

Spot Safety Project Evaluation

Order # 41000025411

Spot Safety Project # 03-04-220

**Spot Safety Project Evaluation of the Directional Crossover with Median U-Turn Installation
US 17 at SR 1184 (Ocean Isle Beach Road)
Brunswick County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Transportation Mobility and Safety Division
North Carolina Department of Transportation

Principal Investigator



Justin Green

7-29-2013

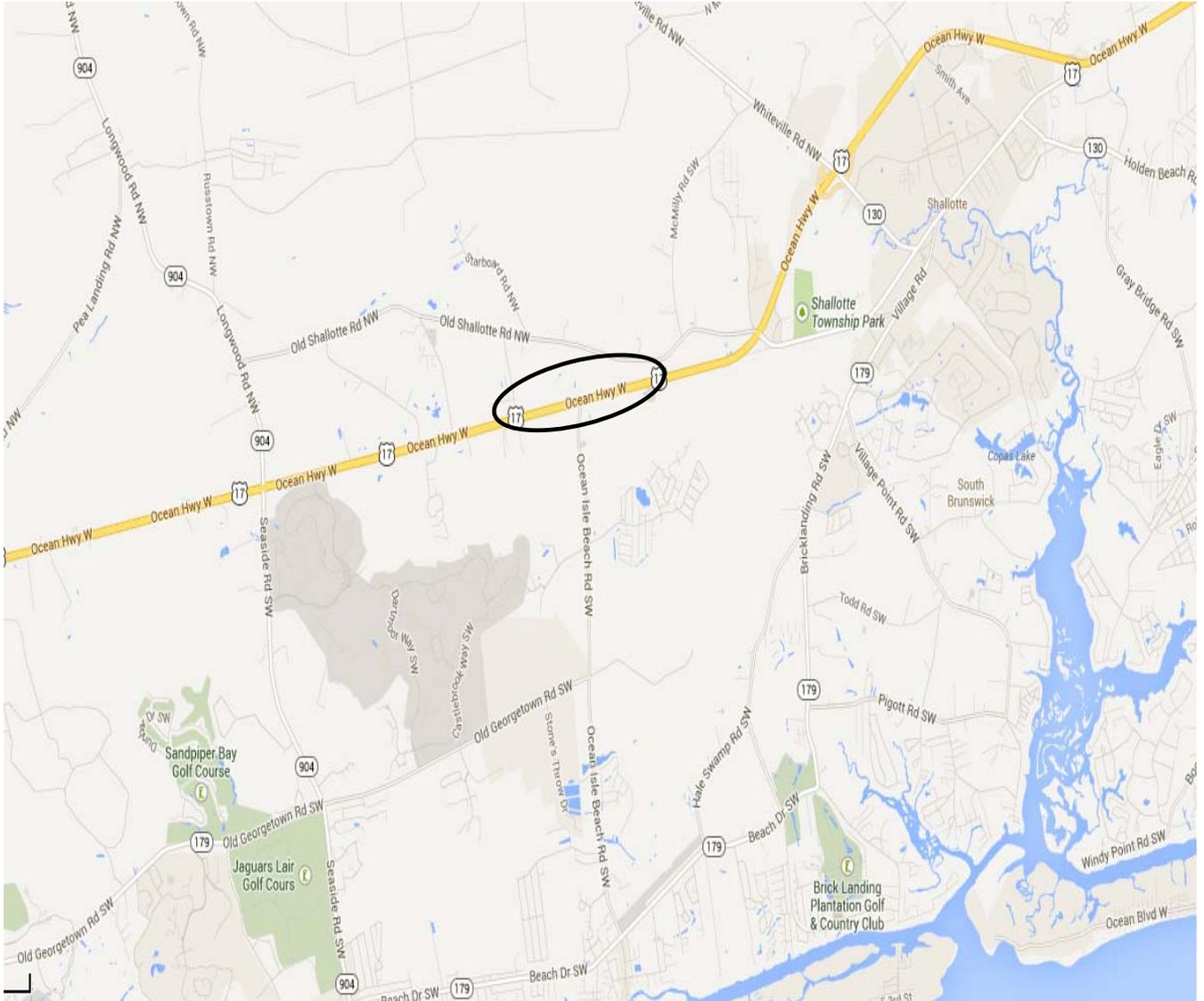
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

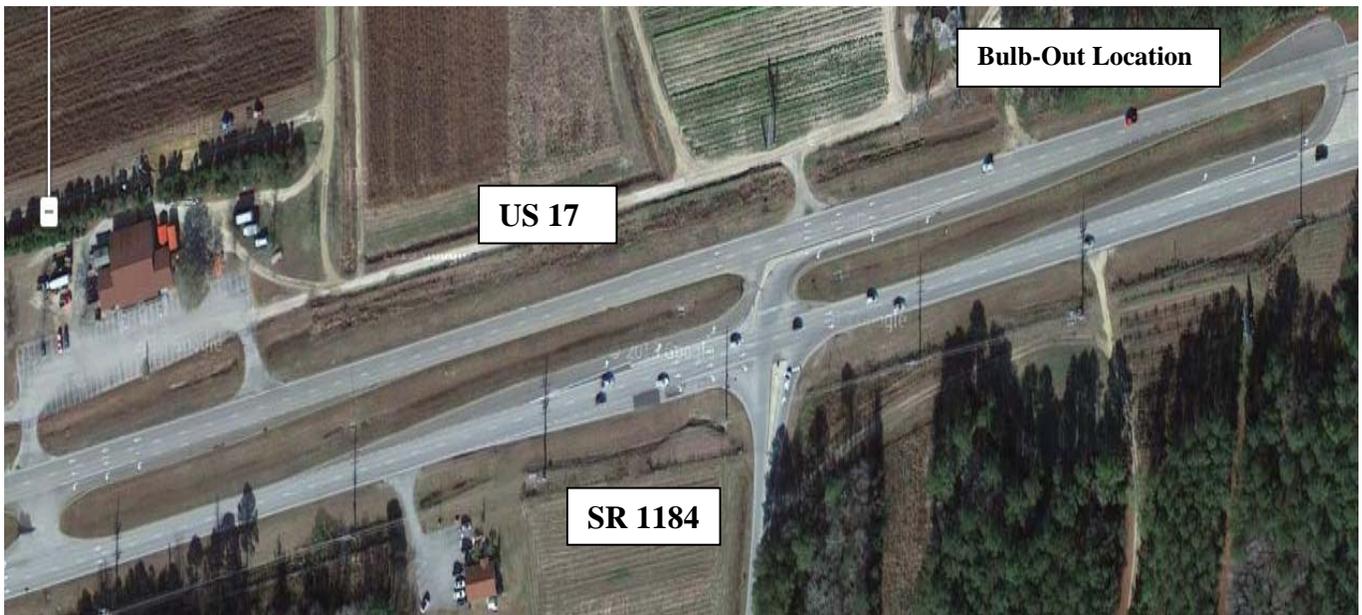
Evaluation of Spot Safety Project Number 03-04-220 located at the Intersection of US 17 at SR 1184 (Ocean Isle Beach Road) in Brunswick County.





Before Period

Aerial Photo provided from Brunswick County GIS Web Map



After Period

Aerial Photo provided from Google Maps

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of a limited movement directional crossover with a median U-Turn concrete divider. US 17 is a four-lane divided facility under partial control access. SR 1321 is a two lane roadway under stop sign control which intersects US 17 at grade. The speed limit on US 17 is 55 mph and SR 1184 is 45 mph.

The original statement of problem indicated that a high number of motorists attempted to enter US 17 from SR 1184 are being involved in angle types collisions. The intended purpose of the crossover improvement was to help alleviate the occurrence and severity of collisions.

The initial crash analysis was completed from September 30, 1999 to September 30, 2004. There were forty-five (45) total reported crashes in the five year analysis period. The final completion date for the improvement at the subject intersection was on December 5, 2008 with a total cost of \$250,000.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period were the months of September 2008 through December 2008. The before period consisted of reported crashes from April 1, 2004 through August 31, 2008 (4 years and 5 months); and the after period consisted of reported crashes from January 1, 2009 through May 31, 2013 (4 years and 5 months). The ending date for this analysis was determined by the date of available crash data at the time of analysis.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map, aerial map, and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Crossover Crashes were the target crashes for the applied countermeasure. The Crossover Crash types considered are as follows: Left turn, different roadways and Angle.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	70	63	- 10.0 %
Total Severity Index	8.63	1.82	- 78.9 %
Target Crashes	19	0	- 100.0 %
Target Crash Severity Index	16.08	0	- 100.0 %
Intersection ADT Volume (2006,2011)	27,400	23,900	- 12.8 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	2	0	- 100.0 %
Class A injury Crashes	3	0	- 100.0 %
Class B injury Crashes	9	5	- 44.4 %
Class C Injury Crashes	28	9	- 67.9 %
Total Injuries	42	14	- 66.7 %

Additional Information	Before	After	Percent Reduction (-) Percent Increase (+)
Rear End, Slow or Stop (At intersection)	35	40	+ 14.3 %
Eastern Most U- Turn Location	N/A	1	-
Western Most U-Turn Location	2	1	- 50.0 %

The naive before and after analysis at the treatment location resulted in a 10 percent decrease in Total Crashes, a 100 percent elimination of Target Crashes, and a 79 percent decrease in the Total Severity Index. The before period ADT year was 2006 and the after period ADT year was 2011.

Results and Discussion

Referencing the *Collision Diagrams*, the before period indicated four (4) angle roadway crashes at the studied intersection and one (1) angle crash at the Holden Brothers entrance (MP 9.927) . The before period also indicated eighteen (18) Left Turn, different roadway crashes (LTDR) including two fatality crashes in May and August 2007. One (1) LTDR crash was reported at the Holden Brothers entrance. After the crossover installation there was one (1) reported LTDR crash at the Holden Brothers entrance and one (1) reported LTDR crash at the “bulb out” U-turn location (MP 10.307). Three LTDR crashes were reported at the studied intersection which featured the median directional crossover. The angle crash pattern was eliminated in the after period.

The before period and after periods displayed a significant rear end crash pattern. Vehicles traveling North on SR 1184 are failing to reduce speed and colliding with vehicles stopped at the dual stop signs at the intersection with US 17. The before period experienced thirty-five (35) crashes reflecting this rear end pattern; the after period experienced forty (40) crashes in this pattern.

The overall target crashes were eliminated in the after period.

Typically, crossover installations occur on median divided roadways and the Safety Evaluation Group evaluates the closest u-turn locations for crash migration. However, with this installation, motorists have the ability to u-turn at the end of the concrete medians. A general search analyzing for u-turn related crashes was completed for the after period and one crash was found at the bulb out location: Crash # 62 (ID# 103005674).

Please see the attached *Treatment Site Photos*. Photos are provided from Google Street View for all four approaches to the treatment intersection. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

Treatment Site Photos (Google Street View)



Looking East on US-17 (Image Date: August 2011)



Looking West on US-17 (Image Date: August 2011)



Looking South onto SR 1184 (Image Date: August 2011)



Looking South; Bulb Out U-Turn on US 17 (Image Date: August 2011)



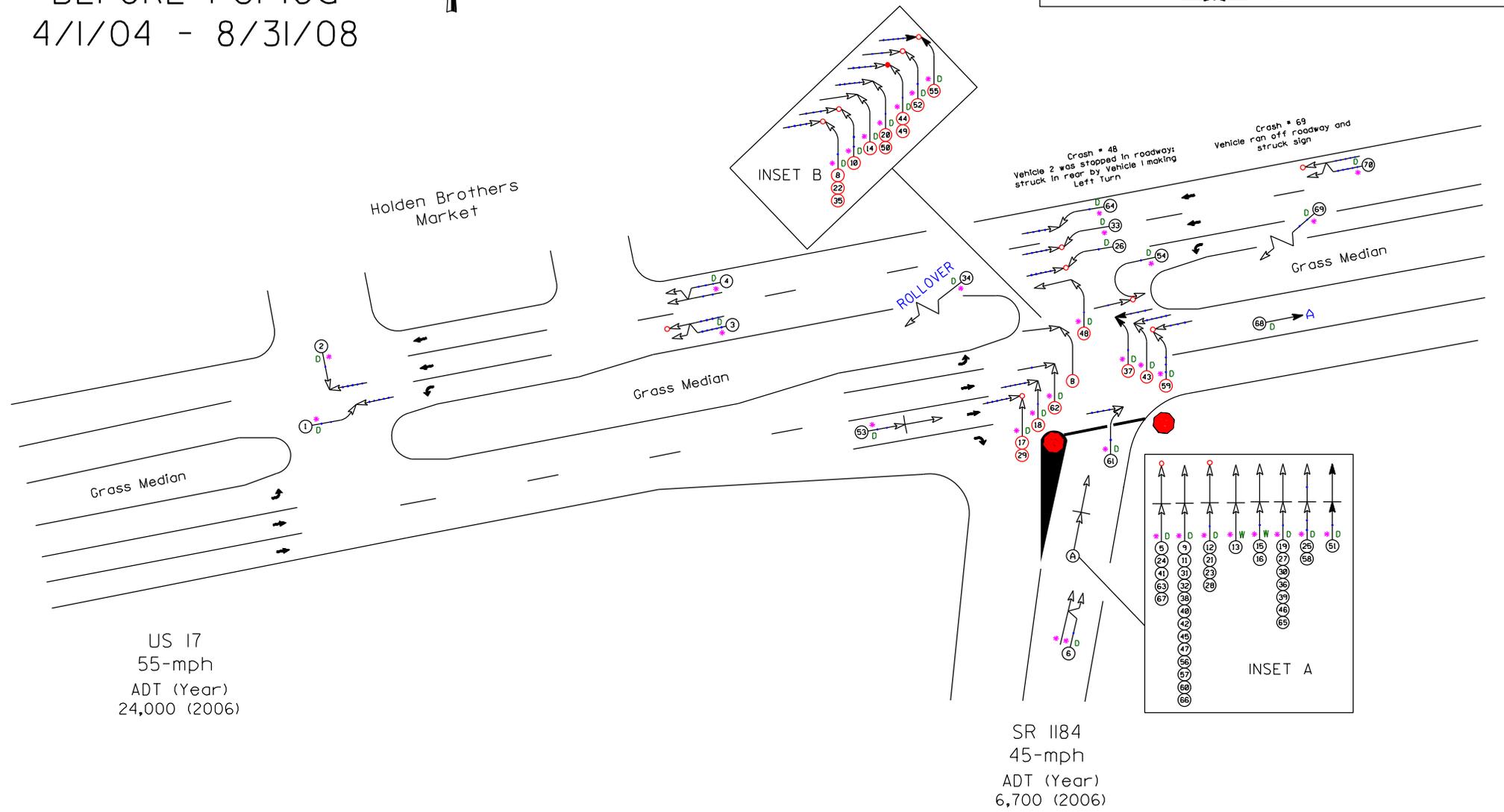
Median Crossover on US 17 & Holden Brothers Entrance; Looking East (Image Date: August 2011)

SS# 03-04-220
 Order# 41000025411
 Brunswick County
 BEFORE Period
 4/1/04 - 8/31/08



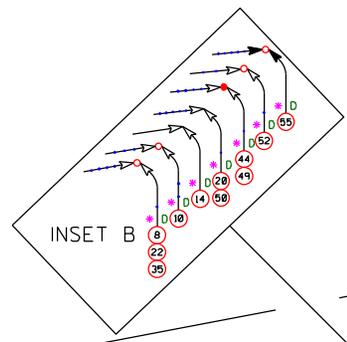
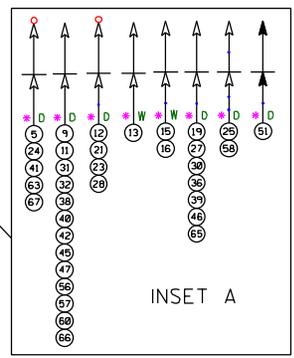
LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAKED VEHICLE		TURNING		20 MPH TO 29		DRIVER AT FAULT
	PAKED VEHICLE		TURNING		30 MPH TO 39		DRY
	FIXED OBJECT		TURNING		40 MPH TO 49		WET
	HEAD ON		TURNING		50 MPH TO 59		ICY OR SNOWY
	REAR END		TURNING		60 MPH TO 69		ONLY
	RAN OFF ROAD		TURNING		TO AND UP		
	RAN OFF ROAD		TURNING		SPEED UNKNOWN		
	RAN OFF ROAD		TURNING				
	RAN OFF ROAD		TURNING				



US 17
 55-mph
 ADT (Year)
 24,000 (2006)

SR 1184
 45-mph
 ADT (Year)
 6,700 (2006)



Crossover
 Target Crashes

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY and SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: 7-24-2013 Prepared By: J. Green

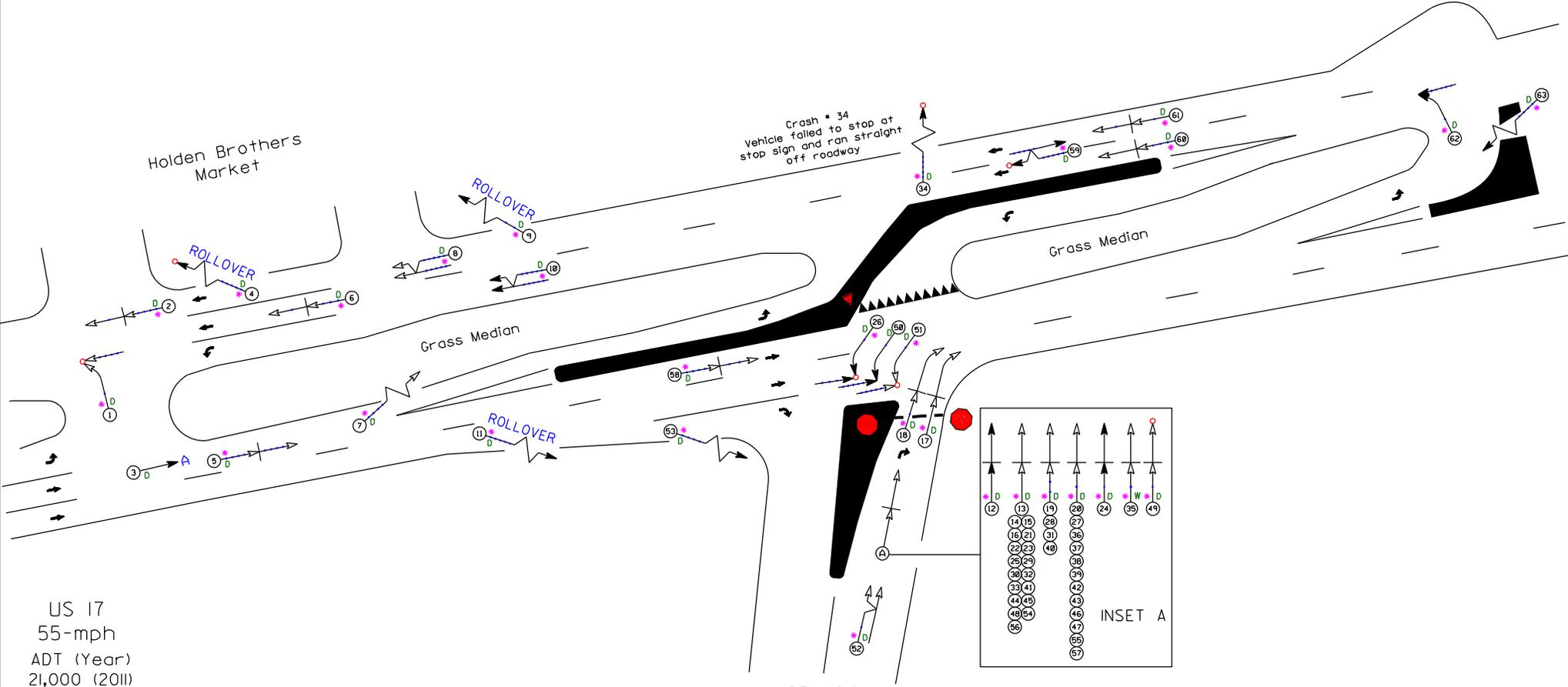
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 AFTER Period
 1/1/09 - 5/31/13



LEGEND							
	MOVING VEHICLE		ANGLE		5 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PARKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		BLURRY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD				TO AND UP		

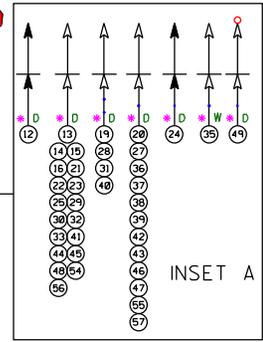
Holden Brothers Market

Crash # 34
 vehicle failed to stop at stop sign and ran straight off roadway



US 17
 55-mph
 ADT (Year)
 21,000 (2011)

SR 1184
 45-mph
 ADT (Year)
 5,700 (2011)



Crossover Target Crashes

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