

Road Safety Audit

**Fulling Mill Road, Cape May County
New Jersey**



Submitted to:

South Jersey Transportation Planning Organization

Submitted by:



In Association with:



June 2004

Introduction

Orth-Rodgers & Associates, Inc. (ORA) has been retained by the South Jersey Transportation Planning Organization (SJTPO) to perform a Road Safety Audit (RSA) of Fulling Mill Road (CR654) from Bayshore Road (CR603) to NJ Route 47 in Lower and Middle Townships, in Cape May County. Fulling Mill Road is an existing road that falls under the jurisdictional control of Cape May County. Fulling Mill Road was selected because it is a high crash corridor. The crash history examined by the Safety Audit Team did not disclose any fatal crashes within the last three-year period, but there was a relatively high percentage of fixed object type of crashes. There are no planned improvements for the road and therefore the results of the audit have been presented in a manner that will allow the roadway management personnel to prioritize the implementation of safety enhancements as deemed appropriate.

The intent of the road safety audit process is to conduct a formal examination of highway features and surrounding environment that increase the potential for crashes and identify countermeasures that will reduce (or eliminate) the probability of such crashes. According to the Federal Highway Administration, the formal definition of a road safety audit is as follows; A Road Safety Audit is the formal examination of an existing or future road or traffic project by an independent team of trained specialists. Its main objective is to address the safe operation of a roadway and ensure a high level of safety for all road users. The RSA team assesses the crash potential and safety performance of a roadway and prepares a report that identifies potential safety problems. For projects that are in the design phase, RSAs can identify deficiencies before they are built into the project and espouse quality improvement incorporating safety measures from the beginning. Project officials or managers can evaluate, select and justify appropriate project changes to the design based on the audit findings. In the case of Fulling Mill Road, there is no improvement project planned at this time, so the results of this audit will be presented in a comprehensive list that will provide appropriate management the flexibility of implementing any or all of the safety improvement ideas identified.

Fulling Mill Road is approximately 2 ½ miles long, beginning at Bayshore Road [milepost 0], and terminating at NJ State Route 47 [milepost 2.46]. The west end of Fulling Mill Road is residential in nature and has a posted speed limit of 40mph, while the 2-mile stretch of Fulling Mill Road on the east end is rural and has a posted speed limit of 50mph. It is a two-lane collector road with intermittent passing zones for both directions in the rural section. There is a traffic signal that controls traffic at its intersection with Bayshore Road, and a posted stop sign controls Fulling Mill Road traffic at NJ Route 47. The width of shoulder varies throughout the corridor and in some areas there is no effective shoulder.

A considerable portion of Fulling Mill Road is surrounded by open space area such as the Cape May County Airport, a County park, and swampy wetlands on both sides of the road. It is one of the few east-west connector roads in the area. The Cape May County Engineer provided a videotape of the road that was taken in 1994. The video revealed that little has changed on Fulling Mill Road in the last 10 years.

Background Information

A kickoff meeting featuring a presentation by ORA took place on March 24, 2004 at the Cape May County Engineering Office. The purpose of the presentation was to educate attendees on important aspects of the safety audit process, such as:

1. Definition - What is involved in a typical safety audit and how it differs from other safety review measures currently in use.
2. Process – The required steps involved in a successful audit and the reasons the steps are required.
3. Lessons learned from previous audits.
4. The Final Report – What to expect.

The following were in attendance at the kickoff meeting:

KICKOFF MEETING ATTENDEES

Name	Agency
Mary Pat Hastings	Cape May County - Department of Health
Lt. Lou Raniszewski	Cape May County - Sheriff's Office
Dale Foster	Cape May County - Engineer
Karen Yunk	FHWA
Kathleen McPherson	Lower Township - Administrator
Sgt. Paynter	Lower Township - Traffic Safety Officer
Lt. Tim Moore	Middle Township - Traffic Safety Officer
Ray Reeve	NJ Division of Highway Traffic Safety
Ed O'Connor	NJ Division of Highway Traffic Safety
Dick Dunne	NJDOT - Design Services
Steve Moy	NJDOT - Local Aid
John J. Petersack	NJDOT - Planning
Bill Beans	NJDOT - Safety Programs

Name	Agency
Jaime Saladino	NJDOT - Safety Programs
Kevin Conover	NJDOT - Safety Programs
Nancy Allen	NJDOT - Traffic Engineering & Investigations
Patricia Ott	NJDOT - Traffic Engineering & Safety
Ernie Lemmerman	Ocean City - Engineer
Sgt. Charles Simonson	Ocean City - Traffic Safety Unit
Timothy Chelius	SJTPO - Executive Director
Teresa Thomas	SJTPO - South Jersey Traffic Alliance
Norman Deitch	Orth-Rodgers & Associates, Inc.
Joseph Fiocco	Orth-Rodgers & Associates, Inc.
Alex Adeeko	Orth-Rodgers & Associates, Inc.

The attendees at the kickoff meeting displayed a genuine interest in safer roadways and more specifically an interest in participating in this pilot safety audit project. Although reference material suggests a smaller group (three to five), an audit team with eleven members was selected for the following reasons; There was a wealth of experience that could be tapped into, the team did not want to discourage any efforts towards a safer roadway environment, and it is hoped that the greater participation in this pilot project will encourage the proliferation of highway safety audits throughout New Jersey. The manageability of such a large group was made possible through efforts of the County Engineer, who provide meeting space as well as a bus on the day of the audit to take the team out to the location.

The audit of Fulling Mill Road took place on April 28th, 2004 and the following were in attendance and will be referred to as “The Safety Audit Team”:

SAFETY AUDIT TEAM FOR FULLING MILL ROAD, CAPE MAY COUNTY

Name	Agency
Dale Foster	Cape May County - Engineer
Karen Yunk	FHWA
Sgt. Paynter	Lower Township - Traffic Safety Officer
Lt. Tim Moore	Middle Township - Traffic Safety Officer
Ray Reeve	NJ Division of Highway Traffic Safety
Jaime Saladino	NJDOT - Safety Programs
Timothy Chelius	SJTPO - Executive Director
Bill Schiavi	SJTPO
Norman Deitch	Orth-Rodgers & Associates, Inc.
Joseph Fiocco	Orth-Rodgers & Associates, Inc.
Alex Adeeko	Orth-Rodgers & Associates, Inc.

Pre-Audit Data Collection

The following information was collected by ORA and their sub-consultant A-Tech Engineering for use during the Safety Audit of Fulling Mill Road:

1. Aerial Photos

Cape May County provided color copies of aerial photographs, scaled at approximately 1"=500'. The entire length of Fulling Mill Road was shown on two 11 by 14 sheets. In addition, a 1"=100' scale copy of the aerial photos found on NJDOT's web site were pasted together on four 24" by 36" sheets for use on the day of the audit.

2. Traffic Data

Peak hour manual turning movement counts were collected at two intersections; (1) Fulling Mill Road and Bayshore Road, and (2) Fulling Mill Road and NJ Route 47. The weekday morning peak hour at Bayshore Road occurred between 8:00am and 9:00am, and at NJ Route 47 between 7:30am and 8:30am. The weekday afternoon peak hour at both intersections occurred between 4:30 and 5:30pm. The specific individual volumes that were counted are illustrated on a stick diagram in the appendix of this report.

Twenty-Four hour Automated Traffic Recorder (ATR) counts were obtained on a straight section of roadway approximately mid-way through the corridor beginning April 14th through April 19th, 2004. The data collected indicates that the eastbound weekday average daily traffic (ADT) is 2956 vehicles/day with a heavy vehicle (HVP) percentage of 6%. The eastbound weekend ADT is 2832 with HVP of 3%. The westbound weekday ADT is 3222 with HVP of 6% and weekend ADT of 3653 and HVP of 5%. The 85th percentile speed at the count location in both directions was 58mph and the average speed was 52mph.

3. Crash Data

Fifty (50) reports detailing the crashes that occurred on Fulling Mill Road, between January 2001 through December 2003, were received from the Lower Township and Middle Township police departments. The details from these reports were reviewed and transferred into a spreadsheet to identify specific patterns that may be occurring. The crashes were also graphically depicted on a 1" = 100' scaled drawing to identify site-specific crash patterns. Charts were created from the data to illustrate the relative frequency of the following factors; year, day of week, time of day, surface condition (wet, dry, etc.), weather condition, light condition, severity, and crash type.

The most obvious trend noted on Fulling Mill Road was the relatively high number of vehicles that “lost control” or “hit fixed object”. More than half of the crashes fell into these two categories. The plotted crash diagram revealed no specific concentration with regard to the location or type of object being struck. The objects most frequently struck (numbers of crashes are in parenthesis) were: trees (8), guide rail (4), utility poles (4), and fences (4). The concern that arises regarding this type of crash pattern is the greater potential for severe injury or a fatality. According to 2001 FARS* data, approximately 31% of fatal crashes, and 17% of injury crashes are a result of crashes that have “Collision with Fixed Object” listed as the first harmful event. These crash types only account for 15% of the total crashes nation-wide.

The only site-specific pattern (3 or more) found in the three-year crash data was that of right-angle collisions between southbound Star Avenue vehicles and westbound Fulling Mill Road vehicles. These three crashes happened on three different days (Tuesday, Thursday and Sunday), during daylight hours, and only one occurred while raining. A fourth collision of this type involved a bicycle proceeding into the intersection from Star Avenue.

4. Sign Inventory

Given the crash data reviewed and the type of road conditions (two lane rural road with numerous curves transitioning into a residential area with numerous intersections), the team leader decided it would be advantageous to the identification of safety issues and possible solutions to inventory and present to the audit team the locations of all signs within the study area. A 1” = 100’ scaled drawing showing all the existing signs was prepared for the audit team. In addition, the results of the ball bank readings collected by the County Engineering Department were added to the corresponding curves illustrated on the drawings. The comparison revealed that the recommended speeds found on existing signs were appropriate with the exception of the first sign westbound on Fulling Mill, which has a supplemental speed plaque of 45mph and the ball-bank readings indicate 40 mph would be more appropriate.

5. Other Information

Additional information that was collected and reviewed by ORA prior to the date of the audit include the following; digital photographs taken during various visits to the site, a file of documents relative to the proposed Wawa at the intersection of Bayshore Avenue and Fulling Mill Road (including projected traffic volumes and proposed improvements to the intersection), a copy of the Straight Line Diagram printed from the State web site, a spread sheet summarizing the data found in each of the 50 crash reports, and copies of the police reports.

Audit

The Team met at the County Engineers office at 10:00am and began the formal audit process. The audit began with brief introductions and an overview of the expectations of team members. The Team Leader, Joe Fiocco, encouraged an open type of forum allowing comments to be made at any time so as not to have any potential issue lost due to the hesitation to bring up the issue at the wrong time or in the wrong context. The Team systematically reviewed the following materials, which were compiled by ORA:

1. Color copies of aerial photographs, scaled at approximately 1"=100'.
2. Copies of the appropriate section of a Cape May County road map were provided to each team member to help illustrate where Fulling Mill Road lies relative to the bay, the residential areas of Lower Township, the Cape May Airport, US Route 9, NJ Route 47, the Garden State Parkway, as well as the surrounding local roadway network.
3. Color copies of aerial photographs, scaled at approximately 1"=500' were provided to each team member.
4. A diagram illustrating available traffic data on Fulling Mill Road was provided to each team member. The data collected included AM and PM peak hour turning movement counts at the intersection with Bayshore Avenue and State Route 47 as well as 24-hour ATR counts at a mid-point location on Fulling Mill Road.
5. A spreadsheet summarizing the 50 crashes that occurred on Fulling Mill Road over a three-year period.
6. Charts that graphically illustrate the crash data were provided to each team member. During the course of the audit two additional charts were requested by team members; one that represents the age of the drivers involved in the crashes and one that represents the number of crashes that had DUI or DWI as a contributing factor.
7. Crash diagrams, at a scale of 1"=100' that were created to illustrate the type of crash and where each occurred along Fulling Mill Road were presented to team members for discussion.
8. A sign inventory placed on a set of plans at a scale of 1"=100' for the entire route was presented to the team for discussion. It was noted (and confirmed during the night visit) that signing along the entire route was relatively new, visible and in very good condition.
9. The results of Ball-Bank readings for curves along the route, which were conducted at the direction of the

County Engineer, were presented and compared to the posted speed limits and existing curve warning signs.

10. The latest Local Traffic Signal (LTS) plan approved by the New Jersey DOT for the intersection of Fulling Mill Road and Bayshore Avenue was presented and discussed.
11. The audit team reviewed the video log of Fulling Mill Road, taken in 1994, that was provided by the County Engineer.
12. Copies of photographs taken during the data collection process were distributed to team members.
13. A set of Safety Audit Checklists that were specifically created for the purpose of auditing existing roads was distributed to each team member. The team leader read each checklist item, and noted hazard identification ideas, as well as safety improvement suggestions. The original safety audit checklists were from a publication entitled "Road Safety Audit", published by AUSTROADS in 1994. The checklist were modified for use in Pennsylvania by the Pennsylvania Department of Transportation (PENNDOT) and further modified by the Safety Audit Team Leader for this project.

A copy of the material identified above is included in the appendix of this report.

The Audit Team then boarded a Cape May County bus and traveled to Fulling Mill Road. Numerous safety improvement ideas were shared between team members in route to the site. The team proceeded to walk the entire length of Fulling Mill Road identifying aspects of the roadway and its surrounding environment that could contribute to the occurrence or relative severity of roadway crashes. The Team leader took notes during the entire audit process and the team members were also requested to take notes. During the field view, the audit team was confronted by a curious observer (truck driver) who volunteered his opinion as to what can be done to make the road safer. His comment was added to the field notes. He specifically suggested that the line of sight could be improved in some areas.

After walking the entire stretch of Fulling Mill Road, the team returned to the County Engineer's office. The team leader summarized the day's findings and additional issues that were brought to the leaders attention were added to the list. The team leader informed the team members on the next step in the audit process. Specifically, the leader would prepare a draft report that describes all of the findings, as well as recommendations and forward to each team member for their review, comment and/or concurrence. The Audit findings are summarized in the following section.

At the conclusion of Safety Audit process on April 28th, 2004, it was agreed by the team that due to the rural nature of the road and the slight over-representation of nighttime crashes, it would be beneficial to conduct a nighttime visit to the site to maximize the opportunity to identify safety issues along the highway.

The nighttime visit was conducted on Tuesday, May 4, 2004 at 8:15pm. Dale Foster, Tim Chelius, Lt. Moore, Bill Schaivi and Joe Fiocco volunteered and participated in the nighttime visit.

The above team members rode the route a number of times and made the following observations:

1. The trees in the vicinity of Garfield Avenue restrict the effectiveness of the overhead street light.
2. The white reflectors on the guide rail provide excellent curve delineation. The removal of any guide rail on the outside of curves should include the installation of chevron signs or delineators.
3. Installing additional chevrons at the curves according to MUTCD guidelines will increase their effectiveness.
4. Replacing the reflectors in all of the Raised Pavement Markers (RPM) will increase their visibility tremendously.
5. There is an obvious absence of nighttime delineation throughout the airport curve.
6. The nighttime visibility of the yellow paint is pale in comparison to the white edge lines.
7. The transition of road from rural to residential is less evident at night.
8. The north side of the intersection of Star Avenue is considerably darker than the south side.
9. The visibility of the stop sign within the airport property is more noticeable at night. This will be exasperated if and when the stop sign is replaced with a newer sign.

The above observations have been incorporated into the following section of this report.

Findings

The findings from the Fulling Mill Road safety audit are presented below.

	SAFETY ISSUE	REMEDIAL ACTION	LEVEL OF EFFORT REQUIRED			POTENTIAL SAFETY BENEFIT		
			LOW	MEDIUM	HIGH	LOW	MEDIUM	HIGH
1	Stop sign at Route 47 appears relatively inconspicuous	Install larger Stop (R1-1) sign	X			X		
		Install a larger stop ahead (W3-1) sign	X			X		
2	The ball-bank reading corresponding to the first curve in the westbound direction indicates a recommended speed of 40mph would be appropriate	Replace the 45mph supplemental plaque with a 40mph plaque on the existing curve warning sign	X			X		
3	Guide rail on the eastbound side of Fulling Mill Rd west of Kimble Ave is not properly installed and is no longer needed	Remove the 2 short sections of guide rail		X				X
4	Curve on the westbound side of Fulling Mill Road west of Kimble Ave has guide rail on the outside of the curve	Regrade the area behind the rail to eliminate the need for the guiderail		X				X
5	Curve on the westbound side of Fulling Mill Road west of Kimble Ave does not have chevrons	Install Chevrons on the outside of the curve	X					X

	SAFETY ISSUE	REMEDIAL ACTION	LEVEL OF EFFORT REQUIRED			POTENTIAL SAFETY BENEFIT		
			LOW	MEDIUM	HIGH	LOW	MEDIUM	HIGH
6	The vegetation on the inside of the curve (eastbound side) just west of the golf driving range restricts visibility along Fulling Mill Rd	Cut back the vegetation within the highway right-of-way	X				X	
7	Pole #14(w31849) is on the outside of the curve on eastbound Fulling Mill Road at approx. milepost 2	Relocate the pole to the inside of the curve (westbound side)			X	X		
		Relocate the pole further away from the edge of travel lane			X	X		
8	Sign post for "Deer Crossing" sign is mounted on a pair of back-to-back channel posts that will not break away if struck	The sign post has been replaced by county forces.	X				X	
9	Guide rail on the eastbound side of Fulling Mill Rd at the stream is longer then necessary and does not have an appropriate end treatment	Remove the excess guiderail and install the appropriate end treatment		X			X	
10	The pipe crossing at mile post 1 (approximate) stops abruptly relative to the edge of the eastbound travel lane	Extend the pipe to or beyond the design clear zone			X		X	
11	Vegetation on the inside of the curve on westbound Fulling Mill Road just east of milepost 1 restricts visibility	Cut back the vegetation within the highway right-of-way	X				X	

	SAFETY ISSUE	REMEDIAL ACTION	LEVEL OF EFFORT REQUIRED			POTENTIAL SAFETY BENEFIT		
			LOW	MEDIUM	HIGH	LOW	MEDIUM	HIGH
12	Guide rail on the eastbound side of Fulling Mill Road in the vicinity of the "Western Pest Services" sign is not warranted	Remove the unwarranted guide rail		X				X
13	The "Western Pest Services" sign behind the guide rail identified in 12 above, is apparently illegally posted and on non-breakaway supports	Have the sign and supports removed	X			X		
14	The curve on the westbound approach to the residential section does not have chevrons posted	Install Chevrons on the outside of the curve	X				X	
15	There is no visual indication to motorist on the westbound approach to the Villas that they are approaching a residential area. This was even more evident at night.	Install an "Entering The Villas" sign on the approach to the residential area	X			X		
		Install delineators at a strategic spacing to give the appearance of a higher travel speed on the approach to the residential area		X		X		
		Install a flashing beacon on the approach to the residential area		X			X	
		Replace the "Reduced Speed" sign approaching the 40 mph zone with the latest approved MUTCD sign (W3-5)	X			X		
16	Vegetation on the inside of the curve on eastbound Fulling Mill Road just east of the residential area restricts visibility	Cut back the vegetation within the highway right-of-way	X				X	

	SAFETY ISSUE	REMEDIAL ACTION	LEVEL OF EFFORT REQUIRED			POTENTIAL SAFETY BENEFIT		
			LOW	MEDIUM	HIGH	LOW	MEDIUM	HIGH
17	Guide rail on the westbound side of the curve entering the residential area of Fulling Mill Road is not warranted and the end section is not appropriate	Remove the unwarranted guide rail	X					X
18	Two storm sewer inlets at the intersection of Garfield Avenue are not bicycle safe	Replace the inlet grates with a bicycle friendly design	X			X		
19	One storm sewer inlet at the intersection of Jennings Avenue is not bicycle safe	Replace the inlet grate with a bicycle friendly design	X			X		
20	Vegetation on the inside of the curve on westbound Fulling Mill Road approaching Woolson Road	Cut back the vegetation within the highway right-of-way	X				X	
21	One storm sewer inlet at the intersection of Mowery Avenue is not bicycle safe	Replace the inlet grate with a bicycle friendly design	X			X		
22	There are no lane control pavement markings on the Fulling Mill Road approach to the signalized intersection of Bayshore Avenue	Install "Arrows" and "Only" on the pavement	X			X		
23	The posted speed limit of 40mph appears a little high given the residential nature of roadway	Conduct a speed study within the residential area to evaluate appropriateness of a reduction in the posted speed to 35mph		X				X

	SAFETY ISSUE	REMEDIAL ACTION	LEVEL OF EFFORT REQUIRED			POTENTIAL SAFETY BENEFIT		
			LOW	MEDIUM	HIGH	LOW	MEDIUM	HIGH
24	The turns at the intersection of Bayshore Road are difficult for larger vehicles	Increase the corner radii.			X		X	
25	Overhead LED traffic signals at the intersection of Bayshore Road are mounted on span wire allowing movement that reduces the signals visibility during windy conditions	Install a tether wire to the bottom of the signal heads to minimize the signal movement (short term)		X			X	
		Install mast arms to replace the span wire (long term)			X		X	
26	The number of crashes involving vehicles out of control and running off the road is significantly over-represented	Resurface the entire road with a material that produces a higher than average (open graded friction course) road-to-tire friction factor			X			X
		Restripe the road with narrower lane widths to encourage lower travel speeds and increase the clear zone		X			X	
		Install edge line rumble strips			X			X
		Selectively clear out the trees that fall within the both the highway right-of-way and the design clear zone		X				X
		Replace the reflectors in the Raised Pavement Markers		X				X
27	Trees surrounding the overhead street light in the vicinity of Garfield Avenue are restricting its effectiveness	Trim back the tree branches	X				X	
28	Removing the guide rail on the curves identified in the above items will reduce the curves night-time visibility	Install chevrons on the outside of the curves where guide rail is being removed, as appropriate	X					X

	SAFETY ISSUE	REMEDIAL ACTION	LEVEL OF EFFORT REQUIRED			POTENTIAL SAFETY BENEFIT		
			LOW	MEDIUM	HIGH	LOW	MEDIUM	HIGH
29	The chevrons that are posted on the curves throughout Fulling Mill Road generally do not extend far enough around the curve to maximize their effectiveness	Add additional chevrons on each curve of Fulling Mill Road in accordance with the guidelines found in the current MUTCD	X				X	
30	There is no roadside delineation along the sides of the road throughout the curve at the airport	Install breakaway post mounted delineators along the outside of the shoulders along the airport curve	X				X	
31	The number of vehicles turning left onto Fulling Mill Road from NJ Route 47 is high relative to the number of vehicles continuing straight on NJ Route 47	Install an exclusive left turn lane on NJ Route 47 at Fulling Mill Road			X		X	
32	The nighttime visibility of the yellow centerline on Fulling Mill Road is much less than the white edge line	Replace the waterborne paint with a long-lasting high-visibility centerline striping material		X			X	
33	The north side of the intersection of Star Avenue is much darker than south side of the intersection due to the placement of the overhead street light	Install a second street light on the north side of the intersection		X				X
		Relocate the existing street light to provide a better balance of light at the intersection		X			X	
34	The stop sign posted within the airport fence and intended for vehicles within the airport property is visible to motorists on Fulling Mill Road	Place some sort of a screen at the stop sign to eliminate its visibility for Fulling Mill Road traffic	X			X		

	SAFETY ISSUE	REMEDIAL ACTION	LEVEL OF EFFORT REQUIRED			POTENTIAL SAFETY BENEFIT		
			LOW	MEDIUM	HIGH	LOW	MEDIUM	HIGH
	(34 continued)	Place the stop sign at an angle so as to not be as visible to Fulling Mill Road traffic	X			X		
35	There are portions of Fulling Mill Road that do not provide for pedestrian travel (i.e. no sidewalk nor shoulder)	Install a paved surface for pedestrian travel outside of the travel lanes along those areas as appropriate			X			X
36	Driveways on the western end of Fulling Mill Road require motorist to either back off of or onto Fulling Mill Road	Install visual clues to motorists that they are in a residential area (i.e. sidewalks, concrete curb radii at intersections, streetscape, etc.)			X		X	
37	There are some post and rail type fences within close proximity of the edge of travel lane within the residential area.	Have those fences that fall within the highway right-of-way removed or relocated by the property owners.			X		X	
38	The fence on the northeast corner of Star Avenue and Fulling Mill Road reduces the visibility for motorists at the intersection	Have the property owner lower or relocate the fence. This action is already being taken by the local municipality according to Sgt. Paynter of Lower Township		X				X

Recommendations

As stated earlier, the intent of the road safety audit process is to conduct a formal examination of highway features and surrounding environment that increase the potential for crashes and identify countermeasures that will reduce (or eliminate) the probability of such crashes. The safety issues identified during the conduct of this audit and included in this report have been organized to provide the convenience and flexibility necessary to allow implementation of safety improvements as time and budget limitations allow. Some of the improvements were of a nature that allowed them to be implemented prior to the publication of this report. To the extent possible, the recommendations have been separated into line items so that improvements can be implemented independently as appropriate. Clearly, consolidating a number of the safety recommendations will reduce the overall cost of improvements. We recommend that the appropriate management staff review the list of recommendations and decide what items can be completed in the immediate (within 1 year) future. The balance can be consolidated into a set of construction plans to be implemented by contracted forces.

The types of crashes occurring on the Fulling Mill Road corridor (i.e. lost control) indicate that there is considerable potential for the future occurrence of crashes involving injury and/or fatalities. Many of the recommendations in this report are intended to 1) reduce the probability of operators losing control of their vehicles, and 2) remove as many fixed objects from the roadside as practical. The Safety Audit Team believes that the benefits (reduced injuries and/or fatalities) to be realized through the implementation of the remedial actions found in this report will far outweigh the costs and should be pursued by the appropriate authorities.

The opinions presented in the findings of this safety audit report are those of the Safety Audit Team as a whole and do not necessarily reflect the opinions of the SJTPO or individual team members.

Appendix

Aerial Photos

Copy of Road Map

Straight Line Diagram

Traffic Data Diagram

Crash Data Summary

Crash Data Charts

Crash Diagrams

Sign Inventory Diagrams

Ball Bank Results

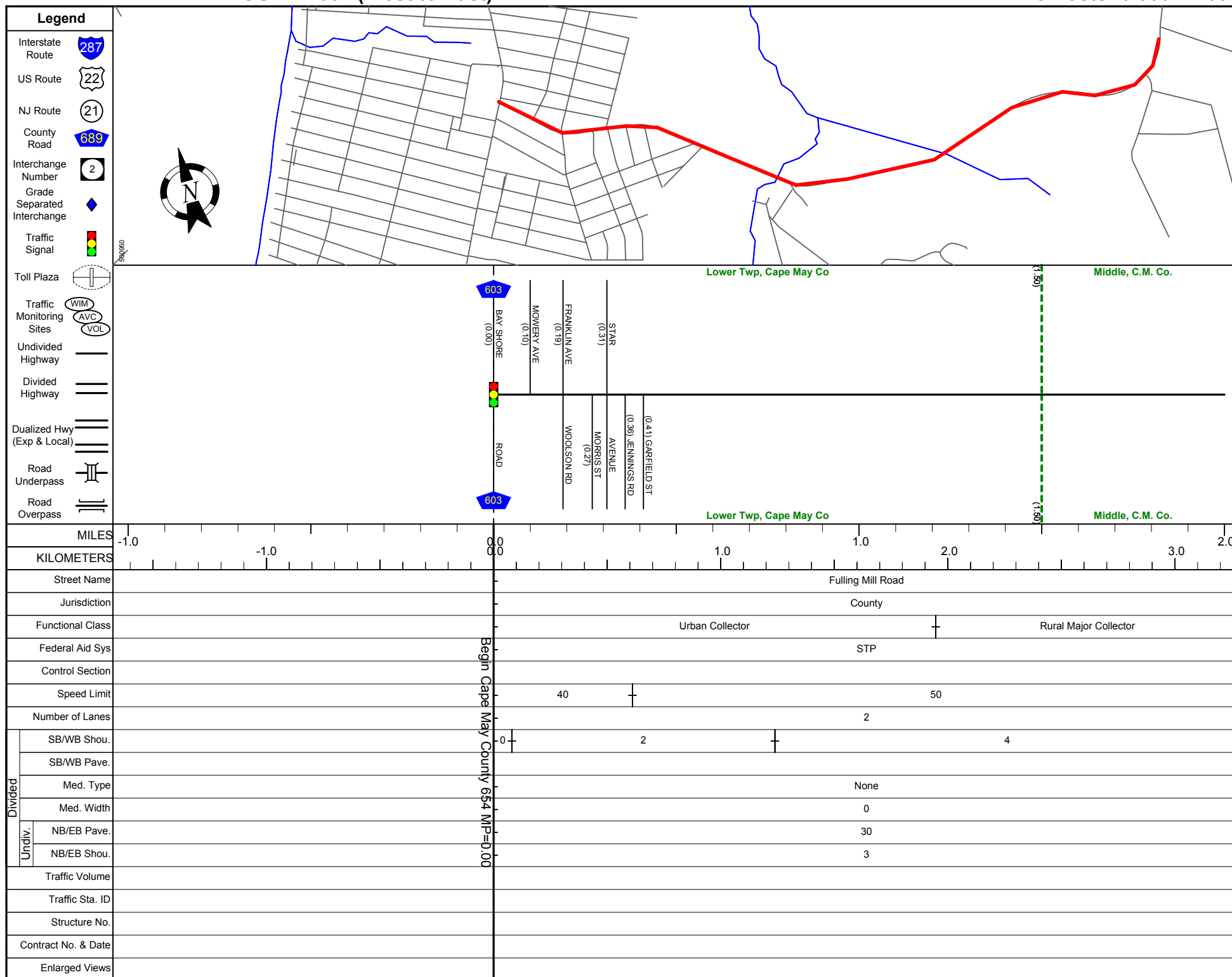
Photographs

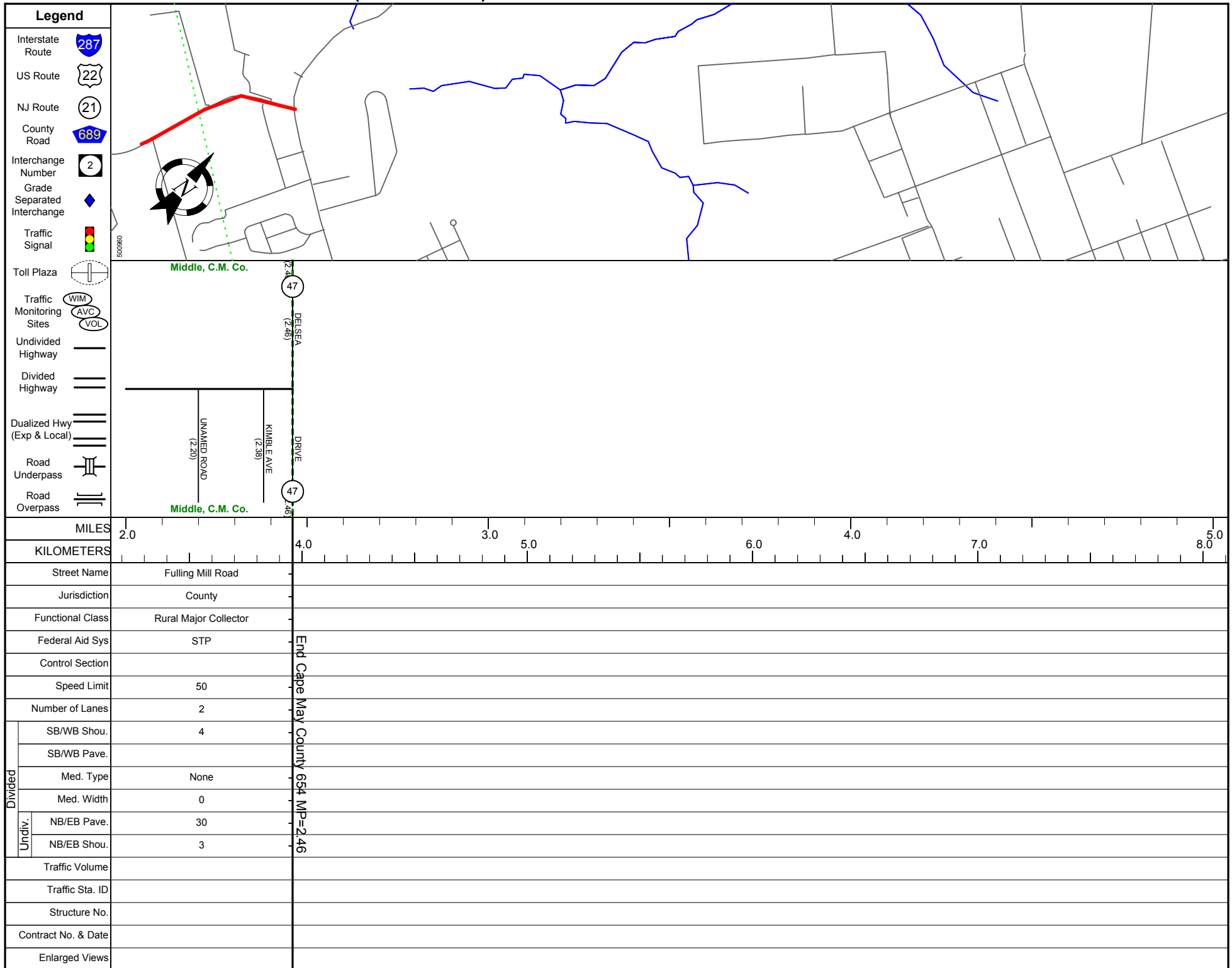
Checklists



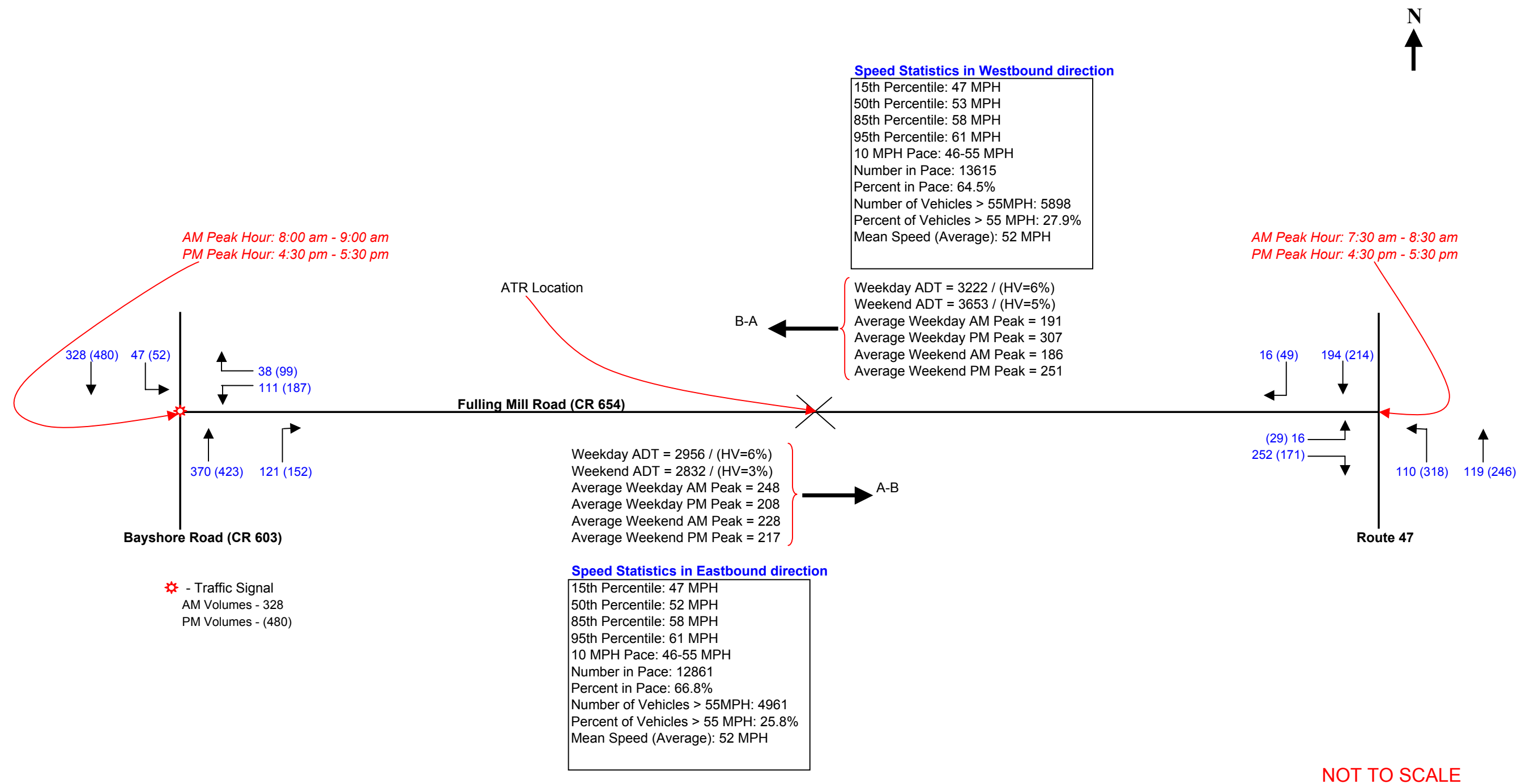








SJTPO Road Safety Audits
Existing 2004 Traffic Data on Fulling Mill Road (CR 654)



ACCIDENT SUMMARY: FULLING MILL ROAD (CR654), CAPE MAY COUNTY-NJ

Crash #	Date	Year	Month	Day of Week	Time Period	Time	AM/PM	Surface Condition	Weather	Light Condition	Crash Type	Fixed Object Struck	Severity	Contr. Factor	Alcohol Related	Driver(s) Zipcode	Age of Driver(s)
001	2/23/01	2001	February	Friday	10:00-11:00	10:18	AM	Wet	Clear	Daylight	Hit Fixed Object	Tree	PDO & Injury	Driver Inattention	None	08204	19
002	3/4/01	2001	March	Sunday	10:00-11:00	11:31	AM	Wet	Rain	Daylight	Lost Control	None	PDO	Driver Inattention	None	08210	25
003	4/10/01	2001	April	Tuesday	22:00-23:00	22:48	PM	Dry	Clear	DNSL	Hit Animal	None	PDO	Animal's Action	None	08257	20
004	6/8/01	2002	June	Friday	8:00-9:00	8:45	AM	Dry	Clear	Daylight	Hit Fixed Object	Falling Log	PDO	Obstruction on Road	None	08251	47
005	3/8/02	2002	March	Friday	15:00-16:00	15:58	PM	Dry	Clear	Daylight	Same Direction	None	PDO	Following Too Closely	None	08251	26 & 17
006	5/21/03	2003	May	Wednesday	23:00-24:00	23:59	PM	Wet	Rain	DNSL	Hit Fixed Object	Tree	PDO & Injury	Animal's Action	None	08251	30
007	6/7/03	2003	June	Saturday	15:00-16:00	15:55	PM	N/A	N/A	N/A	Hit Fixed Object	Fence	PDO	Not Available	Not Available	Not Available	Not Available
008	9/8/02	2002	September	Sunday	21:00-22:00	21:15	PM	Dry	Clear	DSLO	Same Direction	None	PDO	Following Too Closely	None	08251 & 15230	35 & 36
009	11/29/02	2002	November	Friday	19:00-20:00	19:15	PM	Dry	Clear	DSLO	Hit Fixed Object	Traffic Barricades	PDO	Driver Inattention	None	08251	68
010	5/12/03	2003	May	Saturday	4:00-5:00	4:54	AM	Dry	Clear	Dawn/Dusk	Angle	None	PDO	Failed to Obey T.C.D	None	08043 & 08251	29 & 59
011	1/17/03	2003	January	Friday	18:00-19:00	18:38	PM	Icy	Clear	DSLO	Same Direction	None	PDO	Following Too Closely	None	08204 & 08260	36 & 22
012	9/1/03	2003	September	Monday	18:00-19:00	18:18	PM	Dry	Clear	Daylight	Hit Fixed Object	Signpost	PDO	Driver Inattention	Yes	08231	49
013	6/17/01	2001	June	Sunday	1:00-2:00	1:34	AM	Wet	Rain	DSLO	Hit Fixed Object	Utility Pole	PDO	Unsafe Speed	None	08219	28
014	6/19/02	2002	June	Wednesday	12:00-13:00	12:29	PM	Dry	Clear	Daylight	Hit Fixed Object	Utility Pole	PDO	Vehicle Defect	None	08251	18
015	7/22/01	2001	July	Sunday	21:00-22:00	21:19	PM	Dry	Clear	DSLO	Hit Animal	None	PDO	Animal's Action	None	08024	61 & 73
016	5/16/02	2002	May	Thursday	7:00-8:00	7:52	AM	Dry	Clear	Daylight	Left turn	None	PDO	Failed to Yield ROW	None	08242 & 08251	87 & 30
017	7/26/02	2002	July	Friday	15:00-16:00	15:10	PM	Dry	Clear	Daylight	Hit Bicycle	None	PDO	Bicyclist's Action	None	08251 & 08204	47 & 15
018	9/29/02	2002	September	Sunday	16:00-17:00	16:36	PM	Dry	Clear	Daylight	Angle	None	PDO	Failed to Yield ROW	None	08251	17 & 46
019	9/4/03	2003	September	Thursday	15:00-16:00	15:03	PM	Wet	Rain	Daylight	Angle	None	PDO & Injury	Failed to Obey T.C.D	None	08251 & 08204	57 & 18
020	12/23/03	2003	December	Tuesday	13:00-14:00	13:15	PM	Dry	Clear	Daylight	Angle	None	PDO & Injury	Failed to Obey T.C.D	None	08251 & 08251	37 & 82
021	9/10/02	2002	September	Friday	21:00-22:00	21:30	PM	Dry	Clear	Daylight	Hit Fixed Object	Mail Box	PDO	Driver Inattention	None	08260	36
022	2/19/01	2001	February	Monday	0:00-1:00	0:11	AM	Dry	Clear	DNSL	Hit Fixed Object	Fence	PDO & Injury	Unsafe Speed	Yes	08204	17
023	2/8/01	2001	February	Thursday	21:00-22:00	21:30	PM	Dry	Clear	DNSL	Side Swipe	None	PDO & Injury	Driver Inattention	None	08251	17 & 19
024	5/26/01	2001	May	Saturday	21:00-22:00	21:23	PM	Wet	Rain	DNSL	Hit Fixed Object	Fence	PDO & Injury	Unsafe Speed	Yes	08251	19
025	7/16/01	2001	July	Monday	6:00-7:00	6:59	AM	Dry	Clear	Daylight	Hit Fixed Object	Guard Rail	PDO & Injury	Driver Inattention	None	08204	20
026	10/18/01	2001	October	Thursday	14:00-15:00	14:19	PM	Dry	Clear	Daylight	Hit Fixed Object	Guard Rail	PDO	Driver Inattention	None	08251	42
027	1/14/02	2002	January	Monday	7:00-8:00	7:32	AM	Dry	Clear	Daylight	Hit Fixed Object	Tree	PDO & Injury	Driver Inattention	None	08611	50
028	5/24/02	2002	May	Friday	16:00-17:00	16:35	PM	Dry	Clear	Daylight	Hit Bicycle	None	PDO & Injury	Bicyclist's Action/Failed to Yield ROW	None	08251	44 & 24
029	8/19/02	2002	August	Monday	6:00-7:00	6:08	AM	Dry	Clear	Daylight	Hit Fixed Object	Tree	PDO & Injury	Driver Inattention	Yes	19128 & 08251	42
030	10/11/02	2002	October	Friday	9:00-10:00	9:46	AM	Wet	Rain	Daylight	Head-On	None	PDO & Injury	Unsafe Speed	None	08251 & 08204	19 & 24
031	12/20/02	2002	December	Friday	15:00-16:00	15:29	PM	Wet	Rain	Daylight	Hit Fixed Object	Tree	PDO	Other	None	08251	20
032	2/28/03	2003	February	Friday	14:00-15:00	14:18	PM	Wet	Clear	Daylight	Lost Control	None	PDO	Other	None	08251	28
033	3/3/03	2003	March	Monday	9:00-10:00	9:45	AM	Dry	Clear	Daylight	Same Direction	None	PDO	Following Too Closely	None	08251	62 & 30
034	5/6/03	2003	May	Tuesday	20:00-21:00	20:42	PM	Dry	Clear	DNSL	Hit Fixed Object	Tree	PDO & Injury	Unsafe Speed	None	08260	17
035	5/14/03	2003	May	Wednesday	2:00-3:00	2:35	AM	Dry	Clear	DNSL	Hit Fixed Object	Tree	PDO	Driver Inattention	None	08251	22
036	2/19/01	2001	February	Monday	12:00-13:00	12:10	PM	Dry	Clear	Daylight	Side Swipe	None	PDO	Other	None	08219	17
037	2/20/01	2001	February	Tuesday	9:00-10:00	9:43	AM	Dry	Clear	Daylight	Hit Fixed Object	Tree	PDO & Injury	Unsafe Speed	None	08251	79
038	4/8/01	2001	April	Sunday	1:00-2:00	1:34	AM	Dry	Clear	DNSL	Hit Fixed Object	Guard Rail	PDO & Injury	Driver Inattention	None	08260	18
039	2/18/03	2003	February	Tuesday	16:00-17:00	16:07	PM	Wet	Rain	Daylight	Lost Control	None	PDO & Injury	Other	None	08204 & 08257	19 & 55
040	5/27/02	2002	May	Monday	7:00-8:00	7:36	AM	Dry	Clear	Daylight	Hit Fixed Object	Guard Rail	PDO	Driver Inattention	None	08204	49
041	4/15/02	2002	April	Monday	17:00-18:00	17:56	PM	Dry	Clear	Daylight	Hit Fixed Object	Utility Pole	PDO	Driver Inattention	None	08260	30
042	3/23/02	2002	March	Saturday	13:00-14:00	13:10	PM	Dry	Clear	Daylight	Head-On	None	PDO	Other	None	08251	75 & 18
043	3/1/02	2002	March	Friday	15:00-16:00	15:08	PM	Dry	Clear	Daylight	Same Direction	None	PDO & Injury	Following Too Closely	None	08251 & 08270	46 & 38
044	3/18/02	2002	March	Monday	16:00-17:00	16:14	PM	Dry	Clear	Daylight	Same Direction	Fence	PDO & Injury	Other	None	08251	39 & 25
045	1/1/03	2003	January	Wednesday	19:00-20:00	19:35	PM	Wet	Clear	DNSL	Same Direction	None	PDO	Other	None	08251 & 08260	48 & 29
046	5/3/03	2003	May	Saturday	9:00-10:00	9:23	AM	Wet	Clear	Daylight	Right turn	None	PDO	Other	None	08312 & 19128	58 & 54
047	6/27/03	2003	June	Friday	12:00-13:00	12:14	PM	Dry	Clear	Daylight	Same Direction	None	PDO	Other	None	17339 & 08360	60, 16 & 22
048	8/12/03	2003	August	Friday	10:00-11:00	10:49	AM	Dry	Clear	Daylight	Left turn	None	PDO	Other	None	08219 & 89117	47 & 21
049	8/25/03	2003	August	Monday	11:00-12:00	11:56	AM	Dry	Clear	Daylight	Left turn	None	PDO	Other	None	08204 & 08260	73 & 86
050	11/25/03	2003	November	Tuesday	2:00-3:00	2:58	AM	Dry	Clear	DSLO	Hit Fixed Object	Utility Pole	PDO	Driver Inattention	Yes	08251	22

Abbreviations:

DNSL - Daylight No Street Lights

DSLO - Daylight Street Lights On

PDO - Property Damage Only

Chart1 (a)

3-Year Trend (2001 to 2003)

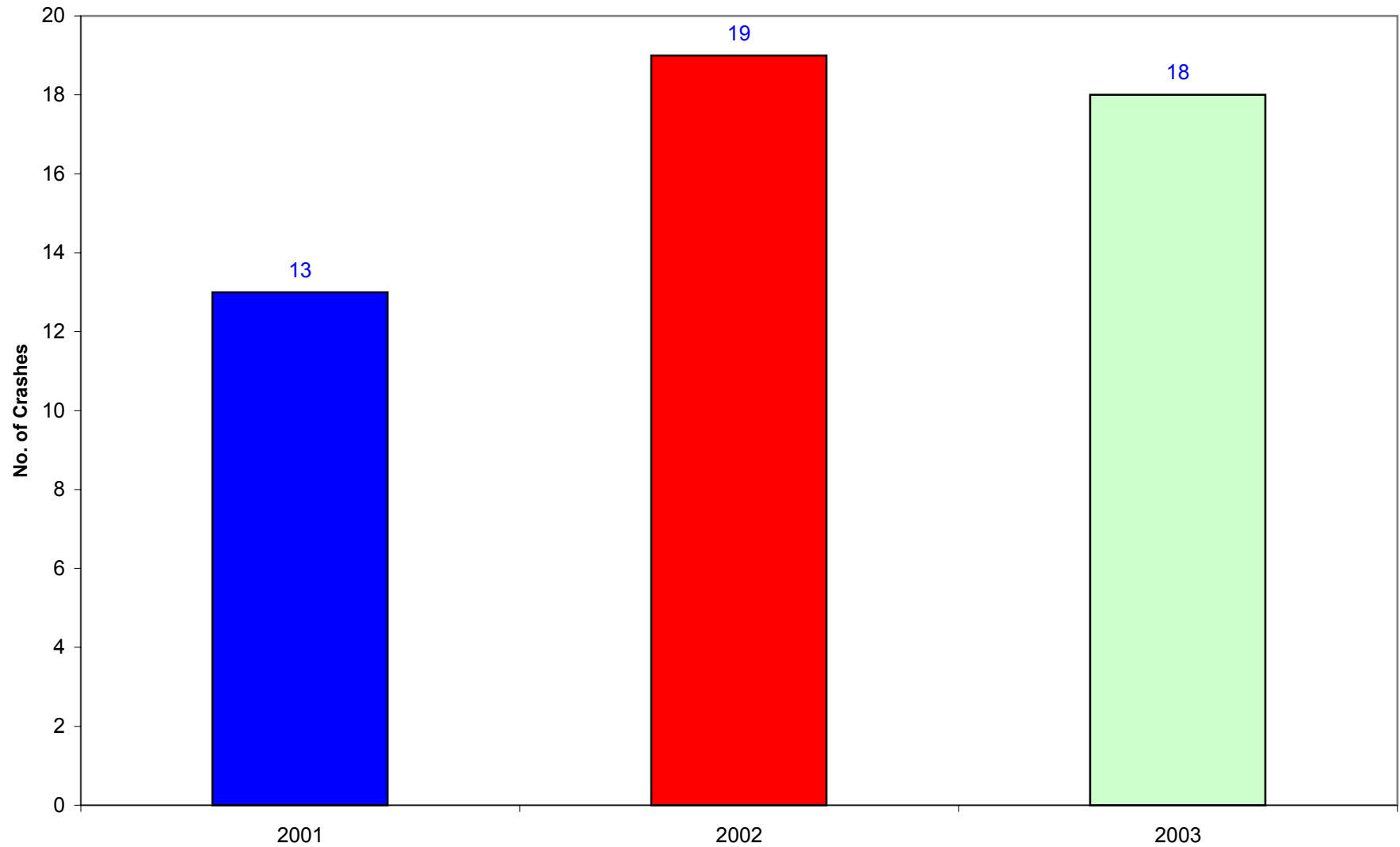
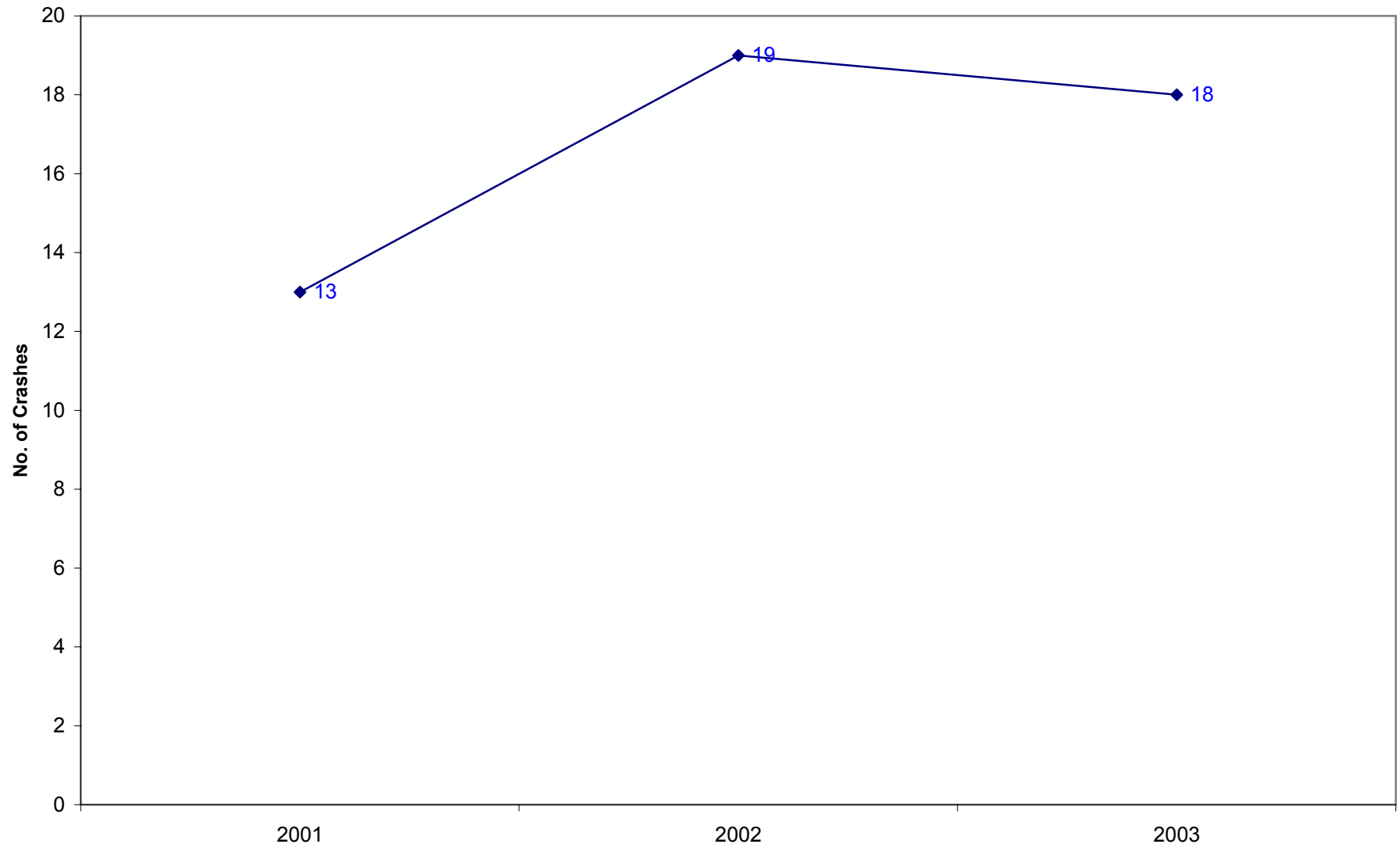
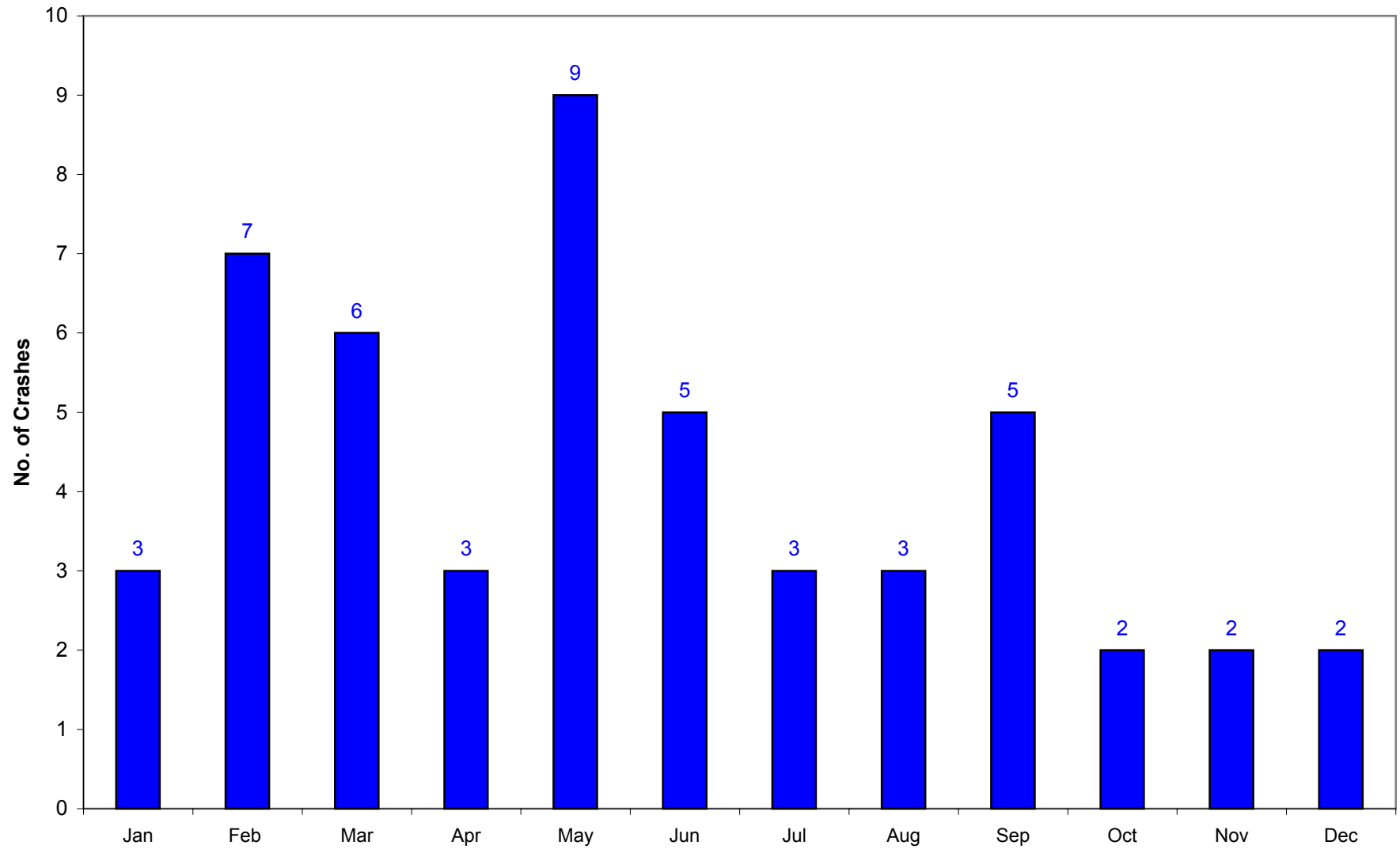


Chart1 (b)

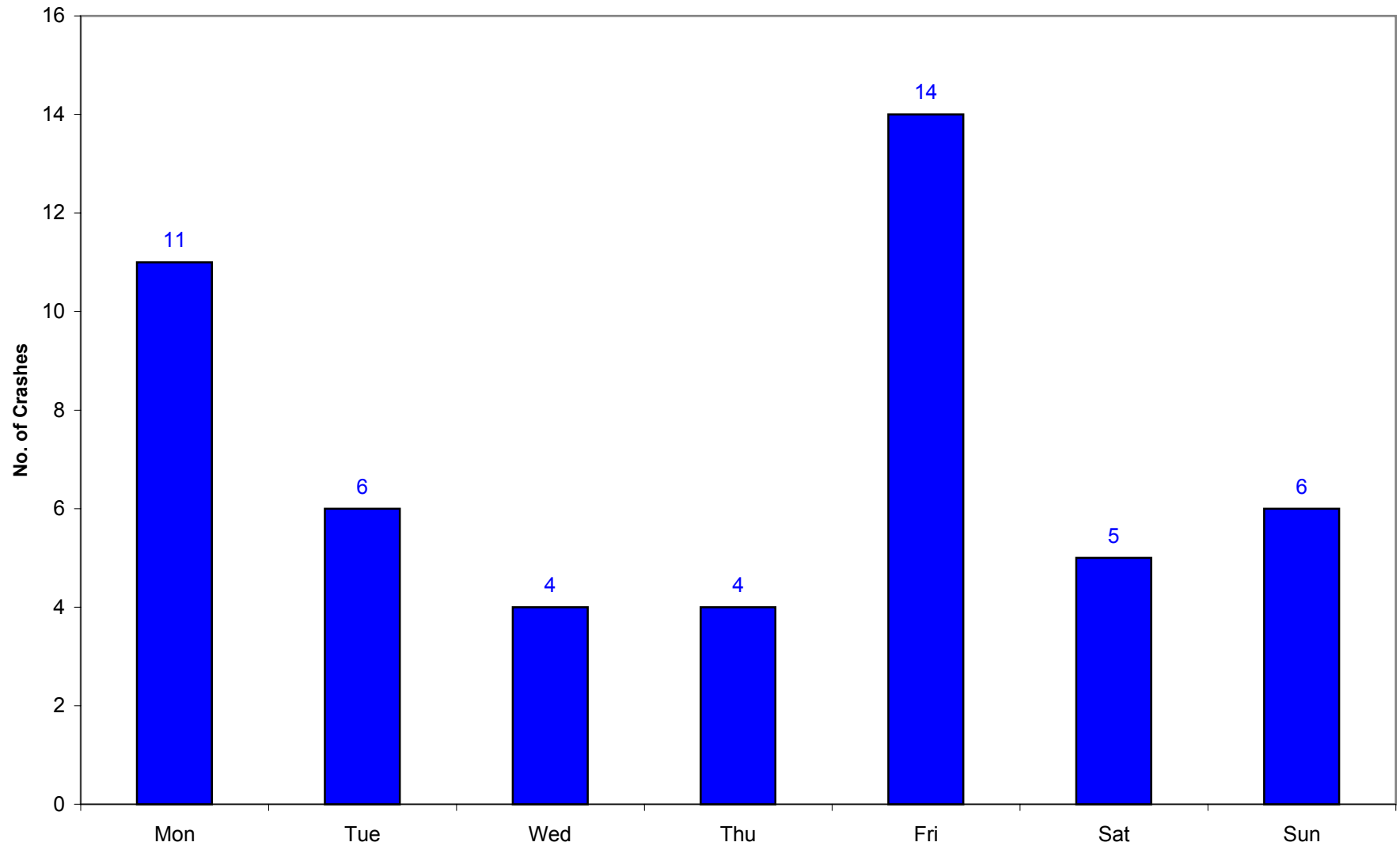
3-Year Trend (2001 to 2003)



Crash Occurrence By Month



Crash Occurrence By Day of Week



Char2 (b)

Crash Occurrence By Day of Week

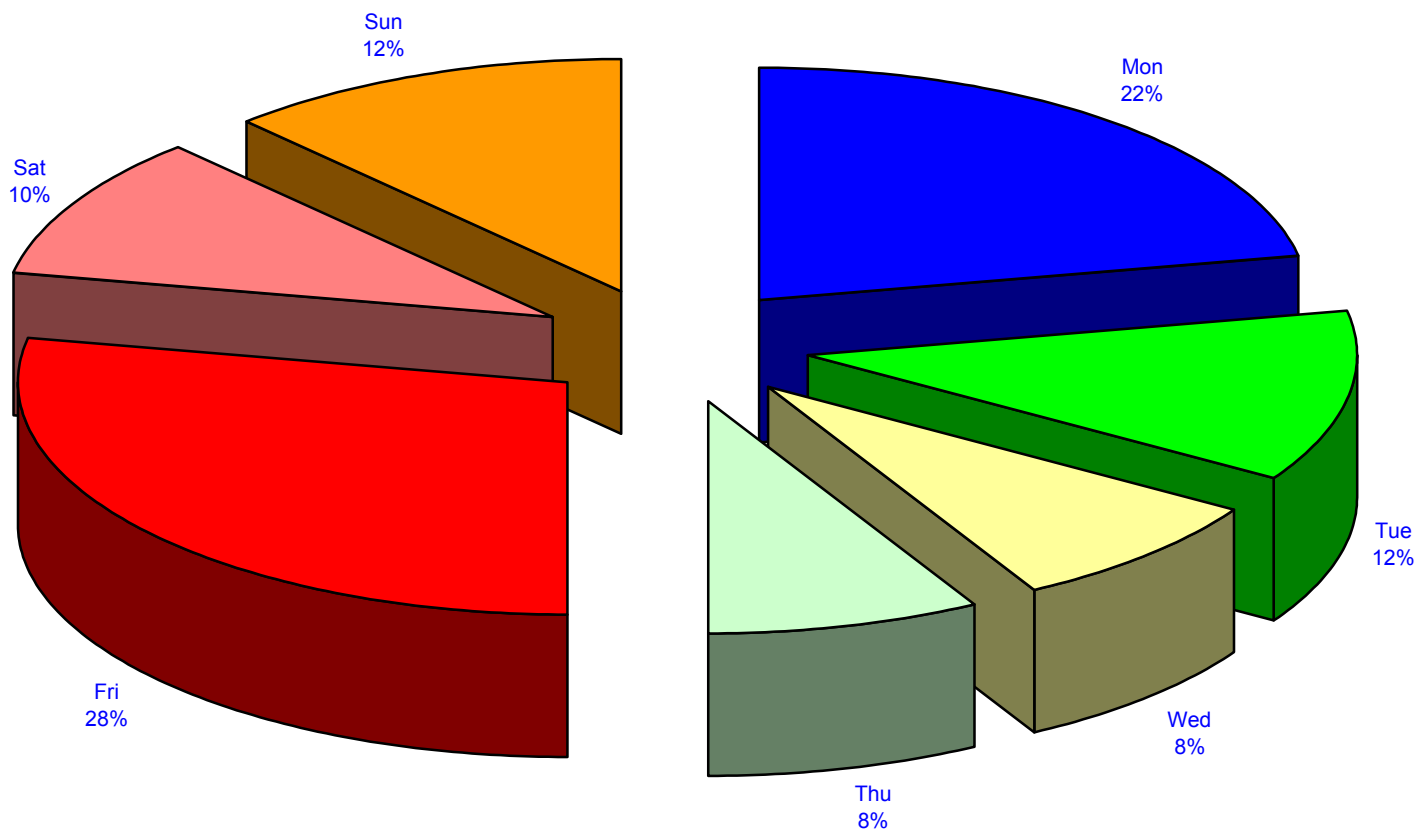


Chart3 (a)

Crash Occurrence By Time of Day

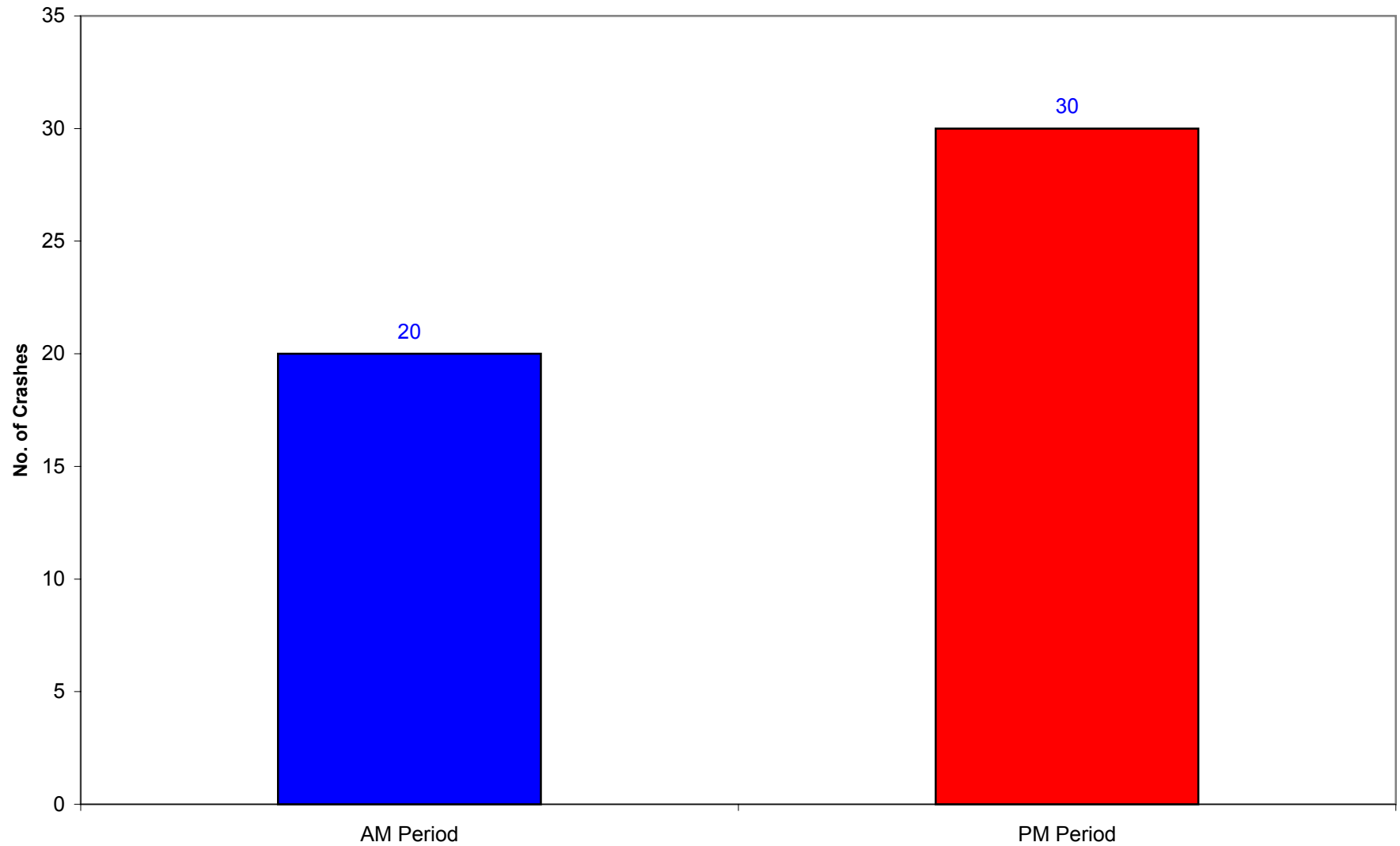


Chart3 (b)

Crash Occurrence By Time of Day

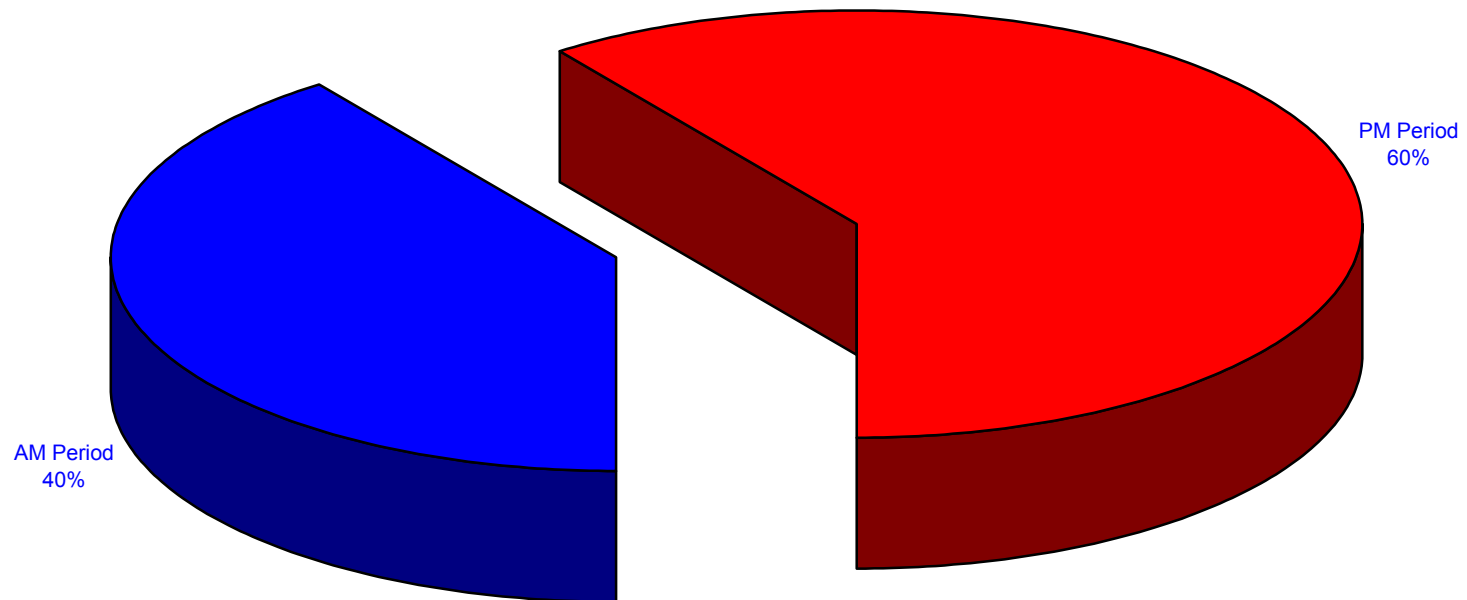


Chart4 (a)

Crash Occurrence By Road Surface Conditions

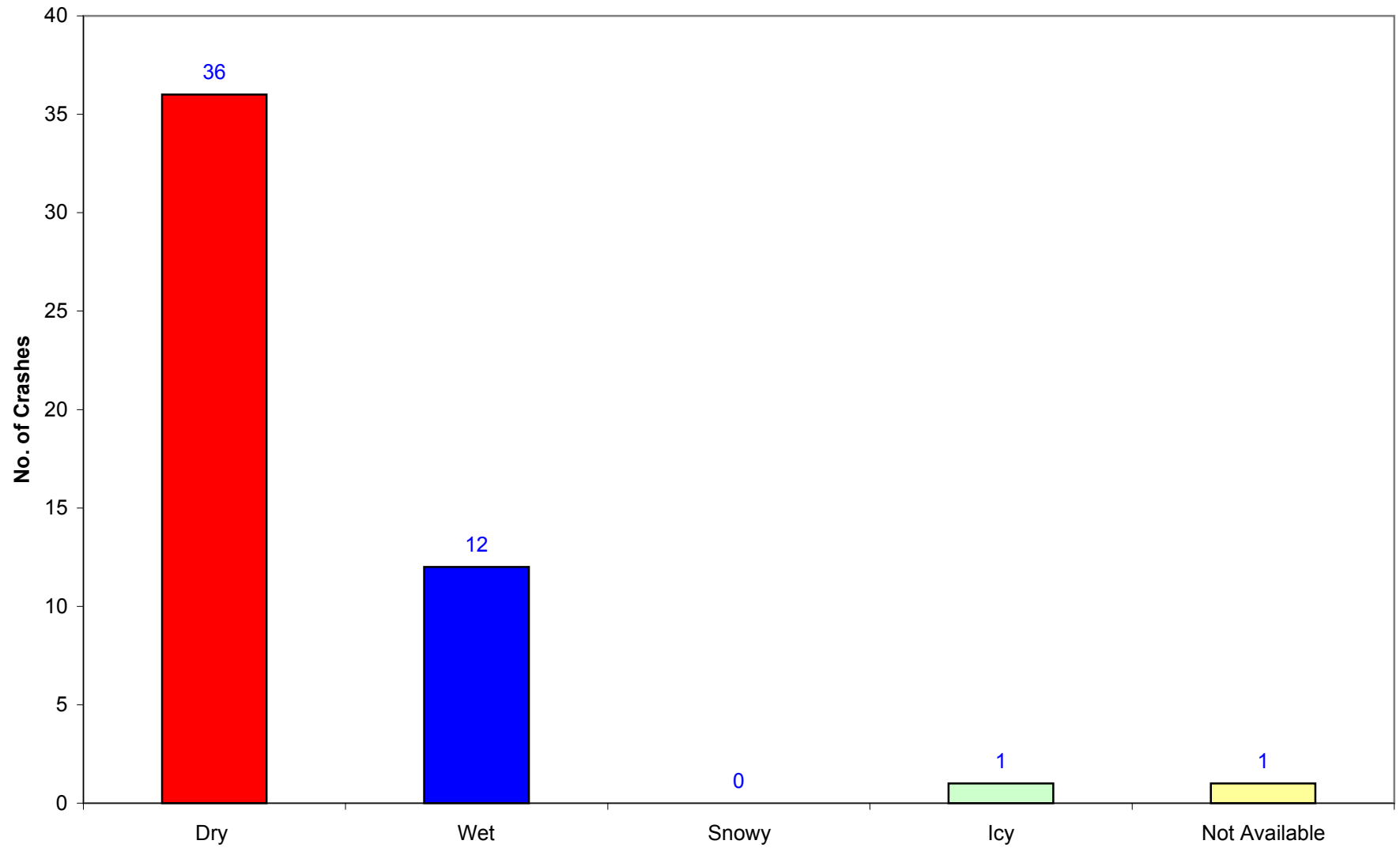


Chart4 (b)

Crash Occurrence By Road Surface Conditions

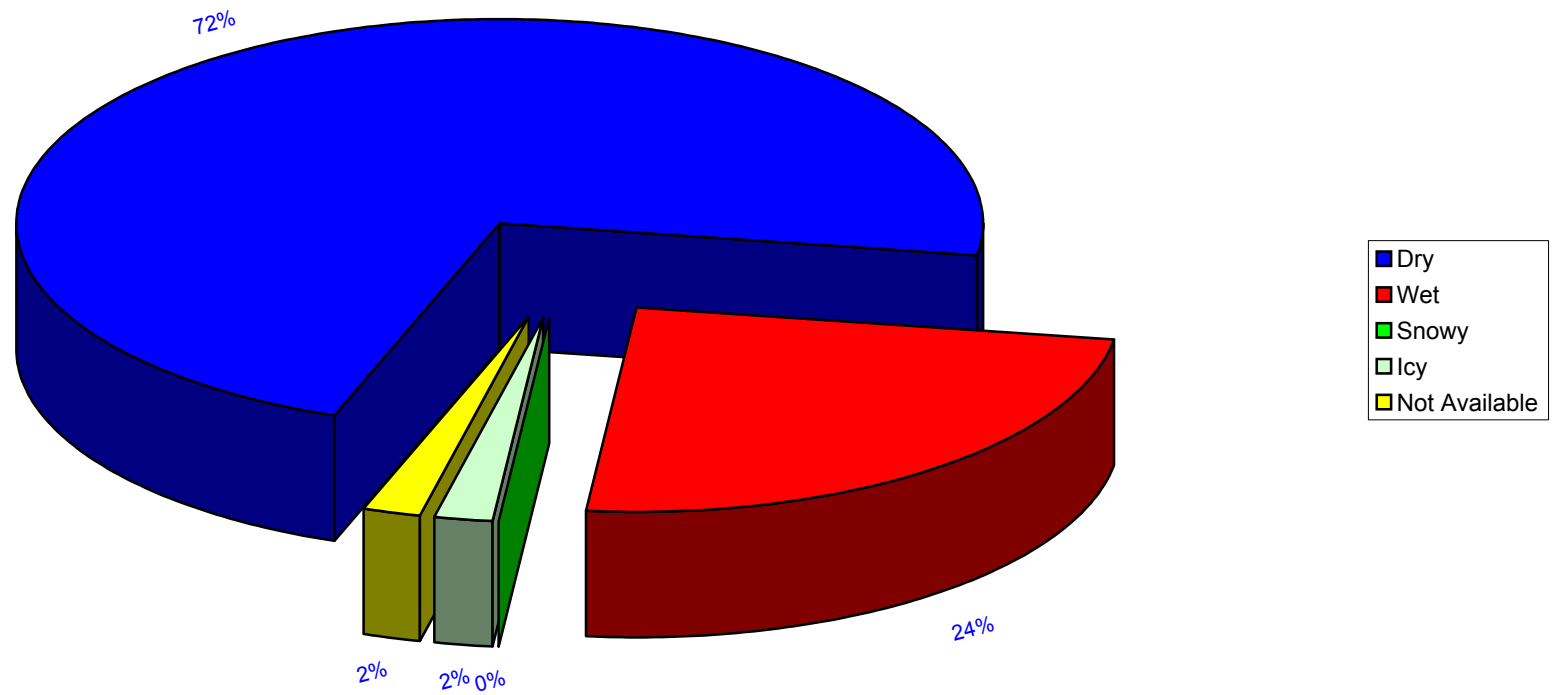


Chart5 (a)

Crash Occurrence By Weather Conditions

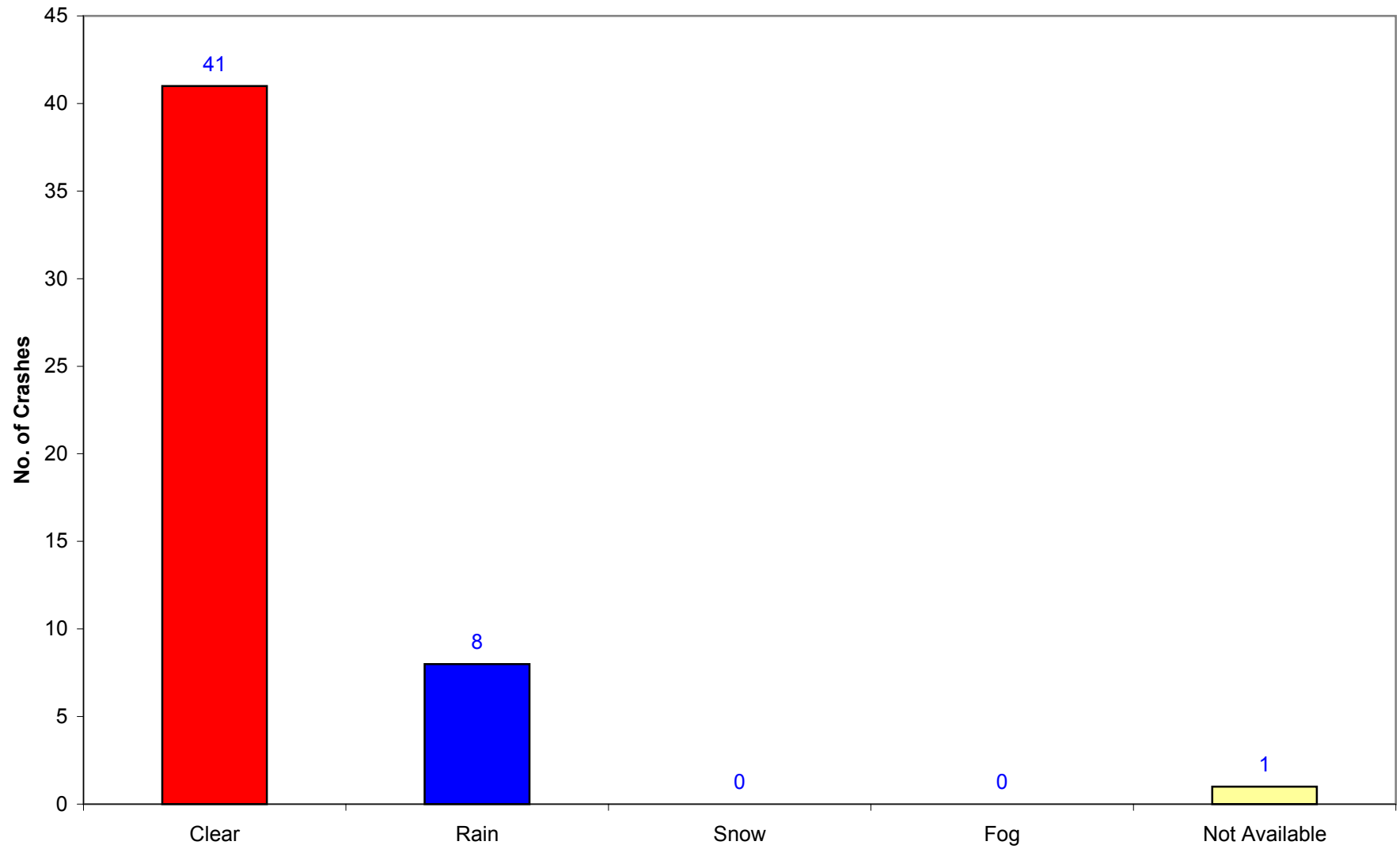


Chart5 (b)

Crash Occurrence By Weather Conditions

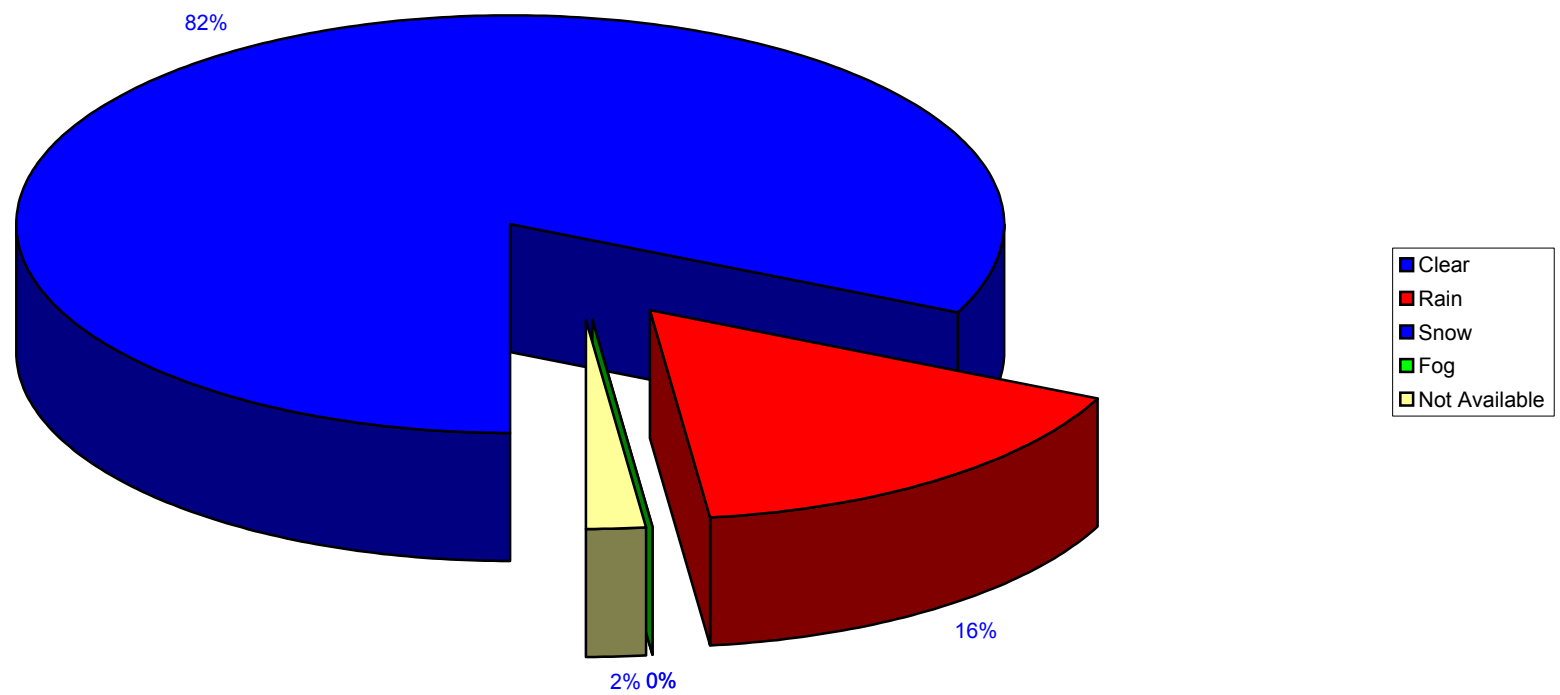


Chart6 (a)

Crash Occurrence By Light Conditions

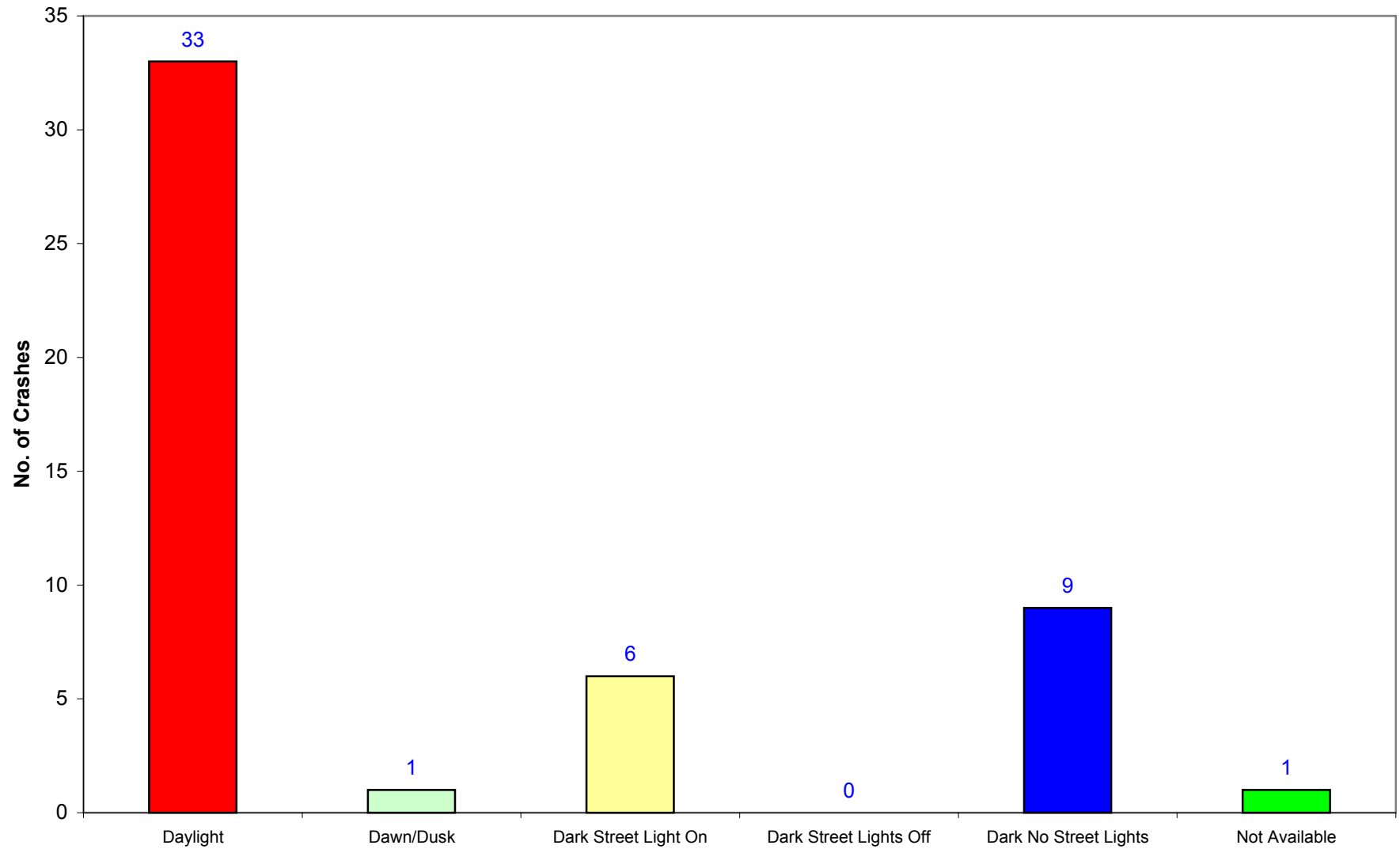


Chart6 (b)

Crash Occurrence By Light Conditions

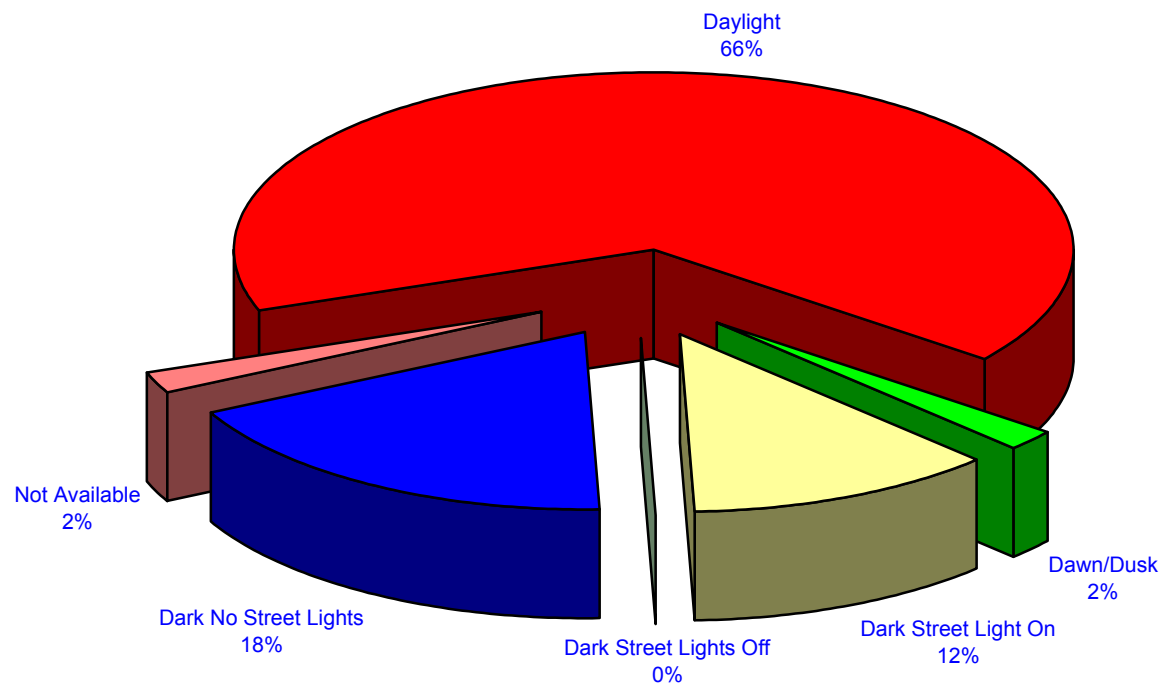


Chart7 (a)

Crash Severity

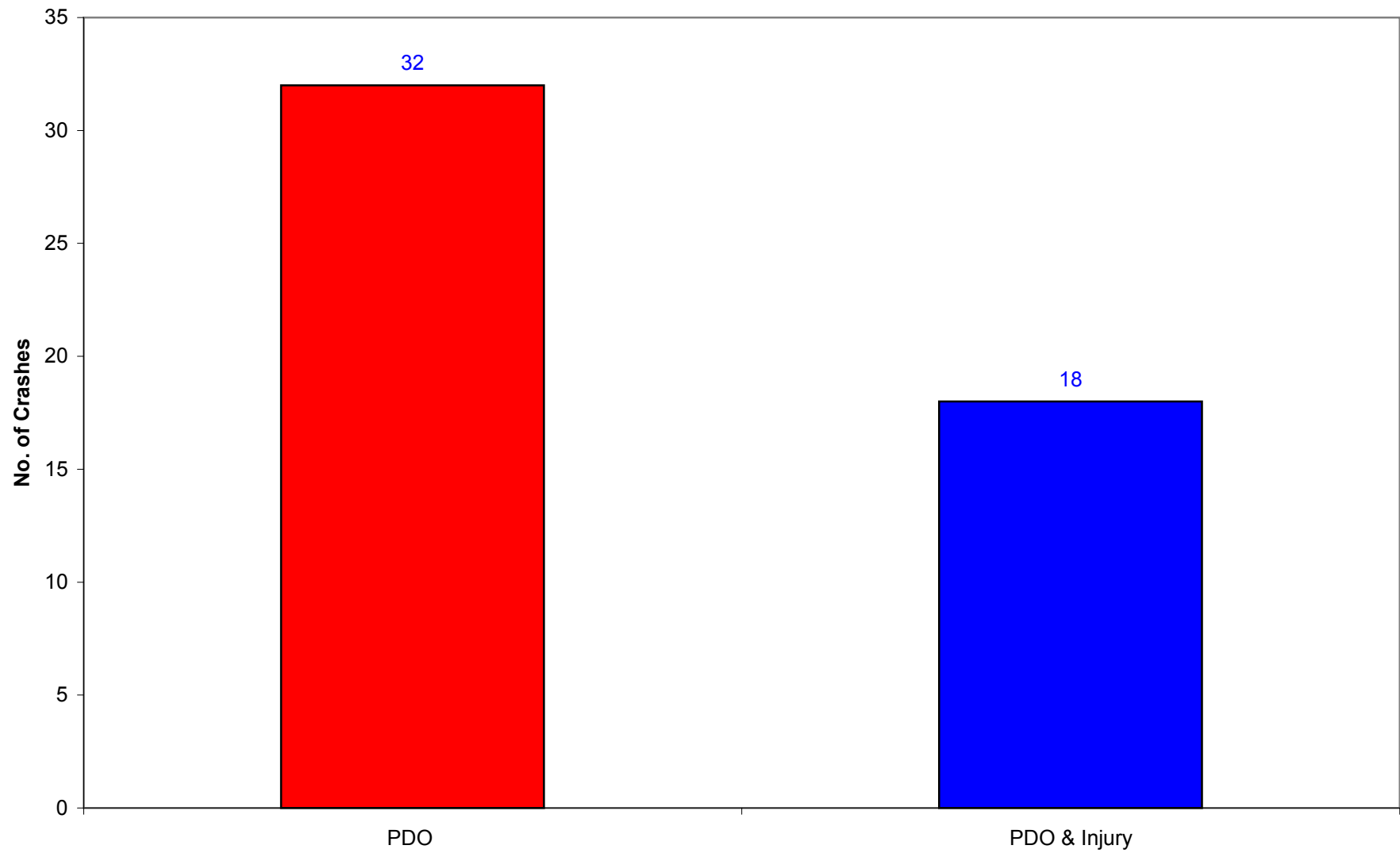


Chart7 (b)

Crash Severity

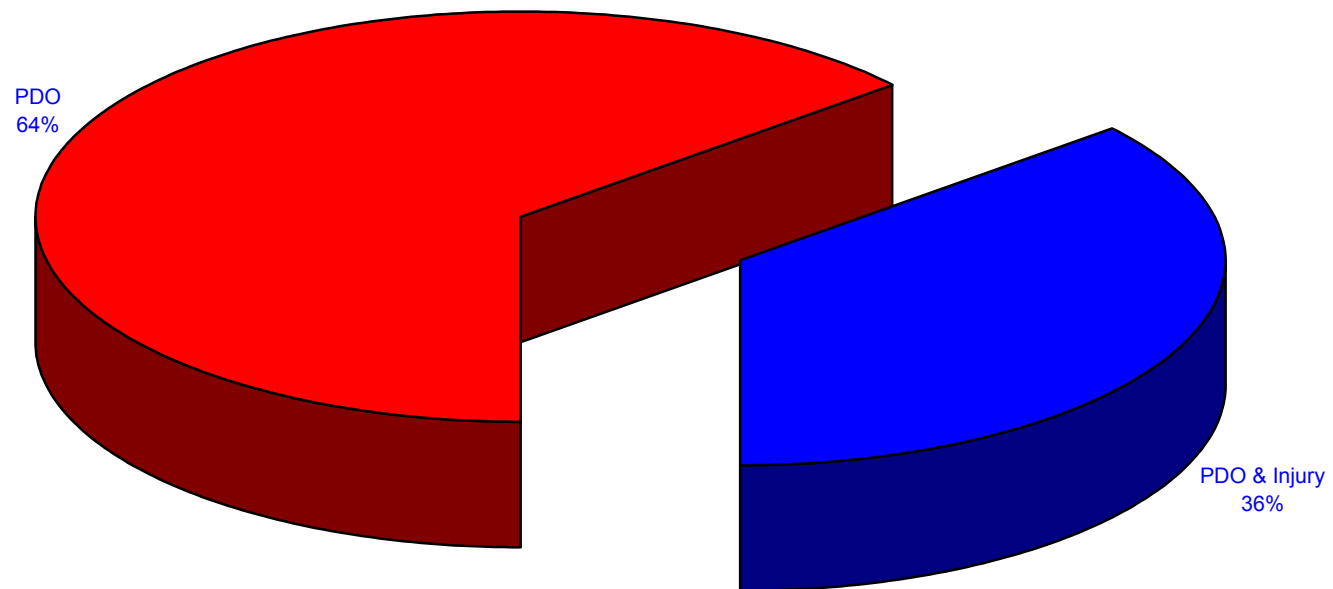


Chart8 (a)

Fixed Object Struck by Vehicle(s)

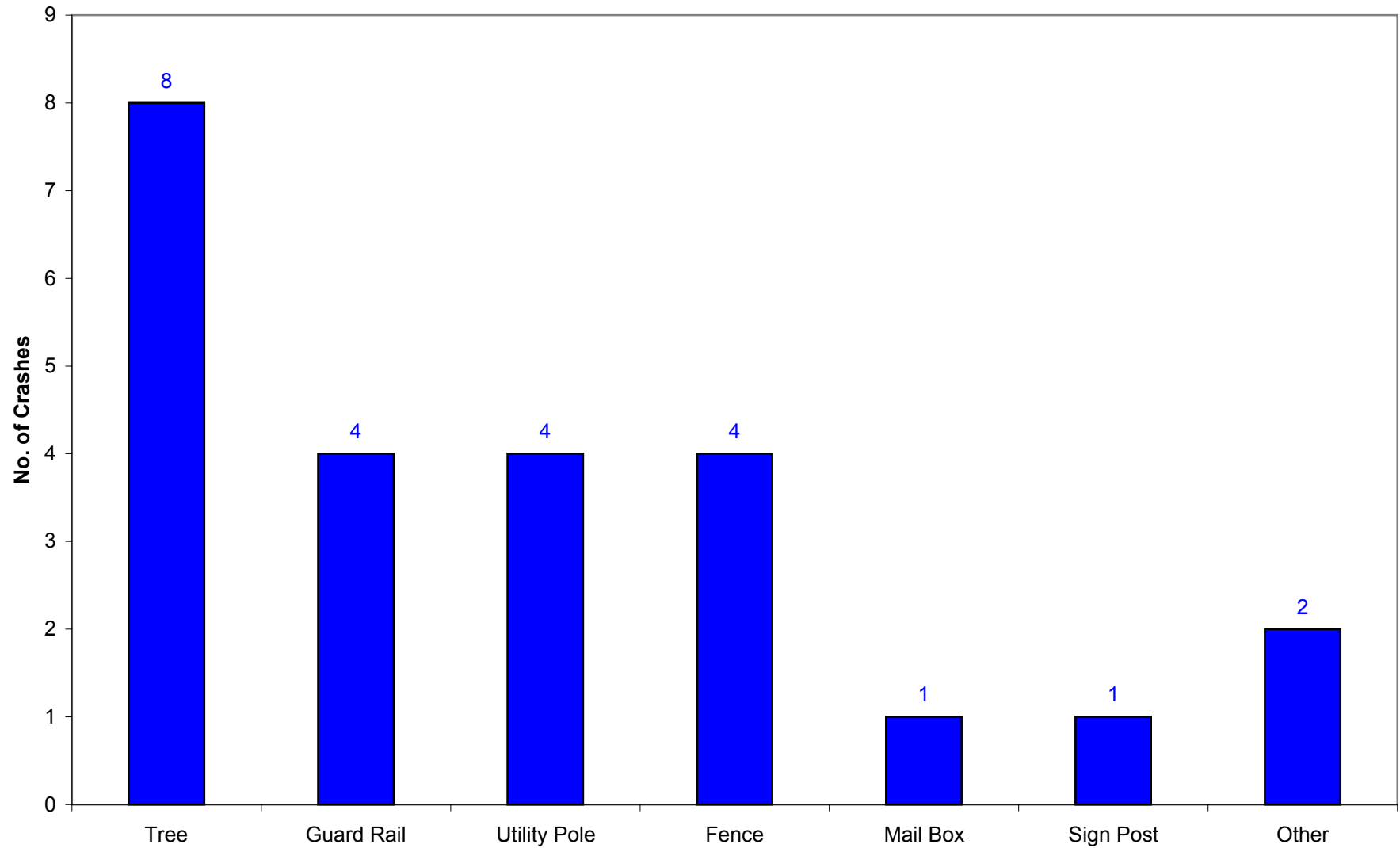


Chart8 (b)

Fixed Object Struck

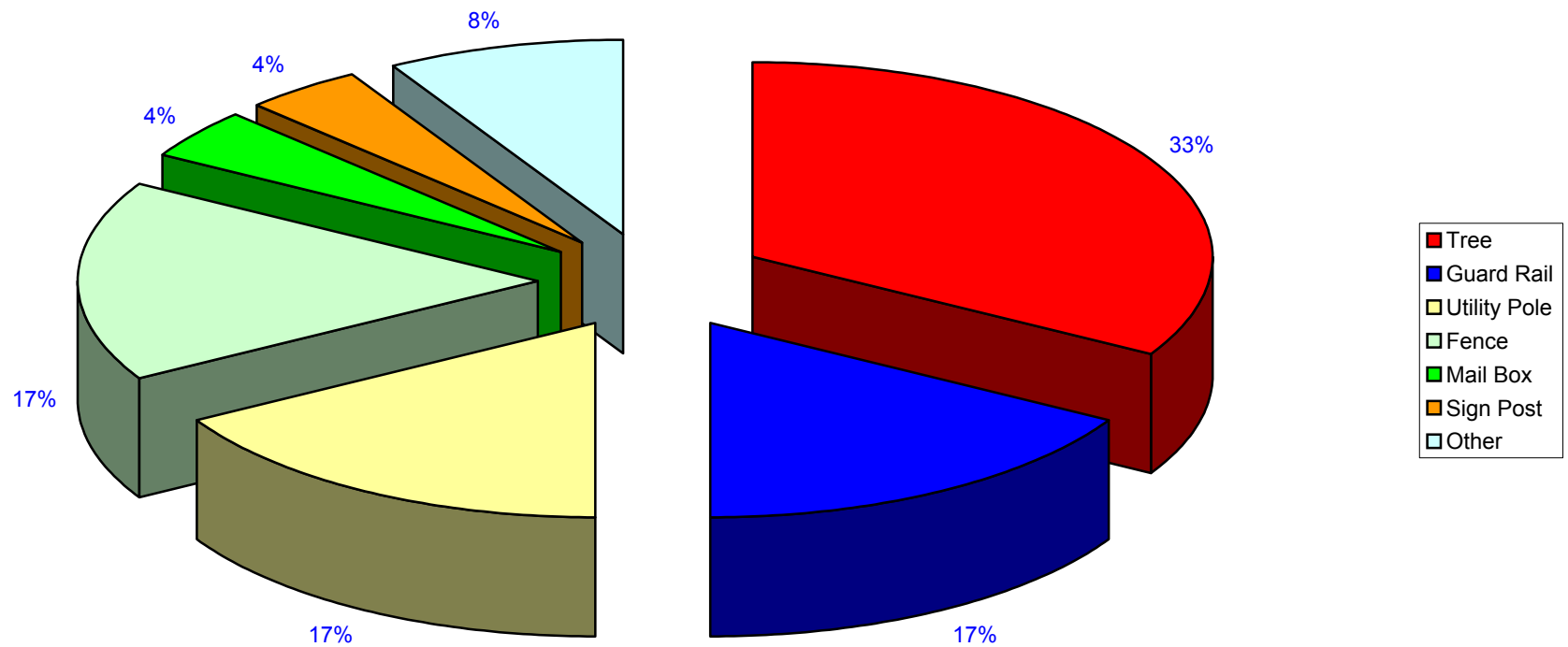


Chart9 (a)

Crash Occurrence By Hour of Day

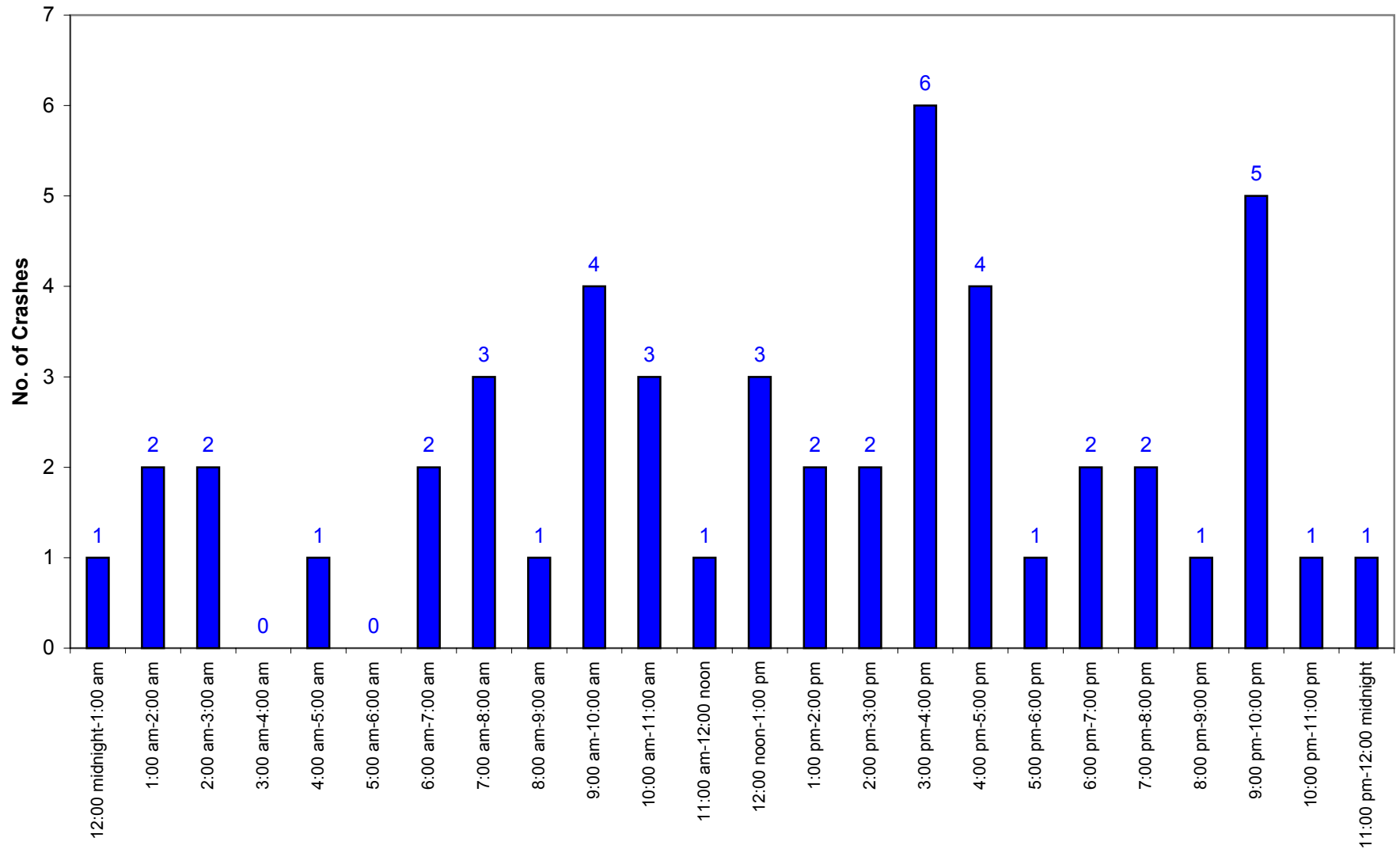
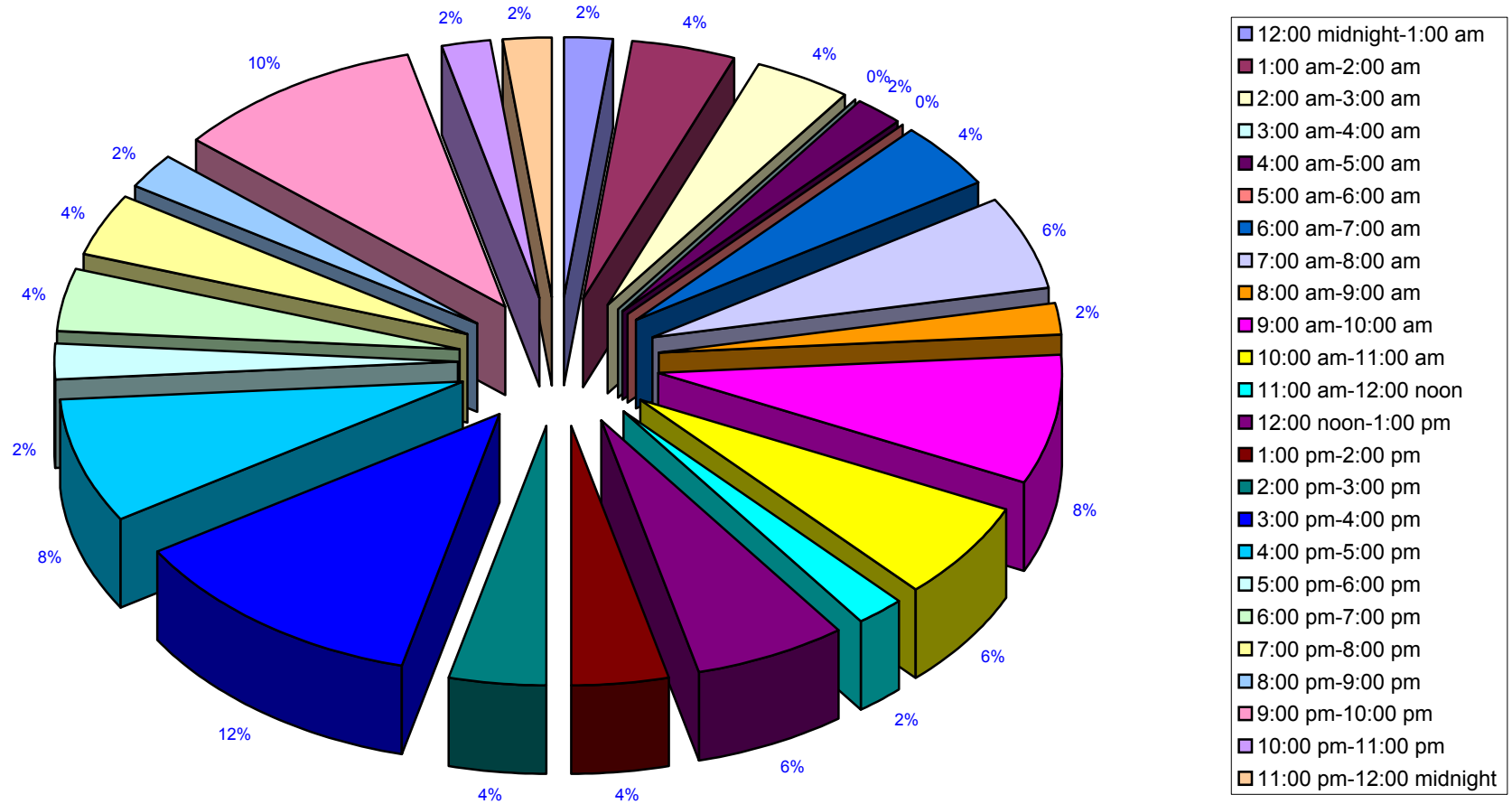
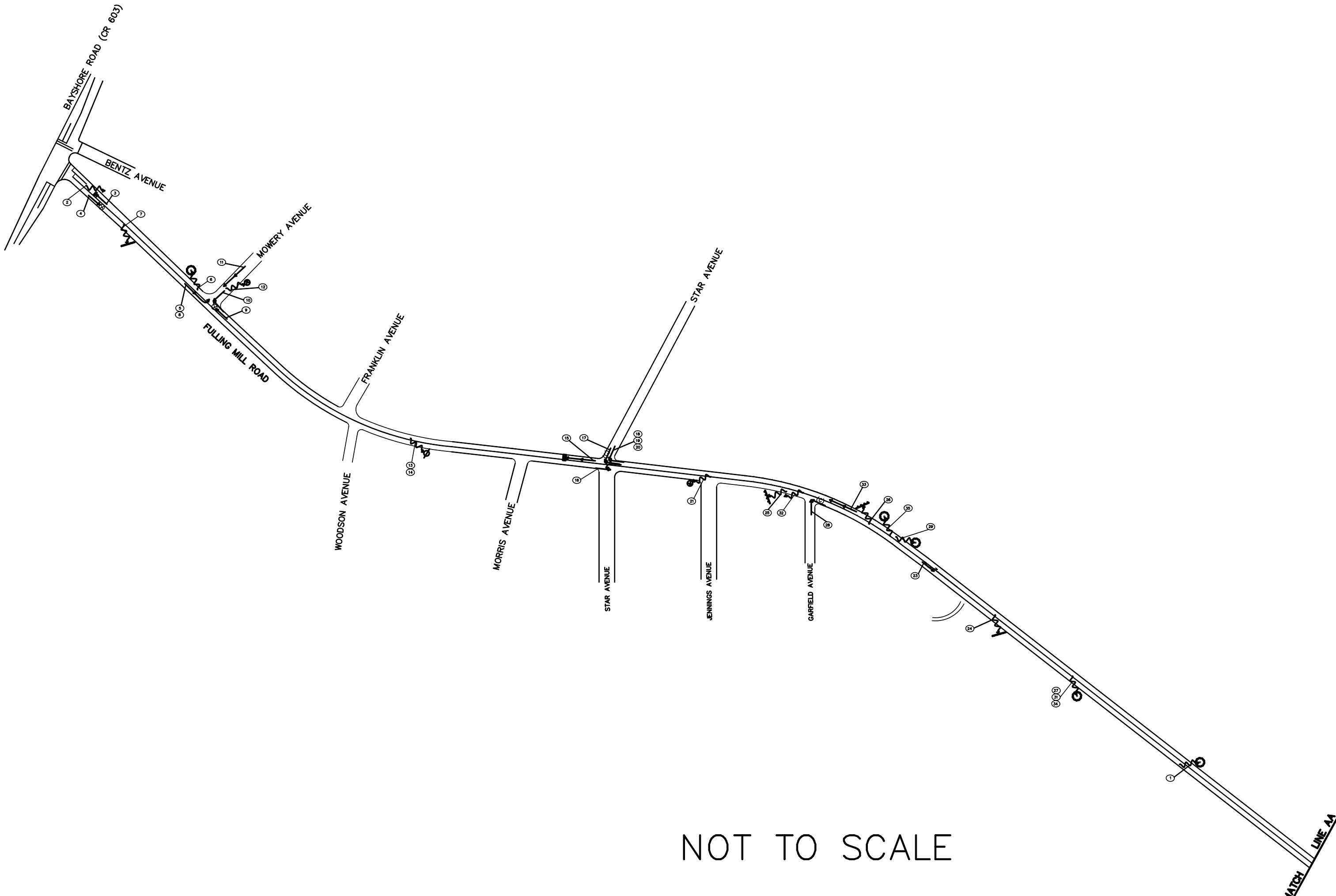
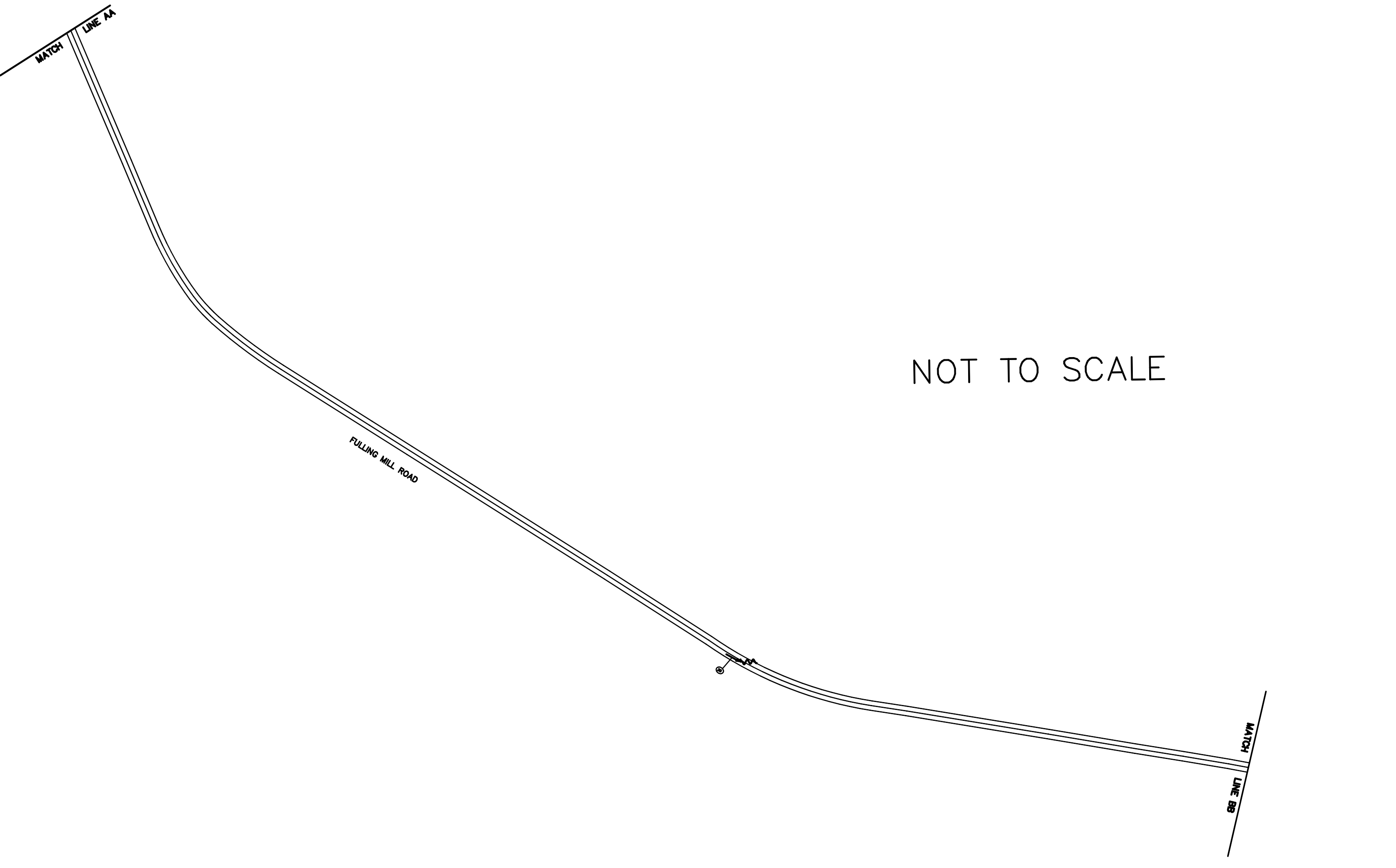


Chart9 (b)

Crash Occurrence By Hour of Day







MATCH

LINE AA

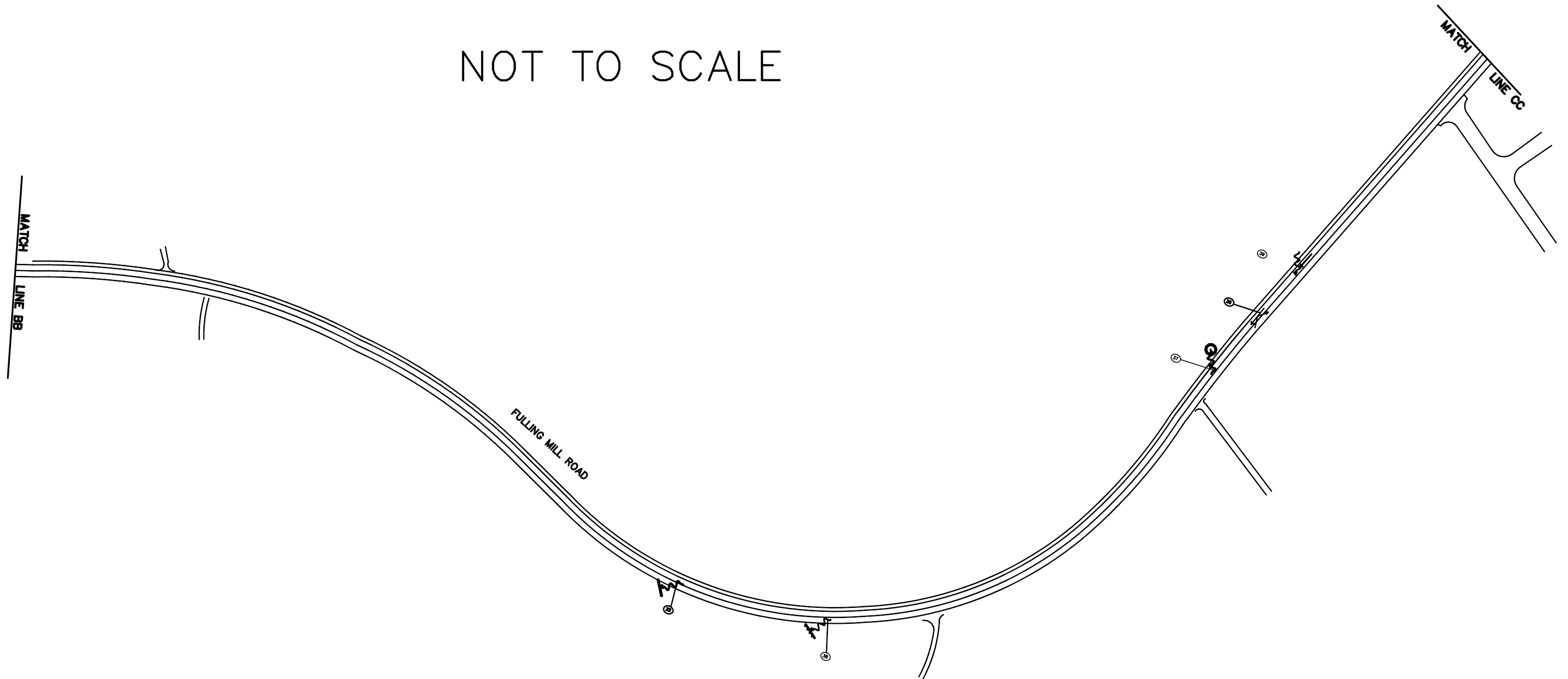
FULLING MILL ROAD

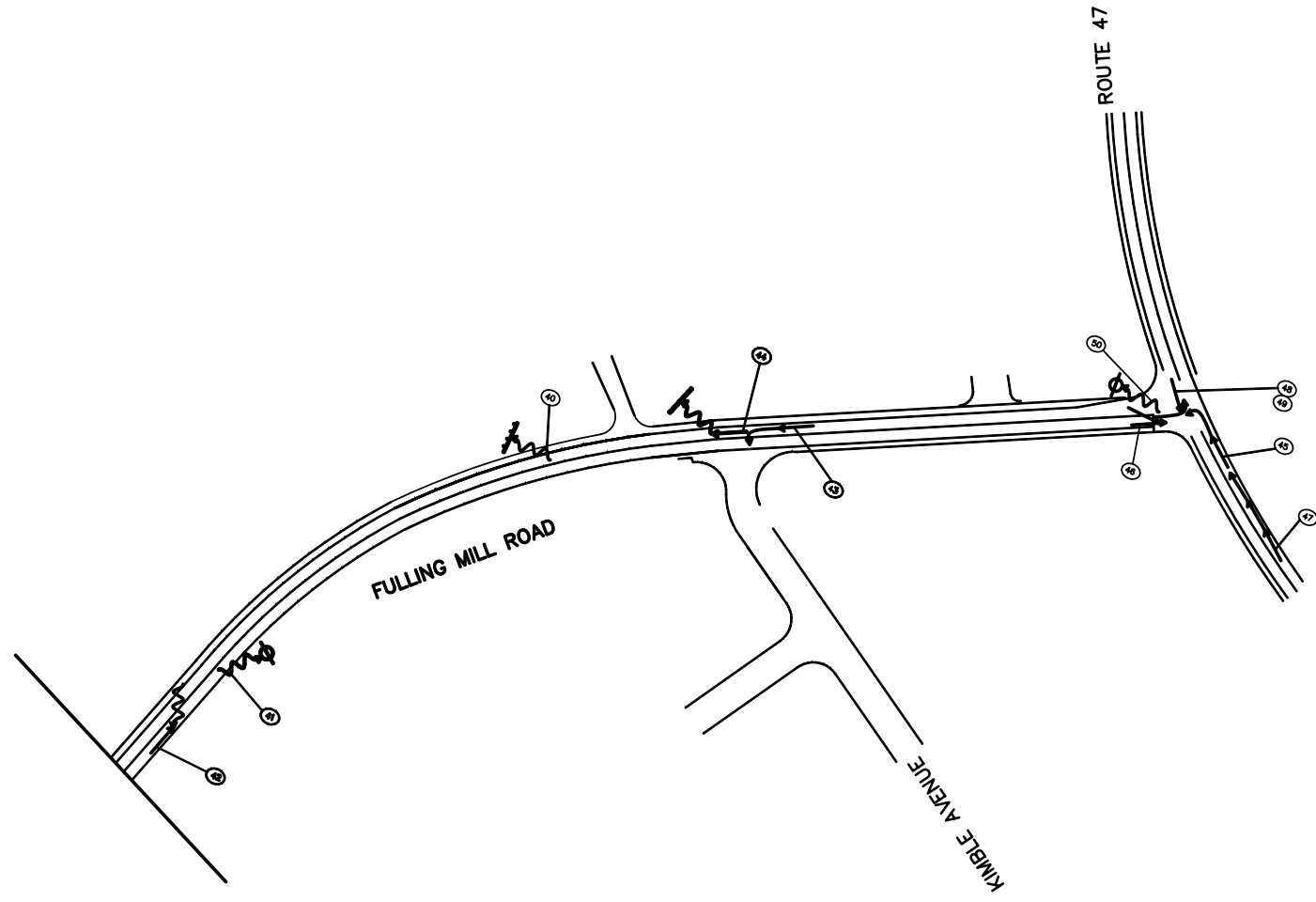
NOT TO SCALE

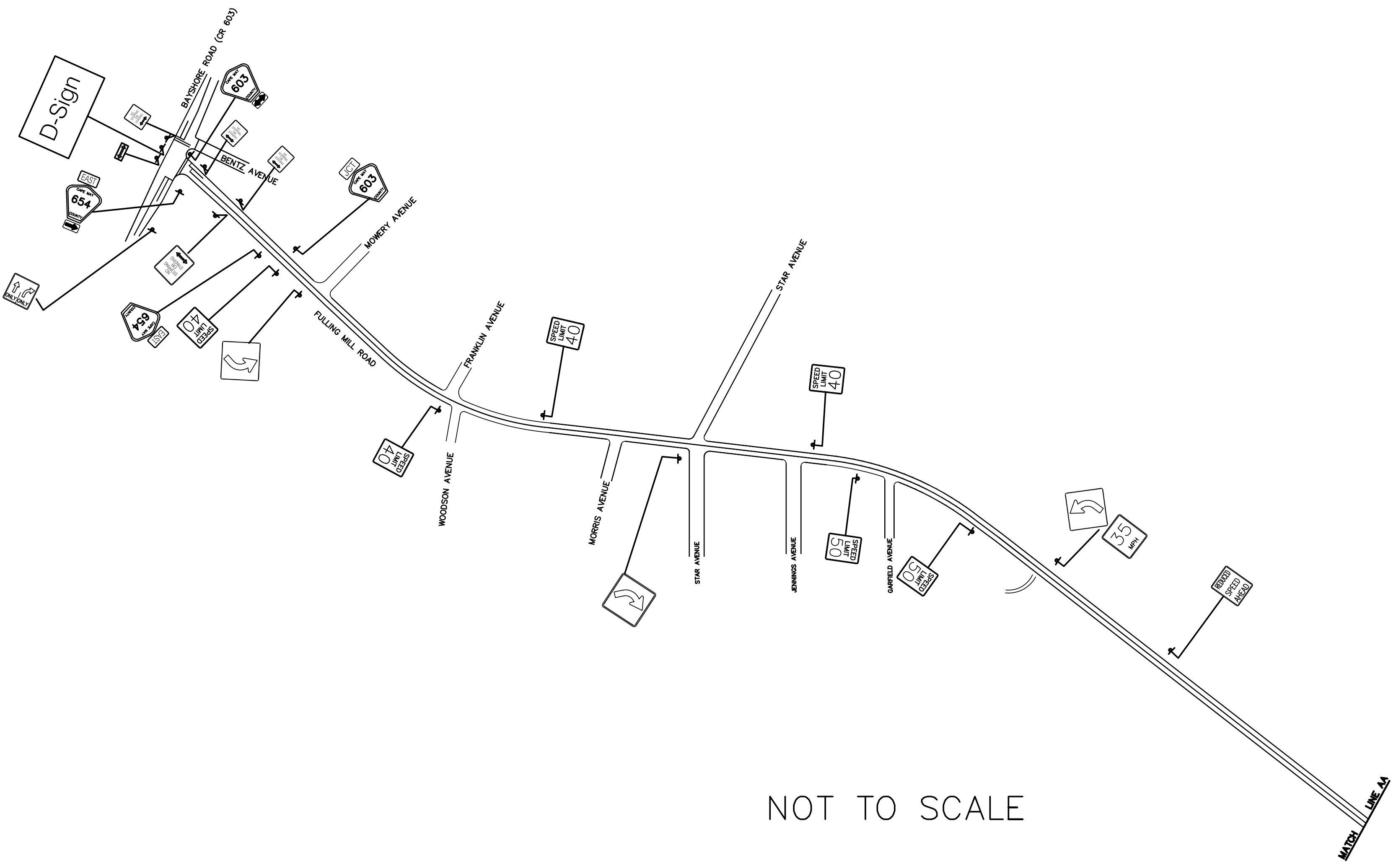
MATCH

LINE BB

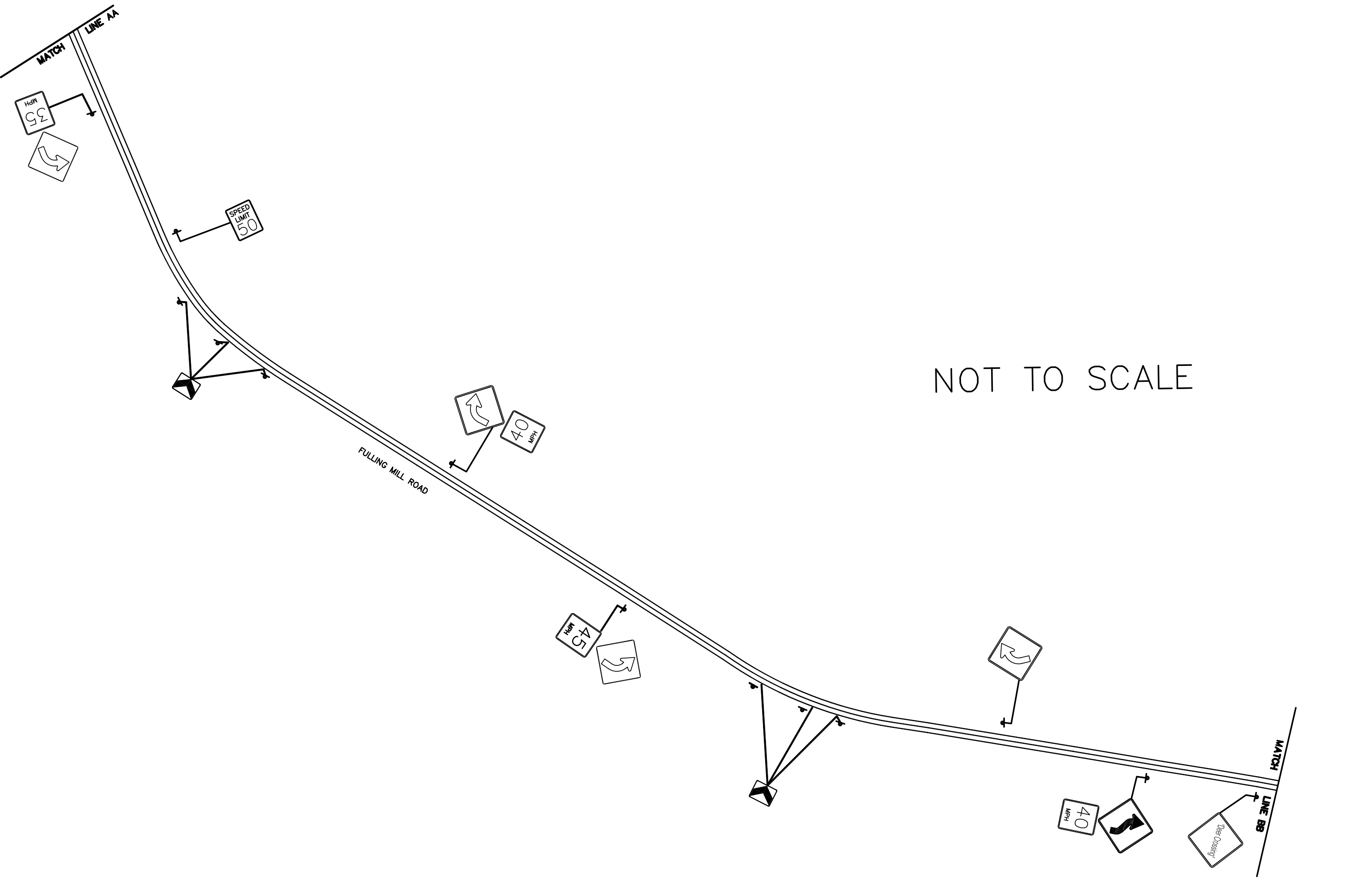
NOT TO SCALE





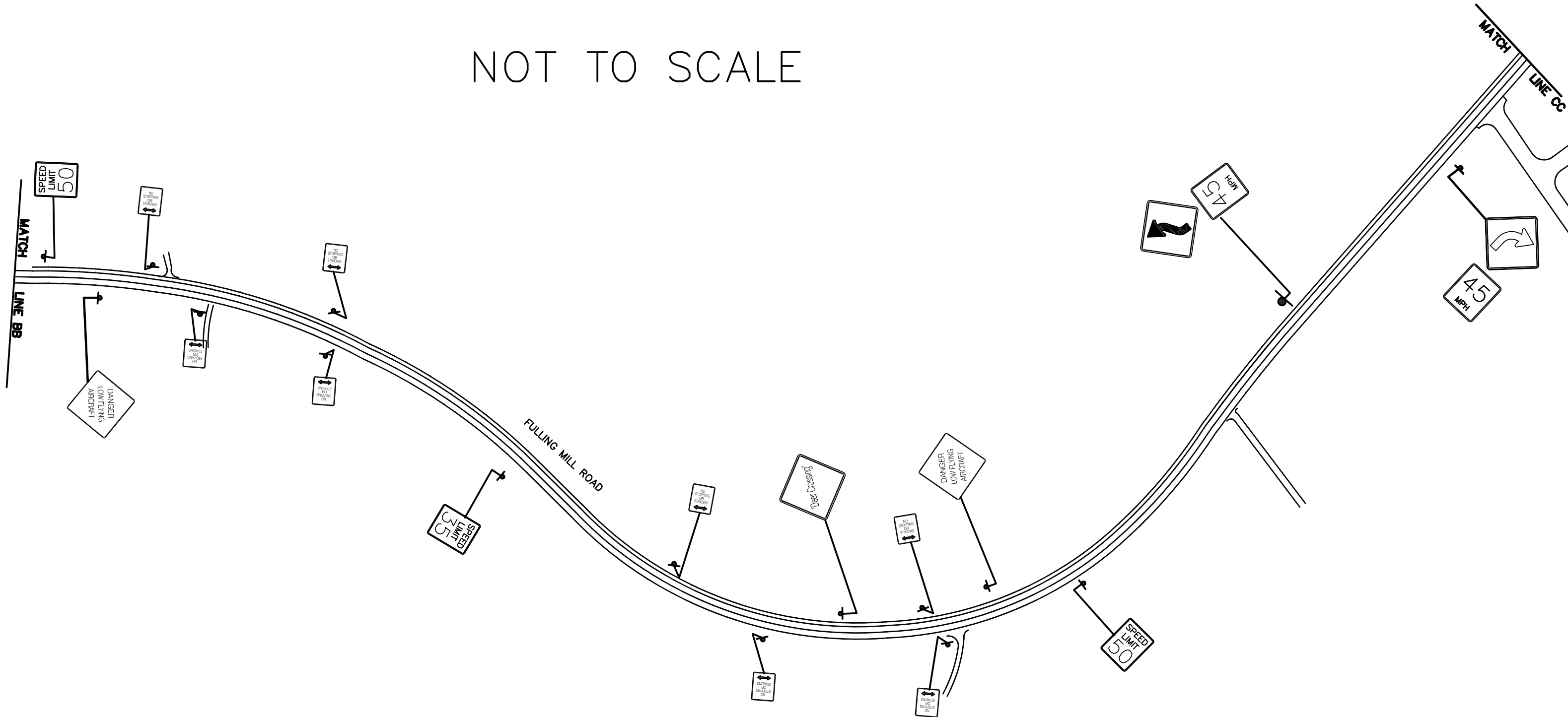


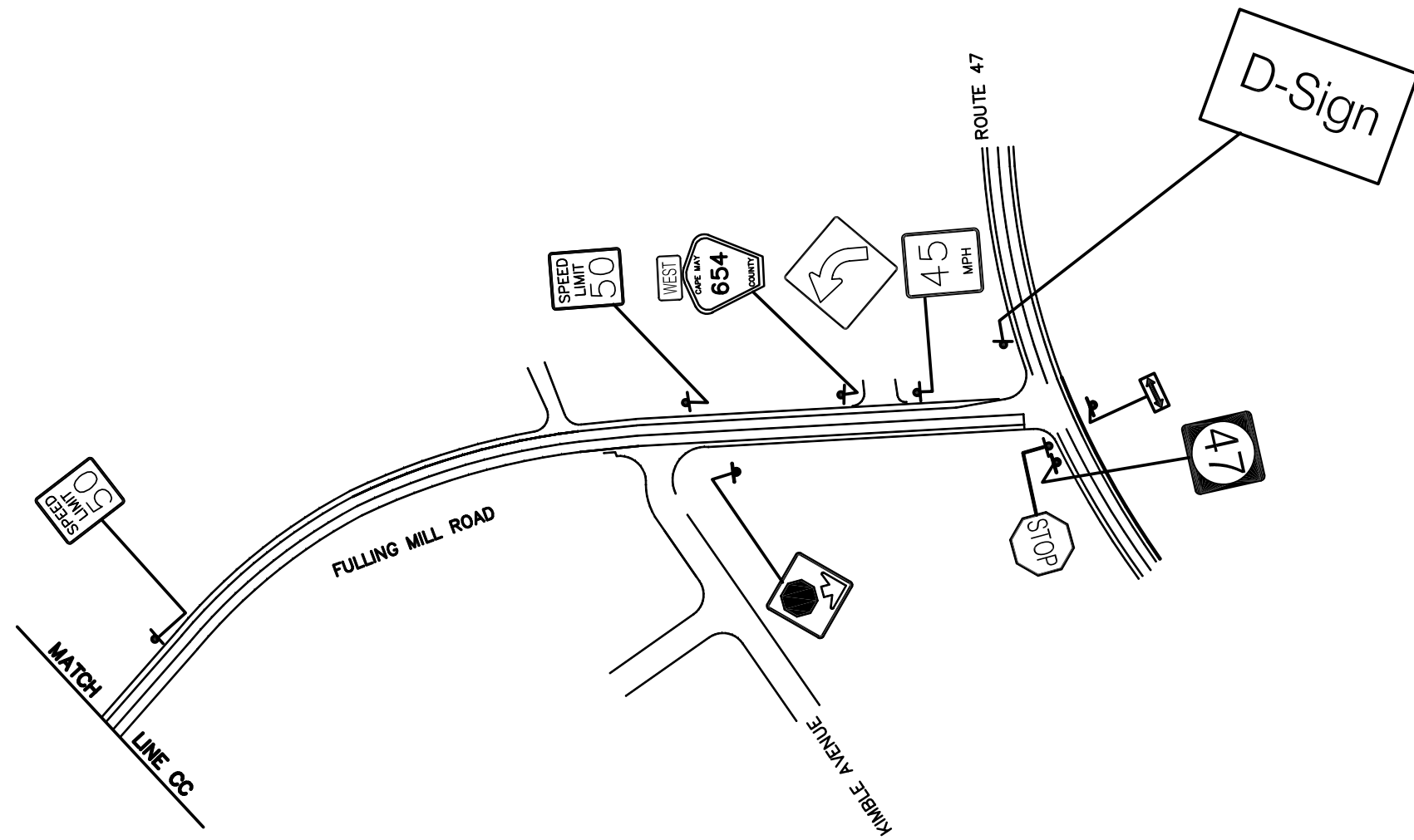
NOT TO SCALE



NOT TO SCALE

NOT TO SCALE





NOT TO SCALE

Route _____

Date _____

Safety Audit Stage 5

Operation/Existing Roads

Checklist 5-1

General Topics

Item	Issues to be Considered	Check	Comments
1 Landscaping	Is landscaping in accordance with guidelines (e.g., clearances, sight distance)?		
	Are required clearances and sight distances not likely to be restricted following future plant growth (landscaping and natural)?		
2 Parking	Are provisions for parking satisfactory in relation to traffic operations and safety?		
3 Temporary works	Are all locations free of construction or maintenance equipment, and any signing or temporary traffic control devices that are no longer required?		
4 Headlight glare	Have any problems due to headlight glare (e.g., two-way service road close to main traffic lanes) been addressed?		

Checklist 5-2**Alignment and Cross Section****Project** _____**Audit Team Members** _____**Date** _____

Item	Issues to be Considered	Check	Comments
5 Widths	Are all traffic lanes and roadway widths, including bridges, adequate?		
6 Shoulders	Are shoulder widths appropriate (e.g. for broken down or emergency vehicles)?		
	Are shoulders traversable for all vehicles and road users?		
	Is the shoulder cross slope sufficient to provide proper drainage?		
7 Side slopes	Are the side slopes and table drains safe for run off vehicles to traverse?		

Checklist 5-2**Alignment and Cross Section****Project** _____**Audit Team Members** _____**Date** _____

Item	Issues to be Considered	Check	Comments
1 Visibility, sight distances	Is sight distance adequate for the speed of traffic using the route?		
	Is adequate sight distance provided for intersections, crossings (e.g., pedestrian, cyclist, cattle, railway) etc.?		
2 Design speed	Is the horizontal and vertical alignment suitable for the (85th percentile) traffic speed? If not:		
	(a) Are warning signs installed?		
	(b) Are advisory speed signs installed?		
	Are the posted advisory speeds for curves appropriate?		

Checklist 5-2**Alignment and Cross Section****Project** _____**Audit Team Members** _____**Date** _____

Item	Issues to be Considered	Check	Comments
3 Overtaking	Are adequate passing opportunities provided?		
4 Readability by drivers	Are there any sections of roadway which may cause confusion e.g.:		
	(a) Is alignment of roadway clearly defined?		
	(b) Has disused pavement (if any) been removed or treated?		
	(c) Have old pavement markings been removed properly?		
	(d) Do streetlight and tree lines conform with the road alignment?		

Checklist 5-3

Intersections

Project _____

Audit Team Members _____

Date _____

Item	Issues to be Considered	Check	Comments
1 Location	Are intersections located safely with respect to horizontal and vertical alignment?		
2 Warning	Where intersections occur at the end of high speed environments (e.g., at approaches to towns), are there traffic control devices to alert drivers?		
3 Controls	Are pavement markings and intersection control signing satisfactory?		
4 Layout	Is the alignment of curbs, traffic islands and medians satisfactory?		
	Is the intersection layout obvious to all users?		
	Are turning radii and tapers appropriate?		

Checklist 5-3***Intersections*****Project** _____**Audit Team Members** _____**Date** _____

Item	Issues to be Considered	Check	Comments
5 Visibility, sight distances	Is sight distance adequate for all movements and all users?		

Checklist 5-4***Auxiliary Lanes and Turn Lanes*****Project** _____**Audit Team Members** _____**Date** _____

Item	Issues to be Considered	Check	Comments
1 Tapers	Are starting and finishing tapers located and aligned correctly?		
2 Shoulders	Are appropriate shoulder widths provided at merges in accordance with design guidelines?		
3 Signs	Is signing and marking installed in accordance with standards?		
4 Turning traffic	Is there advance warning of the approaching auxiliary lane?		

Checklist 5-4

Auxiliary Lanes and Turn Lanes

Project _____

Audit Team Members _____

Date _____

Item	Issues to be Considered	Check	Comments
5 Visibility, sight distances	Have right turn movements within the length of the auxiliary lane been avoided?		
	Has stopping sight distance been provided to the rear of turning vehicles?		
	Has stopping sight distance been provided for entering and leaving vehicles?		

Checklist 5-5

Non-Motorized Traffic

Project _____

Audit Team Members _____

Date _____

Item	Issues to be Considered	Check	Comments
1 Paths	Are there appropriate travel paths and crossing points for pedestrians and cyclists?		
	Where necessary, is fencing installed to guide pedestrians and cyclists to crossings or overpasses?		
	Is fencing of your design (e.g., avoid solid horizontal rails)?		
2 Barriers and fencing	Where necessary, is crash barrier installed to separate vehicle, pedestrian and cyclist flows?		
	Are bus stops appropriately located with adequate clearance from the traffic lane for safety and visibility?		
	Are there adequate provisions for the elderly, the disabled, children, wheelchairs and baby carriages (e.g., holding rails, curb and median crossings, ramps)?		
3 Bus stops	Where necessary, are hand rails provided (e.g., on bridges, ramps), and are they adequate?		
4 Elderly and disabled			

Checklist 5-5

Non-Motorized Traffic

Project _____

Audit Team Members _____

Date _____

Item	Issues to be Considered	Check	Comments
Elderly and disabled (cont.)	Distance between stop line and pedestrian crossing at signalized intersections (for visibility of pedestrians from truck driver's seat).		
	Signal timing - cycle length - pedestrian clearance time - are pedestrian buttons operable?		
5 Cyclists	Is the pavement width adequate for the number of cyclists using the route?		
	Is the bicycle route continuous, i.e., free of squeeze points or gaps?		
	Are bicycle safe grates provided at drainage pits where necessary?		

Checklist 5-6

Signs and Lighting

Project _____

Audit Team Members _____

Date _____

Item	Issues to be Considered	Check	Comments
1 Lighting	Is appropriate lighting installed at intersections, roundabouts, pedestrian and bicycle crossings, pedestrian refuges, etc?		
	Is all lighting operating satisfactorily?		
	Are the appropriate types of poles used for all locations and correctly installed (e.g. slip base at correct height, rigid poles protected if within clear zone)?		
	Are all locations free of any lighting which may conflict visually with traffic signals or signs?		
	Has lighting for signs, particularly overhead signs, been provided where necessary?		
2 Signs	Are all necessary regulatory, warning and direction signs (including detours) in place? Are they conspicuous?		
	Are there any redundant signs?		

Checklist 5-6

Signs and Lighting

Project _____

Audit Team Members _____

Date _____

Item	Issues to be Considered	Check	Comments
Signs (cont.)	Are traffic signs in their correct locations, and properly positioned with respect to lateral clearance and height?		
	Are the correct signs used for each situation, and is each sign necessary?		
	Are signs placed so as not to restrict sight distance, particularly for vehicles?		
	Are all signs effective for all likely conditions (e.g. day, night, rain, fog, rising or setting sun, oncoming headlights, poor lighting)?		
	Do sign supports conform to guidelines?		
3 Marking and delineation	Have retroreflective markers been installed? Where colored markers are used, have they been installed correctly?		
	Is all necessary pavement marking installed?		
	Are pavement markings (center lines, edge lines, transverse lines) clearly visible and effective for all likely conditions (e.g. day, night, rain, fog, rising or setting sun, oncoming headlights, light colored pavement surface, poor lighting)?		
	On light colored pavement surfaces (e.g. concrete) are RRPMS used to simulate traffic lanes?		
Marking and delineation (cont.)			

Checklist 5-6***Signs and Lighting*****Project** _____**Audit Team Members** _____**Date** _____

Item	Issues to be Considered	Check	Comments
	Has raised profile edge marking been provided where necessary (e.g. fatigue zones)?		
	Is delineation adequate and in accordance with guidelines (e.g. post-mounted delineators, RRPMS, chevron alignment markers)?		
	Is delineation effective for all likely conditions (e.g. day, night, rain, fog, rising or setting sun, oncoming headlights)?		
	If chevron alignment markers are installed, have the correct types of markers been used?		
	Are vehicle paths through intersections delineated where required?		
	On truck routes, are reflective devices appropriate to driver's eye height?		

Checklist 5-7

Traffic Signals

Project _____

Audit Team Members _____

Date _____

Item	Issues to be Considered	Check	Comments
1 Operation	Are traffic signals operating correctly? Is the number and location of signal displays appropriate?		
2 Visibility	Are traffic signals clearly visible to approaching motorists?		
	Is the end of likely vehicle queues visible to motorists so that they may stop safely?		
	Have any visibility problems caused by the rising or setting sun been addressed?		
	Are signal displays shielded so that they can be seen only by the motorists for whom they are intended?		
	Where signal displays are not visible from an adequate distance, are signal warning signs and/or flashing lights installed?		
3 Other provisions	Where necessary, are there provisions for visually impaired pedestrians (e.g., audio-tactile push buttons, tactile markings)? Are they working?		
	Where necessary, are there provisions for elderly or disabled pedestrians (e.g., extended green phase, phase displacement)?		

Checklist 5-8

Physical Objects

Project _____

Audit Team Members _____

Date _____

Item	Issues to be Considered	Check	Comments
1 Clear zone	Is a clear zone provided in accordance with the guidelines?		
	Is the appropriate treatment or protection provided for any objects within the clear zone (e.g., slip-base or frangible poles, crash barrier, crash cushions, sloping culvert, headwalls)?		

Checklist 5-8

Physical Objects

Project _____

Audit Team Members _____

Date _____

Item	Issues to be Considered	Check	Comments
2 Crash barriers	Are safety barriers installed at all necessary locations, including on bridges, in accordance with guidelines?		
	Are the crash barrier systems suitable for the purpose?		
	Is the length of crash barrier at each installation adequate? Are the crash barriers correctly installed?		
	Are Guard Rail Energy Absorbing Terminals (GREAT) or crash cushions installed where necessary (e.g., off ramp, bridge piers)?		

Checklist 5-8**Physical Objects****Project** _____**Audit Team Members** _____**Date** _____

Item	Issues to be Considered	Check	Comments
Crash barriers (cont.)	Where works are subject to stage construction, are temporary barriers installed in accordance to guidelines?		
	Is there a safe run off area behind breakaway terminals?		
3 Fencing	Is pedestrian fencing where needed?		
	Is fencing in the clear zone free of separate horizontal rails?		
	Is there adequate delineation/visibility of barriers and fences at night?		

Checklist 5-9***Delineation*****Project** _____**Audit Team Members** _____**Date** _____

Item	Issues to be Considered	Check	Comments
1 Line markings	Are all line markings (center line, edge line, transverse lines) in good condition?		
2 Guide posts	Are guide posts correctly placed, clean, and visible?		
3 Raised and Recessed Pavement Markings	Are RPM's in good condition?		
4 Chevron Alignment Markers	Are Chevron Alignment Markers placed correctly, and used only according to standards?		

Checklist 5-10**Pavement****Project** _____**Audit Team Members** _____**Date** _____

Item	Issues to be Considered	Check	Comments
1 Pavement defects	Is the pavement free of defects (e.g., excessive roughness or rutting, potholes, etc.) which could result in safety problems (e.g., loss of steering control)?		
2 Skid resistance	Does the pavement appear to have adequate skid resistance, particularly on curves, steep grades and approaches to intersection? Has skid resistance testing been carried out where necessary?		
3 Ponding	Is the pavement free of areas where ponding or sheet flow of water may occur with resultant safety problems?		
4 Loose screenings	Is the pavement free of loose screenings?		

Ball Bank data along Fulling Mill Rd . April 23, 2004

Numbers in circles correspond to signs on the Fulling Mill Rd. sign list:

Safe speed for negotiating the curves at posted speeds of 35 MPH and above is found at 10 degrees reading on the ball bank instrument.

The curves are identified by the sign number. Each curve was measured twice, beginning at the posted speed and decreasing in 5 MPH increments until the safe speed indication was found.

Facing Eastbound traffic

sign	posted speed limit	ball bank indications	
②	40	40=	10,11
		35=	8,9
④	50	50=	10,11
		45=	10,10
		40=	8,7
⑦	50	50=	15,15
		45=	12,13
		40=	10,12
		35=	8,8
⑨	50	50=	10,11
		45=	9,9
⑪	50	50=	15,15
		45=	12,12
		40=	10,10
		35=	8,7
⑮	50	50=	14,15
		45=	12,11
		40=	9,9

degrees

Facing Westbound traffic

sign	posted speed	ball bank indications	
⑮	50	50=	15,16
		45=	14,14
		40=	10,10
		35=	9,9

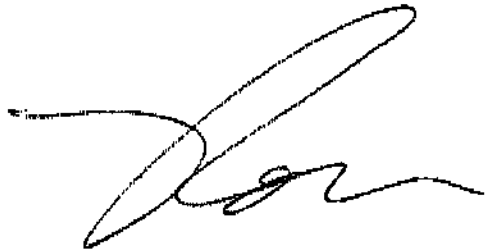
NATURE SAVER™ FAX MEMO 01610

Date	4/27/04	of pages	3
To	Joe Surace	From	Chad J. J. J.
Co./Firm		Co.	
Phone #		Phone #	
Fax #		Fax #	

21	50	50=	12,12
		45=	9,9
		40=	8,8
25	50	50=	9,9
		45=	7,8
27	50	50=	14,14
		45=	11,10
		40=	9,8
30	50	50=	15,15
		45=	12,11
		40=	9,9

There is no curve sign installed for the last curve facing westbound traffic
but this is the ball bank data :

--	40	40=	8,7
		35=	5,5



Curve sign locations along Fulling Mill Rd.
April 2004

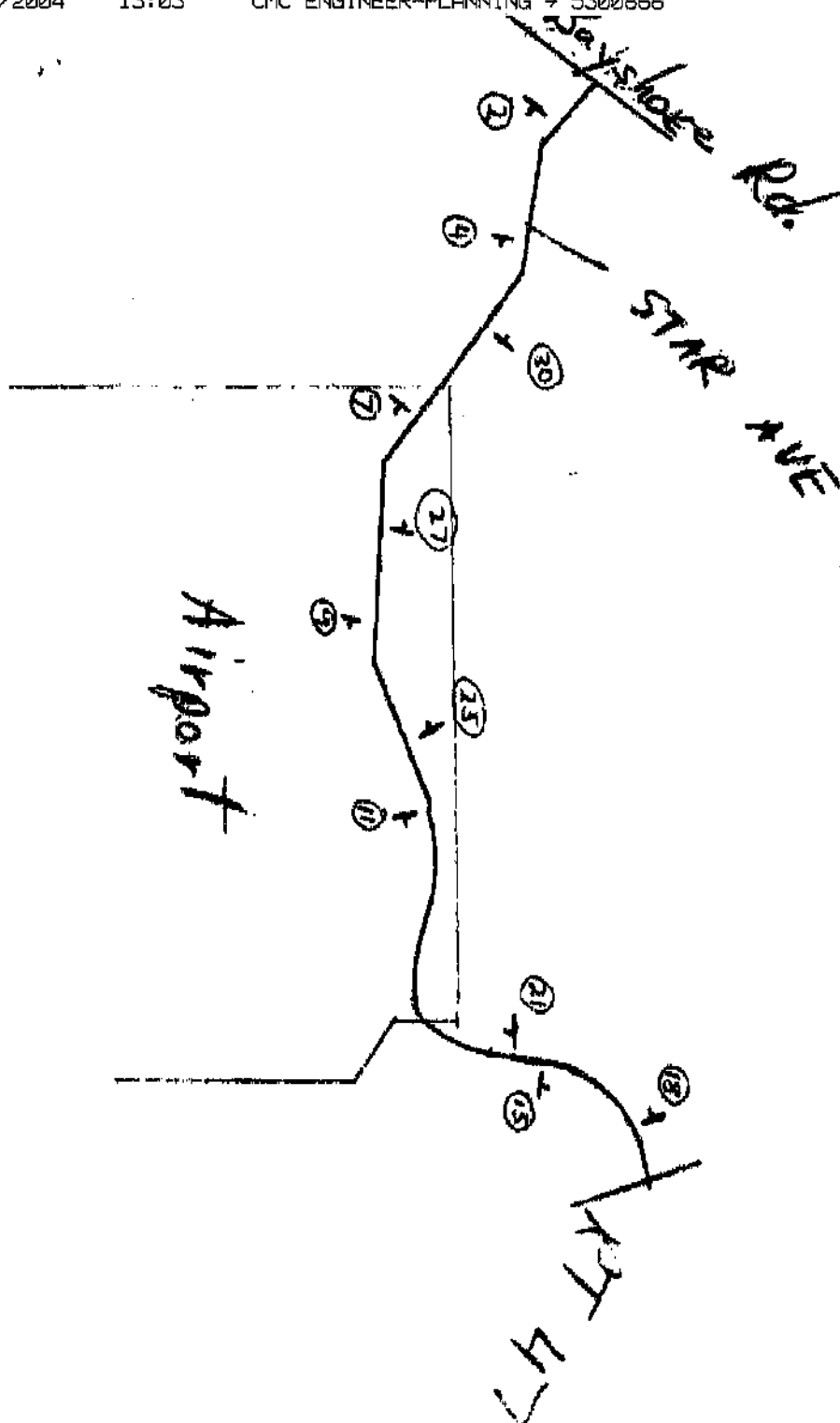


PHOTO LOG - FULLING MILL ROAD



1



2



3



4



5



6

PHOTO LOG - FULLING MILL ROAD



7



8



9



10



11



12

PHOTO LOG - FULLING MILL ROAD



13



14



15



16



17



18

PHOTO LOG - FULLING MILL ROAD



19



20



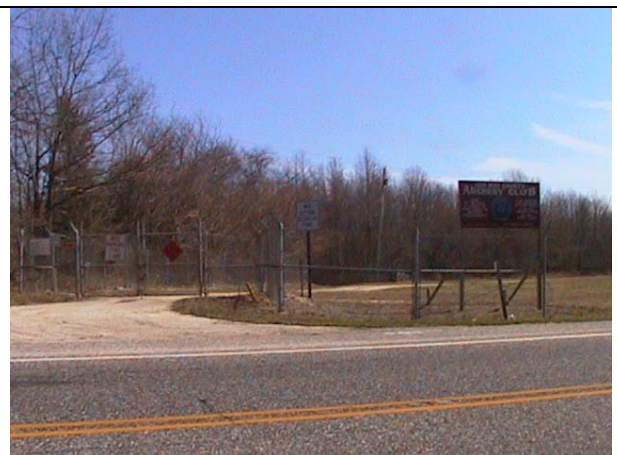
21



22



23



24

PHOTO LOG - FULLING MILL ROAD



25



26



27



28