

Submitted By: Thomas F Kicklighter, III Date: 05 / 05 / 2016 Recommended: Thomas F Kicklighter, III Date: 05 / 13 / 2016

To: Brad Reynolds
Program / Project Manager

Engineer of Record

BASIS OF DESIGN EXCEPTION

- Request for Approval of Design Exceptions to AASHTO Guidelines
- Request for Approval of Design Exceptions from Standard SCDOT Procedures

PROJECT CHARACTERISTICS

County: Spartanburg & Cherokee Rd./Route: Interstate 85 Const. Pin: P027114

From: MM 80 To: MM 96

Length: Various sections along approximately 16 miles MPO / COG: Appalachian

Work Type: Widening and pavement reconstruction

Functional Classification: Urban Freeway

Group Designation: (1 / 2 / 3 / 4) (if applicable)

Type of Terrain: (Level / Rolling / Mountainous)

Design Speed: 65 (mph)

2013 ADT 58,600

2040 ADT 87,600

TRUCKS 25 %

CRASH ANALYSIS

(Attach additional sheets with accident history data)

TOTAL PROJECT ESTIMATE (\$) \$340,776,850

CHECK APPROPRIATE BOX(ES) FOR DESIGN EXCEPTION(S)

- | | | |
|---|---|--|
| <input type="checkbox"/> Design Speed | <input checked="" type="checkbox"/> Maximum Grade | <input type="checkbox"/> Travel Lane Width |
| <input type="checkbox"/> Horizontal Alignment | <input type="checkbox"/> Vertical Clearance | <input type="checkbox"/> Shoulder Width |
| <input type="checkbox"/> Minimum Radii | <input type="checkbox"/> Bridge Width | <input type="checkbox"/> Horizontal Clearance |
| <input type="checkbox"/> Vertical Alignment | <input type="checkbox"/> Structural Capacity | <input type="checkbox"/> Stopping Sight Distance |
| <input type="checkbox"/> Level SSD K-Values | <input type="checkbox"/> Superelevation Rate | |
| | <input type="checkbox"/> Cross Slope | |
| | <input type="checkbox"/> Travel Lanes | |
| | <input type="checkbox"/> Shoulders | |

DESCRIBE ELEMENT(S) FOR DESIGN EXCEPTION(S)

(Attach additional sheets as needed) _____

(See Attachment) _____

JUSTIFICATION FOR DESIGN EXCEPTION(S)

(Attach additional sheets as needed) _____

(See Attachment)

DESCRIBE STEPS TO ELEMIMATE DESIGN EXCEPTION(S), INCLUDE COST

(Attach additional sheets as needed) _____

(See Attachment)

HOW WILL FUTURE CONSTRUCTION IMPACT DESIGN EXCEPTION(S)?

(Attach additional sheets as needed) _____

(See Attachment)

RECORD OF DECISION

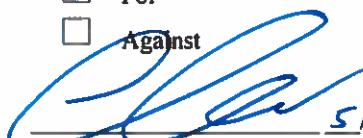
For

Against

 5/24/2016
(Regional Design Manager/
Program Manager / DEA) Date

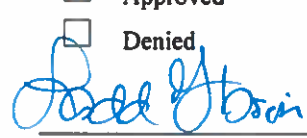
For

Against

 5/24/16
(Regional Production Engineer) Date

Approved

Denied

 5/24/2016
(Director of Preconstruction) Date

Concur

 5/25/16
FHWA (NHS > \$50 million & All Interstate)

cc:
Director of Preconstruction
FHWA
Preconstruction Support Engineer
Regional Production Group Engineer
District Engineering Administrator
Director of Traffic Engineering

DESCRIBE ELEMENT(S) FOR DESIGN EXCEPTION(S)

The proposed design for the I-85 mainline alignment contains four (4) locations the profile grade exceeds 5.00%, ranging between 5.15% and 6.32%. The southbound lanes have one (1) area in the up-grade direction and two (2) in the down grade direction. The northbound lanes have one (1) location in the down grade direction. According to the 2001 AASHTO Policy on Geometric Design of Highways and Streets, January 2005 Interstate Standards, and the 2003 South Carolina Highway Design Manual, the maximum grade for an urban freeway with rolling terrain and a 65 MPH design speed is 5%. Per AASHTO this maximum grade is recommended in order to maintain close speed differentials between the various types of vehicles (i.e. trucks versus passenger vehicles) of no more than 20 MPH. AASHTO in Chapter 3 section under the "Control Grades for Design" acknowledges that short grades of less than 500' have little impact on the speed differentials of vehicles.

JUSTIFICATION FOR DESIGN EXCEPTIONS

The elimination of the vertical grade design exceptions would require extensive reconstruction of I-85, would present major traffic control issues and add significantly to the cost of the project. In the project's Accident Analysis Report prepared by Bihl Engineering, the traffic collision report for a three-year period shows the most common type of accident was fixed object (40%), with rear end collisions following at (27%) (see Figures 2 and 8 of the Accident Analysis Report). Both of these types of accidents occur sporadically throughout the project limits. As noted on page 8 of the Accident Analysis Report, northbound rear-end collisions are the most numerous on this section of roadway with three clusters located between MM 80 and MM 81. There is also a cluster of rear-end crashes southbound at approximately MM 81.5. According to the report, most of these accidents occur at the beginning of the project when traffic has slowed or stopped where I-85 reduces from 3-lanes to 2-lanes in the NB direction. The backed up queue causes vehicles to slow down or come to a stopped condition. The primary cause for crashes at this location as noted on the Accident Report is motorists "driving too fast for conditions" and being unable to stop in time to avoid a collision with a substantially slowed or stopped vehicle (see Tables 2-4). The widening of this section of I-85 from four lanes to six lanes will improve this condition. As stated in Section 4.8 of the Accident Analysis Report, most of the accidents between Exit 95 and Exit 96 were caused by insufficient ramp lengths at the two interchange ramps. These types of accidents are prevalent in the areas where ramp traffic is entering or exiting the I-85 mainline. The widening of this section of I-85 from four to six lanes and the extension of acceleration and deceleration ramps at exits 95 and 96 will improve this condition.

In the I-85 northbound direction there is one (1) substandard area between Sta 889+15 – Sta 894+28 (MM 80.6) at -6.32%. This location is where I-85 reduces from a 3 lanes to 2 lanes. In this area between MM 80-82, there were 38 rear end collisions and 9 sideswipes collisions in the NB direction as outlined in the Accident Analysis Report. The most probable cause as outlined in the Accident Analysis Report was due to slowed or stopped I-85 traffic at the reduction of lanes from 3 to 2.

In the I-85 southbound direction there are three (3) substandard locations in two (2) separate areas between the following approximate Stations and grade/ grade direction of traffic (Uphill+/downhill-):

Sta 887+78 – Sta 894+58 (MM 80.6) at 5.82% & Sta 951+23 – Sta 958+60 (MM 81.8) at -6.00% This area is where the CSX railroad bridge overpass is located and the second grade is just north of the Pacolet River bridge. In this area between MM 80-82, there were 21 rear end collisions and 4 sideswipes collisions in

the SB direction as outlined in the Accident Analysis Report. The most probable cause as outlined in the Accident Analysis Report was due to slowed or stopped I-85 traffic at the expansion of lanes from 2 to 3.

Sta 1709+25 –Sta 1711+95 (MM 96.1) at -5.95%.

This area is located immediately north of the Cherokee Creek Bridge. In this area, there was not any substantial number of crashes that would indicate an issue with the existing conditions.

DESCRIBE STEPS TO ELIMINATE DESIGN EXCEPTION(S), INCLUDE COST

Major reconstruction on I-85 would be required to correct the substandard grades. The existing roadway in the aforementioned areas would need to be lowered and/or raised to approximately 5' to 7'. The substantial reconstruction of the road would require very complex maintenance of traffic due to the elevation difference that exists between the northbound and southbound lanes. The physical constraints of tying the vertical profile to the existing bridges crossing the Cherokee Creek would be impractical.

Mile Marker MM 80.6 & MM 81.8 (NB Sta 889+15 – Sta 894+28 and SB Sta 887+78 – Sta 894+58 & SB Sta 951+23 – Sta 958+60)

These grades are located at the beginning of the project in the vicinity of the existing CSX railroad overpass and the Pacolet River. In order to reduce the grades to 5.00% or less, the pavement would need to be cut or raised between approximately 7'-10' in certain areas. The surrounding grades cannot be raised, due to the vertical clearance of the proposed CSX railroad overpass bridge and the elevation of the existing Pacolet River Bridge which was constructed in 1998. The cutting or raising of the existing pavement approximately 7'-10' is not a viable alternative due to concerns with maintenance of traffic during construction. The existing bridges are not wide enough to accommodate 4-lanes of traffic (i.e. 2 in each direction) while the opposite side lanes are closed and reconstructed. The existing structure would need to be widened to accommodate traffic. On the uphill grades areas, since I-85 is being widened to 3-lanes in each direction truck restrictions will be placed on the inside lanes. This will allow vehicles not being affected by the grades opportunity to pass vehicles such as a truck where speeds have been affected due to the uphill grade. The downhill grade should not cause any issue that would affect the LOS of the interstate. Costs to remove the entire pavement structure over the entire required areas and the associated traffic control would result in an estimated cost to complete this work of \$11,000,000. Based on the costs, minimal crash history related to grade, and the opportunity for faster moving vehicles to pass slower moving vehicle in the inside third lane, it is recommended to retain the existing geometry.

Mile Marker MM 96.1 (SB Sta 1708+95 –Sta 1711+95)

This grade is located just north of the Cherokee Creek bridge structures, which were constructed in the last 18 years. The existing structures have good sufficiency ratings and do not need to be replaced. The structures over the Cherokee Creek were constructed to accommodate 6-lanes, so no widening will be required of these structures. Due to the location of this grade and the Cherokee Creek Bridges, maintenance of traffic would pose a major issue. The existing bridge in the NB direction is not wide enough to accommodate 4-lanes of traffic (2 lanes in each direction) while the SB lanes are closed and reconstructed to reduce the grade. The existing structure would need to be widened to accommodate construction traffic. The downhill grade should not cause any issue that would affect the LOS of the interstate. Costs to remove the entire pavement structure over the entire required areas and the associated traffic control would require major reconstruction effort and would cost approximately \$5,000,000. Based on the costs, minimal crash history related to grade, and the opportunity for faster moving vehicles to pass slower moving vehicles in the inside third lane, it is recommended to retain the existing geometry.

MITIGATION

Widening from 2 to 3 lanes in the sections leading up to and away from the bridge should help reduce congestion and improve safety. With the construction of the new concrete pavement which will replace the existing asphalt pavement the proper cross slope will be provided and improves the facility by eliminating any flat spots on the pavement which currently exist. Additionally, the design will provide both the appropriate super-elevation rates and transition lengths along with the correct clear zone treatment which will significantly improve I-85 throughout the project limits.

HOW WILL FUTURE CONSTRUCTION IMPACT DESIGN EXCEPTION(S)?

Future construction is not anticipated to be impacted by the design exception. Due to the significant issues associated with constructability and maintenance of traffic to correct the grades and the fact that the crash analysis does not indicate adverse effects on safety, it is not anticipated these grades will be modified in the future provided an acceptable level of safety remains in the future.

Accident Analysis Report

**I-85 Widening Project MM 80 to MM 96
Spartanburg and Cherokee Counties, SC**

**Prepared for:
South Carolina Department of Transportation**

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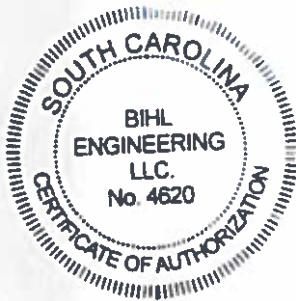
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**Accident Analysis Report
I-85 Widening Project MM 80 – MM 96
Spartanburg and Cherokee Counties
South Carolina**

**Prepared for:
South Carolina Department of Transportation**

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**December 2014
(revised March 2015)
(revised April 2016)**

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1.0 Executive Summary

The South Carolina Department of Transportation (SCDOT) is proposing a widening of Interstate 85 (I-85) from four lanes to six lanes from near Gossett Rd. (S-57) (Exit 80) to just north of SC 18 (Exit 96) in Spartanburg and Cherokee Counties. The project includes adding a travel lane in each direction, improving various interchanges and exit ramps, and replacing overpass bridges. As part of the widening project, the crash information is being reviewed for the interstate and its ramp interchanges and surrounding roadways.

For the study, historic crash data from the last three years were reviewed for the entirety of the proposed widening including access points at the following interchanges: Exit 82 (Bud's Drive)/Exit 83 (SC 110), Exit 87 (Green River Rd.), Exit 95 (SC 18 – Gaffney), and Exit 96 (SC 18 – Shelby and the Gaffney Ferry Road northbound on-ramp). Data included accidents occurring on the interstate as well as on the ramps and the surrounding roads in the vicinity of each of these interchanges.

The 1,019 crashes (902 interstate or interstate ramp crashes and 117 surrounding roadway crashes) were reviewed to identify hot spot locations and trends.

A majority of the accidents were classified as property damage only; however, 14% were classified as possible injuries, 3% as non-incapacitating injuries, less than 1% as incapacitating injuries and less than 1% as fatalities. One additional fatality has occurred since December 2014. Fatal crashes were a mixture of fixed object, angle and head-on crashes as well as crashes involving pedestrians. Reviewing the available information regarding the fatality locations, there does not appear to be a trend in cause. An increase in lighting at locations where pedestrians are expected could be considered during the design.

The most common accident type along I-85 was “not a collision with a motor vehicle in transport (collision with fixed object),” comprising 358 of the 902 total crashes (40%). These included collisions with fixed objects such as the guardrail, median, or fence. Rear-end collisions (27%) and sideswipes, same direction, (14%) were the next most common crash types.

Study area hot spots are listed below:

- Various areas along the corridor with limited clear zone due to bridges, fencing, embankments, etc.
- I-85 North and South at vertical curve locations between MM 80 and MM 81
- I-85 South at MM 82.542
- I-85 North at Exit 82 off-ramp
- I-85 South at Exit 83 on-ramp

- I-85 South at MM 83.675
- I-85 North Exit 90 on-ramp
- Surrounding roadways at Exit 95, east of interstate (Hampshire Drive and SC 18 from Matthew Drive to the S-82 Overpass) – approximately half of crashes on the non-interstate roadways occur in this area.
- I-85 North at Exit 96 off-ramp
- I-85 North at Exit 96 on-ramp
- I-85 North at Gaffney Ferry Road on-ramp

A review of the crash history shows that the geometric conditions of the interchanges and how they tie into the non-interstate roadway system play a large role in the crash locations. Merging distance at on-ramps should be improved to SCDOT standards. There are some vertical curve locations on the interstate that show an increase in accidents; however, most do not appear to have a significant effect on crash locations. Many of the fixed object crashes on I-85 occur where there is a limited recovery zone due to fencing, guardrails, etc. Many guardrails, fences, etc. are installed to help prevent more severe crashes; however, maximizing the recovery distance without compromising the safety installation reason of a fixed object may help reduce the number of fixed object crashes.

Also, the non-interstate system has many nonstandard intersections (skew, general design, sight distance, etc.) that likely cause driver confusion as they enter or exit the interstate contributing to area crashes.

2.0 Introduction

Figure 1 shows the project limits of the crash data review. As stated previously, SCDOT is proposing to widen Interstate 85 (I-85) from four lanes to six lanes from near Gossett Rd. (S-57) (Exit 80) to just north of SC 18 (Exit 96) in Spartanburg and Cherokee Counties.

For the interstate corridor, historic crash data from the last three years, from January 2011 through December 2013, were reviewed for the project study area including the following interchanges: Exit 82 (Bud's Drive)/Exit 83 (SC 110), Exit 87 (Green River Rd.), Exit 95 (SC 18 – Gaffney), and Exit 96 (SC 18 – Shelby including the Gaffney Ferry Road northbound on-ramp). Data included accidents occurring on the interstate as well as on the ramps. One additional fatality that occurred since December 2014 is also discussed. For other study area roads in the vicinity of these interchanges, crash data included events from January 2011 through August 2014.

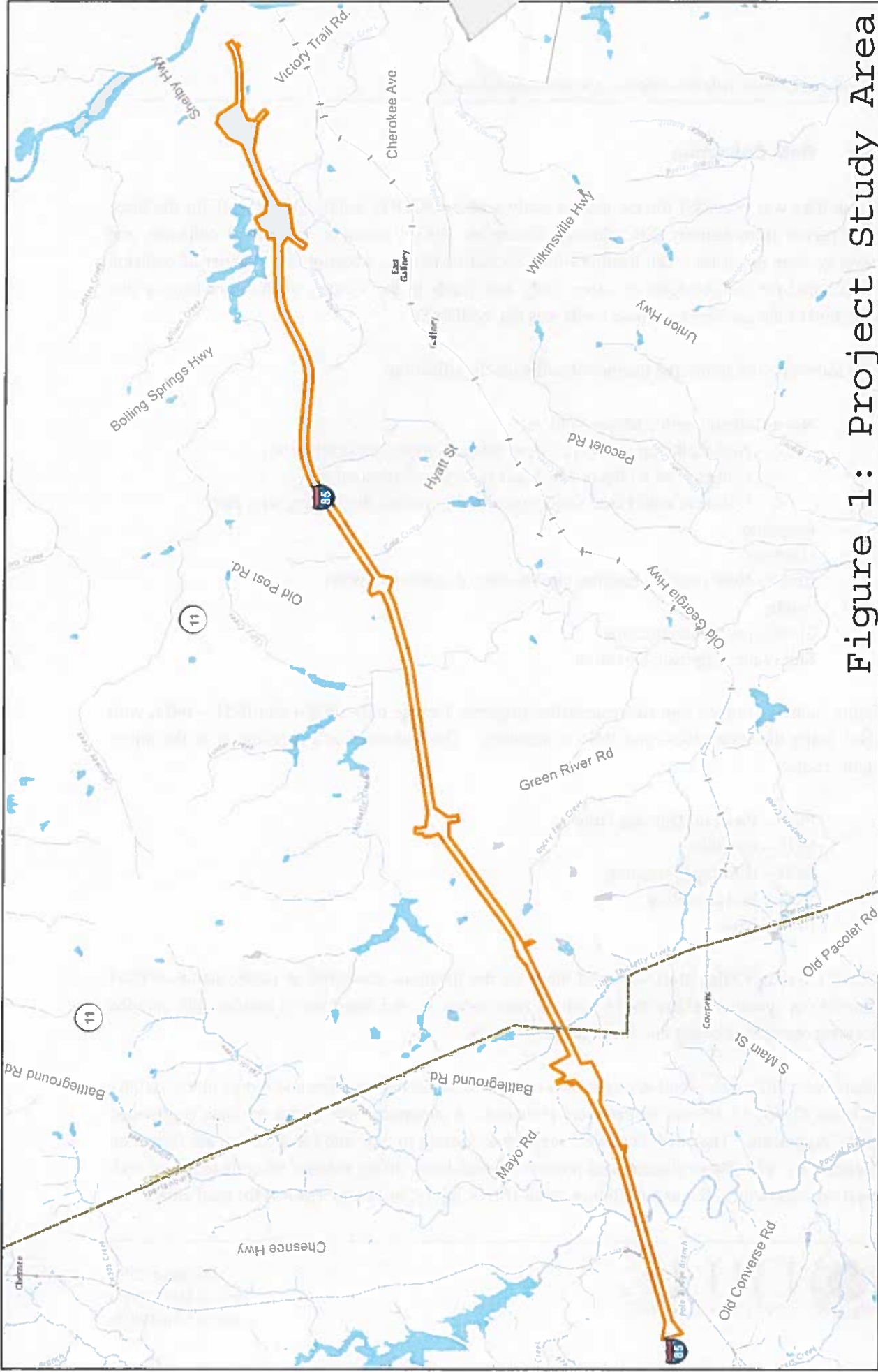


Figure 1: Project Study Area

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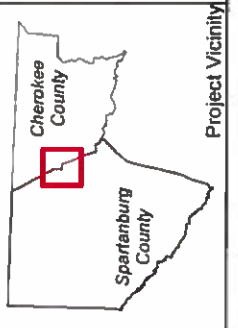
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Miles

Project Study Area
 County Line
 Road
 River/Stream
 Rail
 Water Body

I-85 Widening MM 80 to MM 96

Project Study Area

Cherokee & Spartanburg Counties



Source: ESRI; US Census; USDA Geospatial Gateway; SCDNR

3.0 Data Collection

Crash data was provided for the project study area by SCDOT Safety Office staff for the three year period from January 2011 through December 2013. Location, manner of collision, and severity were noted for crash locations on I-85 and its ramps. Location and manner of collision were noted for the accidents on other study area roads in the vicinity of the interchanges (the direction of the accidents on these roads was not available).

The following list shows the manner of collision classification:

- Not a Collision with a Motor Vehicle
 - o Non-Collision (run off road, rollover/overturn, jackknife, etc.)
 - o Collision with Object Not Fixed (animal, pedestrian, etc.)
 - o Collision with Fixed Object (guardrail, median, ditch, sign, tree, etc.)
- Rear End
- Head-on
- Rear-to-Rear (vehicle backing into the rear of another vehicle)
- Angle
- Sideswipe, Same Direction
- Sideswipe, Opposite Direction

Injury Status is broken into five categories: property damage only (PDO) and INJ1 – INJ4, with INJ1 being the least severe and INJ4 as fatalities. The following is a description of the injury status codes:

- PDO – Property Damage Only
- INJ1 – Possible
- INJ2 – Non-Incapacitating
- INJ3 – Incapacitating
- INJ4 – Fatal

SCDOT Safety Office staff reviewed many of the locations classified as injury status of INJ4 (fatality) or unique accident types such as rear-to-rear on the interstate to confirm the detailed accident report was coded into the database properly.

There were 902 crashes on I-85 from MM 80 to MM 96 on the mainline and ramps in the vicinity of Exits 82, 83, 87, 95 and 96 that were reviewed. A summary table of the raw data is provided in the **Appendix**. The crash data were mapped according to type and location and are shown on **Figures 2 – 12**. These figures also provide a breakdown of the manner of collision (rear end, head-on, sideswipe, etc.) and the injury status (PDO, injury, or fatality (INJ4)) for each crash.

Since the December 2014 submittal an additional fatality crash occurred. This is discussed later in the report.

In addition to the interstate data, the following roadways were included in the study area (data included crashes from January 2011 through August 2014):

- Bud's Drive (Spartanburg County)
- S-42-737 (Bud Arthur Road and Frontage Road N) (Spartanburg County)
- SC 110 (Spartanburg County)
- Edgefield Road (S-42-22) (Spartanburg County)
- Horry Road (S-42-9725 and S-42-9724) (Spartanburg County)
- Phillips Drive (Spartanburg County)
- Webber Road (S-11-665) (Cherokee County)
- Lindley Road (Cherokee County)
- Hampshire Drive (S-18-661) (Cherokee County)
- Suzanna Drive (Cherokee County)
- Matthew Road (S-11-614) (Cherokee County)
- SC 18 (Cherokee County)
- Fatz Drive (Cherokee County)
- Pleasant School Road (S-11-82) (Cherokee County)
- Wilcox Avenue (S-11-668) (Cherokee County)
- SC 329 (Victory Trail Road) (Cherokee County)
- Wind Hill Road (S-11-663) (Cherokee County)
- Gaffney Ferry Road (S-11-49) (Cherokee County)

There were 117 crashes on the other study area state, secondary, and county roads during the study time period. Type of collision is noted on the figures. Due to the availability of data, the direction of travel is not noted in the provided data for these locations. A unique symbology and numbering system is used for these crashes and is shown in **Figures 2 - 12**. Note that some roadways were accident free during our study time period. Crash stack data and summary data is provided in the **Appendix**.

A crash summary and analysis is provided in **Section 4**.

4.0 Crash Analysis

The data was summarized into eight groups, five interchange areas Exit 82 (Bud's Drive)/Exit 83 (SC 110), Exit 87 (Green River Rd.), Exit 95 (SC 18 – Gaffney), and Exit 96 (SC 18 – Shelby including the Gaffney Ferry Road northbound on-ramp) and three segments for the remainder of I-85 in the study area (MM 80 to Exit 82, Exit 83 to Exit 87, Exit 87 to Exit 95). Data on I-85 within 0.5 miles of an interchange was included in the respective interchange summaries. For

each group, the crash data were summarized and analyzed to identify any hot spots, trends, or locations with particularly high crash frequency.

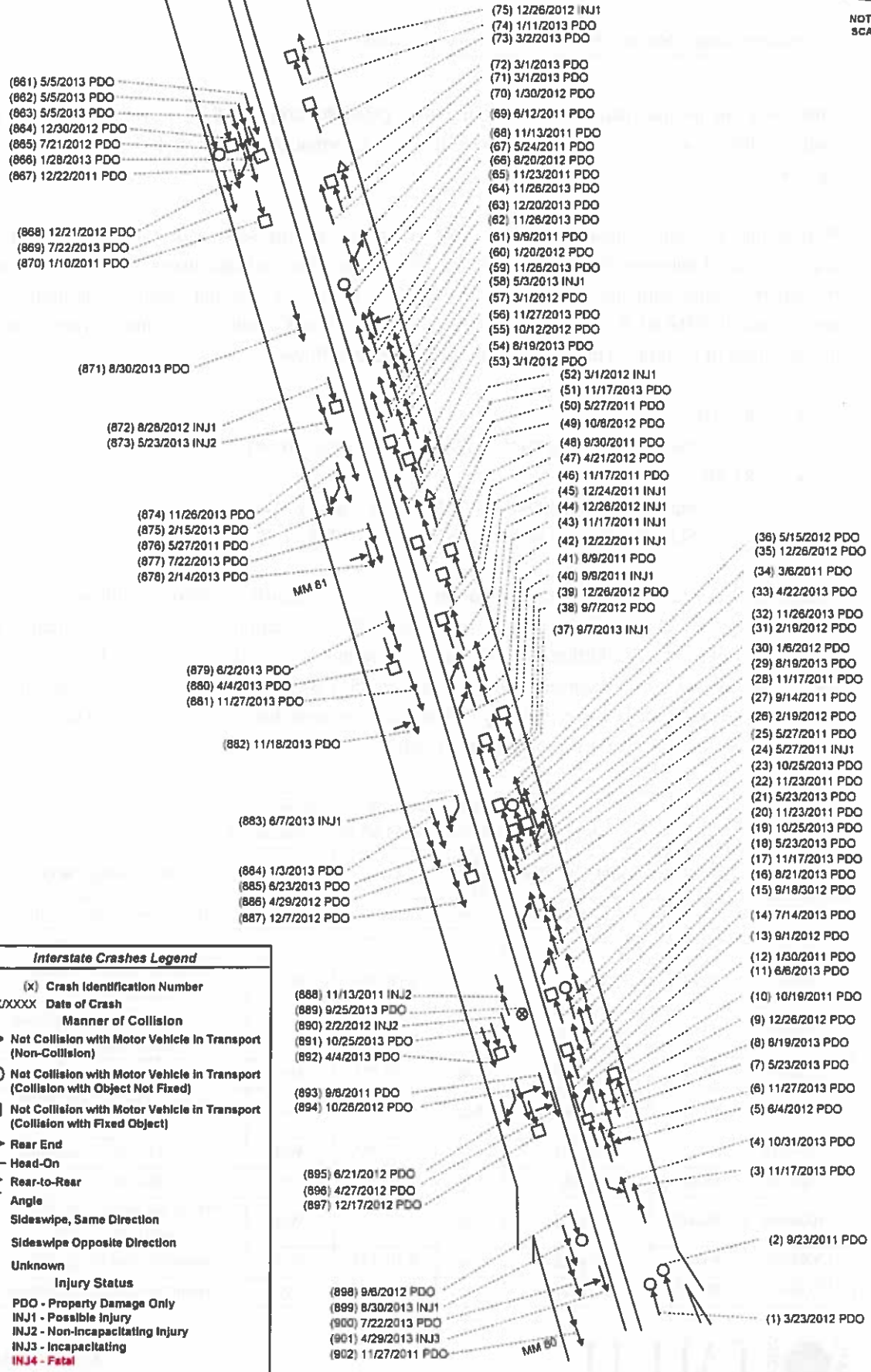
4.1 I-85 from MM 80 to Exit 82 (Bud's Drive)

I-85 has two travel lanes in each direction in this segment with vertical curves noted in the vicinity of the following locations: MM 80.4, MM 80.7, and MM 81.0. This segment is approximately 1.5 miles long. The I-85 crash data for this segment are shown Figure 2.

Table 1 shows a summary of the crash data on this segment.

Table 1: I-85 between MM 80 and Exit 82 Crash Data Summary				
I-85 North				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	2	2	0	0
Non-Fixed Object	5	5	0	0
Fixed Object	18	17	1	0
Rear End	38	31	7	0
Angle	2	2	0	0
Sideswipe, Same Direction	9	7	2	0
Sideswipe, Opposite Direction	1	1	0	0
Total	75	65	10	0
I-85 South				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	0	0	0	0
Non-Fixed Object	2	2	0	0
Fixed Object	8	7	1	0
Rear End	21	18	3	0
Head-on	1	0	1	0
Angle	5	4	1	0
Sideswipe, Same Direction	4	3	1	0
Unknown	1	1	0	0
Total	42	35	7	0

NOT TO SCALE



Interstate Crashes Legend	
(x)	Crash Identification Number
XXXXXX	Date of Crash
Manner of Collision	
	Not Collision with Motor Vehicle in Transport (Non-Collision)
	Not Collision with Motor Vehicle in Transport (Collision with Object Not Fixed)
	Not Collision with Motor Vehicle in Transport (Collision with Fixed Object)
	Rear End
	Head-On
	Rear-to-Rear
	Angle
	Sideswipe, Same Direction
	Sideswipe Opposite Direction
	Unknown
Injury Status	
PDO	- Property Damage Only
INJ1	- Possible Injury
INJ2	- Non-Incapacitating Injury
INJ3	- Incapacitating
INJ4	- Fatal

There was one incapacitating accident southbound (MM 80.058) on I-85 that was classified as an angle collision on a dry pavement. No additional information was available as to mitigating factors.

Northbound rear-end collisions are the most numerous on this section of roadway with three clusters located between MM 80 and MM 81. There are three vertical curves in this section and the clusters track with the curves. There is also a cluster of rear-end crashes southbound at approximately MM 81.5. These three vertical curves do not meet the minimum criteria for a design speed of 65 mph. These specific locations are as follows:

- I-85 NB
 - Sta 889+15 – Sta 894+28 (MM 80.58 – MM 80.68)
- I-85 SB
 - Sta 887+78 – Sta 894+58 (MM 80.55 – MM 80.69)
 - Sta 951+23 – Sta 958+60 (MM 81.75 – MM 81.90)

Tables 2 -4 provides a more detailed summary of these specific accidents in these locations, summarizing the light condition, time of day, road surface condition, and contributing factors as noted by the officers. In addition, if a vehicle was determined to be driving too fast for conditions and a fixed object crash occurred or one of the vehicles was stopped, this is also noted in the tables. These tables show that a majority of the accidents were due to vehicles driving too fast for the conditions, other driver error, or object in roadway.

Crash Number	Milepoint	Light Condition	Curve Type	Time	Wet/Dry	Contributing Factor
12508512	80.591	Daylight	Sag	5:57 PM	Wet	driving too fast for conditions
11553892	80.604	Daylight	Sag	5:10 PM	Dry	driving too fast for conditions
11580335	80.613	Daylight	Sag	8:00 AM	Wet	driving too fast for conditions – fixed object crash
13572707	80.618	Daylight	Sag	12:01 PM	Wet	driving too fast for conditions – fixed object crash
12500494	80.623	Daylight	Sag	2:40 PM	Dry	improper lane usage/change
12508992	80.629	Dusk	Sag	6:00 PM	Wet	driving too fast for conditions – stopped vehicle
13614375	80.633	Daylight	Sag	3:55 PM	Wet	driving too fast for conditions
13529191	80.640	Dark	Sag	12:55 AM	Dry	animal in road
11008590	80.642	Daylight	Sag	9:00 AM	Wet	driving too fast for conditions – fixed object crash
12605387	80.645	Daylight	Sag	8:10 AM	Wet	driving too fast for conditions
12530612	80.648	Daylight	Sag	4:00 PM	Dry	driving too fast for conditions

**Table 3: Individual Crash Analysis -
Interstate 85 SB From MM 80.55 to MM 80.69**

Crash Number	Milepoint	Light Condition	Curve Type	Time	Wet/Dry	Contributing Factor
12594382	80.577	Dark	Crest	6:18 PM	Dry	followed too closely
12526096	80.598	Daylight	Crest	12:45 PM	Dry	improper lane usage/change
13551781	80.637	Daylight	Crest	4:18 PM	Dry	driving too fast for conditions
13501860	80.657	Dawn	Crest	5:00 AM	Dry	driving too fast for conditions
13544785	80.66	Dark	Crest	3:00 AM	Dry	driving too fast for conditions – fixed object crash

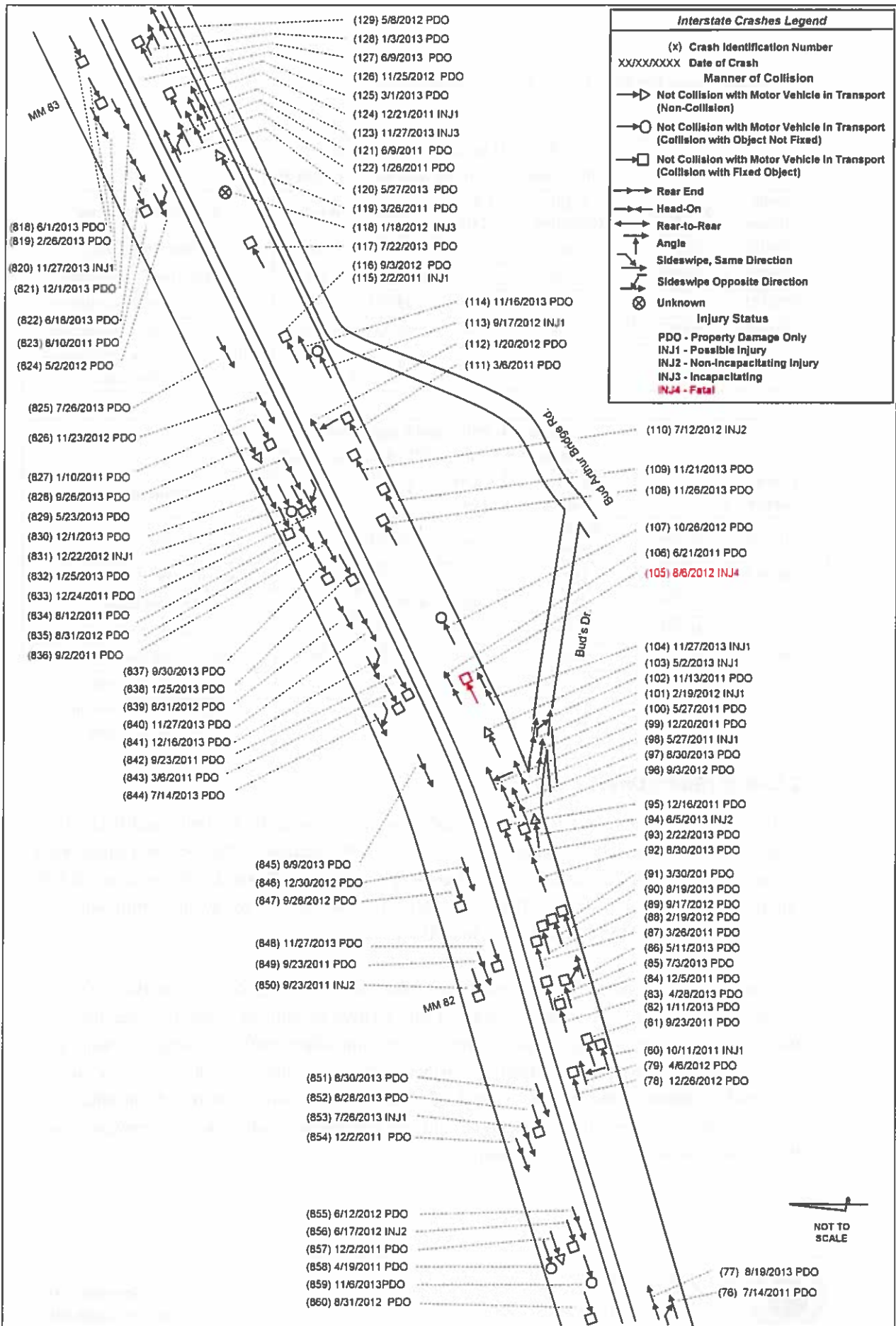
**Table 4: Individual Crash Analysis -
Interstate 85 SB From MM 81.75 to MM 81.90**

Crash Number	Milepoint	Light Condition	Curve Type	Time	Wet/Dry	Contributing Factor
11517674	81.756	Dark (street lamp lit)	Sag	8:34 PM	Dry	debris
11585466	81.769	Dark	Sag	10:01 PM	Dry	aggressive operation of vehicle
12538590	81.774	Dark	Sag	4:00 AM	Dry	fatigued/asleep
12535428	81.778	Daylight	Sag	5:25 PM	Wet	followed too closely
11585469	81.865	Dark	Sag	10:15 PM	Dry	improper lane usage/change
13566818	81.882	Daylight	Sag	6:46 PM	Dry	driving too fast for conditions
13576875	81.887	Dark	Sag	9:42 PM	Dry	driving too fast for conditions – fixed object crash

4.2 Exit 82 (Bud's Drive)

I-85 Exit 82 is a northbound only off-ramp and provides access to Bud's Drive and Bud Arthur Bridge Road approximately 1.2 miles south of the Exit 83 overpass. The I-85 and other study area road crash data for the vicinity of this interchange are shown **Figure 3**. This segment of I-85 is approximately 1.5 miles long. There are vertical curves at the following northbound and southbound locations: MM 82, MM 82.2, and MM 83.

Bud's Drive is a slip road from I-85 northbound to Bud Arthur Bridge Road where Bud's Drive is stop controlled. There were three accidents on Bud's Drive as vehicles exited the interstate (two rear-end and one angle). The unusual ramp design with other traffic crossing the ramp as it merges with Bud's Drive was a likely contributing factor to these accidents. There are 26 northbound accidents in the vicinity of Bud's Drive: 14 were collisions with a fixed object, six were rear end, two were angle collisions, and the remaining crashes were sideswipes, non-collision, or collision with object not fixed.



I-85 Widening Project
MM 80 - MM 96

Exit 82
Vicinity

Figure
3

Of the collisions with fixed objects south of the exit ramp, four crashes involved a ditch within 0.07-mile stretch (MMs 81.946, 81.989, 81.99, 82.013). The remaining fixed object collisions involved crashes with medians, a culvert, embankments etc. but were not clustered in one particular area.

Table 5 shows a summary of the crash data at this location on I-85 or its ramps.

Table 5: Exit 82 Crash Data Summary				
I-85 North				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	3	1	2	0
Non-Fixed Object	2	1	1	0
Fixed Object	24	20	3	1
Rear End	16	11	5	0
Angle	3	3	0	0
Sideswipe, Same Direction	5	5	0	0
Unknown	1	0	1	0
Total	54	41	12	1
I-85 South				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	2	2	0	0
Non-Fixed Object	3	2	1	0
Fixed Object	16	14	2	0
Rear End	18	16	2	0
Sideswipe, Same Direction	4	4	0	0
Total	43	38	5	0

A collision with the median barrier just beyond Exit 82 at MM 82.322 resulted in a fatality. The crash occurred on dry pavement. No other contributing factors were available.

There were two incapacitating injury crashes on northbound I-85 in the vicinity of Exit 82. One occurred at MM 82.83 and was classified as not a collision with a motor vehicle with an unknown sequence of events on wet pavement. The other occurred at MM 82.935 and was classified as a rear-end crash on dry pavement.

Clusters of northbound and southbound rear-end crashes occurred at the MM 83 vertical curve. There does not appear to be an increase in crash occurrences at the other vertical curve location.

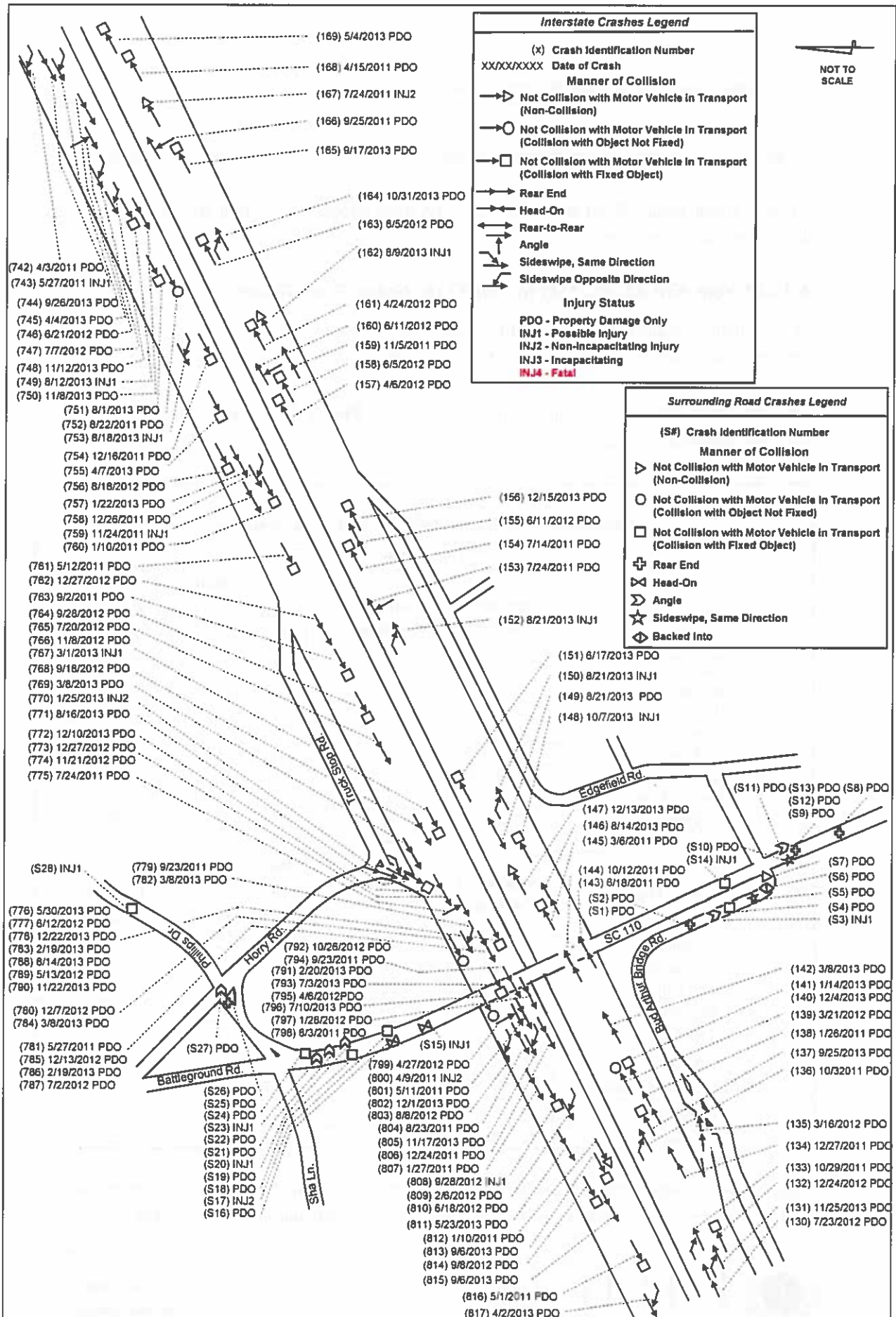
4.3 Exit 83 (SC 110)

I-85 Exit 83 provides northbound and southbound access to SC 110 via Bud Arthur Bridge Road, Edgefield Road, Horry Road, Sha Lane, and Phillips Drive. The crash data for this interchange are shown in Figure 4. This segment of I-85 is approximately 0.75 miles long. There is a vertical curve northbound at MM 83.5.

As shown in Figure 4, there were 34 collisions in less than a 0.04 mile range south of the southbound on-ramp. Of these accidents, 15 were classified as rear-end collisions. Possible contributing factors to the high occurrence of rear-end collisions in this area include the radius of the on-ramp coupled with a short merge lane (approximately 130 feet full width merge distance) and the close proximity to a narrowed clear zone due to an overpass for SC 110.

Table 6 shows a summary of the crash data at this location on I-85 or its ramps.

Table 6: Exit 83 Crash Data Summary				
I-85 North				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	3	1	2	0
Non-Fixed Object	1	1	0	0
Fixed Object	16	15	1	0
Rear End	10	10	0	0
Rear-to-Rear	1	1	0	0
Angle	3	3	0	0
Sideswipe, Same Direction	6	4	2	0
Total	40	35	5	0
I-85 South				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	1	1	0	0
Non-Fixed Object	4	4	0	0
Fixed Object	26	23	3	0
Rear End	28	24	4	0
Angle	3	3	0	0
Sideswipe, Same Direction	14	13	1	0
Total	76	68	8	0



There does not appear to be an increase in crash occurrences at the vertical curve location.

As Bud Arthur Bridge Road approaches SC 110, there appears to be sight distance issues in both directions due to tree cover.

4.4 I-85 from Exit 83 (SC 110) to Exit 87 (S. Green River Road)

This segment is approximately two miles long. I-85 has two travel lanes in each direction in this segment with a vertical curve noted at MM 83.9 northbound.

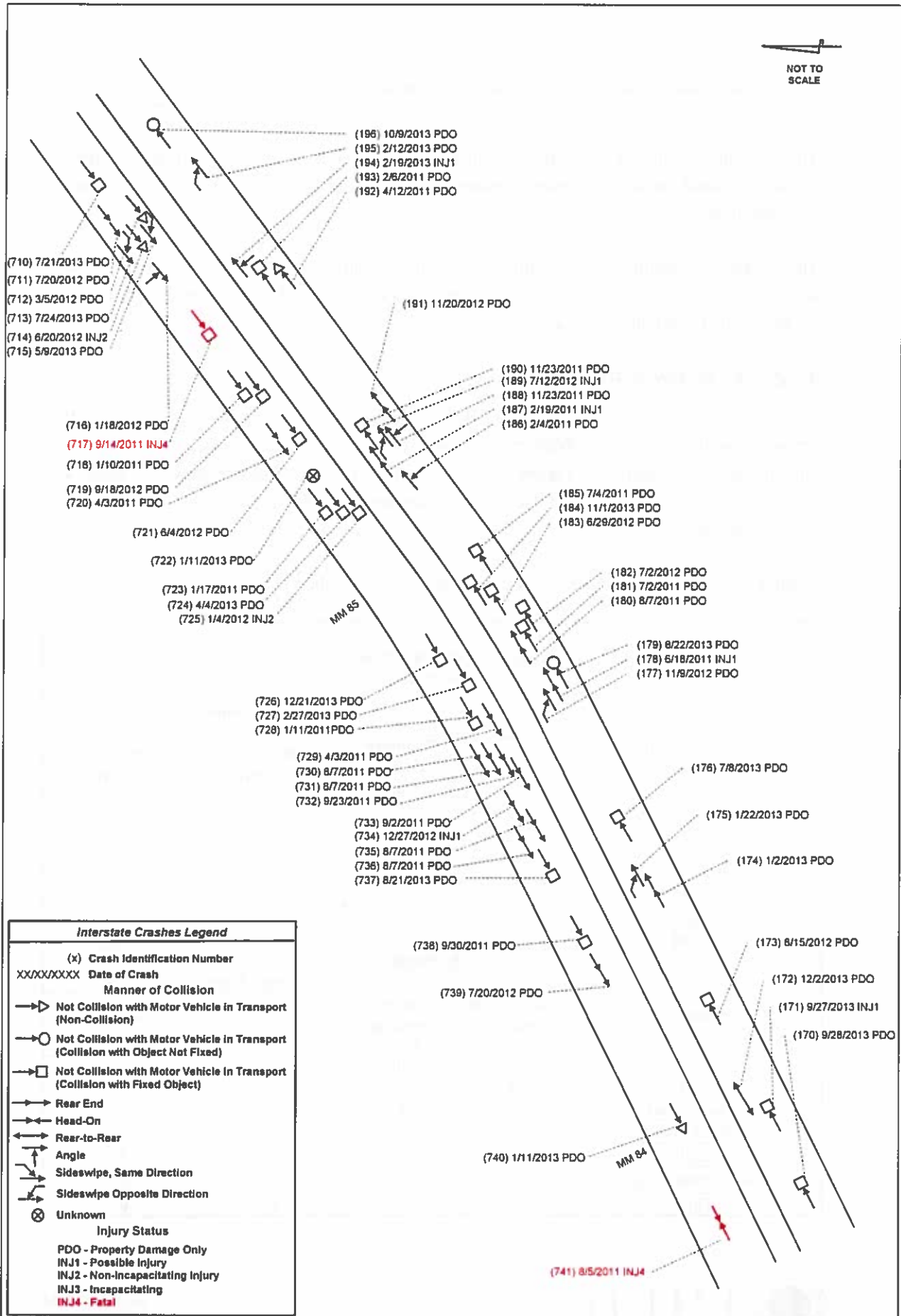
The I-85 crash data for this segment of I-85 are shown Figure 5. Table 7 shows a summary of the crash data at this location.

Table 7: I-85 between Exit 83 and Exit 87 Crash Data Summary				
I-85 North				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	1	1	0	0
Non-Fixed Object	2	2	0	0
Fixed Object	11	10	1	0
Rear End	5	3	2	0
Angle	3	2	1	0
Sideswipe, Same Direction	4	3	1	0
Backed Into	1	1	0	0
Total	27	22	5	0
I-85 South				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	3	2	1	0
Non-Fixed Object	0	0	0	0
Fixed Object	13	11	1	1
Rear End	11	10	1	0
Head-on	1	0	0	1
Angle	1	1	0	0
Sideswipe, Same Direction	2	2	0	0
Unknown	1	1	0	0
Total	32	27	3	2

Collision with a fixed object is the most common crash type with most crashes occurring around MM 84.7. There is also a cluster of rear-end crashes on southbound I-85 around MM 84.7.



NOT TO SCALE



Interstate Crashes Legend	
(x)	Crash Identification Number
XXXX/XXXX	Date of Crash
Manner of Collision	
	Not Collision with Motor Vehicle in Transport (Non-Collision)
	Not Collision with Motor Vehicle in Transport (Collision with Object Not Fixed)
	Not Collision with Motor Vehicle in Transport (Collision with Fixed Object)
	Rear End
	Head-On
	Rear-to-Rear
	Angle
	Sideswipe, Same Direction
	Sideswipe Opposite Direction
	Unknown
Injury Status	
PDO	- Property Damage Only
INJ1	- Possible Injury
INJ2	- Non-Incapacitating Injury
INJ3	- Incapacitating
INJ4	- Fatal



I-85 Widening Project
MM 80 – MM 96

Mainline between
Exit 83 and Exit 87

Figure
5

This is in the vicinity of an overpass, with limited clear zone due to the overpass structure and guardrail around the bridge supports; however, the cause of other incidents is unclear based on available data.

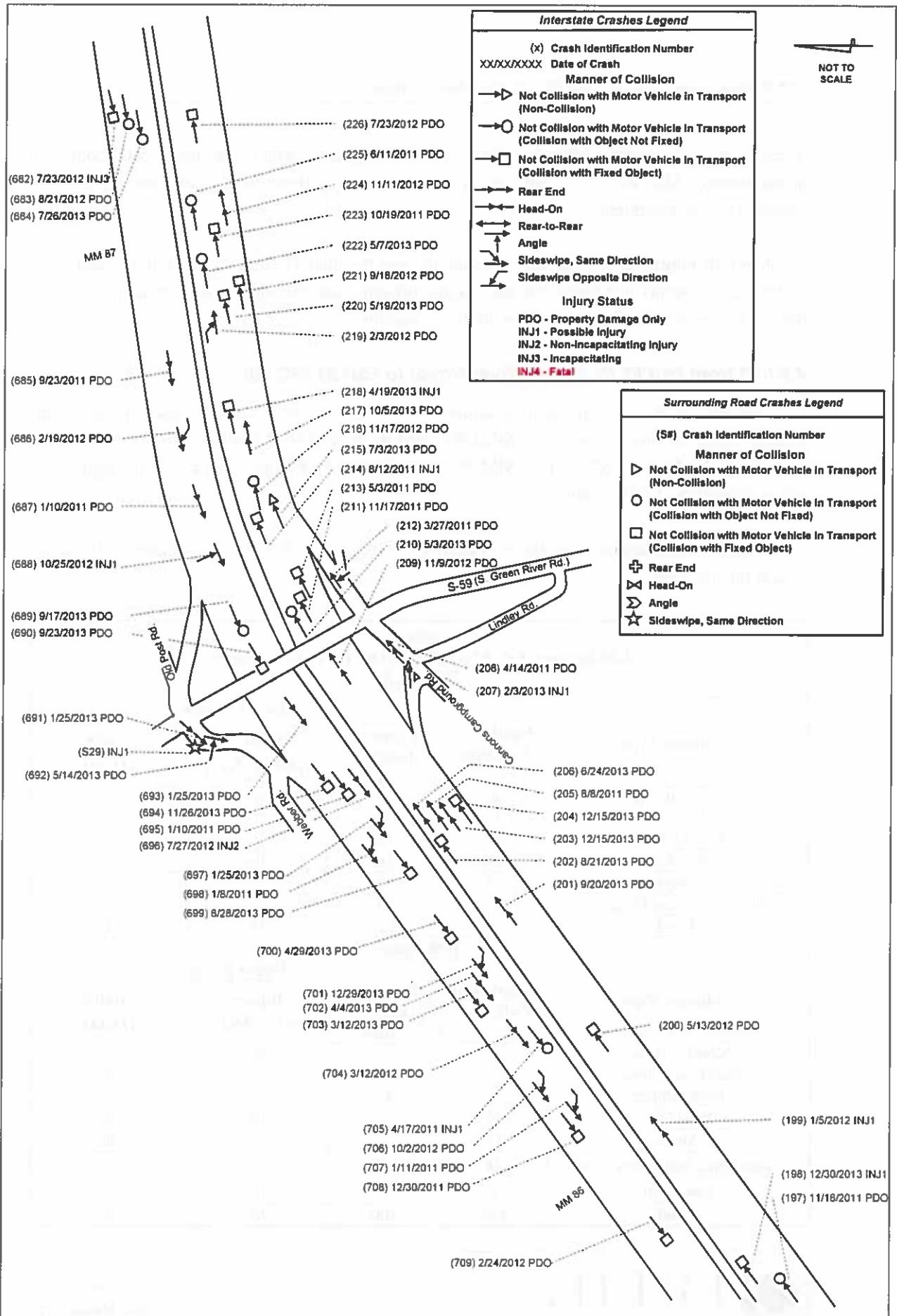
There were two fatality crashes southbound in this section both on I-85 southbound. One was a head-on collision at MM 83.857 and the other was a collision with a fixed object (fence) at MM 85.489. Both occurred on dry pavement.

4.5 Exit 87 (S. Green River Road)

I-85 Exit 87 provides access to S. Green River Road via Cannons Campground and Lindley Road for northbound traffic and via Webber Road and S-665 for southbound traffic. The crash data for this interchange are shown in Figure 6. This segment of I-85 is approximately 1.25 miles long. There are vertical curves at MM 86.1 (northbound and southbound) and MMs 86.4, 86.7, and 87.1 (southbound).

Table 8 below shows a summary of the crash data at this location on I-85 or its ramps.

Table 8: Exit 87 Crash Data Summary				
I-85 North				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	2	1	1	0
Non-Fixed Object	5	5	0	0
Fixed Object	12	9	3	0
Rear End	8	7	1	0
Angle	1	1	0	0
Sideswipe, Same Direction	2	2	0	0
Total	30	25	5	0
I-85 South				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	0	0	0	0
Non-Fixed Object	4	3	1	0
Fixed Object	9	8	1	0
Rear End	7	6	1	0
Angle	2	1	1	0
Sideswipe, Same Direction	6	6	0	0
Total	28	24	4	0



There was one incapacitating accident in this segment which occurred southbound at approximately MM 87.112. This was a collision with a fixed object (median barrier) and occurred on dry pavement.

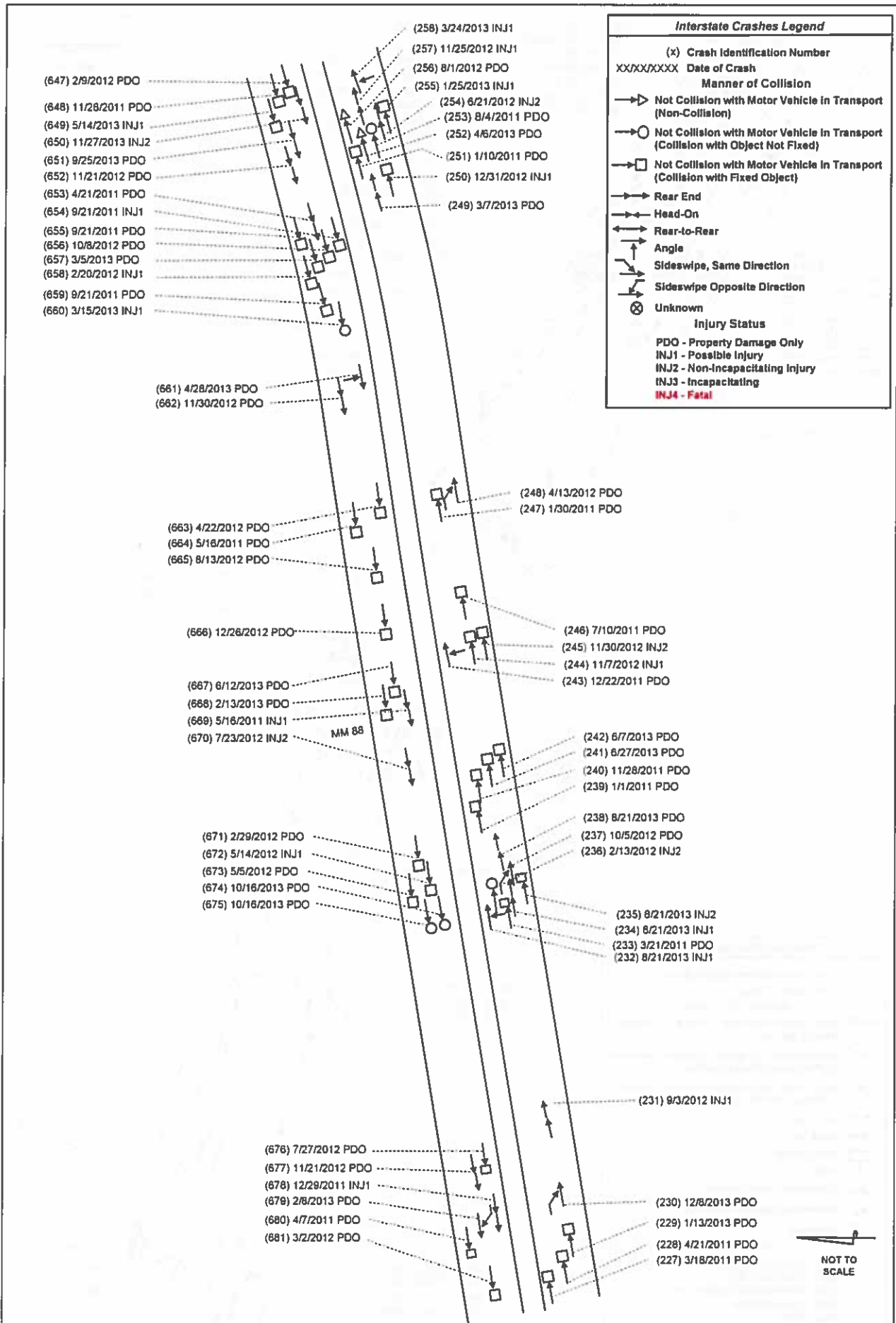
As shown in **Figure 6**, the number of accidents near the interstate ramps was not atypical. The vertical curve occurs just before the northbound off-ramp and the southbound on-ramp; however, there is no apparent increase in crashes at these locations.

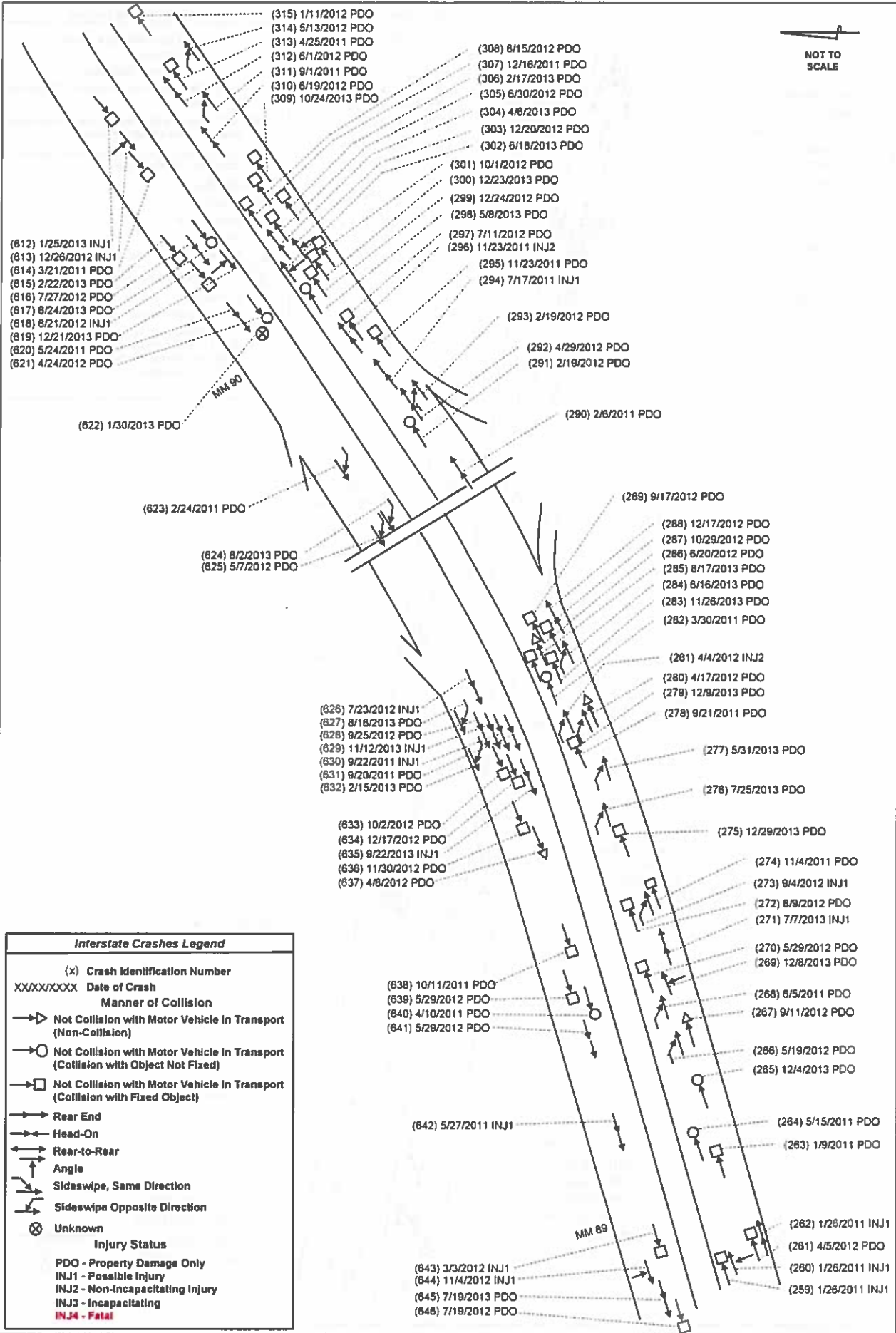
4.6 I-85 from Exit 87 (S. Green River Road) to Exit 95 (SC 18)

I-85 has two travel lanes in each direction in this segment with vertical curves noted in the vicinity of the following locations: MMs 89, MM 91.8, MM 92.7 northbound, and MMs 89.1, MM 90.6, MM 91.2, MM 91.7, MM 91.9, and MM 92.8 southbound. This segment is approximately 5.75 miles long.

Crash data for this segment are shown **Figures 7 - 10**. **Table 9** shows a summary of the crash data at this location.

Table 9: I-85 between Exit 87 and Exit 95 Crash Data Summary				
I-85 North				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	6	6	0	0
Non-Fixed Object	13	10	2	1
Fixed Object	74	58	16	0
Rear End	26	16	10	0
Angle	16	8	7	1
Sideswipe, Same Direction	26	23	3	0
Total	161	121	38	2
I-85 South				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	2	2	0	0
Non-Fixed Object	9	8	1	0
Fixed Object	53	44	9	0
Rear End	31	21	10	0
Angle	11	6	5	0
Sideswipe, Same Direction	18	17	1	0
Unknown	2	2	0	0
Total	126	100	26	0



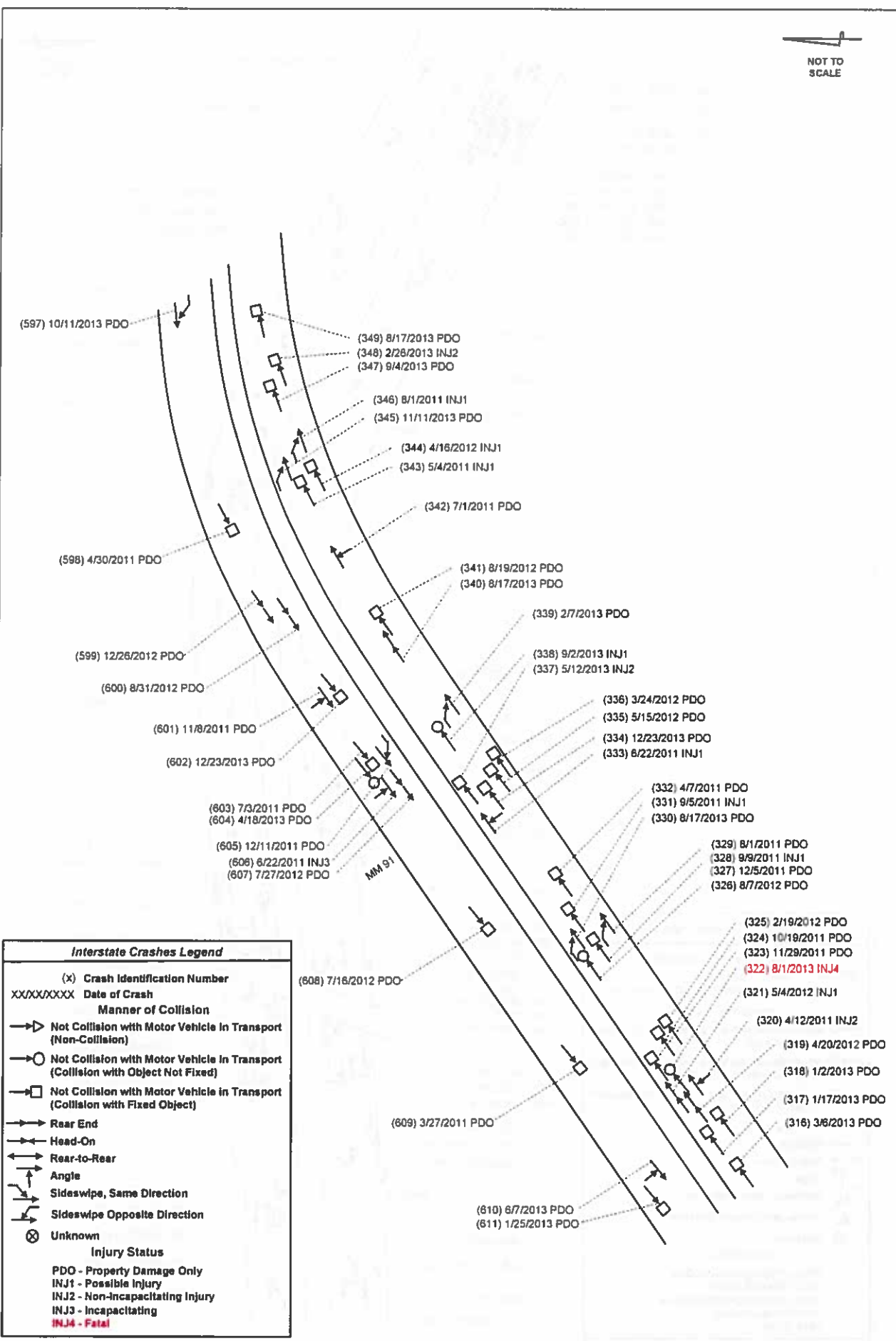


I-85 Widening Project
MM 80 – MM 96

Mainline Between
Exit 87 and Exit 95 - 2

Figure
8

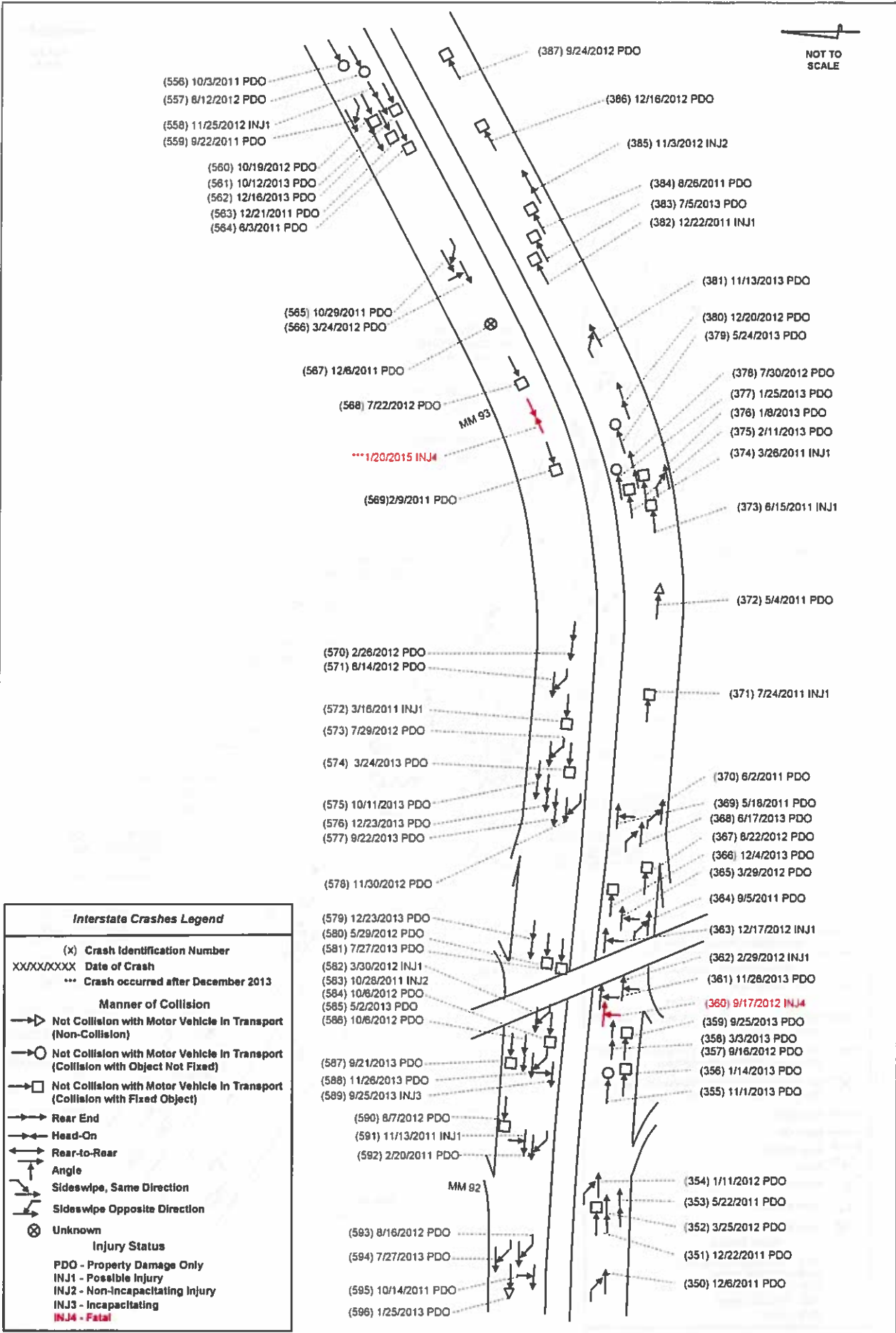
NOT TO SCALE



I-85 Widening Project
MM 80 - MM 96

Mainline Between
Exit 87 and Exit 95 - 3

Figure
9



There are clusters of fixed object crashes throughout this section which occur mainly in areas with limited shoulders on both sides due to fencing or guardrail for frontage roads, bridge structures, or embankments, or medians for bridges, etc.

There is also a cluster of fixed object and other crashes at the northbound on-ramp from Exit 90. This hot spot may have already been addressed because the on-ramp appears to be recently paved and may have been upgraded during that project. This should be reviewed during design to confirm SCDOT merging standards are met or if further action should be considered.

There were two incapacitating injury accidents on southbound I-85 in this segment. One occurred at approximately MM 91.078 and the other occurred at approximately MM 92.139. Both were classified as angle collisions on a dry pavement.

There are clusters of accidents in vicinity of the ramps for Exit 92, one of which is a fatal angle crash that occurred at the northbound on-ramp. The accident occurred near the start of the ramp and it is unclear if it involved merging vehicles or vehicles on the mainline. There is approximately 400 feet of full width merge area for vehicles to enter I-85.

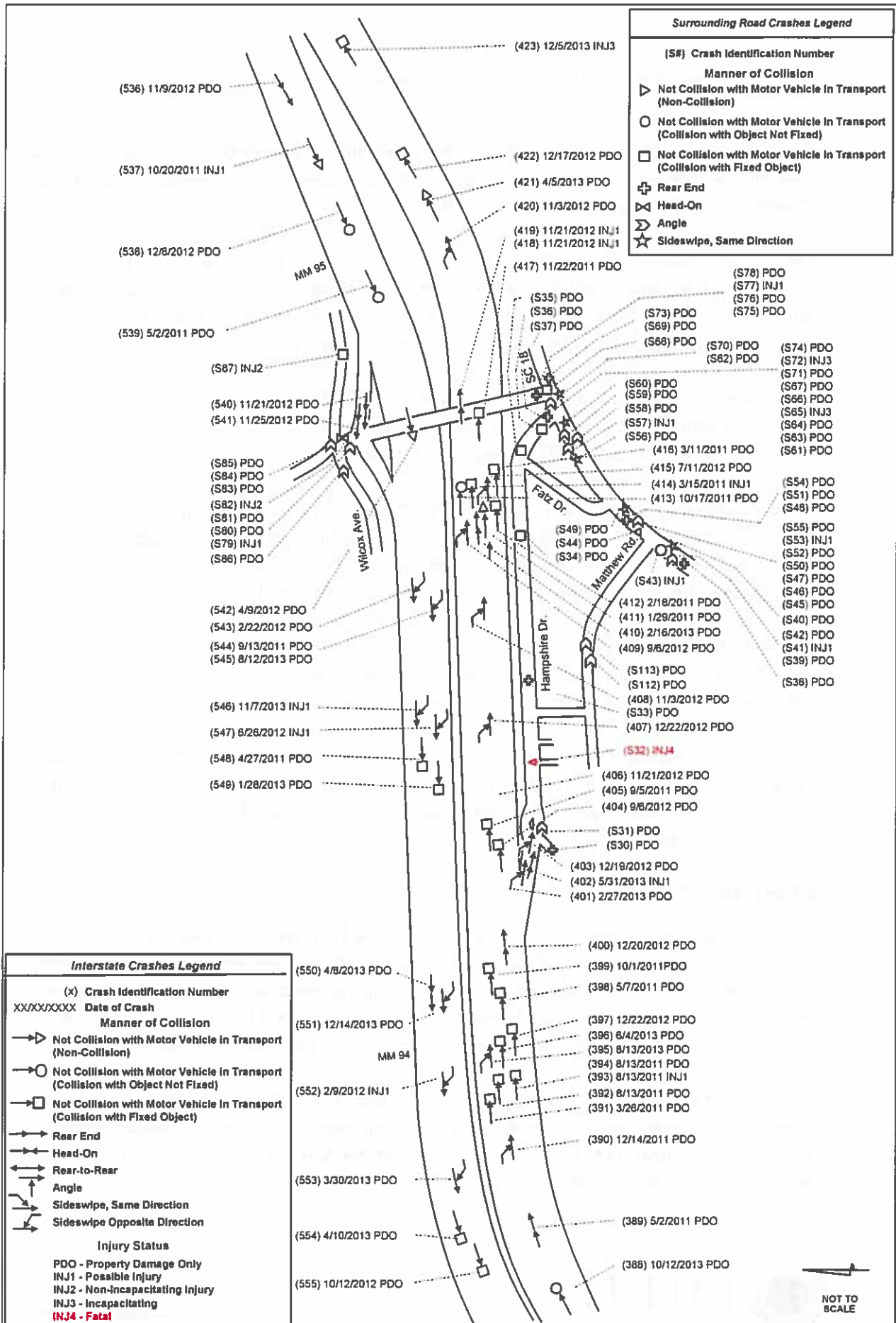
Another fatality occurred northbound on I-85 around MM 90.5 and involved a pedestrian. Further review may be desired to determine if there were other contributing factors that could be mitigated in the design such as lighting or geometric related items.

There was also a fatality that occurred since the December 2014 submittal in the vicinity of MM 92.94 just north of Providence Road. This was a head-on collision caused when a northbound vehicle crossed the cable barrier in the median and struck a southbound vehicle. Excessive speed was cited as a contributing factor.

4.7 Exit 95 (SC 18)

I-85 Exit 95 provides access to SC 18 – Shelby Hwy. via Hampshire Drive and Fatz Drive. The southbound on- and off-ramps connect directly onto SC 18. The northbound off-ramp connects to a bi-directional frontage road (Hampshire Drive) which provides access to SC 18 and adjacent properties. The crash data for this interchange are shown **Figure 11**. This segment of I-85 is approximately 1.75 miles long. There were no vertical curves identified in this section.

As seen in **Figure 11**, there are two areas of concern near Exit 85 northbound. In the approximate 0.2-mile stretch before the northbound exit ramp, there were five vehicle collisions with the median (MMs 93.851, 93.878, 93.946, 93.991, 94.026) and three vehicle collisions with the fence (MMs 93.884, 93.886, 93.927).



Surrounding Road Crashes Legend	
(S#)	Crash Identification Number
Manner of Collision	
▷	Not Collision with Motor Vehicle In Transport (Non-Collision)
○	Not Collision with Motor Vehicle In Transport (Collision with Object Not Fixed)
□	Not Collision with Motor Vehicle In Transport (Collision with Fixed Object)
⇐	Rear End
⇌	Head-On
↗	Angle
☆	Sideswipe, Same Direction

Interstate Crashes Legend	
(x)	Crash Identification Number
XXXX/XXXX	Date of Crash
Manner of Collision	
▷	Not Collision with Motor Vehicle in Transport (Non-Collision)
○	Not Collision with Motor Vehicle in Transport (Collision with Object Not Fixed)
□	Not Collision with Motor Vehicle in Transport (Collision with Fixed Object)
⇐	Rear End
⇌	Head-On
⇐⇐	Rear-to-Rear
↗	Angle
↔	Sideswipe, Same Direction
↔	Sideswipe Opposite Direction
Injury Status	
PDO	- Property Damage Only
INJ1	- Possible Injury
INJ2	- Non-Incapacitating Injury
INJ3	- Incapacitating
INJ4	- Fatal



I-85 Widening Project
MM 80 – MM 96

Exit 95
Vicinity

Figure
11

Table 10 below shows a summary of the crash data at this location on I-85 or its ramps.

Table 10: Exit 95 Crash Data Summary				
I-85 North				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	2	2	0	0
Non-Fixed Object	2	2	0	0
Fixed Object	16	13	3	0
Rear End	7	4	3	0
Sideswipe, Same Direction	9	9	0	0
Total	36	30	6	0
I-85 South				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	2	1	1	0
Non-Fixed Object	2	2	0	0
Fixed Object	4	4	0	0
Rear End	4	4	0	0
Sideswipe, Same Direction	8	5	3	0
Total	20	16	4	0

There was one incapacitating accident northbound that occurred in this segment. This accident occurred at approximately MM 95.273 and was classified as a collision with a fixed object (guardrail face) on wet pavement.

There was also a fatality on Hampshire Drive just north of the I-85 northbound exit ramp that was classified as not a collision with a motor vehicle in transport (non-collision) and is noted as a pedestrian accident in dark conditions. Further review may be desired at this location to review if lighting is appropriate to be considered in the design.

On SC 18 from just east of Matthew Drive to the S-82 overpass there were 45 crashes during the study period, most of which



Source: Google Earth

Photo: SC 18 at Hampshire Drive

were angle or sideswipe. Most crashes were classified as property damage only; however, two angle crashes on SC 18 between Hampshire Drive and the S-82 overpass were classified as incapacitating crashes (INJ3). This photo shows the approach to SC 18 from Hampshire Drive. As can be seen, this intersection is a nonstandard four-leg intersection with driveways that form two additional entry points to the intersection. The redesign of the SC 18 corridor including this intersection along with the intersections at Fatz Drive and Matthew Road would improve operations in this area.

4.8 Exit 96 and Gaffney Ferry Road On-Ramp

I-85 Exit 96 provides access to SC 18 – Shelby. Also included in this section is the I-85 northbound on-ramp at Gaffney Ferry Road. At Exit 96, the northbound and southbound on- and off-ramps connect directly to SC 18. The crash data for this section are shown **Figure 12**. This section of I-85 is approximately 2.25 miles long, there are vertical curves at MM 95.9 and 96.3 (northbound and southbound) and a vertical curve at 96.0 (southbound). The latter vertical curve does not meet the minimum criteria for a design speed of 65 mph.

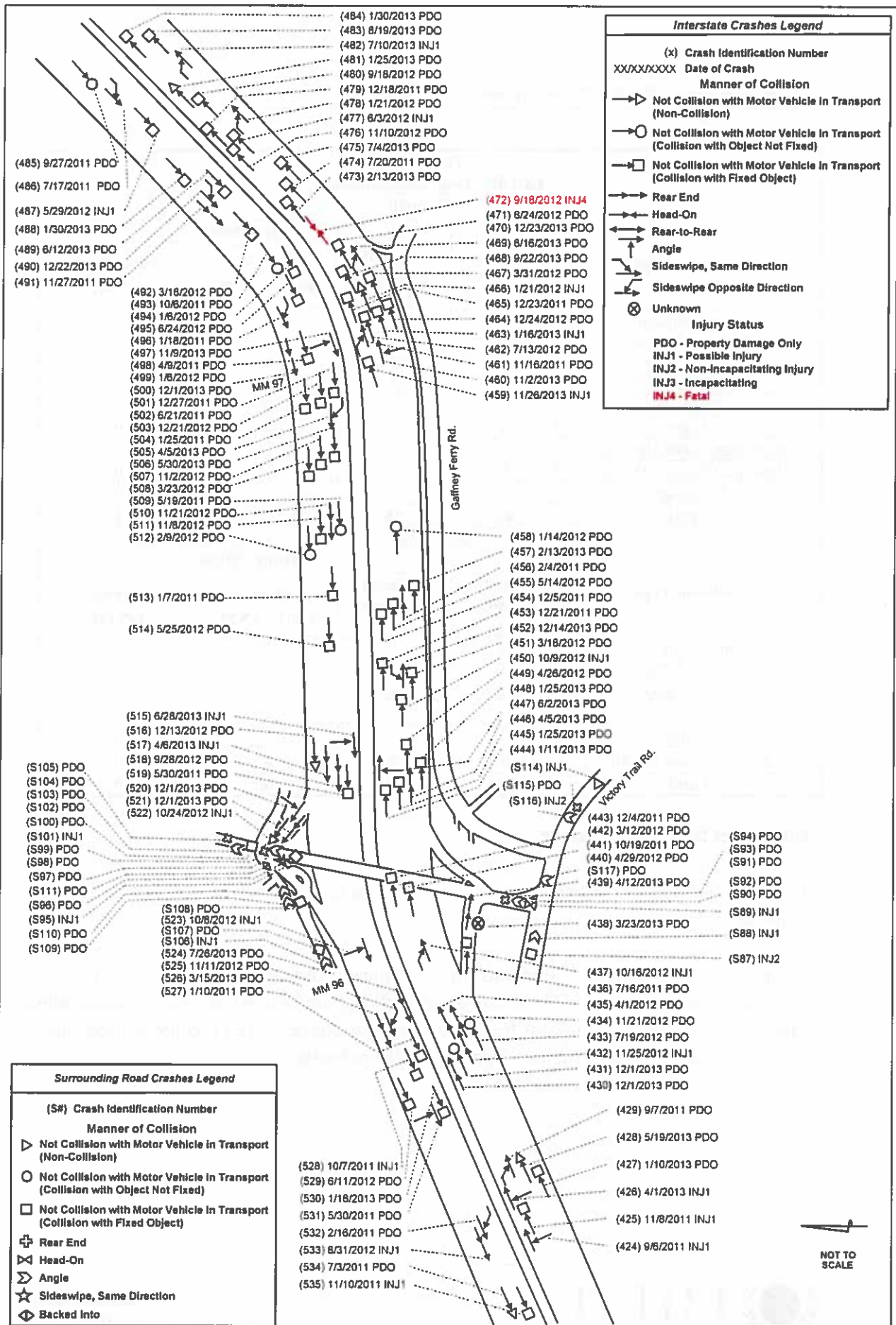
Table 11 below shows a summary of the crash data at this location on I-85 or its ramps.

As seen in **Figure 12**, immediately before the northbound exit ramp between MM 95.786 and 95.862, there is a cluster of accidents. Immediately after the northbound on-ramp, between MM 96.402 and 96.673, there were 14 accidents, nine of which were a vehicle striking the guardrail or median. Near the Gaffney Ferry Road on-ramp, between MM 96.994 and 97.17 there were 13 accidents, six of which were a vehicle striking the median barrier. There is not a full width merge area at the Gaffney Ferry Road on-ramp so vehicles must immediately begin their merging maneuver when they reach I-85. For the total segment analyzed, 24 of the 61 accidents were vehicles striking the median barrier.

On southbound I-85 between MM 96.836 and 97.018, there were 11 accidents, seven of which were vehicles striking the median barrier. In this area, there is an embankment limiting clear zone area.

There was one head-on collision on I-85 northbound (MM 97.196) near the Gaffney Ferry Road on-ramp. The crash occurred on wet pavement; no other mitigating factors were available.

The vertical curve at Sta 1709+25 – Sta 1711+95 (MM 96.11 – MM 96.17) does not meet the minimum standards for a 65 mph design speed. Based on a review of the available data, there were no accidents in this section of the roadway.



I-85 Widening Project
MM 80 - MM 96

Exit 96
Vicinity

Figure
12

Table 11: Exit 96 Crash Data Summary I-85 North				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	3	2	1	0
Non-Fixed Object	3	3	0	0
Fixed Object	35	29	6	0
Rear End	7	6	1	0
Head-On	1	0	0	1
Angle	4	2	2	0
Sideswipe, Same Direction	6	4	2	0
Sideswipe, Opposite Direction	1	1	0	0
Unknown	1	1	0	0
Total	61	48	12	1
I-85 South				
Collision Type	Number of Collisions	Injury Status		
		Property Damage Only	Injury (INJ1 – INJ3)	Fatality (INJ4)
Non-Collision	3	2	1	0
Non-Fixed Object	4	4	0	0
Fixed Object	23	20	3	0
Rear End	10	8	2	0
Angle	5	3	2	0
Sideswipe, Same Direction	6	6	0	0
Total	51	43	8	0

5.0 Hot Spots and Trends

Trends and hot spots were found as a result of analysis crash location data along the proposed widening corridor.

A majority of the accidents were classified as property damage only; however, 14% were classified as possible injuries, 3% as non-incapacitating injuries, less than 1% as incapacitating injuries and less than 1% were classified as fatal. Fatality crashes were a mixture of fixed object, angle and head-on crashes as well as crashes involving pedestrians.

The most severe injuries (INJ3 and INJ4) and manner of collision are summarized below:

- Fatalities (INJ4)
 - o I-85 North at MM 82.322 – Fixed Object - Guardrail
 - o I-85 South at MM 83.857 – Head-on
 - o I-85 South at MM 85.489 – Fixed Object - Fence
 - o I-85 North at MM 90.555 – Object Not Fixed – Pedestrian
 - o I-85 North at MM 92.179 – Angle
 - o I-85 South at MM 92.94 – Head-on (occurred between December 2014 and February 2015)
 - o I-85 North at MM 97.196 – Head-on
 - o S-42-661 (Hampshire Drive) at MM 1.440 – Object Not Fixed – Pedestrian
- Incapacitating Injury (INJ3)
 - o I-85 South at MM 80.058 – Angle
 - o I-85 North at MM 82.935 – Angle
 - o I-85 North at MM 82.83 – Not Collision with Motor Vehicle – Unknown Type
 - o I-85 South at MM 87.112 – Fixed Object – Median Barrier
 - o I-85 South at MM 91.078 – Angle
 - o I-85 South at MM 92.139 - Angle
 - o I-85 North at MM 95.273 – Fixed Object – Guardrail Face
 - o SC 18 at Fatz /S-82 Overpass - Angle
 - o SC 18 at Fatz /S-82 Overpass - Angle

The most common accident type was “not a collision with a motor vehicle in transport (collision with fixed object),” comprising 358 of the 902 total crashes (40%). These included crashes with fixed objects such as the guardrail, median, or fence. Rear-end collisions (27%) and sideswipes, same direction, (14%) were the next two most common crash types.

Fewer than 5% of the crashes were due to snow, slush or ice.

Study area hot spots are listed below:

- Various areas along the corridor with limited clear zone due to bridges, fencing, embankments, etc.
- I-85 North and South at Vertical Curve Locations between MM 80 and MM 81
- I-85 South at MM 82.542
- I-85 North at Exit 82 off-ramp
- I-85 South at Exit 83 on-ramp
- I-85 South at MM 83.675
- I-85 North Exit 90 on-ramp

- Surrounding roadways at Exit 95, east of interstate (Hampshire Drive and SC 18 from Matthew Drive to the S-82 Overpass) – approximately half of crashes on the non-interstate roadways occur in this area.
- I-85 North at Exit 96 off-ramp
- I-85 North at Exit 96 on-ramp
- I-85 North at Gaffney Ferry Road on-ramp

In summary, improvements to the geometric conditions of these rural interchanges including improved tie-ins to the non-interstate roadway system would improve traffic operations. Many on-ramps such as Exit 83 and Gaffney Ferry Road have limited merging areas, and off-ramp traffic often encounters nonstandard intersections that likely cause driver confusion.

On the interstate, there are some vertical curve locations that show an increase in accidents where the vertical curve may have been a contributing factor; however, many do not appear to have a significant effect on crash location.

Many of the fixed object crashes on I-85 occur where there is a limited recovery zone due to fencing, guardrails, etc. Maximizing the recovery distance along the corridor during the widening project, where practical, may help reduce the number of fixed object crashes.

On many non-interstate roadways at locations such as Bud Arthur Bridge Road at SC 110 the sight distance could be improved through activities such as trimming trees or other measures.

Lastly, reviewing the available information regarding the fatality locations, there appears to be no trend as causes are varied. Two accidents involved pedestrians. An increase in lighting at locations where pedestrians may be expected could be considered during the design.

Appendix

Table with columns: 757, 13504161, 42, 1, 65, 0, 83,348, 3, 110, 0, 0, 0, 0, 0, 1/227013 0 0, INTERSTATE 85, 20, 10, 22, 1 S, 54600, 35.04732698, -81.80872956

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53000	35.07378056	-61.75113056	1	10	0	0	38	1	5	18	1
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53000	35.07418056	-61.74816111	1	34	0	0	56	1	5	18	1
53000	35.07431111	-61.74716111	1	100	0	0	56	1	5	18	1
53000	35.07436844	-61.74681644	1	60	50	0	22	1	5	18	1
53000	35.07448869	-61.74671111	1	210	10	0	4	1	5	18	1
53000	35.07453056	-61.74598644	1	100	0	0	4	1	5	18	1
53000	35.0753056	-61.73927656	1	38	1	5	18	1	5	18	1
53000	35.07531111	-61.73927656	1	100	0	0	58	1	5	18	1
53000	35.07541111	-61.73901644	1	5	0	0	58	1	5	18	1
53000	35.07538869	-61.73890556	1	56	1	5	18	1	5	18	1
53000	35.07551111	-61.73828889	1	317	0	0	51	1	5	18	1
53000	35.07574	-61.73631644	1	120	100	0	22	1	5	18	1
53000	35.07591844	-61.73483889	1	100	10	0	22	1	5	18	1
53000	35.07598644	-61.73483889	1	52	1	5	18	1	5	18	1
53000	35.07580544	-61.73416111	1	121	150	0	58	1	5	18	1
53000	35.07648056	-61.73171844	1	48	1	5	18	1	5	18	1
53000	35.07658869	-61.73171844	1	100	100	0	48	1	5	18	1
53000	35.07703056	-61.72778656	1	80	3	1	58	1	5	18	1
53000	35.07698111	-61.72730889	1	43	10	0	22	1	5	18	1
53000	35.07713056	-61.72819844	1	153	100	0	20	1	5	18	1
53000	35.07728111	-61.72546844	1	100	100	0	56	1	5	18	1
53000	35.07730556	-61.72491111	1	43	1	5	18	1	5	18	1
53000	35.07743889	-61.72448889	1	56	1	5	18	1	5	18	1
53000	35.07745	-61.72448889	1	56	1	5	18	1	5	18	1
53000	35.07735	-61.72416844	1	56	1	5	18	1	5	18	1
53000	35.07758869	-61.72241684	1	200	0	0	56	1	5	18	1
53000	35.07791111	-61.72241684	1	22	10	0	22	1	5	18	1
53000	35.07805644	-61.7218844	1	100	100	0	22	1	5	18	1
53000	35.07818056	-61.7218844	1	231	100	0	22	1	5	18	1
53000	35.07838869	-61.72091844	1	100	100	0	56	1	5	18	1
53000	35.07835	-61.72091844	1	90	0	0	51	1	5	18	1
53000	35.07841844	-61.72056111	1	168	100	0	48	1	5	18	1
53000	35.0785	-61.72056111	1	300	100	0	22	1	5	18	1
53000	35.07861844	-61.71919844	1	25	43	0	22	1	5	18	1
53000	35.07920556	-61.71919844	1	50	10	0	56	1	5	18	1
53000	35.07920556	-61.71919844	1	50	10	0	22	1	5	18	1
53000	35.07981111	-61.71530556	1	30	0	0	23	1	5	18	1
53000	35.07981111	-61.71530556	1	100	100	0	22	1	5	18	1
53000	35.07980556	-61.71530556	1	15	0	0	56	1	5	18	1
53000	35.08002556	-61.7118644	1	10	0	0	58	1	5	18	1
53000	35.08002556	-61.7118644	1	40	1	5	18	1	5	18	1
53000	35.08003889	-61.71056111	1	25	10	0	56	1	5	18	1
53000	35.08093056	-61.71031644	1	6	1	5	51	1	5	18	1
53000	35.08100556	-61.71031644	1	50	0	0	22	1	5	18	1
53000	35.08116111	-61.71006644	1	4	10	0	22	1	5	18	1
53000	35.08111111	-61.70978889	1	10	10	0	22	1	5	18	1
53000	35.08119444	-61.70978889	1	100	100	0	22	1	5	18	1
53000	35.08130556	-61.7087	1	20	0	0	22	1	5	18	1
53000	35.08138889	-61.70828656	1	50	10	0	50	1	5	18	1
53000	35.08256111	-61.71913889	1	21	1	5	22	1	5	18	1
53000	35.08443889	-61.70719844	1	50	1	5	22	1	5	18	1
53000	35.08271111	-61.7059	1	1	0	0	22	1	5	18	1
53000	35.0846	-61.70248056	1	99	0	0	22	1	5	18	1
53000	35.08471111	-61.70226111	1	25	100	0	39	1	5	18	1
53000	35.08475	-61.70226111	1	50	7	43	48	1	5	18	1
53000	35.08513889	-61.70130556	1	9	0	0	51	1	5	18	1
53000	35.08531111	-61.7020556	1	100	100	0	38	1	5	18	1
53000	35.08531844	-61.70178889	1	10	0	0	48	1	5	18	1
53000	35.08531844	-61.70178889	1	100	100	0	47	1	5	18	1
53000	35.0863	-61.70151111	1	100	100	0	41	1	5	18	1
53000	35.0873	-61.70330556	1	50	50	0	22	1	5	18	1
53000	35.08693889	-61.70330556	1	60	0	0	58	1	5	18	1

