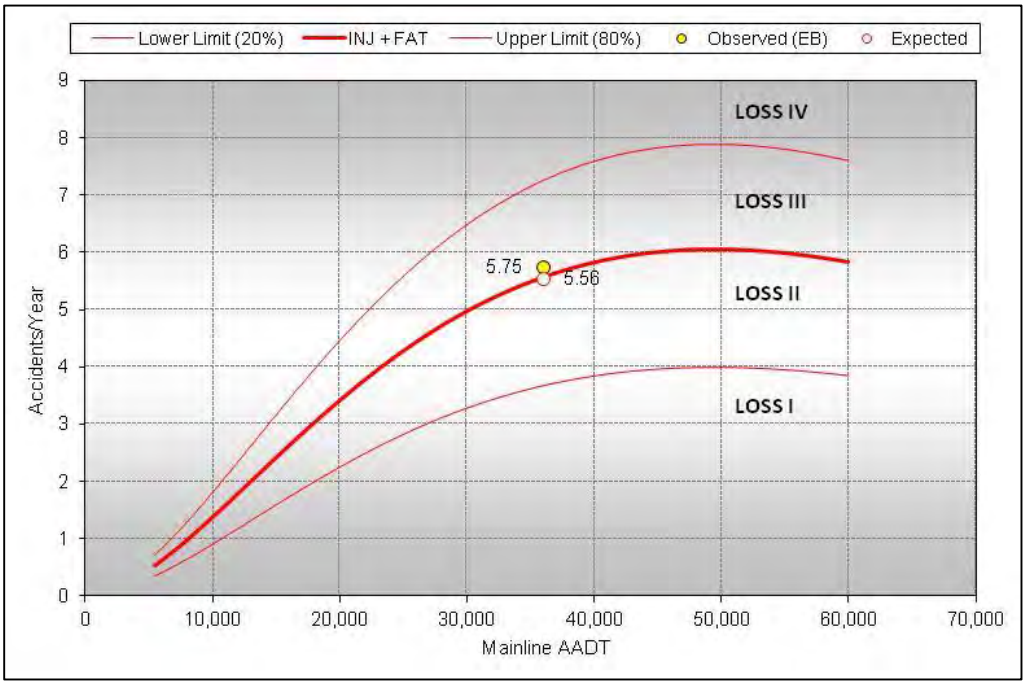


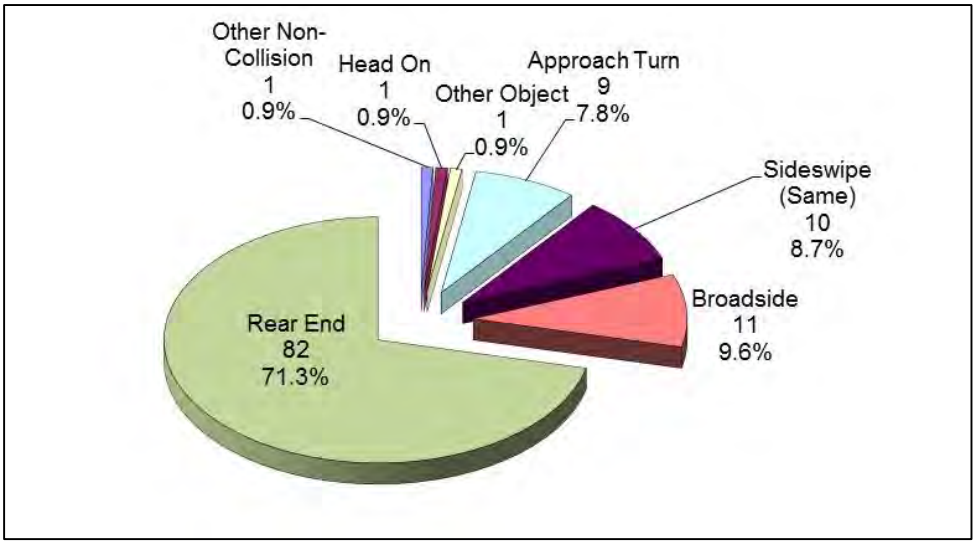
Figure 56
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (SH 44 [104th Avenue])
Minor AADT = 13,700



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 115 crashes, 86 were property damage only, 28 resulted in injuries and one fatal crash. **Figure 57** provides a graphical representation of crash types for this location. Rear end crashes (71.3%) were predominant followed by broadside (9.6%) and sideswipe same direction (8.7%) type crashes.

Figure 57
US 85C / SH 44 [104th Avenue] (MP 227.39 & MP 1.80)
115 Total Crashes



Fatal Crashes

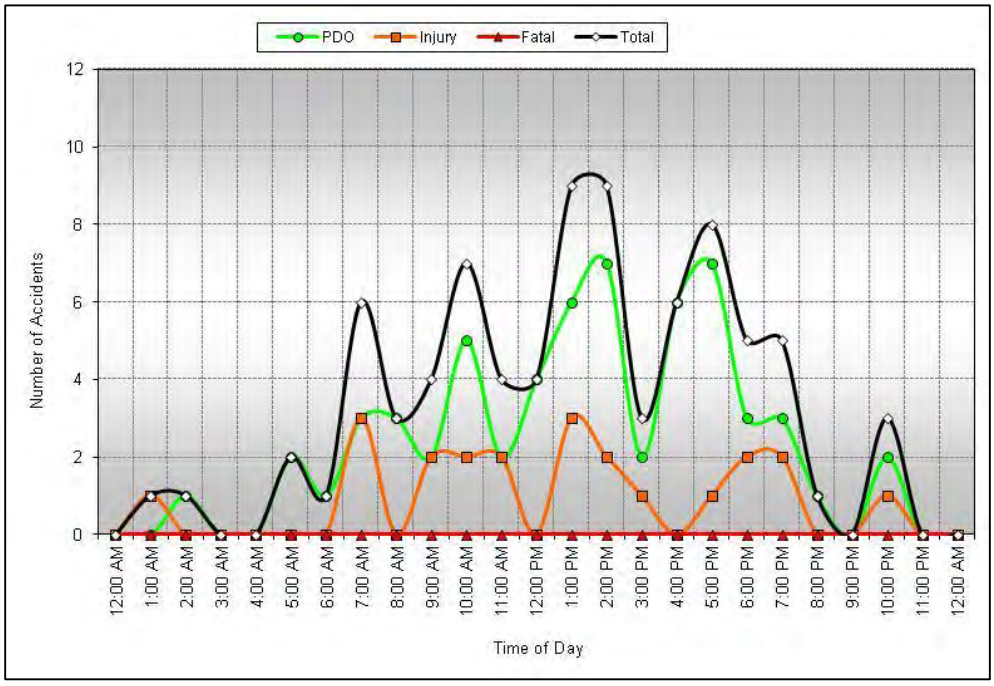
The fatal crash occurred on April 24, 2011 at 23:06 in the night. The crash occurred during rainy conditions so the roadways were wet; the intersection is lighted. Vehicle #1 was traveling eastbound on SH 44 (104th Avenue), and Vehicle #2 was traveling southbound. Vehicle #1 went through a red light, causing a broadside collision. The driver of Vehicle #1 was the fatality. No alcohol or drugs were suspected, and both drivers were wearing seatbelts. No crash pattern was found.

Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of intersection. A review of the rear end crash history indicated that there were 29 crashes northbound, 26 crashes southbound, 12 crashes eastbound and 15 crashes westbound. Road conditions for rear end type crashes showed that only eight of 82 crashes (9.7%) were related to inclement weather.

Figure 58 indicates the time of day rear end type crashes occurred. It can be seen that rear end type crashes occur during peak periods of the day including the AM, mid-day and PM peak periods when congestion is typically higher.

Figure 58
Time of Day – Rear End Type Crashes



Based upon the identified crash patterns at this intersection, the following mitigation measures should be considered:

- Reviewing/updating the existing yellow/all red clearance intervals could help reduce the frequency of rear end type crashes.
- Consider repositioning flashing warning signs (W2-1) at an appropriate distance for current approach speeds) of the upcoming signalized intersection further south on US 85C for the northbound traffic and consider adding one north of the intersection for the southbound traffic. These signs should be appropriately sized for an expressway (48”x48”). If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases.

US 85C / Long Peak Drive (MP 227.91)

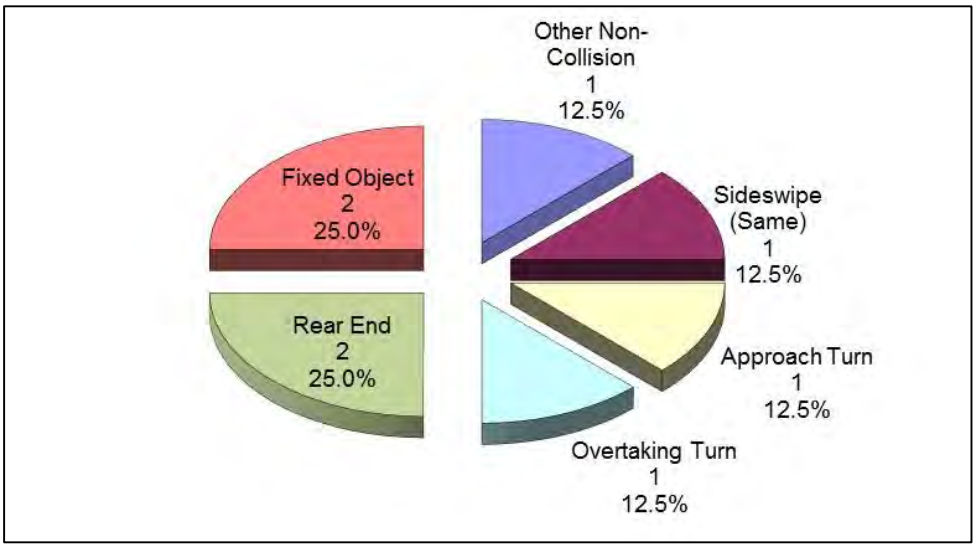
The intersection of US 85C with Long Peak Drive is a three-leg, divided, unsignalized intersection in Commerce City. There are both left-turn and right-turn deceleration lanes provided along US 85C with two through lanes on the main approaches. The eastbound approach provides only a right-turn lane with an acceleration lane. **Figure 59** shows an aerial view of the intersection.

Figure 59
Aerial Photo: US 85C / Long Peak Drive (MP 227.91)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were eight crashes, five were property damage only and three were injury related. **Figure 60** provides a graphical representation of crash types for this location. Rear end type crashes and fixed object type crashes were the two were predominant type of crashes (25% each) at intersection.

Figure 60
US 85C / Long Peak Drive (MP 227.91)
8 Total Crashes



Observations / Recommendations

A review of the crash history indicates that there is no current pattern to crashes at the intersection of US 85C and Long Peak Drive. There are no suggestions for improvement at this time.

US 85C / 112th Avenue (MP 228.57)

The intersection of US 85C and 112th Avenue is a four-leg, divided, signalized intersection in Commerce City. There are both left-turn and right-turn deceleration lanes provided along US 85C with two through lanes on the main approaches. 112th Avenue provides shared left-turn/through/right-turn lane with right-turn acceleration lanes onto US 85C. The posted speed limit on US 85C is 55 mph, and the posted speed limit on 112th Avenue is 45 mph. **Figure 61** shows an aerial view of the intersection.

Figure 61
Aerial Photo: US 85C / 112th Avenue (MP 228.57)

Safety Performance Function Analysis

For the intersection of US 85C with 112th Avenue, **Figure 62** shows that the frequency of total crashes over the five-year study period was significantly better than expected for a four-lane divided signalized four-leg intersection which indicates a low potential for crash reduction (LOSS I). **Figure 63** shows that the severity of crashes also indicates a low potential for crash reduction (LOSS I).

Figure 62
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (112th Avenue)
Minor AADT = 6,800

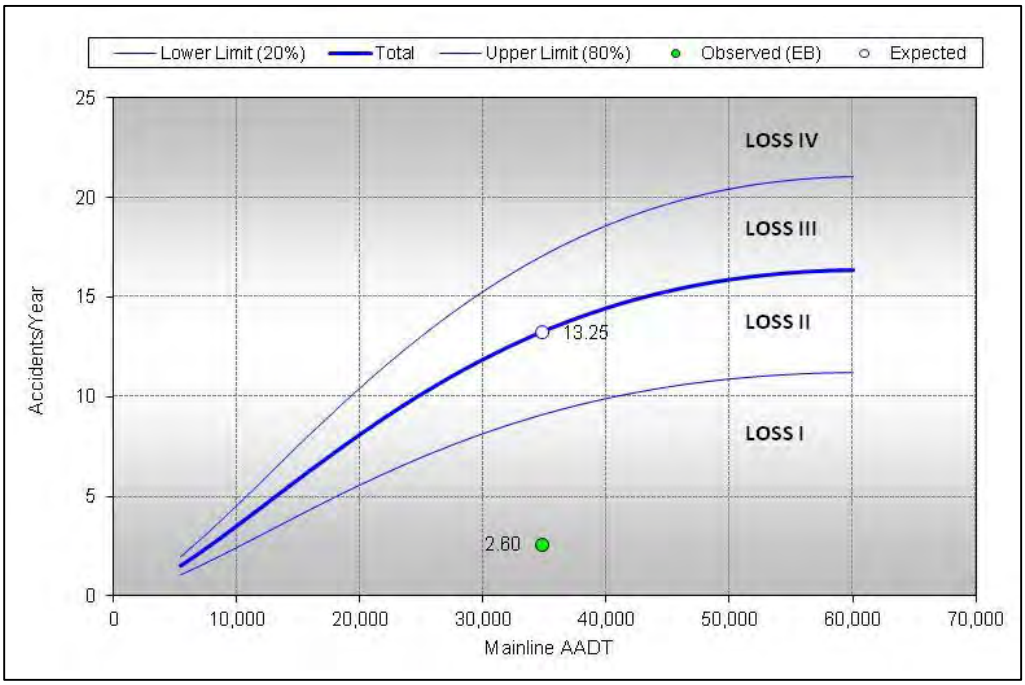
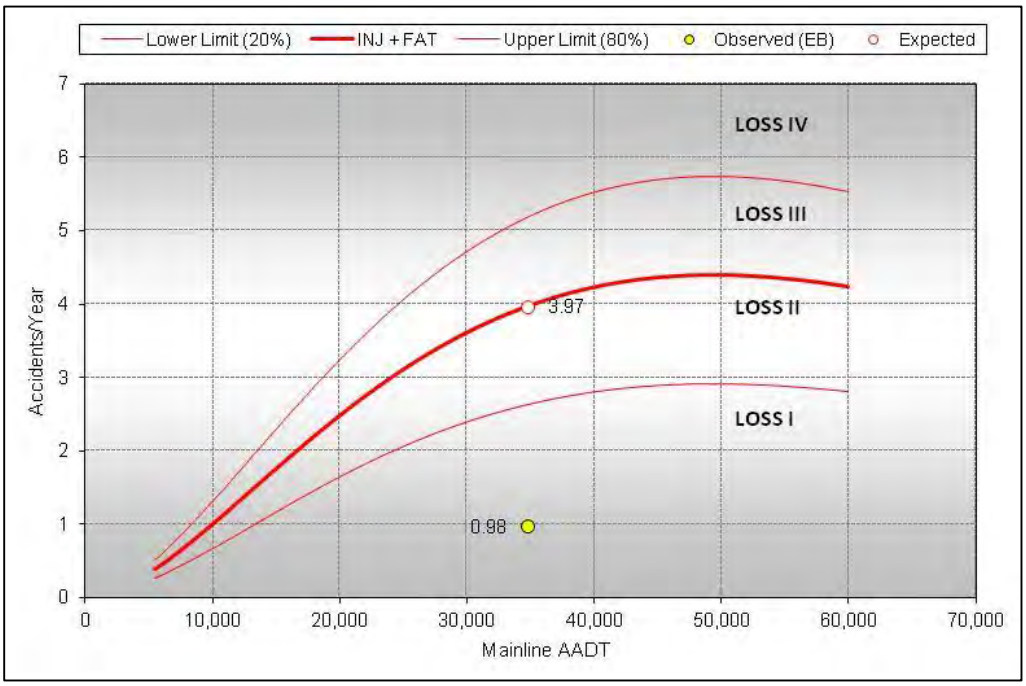


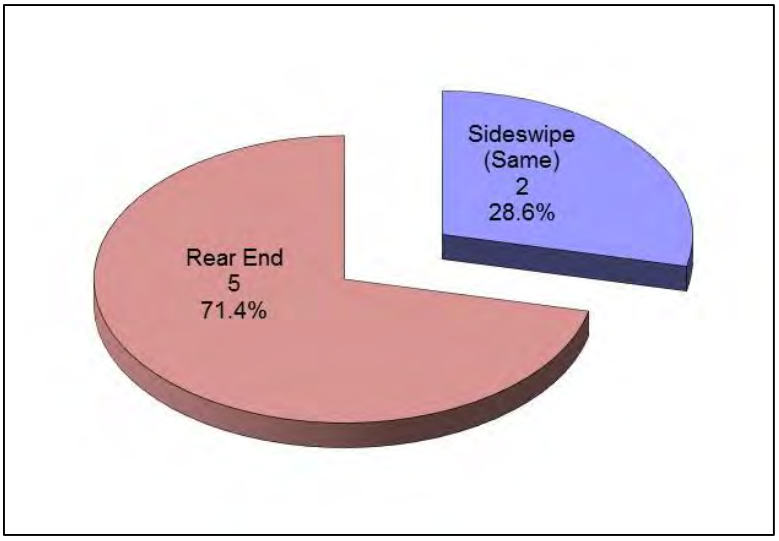
Figure 63
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (112th Avenue)
Minor AADT = 6,800



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were seven crashes, which all seven were property damage only. **Figure 64** provides a graphical representation of crash types for this location. Rear end type crashes (71.4%) were the predominant crash type followed by sideswipe (same) type crashes (28.6%).

Figure 64
US 85C / 112th Avenue (MP 228.57)
7 Total Crashes



Observations / Recommendations

There are no significant crash types at this intersection. However, it is worth noting that the rear end crashes had five crashes of which four occurred on dry roadway conditions. Directionally, two occurred northbound and three occurred southbound.

Reviewing the existing yellow/all red clearance intervals could help reduce rear end type crashes. Additionally, consideration of repositioning intersection warning signs (at an appropriate distance for current approach speeds) further away from the intersection could improve driver awareness of the upcoming signalized intersection. If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases.

US 85C / 120th Avenue (MP 229.76)

The intersection of US 85C and 120th Avenue is a four-leg, divided, signalized intersection. There are both left-turn and right-turn deceleration lanes provided along US 85C with two through lanes on the main approaches. Southbound US 85C vehicles turning right have an acceleration on the west leg of the intersection. The west leg of 120th Avenue provides one left-turn lanes, one through lane, and a right-turn lane with an acceleration lane onto southbound US 85C. The east leg has a left-turn lane, and a shared through/right-turn lane with an acceleration lane onto northbound US 85C. The posted speed limit on US 85C is 55 mph, and the posted speed limit on 120th Avenue is 45 mph. **Figure 65** shows an aerial view of the intersection.

Figure 65
Aerial Photo: US 85C / 120th Avenue (MP 229.76)

Safety Performance Function Analysis

For the intersection of US 85C with 120th Avenue, **Figure 66** shows that the frequency of total crashes indicates a low to moderate potential for crash reduction for a signalized four-lane divided four-leg intersection (LOSS II). **Figure 67** shows that the severity of crashes also indicates a low to moderate potential for crash reduction (LOSS II).

Figure 66
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (120th Avenue)
Minor AADT = 10,400

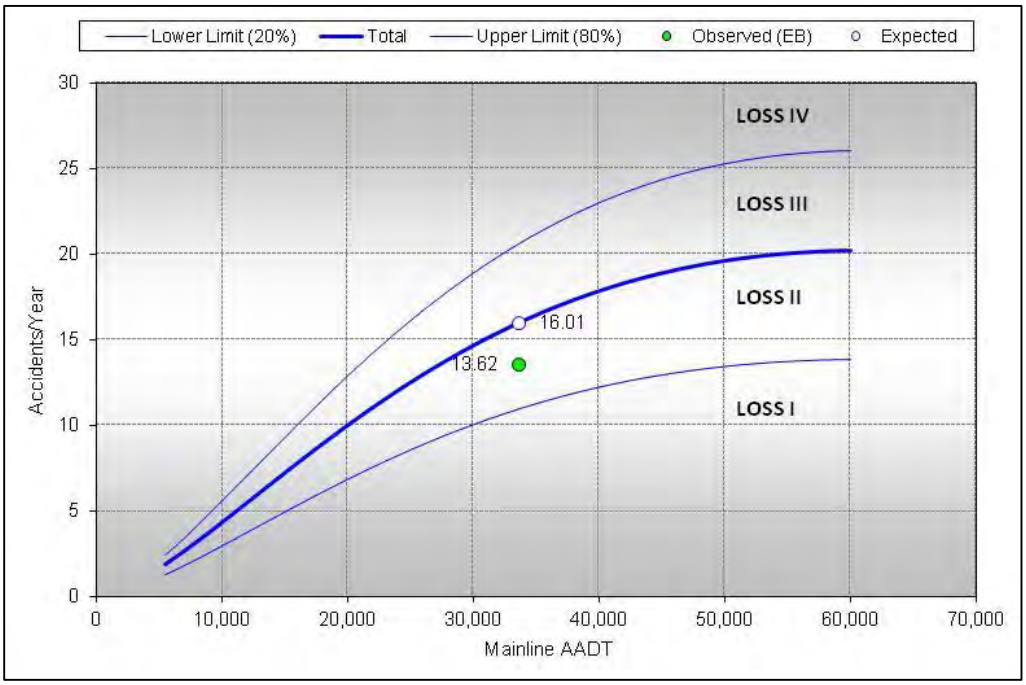
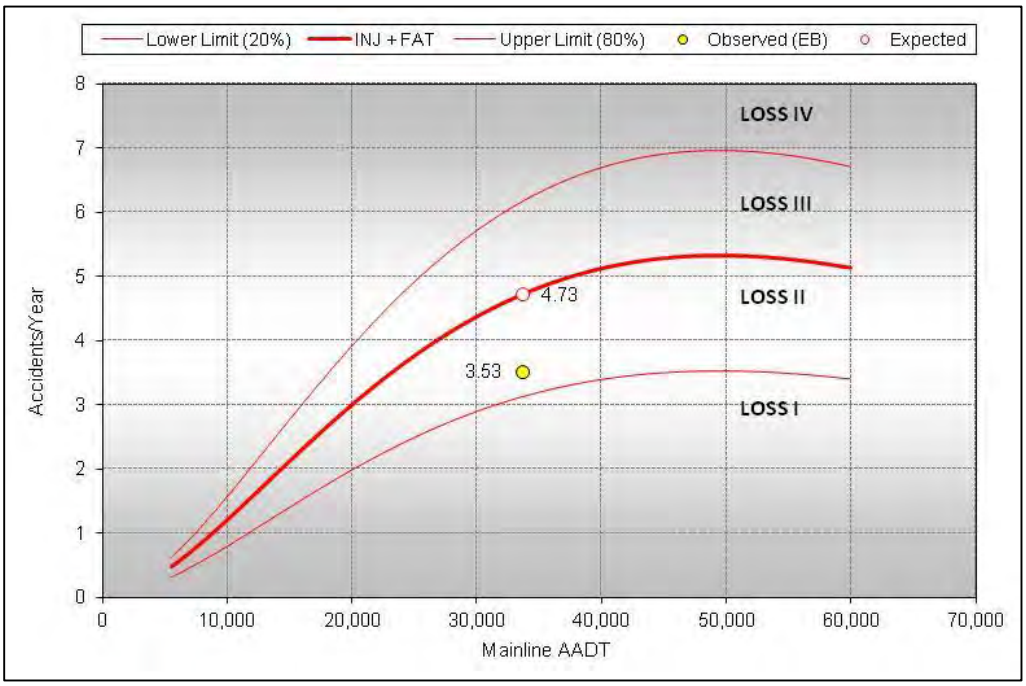


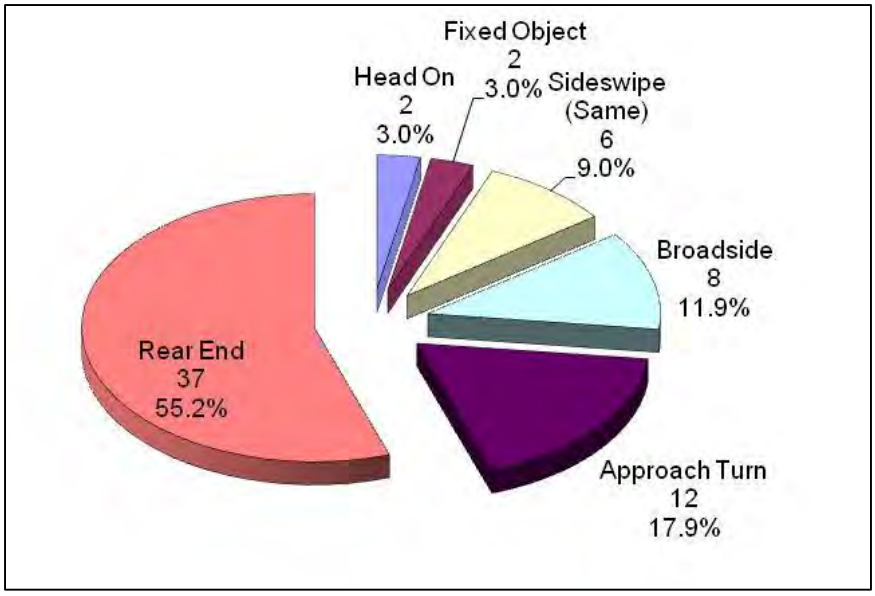
Figure 67
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (120th Avenue)
Minor AADT = 10,400



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 67 crashes, 51 were property damage only, and 16 resulted in injuries. **Figure 68** provides a graphical representation of crash types for this location. Rear end type crashes (55.2%) were the predominant crash type followed by approach turn type crashes (17.9%) and broadside type crashes (11.9%).

Figure 68
US 85C / 120th Avenue (MP 229.76)
67 Total Crashes



Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of intersection. Directionally, 18 rear end type crashes occurred northbound, nine southbound, eight eastbound and two westbound. Thirty-six of the 37 rear end crashes occurred on dry pavement and one crash was on icy road conditions. Reviewing and updating the existing yellow/all red clearance intervals should be considered to help reduce the frequency of rear end type crashes.

Reviewing the existing yellow/all red clearance intervals could help reduce rear end type crashes. Additionally, consideration of repositioning intersection warning signs (at an appropriate distance for current approach speeds) further away from the intersection could improve driver awareness of the upcoming signalized intersection. If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases.

US 85C / 124th Avenue (SH 22A) (MP 230.29 & MP 1.84)

The intersection of US 85C and 124th Avenue is a four-leg, divided, signalized intersection. There are both left-turn and right-turn deceleration lanes provided along US 85C with two through lanes on the main approaches. 124th Avenue provides one combine left-turn/through/ right-turn lane on the east and west legs of the intersection with right-turn acceleration lane provided onto US 85C. The posted speed limit on US 85C is 55 mph, and the posted speed limit on 124th Avenue is 35 mph. **Figure 69** shows an aerial view of the intersection.

Figure 69
Aerial Photo: US 85C / 124th Avenue (SH 22A) (MP 230.29 & MP 1.84)

Safety Performance Function Analysis

For the intersection of US 85C with 124th Avenue, **Figure 70** shows that the frequency of total crashes indicates a low to moderate potential for crash reduction for a signalized four-lane divided four-leg intersection (LOSS II). **Figure 71** shows that the severity of crashes also indicates a low to moderate potential for crash reduction for this intersection type (LOSS II).

Figure 70
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (124th Avenue)
Minor AADT = 5,200

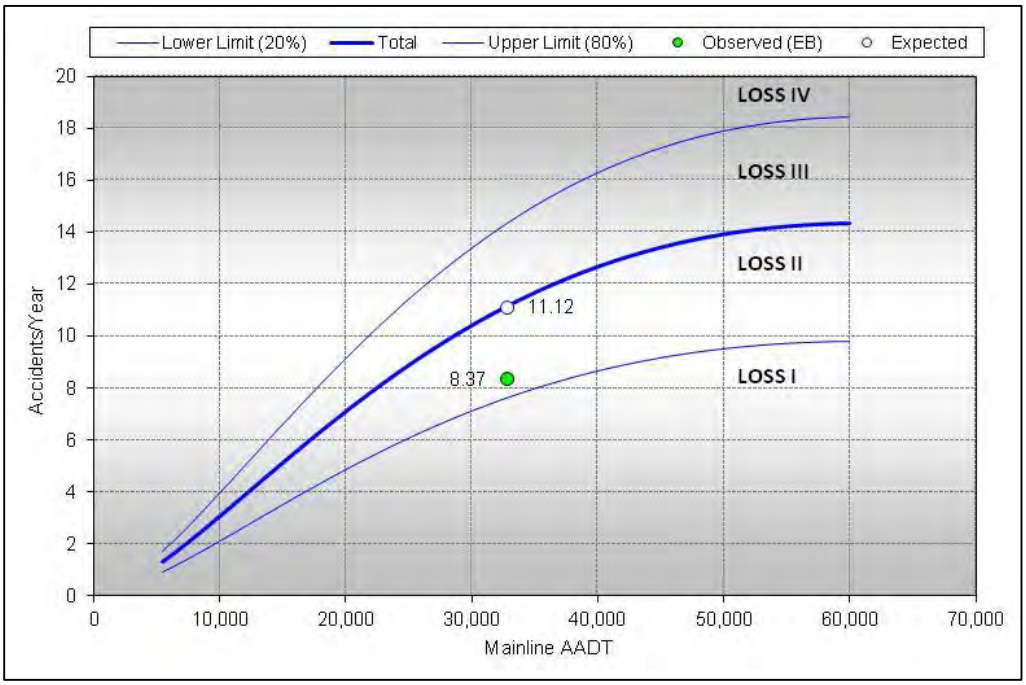
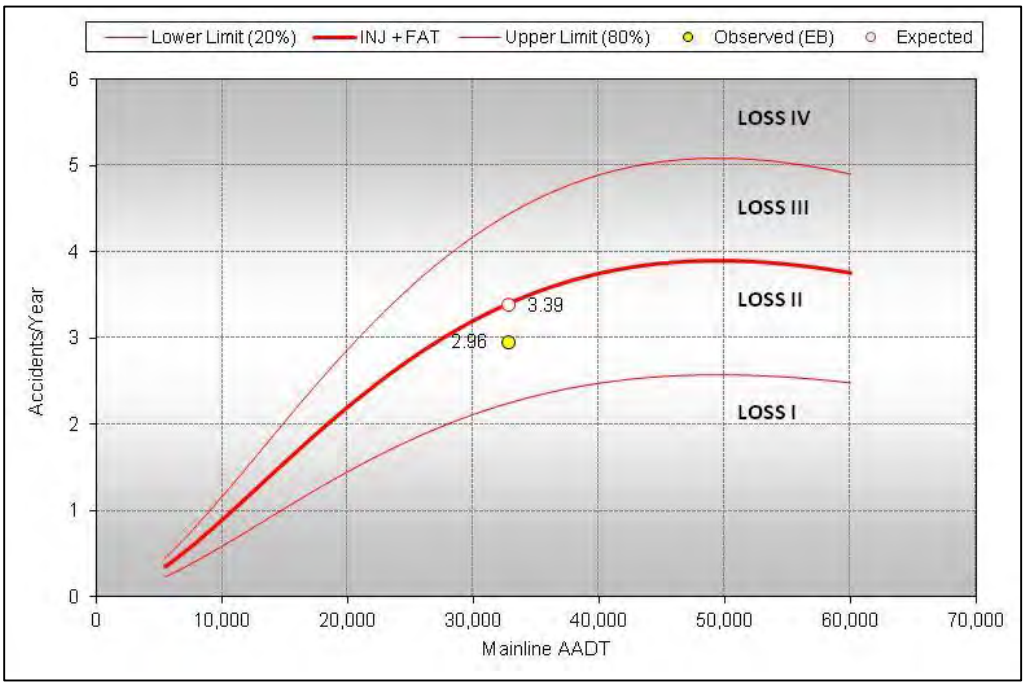


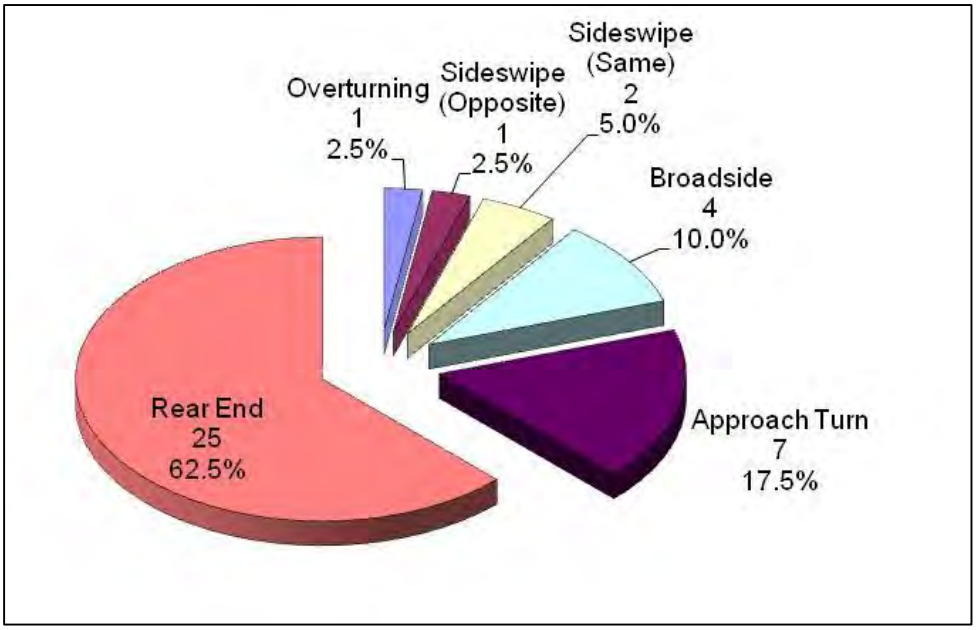
Figure 71
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (124th Avenue)
Minor AADT = 5,200



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 40 crashes, 26 were property damage only, and 14 resulted in injuries. **Figure 72** provides a graphical representation of crash types for this location. Rear end type crashes (62.5%) were the predominant crash type followed by approach turn type crashes (17.5%).

Figure 72
US 85C / 124th Avenue (MP 230.29)
40 Total Crashes



Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of intersection. A review of the crash history indicated that 12 of the rear end crashes were northbound, 11 southbound, one eastbound and one westbound. Twenty-three of the 25 crashes occurred on dry pavement, one crash on wet road conditions and one on icy road conditions. Reviewing and updating the existing yellow/all red clearance intervals should be considered to help reduce the frequency of rear end type crashes.

Reviewing the existing yellow/all red clearance intervals could help reduce rear end type crashes. Additionally, consideration of repositioning intersection warning signs (at an appropriate distance for current approach speeds) further away from the intersection could improve driver awareness of the upcoming signalized intersection. If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases.

Although the frequency of approach turn type crashes is not higher than expected, five of the seven crashes involved southbound vehicles. This situation should be monitored, and a protected-only left turn signal for southbound vehicles installed if it persists.

US 85C / 132nd Avenue (MP 231.38)

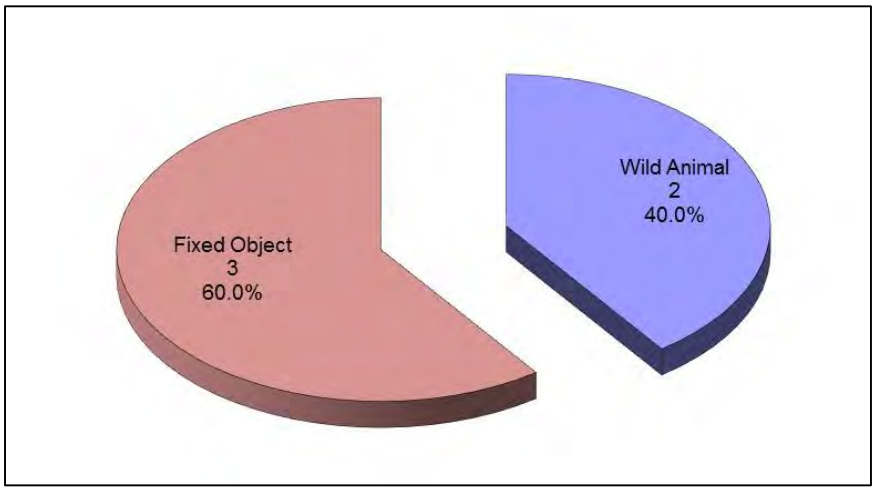
The intersection of US 85C with 132nd is a four-leg, divided, unsignalized intersection. US 85C has two through lanes on the main approaches. The northbound approach provides a left-turn lane. The southbound approach only provides a right-turn lane. 132nd Avenue provides one combine left-turn/through/right-turn lane on the east and west legs of the intersection with an eastbound right-turn acceleration lane provided onto southbound US 85C. 132nd Avenue does not provide a railroad crossing to the east and is fenced off. The posted speed limit on US 85C is 65 mph. **Figure 73** shows an aerial view of the intersection.

Figure 73
Aerial Photo: US 85C / 132nd Avenue (MP 231.38)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were five crashes, all five were property damage only. **Figure 74** provides a graphical representation of crash types for this location. Fixed object type crashes and wild animal type crashes were the only types of crashes occurring at the 132nd Avenue intersection.

Figure 74
US 85C / 132nd Avenue (MP 231.38)
5 Total Crashes



Observations / Recommendations

A review of the crash history indicates that there is no current pattern to crashes at the intersection of US 85C and 132nd Avenue. There are no suggestions for improvement at this time.

US 85C / 136th Avenue (MP 231.93)

The intersection of US 85C and 136th Avenue is a four-leg, divided, signalized intersection. There are both left-turn and right-turn deceleration lanes provided along US 85C with two through lanes on the main approaches. The west leg of 136th Avenue provides one combine left-turn/through/right-turn lane with an acceleration lane onto southbound US 85C. The east leg of 136th Avenue provides one combine left-turn/through and a separate right-turn lane with an acceleration lane onto northbound US 85C. The posted speed limit on US 85C is 55 mph, and the posted speed limit on 136th Avenue is 45 mph. **Figure 75** shows an aerial view of the intersection.

Figure 75
Aerial Photo: US 85C / 136th Avenue (MP 231.93)

Safety Performance Function Analysis

For the intersection of US 85C with 136th Avenue, **Figure 76** shows that the frequency of total crashes indicates a low to moderate potential for crash for a signalized four-lane divided four-leg intersection (LOSS II). **Figure 77** shows that the severity of crashes indicates a low potential for crash reduction (LOSS I).

Figure 76
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (136th Avenue)
Minor AADT = 3,000

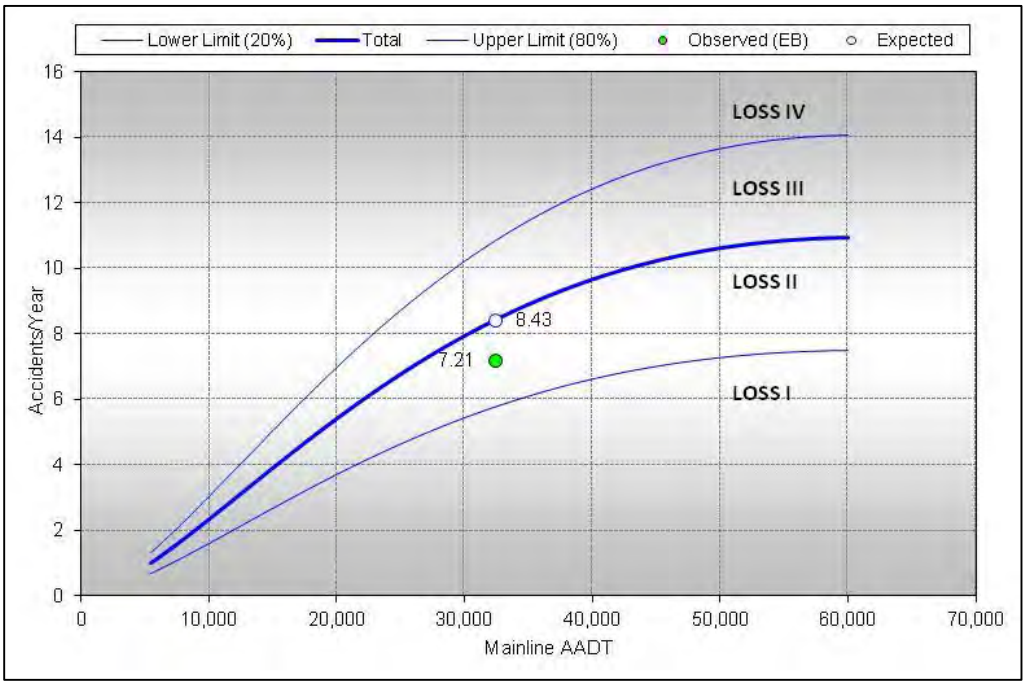
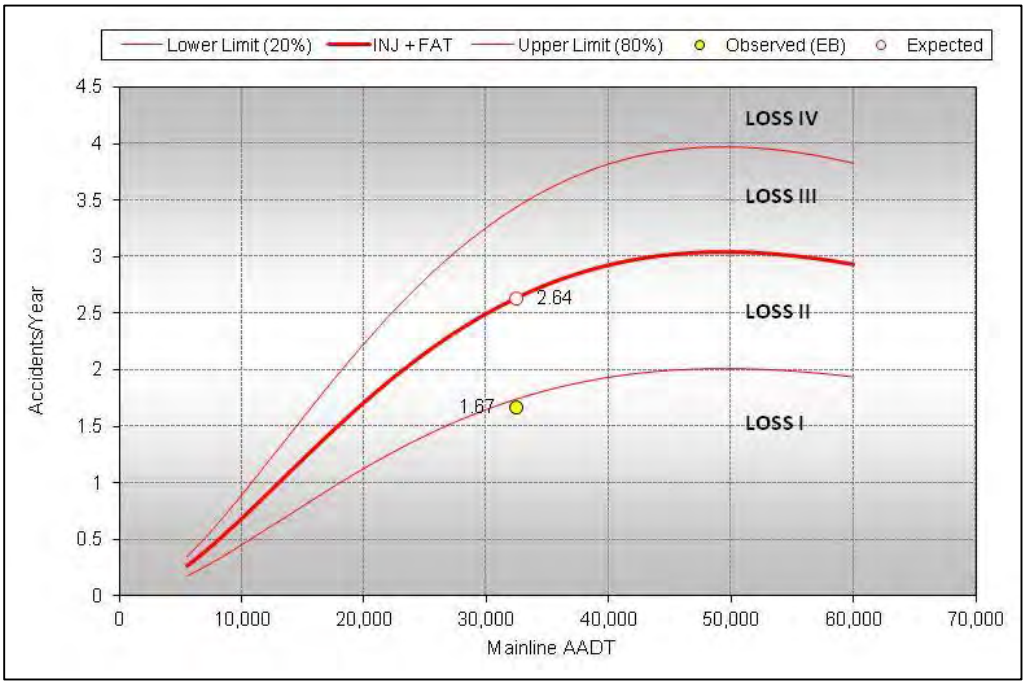


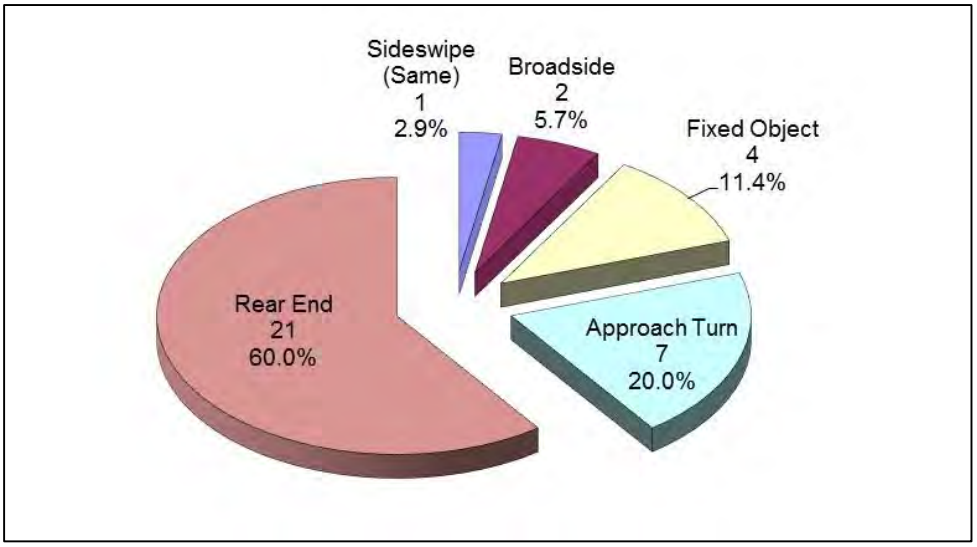
Figure 77
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (136th Avenue)
Minor AADT = 3,000



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 35 crashes, 29 were property damage only, and six resulted in injuries. **Figure 78** provides a graphical representation of crash types for this location. Rear end type crashes (60.0%) were the predominant crash type followed by approach turn type crashes (20.0%).

Figure 78
US 85C / 136th Avenue (MP 231.93)
35 Total Crashes



Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of intersection. A review of the crash history indicated that 13 of the rear end crashes were northbound, seven southbound, and one westbound. Nineteen of the 21 rear end crashes occurred on dry pavement, and two crashes occurred on wet road conditions.

Reviewing the existing yellow/all red clearance intervals could help reduce rear end type crashes. Additionally, consideration of repositioning intersection warning signs (at an appropriate distance for current approach speeds) further away from the intersection could improve driver awareness of the upcoming signalized intersection. If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases.

US 85C / 144th Avenue (MP 233.04)

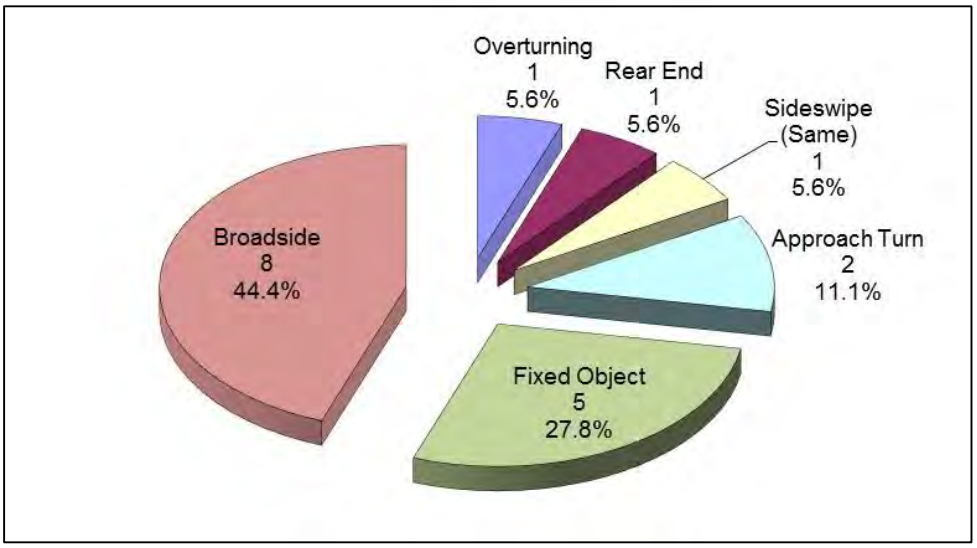
The intersection of US 85C with 144th Avenue is a four-leg, divided, unsignalized intersection. The northbound and southbound approaches provide a left-turn and right-turn deceleration lane onto 144th Avenue. There are two through lanes along US 85C. 144th Avenue provides right out only access to US 85C with acceleration lanes onto US 85C. The posted speed limit on US 85C is 65 mph, and 144th Avenue posted speed limit is 45 mph. **Figure 79** shows an aerial view of the intersection.

Figure 79
Aerial Photo: US 85C / 144th Avenue (MP 233.04)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 18 crashes, eleven were property damage only, five resulted in injuries and two were fatalities. **Figure 80** provides a graphical representation of crash types for this location. Broadside type crashes (44.4%) were the predominant crash type followed by fixed object turn type crashes (27.8%).

Figure 80
US 85C / 144th Avenue (MP 233.04)
18 Total Crashes



Fatal Crashes

The two fatal crashes at the intersection of 144th Avenue occurred in 2008.

The first crash occurred on July 5, 2008 at 14:08 during dry, daylight conditions. Vehicle #1 was traveling westbound on 144th Avenue and failed to stop for the stop sign at US 85C, causing a broadside crash with Vehicle #2 that was traveling southbound. The front passenger of Vehicle #1 was the fatality. Alcohol was not involved; however, the driver of Vehicle #1 was driving without a valid driver's license.

The second reported fatal crash occurred on July 9, 2008 at 18:46 in dry, daylight conditions. Vehicle #1 was traveling northbound approaching 144th Avenue to make a left-turn. Vehicle #2 was traveling southbound. Vehicle #1 failed to yield to Vehicle #2, causing an approach turn crash. The driver in Vehicle #1 was the fatality.

Observations / Recommendations

The frequency of broadside type crashes was higher than expected for this type of intersection. A review of the crash history indicated that the eight broadside crashes occurred before the 144th Avenue approaches were converted into right-turn onto US 85C only in early 2011. Since the conversion, there has been no more broadside type crashes reported at 144th Avenue. It is recommended to monitor situation for possible additional corrective measures.

US 85C / Bromley Lane (MP 234.09)

The intersection of US 85C and Bromley Lane is a four-leg, divided, signalized intersection located in Brighton. There are both left-turn and right-turn deceleration lanes provided along US 85C with two through lanes on the main approaches. The west leg of Bromley Lane provides a left-turn lane, two through lanes, and right-turn lanes with an acceleration lane onto southbound US 85C. The east leg of Bromley Lane provides two left-turn lanes, two through lanes, and right-turn lanes with an acceleration lane onto northbound US 85C. The posted speed limit on US 85C is 55 mph, and the posted speed limit on Bromley Lane is 35 mph. **Figure 81** shows an aerial view of the intersection.

Figure 81
Aerial Photo: US 85C / Bromley Lane (MP 234.09)

Safety Performance Function Analysis

For the intersection of US 85C with Bromley Lane, **Figure 82** shows that the frequency of total crashes indicates a low to moderate potential for crash reduction for a signalized four-lane divided four-leg intersection (LOSS II). **Figure 83** shows that the severity of crashes indicates a low potential for crash reduction (LOSS I).

Figure 82
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (Bromley Lane)
Minor AADT = 17,200

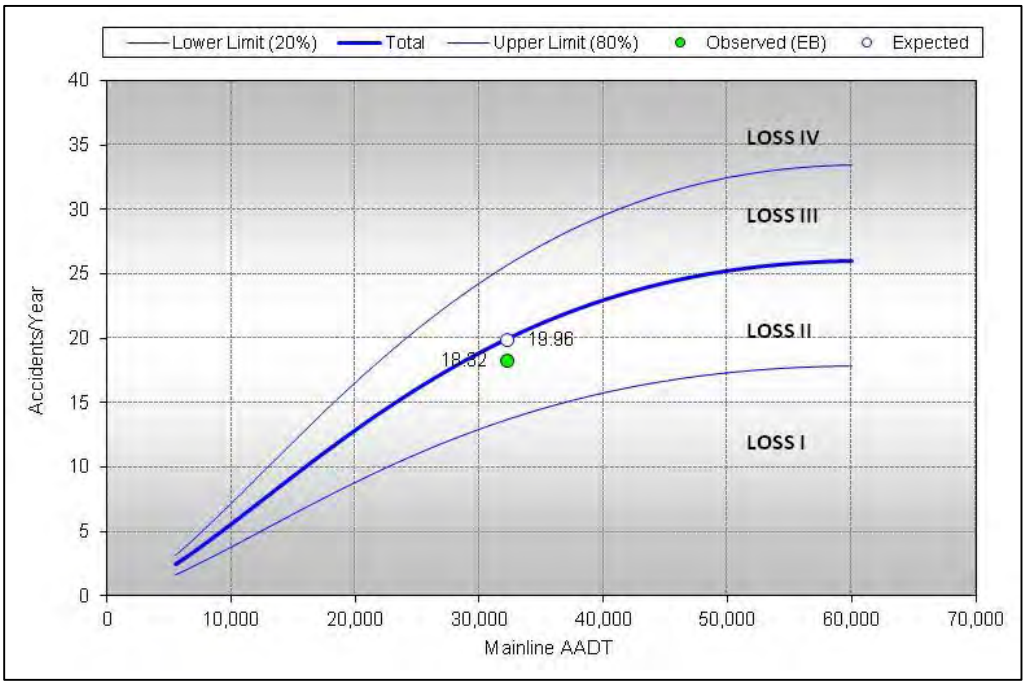
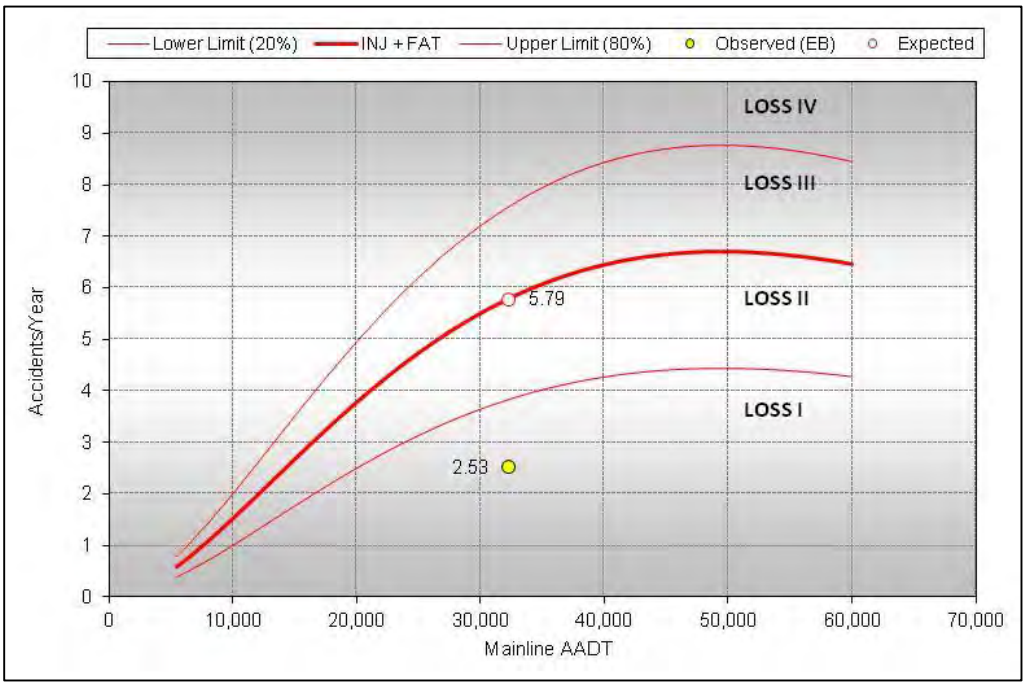


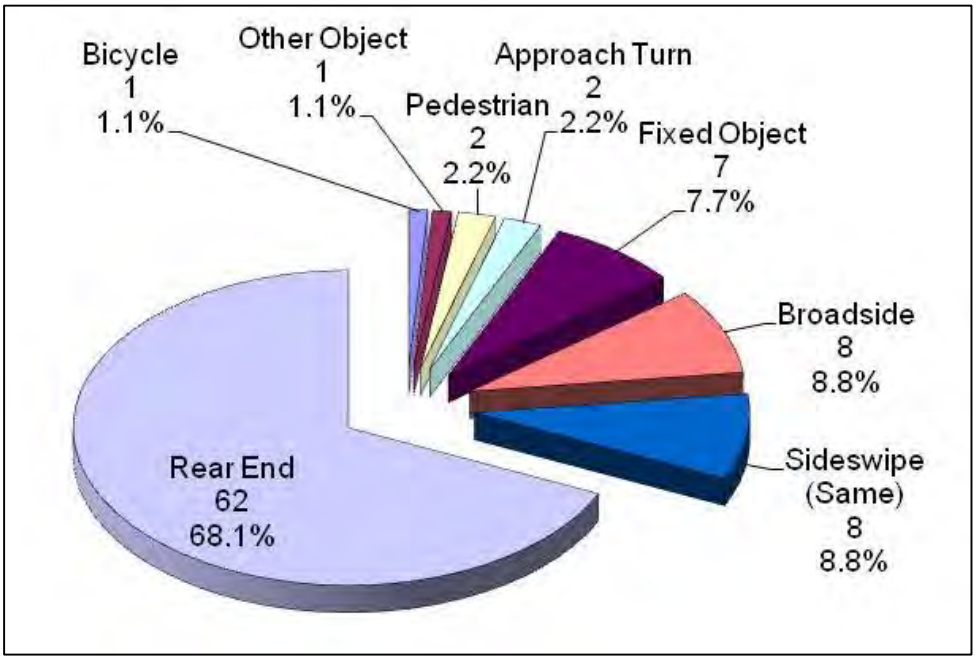
Figure 83
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (Bromley Lane)
Minor AADT = 17,200



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 91 crashes, 82 were property damage only, eight resulted in injuries, and one fatal crash. **Figure 84** provides a graphical representation of crash types for this location. Rear end type crashes (68.1%) were the predominant crash type followed by sideswipe (same side) and broadside type crashes (8.8% each).

Figure 84
US 85C / Bromley Lane (MP 234.09)
91 Total Crashes



Fatal Crashes

The one fatal crash at the intersection with Bromley Lane occurred on May 15, 2008 at 23:38, under dry, dark-lighted conditions. A pedestrian was crossing US 85C eastbound south of Bromley Lane, not at the crosswalk. Vehicle #1 was traveling southbound on US 85C with the green light and collided with the pedestrian. The fatality was the pedestrian. No drugs or alcohol were reported.

Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of intersection. A review of the crash history indicated that 39 of the rear end crashes were northbound, nine southbound, six eastbound, and eight westbound. Fifty-five of the 62 rear end crashes occurred on dry pavement, five crashes on wet road conditions, and two were on snowy/slushy road conditions. Reviewing the existing yellow/all red clearance intervals could help reduce rear end type crashes. Additionally, consideration of repositioning intersection warning signs (at an appropriate distance for current approach speeds) further away from the intersection could improve driver awareness of the upcoming signalized intersection. If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases.

The Bromley Lane approaches were recently widened to provide a second left-turn lane for westbound traffic. This intersection should be monitored to see if this has changed any crash patterns.

US 85C / SH 7D (MP 235.10 & MP 76.99)

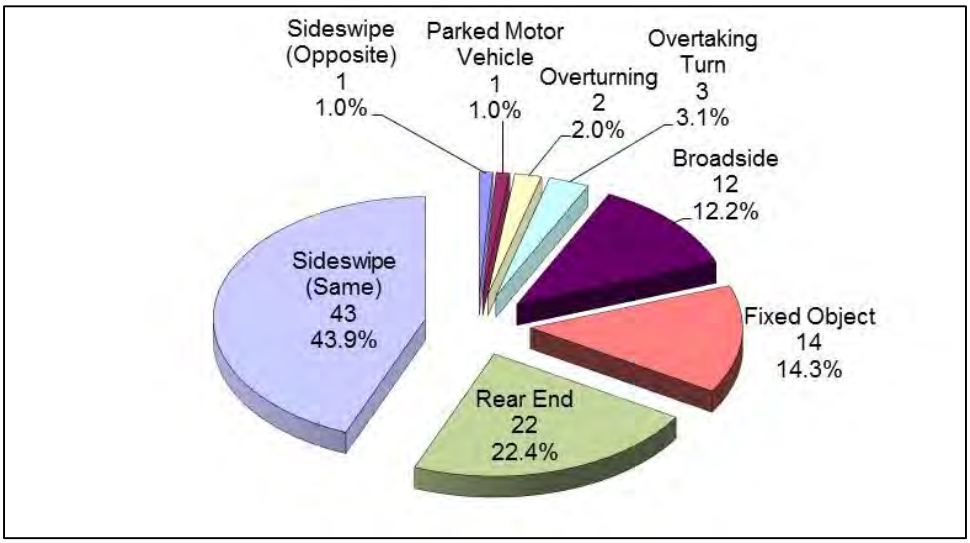
The interchange of US 85C with SH 7 has a diamond configuration with roundabouts where the on- and off-ramps from US 85C intersect with SH 7D. The west roundabout incorporates the west frontage road along US 85C, and the east roundabout includes a bypass lane for westbound to northbound traffic. Both roundabouts have two-lane configurations. All approaches of SH 7D have two lanes in each direction. Only the northbound off-ramp from US 85C has two lanes. All other approaches and exits have single lanes. The posted speed limit on eastbound SH 7D is 30 mph and 25 mph on westbound. **Figure 85** shows an aerial view of the interchange.

Figure 85
Aerial Photo: US 85C / SH 7D (MP 235.10 & MP 76.93/77.05)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 98 crashes related to the roundabouts, 91 were property damage only and seven resulted in injury. **Figure 86** provides a graphical representation of crash types for this location. Sideswipe (same) type crashes (43.9%) were the predominant crash type followed by rear end (22.4%), fixed object (14.3%), and broadside type crashes (12.2%). There were 46 crashes at the west roundabout, while the east experienced 52. The percentage of rear-end type crashes was higher at the west roundabout (37% vs. 10%) while the percentage of sideswipe (same) and broadside type crashes was higher at the east roundabout (62% vs. 50%).

Figure 86
US 85C / SH 7D (MP 235.10 & MP 76.99)
98 Total Crashes



Observations / Recommendations

There are no diagnostics nor SPFs available for roundabouts, but the prevalence of sideswipe (same) and rear end type crashes appears to be the expected types of crashes. Although only a few officer narratives were available at this location for review, many “broadside” crashes have probably been incorrectly coded. Officer narratives at other roundabouts reference vehicles failing to yield right-of-way when entering the roundabout and colliding with a vehicle in the roundabout as both broadside and sideswipe (same direction) crashes. Thus, if broadside crashes are mostly miscoded, sideswipe (same) crashes would be between 50 and 55 percent of the total. Without a frame of reference, the total number of crashes seems high – an average of ten crashes at each roundabout over the five-year study period. After 2008 (8 crashes), the other four years had crash totals in the mid-20’s. There were 46 crashes at the west roundabout and 52 at the east. A total of nine crashes were noted as being caused by vehicles on the US 85C off-ramps (six northbound and three southbound).

A brief review (Google StreetView) of the signing reveals that the regulatory, warning, and guide signing for the roundabout is inconsistent. It is recommended that a thorough review of the signing be conducted and signing upgraded to conform to the most recent guidance in the MUTCD (2012 Supplement).

US 85C / Denver Street (MP 235.60)

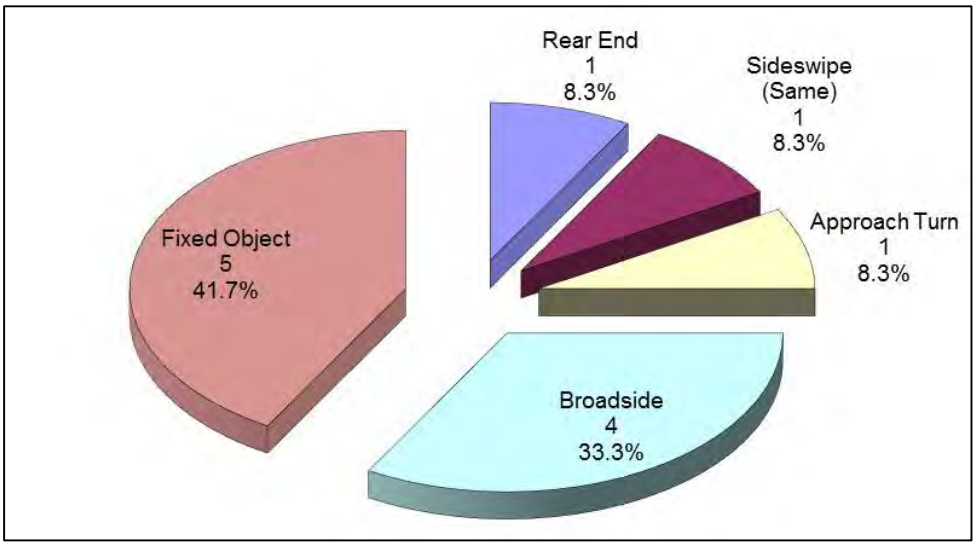
The intersection of US 85C with Denver Street is a four-leg, divided, unsignalized intersection. The northbound and southbound approaches provide a left-turn and right-turn deceleration lanes onto Denver Street. There are two through lanes along US 85C. Denver Street's east leg provides right-turn out only access to US 85C with right-turn acceleration lanes onto northbound US 85C. The west leg of Denver Street is a left-turn/through/right-turn lane with right-turn acceleration lanes onto southbound US 85C. The posted speed limit on US 85C is 65 mph. Denver Street has a posted speed limit of 30 mph. **Figure 87** shows an aerial view of the intersection.

Figure 87
Aerial Photo: US 85C / Denver Street (MP 235.60)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 12 crashes, eleven were property damage only and only one resulted in injury. **Figure 88** provides a graphical representation of crash types for this location. Fixed object type crashes (41.7%) were the predominant crash type followed by broadside type crashes (33.3%).

Figure 88
US 85C / Denver Street (MP 235.60)
12 Total Crashes



Observations / Recommendations

The frequency of fixed object type crashes was higher than expected for this type of intersection. A review of the crash history indicated that the four fixed object type crashes occurred in dry road conditions and one in icy road conditions. Two occurred in daylight conditions and three in dark unlighted/lighted conditions. Three vehicles struck signs, one hit a fence, and one hit a light pole. There is no correctible pattern to these crashes, and there are no suggestions for improvement at this time.

It should be noted that the island restricting westbound Denver Street traffic to right turns only was installed in early 2013. The four broadside crashes all were caused by westbound vehicles on Denver Street, and the turn restriction should have corrected the broadside problem. The intersection should be monitored to make sure this has happened.

US 85C / CR 2 (168th Avenue/Baseline Road) (MP 236.03)

The intersection of US 85C and CR 2 is a four-leg, divided, signalized intersection. There are both left-turn and right-turn deceleration lanes provided along US 85C with two through lanes on the main approaches. The east leg provides a left-turn/through/right-turn lane with a right-turn acceleration lane onto northbound US 85C. The west leg of the intersection has a left-turn/ through lane and dedicated right-turn lane with an acceleration lane onto southbound US 85C. The posted speed limit on US 85C is 50 mph, and the posted speed limit on CR 2 is 30 mph. **Figure 89** shows an aerial view of the intersection.

Figure 89
Aerial Photo: US 85C / CR 2 (168th Avenue/Baseline Road) (MP 236.03)

Safety Performance Function Analysis

For the intersection of US 85C with CR 2 (168th Avenue/Baseline Road), **Figure 90** shows that the frequency of total crashes over the five-year study period indicates a moderate to high potential for crash reduction (LOSS III) for a four-lane divided signalized four-leg intersection. **Figure 91** shows that the severity of crashes also indicates a moderate to high potential for crash reduction for this intersection type (LOSS III).

Figure 90
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (CR 2 [168th Avenue/Baseline Road])
Minor AADT = 4,500

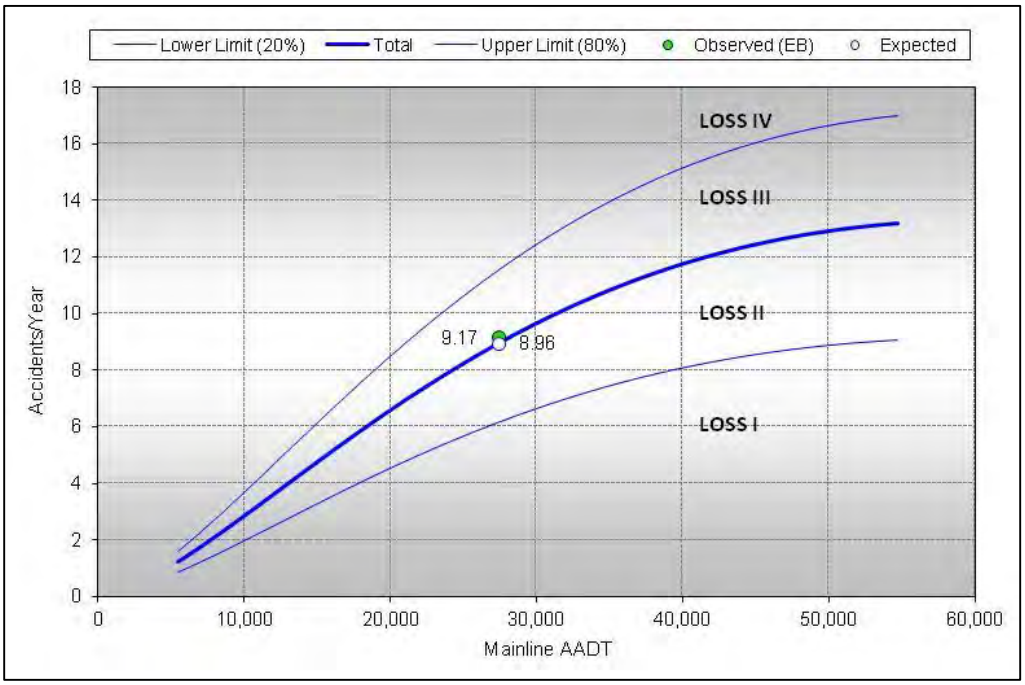
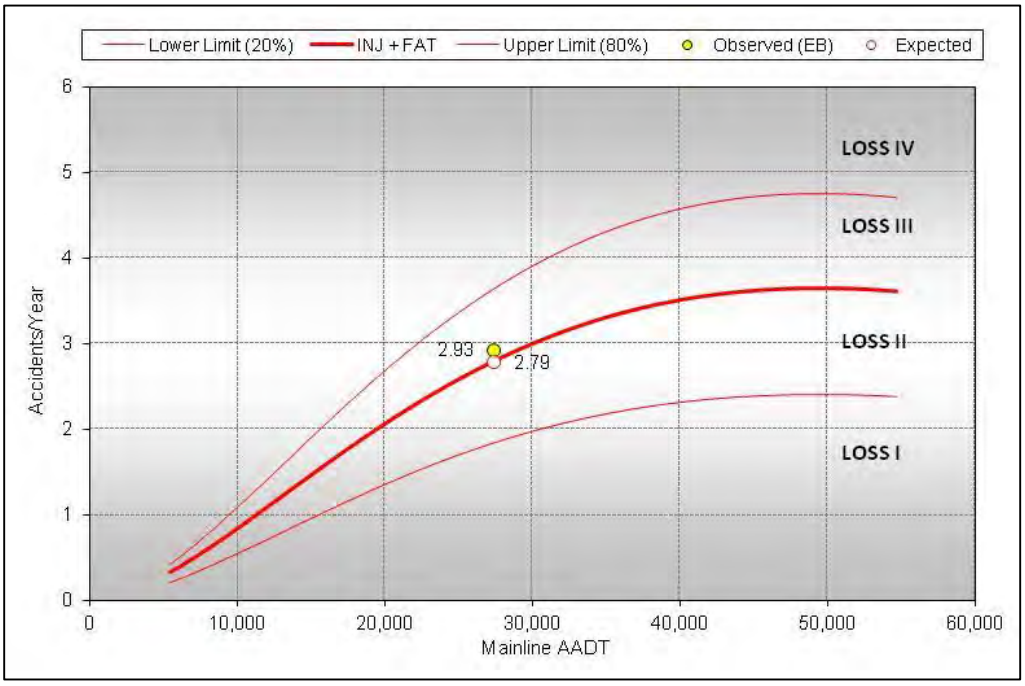


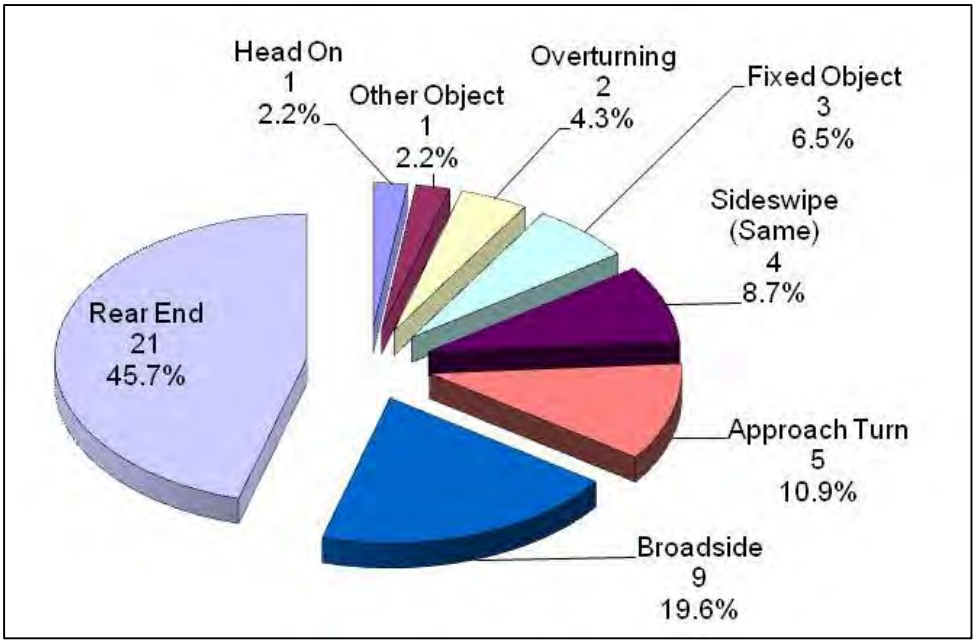
Figure 91
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (CR 2 [168th Avenue/Baseline Road])
Minor AADT = 4,500



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 46 crashes, 31 were property damage only and 15 resulted in injuries. **Figure 92** provides a graphical representation of crash types for this location. Rear end type crashes (45.7%) were the predominant crash type followed by broadside type crashes (19.6%).

Figure 92
US 85C / CR 2 (168th Avenue/Baseline Road) (MP 236.03)
46 Total Crashes



Observations / Recommendations

There are no significant crash types at this intersection. However, it is worth noting that the rear end crashes had 21 crashes of which 19 occurred on dry roadway conditions. Directionally, ten of the 21 occurred northbound, five southbound, one eastbound, and five westbound.

Reviewing the existing yellow/all red clearance intervals could help reduce rear end type crashes. Additionally, consideration of repositioning intersection warning signs (at an appropriate distance for current approach speeds) further away from the intersection could improve driver awareness of the upcoming signalized intersection. If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases.

US 85C / CR 2.5 (MP 236.55)

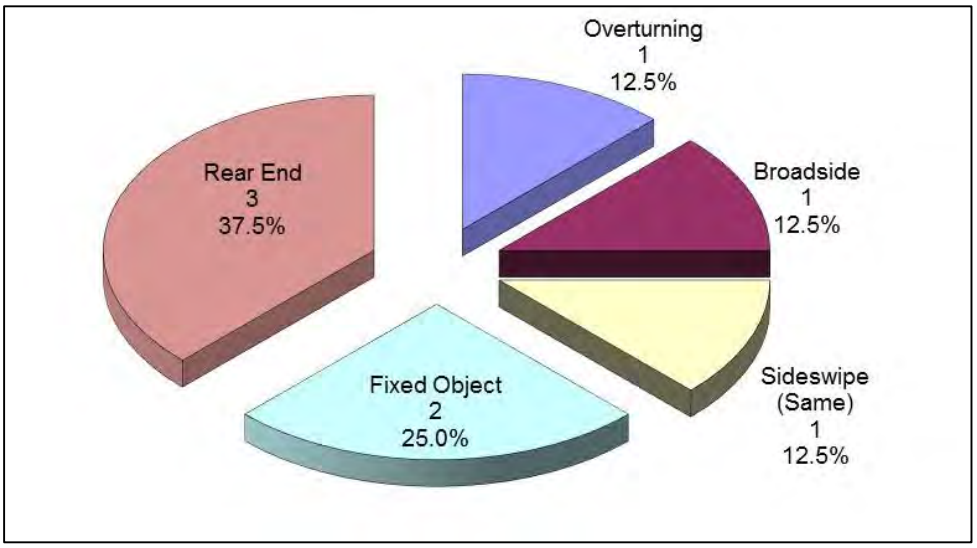
The intersection of US 85C with CR 2.5 is a three-leg, divided, unsignalized intersection. The southbound approach provides a left-turn deceleration lane. There are two through lanes along US 85C. CR 2.5 provides a left-turn/through/right-turn lane. The posted speed limit on US 85C is 65 mph. **Figure 93** shows an aerial view of the intersection.

Figure 93
Aerial Photo: US 85C / CR 2.5 (MP 236.55)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were eight crashes, three were property damage only and five resulted in injuries. **Figure 94** provides a graphical representation of crash types for this location. Rear end type crashes (37.5%) were the predominant crash type followed by fixed object type crashes (25.0%).

Figure 94
US 85C / CR 2.5 (MP 236.55)
8 Total Crashes



Observations / Recommendations

A review of the crash history indicates that there is no current pattern to crashes at the intersection of US 85C and CR 2.5. There are no suggestions for improvement at this time.

US 85C / CR 6 (MP 238.09)

The intersection of US 85C and CR 6 is a four-leg, divided, signalized intersection. There are both left-turn and right-turn deceleration lanes provided along US 85C with two through lanes on the main approaches. The east leg provides a left-turn lane and a through/right-turn lane with a right-turn acceleration lane onto northbound US 85C. The west leg of the intersection has a left-turn lane and through/right-turn lane with an acceleration lane onto southbound US 85C. The posted speed limit on US 85C is 65 mph, and the posted speed limit on CR 6 is 35 mph. **Figure 95** shows an aerial view of the intersection.

Figure 95
Aerial Photo: US 85C / CR 6 (MP 238.09)

Safety Performance Function Analysis

For the intersection of US 85C with CR6, **Figure 96** shows that the frequency of total crashes over the five-year study period was significantly better than expected for a four-lane divided signalized four-leg intersection which indicates a low potential for crash reduction (LOSS I). **Figure 97** shows that the severity of crashes also significantly indicates a low potential for crash reduction (LOSS I).

Figure 96
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (CR 6)
Minor AADT = 1,700

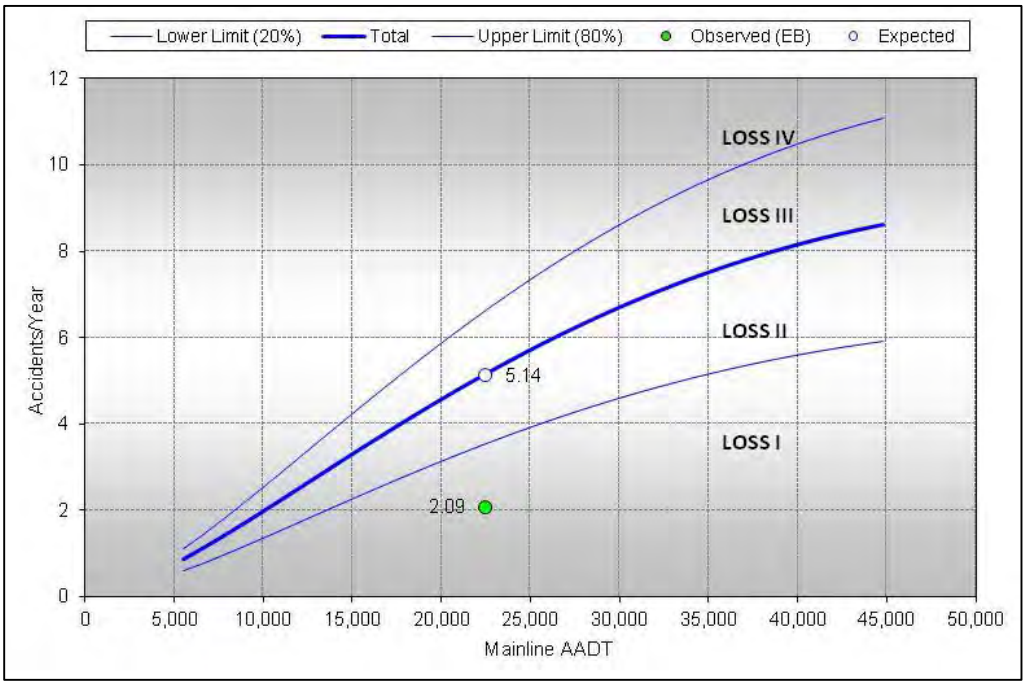
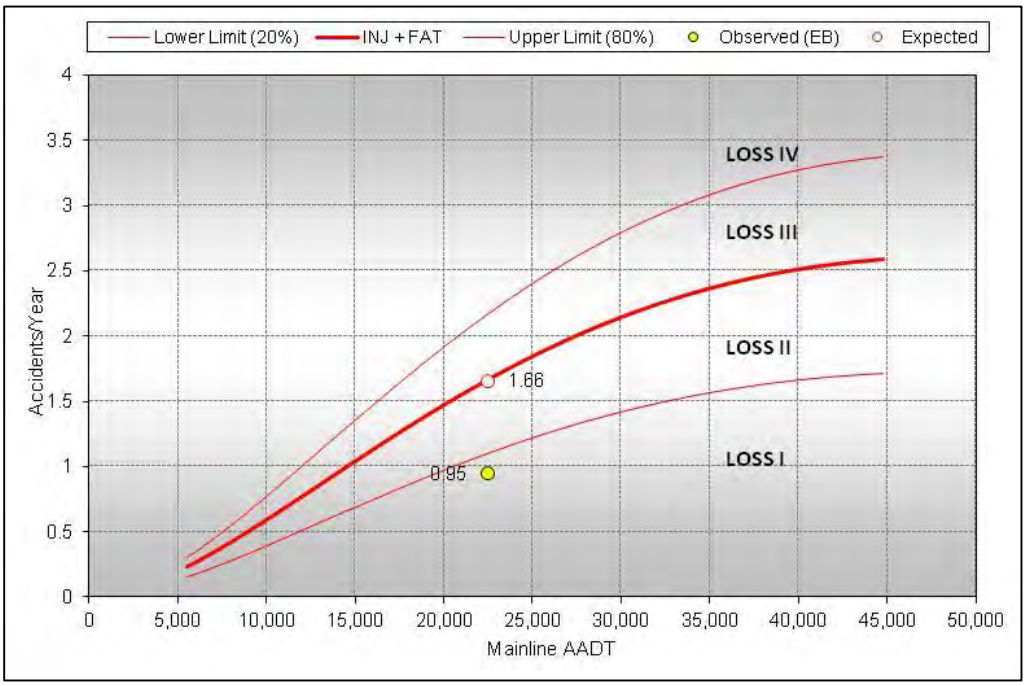


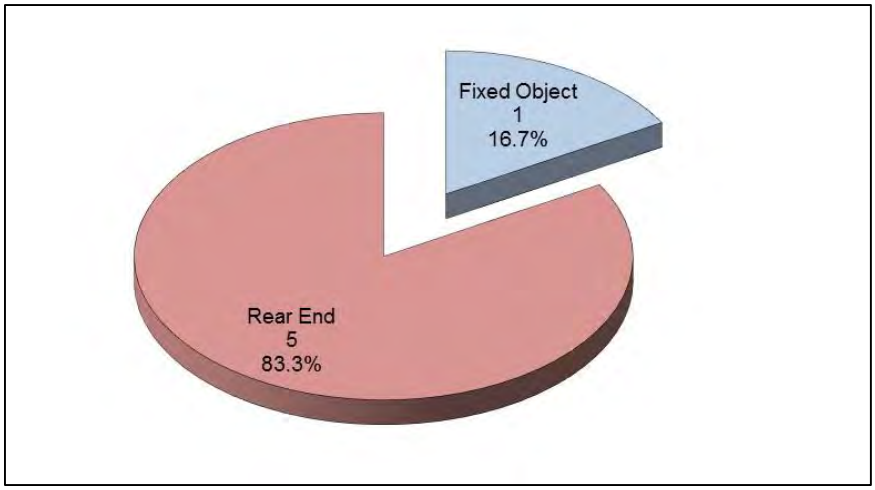
Figure 97
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (CR 6)
Minor AADT = 1,700



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were six crashes, four were property damage only and two resulted in injuries. **Figure 98** provides a graphical representation of crash types for this location. Rear end type crashes (83.3%) were the predominant crash type followed by fixed object type crashes (16.7%).

Figure 98
US 85C / CR 6 (MP 238.09)
6 Total Crashes



Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of intersection. A review of the crash history indicated that all five of the rear end crashes were southbound and all occurred on dry pavement.

Reviewing the existing yellow/all red clearance intervals could help reduce rear end type crashes. Additionally, consideration of repositioning intersection warning signs (at an appropriate distance for current approach speeds) further away from the intersection could improve driver awareness of the upcoming signalized intersection. If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases.

US 85C / CR 8 (MP 239.08)

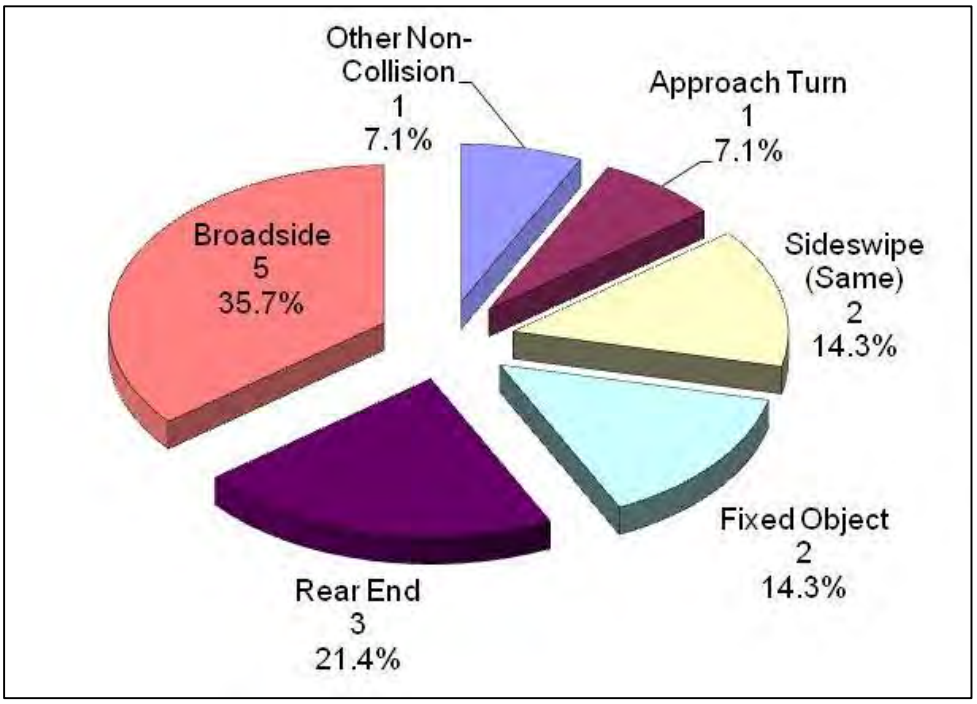
The intersection of US 85C with CR 6 is a four-leg, divided, unsignalized intersection. The northbound and southbound US 85C approaches provide both left-turn and right-turn deceleration lanes onto CR 8. There are two through lanes along both directions of US 85C. CR 8 provides a left-turn/through/right-turn lane and right-turn acceleration lanes onto US 85C. The posted speed limit on US 85C is 65 mph. **Figure 99** shows an aerial view of the intersection.

Figure 99
Aerial Photo: US 85C / CR 8 (MP 239.08)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 14 crashes, seven were property damage only and seven resulted in injuries. **Figure 100** provides a graphical representation of crash types for this location. Broadside type crashes (35.7%) were the predominant crash type followed by rear end type crashes (21.4%).

Figure 100
US 85C / CR 8 (MP 239.08)
14 Total Crashes



Observations / Recommendations

There are no significant crash types at this intersection. However, it is worth noting that the broadside crashes had five crashes that all occurred on dry roadway conditions. Directionally, the five broadside type crashes occurred westbound. Field visit did not find sight distance as an issue. It is recommended to monitor this intersection for future broadside crashes and review the need for a right-turn only island for westbound traffic if the issue persists.

US 85C / SH 52A (MP 241.59 & MP 19.96)

The interchange of US 85C with SH 7 has a diamond configuration with signalized intersections where the off-ramps (and on-ramps) from US 85C intersect with SH 52A. At each intersection, there is one through lane on SH 52A with separate left-turn lanes for the on-ramps. The left-turn arrows at each intersection are protected-permitted phasing. The off-ramps each have a left/through lane and a separate right turn lane. The posted speed limit on SH 52A is 30 mph. **Figure 101** shows an aerial view of the interchange.

Figure 101
Aerial Photo: US 85C / SH 52A (MP 235.10 & MP 19.96)

Safety Performance Function Analysis

For the west intersections of SH 52A with the ramps to/from US 85C, **Figure 102** shows that the frequency of total crashes indicates a high potential for crash reduction for a signalized two-lane ramp intersection (LOSS IV). **Figure 103** shows that the severity of crashes also indicates a to moderate to high potential for crash reduction (LOSS III).

For the east intersections of SH 52A with the ramps to/from US 85C, **Figure 104** shows that the frequency of total crashes indicates a high potential for crash reduction for a signalized two-lane ramp intersection (LOSS III/IV). **Figure 105** shows that the severity of crashes also indicates a to moderate potential for crash reduction (LOSS II/III).

Figure 102
Two-Lane (Mainline) Signalized Ramp Intersection
Total Crashes per Year (West Ramps – SH 52A at US 85C)
SH 52A AADT = 9,500

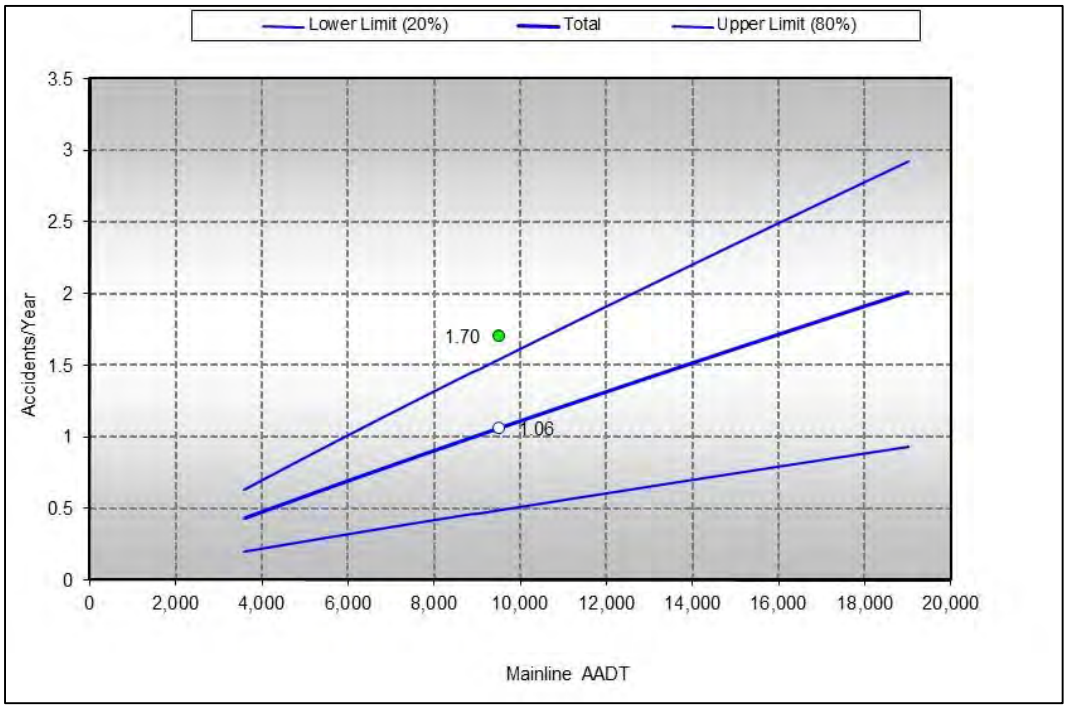


Figure 103
Two-Lane (Mainline) Signalized Ramp Intersection
Injury + Fatal Crashes per Year (West Ramps – SH 52A at US 85C)
SH 52A AADT = 9,500

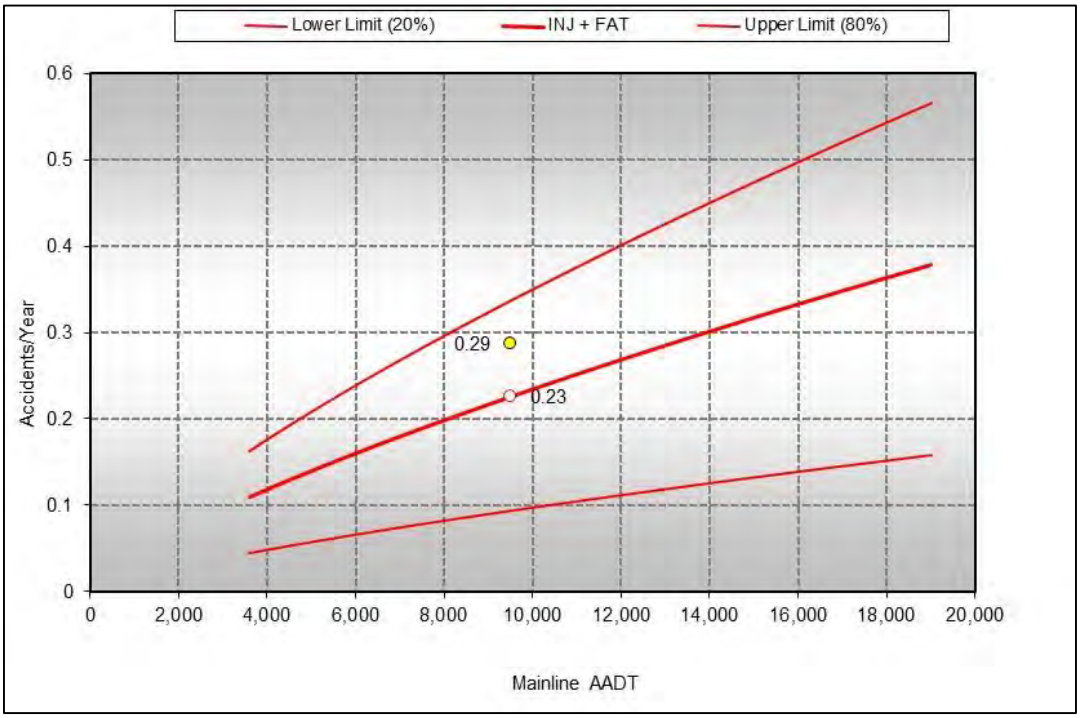


Figure 104
Two-Lane (Mainline) Signalized Ramp Intersection
Total Crashes per Year (East Ramps – SH 52A at US 85C)
SH 52A AADT = 13,600

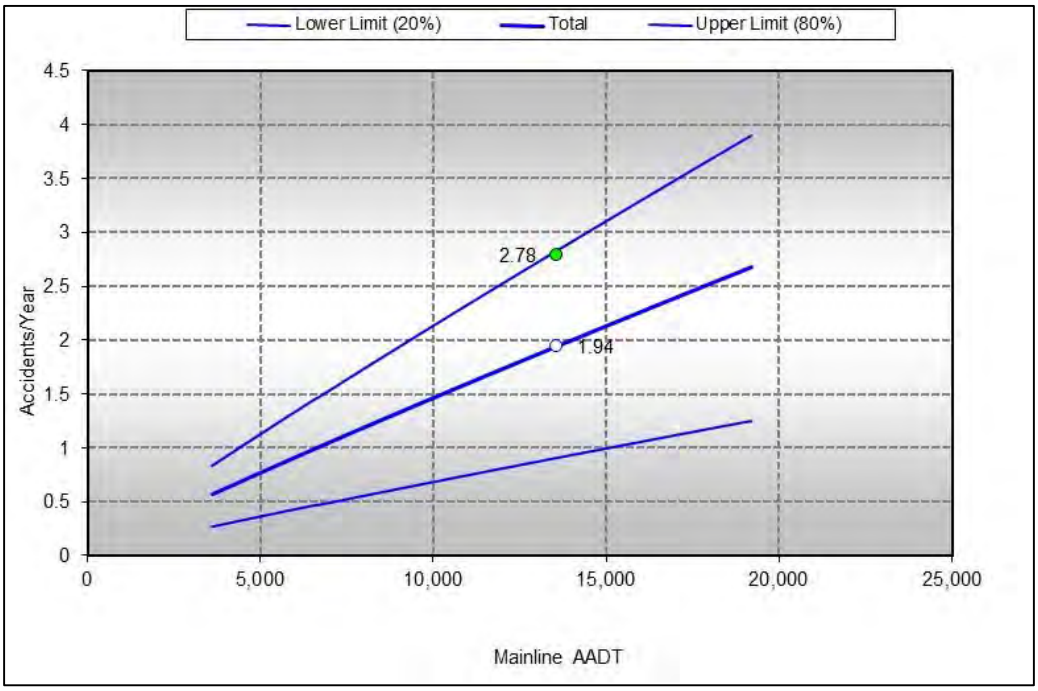
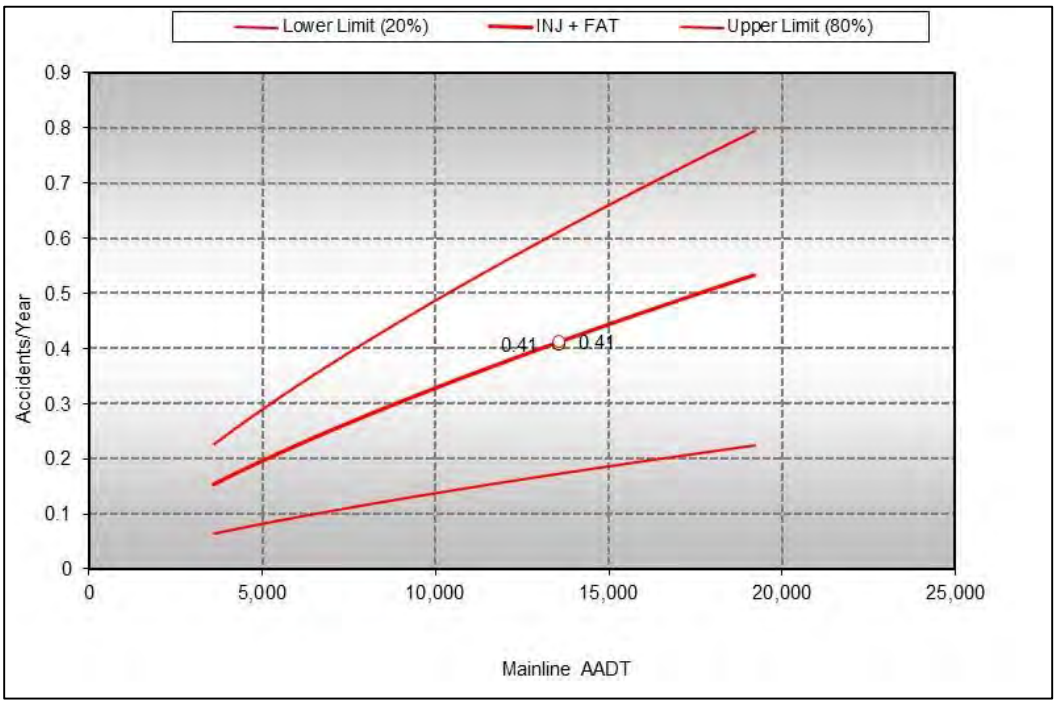


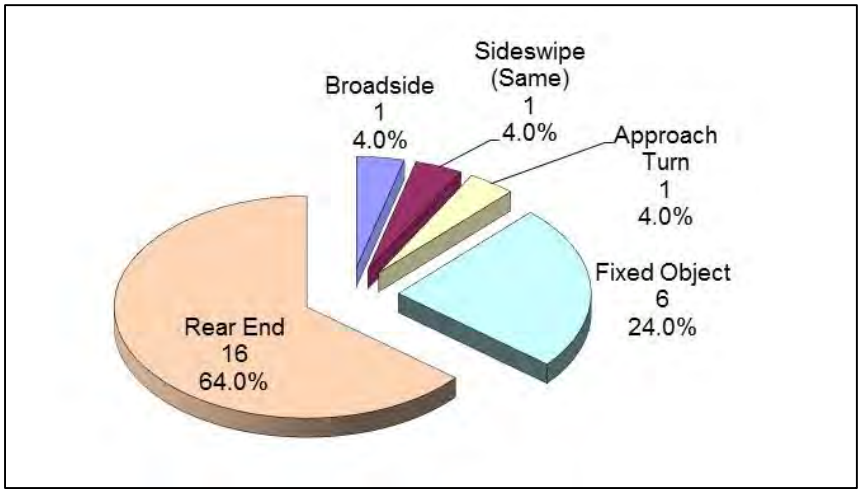
Figure 105
Two-Lane (Mainline) Signalized Ramp Intersection
Injury + Fatal Crashes per Year (East Ramps – SH 52A at US 85C)
SH 52A AADT = 13,600



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 25 crashes at the intersections or related to them, 21 were property damage only and four resulted in an injury. **Figure 106** provides a graphical representation of crash types for this location. Rear-end (64.0%) type crashes were the predominant crash type followed by fixed object (24.0%) type crashes (12.2%). The east intersection/ramps experienced 15 of the crashes, and the west had 10. The patterns of rear-end and fixed object type crashes was fairly consistent between the two intersections.

Figure 106
US 85C / SH 52A (MP 235.10 & MP 19.96)
25 Total Crashes



Observations / Recommendations

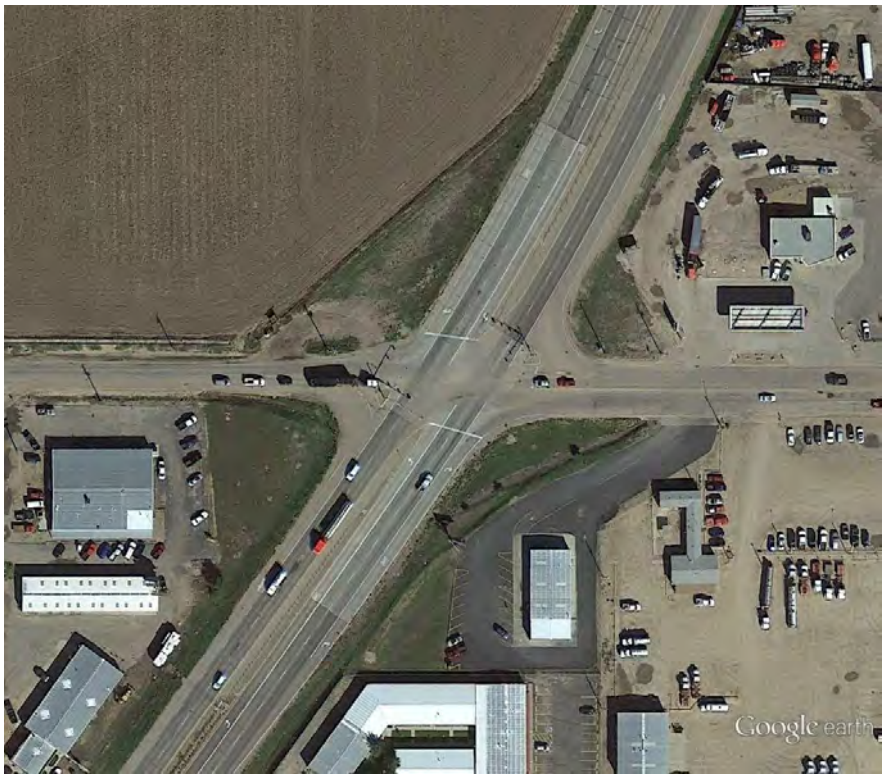
There are no direct diagnostics available for two-lane (mainline) signalized ramp intersection roundabouts to determine the expected number of crashes. However, the prevalence of rear end type crashes would be higher than expected if these intersections were either normal 3-leg or 4-leg intersections. Since most of the crashes were caused by vehicles travelling on SH 52A, this general comparison would appear to be valid. At the west intersection, four of the six rear-end type crashes were eastbound, while five of the rear-end crashes at the east intersection were westbound on SH 52A and four were northbound on the US 85C off-ramp. These vehicles were all approaching the first of two signalized intersections at the interchange. There does not appear to be a sight-distance concern with see the second signal when looking from under the US 85C bridges.

A brief review (Google StreetView) of the signing reveals that the there are no advance intersection warning signs provided for the intersection. Installing intersection warning signs (W2-1) should be considered on SH 52A and the northbound US 85C off-ramp. If the problem persists and separation distances allow, a flashing beacon could be considered which connects to the signal controller in order to anticipate red phases. This could improve driver awareness of the upcoming signalized intersection and reducing the frequency of rear end type crashes. Reviewing the existing yellow/all red clearance intervals could help reduce rear end type crashes.

US 85C / CR 14.5 (14th Street) (MP 242.66)

The intersection of US 85C and CR 14.5 is a four-leg, divided, signalized intersection located in Fort Lupton. There are both left-turn and right-turn deceleration lanes provided along US 85C with two through lanes on the main approaches. The east leg of CR 14.5 provides a left-turn lane and a through/right-turn lane with an acceleration lane onto northbound US 85C. The west leg provides a left-turn/through/right-turn lane with an acceleration lane onto southbound US 85C. The posted speed limit on US 85C is 55 mph, and the posted speed limit on CR 14.5 is 25 mph. **Figure 107** shows an aerial of the intersection.

Figure 107
Aerial Photo: US 85C / CR 14.5 (14th Street) (MP 242.66)



Safety Performance Function Analysis

For the intersection of US 85C with CR 14.5, **Figure 108** shows that the frequency of total crashes indicates a low to moderate potential for crash reduction for a signalized four-lane divided four-leg intersection (LOSS II). **Figure 109** shows that the severity of crashes indicates a moderate to high potential for crash reduction for this intersection type (LOSS III).

Figure 108
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (CR 14.5 [14th Street])
Minor AADT = 4,550

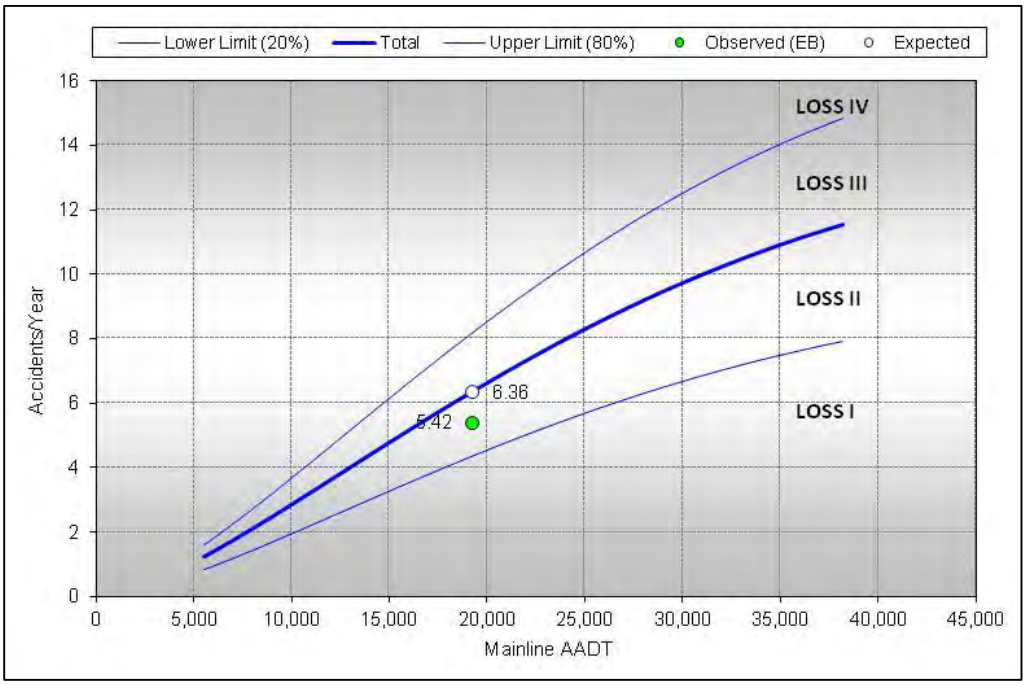
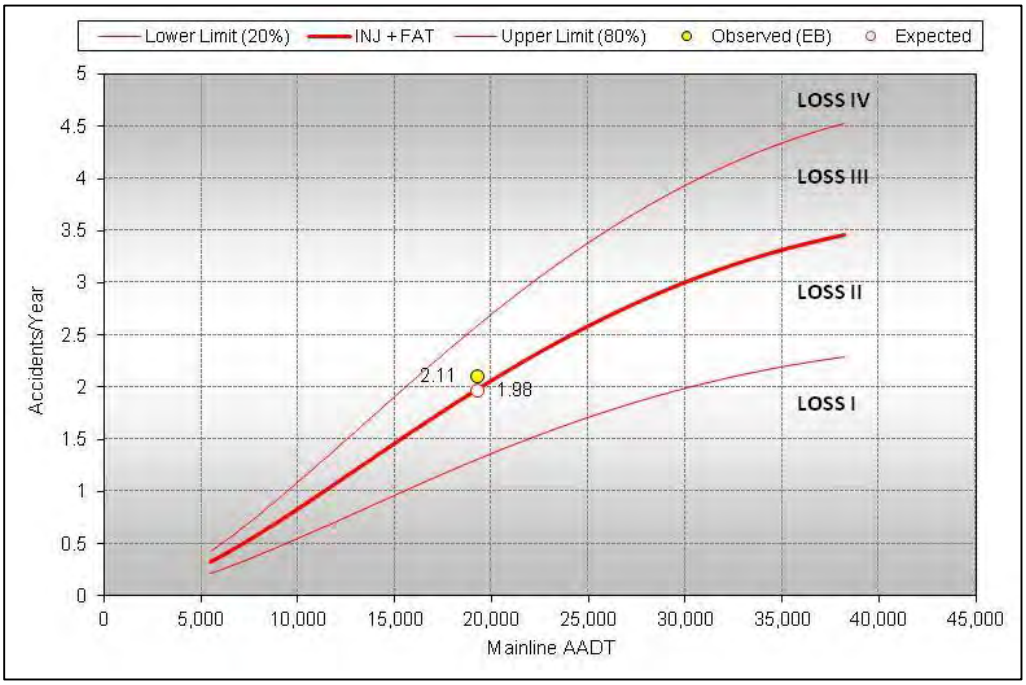


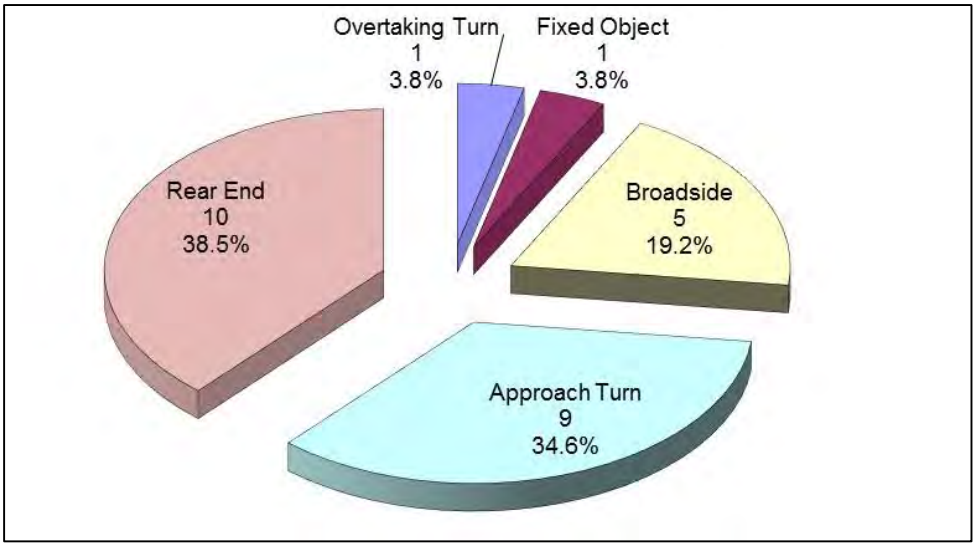
Figure 109
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (CR 14.5 [14th Street])
Minor AADT = 4,550



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 26 crashes, 15 were property damage only, ten resulted in injuries, and one fatal crash. **Figure 110** provides a graphical representation of crash types for this location. Rear end type crashes (38.5%) were the predominant crash type followed by approach turn type crash (34.6%).

Figure 110
US 85C / CR 14.5 [14th Street] (MP 242.66)
26 Total Crashes



Fatal Crashes

There was one fatal crash that occurred on August 13, 2010 at 9:14 under dry, daylight conditions. Vehicle #1 was traveling northbound on US 85C approaching 14½ Street and was attempting a left-turn when it was struck by southbound Vehicle # 2 on the passenger side of the vehicle. This approach turn type crash was noted to be careless driver and driver inexperience for the driver of Vehicle #1. Neither vehicle was speeding. No alcohol or drugs were suspected. Fatality was the passenger of Vehicle #1.

Observations / Recommendations

The frequency of approach turn type crashes was higher than expected for this type of intersection. A review of the crash history indicated that five of the approach turn type crashes were northbound, three southbound, and one westbound. All nine of the approach turn type crashes occurred on dry pavement road conditions. The signal provides protect-permitted left-turn movements along the mainline. Site visit indicated there could be a sight distance issue due to the intersection is positioned on a curve along US 85C. It was observed that northbound left-turning vehicles have difficulty viewing the mainline when there are opposing left-turning vehicles.

It is recommended to consider converting the northbound and southbound left-turn operations to protected only. Additionally, reviewing/updating the existing yellow/all red clearance intervals could provide more clearance time for turning movements to clear the intersection. Consideration of repositioning intersection warning signs (at an appropriate distance for current approach speeds) further away from the intersection could improve driver awareness of the upcoming signalized intersection. If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases.

US 85C / CR 16 (MP 243.21)

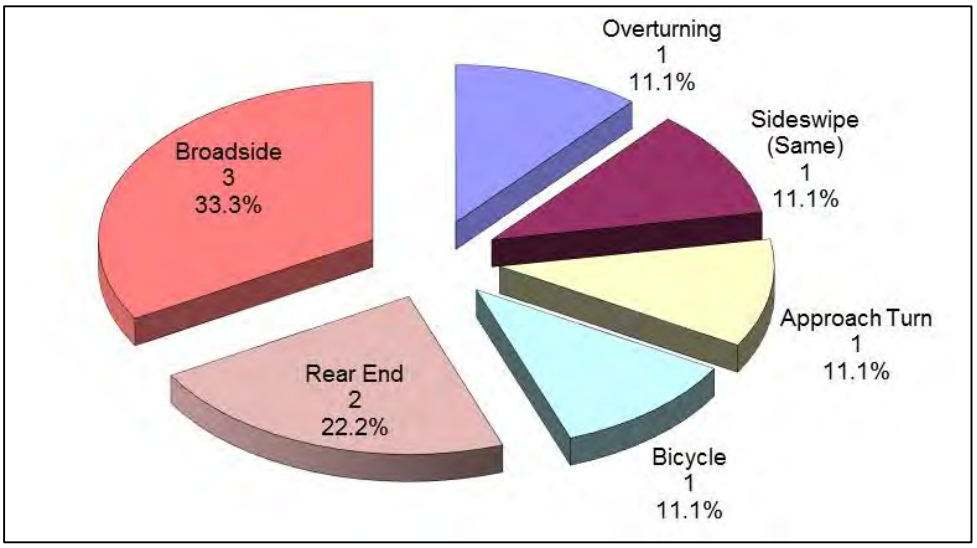
The intersection of US 85C with CR 16 is a three-leg, divided, unsignalized intersection. Access to CR 16 is only provided via northbound US 85C. There is a northbound right-turn deceleration lane on US 85C. CR 16 has right-turn only access. The posted speed limit on US 85C is 65 mph. **Figure 111** shows an aerial view of the intersection.

Figure 111
Aerial Photo: US 85C / CR 16 (MP 243.21)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were nine crashes, five were property damage only and four resulted in injuries. **Figure 112** provides a graphical representation of crash types for this location. Broadside type crashes (33.3%) were the predominant crash type followed by rear end type crashes (22.2%).

Figure 112
US 85C / CR 16 (MP 243.21)
9 Total Crashes



Observations / Recommendations

There are no significant crash types at this intersection. However, it is worth noting that there were three broadside crashes that all occurred before 2012. Sometime in early 2012, the median was closed so that westbound vehicles can only turn right at the intersection. This has eliminated the broadside crash problem through 2014.

US 85C / CR 18 (MP 244.21)

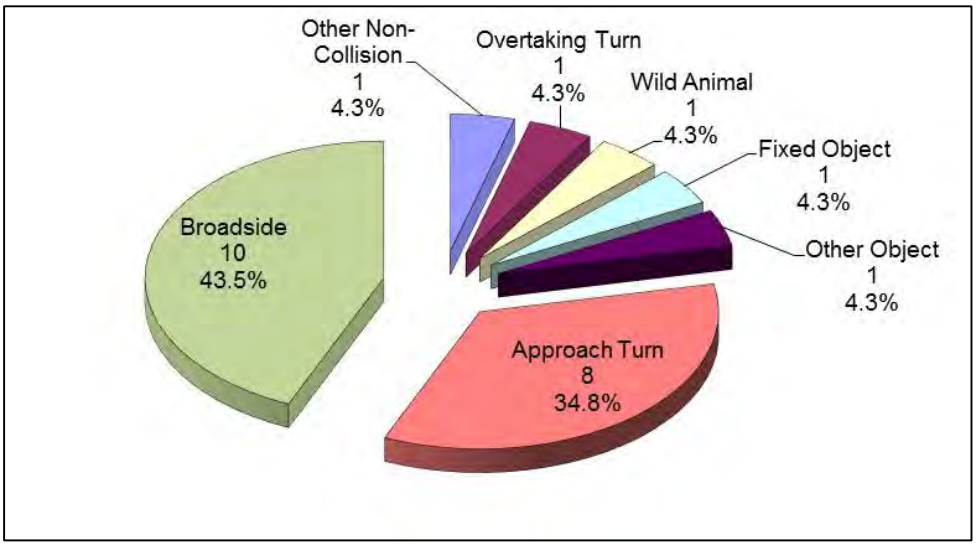
The intersection of US 85C with CR 18 is a four-leg, divided, unsignalized intersection. The northbound and southbound US 85C approaches provide both left-turn and right-turn deceleration lanes onto CR 18. There are two through lanes along US 85C. The east leg of CR 18 provides a left-turn/through/right-turn lane and right-turn acceleration lanes onto northbound US 85C. The west leg of the intersection provides left-turn/through lane and right turn lane with an acceleration lane onto southbound US 85C. The posted speed limit on US 85C is 65 mph. **Figure 113** shows an aerial view of the intersection.

Figure 113
Aerial Photo: US 85C / CR 18 (MP 244.21)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 23 crashes, ten were property damage only and 13 resulted in injuries. **Figure 114** provides a graphical representation of crash types for this location. Broadside type crashes (43.5%) were the predominant crash type followed by approach turn type crashes (34.8%).

Figure 114
US 85C / CR 18 (MP 244.21)
23 Total Crashes



Observations / Recommendations

The frequency of broadside type crashes was higher than expected for this type of intersection. A review of the crash history indicated that six of the broadside type crashes were eastbound vehicles (four hitting southbound vehicles and two hitting northbound vehicles) and three were westbound (all hitting northbound vehicles). None of the at-fault vehicles was a large truck. Six of the crashes resulted in a total of 15 injuries. Ten broadside type crashes occurred on dry pavement road conditions during daylight hours. Only two of the crashes involved eastbound vehicles that crossed the median and struck a northbound vehicle; seven vehicles struck US 85C vehicles in the closer direction of travel. Six of the vehicles were going straight while three were making left turns. A site visit indicated there is not a sight distance issue. There is no indication in the crash records that the at-fault vehicles failed to stop at the stop signs. There are double posted intersection warning signs (W2-1) on both approaches of US 85C. It is recommended that the size of these signs be increased to freeway standard (48”x48”). This intersection should be monitored in the future to see if more aggressive measures (such as beacons on the stop signs, intersection warning signs, or ultimately right turn only restrictions for both CR 18 approaches) might be appropriate.

The frequency of approach turn type crashes was higher than expected for this type of intersection. A review of the crash history indicated that one of the approach turn type crashes was northbound and seven were southbound. Seven of the crashes resulted in 15 injuries. All eight of the approach turn type crashes occurred on dry pavement road conditions. Five of the crashes occurred during daylight hours. It should be noted that the position of the southbound left-turn lane was shifted further east in the median to give better visibility of oncoming northbound traffic. There was only one southbound approach turn crash in 2012. It is recommended to monitor this intersection for future approach turn crashes and determine the need for more aggressive measures (such as closing the median to create right-in, right-out turns for both CR 18 approaches) if the issue persists.

Closing the median to create right-in, right-out turns for both CR 18 approaches would positively address both broadside and approach turn type crashes.

US 85C / CR 22 (MP 246.21)

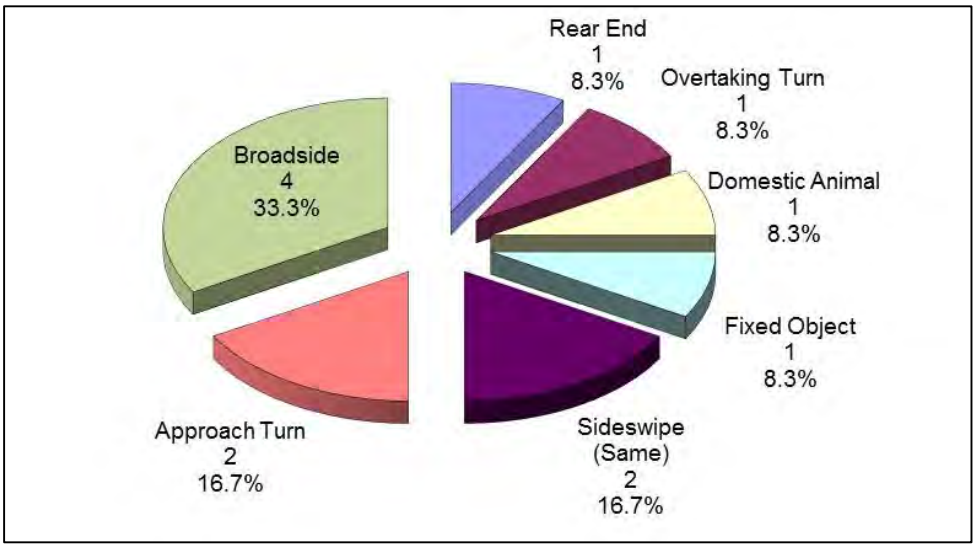
The intersection of US 85C with CR 22 is a four-leg, divided, unsignalized intersection. The northbound approach provides a right-turn deceleration lane onto CR 22 with an acceleration lane onto northbound US 85C. The southbound approach provides left-turn onto CR 22. There are two through lanes along US 85C. The east leg of the intersection provides a left-turn/through/right-turn lane. The west left of the intersection provides access to a private residency. The posted speed limit on US 85C is 65 mph. **Figure 115** shows an aerial view of the intersection.

Figure 115
Aerial Photo: US 85C / CR 22 (MP 246.21)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 12 crashes, six were property damage only and six resulted in injuries. **Figure 116** provides a graphical representation of crash types for this location. Broadside type crashes (33.3%) were the predominant crash type followed by approach turn and sideswipe (same) type crashes (16.7% each).

Figure 116
US 85C / CR 22 (MP 246.21)
12 Total Crashes



Observations / Recommendations

There are no significant crash types at this intersection. However, it is worth noting that there were four broadside crashes that all occurred on dry roadway conditions. Directionally, the four broadside type crashes occurred westbound. Three vehicles were making left turns, and two hit northbound vehicles while one hit a southbound vehicle. A field visit did not find sight distance as an issue. There are double posted intersection warning signs (W2-1) on both approaches of US 85C. Increasing the size of these signs to freeway standard (48”x48”) could be considered. This intersection should be monitored in the future to see if more aggressive measures (such as beacons on the stop signs, intersection warning signs, or ultimately right turn only restrictions for both CR 18 approaches) might be appropriate.

US 85C / CR 22.5 (MP 246.71)

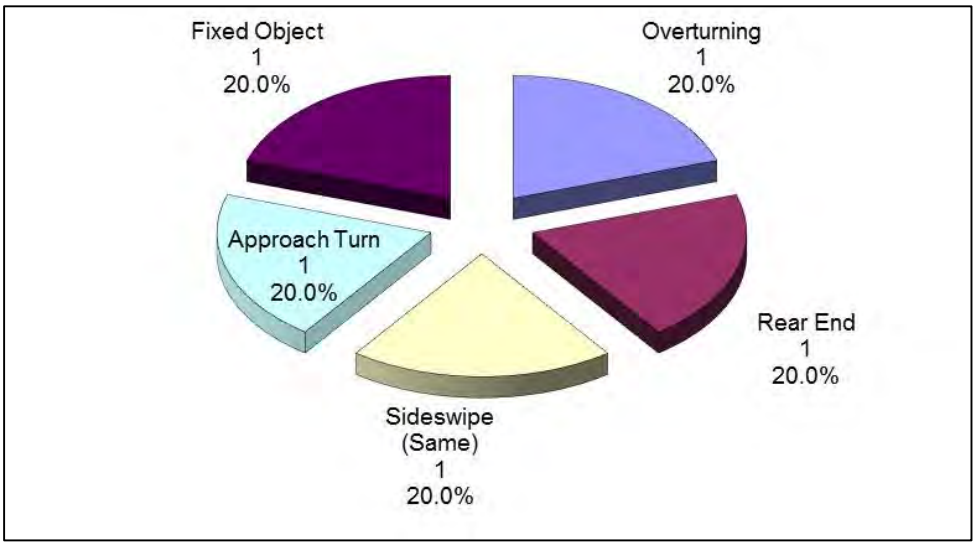
The intersection of US 85C with CR 22.5 is a four-leg, divided, unsignalized intersection. The northbound approach provides left-turn deceleration lane onto CR 22. There are two through lanes along US 85C. The east and west approaches of the intersection provide left-turn/through/right-turn lanes. The posted speed limit on US 85 is 65 mph. **Figure 117** shows an aerial view of the intersection.

Figure 117
Aerial Photo: US 85C / CR 22.5 (MP 246.71)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were five crashes and all were property damage only. **Figure 118** provides a graphical representation of crash types for this location.

Figure 118
US 85C / CR 22.5 (MP 246.71)
5 Total Crashes



Observations / Recommendations

A review of the crash history indicates that there is no current pattern to crashes at the intersection of US 85C and CR 22.5. There are no suggestions for improvement at this time.

US 85C / CR 28 (MP 249.22)

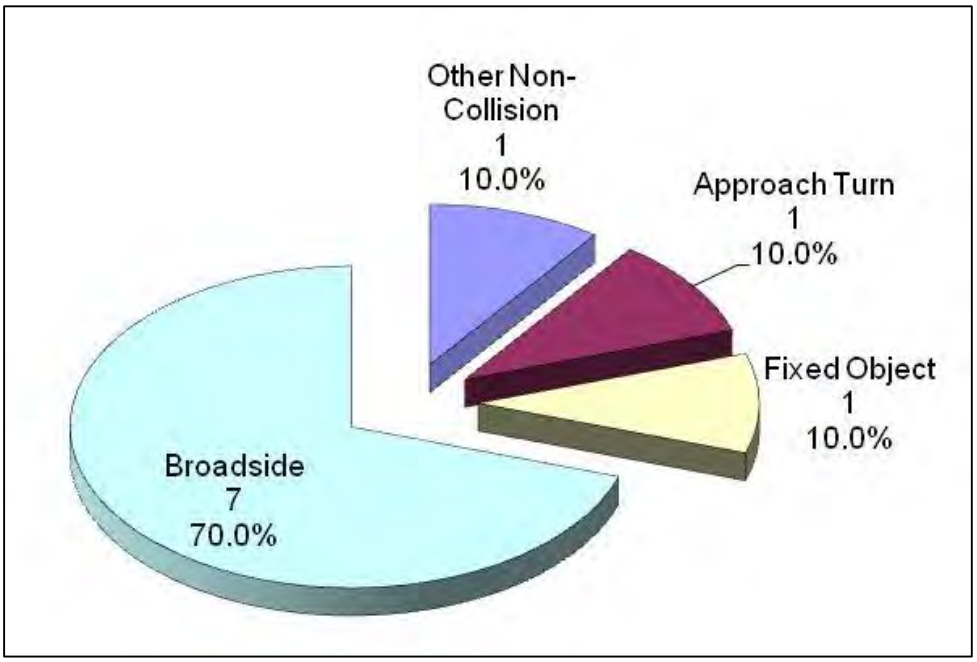
The intersection of US 85C with CR 28 is a four-leg, divided, unsignalized intersection. The northbound and southbound US 85C approaches provide both left-turn and right-turn deceleration lanes onto CR 28. There are two through lanes along US 85C. CR 28 provides a left-turn/through/right-turn lane and right-turn acceleration lanes onto both directions of US 85C. The posted speed limit on US 85C is 65 mph; however, directly north of the intersection the posted speed limit changes to 55 mph. **Figure 119** shows an aerial view of the intersection.

Figure 119
Aerial Photo: US 85C / CR 28 (MP 249.22)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 10 crashes, four were property damage only and six resulted in injuries. **Figure 120** provides a graphical representation of crash types for this location. Broadside type crashes (70.0%) were the predominant crash type.

Figure 120
US 85C / CR 28 (MP 249.22)
10 Total Crashes



Observations / Recommendations

The frequency of broadside type crashes was higher than expected for this type of intersection. A review of the crash history indicated that four of the approach turn type crashes were eastbound and three were westbound. There was no strong pattern by direction for the vehicles on US 85C that were struck. All seven of the broadside type crashes occurred on dry pavement road conditions. Site visit did not find sight distance as an issue. There are double posted intersection warning signs (W2-1) on both approaches of US 85C. Increasing the size of these signs to freeway standard (48”x48”) could be considered. This intersection should be monitored in the future to see if more aggressive measures (such as beacons on the stop signs, intersection warning signs, or ultimately right turn only restrictions for both CR 18 approaches) might be appropriate.

US 85C / SH 66 (MP 250.65)

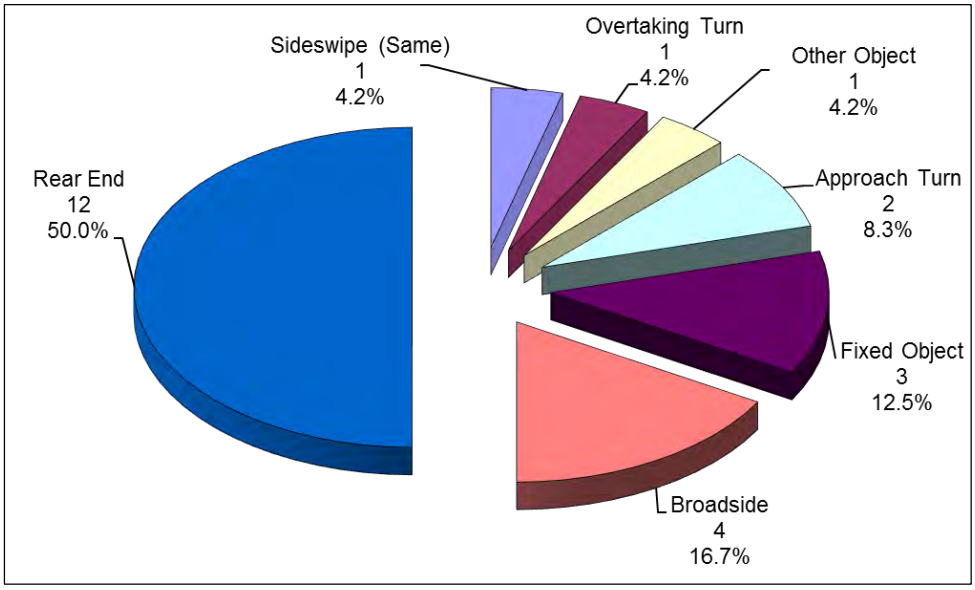
The intersection of US 85C and SH 66 is a four-leg, divided, signalized intersection located in Platteville. The northbound approach provides both left-turn and right turn deceleration lanes. The southbound approach provides a right-turn deceleration lane for turning onto westbound SH 66. US 85C has two through lanes on the main approaches. The east leg (Platte Street) has a left-turn/through/right-turn lane approach. The west leg provides a left-turn/through lane with right-turn lane and an acceleration lane onto southbound US 85C. The posted speed limit on US 85C is 55 mph, and the posted speed limit on SH 66 is 35 mph. **Figure 121** shows an aerial view of the intersection.

Figure 121
Aerial Photo: US 85C / SH 66 (MP 250.65)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 24 crashes, 20 were property damage only and four that resulted in injuries. **Figure 122** provides a graphical representation of crash types for this location. Rear end type crashes (50.0%) were the predominant crash type followed by broadside type crash (16.7%).

Figure 122
US 85C / SH 66 (MP 250.65)
24 Total Crashes



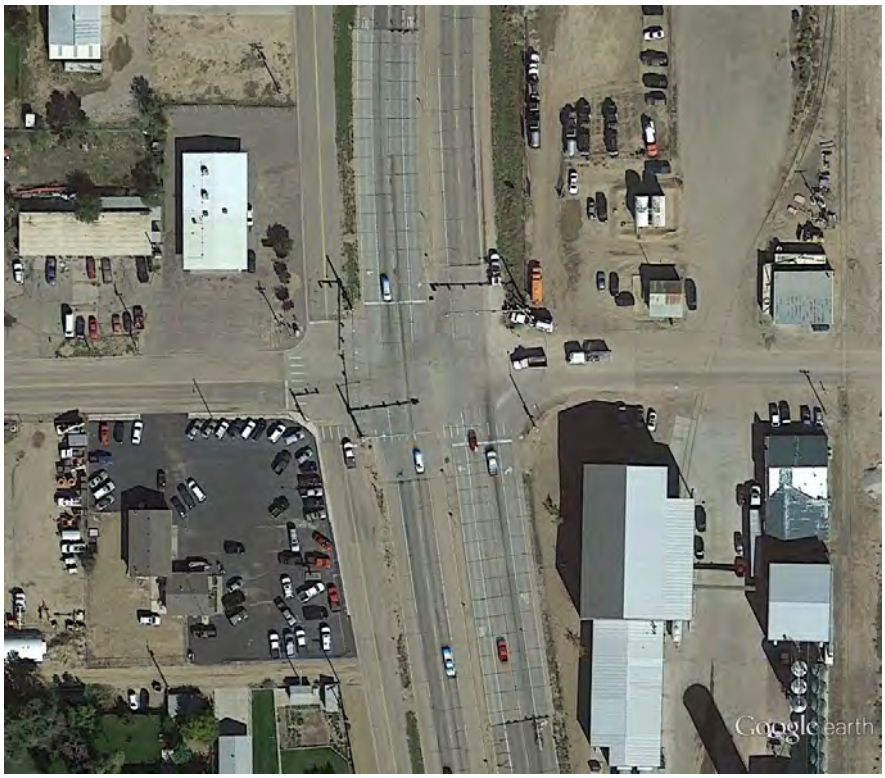
Observations / Recommendations

There are no significant crash types at this intersection. However, it is worth noting that the rear end type crashes had 12 crashes of which 11 occurred on dry roadway conditions and one on icy road conditions. Directionally, four occurred northbound, five were southbound, and three occurred eastbound. Reviewing and updating the existing yellow/all red clearance intervals could be considered to help reduce the frequency of rear end type crashes. Additionally, consideration of repositioning intersection warning signs (at an appropriate distance for current approach speeds) further away from the intersection could improve driver awareness of the upcoming signalized intersection. If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases.

US 85C / CR 32 (MP 251.22)

The intersection of US 85C and CR 32 is a four-leg, divided, signalized intersection located in Platteville. There are both left-turn and right-turn deceleration lanes provided along US 85C with two through lanes on the main approaches. The east and west legs have a single lane approach for left/through/right turns. The adjacent frontage road on the west side of the intersection is included in the signalization. The posted speed limit on US 85C is 50 mph, and the posted speed limit on CR 32 is 30 mph. **Figure 123** shows an aerial view of the intersection.

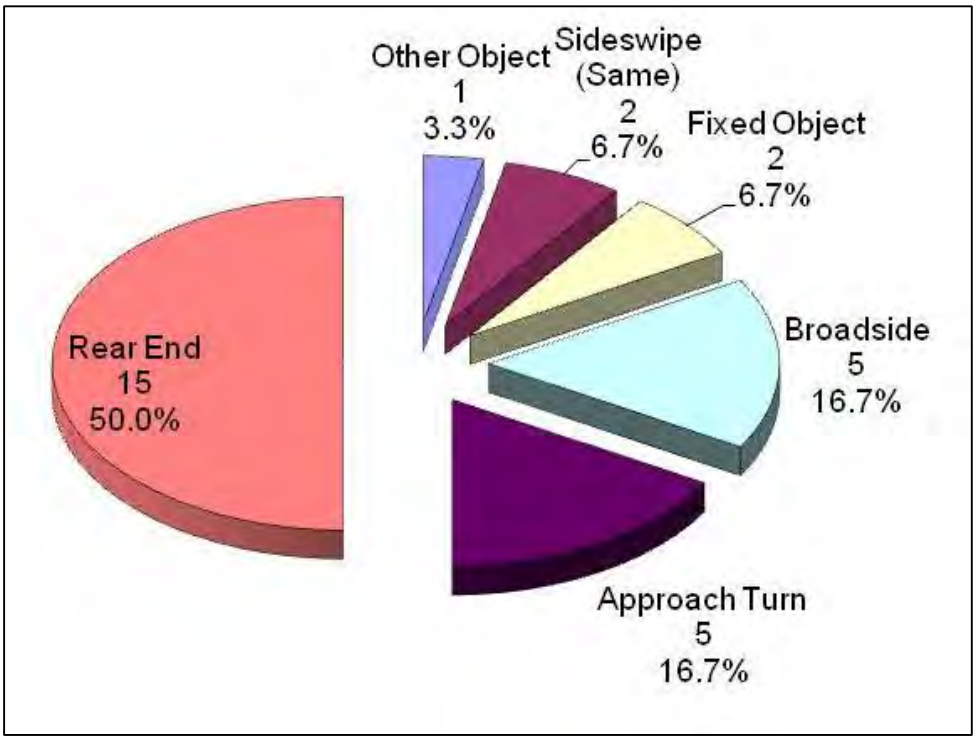
Figure 123
Aerial Photo: US 85C / CR 32 (MP 251.22)



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 30 crashes, 22 were property damage only and eight that resulted in injuries. **Figure 124** provides a graphical representation of crash types for this location. Rear end type crashes (50.0%) were the predominant crash type followed by broadside and approach turn type crashes (16.7% each).

Figure 124
US 85C / CR 32 (MP 251.22)
30 Total Crashes



Observations / Recommendations

There are no significant crash types at this intersection. However, it is worth noting that the rear end type crashes had 15 crashes of which ten occurred on dry roadway conditions and three on icy road conditions. Directionally, five occurred northbound and ten occurred southbound. Reviewing and updating the existing yellow/all red clearance intervals could be considered to help reduce the frequency of rear end type crashes. There should be consideration of shifting the change in speed limit sign further north to provide drivers more time to slow down before a signalized intersection. Additionally, consideration of repositioning intersection warning signs (at an appropriate distance for current approach speeds) further away from the intersection could improve driver awareness of the upcoming signalized intersection. If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases.

US 85C / CR 36 (MP 253.27)

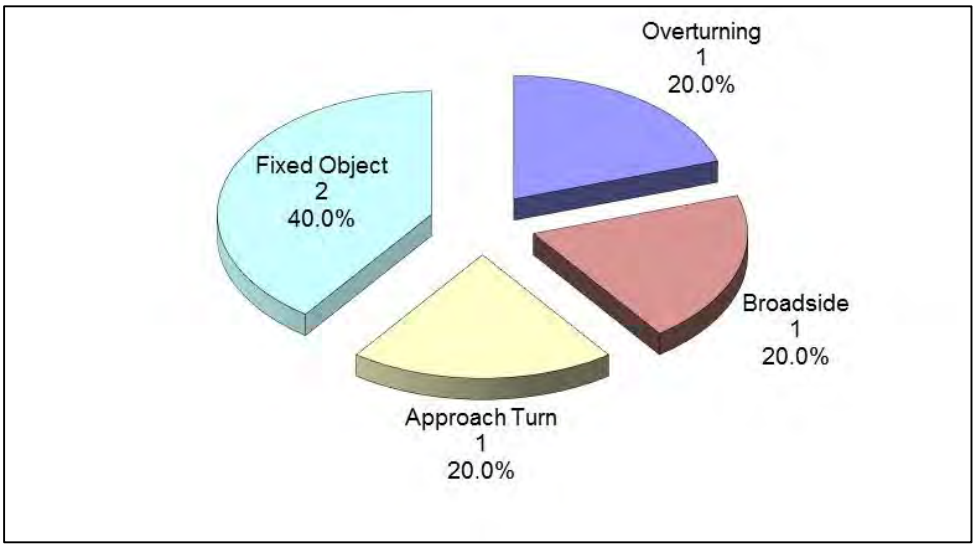
The intersection of US 85C with CR 36 is a four-leg, divided, unsignalized intersection. The northbound and southbound US 85C approaches provide both left-turn and right-turn deceleration lanes onto CR 36. There are two through lanes along US 85C. CR 36 provides a left-turn/through/right-turn lane on both approaches. The posted speed limit on US 85C is 65 mph. **Figure 125** shows an aerial view of the intersection.

Figure 125
Aerial Photo: US 85C / CR 36 (MP 253.27)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were five crashes, three were property damage only and two resulted in injuries. **Figure 126** provides a graphical representation of crash types for this location. Fixed object type crashes (40.0%) were the predominant crash type.

Figure 126
US 85C / CR 36 (MP 253.27)
5 Total Crashes



Observations / Recommendations

A review of the crash history indicates that there is no current pattern to crashes at the intersection of US 85C and CR 36. There are no suggestions for improvement at this time.

US 85C / SH 60 (CR 27) (MP 253.81)

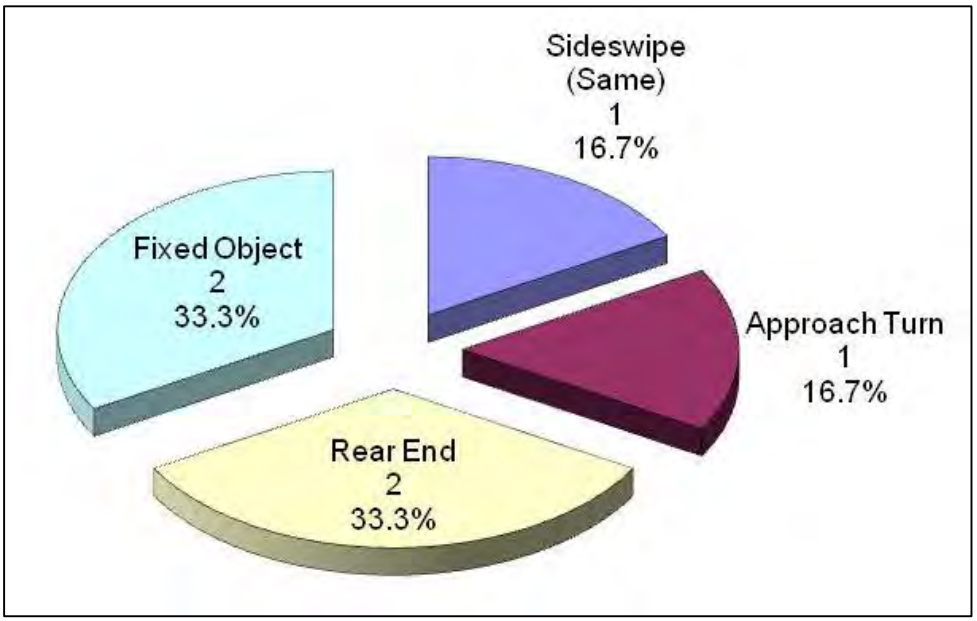
The intersection of US 85C with SH 60 (CR 27) is a three-leg, divided, unsignalized intersection. There is a southbound right-turn deceleration lane and a northbound left turn lane on US 85C. There are two through lanes along US 85C. SH 60 has a left-turn lane and a channelized right-turn lane with an acceleration lane on southbound US 85C. The posted speed limit on US 85C is 65 mph. **Figure 127** shows an aerial view of the intersection.

Figure 127
Aerial Photo: US 85C / SH 60 (CR 27) (MP 253.81)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were six crashes, four were property damage only and two resulted in injuries. **Figure 128** provides a graphical representation of crash types for this location.

Figure 128
US 85C / SH 60 [CR 27] (MP 253.81)
6 Total Crashes



Observations / Recommendations

A review of the crash history indicates that there is no current pattern to crashes at the intersection of US 85C and SH 60 (CR 27). There are no suggestions for improvement at this time.

US 85C / CR 42 (MP 257.26)

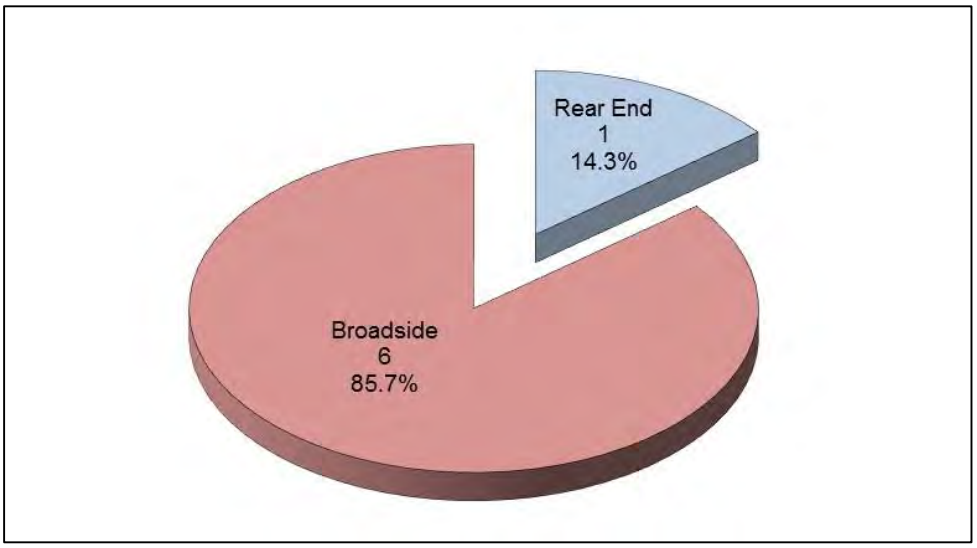
The intersection of US 85C and CR 42 is a four-leg, divided, signalized intersection. CR 42 has been signalized since the five-year study period (1/1/2008 – 12/31/2012). There are both left-turn and right-turn deceleration lanes provided along US 85C with two through lanes on the main approaches. The east and west legs have a single lane approach with right-turn acceleration lanes along each direction of US 85C. The posted speed limit on US 85C is 60 mph, and the posted speed limit on CR 42 is 20 mph. **Figure 129** shows an aerial view of the intersection.

Figure 129
Aerial Photo: US 85C / CR 42 (MP 257.26)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were seven crashes, five were property damage only and two resulted in injuries. **Figure 130** provides a graphical representation of crash types for this location. Broadside type crashes (85.7%) were the predominant crash type.

Figure 130
US 85C / CR 42 (MP 257.26)
7 Total Crashes



Observations / Recommendations

The frequency of broadside type crashes was higher than expected for this type of intersection. Broadside type crashes are common for unsignalized intersections. Since the five-year study period (1/1/2008 – 12/31/2012), a traffic signal has been installed. It is expected that this signal will mitigate the historic pattern of broadside type crashes. It is recommended to monitor this intersection for any future crash patterns.

US 85C / CR 44 (MP 258.60)

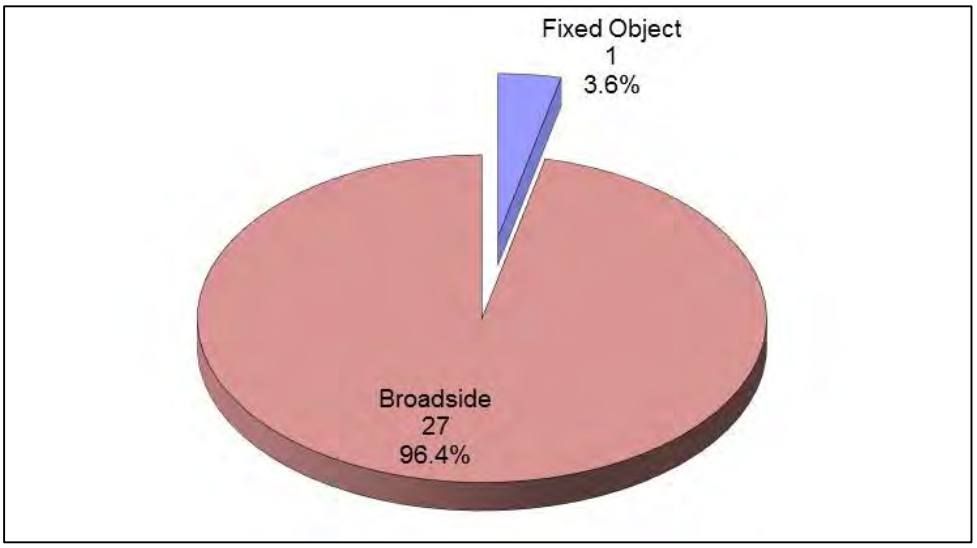
The intersection of US 85C with CR 44 is a four-leg, divided, unsignalized intersection. The northbound and southbound US 85C approaches provide both left-turn and right-turn deceleration lanes onto CR 44. There are two through lanes along US 85C. Both approaches from CR 44 have a left-turn/through lane with a short channelized right-turn access with an acceleration lane onto both directions of US 85C. The posted speed limit on US 85C is 65 mph. The posted speed limit on CR 44 is 45 mph. **Figure 131** shows an aerial view of the intersection.

Figure 131
Aerial Photo: US 85C / CR 44 (MP 258.60)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 28 crashes, fifteen were property damage only and thirteen resulted in injuries. **Figure 132** provides a graphical representation of crash types for this location. Broadside type crashes (96.4%) were the predominant crash type.

Figure 132
US 85C / CR 44 (MP 258.60)
28 Total Crashes



Observations / Recommendations

The frequency of broadside type crashes was higher than expected for this type of intersection. A review of the crash history indicated that 11 of the broadside type crashes were eastbound, 15 westbound and one southbound. Twenty-four of the 27 broadside type crashes occurred on dry pavement road conditions, two on wet road conditions and one on icy road conditions. Broadside type crashes at this intersection had 18 crashes that involved either trucks or buses. Twenty-four of the crashes involved eastbound and northbound vehicles or westbound and southbound vehicles – meaning that the side road vehicles crossed the median and then were struck from the right. Site visit did not find sight distance as an issue; however, the intersection is angled at approximately 45 degrees. This means that the drivers of almost all of the at-fault vehicles had to look more than 90-degrees over their shoulders to see oncoming traffic. This larger angle may make it harder for large trucks and busses to see oncoming traffic.

Given that there are existing businesses on each corner on the west side and there are UPRR tracks to the east, realigning the approaches to be perpendicular would be very expensive. There are currently double posted intersection warning signs (W10-2) on both approaches of US 85C. Unfortunately, the northbound posting is at MP 258.213, south of the intersection with CR 33 (MP 258.37). Increasing the size of these signs to freeway standard (48”x48”) and adding northbound signs south of CR 44 should be considered. Flashing beacons for these signs should also be considered. If a pattern of side road drivers failing to stop becomes apparent, flashing read beacons could be added to larger stop signs. This intersection should be monitored in the future to see if more aggressive measures (such as a traffic signal) might be appropriate. Constructing a signal will likely reduce the broadside collisions but could also increase the overall number of crashes, especially rear end crashes.

US 85C / CR 46 / CR 35 (MP 259.93)

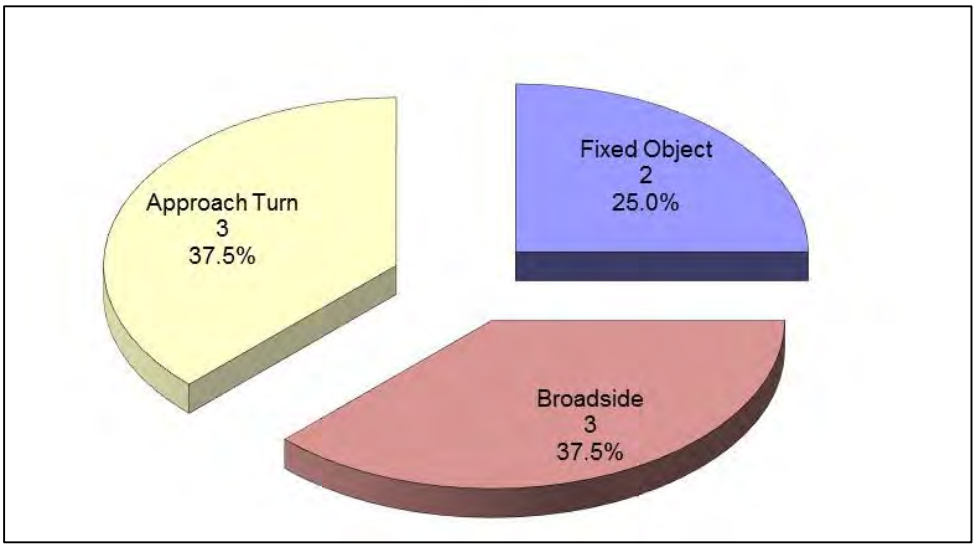
The intersection of US 85C with CR 46/CR35 is a four-leg, divided, unsignalized intersection. The northbound and southbound US 85C approaches provide both left-turn and right-turn deceleration lanes onto CR 46/CR35. There are two through lanes along US 85C. The approaches from CR 46/CR35 both have a left-turn/through/right-turn lanes and right-turn acceleration lanes onto US 85C. The posted speed limit on US 85C is 65 mph. **Figure 133** shows an aerial view of the intersection.

Figure 133
Aerial Photo: US 85C / CR 46 / CR 35 (MP 259.93)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were eight crashes, five were property damage only and three resulted in injuries. **Figure 134** provides a graphical representation of crash types for this location. Broadside type crashes (37.5%) and approach turn type crashes (37.5%) were the predominant crash types.

Figure 134
US 85C / CR 46 / CR 35 (MP 259.93)
8 Total Crashes



Observations / Recommendations

A review of the crash history indicates that there is no current pattern to crashes at the intersection of US 85C and CR 46/CR 35. There are no suggestions for improvement at this time.

US 85C / SH 375 (1st Avenue) (MP 262.63)

The intersection of US 85C and SH 375 (1st Avenue) is a four-leg, divided, signalized intersection located in LaSalle. There are both left-turn and right-turn deceleration lanes in both directions along US 85C with two through lanes on the main approaches. The east and west legs have a left-turn lane and through-right lane approach with right-turn acceleration lanes. The posted speed limit on US 85C is 40 mph, and the posted speed limit on SH 375 is 25 mph. **Figure 135** shows an aerial view of the intersection.

Figure 135
Aerial Photo: US 85C / SH 375 (1st Avenue) (MP 262.63)

Safety Performance Function Analysis

For the intersection of US 85C with SH 375 (1st Avenue), **Figure 136** shows that the frequency of total crashes over the five-year study period indicates a low potential for crash reduction for a four-lane divided signalized four-leg intersection which indicates a low potential for crash reduction (LOSS I). **Figure 137** shows that the severity of crashes also indicates a low potential for crash reduction (LOSS I).

Figure 136
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (SH 375 [1st Avenue])
Minor AADT = 3,200

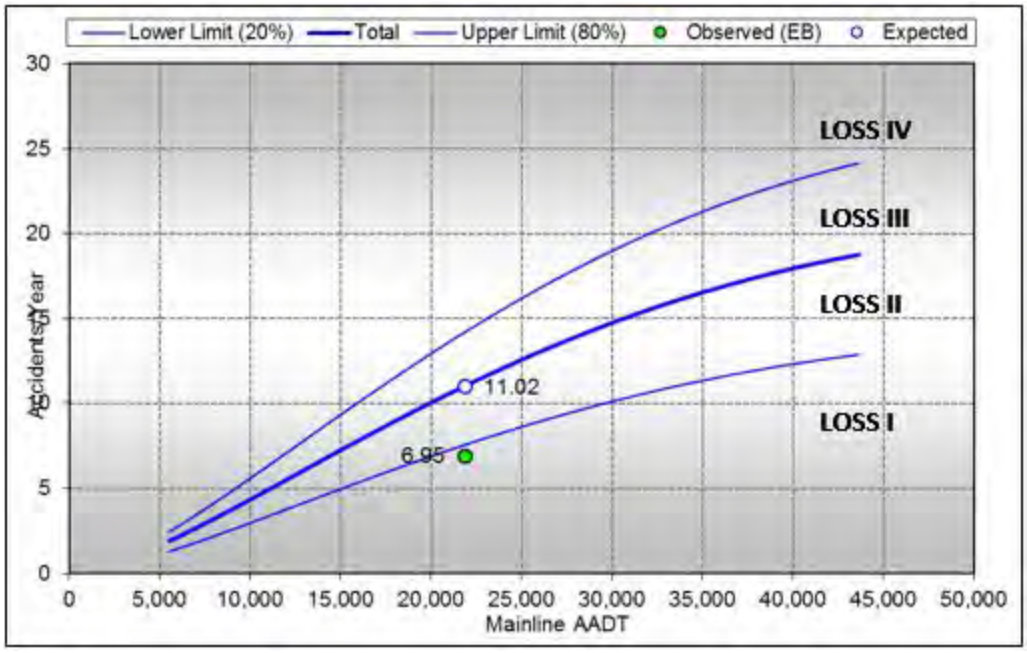
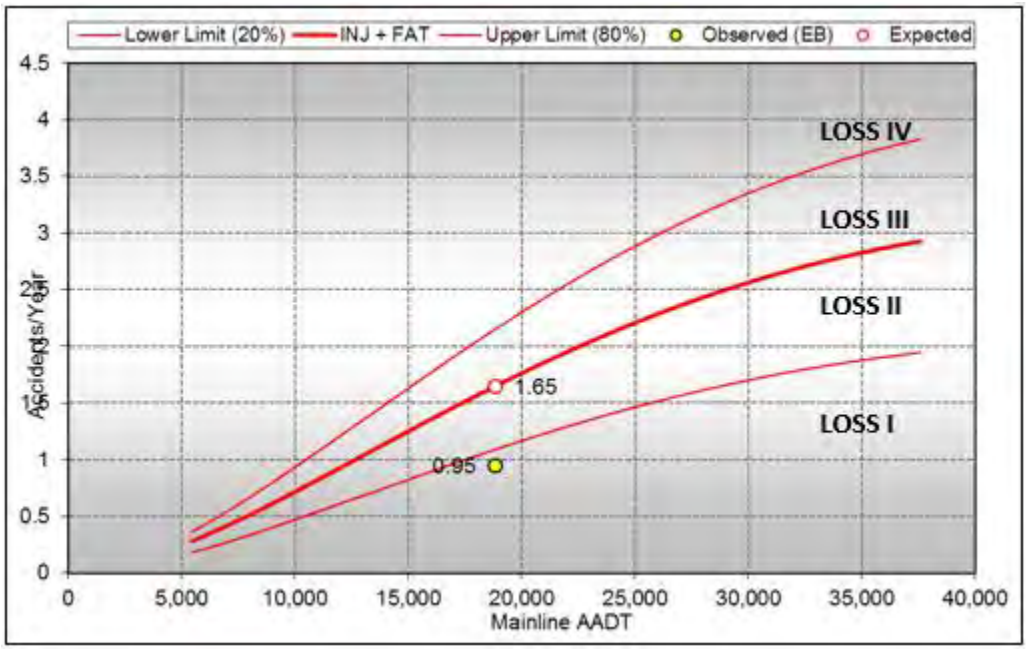


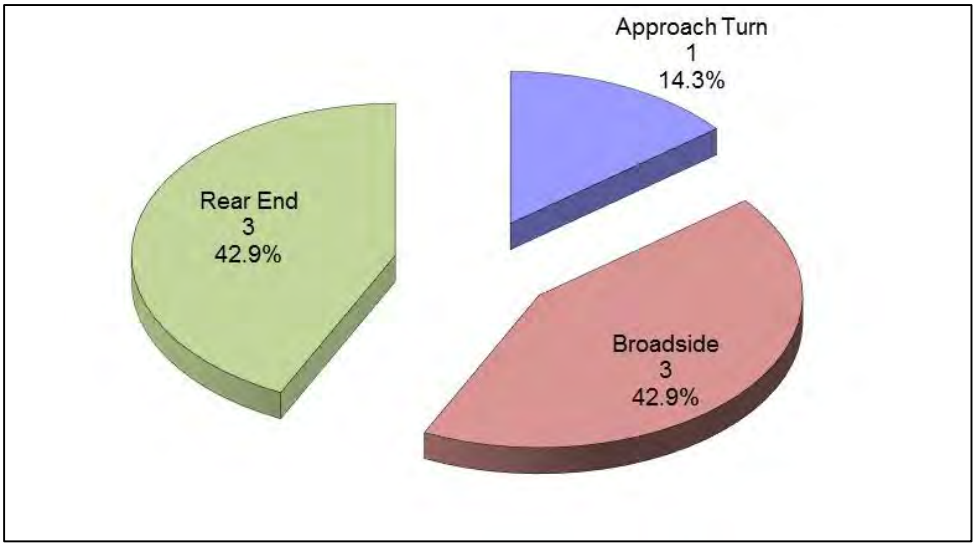
Figure 137
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (SH 375 [1st Avenue])
Minor AADT = 3,200



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were seven crashes, five were property damage only and two resulted in injury. **Figure 138** provides a graphical representation of crash types for this location. Broadside type crashes (42.9%) and approach turn type crashes (42.9%) were the predominant crash types.

Figure 138
US 85C / SH 375 [1st Avenue] (MP 262.63)
7 Total Crashes



Observations / Recommendations

A review of the crash history indicates that there is no current pattern to crashes at the intersection of US 85C and SH 375 (1st Avenue). There are no suggestions for improvement at this time.

US 85C / 5th Avenue (MP 262.99)

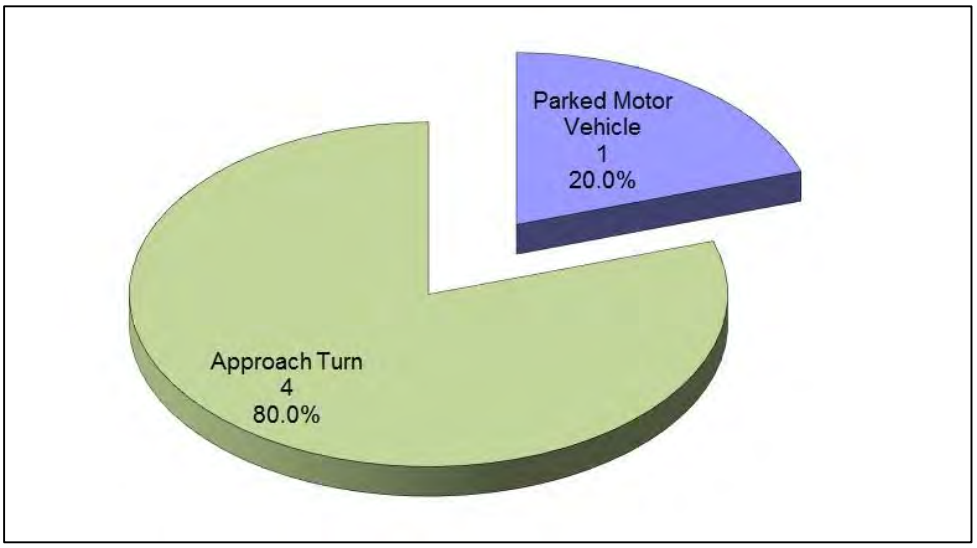
The intersection of US 85C and 5th Avenue is a four-leg, divided, unsignalized intersection located in LaSalle. There are both left-turn and right-turn deceleration lanes provided in both directions along US 85C with two through lanes on the main approaches. The east and west legs have a single left-turn/through/right-turn lane approach. The 5th Avenue westbound approach has a right-turn acceleration lane. The posted speed limit on US 85C is 40. **Figure 139** shows an aerial view of the intersection.

Figure 139
Aerial Photo: US 85C / 5th Avenue (MP 262.99)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were five crashes, one was property damage only and four resulted in injuries. **Figure 140** provides a graphical representation of crash types for this location. Approach turn type crashes (80.0%) were the predominant crash type.

Figure 140
US 85C / 5th Avenue (MP 262.99)
5 Total Crashes



Observations / Recommendations

There are no significant crash types at this intersection. However, it is worth noting that the approach turn type crashes had four crashes that all occurred on dry roadway conditions. Directionally, two of the approach turn type crashes occurred northbound and two occurred southbound. Field visit did not find sight distance as an issue. This intersection should be monitored for future approach turn crashes and the need for more aggressive measures reviewed if the issue persists.

US 85C / SH 394 / CR 52 (MP 263.44)

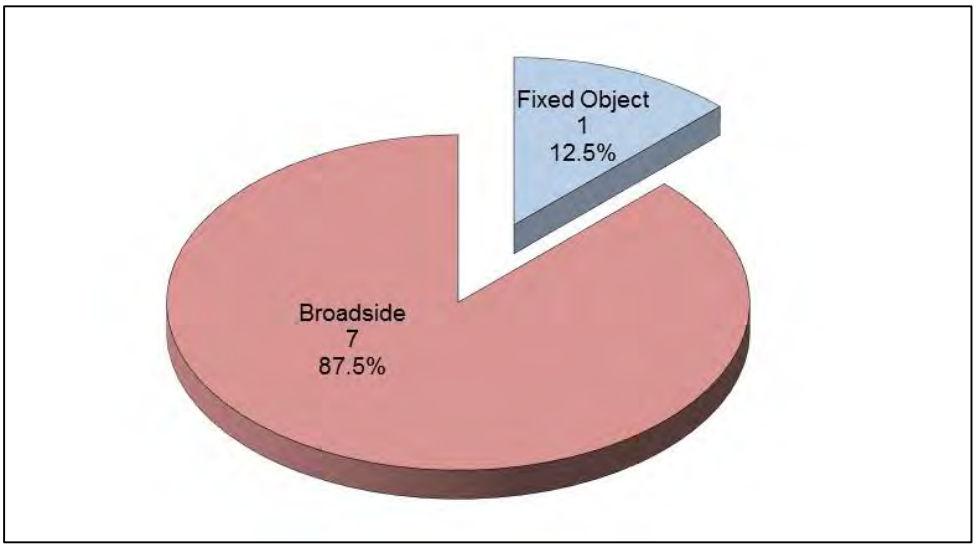
The intersection of US 85C with SH 394/CR 52 is a four-leg, divided, unsignalized intersection. The northbound and southbound US 85C approaches provide left-turn lanes onto SH 394/CR 52. The northbound approach provides a right-turn deceleration lane. There are two through lanes along US 85C. SH 394/CR 52 provides a left-turn/through/right-turn lane at each approach onto US 85C. The CR 52 westbound approach includes a right-turn acceleration lane onto northbound US 85C. The posted speed limit on US 85C is 50 mph. **Figure 141** shows an aerial view of the intersection.

Figure 141
Aerial Photo: US 85C / CR 52 (MP 263.44)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were eight crashes, four were property damage only and four resulted in injuries. **Figure 142** provides a graphical representation of crash types for this location. Broadside type crashes (87.5%) were the predominant crash type.

Figure 142
US 85C / CR 52 (MP 263.44)
8 Total Crashes



Observations / Recommendations

The frequency of broadside type crashes was higher than expected for this type of intersection. A review of the crash history indicate that the broadside type crashes had seven crashes which five occurred on dry roadway conditions, one occurred on wet road conditions, and one with road treatment roadway conditions. Directionally, five broadside type crashes occurred eastbound, one occurred westbound and one occurred southbound. Field visit did not find a sight distance issue for westbound traveling vehicles but did observe that eastbound traffic has an issue seeing northbound US 85C vehicles. Three of the five eastbound crashes were with northbound vehicles that require drivers to look more than ninety-degrees out of the right side of their vehicles. It is noted that the railroad crossing on the east leg was not a contributing factor to the broadside type crashes. There are currently double posted (inside and outside shoulders) intersection warning signs (W10-2) on both approaches of US 85C. Increasing the size of these signs to freeway standard (48”x48”) and adding flashing beacons should be considered. This intersection should be monitored for future broadside crashes and the need for more aggressive measures reviewed if the issue persists.

US 85C / 42nd Street (MP 264.11)

The intersection of US 85C with 42nd Street is a four-leg, divided, signalized intersection located in Evans. The northbound and southbound US 85C approaches provide both left-turn and right-turn deceleration lanes onto 42nd Street. There are two through lanes along US 85C. The east and west legs have a left-turn lane and through/right-turn lane with right-turn acceleration lanes onto both directions of US 85C. The posted speed limit on US 85C is 50 mph. The posted speed limit on 42nd Street is 35 mph. **Figure 143** shows an aerial view of the intersection.

Figure 143
Aerial Photo: US 85C / 42nd Street (MP 264.11)

Safety Performance Function Analysis

For the intersection of US 85C with 42nd Street (MP 264.11), **Figure 144** shows that the frequency of total crashes over the five-year study period was significantly better than expected for a four-lane divided signalized four-leg intersection which indicates a low potential for crash reduction (LOSS I). **Figure 145** shows that the severity of crashes also indicates a low potential for crash reduction (LOSS I).

Figure 144
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (42nd Street)
Minor AADT = 10,500

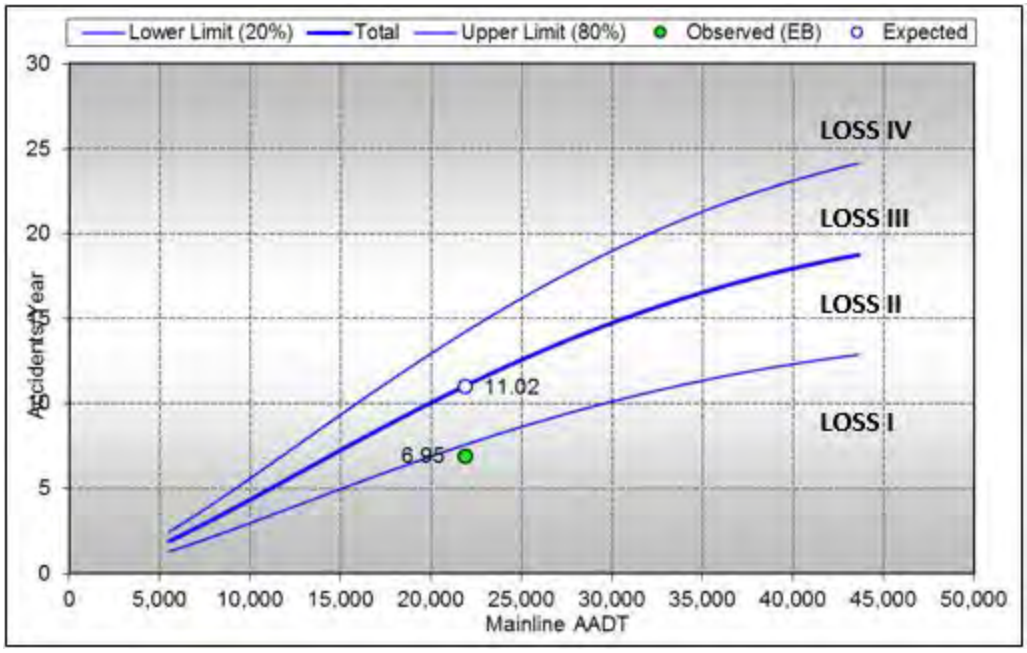
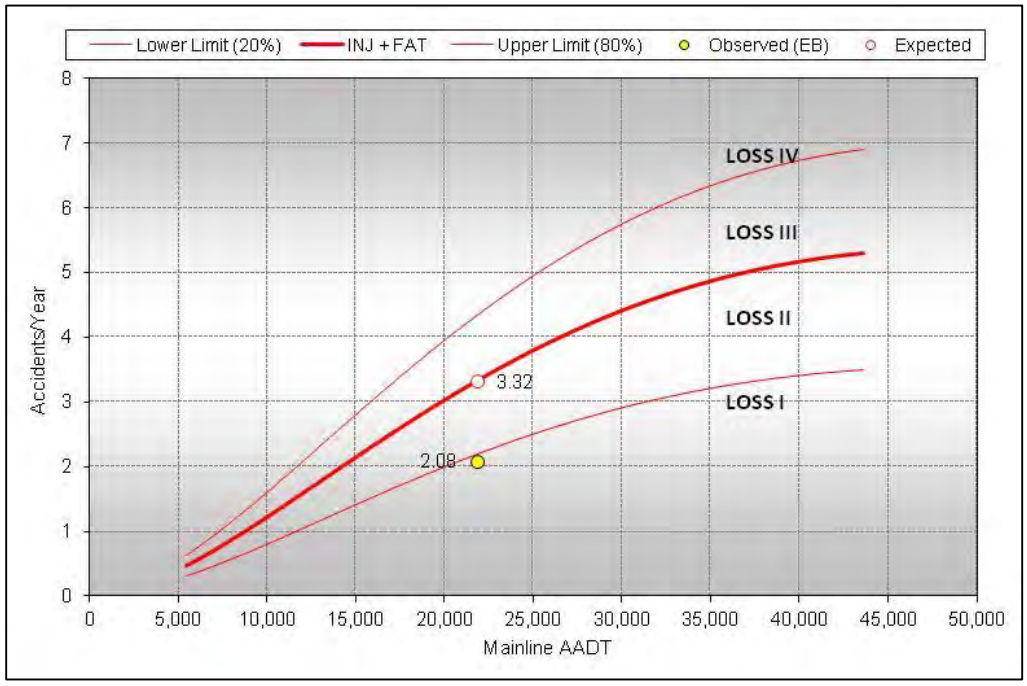


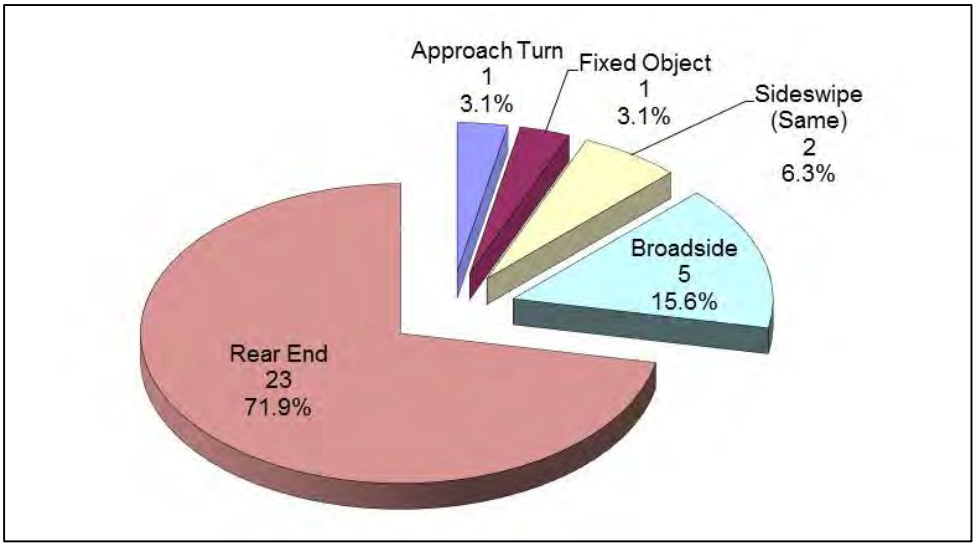
Figure 145
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (42nd Street)
Minor AADT = 10,500



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 32 crashes, 24 were property damage only and eight resulted in injuries. **Figure 146** provides a graphical representation of crash types for this location. Rear end type crashes (71.9%) were the predominant crash type.

Figure 146
US 85C / 42nd Street (MP 264.11)
32 Total Crashes



Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of intersection. A review of the crash history indicated that 12 of the rear end crashes were northbound, four southbound, four eastbound, and three westbound. Sixteen of the 23 rear end crashes occurred on dry pavement, two crashes on wet roads, four were on snowy/icy roads, and one on a treated roadway.

It was noted that this is the first signalized intersection in the northbound direction entering the Greeley urban area. There are currently no upcoming intersection warning signs provided for the intersection. Installing an intersection warning sign (W2-1) with flashing beacon on northbound US 85L should be considered. If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases. This could improve driver awareness of the upcoming signalized intersection and reducing the frequency of rear end type crashes. Additionally, it is recommended to review/update the existing yellow/all red clearance intervals to reduce the frequency of rear end type crashes at the other approaches to the intersection.

US 85C / CR 54 (37th Street) (MP 264.71)

The intersection of US 85C with 37th Street is a four-leg, divided, signalized intersection located in Evans. The northbound and southbound US 85C approaches provide both left-turn and right-deceleration turn lanes onto 37th Street. There are two through lanes along US 85C. The east and west legs have a left-turn lane and through/right-turn lane. The westbound approach includes a short channelized right-turn lane with an acceleration lane onto northbound US 85C. The eastbound approach has a right-turn acceleration lane along southbound US 85C. The posted speed limit on US 85C is 45 mph. The posted speed limit on 37th Street is 30 mph. **Figure 147** shows an aerial view of the intersection.

Figure 147
Aerial Photo: US 85C / CR 54 (37th Street) (MP 264.71)

Safety Performance Function Analysis

For the intersection of US 85C with CR 54 (37th Street), **Figure 148** shows that the frequency of total crashes indicates a low to moderate potential for crash reduction for a signalized four-lane divided four-leg intersection (LOSS II). **Figure 149** shows that the severity of crashes indicates a low to moderate potential for crash reduction for this intersection type (LOSS II).

Figure 148
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (CR 54 [37th Street])
Minor AADT = 9,700

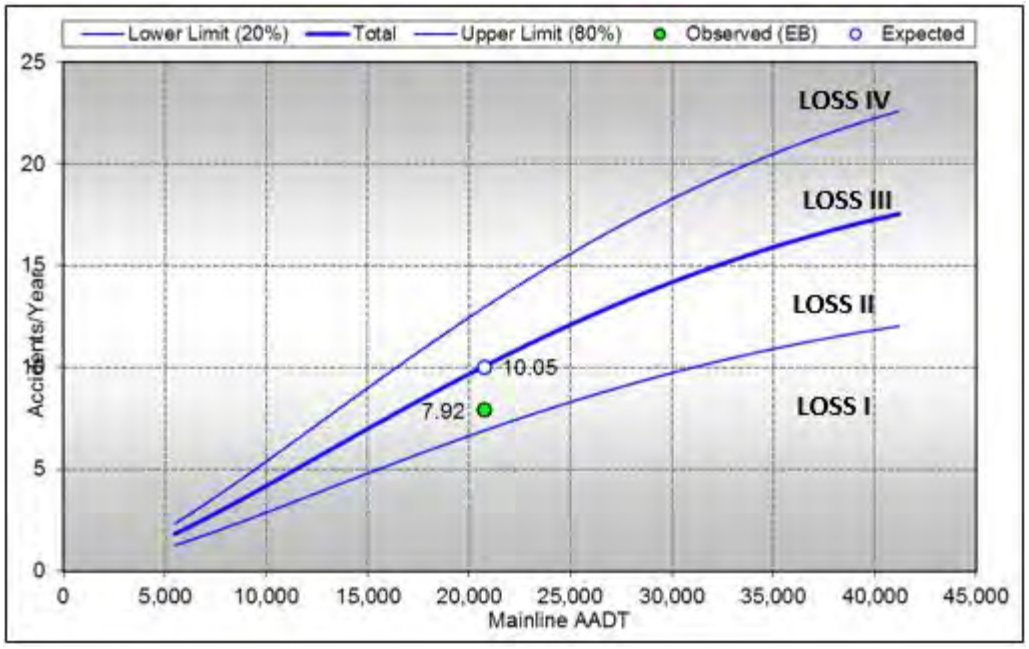
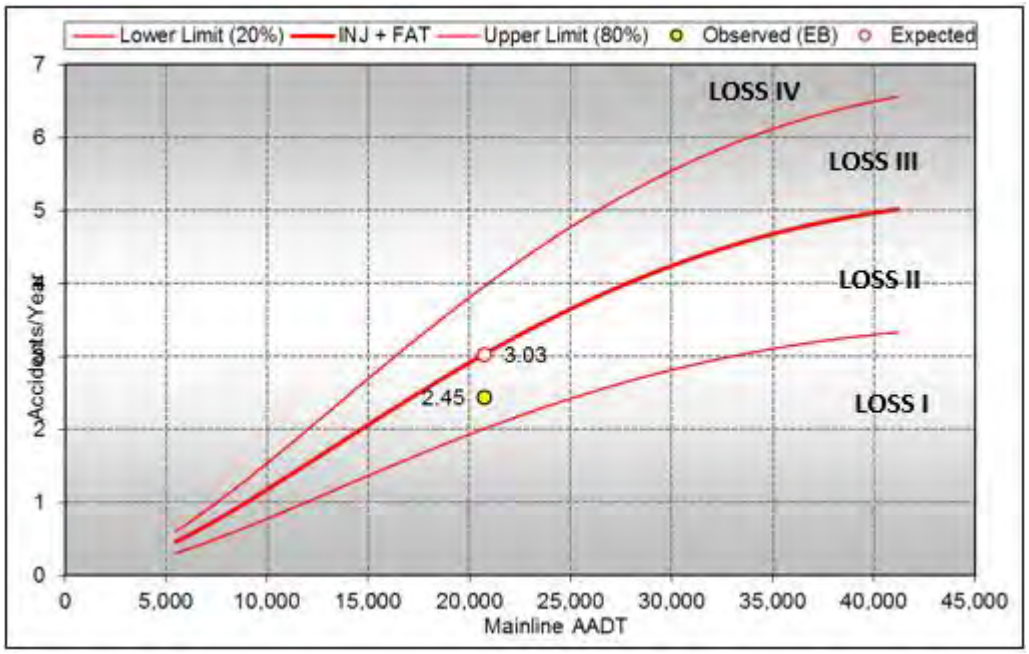


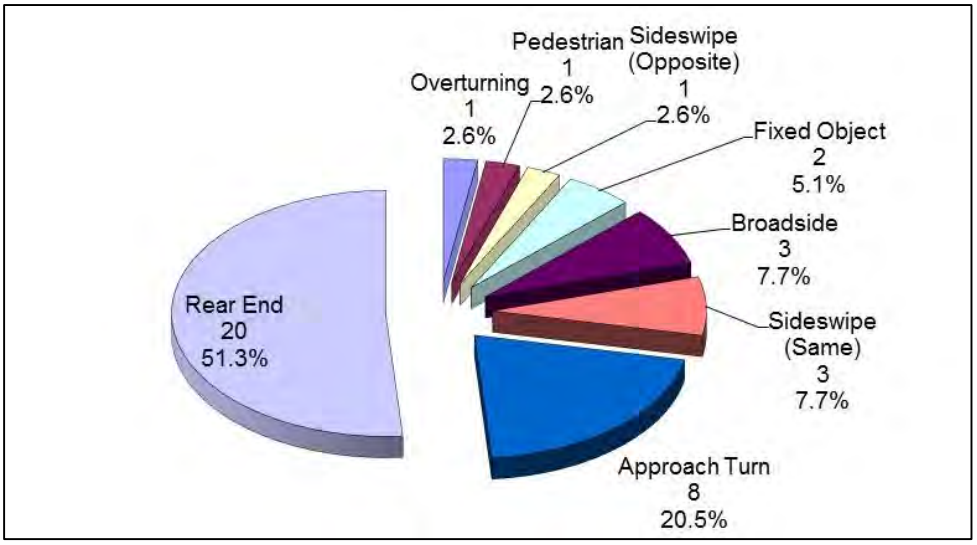
Figure 149
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (CR 54 [37th Street])
Minor AADT = 9,700



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 38 crashes, 27 were property damage only, 10 resulted in injuries and one fatal crash. **Figure 150** provides a graphical representation of crash types for this location. Rear end type crashes (51.3%) were the predominant crash type.

Figure 150
US 85C / CR 54 [37th Street] (MP 264.71)
38 Total Crashes



Fatal Crashes

The one fatal crash at the intersection of US 85C / CR 54 (37th Street) occurred on January 8, 2009 at 5:55am. The crash occurred in dry dark-lighted conditions. Vehicle #1 (a motorcycle) was traveling westbound on 37th Street and was stopped at a red light waiting to make a left-turn. When the light turned green, Vehicle #1 began to turn left and collided with Vehicle #2 that was traveling eastbound through the intersection. Alcohol and drugs was suspected for both the driver and passenger of Vehicle #1. Cause was failure to yield right of way. No crash pattern found.

Observations / Recommendations

There are no significant crash types at this intersection. However, it is worth noting that the rear end crashes had 19 crashes or which 16 occurred on dry roadway conditions and three on snowy road conditions. Directionally, 13 occurred northbound, three occurred southbound, one occurred eastbound and two occurred westbound. Based on this information, there does not appear to be a correctable pattern. However, consideration of repositioning intersection warning signs further away from the intersection could improve driver awareness of the upcoming signalized intersection. If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases. It was noted that reduction of the posted speed limit is located after the intersection warning signs. Providing more distance before the intersection with slower speeds might also help reduce the frequency of rear end type crashes. It is also recommended to review/update the existing yellow/all red clearance intervals for the signals at the intersection to reduce rear end type crashes.

US 85C / 31st Street (MP 265.19)

The intersection of US 85C with 31st Street is a four-leg, divided, signalized intersection located in Evans. The northbound and southbound US 85C approaches provide both left-turn and right-turn lanes onto 31st Street. There are two through lanes along US 85C. The eastbound approach provides a left-turn lane and a through/right-turn lane with a right-turn acceleration lane onto southbound US 85C. The westbound approach provides a left-turn lane, through lane and a channelized right-turn lane with a right-turn acceleration lane onto northbound US 85C. The posted speed limit on US 85C is 45 mph. The posted speed limit on 31st Street is 30 mph. **Figure 151** shows an aerial view of the intersection.

Figure 151
Aerial Photo: US 85C / 31st Street (MP 265.19)

Safety Performance Function Analysis

For the intersection of US 85C with 31st Street, **Figure 152** shows that the frequency of total crashes indicates a low to moderate potential for crash reduction for a signalized four-lane divided four-leg intersection (LOSS II). **Figure 153** shows that the severity of crashes also indicates a low to moderate potential for this intersection type (LOSS II).

Figure 152
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (31st Street)
Minor AADT = 8,000

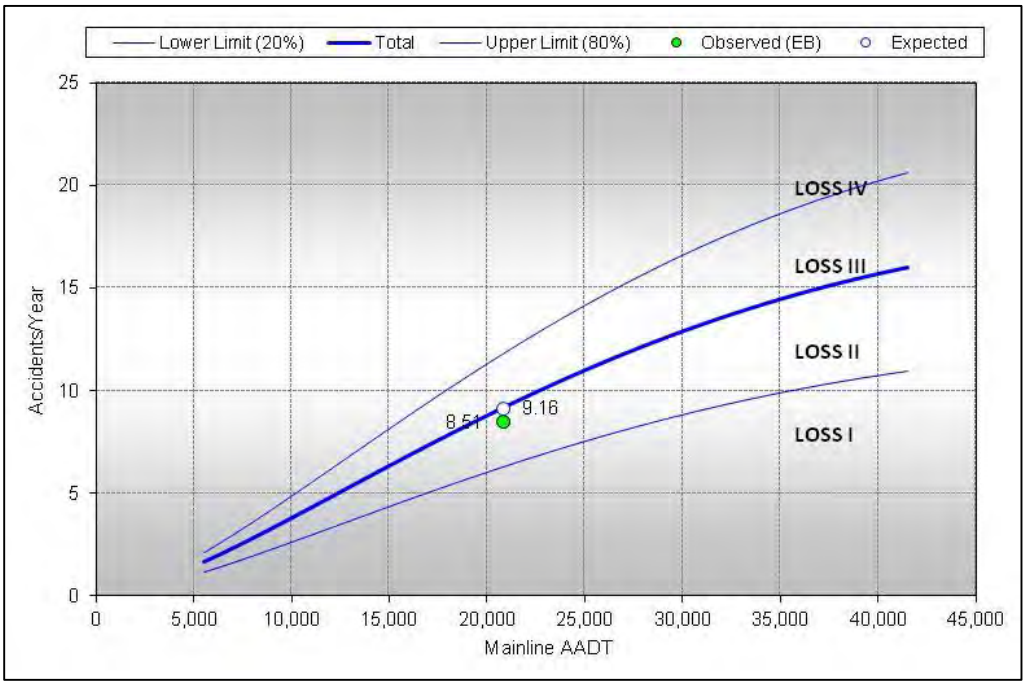
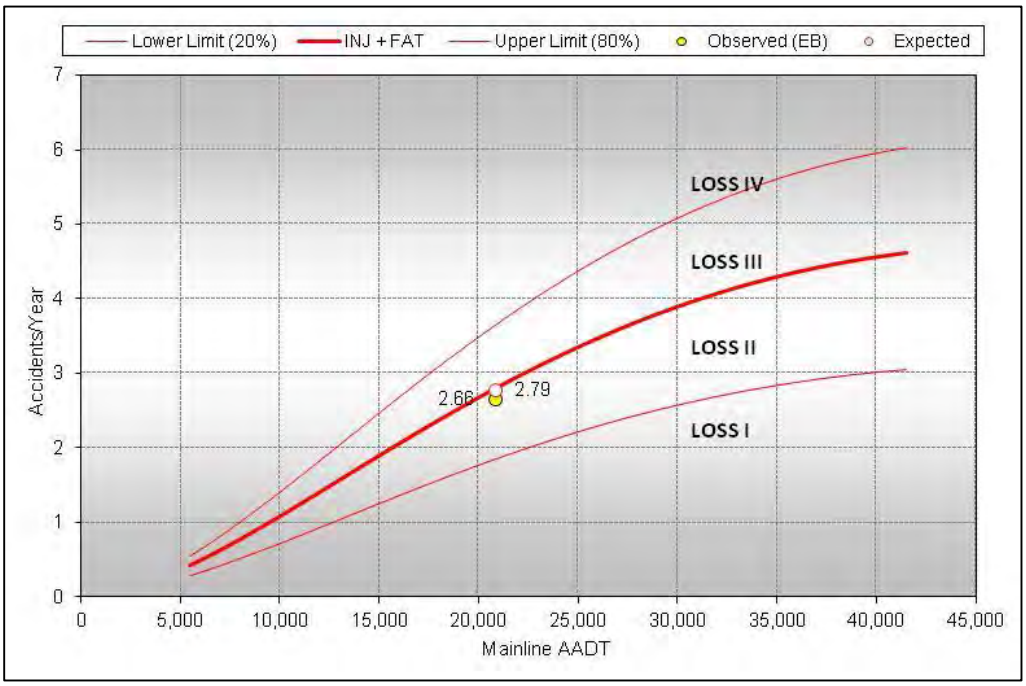


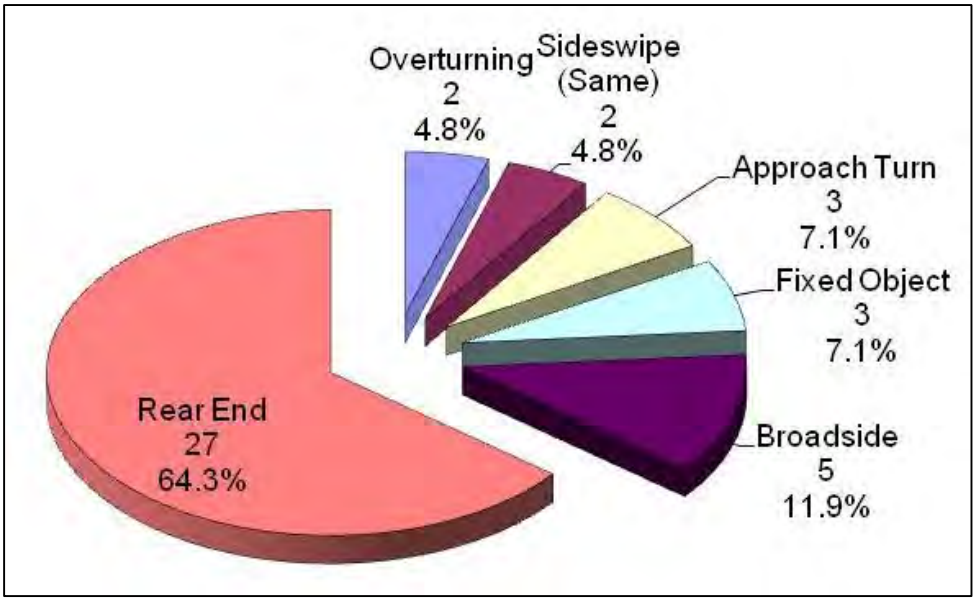
Figure 153
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (31st Street)
Minor AADT = 8,000



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 42 crashes, 29 were property damage only and 13 resulted in injuries. **Figure 154** provides a graphical representation of crash types for this location. Rear end type crashes (64.3%) were the predominant crash type.

Figure 154
US 85C / 31st Street (MP 265.19)
42 Total Crashes



Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of intersection. A review of the crash history indicated that 12 of the rear end crashes were northbound, 10 southbound, two eastbound, and three westbound. Twenty-two of the 27 rear end crashes occurred on dry pavement, one crash on wet road conditions, two were on snowy road conditions, one on road treatment road conditions and one marked as foreign material road conditions. Twenty-two of the rear end type crashes occurred during the day, three during the night, one at dawn/dusk and one was unknown.

The intersection of US 85C with 31st Street is directly south of the interchange with US 34. The close proximity to the interchange can cause drivers not to notice the signalized intersection before it is too late to stop. It is recommended to consider intersection warning signs to improve driver awareness of the upcoming signalized intersection. If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases. It is also recommended to review/update the existing yellow/all red clearance intervals which could help reduce the frequency of rear end type crashes.

US 85L / 22nd Street (MP 266.65)

The intersection of US 85L with 22nd Street is a four-leg, divided, and signalized intersection located in Greeley. The northbound and southbound US 85C approaches provide both left-turn and right-deceleration turn lanes onto 22nd Street. There are two through lanes along US 85L and on 22nd Street. The eastbound and westbound approaches provide a left-turn lane, through lane and a through/right-turn lane with right-turn acceleration lanes onto both directions of US 85L. The posted speed limit on US 85L is 50 mph. **Figure 155** shows an aerial view of the intersection.

Figure 155
Aerial Photo: US 85L / 22nd Street (MP 266.65)

Safety Performance Function Analysis

For the intersection of US 85L with 22nd Street **Figure 156** shows that the frequency of total crashes indicates a low to moderate potential for crash reduction for a signalized four-lane divided four-leg intersection (LOSS II). **Figure 157** shows that the severity of crashes indicates a moderate potential for crash reduction for this intersection type (LOSS II/LOSS III).

Figure 156
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (22nd Street)
Minor AADT = 13,200

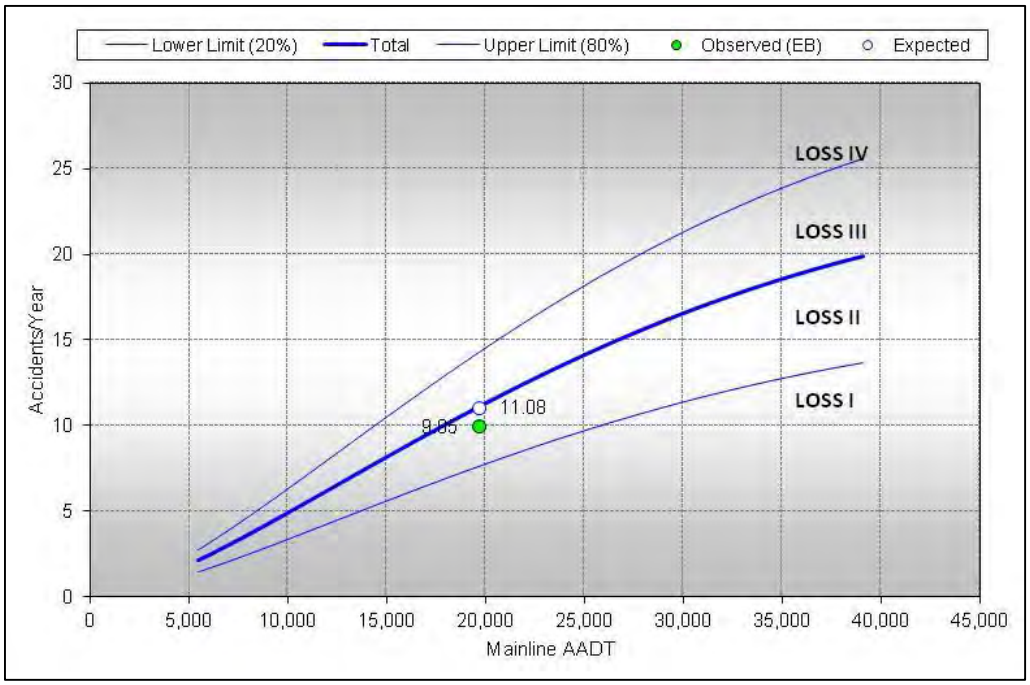
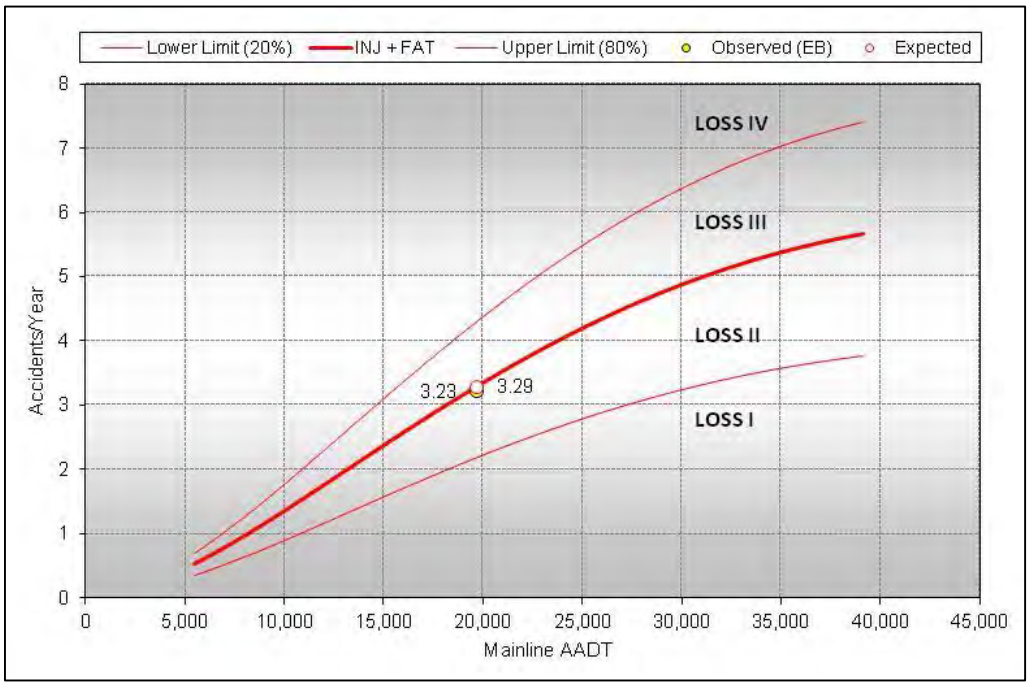


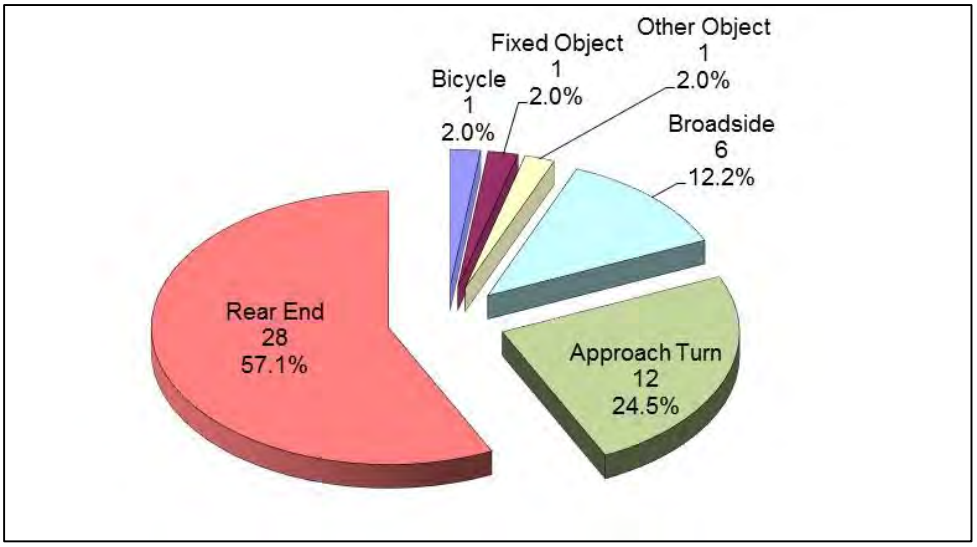
Figure 157
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (22nd Street)
Minor AADT = 13,200



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 49 crashes, 33 were property damage only and 16 resulted in injuries. **Figure 158** provides a graphical representation of crash types for this location. Rear end type crashes (57.1%) were the predominant crash type followed by approach turn type crashes (24.5%).

Figure 158
US 85C / 22nd Street (MP 266.65)
49 Total Crashes



Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of intersection. A review of the crash history indicated that eight of the rear end crashes were northbound, six southbound, two eastbound, and twelve westbound. Twenty-four of the 28 rear end crashes occurred on dry pavement and four crashes were on wet road conditions. Twenty-six of the rear end type crashes occurred during the day, one during the night and one at dawn/dusk lighting conditions. Rear end type crashes at this intersection had nine crashes that involved either trucks or buses.

The intersection of US 85C with 22nd Street is directly north of the interchange with US 34. The close proximity to the interchange can cause drivers not to notice the signalized intersection before it is too late to stop. It is recommended to consider intersection warning signs in the northbound direction to improve driver awareness of the upcoming signalized intersection.

Although the frequency of approach turn type crashes were not higher than expected, it is worth noting that the approach type crashes had 12 crashes of which 11 occurred on dry roadway conditions and one on wet roadway conditions. Directionally, three occurred northbound, five occurred southbound and four occurred westbound. None of the approach turn type crashes involved trucks or buses. All left-turn movements at the intersection are currently protected-only. Based on this information, there does not appear to be a correctable pattern. However, it is recommended to review/update the existing yellow/all red clearance intervals for the signals at the intersection to reduce approach turn type crashes.

US 85L / US 34D (18th Street) (MP 267.18)

The intersection of US 85L with US 34D (18th Street) is a four-leg, divided, signalized intersection located in Greeley. The northbound and southbound US 85L approaches provide both left-turn and right-turn lanes onto US 34 (18th Street). The northbound approach has a channelized right-turn lane. There are two through lanes along US 85L. The eastbound approach has a left-turn lane, through/right-turn lane with an acceleration lane onto US 85L. The westbound approach has a left-turn lane, a through lane and a right-turn channelized lane with an acceleration lane onto US 85L. The posted speed limit on US 85L is 50 mph. The posted speed limit on US 34D (18th Street) is 30 mph. **Figure 159** shows an aerial view of the intersection.

Figure 159
Aerial Photo: US 85L / US 34D (18th Street) (MP 267.18)

Safety Performance Function Analysis

For the intersection of US 85L with US 34 (18th Street), **Figure 160** shows that the frequency of total crashes over the five-year study period was significantly better than expected for a four-lane divided signalized four-leg intersection which indicates a low potential for crash reduction (LOSS I). **Figure 161** shows that the severity of crashes also indicates a low potential for crash reduction (LOSS I).

Figure 160
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (US 34D [18th Street])
Minor AADT = 9,000

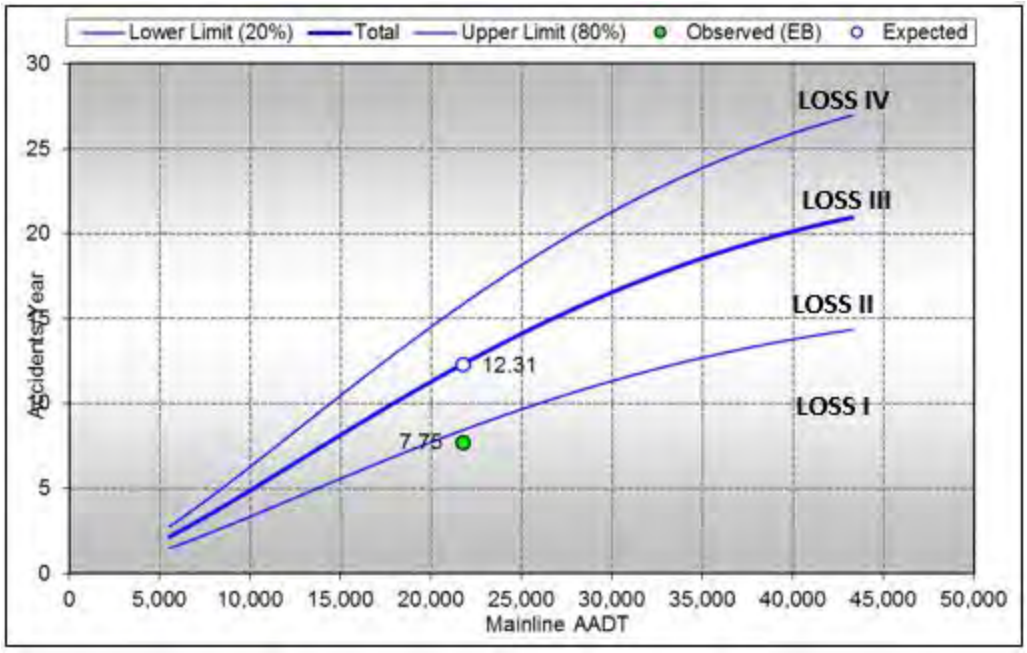
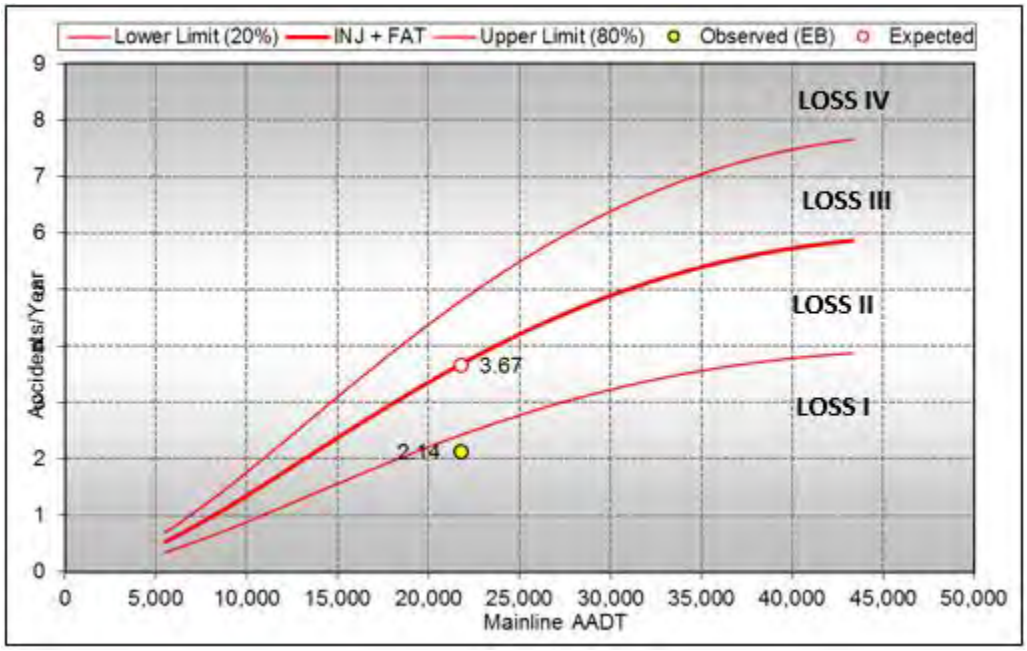


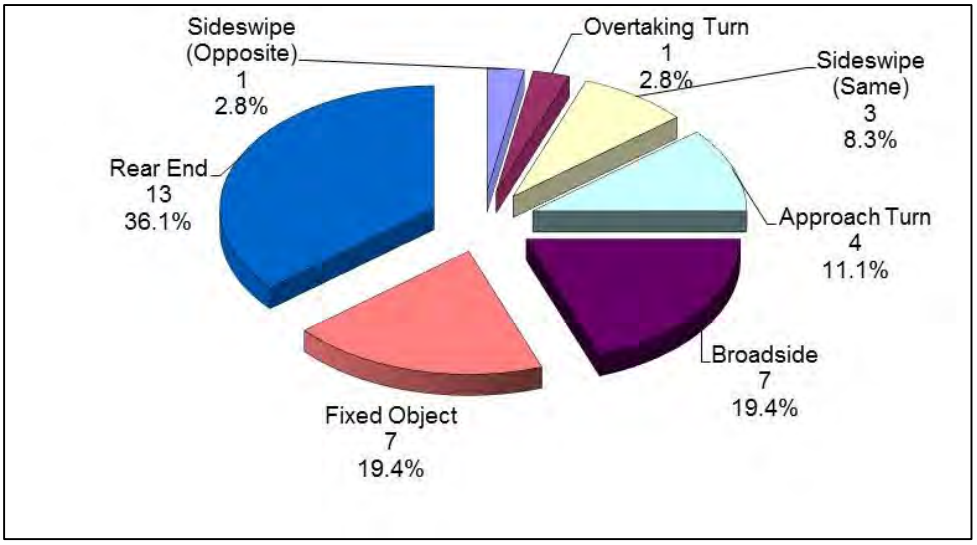
Figure 161
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (US 34D [18th Street])
Minor AADT = 9,000



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 36 crashes, 28 were property damage only, and 8 resulted in injuries. **Figure 162** provides a graphical representation of crash types for this location. Rear end type crashes (36.1%) were the predominant crash type followed by fixed object and broadside turn type crashes (both 19.4%).

Figure 162
US 85L / US 34D [18th Street] (MP 267.18)
36 Total Crashes



Observations / Recommendations

The frequency of fixed object type crashes was higher than expected for this type of intersection. A review of the crash history indicated that five of the fixed object crashes were northbound, one southbound, and one westbound. Five of the seven fixed object crashes occurred on dry pavement, one was on icy and one was on slushy road conditions. Two of the fixed object type crashes occurred during the day, three during the night and two at dawn/dusk lighting conditions. Fixed object type crashes at this intersection had three that involved either trucks or buses. There was no pattern to the fixed objects that were hit and therefore no improvement recommendations.

Although the frequency of rear end type crashes was not higher than expected it is worth noting that the approach type crashes had 13 crashes that 11 occurred on dry roadway conditions and two on wet roadway conditions. Directionally, five occurred northbound, seven occurred southbound and one occurred westbound. Only one of the approach turn type crashes involved trucks or buses. Northbound and southbound left-turn movements at the intersection are currently protected-only. It is unknown when this more restrictive phasing was instituted. Westbound left-turn movements are permitted with a sign that specifies that “left turn yield on green.” However, it is recommended to review/update the existing yellow/all red clearance intervals for the signals at the intersection to reduce approach turn type crashes.

US 85L / 16th Street (MP 267.44)

The intersection of US 85L with 16th Street is a four-leg, divided, and signalized intersection located in Greeley. The northbound and southbound US 85L approaches provide both left-turn and right-turn lanes onto 16th Street. There are two through lanes along US 85L. The eastbound approach has a left-turn lane, a through lane and a right-turn lane with an acceleration lane onto northbound US 85L. The westbound approach has a left-turn lane, a through lane and a right-turn channelized lane with an acceleration lane onto southbound US 85L. The posted speed limit on US 85L is 50 mph. The posted speed limit on 16th Street is 30 mph. **Figure 163** shows an aerial view of the intersection.

Figure 163
Aerial Photo: US 85L / 16th Street (MP 267.44)

Safety Performance Function Analysis

For the intersection of US 85L with 16th Street, **Figure 164** shows that the frequency of total crashes indicates a low to moderate potential for crash reduction for a signalized four-lane divided four-leg intersection (LOSS II). **Figure 165** shows that the severity of crashes also indicates a low to moderate potential for reduction (LOSS II).

Figure 164
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (16th Street)
Minor AADT = 7,300

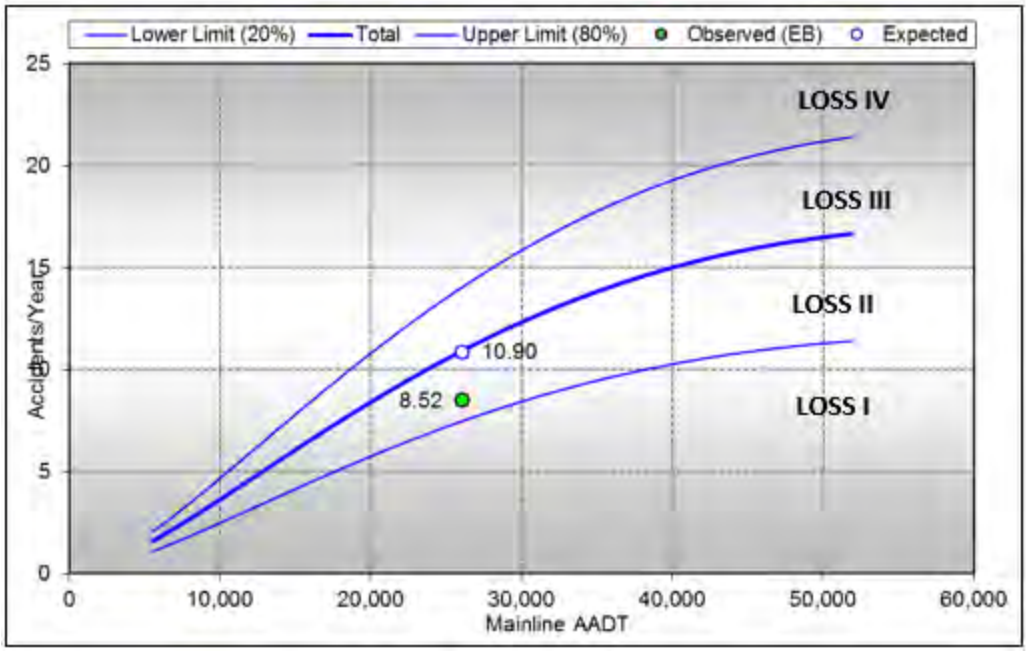
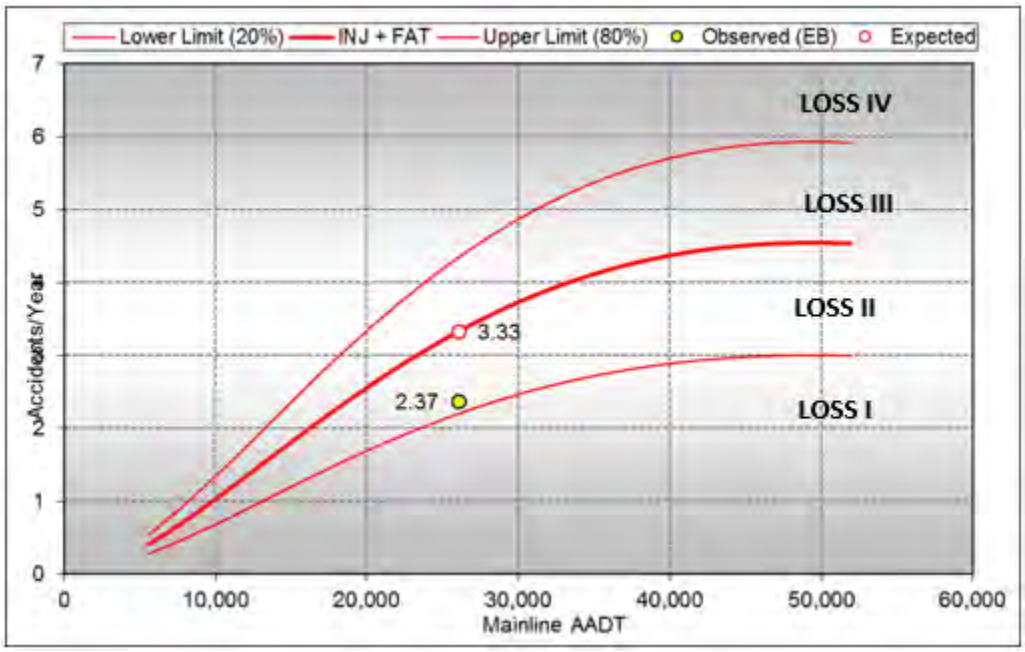


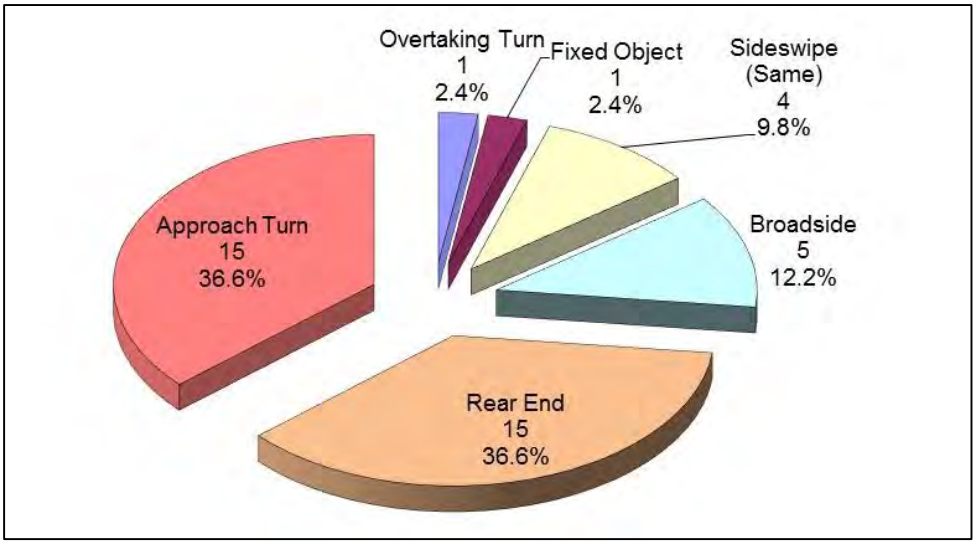
Figure 165
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (16th Street)
Minor AADT = 7,300



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 41 crashes, 31 were property damage only and 10 resulted in injuries. **Figure 166** provides a graphical representation of crash types for this location. Rear end type crashes (36.6%) and approach turn type crashes (36.6%) were the predominant crash types.

Figure 166
US 85L / 16th Street (MP 267.44)
41 Total Crashes



Observations / Recommendations

The frequency of approach turn type crashes was higher than expected for this type of intersection. A review of the crash history indicated that six of the approach turn crashes were northbound, seven southbound, and two westbound. Twelve of the 15 approach turn crashes occurred on dry pavement, one on wet conditions, one on snowy conditions, and one marked as foreign material road conditions. Eleven of the approach turn type crashes occurred during the day, three during the night and one at dawn/dusk lighting conditions. Approach turn type crashes at this intersection had three crashes that involved either trucks or buses.

All left-turn movements at this intersection are currently protected-only. However, the analysis period of 2008 to 2012 consists of some crash records that occurred before the installation of the protected-only left turn phasing. It is expected that the installation of protected-only left-turn phasing will reduce the frequency of approach turn type crashes. The intersection should be monitored to determine if the left-turn phasing reduces crashes at this intersection.

US 85L / 13th Street (MP 267.77)

The intersection of US 85L with 13th Street is a four-leg, divided, and signalized intersection located in Greeley. The northbound and southbound US 85L approaches provide both left-turn and right-turn lanes onto 13th Street. There are two through lanes along US 85L. The east and west legs have a left-turn/through/right-turn approach. The westbound right-turn is channelized with an acceleration lane onto northbound US 85L. The eastbound right-turn onto southbound US 85L also has an acceleration lane. The posted speed limit on US 85L is 50 mph. The posted speed limit on 13th Street is 30 mph. **Figure 167** shows an aerial view of the intersection.

Figure 167
Aerial Photo: US 85L / 13th Street (MP 267.77)

Safety Performance Function Analysis

For the intersection of US 85L with US 34 (13th Street), **Figure 168** shows that the frequency of total crashes indicates a low potential for crash for a signalized four-lane divided three-leg intersection (LOSS I). **Figure 169** shows that the severity of crashes indicates a low potential for crash reduction (LOSS I).

Figure 168
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (13th Street)
Minor AADT = 5,200

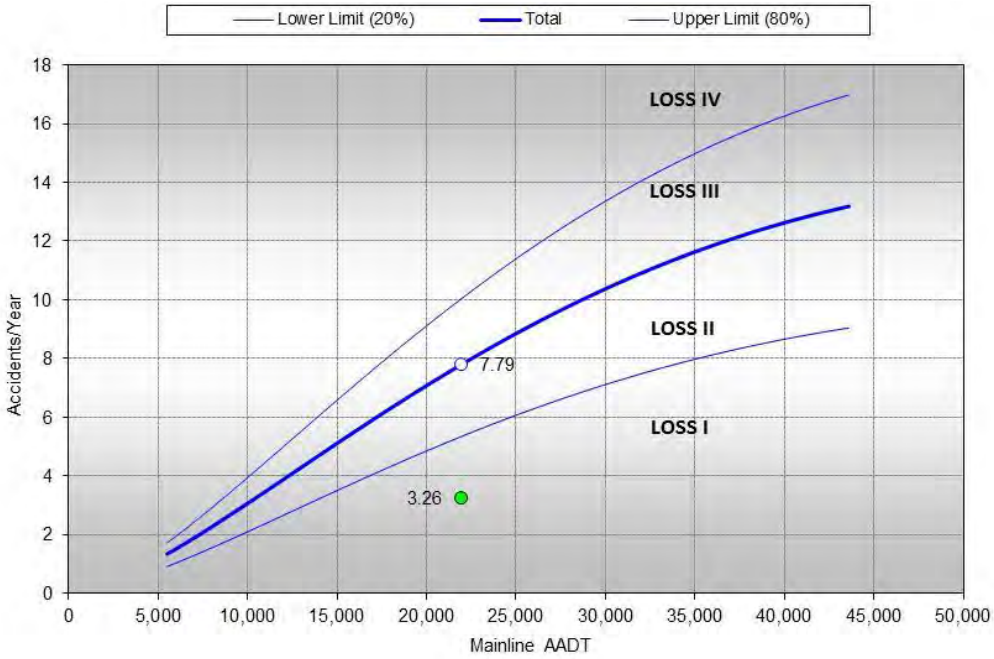
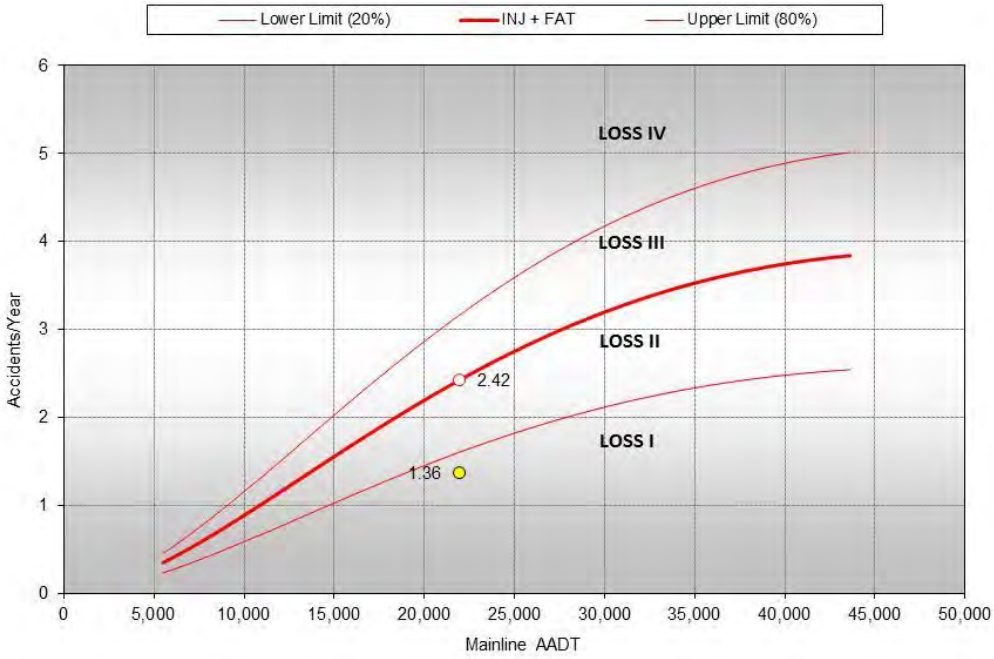


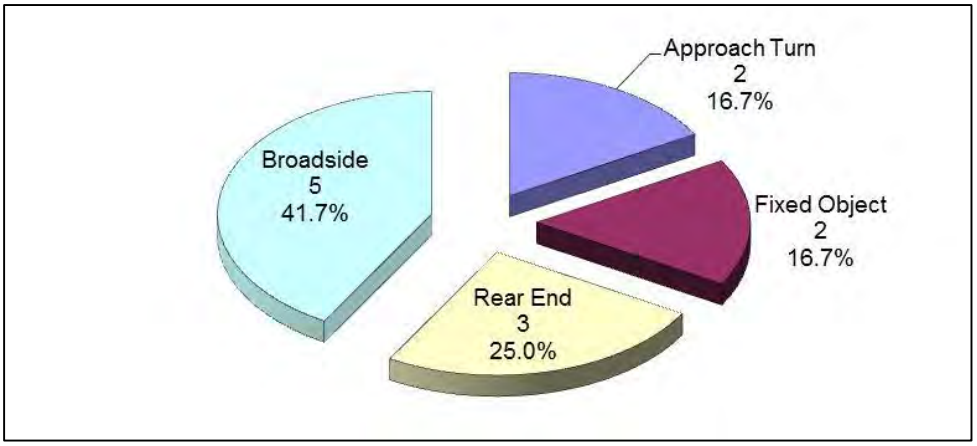
Figure 169
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (13th Street)
Minor AADT = 5,200



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 12 crashes, eight were property damage only and four resulted in injuries. **Figure 170** provides a graphical representation of crash types for this location. Broadside type crashes (41.7%) were the predominant crash type followed by rear end type crashes (25.0%).

Figure 170
US 85C / 13th Street (MP 267.77)
12 Total Crashes



Observations / Recommendations

The frequency of broadside type crashes was higher than expected for this type of intersection. A review of the crash history indicated that three of the broadside crashes were eastbound and two were westbound. Four of the five broadside crashes occurred on dry pavement and one crash was on wet road conditions. Four of the broadside type crashes occurred during the day and one during the night. None of the broadside type crashes at this intersection involved either trucks or buses.

The intersection of US 85L and 13th Street was recently signalized. Since the range of the crash analysis occurred during a time when the intersection was not signalized and the fact the all of the broadside crashes involved side street traffic, it is expected that the recent signal installation will reduce the number of broadside crashes at this intersection. No additional improvements are recommended.

US 85L / SH 263A (8th Street) (MP 268.22)

The intersection of US 85L with SH 263A (8th Street) is a four-leg, divided, signalized intersection located in Greeley. The northbound and southbound US 85L approaches provide both left-turn and right-turn lanes onto SH 263A (8th Street). There are two through lanes along US 85L. The east and west legs have a left-turn/through/right-turn approach with right-turn acceleration lanes onto US 85L. The posted speed limit on US 85L is 45 mph. The posted speed limit on 8th Street is 30 mph. **Figure 171** shows an aerial view of the intersection.

Figure 171
Aerial Photo: US 85L / SH 263A (8th Street) (MP 268.22)

Safety Performance Function Analysis

For the intersection of US 85L with SH 263A (8th Street), **Figure 172** shows that the frequency of total crashes indicates a low potential for crash for a signalized four-lane divided three-leg intersection (LOSS I). **Figure 173** shows that the severity of crashes indicates a low potential for crash reduction (LOSS I).

Figure 172
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (SH 263A [8th Street])
Minor AADT = 13,700

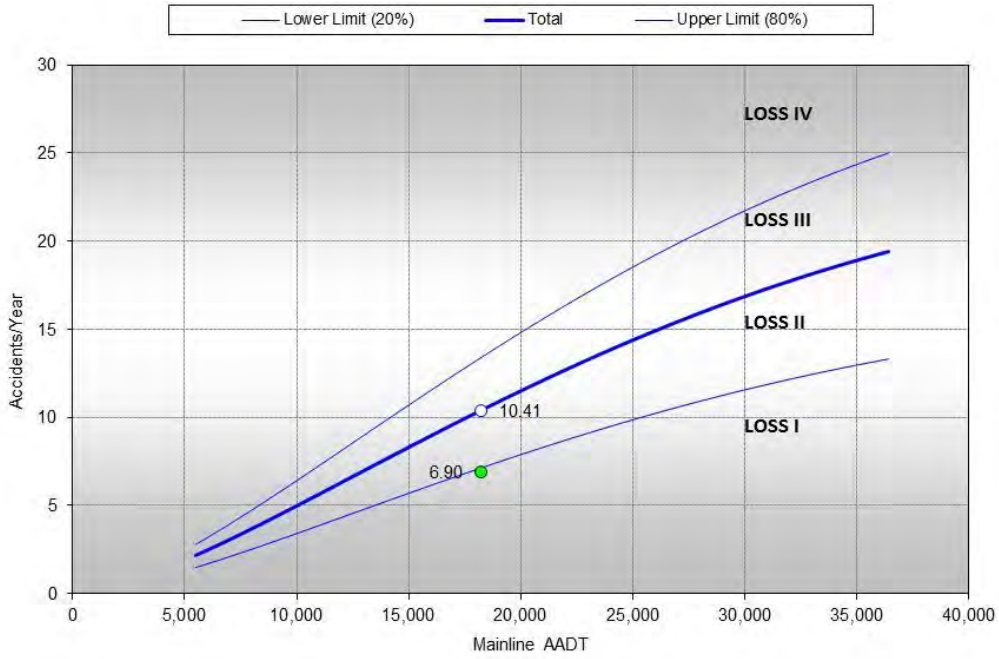
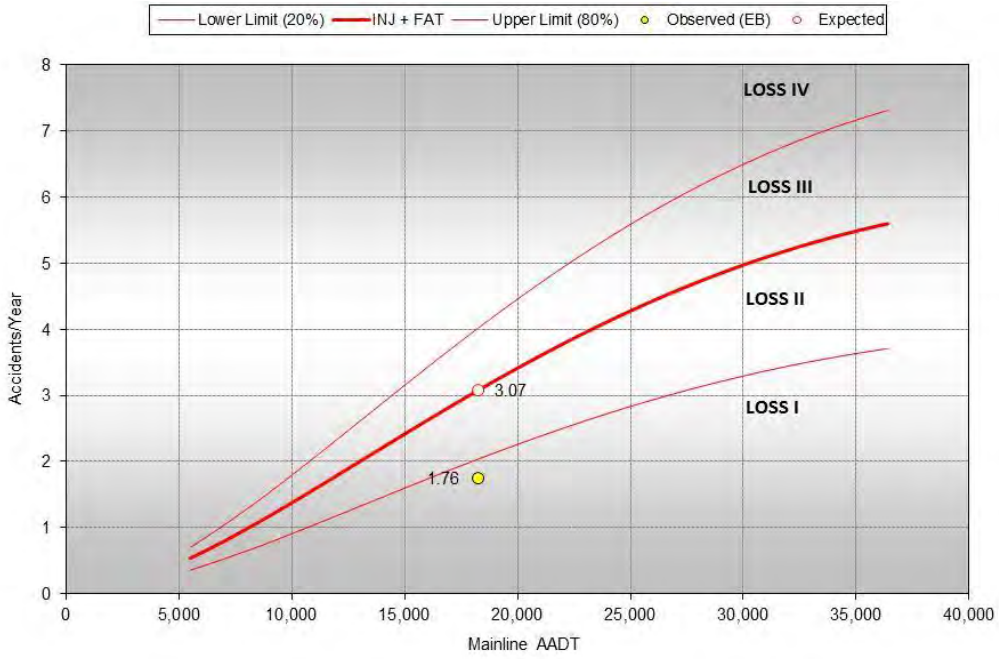


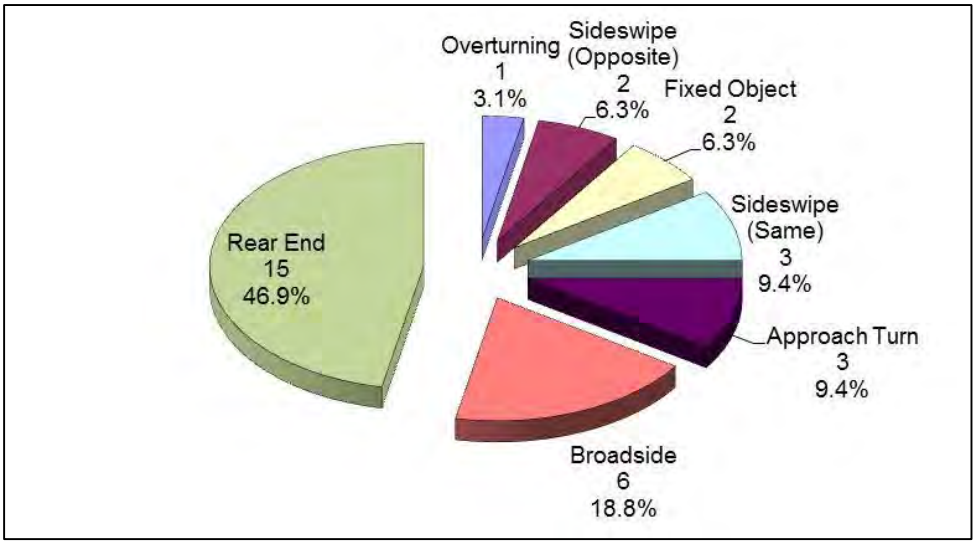
Figure 173
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (SH 263A [8th Street])
Minor AADT = 13,700



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 32 crashes, 26 were property damage only and six resulted in injuries. **Figure 174** provides a graphical representation of crash types for this location. Rear end type crashes (46.9%) were the predominant crash type followed by broadside type crashes (18.8%).

Figure 174
US 85C / SH 263A (8th Street) (MP 268.22)
32 Total Crashes



Observations / Recommendations

Although none of the crash types at this intersection are significantly higher than expected, there are patterns to the rear end and broadside type crashes that consideration should be given to addressing. Eight of the 15 rear end crashes were northbound and six of these occurred in the afternoon and early evening. Five of the six broadside crashes occurred when vehicles on US 85L ran through a red light. There are a number of guide signs of the US 85L approaches to this intersection so drivers should be aware that they are approaching it but may not be aware that the signal is red. There are currently no upcoming intersection warning signs provided for the intersection. Installing intersection warning signs (W2-1) with flashing beacon on US 85L should be considered. The speed limit on US 85L is 45 mph so there should be sufficient separation distance to connect the flashing beacon to the signal controller in order to anticipate red phases. This would improve driver awareness of the upcoming signalized intersection and reducing the frequency of rear end type crashes. Additionally, it is recommended to review/update the existing yellow/all red clearance intervals to reduce the frequency of rear end type crashes at the other approaches to the intersection.

US 85L / 5th Street (MP 268.49)

The intersection of US 85L with 5th Street is a four-leg, divided, and signalized intersection located in Greeley. The northbound and southbound US 85L approaches provide both a left-turn and a right-turn lane onto 5th Street. There are two through lanes along US 85L. The east and west legs have a left-turn/through-right-turn approach with right-turn acceleration lanes onto US 85L The posted speed limit on US 85L is 50 mph. The posted speed limit on 5th Street is 30 mph. **Figure 175** shows an aerial view of the intersection.

Figure 175
Aerial Photo: US 85L / 5th Street (MP 268.49)

Safety Performance Function Analysis

For the intersection of US 85L with 5th Street, **Figure 176** shows that the frequency of total crashes indicates a low to moderate potential for crash for a signalized four-lane divided three-leg intersection (LOSS II). **Figure 177** shows that the severity of crashes indicates a low to moderate potential for crash reduction for this intersection type (LOSS II/).

Figure 176
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (5th Street [MP 268.49])
Minor AADT = 5,800

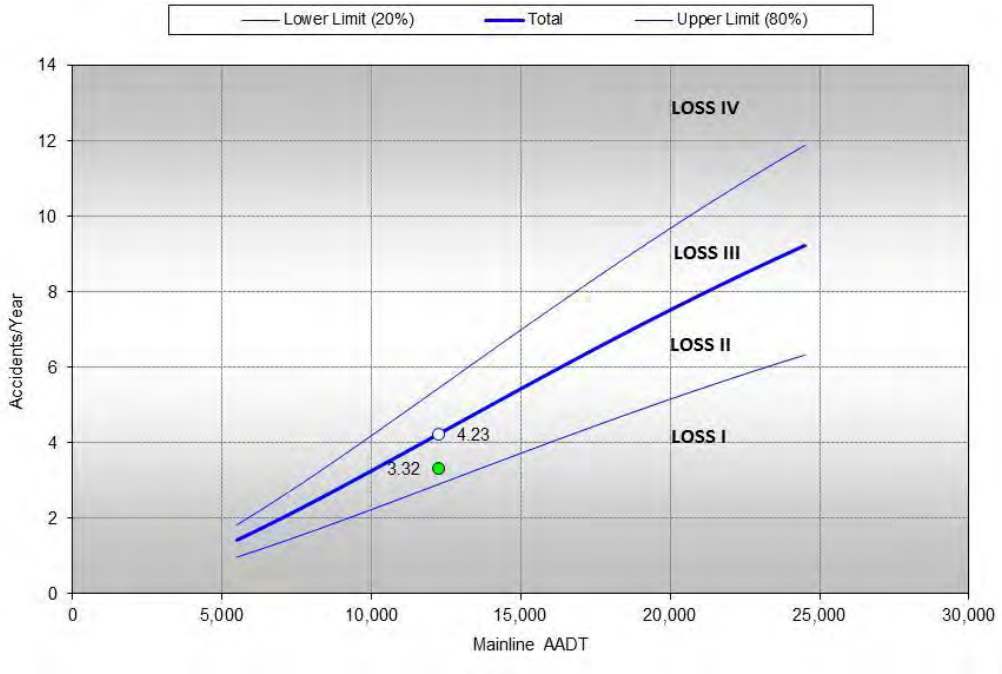
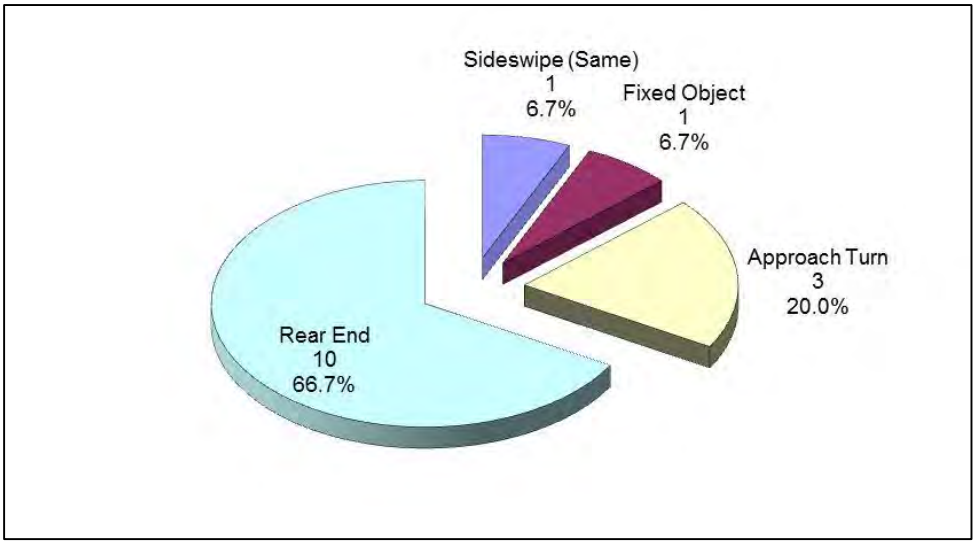


Figure 177
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (5th Street [MP 268.49])
Minor AADT = 5,800

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were fifteen crashes, eleven were property damage only and four resulted in injuries. **Figure 178** provides a graphical representation of crash types for this location. Rear end type crashes (66.7%) were the predominant crash type followed by approach turn type crashes (20.0%).

Figure 178
US 85L / 5th Street (MP 268.49)
15 Total Crashes



Observations / Recommendations

The frequency of rear end type crashes was higher than expected for this type of intersection. A review of the crash history indicated that two of the rear end crashes were northbound, six eastbound, and two westbound. Nine of the ten rear end crashes occurred on dry pavement and one crash was on wet road conditions. Eight of the rear end type crashes occurred during the day, one during the night and one at dawn/dusk lighting conditions. None of the rear end type crashes at this intersection involved either trucks or buses.

The intersection of US 85C with 5th Street was improved in 2012 with upgraded signals and mast arms and all approaches were brought up to current roadway standards. It is expected that these changes should provide some level of reduction in the level of crashes experienced at this intersection. It is recommended to review/update the existing yellow/all red clearance intervals to reduce the frequency of rear end type crashes at the other approaches to the intersection.

It is also recommended that crashes patterns continue to be monitored in the future. Advanced warning signs (W2-1) with flashing beacons might be a further improvement.

US 85L / O Street (MP 270.43)

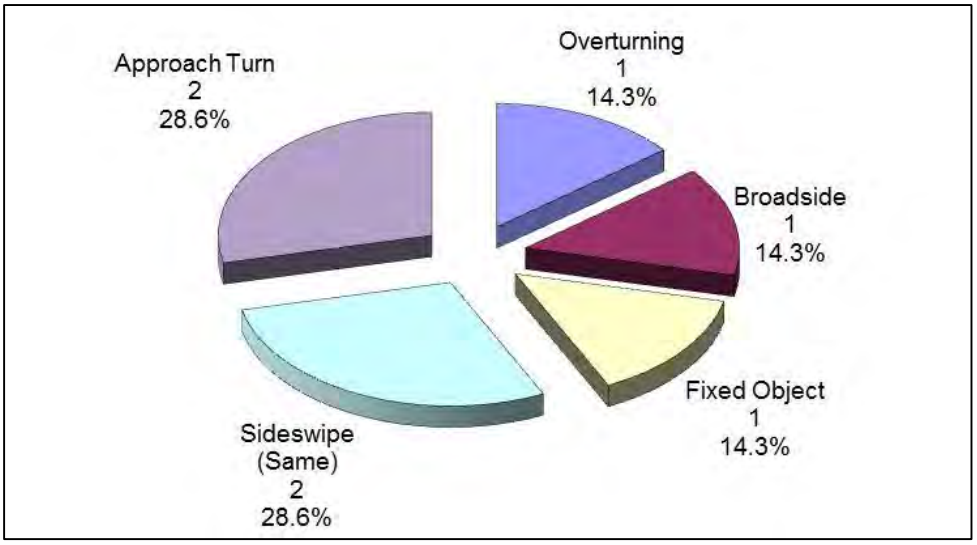
The intersection of US 85L with O Street is a three-leg, divided, unsignalized intersection. A northbound right-turn and southbound left-turn lane onto O Street are provided. There are two through lanes along US 85L. O Street only allows right-turn onto northbound US 85L, and there is a right-turn acceleration lane. The posted speed limit on US 85L is 65 mph. **Figure 179** shows an aerial view of the intersection.

Figure 179
Aerial Photo: US 85L / O Street (MP 270.43)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were seven crashes, five were property damage only and two resulted in injuries. **Figure 180** provides a graphical representation of crash types for this location. Approach turn type crashes (28.6%) and sideswipe (same) type crashes (28.6%) were the predominant crash types.

Figure 180
US 85L / O Street (MP 270.43)
7 Total Crashes



Observations / Recommendations

There are no significant crash types at the intersection of US 85L and O Street. There are no suggestions for improvements at this time.

US 85L / 11th Street (MP 271.19)

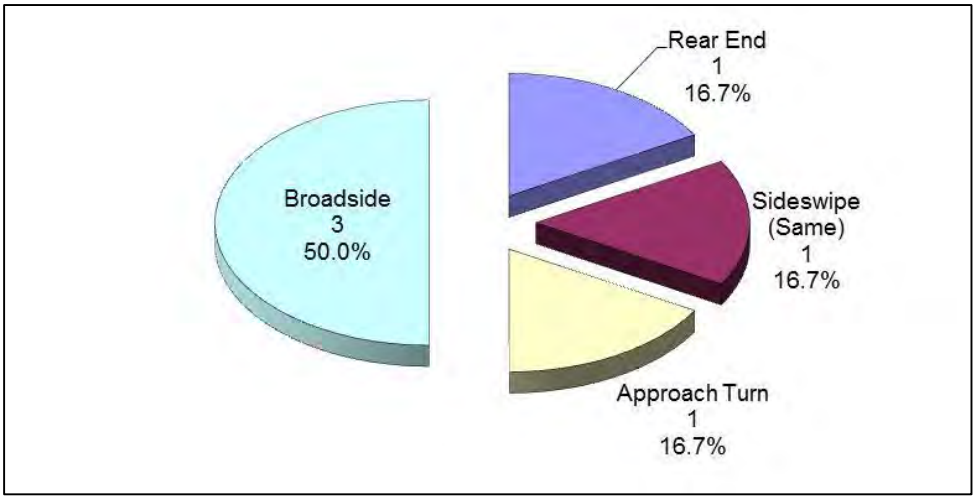
The intersection of US 85L with CR 6 is a three-leg, divided, unsignalized intersection. The northbound approach has a left-turn onto 11th street and two through-lanes. The southbound direction has a through/through-right-turn approach. 11th Street provides a left-turn and right-turn lane, both movements have acceleration lanes onto US 85L The posted speed limit on US 85 is 65 mph. The posted speed limit on 11th Street is 45 mph. **Figure 181** shows an aerial view of the intersection.

Figure 181
Aerial Photo: US 85L / 11th Street (MP 271.19)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were six crashes, three were property damage only and three resulted in injuries. **Figure 182** provides a graphical representation of crash types for this location. Broadside type crashes (50.0%) were the predominant crash type.

Figure 182
US 85L / 11th Street (MP 271.19)
6 Total Crashes



Observations / Recommendations

There are no significant crash types at the intersection of US 85L and 11th Street. There are no suggestions for improvements at this time.

US 85L / SH 392A (CR 68) (MP 272.48)

The intersection of US 85L with SH 392 (CR 68) is a four-leg, divided, and signalized intersection located in Lucerne. The northbound and southbound US 85L approaches provide both left-turn and channelized right-turn lanes onto SH 392. There are two through lanes along US 85L. The east and west legs have a through-left-turn/right-turn approach. The right-turn lanes off SH 392A are channelized and have acceleration lanes onto US 85L. The posted speed limit on US 85L is 55 mph. The posted speed limit on SH 392 is 45 mph. **Figure 183** shows an aerial view of the intersection.

Figure 183
Aerial Photo: US 85L / SH 392A (CR 68) (MP 272.48)

Safety Performance Function Analysis

For the intersection of US 85L with State Highway 392 **Figure 184** shows that the frequency of total crashes indicates a high potential for crash reduction for a signalized four-lane divided four-leg intersection (LOSS IV). **Figure 185** shows that the severity of crashes indicates a high potential for crash reduction (LOSS IV).

Figure 184
Four-Lane Divided Signalized Four-Leg Intersection
Total Crashes per Year (SH 392A [MP 272.48])
Minor AADT = 13,200

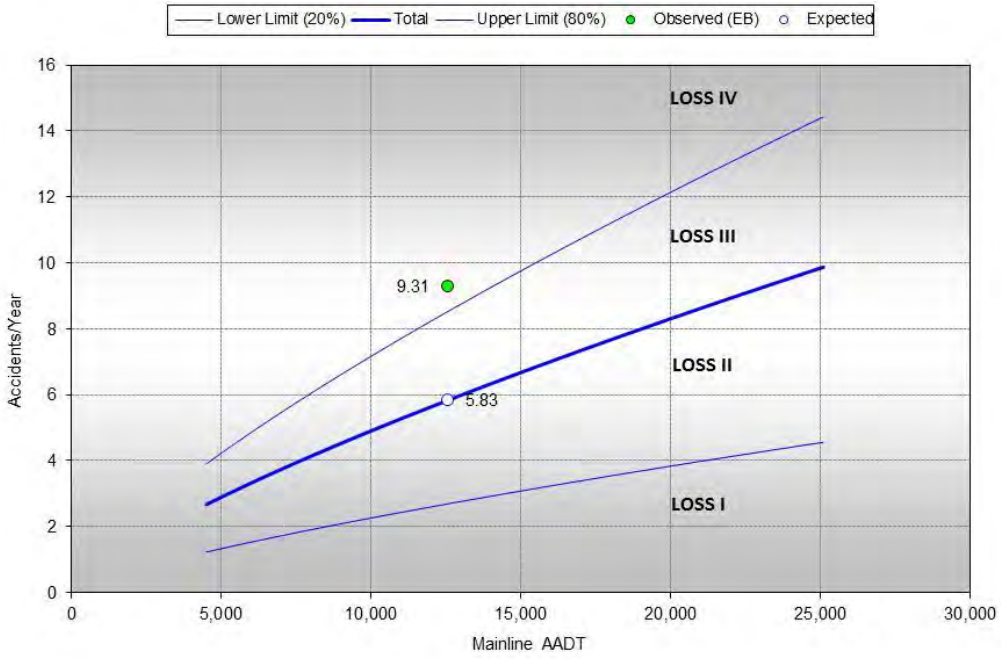
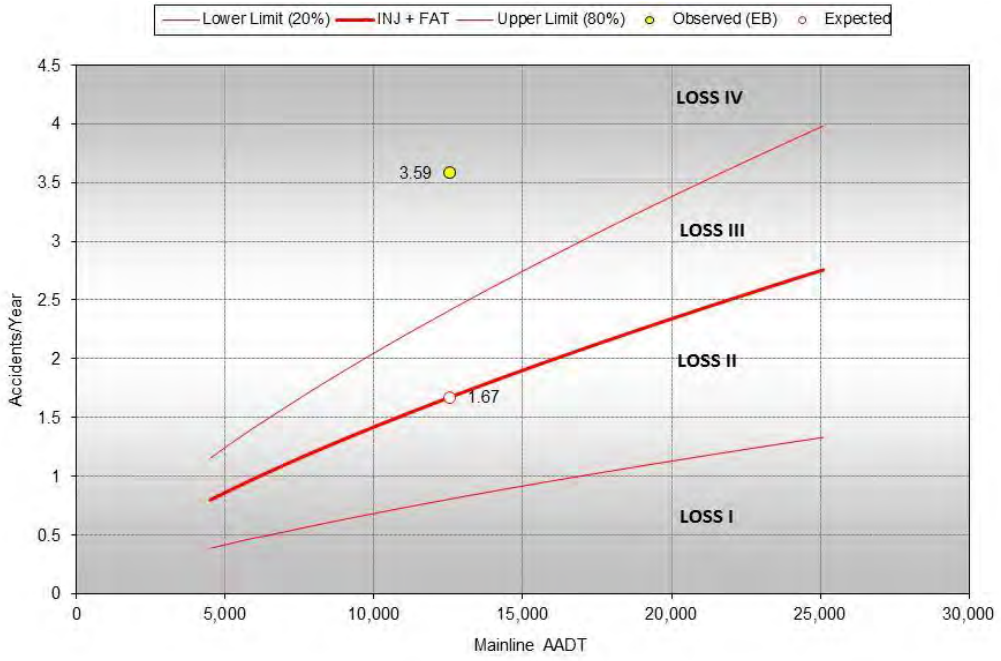


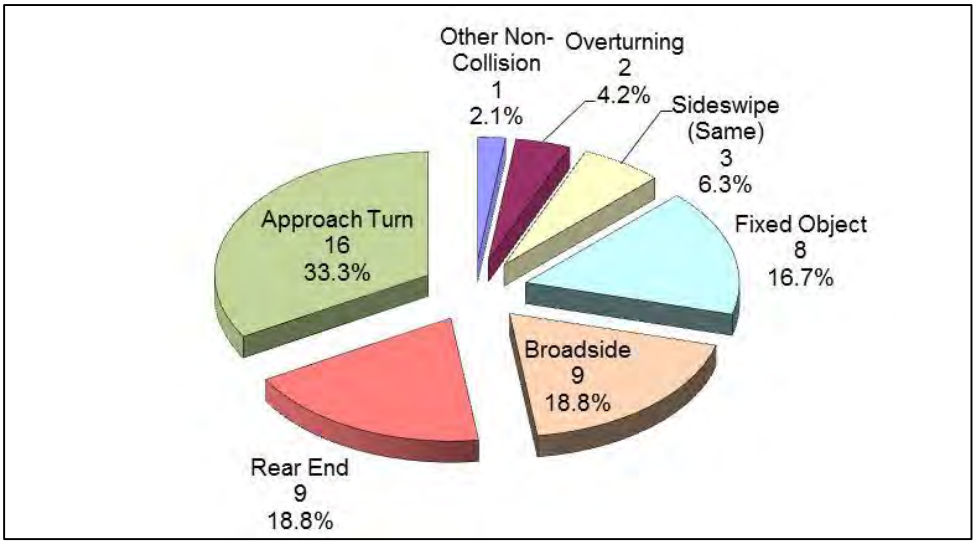
Figure 185
Four-Lane Divided Signalized Four-Leg Intersection
Injury + Fatal Crashes per Year (SH 392A [MP 272.48])
Minor AADT = 13,200



Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 48 crashes, 27 were property damage only and 21 resulted in injuries. **Figure 186** provides a graphical representation of crash types for this location. Approach turn type crashes (33.3%) were the predominant crash type followed by rear end type crashes (18.8%).

Figure 186
US 85C / SH 392A (MP 272.48)
48 Total Crashes



Observations / Recommendations

The frequency of approach turn type crashes was higher than expected for this type of intersection. A review of the crash history indicated that ten of the approach turn type crashes were northbound and six were southbound. Thirteen of the sixteen approach turn type crashes occurred on dry pavement, two crashes were on wet road conditions, and one was on icy road conditions. Nine of the approach turn type crashes occurred during the day, four during the night, and three at dawn/dusk lighting conditions. Approach turn type crashes at this intersection had two crashes that involved either trucks or buses.

During most of the study period (2008 through at least July 2012), there were no left turn phases for the US 85L approaches. Currently, there is protected/permitted left turn phasing for the north and south approaches. A quick check of 2013 and 2014 crash records reveals that the approach turn problem probably persists. Changing to flashing yellow left turn arrows or protected only left turn phasing might be considered. Upgrading the signal installation by relocating the signal poles from the median (where they can obstruct sight distance of oncoming traffic) to the outside shoulders might also be considered.

Although the broadside type crashes at this intersection are not significantly higher than expected, there is a directional pattern with six of the nine crashes caused by US 85L vehicles. To possibly reduce the number of broadside type crashes, connecting the flashing beacons on the intersection warning signs (W2-1) on US 85L to the signal controller in order to anticipate red phases could be considered. It is also recommended to review/update the existing yellow/all red clearance intervals to reduce the frequency of rear end and other types of crashes.

US 85L / CR 74 (Collins Street) (MP 275.59)

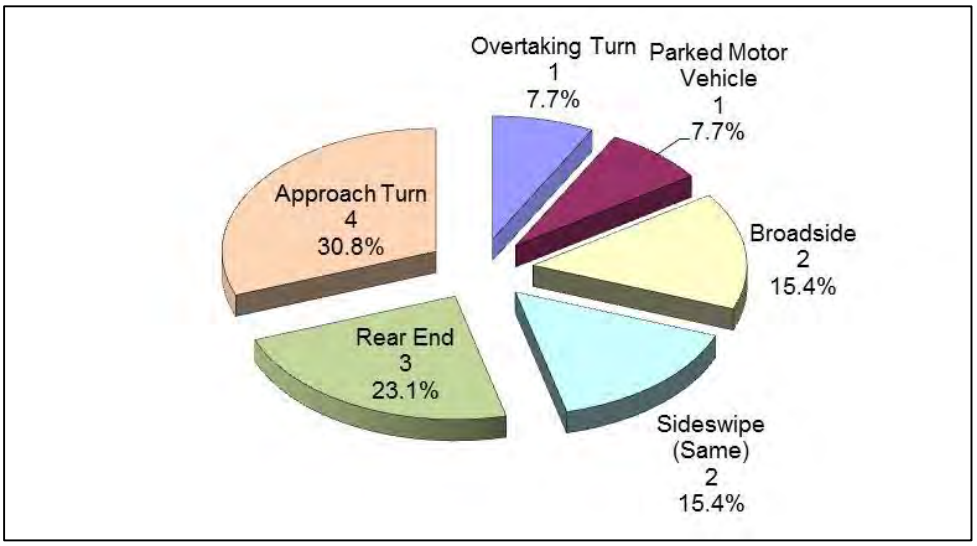
The intersection of US 85L with CR 74 (Collins Street) is a four-leg, divided, and signalized intersection located in Eaton. The northbound approach provides a left-turn and a right-turn lane onto CR 74, with two through lanes along US 85L. The southbound approach has left-turn, through, and through-right-turn lanes. The westbound approach has a left-turn lane and a through-right-turn lane configuration. The eastbound approach has left-turn, through, and right-turn lanes with a right-turn acceleration lane onto southbound US 85L. The posted speed limit on US 85L is 35 mph. **Figure 187** shows an aerial view of the intersection.

Figure 187
Aerial Photo: US 85L / CR 74 (Collins Street) (MP 275.59)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were 13 crashes and all 13 were property damage only. **Figure 188** provides a graphical representation of crash types for this location. Approach turn type crashes (30.8%) were the predominant crash type followed by rear end type crashes (23.1%).

Figure 188
US 85L / CR 74 (Collins Street) (MP 275.59)
13 Total Crashes



Observations / Recommendations

A review of the crash history indicates that there is no current pattern to crashes at the intersection of US 85L and CR 74 (Collins Street). There are no suggestions for improvements at this time.

US 85L / CR 76 (MP 276.62)

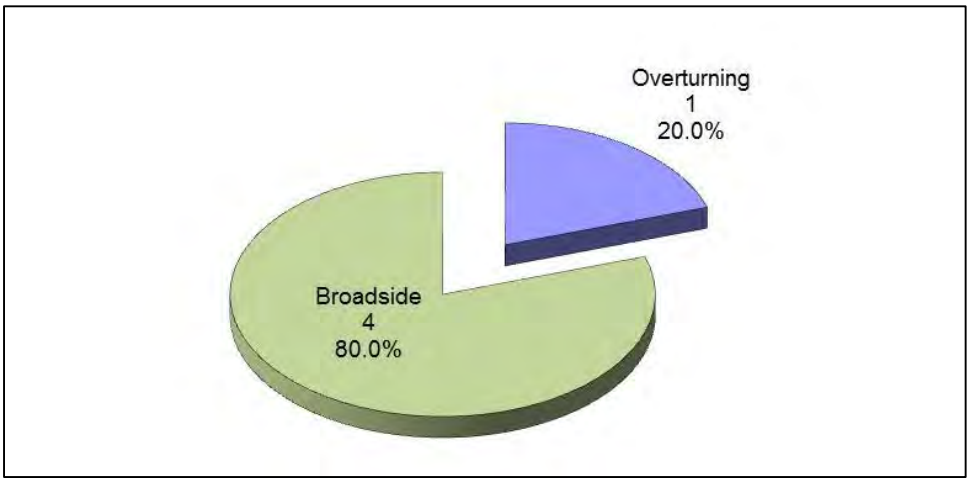
The intersection of US 85L with CR 76 is a four-leg, divided, unsignalized intersection. The northbound and southbound approaches provide left-turn and a right-turn lanes onto CR 76, with two through lanes along US 85L The westbound and eastbound approaches have shared left-turn/through/right-turn configurations with right-turn acceleration lanes onto each direction of US 85L. The posted speed limit on US 85L is 55 mph for northbound traffic and 50 mph for southbound traffic. **Figure 189** shows an aerial view of the intersection.

Figure 189
Aerial Photo: US 85L / CR 76 (MP 276.62)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were five crashes, and all five crashes resulted in injuries. **Figure 190** provides a graphical representation of crash types for this location. Broadside type crashes (80.0%) were the predominant crash type followed by overturning type crashes (20.0%).

Figure 190
US 85C / CR 76 (MP 276.62)
5 Total Crashes



Observations / Recommendations

The frequency of broadside type crashes was higher than expected for this type of intersection. A review of the crash history indicated that three of the four broadside type crashes were eastbound, and one was westbound. Three crashes were on dry pavement, and one was on icy road conditions. All of the crashes occurred during the day with the sun generally behind the drives. All of the crashes involved either passenger vehicles or SUVs.

Currently, there are stop signs for both approaches of CR 76. In addition, there are stop signs in each direction just east of the intersection where CR 76 crosses the UPRR tracks. Placing larger stop signs (R1-1 – 48”x48”) should be considered for both CR 76 approaches to the intersection. The pattern of crashes should be monitored, and if the broadside pattern persists, a flashing red beacon should be considered for the stop signs and a flashing yellow beacon for the advanced warning sign (W2-1) west of the intersection for eastbound CR 76 traffic.

US 85L / SH 14C (1st Street) (MP 279.76)

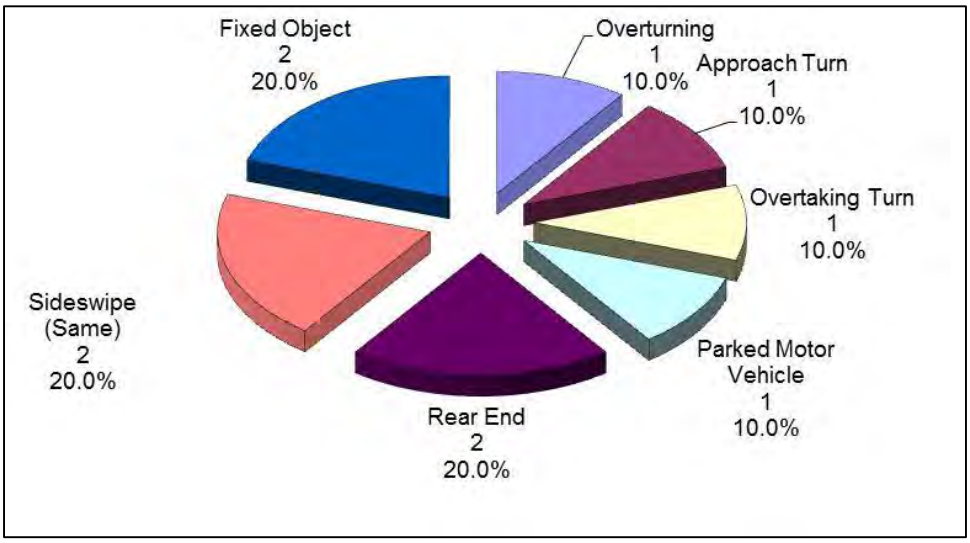
The intersection of US 85L with SH 14C (1st Street) is a four-leg, undivided, signalized intersection located in Ault. The northbound and southbound approaches provide left-turn and right-turn lanes onto SH 14C, with two through lanes along US 85L. The westbound and eastbound approaches have shared left-turn/through/right-turn configurations. The posted speed limit on US 85L is 35 mph. **Figure 191** shows an aerial view of the intersection.

Figure 191
Aerial Photo: US 85L / SH 14C (1st Street) (MP 279.76)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were ten crashes, nine were property damage only and one resulted in injury. **Figure 192** provides a graphical representation of crash types for this location. Rear end type crashes, sideswipe (same), and fixed object crashes (20.0%) were the predominant crash types at this intersection.

Figure 192
US 85L / SH 14C (1st Street) (MP 279.76)
10 Total Crashes



Observations / Recommendations

A review of the crash history indicates that there is no current pattern to crashes at the intersection of US 85L and SH 14C. There are no suggestions for improvements at this time.

US 85L / CR 100 (MP 289.00)

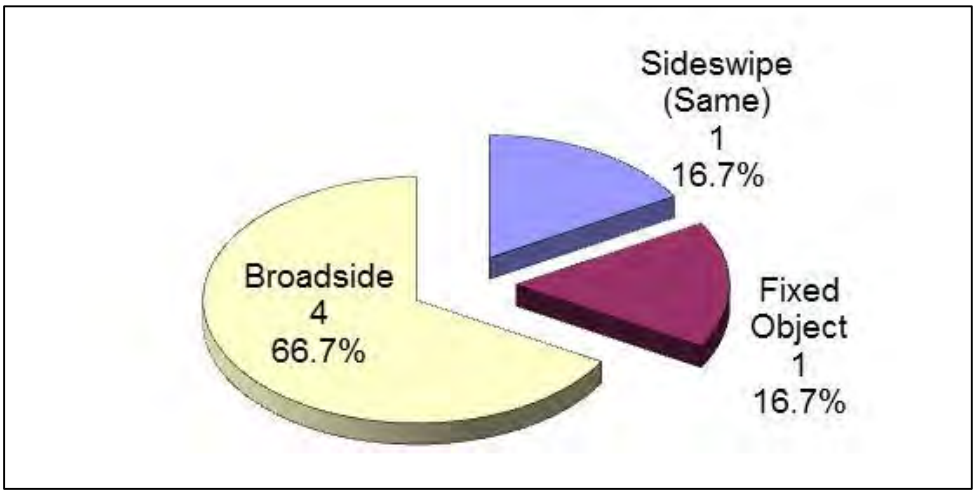
The intersection of US 85L with CR 100 is a four-leg, undivided, unsignalized intersection located near Nunn. All approaches are single lane approaches with shared left-turn/through/ right-turn configurations. The westbound approach is unpaved and crosses the railroad approximately 150 feet east of the intersection. The posted speed limit on US 85L is 55 mph. **Figure 193** shows an aerial view of the intersection.

Figure 193
Aerial Photo: US 85L / CR 100 (MP 289.00)

Crash History

During the five-year study period (1/1/2008 – 12/31/2012), there were six crashes, two were property damage only, three resulted in injuries, and one fatal crash. **Figure 194** provides a graphical representation of crash types for this location. Broadside crashes (66.7%) were the predominant crash type followed by sideswipe (same direction) crashes (16.7%) and fixed object crashes (16.7%).

Figure 194
US 85L / CR 100 (MP 289.00)
6 Total Crashes



Fatal Crashes

This broadside type crash occurred on October 14, 2010 at 19:10 under dry and dark-unlighted conditions. Vehicle #1 (a passenger car) was traveling eastbound on CR 100, and Vehicle #2 (a large truck) was traveling northbound. The crash was reported as a front to side collision. Alcohol was suspected for the driver of Vehicle #1. Vehicle #1 was reported to be traveling 20 miles over the speed limit of 35 mph. Vehicle #1 was reported to disregard the stop sign.

Observations / Recommendations

The frequency of broadside type crashes was higher than expected for this type of intersection. A review of the crash history indicated that three of the four broadside type crashes were eastbound, and one was northbound (unusual circumstances). Three crashes were on dry pavement, and one was on wet road conditions. Two of the crashes occurred during the day, and the other two were in dark, unlighted conditions. Three of the crashes involved either passenger vehicles or light trucks, and one involved a larger truck.

Currently, there are stop signs for both approaches of CR 100. In addition, there is an additional stop sign before the intersection are eastbound traffic at the gravel frontage road approaching from the south. Placing larger stop signs (R1-1 – 48”x48”) should be considered for both CR 100 approaches to the intersection. The additional stop sign on the west leg should be replaced with a “Do Not Block Intersection” (R10-7) sign to reduce confusion about were eastbound vehicles should stop. The pattern of crashes should be monitored, and if the broadside pattern persists, a flashing red beacon should be considered for the stop signs and a flashing yellow beacon for the advanced warning sign (W2-1) west of the intersection for eastbound CR 100 traffic.

CONCLUSIONS AND RECOMMENDATIONS

These conclusions and recommendations are based on the analysis of five years of crash history, field visits, and reviews of video log. Regions 1 and 4 are advised to verify through field survey, the observations made in this report regarding physical features, roadside characteristics and traffic control devices.

US 85 traverses flat and rolling terrain. From I-76 (MP 226.80) through Ault (MP 280.27), US 85 has a four-lane divided cross section. North of Ault, US 85 is a two-lane roadway. US 85 traverses urban areas in the southern segments and the Evans/Greeley/Eaton area. The middle and north segments are rural.

CDOT has been active through the US 85 corridor making safety related improvements in the three years since 2012. These improvements include cable rail median barrier through much of the corridor in Weld County south of LaSalle. In addition, at least one intersection (CR 42) has been signalized, and several existing signals have been modified. The following is a brief summary of additional safety improvements that could be considered.

General Recommendations

The following features should be considered along US 85 as elements of any significant improvements project (such as repaving or reconstruction) that might be undertaken by the Regions:

- Good skid resistance and drainage of the roadway surface,
- Adjustment, repair, and upgrade of existing guardrail to meet current standards,
- Elimination of pavement edge drop-offs (Safety Edge Application),
- Crown correction where required,
- Appropriate pavement markings, signing, and delineation,
- Replace all button reflectors and guardrail reflectors to ensure good nighttime and inclement weather (fog, snow, rain, etc.) delineation.

Other general improvements that the Regions should consider include:

- Cable rail median barrier throughout the four-lane divided segments of the corridor. Cable rail has recently been installed between CR 2 (MP 236.03) and LaSalle (MP 265.85). Concrete barrier is deployed in the vicinity of the SH 52 interchange in Fort Lupton.

- Much of the corridor south of LaSalle already has outside shoulder rumble strips installed. These should be considered for the rest of the corridor north of 5th Street in Greeley. Shoulder widening may be necessary in certain sections to accomplish this.

- Most of the signalized intersections are isolated: approximately a mile or more separation with the exception of the Evans and Greeley areas. Rear end and sideswipe (same) type crashes are higher than expected, generally due to high volumes and congestion. Reviewing and updating the existing yellow/all red clearance intervals to reduce the frequency of rear end and other types of crashes should be considered.

Many of the signalized intersections have advanced warning signs (R2-1) with flashing beacons on the US 85 approaches. Repositioning these intersection warning signs at an appropriate distance for current approach speeds should be considered. If the separation distance allows, the flashing beacon should be connected to the signal controller in order to anticipate red phases.

Specific Recommendations

- Through Segment 1C (from midway between the 124th and 132nd Avenue intersections [MP 230.87] and extending north to north of the SH 7 interchange [MP 235.19]), a specific off-road left pattern of crashes was identified, and cable rail barriers should be considered for the median of this segment.

- The intersection of US 85C with CR 44 is an unsignalized intersection that has a significant broadside crash problem: 27 of 28 total crashes. CR 44 intersects US 85C at a skew angle, which makes it harder for large trucks and busses (as well as other vehicles) to see oncoming traffic. There are currently double posted intersection warning signs (W10-2) on both approaches of US 85C. Unfortunately, the northbound posting is at MP 258.213, south of the intersection with CR 33 (MP 258.37). Increasing the size of these signs to freeway standard (48"x48") and adding northbound signs south of CR 44 should be considered. Flashing beacons for these signs should also be considered. This intersection should be monitored in the future to see if more aggressive measures (such as a traffic signal) might be appropriate. Constructing a signal will likely reduce the broadside collisions but could also increase the overall number of crashes, especially rear end crashes.

- The intersection of US 85L with SH 392 (CR 68) is a signalized intersection located in Lucerne. The frequency of approach turn type crashes was higher than expected for this type of intersection. Changing to flashing yellow left turn arrows or protected only left turn phasing might be considered. Upgrading the signal installation by relocating the signal poles from the median (where they can obstruct sight distance of oncoming traffic) to the outside shoulders might also be considered.

- The intersection of US 85L with CR 76 in Ault is an unsignalized intersection that has a higher than expected number of broadside crashes, primarily caused by eastbound drivers. Placing larger stop signs (R1-1 – 48"x48") should be considered for both CR 76 approaches to the intersection. The pattern of crashes should be monitored, and if the broadside pattern persists, a flashing red beacon should be considered for the stop signs and a flashing yellow beacon for the advanced warning sign (W2-1) west of the intersection for eastbound CR 76 traffic.

- The intersection of US 85L with CR 100 in Nunn is an unsignalized intersection that has a higher than expected number of broadside crashes. Placing larger stop signs (R1-1 – 48"x48") should be considered for both CR 100 approaches to the intersection. The additional stop sign on the west leg should be replaced with a "Do Not Block Intersection" (R10-7) sign to reduce confusion about were eastbound vehicles should stop. The pattern of crashes should be monitored, and if the broadside pattern persists, a flashing red beacon should be considered for the stop signs and a flashing yellow beacon for the advanced warning sign (W2-1) west of the intersection for eastbound CR 100 traffic.

Appendices

See attached electronic files generated during the analyses of safety along US 85.