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# ***South Jersey Transportation Planning Organization***

## **2005 Road Safety Audit**

**Hook Road (CR 551)  
Pennsville Township, Carney's Point Township, Salem County**



**Prepared By:**



Orth-Rodgers & Associates, Inc.  
810 Bear Tavern Road, Suite 307  
West Trenton, NJ 08628

In Association with:



June 14, 2005

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### **Prepared By:**

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West Trenton, NJ 08628

In Association with:

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June 14, 2005

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# Introduction

The South Jersey Transportation Planning Organization (SJTPO) has retained Orth-Rodgers & Associates, Inc. (ORA) to conduct their 2005 Road Safety Audit (RSA) of five sections of roadway in southern New Jersey. The sections of roadways to be studied were selected by SJTPO based on a number of factors considered important to the safety and future development of the roadways. Among the factors considered were crash data, traffic volume growth, local cooperation and control, and recent and future development along the roadway. State highways were excluded from the process. County and local officials cooperated with SJTPO in identifying roads that meet these parameters. The selection process is detailed in a report prepared by SJTPO dated November 29, 2004.

Two of the roadways are located in Atlantic County, one is in Cumberland County and two are in Salem County. The five roadway sections are:

1. English Creek Road (CR 575) between Ocean Heights Avenue (CR 559A) and Delilah Road (CR 646), in the Township of Egg Harbor, Atlantic County.
2. Delilah Road (CR 646) between the Airport Circle (at Tilton Road, CR 563) and US Route 9 in the Township of Egg Harbor and the City of Pleasantville, Atlantic County.
3. Third Street, Wheaton Avenue, and South Main Road (CR 555) between Main Street (Millville) and Sherman Avenue, in the Cities of Millville and Vineland, Cumberland County.
4. Hook Road (CR 551) between Route 49 and US Route 40 in the Townships of Pennsville and Carneys Point, Salem County.
5. Richwood Road (CR 609), Swedesboro Road (CR 666), and Monroeville Road (CR 604) in the Township of Upper Pittsgrove, Salem County.

Each road will have a separate report, but will share the same introduction, background section, format and some text.

Safety audits serve to address safe operation of roadways and to ensure a high level of safety for all road users. The process of a safety audit is two-fold: 1) to conduct a formal examination of highway features and the surrounding environment that increase the potential for crashes; and, 2) identify countermeasures that will reduce or (eliminate) the probability of such crashes. According to the Federal Highway Administration (FHWA), the formal definition of a road safety audit is as follows:

***“A Road Safety Audit is the formal examination of an existing or future roadway or traffic project by an independent team of trained specialists.”<sup>1</sup>***

To accomplish these goals, the audit team assesses the crash potential and safety performance of a roadway and prepares a report that documents the safety deficiencies and appropriate countermeasures. Safety audits are especially important during the design phase of a project as they can identify deficiencies before they are built into the project and propose cost-effective safety improvements that can be adopted from the onset. Project managers can then evaluate, select, and justify appropriate project changes within the constraints of budget, time and policy issues.

The purpose of this audit is to identify potential safety deficiencies along the selected section of five roads. There are three primary parts of the audit: 1) the data collection phase; 2) the field view (conducted by the team); and, 3) the preparation of the report and findings.

The data collection phase is performed prior to the audit team conducting a field view of the entire roadway. The data is intended to assist the team in identifying potential safety problems, as well as to provide a factual and historic component of the study. Traffic count and crash data

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<sup>1</sup> Federal Highway Administration, Road Safety Audits and Road Safety Audit Reviews , EDL #12345 FHWA XX-03-999

are collected, an inventory of the traffic control devices is taken, and a capacity analysis of major intersections is performed. The traffic counts were used to analyze solutions for the intersections, as well as aid in identifying the most congested sections of the roads. The crash data assisted the team in identifying specific areas and/or conditions that warrant close scrutiny that might have otherwise been overlooked. The inventory of traffic control devices, in addition to documenting what traffic control devices were present before the audit began, often provides clues to safety issues that have been identified or experienced in the past. The capacity analysis of intersections identify how well the intersections are operating and when and where improvements may be needed. Based on an analysis of all data, the audit team can conduct a productive and comprehensive evaluation of the roads being studied.

# BACKGROUND INFORMATION

A kick-off meeting was held on March 17, 2005, at the County courthouse in the City of Salem. This meeting featured a presentation by ORA to provide a forum to educate attendees on core elements of the RSA process such as:

1. Definition – What is involved in the 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 Draft & Final Report – What to expect.

The kick-off meeting also facilitated the exchange of ideas among attendees. The attendees displayed a genuine interest in safer roadways and more specifically an interest in participating in this audit. A typical audit team is comprised of three to five members. ORA chose to have a larger than usual audit team for this project for the following reasons:

- ♦ There was a wealth of experience that could be tapped into.
- ♦ The team did not want to discourage any effort towards achieving a safer roadway environment.
- ♦ It is hoped that greater participation will increase the likelihood that the findings of the team would be implemented.

At the end of the kick-off meeting, the RSA was scheduled for April 26, 2005, commencing at 9:00 AM. The attendees at the kick-off meeting are listed below.

**KICK-OFF MEETING ATTENDEES:**

| <b>Name</b>        | <b>Agency</b>                                    |
|--------------------|--|
| Scott Oplinger     | NJDOT Division of Safety and Traffic Engineering |
| Bill Schiavi       | SJTPO  |
| Rosemarie Anderson | DVRPC  |
| Karen Yunk         | FHWA   |
| Sgt. S. Ware       | Vineland Police Department                       |
| Charles Munyon     | Salem County Planning Board                      |
| John J. Petersack  | NJDOT Planning                                   |
| Bill Miller        | Salem County Engineering                         |
| Joe Federici       | Salem County Engineering                         |
| Chuck Sullivan     | Salem County                                     |
| Ron Harvey         | Millville Police                                 |
| Matt Rabbai        | Millville Police                                 |
| Jack Lynch         | Pennsville Township                              |
| Ed O'Connor        | NJDHTS   |
| Mike Barruzza      | CC Sheriff's Department                          |
| Bill Garrison      | CC Sheriff's Department                          |
| Richard Jones      | Millville Engineering Department                 |
| Karl Gleissner     | Cumberland County Planning                       |
| Ron Groshardt      | Cumberland County Engineering                    |
| Richard Tesanro    | NJSP Woodstown                                   |
| Jeff Ridgway       | Salem City                                       |
| Ted Vengenock      | Salem County Sheriff's Department                |
| Sean H. Phillips   | Salem County Sheriff's Department                |
| Robert Brewn       | Cumberland County Planning Department            |
| Don Chafin         | Pennsville Police                                |
| Jack Cimprich      | Upper Pittsgrove Township                        |
| Barry Foote        | Upper Pittsgrove Public Works                    |
| Norman Deitch      | Orth-Rodgers & Associates, Inc.                  |
| George Strathern   | Orth-Rodgers & Associates, Inc.                  |

# HOOK ROAD

Hook Road (CR 551) is an existing roadway that is under the jurisdictional control of Salem County. It is designated as a south-north road. The section being audited is a major connector roadway between Route 49 and RT 40, I-295, and the New Jersey Turnpike. It is an approximately 40 foot wide roadway with what appears to be 12 lanes and 8 foot shoulders along it's entire length except at it's approach to Rt 49 where it is flared to provide a left turn lane and a shared through and right turn lane. The only traffic signal in the study area is at the southern terminus of the road where it intersects with Route 49. That traffic signal is under the jurisdiction of the NJDOT. Development along the road is best described as rural residential. Local officials stated that the roadway is not just used on a daily basis by local and county residents, but also by motorists going to and from the recreational shore area. There is not a major traffic generator on the road. The speed limit along the road is 50 MPH from Rt 49 to the vicinity of Pittsfield Road, 45 MPH from the vicinity of Pittsfield Road to the vicinity of Beaver Ave, 50 MPH from the vicinity of Beaver Road to the vicinity of Churchtown Road and 45 MPH on the remainder of the road. There is a shopping center at the southern terminus of the study section. A 376,000-square-foot Super Walmart shopping center is proposed along Rt 49 just south of the existing shopping center. The traffic impact study for this development is recommending that the shared through and right turn lane along the Hook Road approach to Rt 49 be revised to a shared left turn, through and right turn lane. That same study is projecting the development to generate 459 trips on Hook Road during the Saturday peak hour (11:30 AM-12:30 PM) and 338 trips during the weekday peak hour (4:00 PM-5:00 PM). The road surface, the signing and pavement markings along the road were observed to be in good condition. Corner sight distance at intersections was also observed to be good with trees and other growth trimmed or cutback.



The following sections describe the various tasks undertaken by ORA in partnership with the Safety Audit Team and summarize the findings from the audit process in a manner that will allow the responsible agencies and personnel to prioritize implementation of safety enhancements.

# Pre-Audit Data Collection and Analysis

Prior to the audit activities on site, ORA collected and reviewed traffic data and other related materials in order to assist the team in conducting the audit. A description of the materials that were reviewed is provided below.

## 1. Aerial Photos

Aerial photographs of the study section, scaled at approximately 1"=300' were printed and used as reference at the kick-off and audit meetings.

## 2. Straight Line Plan

The straight line diagram was used as a base for 1"=400' straight line plans of the study section of the road. The crash data, traffic counts, and inventory of traffic control devices were shown on these plans for use at the audit and for the final report.

## 3. Traffic Volume Data

In a conversation with Salem County representatives, it was agreed that AM (7:00-9:00 AM) and PM (4:00-6:00 PM) peak hour manual counts would be taken at the Pittsfield Road intersection. An ATR count was also taken along the road north of Pittsfield Road. No other counts were deemed necessary.

Because of the very light volumes counted along the Pittsfield Road approaches it was not necessary to perform a HCS analysis of the intersection.

#### **4. Crash Data**

SJTPO received and forwarded to ORA the crash reports from the Pennsville Township Police Department for the years 2001, 2002, and 2003. On May 5, 2005, Sgt. Chatin provided crash data for the year 2004. Summary sheets were prepared for each of the four years, as well as a summary sheet for the four-year period. For the four-year period, a total of 172 crashes were plotted for the study section of road. Thirty-eight (38) crashes occurred in 2001, 38 in 2002, 55 in 2003 and 41 in 2004.

The type of crashes are characterized as follows:

**0-fatal crashes**

**43- injury crashes**

**129-non-injury crashes**

**27 – right-angle type crashes** – five (5) at the Sunoco Gas Station driveway, three (3) at RT 49, two (2) at Mahoney Road, five (5) at Pittsfield Road, four (4) at Churchtown Road. No other concentrations.

**50 – same-direction type crashes** – five (5) at the Sunoco gas station driveway, 14 at Rt 49, four (4) at Churchtown Road. No other concentrations.

**33 – fixed-object type crashes** – No concentration.

**4 – head on type crashes** – No concentrations.

**2 – side swipe type crash.**

**9 – left-turn type crashes** – No concentrations.

**44 – other type crashes, including 24 struck deer.**

An extensive review of the crashes established the following:

- ♦ The critical months for crashes were January and November. It is surprising to see that the number of crashes in July and August were significantly lower than the number of crashes in other months when the locals officials stated that the route is used by traffic going to and from the recreational shore area.
- ♦ The highest frequency of crashes occurred on Fridays.
- ♦ The highest frequency of crashes occurred between 3:00-4:00 PM.
- ♦ The percentage of crashes during hours of darkness (35%) is higher than the statewide average for county roads (approximately 28%). The roadway is generally well lit and the pavement markings and signing are in good condition.
- ♦ The percentage of crashes for wet surface conditions (22%) is consistent with the statewide average for county roads (approximately 21%). The percentage of crashes with snowy or icy surface conditions (14%) is higher than the statewide average for county roads (approximately 6.9%). It was ascertained during the audit that the county is now installing snow fence in open areas along the road during the winter months to control snow drifting.
- ♦ The percentage of crashes with injuries (25%) is lower than the statewide average for county roads (approximately 30%).
- ♦ The percentage of same directional crashes (29%) is consistent with the statewide average for county roads (approximately 29%).
- ♦ The percentage of left-turn crashes (5%) is consistent with the statewide average for county roads (approximately 6%).
- ♦ The percentage of fixed-object type crashes (19%) is higher than the statewide average for county roads (approximately 12%).

## **5. Other Information**

Additional materials reviewed by ORA prior to the formal audit process included videotapes

from pre-audit field views and the traffic signal plan and timing for the Rt 49 signalized intersection.

Materials listed above are included in the Appendix.

# Audit

On April 26, 2005, the Safety Audit Team met in the F.O.P. building in Pennsville to formally conduct the roadway inspection. The meeting commenced at 9:00 AM with brief statements by ORA representatives who reiterated the importance of RSAs and outlined the objectives of the safety audit. There were brief introductions by team members followed by an extensive review and discussion of materials described in the previous section. The team then walked to the Rt 49 and Hook Road intersection to begin the audit. Salem County provided a van for the team. Team members are listed below.

## SAFETY AUDIT TEAM FOR HOOK ROAD

| Name             | Agency                                       |
|------------------|--|
| Joe Federici     | Salem County Engineer                        |
| Don Chafin       | Pennsville Police Department                 |
| Nichole Jacobs   | NJDOT - Traffic Engineering & Investigations |
| Bill Miller      | Salem County Engineering                     |
| Norman Deitch    | Orth-Rodgers & Associates, Inc.              |
| Karen Yunk       | FHWA   |
| Bill Schiavi     | SJTPO  |
| George Strathern | Orth-Rodgers & Associates, Inc.              |
| Charles Munyan   | Salem County Planning Board                  |

The team began at RT 49 and walked to Pittsfield Road before breaking for lunch. After lunch, the team resumed the audit beginning at the I-295 ramps and walked south to Pittsfield Road.

During the walk, team members identified features on the roadway and its surrounding environment that could contribute to the occurrence or relative severity of roadway crashes. At each intersection and mid-block location, the Audit Team identified safety deficiencies and inappropriate traffic signs and other items that are not consistent with effective road function

and use. A variety of safety improvement measures were discussed with field notes and digital photographs being taken by team members.

At the completion of the audit, the team leader recapped the findings of the audit with the team.

The team leader informed other team members on the next step in the audit process; ORA will prepare a draft report summarizing the findings from the audit process and forward the report to all team members for their review and comments.

Sgt. Don Chafin, Bill Schiavi, Norm Deitch and George Strathern conducted a night audit on May 5, 2005. The goal was to check the retroreflectivity of the street signs, pavement markings, and condition of the raised pavement markers (RPMs). In addition, the need for street lighting was checked and lights adjacent to the roadway on private property were checked to ensure that they did not create bright areas that could distract drivers. The team also looked for issues that would only be apparent during hours of darkness, such as clearly defined roadway alignment, signal indication visibility conflicts, ineffective street lighting, etc.

The next section of the report summarizes the findings from the roadway inspection.

# Findings

The findings from the Hook Road safety audit are presented on the following pages.



| SAFETY ISSUE  | REMEDIAL ACTION  | LEVEL OF EFFORT REQUIRED |        |      | POTENTIAL SAFETY BENEFIT |        |      |
|---|--|--------------------------|--------|------|--------------------------|--------|------|
|   |  | LOW                      | MEDIUM | HIGH | LOW                      | MEDIUM | HIGH |
| 1 Rt 49 and Hook Road. This signalized intersection is under the jurisdiction of the NJDOT. The signal installation appears to conform to the current standards of the MUTCD. It was ascertained from the DOT that a Super Walmart and Home Depot is being developed along the west side of RT 49 just south of the existing shopping center at the intersection. In conjunction with this development the traffic consultant for the developer is proposing that the lane configuration along the Hook Road approach be changed from the existing left turn lane and shared straight thru and right turn lane to a left turn lane and a shared left turn, thru, and right turn lane. There is a Sunoco gas station on the northeast corner of the intersection. Ten crashes occurred at its' driveways onto Hook Road and two at its' driveway onto Rt 49. | There was much discussion as to what could be done to alleviate the crashes at the Sunoco driveways onto Hook Road. The discussion included the feasibility of prohibiting left turns into and out of the driveways. Although specific conclusions were not reached as to what action should be taken to improve the crash experience it was the consensus of the team that consideration should be give to prohibiting some if not all of the left turns into and out of the driveways. The options should be examined in more detail. Prohibiting the left turn from one of the driveways onto Hook Road was also discussed in detail. It is felt that the increased traffic generated by the Super Walmart development and the revised lane configuration may exasperate the crash experience at these driveways. |                          |        | X    |                          |        | X    |
| 2 Non-standard black on yellow diamond shaped 'NO LEFT TURN' sign along the north side of the road in the vicinity of the Sunoco gas station driveways.   | Remove sign. Install appropriate turn prohibition signs if it is decided to prohibit turns into the driveway.  | X                        |        |      | X                        |        |      |
| 3 Route 49 and Hook Road – Some of the painted crosswalks direct pedestrians into a vertical curb several feet from the depressed handicap ramps.   | The NJDOT should be requested to remove and repaint the crosswalks in their proper locations.  | X                        |        |      | X                        |        |      |

| SAFETY ISSUE   | REMEDIAL ACTION   | LEVEL OF EFFORT REQUIRED |        |      | POTENTIAL SAFETY BENEFIT |        |      |
|--|---|--------------------------|--------|------|--------------------------|--------|------|
|  |   | LOW                      | MEDIUM | HIGH | LOW                      | MEDIUM | HIGH |
| 4 Improperly mounted mailboxes are commonplace along the roadway. Mailboxes are either installed on non-breakaway posts, on horizontal members, or both. If struck, they could cause significant, needless damage and injuries. The location of improperly installed boxes are listed below: | Possibly working with the local postmaster, those identified property owners could be requested to remount the boxes on 4"x4" posts, or approved postal service supports. |                          |        |      |                          |        |      |
| • On northbound side of road just north of Rt 49, mailboxes installed on post with horizontal member.  |   |                          |        |      |                          |        |      |
| • On corner of Winslow Road, mailbox installed on 6"x6" post.  |   |                          |        |      |                          |        |      |
| • Along the northbound side of road approximately 1,200 feet north of Winslow Road, mailbox installed on concrete filled pipe.   |   |                          |        |      |                          |        |      |
| • Brick mailbox along the northbound side of the road, in front of #120, has recently been hit by a vehicle.   |   |                          |        |      |                          |        |      |
| • Mailbox installed on cut-off utility pole, in front of Associated Printers, at #23.  |   |                          |        |      |                          |        |      |
| • Along the southbound side of the road, mailbox at #103 is installed on 6"x8" post.   |   |                          |        |      |                          |        |      |
| • Along the northbound side of road, opposite Lee Road, six mailboxes are installed on horizontal member.  |   |                          |        |      |                          |        |      |

|   | SAFETY ISSUE  | REMEDIAL ACTION | LEVEL OF EFFORT REQUIRED |        |      | POTENTIAL SAFETY BENEFIT |        |      |
|---|---|-----------------|--------------------------|--------|------|--------------------------|--------|------|
|   |   |                 | LOW                      | MEDIUM | HIGH | LOW                      | MEDIUM | HIGH |
| 4 | (continued)   |                 |                          |        |      |                          |        |      |
|   | <ul style="list-style-type: none"> <li>On southbound side of road at #159, mailbox is installed on pipe.</li> </ul>   |                 |                          |        |      |                          |        |      |
|   | <ul style="list-style-type: none"> <li>Along southbound side of road in front of #243, mailbox installed on 6"x6" post.</li> </ul>  |                 |                          |        |      |                          |        |      |
|   | <ul style="list-style-type: none"> <li>Along the southbound side of road at #307, mailbox has I-beam post and horizontal member.</li> </ul>   |                 |                          |        |      |                          |        |      |
|   | <ul style="list-style-type: none"> <li>Along the northbound side, #334 mailbox installed with horizontal member.</li> </ul>   |                 |                          |        |      |                          |        |      |
|   | <ul style="list-style-type: none"> <li>Along the northbound side, #340 mailbox is installed on concrete filled pipe with horizontal angle iron.</li> </ul>                                      |                 |                          |        |      |                          |        |      |
|   | <ul style="list-style-type: none"> <li>Along the northbound side of the road in front of #342 (approx. 100 feet south of King Street), mailboxes have horizontal angle iron support.</li> </ul> |                 |                          |        |      |                          |        |      |

| SAFETY ISSUE   | REMEDIAL ACTION   | LEVEL OF EFFORT REQUIRED |        |      | POTENTIAL SAFETY BENEFIT |        |      |
|--|---|--------------------------|--------|------|--------------------------|--------|------|
|  |   | LOW                      | MEDIUM | HIGH | LOW                      | MEDIUM | HIGH |
| 5 Hook Road passing zone begins very close to the Rt 49 intersection.  | Consideration should be given to extending the existing northbound no passing zone beginning at RT 49 to the end of the solid yellow approaching the intersection for southbound traffic.   | X                        |        |      | X                        |        |      |
| 6 White on green guide sign for RT 49-Salem -Pennsville facing southbound traffic approaching RT 49 obstructed by utility pole and tree.   | Relocate sign to un-obstructed location.  | X                        |        |      | X                        |        |      |
| 7 There is an over representation of fixed object type crashes. A review of the police reports revealed several motorists admitting to falling asleep as the cause of the crash  | Possible corrective actions were discussed in detail. The Team agreed that some type of shoulder rumble strip similar to that which the NJDOT installs for the interstate highways should be considered for the more sparsely developed sections of the road. |                          |        | X    |                          |        | X    |
| 8 It was also suggested by team members that putting reflectors on the utility poles which line the road may help alleviate the night time fixed object type crashes, or at least help a motorist who has left the road at night avoid the pole. | Consideration should be given to developing a program with the utility companies to install reflectors on utility poles that are a constant distance off of the road. The poles become the roadside support system for the delineators.                       |                          | X      |      |                          | X      |      |
| 9 General Comment. Existing inlets not bicycle safe  | Consideration should be given to replacing all inlets with bicycle safe inlets.   |                          | X      |      | X                        |        |      |

| SAFETY ISSUE   | REMEDIAL ACTION   | LEVEL OF EFFORT REQUIRED |        |      | POTENTIAL SAFETY BENEFIT |        |      |
|--|---|--------------------------|--------|------|--------------------------|--------|------|
|  |   | LOW                      | MEDIUM | HIGH | LOW                      | MEDIUM | HIGH |
| 10 There is an over representation of struck deer type crashes on the road.  | Consideration should be give to installing additional deer crossing warning signs at locations that can be identified to have frequent deer crossings. The vicinity of Sinnickson Lane is a location for consideration. | X                        |        |      |                          | X      |      |
| 11 There is a headwall along both sides of the road approximately 600 feet south of Sinnickson Lane that appears to be a warranted obstruction.                | Consideration should be given to the installation of guide rail.  | X                        |        |      | X                        |        |      |
| 12 There is a concrete fence post along the southbound side of road opposite Winslow Road.   | Contact property owner to remove fence post.  | X                        |        |      | X                        |        |      |
| 13 There is no luminare at the Winslow Road intersection.  | Consideration should be given to installing a luminare at the intersection.   |                          | X      |      |                          | X      |      |
| 14 A large sign for the M&M Hunting Preserve along the northbound side of road just north of Winslow Road appears to be non-breakaway.                         | Contact property owner to drill sign posts to breakaway standard.   | X                        |        |      |                          | X      |      |
| 15 Cross drain with flared section along the southbound side of road approximately 1000 feet north of Winslow Road by fenced in pasture with assorted animals. | Consideration should be given to the installation of guide rail.  | X                        |        |      | X                        |        |      |

| SAFETY ISSUE   | REMEDIAL ACTION   | LEVEL OF EFFORT REQUIRED |        |      | POTENTIAL SAFETY BENEFIT |        |      |
|--|---|--------------------------|--------|------|--------------------------|--------|------|
|  |   | LOW                      | MEDIUM | HIGH | LOW                      | MEDIUM | HIGH |
| 16 Concrete fence posts along the southbound side of road approximately 1000 feet and 1200 feet north of Winslow Road.   | Contact property owner to remove fence posts.   | X                        |        |      | X                        |        |      |
| 17 Sign for the Moose Lodge at # 2376 appears to be non-breakaway.   | Contact property owner to drill post to breakaway standard.   | X                        |        |      | X                        |        |      |
| 18 Mahoney Road:<br><ul style="list-style-type: none"> <li>Finger island has no signing and has numerous tire tracks over it.</li> <li>Stop sign on the approach obstructs visibility of large arrow sign on top of intersection.</li> <li>Intersection appears to have corner radii larger than necessary.</li> </ul> | Install "KEEP RIGHT" signs on both ends of finger island.   |                          | X      |      |                          | X      |      |
|  | Relocate large arrow sign approximately 10 feet to the north.   |                          |        |      |                          |        |      |
|  | Consideration should be given to re-designing the intersection with smaller radii that will eliminate the need for the finger island. |                          |        | X    | X                        |        |      |
| 19 There are swales along both sides of the road approximately 700 feet north of Mahoney Road.   | Consideration be given to the installation of guide rail at this location.  |                          | X      |      |                          | X      |      |
| 20 Bus Shelter along the northbound side of road just north of Five Star Rentals no longer used. Potential fixed object.   | Remove shelter and concrete slab/footings.  |                          | X      |      |                          | X      |      |

| SAFETY ISSUE  | REMEDIAL ACTION   | LEVEL OF EFFORT REQUIRED |        |      | POTENTIAL SAFETY BENEFIT |        |      |
|---|---|--------------------------|--------|------|--------------------------|--------|------|
|   |   | LOW                      | MEDIUM | HIGH | LOW                      | MEDIUM | HIGH |
| 21 Bus Shelter along the southbound side of road approximately 200 feet north of Five Star Rentals no longer used. Potential fixed object.  | Remove shelter and concrete slab/footings.  |                          | X      |      |                          | X      |      |
| 22 Cross road warning signs installed along both northbound and southbound approaches to Pittsfield Road.   | Install street name plates below signs.   | X                        |        |      | X                        |        |      |
| 23 Pittsfield Road- This is a cross type intersection with stop signs installed on the Pittsfield Road approaches. This intersection experienced five right angle type crashes and two crashes involving a southbound left turning vehicle being struck by a northbound vehicle. Local members of the team feel that motorist observance of the stop control is good. They attribute the crashes to Pittsfield Road traffic miss- judging the speed of traffic on the Hook Road approaches. It was the consensus of the team that the installation of a flashing signal should be considered for the intersection. Although volumes on Pittsfield Road are low it is the only full cross intersection along the road and the longest intersecting road. It connects to RT 49 and has the potential of carrying higher volumes in the future as the area develops. | Consideration be given to installing a flashing signal at the intersection. Install new stop signs at intersection. |                          | X      |      |                          |        | X    |

|    | SAFETY ISSUE  | REMEDIAL ACTION   | LEVEL OF EFFORT REQUIRED |        |      | POTENTIAL SAFETY BENEFIT |        |      |
|----|---|---|--------------------------|--------|------|--------------------------|--------|------|
|    |   |   | LOW                      | MEDIUM | HIGH | LOW                      | MEDIUM | HIGH |
| 24 | Pittsfield Road intersection-corner sight distance across southwest and southeast corners somewhat restricted.  | Selectively trim trees and other vegetation on corners to ensure adequate sight distance.   | X                        |        |      |                          | X      |      |
| 25 | Swale along the northbound side of road between Pittsfield Road and the Crossroads Community Church. Head wall in same area.  | Consideration should be give to installing guiderail.   |                          | X      |      |                          |        | X    |
| 26 | Type "B" inlet without curb on northwest corner of intersection and another along the southbound side of road approximately 330 feet south of intersection.   | Replace with bicycle safe inlet and install curbing.  |                          | X      |      |                          | X      |      |
| 27 | Erie Avenue- Stop sign and post worn.   | Replace sign and post.  | X                        |        |      |                          | X      |      |
| 28 | Empty fence post along the northbound side of road approximately 700 feet south of Beaver Avenue.   | Remove post   | X                        |        |      | X                        |        |      |
| 29 | Knocker's Crabhouse is on the northeast corner of Beaver Avenue. Angle parking stalls are painted in its' parking lot so that vehicles will park up to the curb along the northbound side of the road. Theses parked vehicles will then restrict the sight distance across that corner of the intersection. | Contact property owner to install parking blocks or otherwise revise parking so that sight distance is not obstructed and the sidewalk area (by statue) is free of parked vehicles. | X                        |        |      |                          | X      |      |



|    | SAFETY ISSUE   | REMEDIAL ACTION  | LEVEL OF EFFORT REQUIRED |        |      | POTENTIAL SAFETY BENEFIT |        |      |
|----|--|--|--------------------------|--------|------|--------------------------|--------|------|
|    |  |  | LOW                      | MEDIUM | HIGH | LOW                      | MEDIUM | HIGH |
| 30 | Lee Road- Stop sign worn and post bent.  | Replace both sign and post.  | X                        |        |      | X                        |        |      |
| 31 | Swale along southbound side of road approximately 1000 feet north of George Drive.                                       | Consideration should be given to installing guide rail.                        |                          |        | X    |                          | X      |      |
| 32 | Mailbox along southbound side of road in front of #243 installed on 6" x 6' post.  |  | X                        |        |      | X                        |        |      |
| 33 | Chain link fence with top stiffing member 6 feet behind shoulder in front of #245.                                       | Consider contacting property owner regarding removing stiffing member.         | X                        |        |      |                          | X      |      |
| 34 | Sign post along the northbound side of road opposite # 289 with wooden arrow sign.                                       | Remove sign and post.  | X                        |        |      | X                        |        |      |
| 35 | Along the southbound side of road in front of #289 a pipe with electrical fixture mounted on top. Possible fixed object. | Contact property owner regarding removing post and fixture.                    | X                        |        |      | X                        |        |      |
| 36 | There is a side road warning sign along the southbound side of road approaching Churchtown Road                          | Install street name plate below sign.  | X                        |        |      | X                        |        |      |
| 37 | Stop sign on Dunlap Ave. worn.   | Replace sign   | X                        |        |      |                          | X      |      |
| 38 | Steel sign support for Uncle Teddy's custard approximately 5 feet behind curb on northeast corner of Orange Street.      | Consideration should be given to contacting property owner to remove sign.     | X                        |        |      |                          | X      |      |
| 39 | Boulders behind curb at #340. Potential fixed object.  | Contact property owner to remove boulders farther from road out of clear zone. | X                        |        |      | X                        |        |      |

| SAFETY ISSUE |   | REMEDIAL ACTION  | LEVEL OF EFFORT REQUIRED |        |      | POTENTIAL SAFETY BENEFIT |        |      |
|--------------|---|--|--------------------------|--------|------|--------------------------|--------|------|
|              |   |  | LOW                      | MEDIUM | HIGH | LOW                      | MEDIUM | HIGH |
| 40           | Boulders approximately 4 feet behind curb at #342. Potential fixed object.  | Contact property owner to remove boulders farther from road out of clear zone. | X                        |        |      | X                        |        |      |
| 41           | Stop sign on the King Street approach is worn.  | Replace sign.  | X                        |        |      | X                        |        |      |
| 42           | Stop sign on the Humphreys Avenue approach is worn.   | Replace sign.  | X                        |        |      | X                        |        |      |
| 43           | There is a crossroad warning sign along the southbound side of road approaching Humphreys Avenue.                                   | Install street nameplate below sign.   | X                        |        |      | X                        |        |      |
| 44           | Concrete bollards along northbound side of road approximately 1000 feet south of Glenside Ave (blue house). Potential fixed object. | Contact property owner to remove bollards.                                     | X                        |        |      | X                        |        |      |
| 45           | Concrete bollards on southwest corner of Glenside Avenue near driveway. Potential fixed object.                                     | Contact property owner to remove bollards.                                     | X                        |        |      | X                        |        |      |

| SAFETY ISSUE   | REMEDIAL ACTION   | LEVEL OF EFFORT REQUIRED |        |      | POTENTIAL SAFETY BENEFIT |        |      |
|--|---|--------------------------|--------|------|--------------------------|--------|------|
|  |   | LOW                      | MEDIUM | HIGH | LOW                      | MEDIUM | HIGH |
| 46 The night safety audit found the following:<br><ul style="list-style-type: none"> <li>Signal Ahead sign facing southbound traffic on Hook Road approaching Rt 49 needs replacing.</li> <li>The roadway has continuous highway lighting over 75% of its length. One area where there is no lighting is the undeveloped area in the vicinity of Sinnickson Lane. This area is also a high deer crash area. Lighting may give motorists more time to see and react to potential deer conflicts.</li> </ul> | Replace Signal Ahead sign.  | X                        |        |      | X                        |        |      |
|  | Consideration should be given to installing additional lighting in the area south of Sinnickson Lane. |                          | 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 the implementation of the safety improvements as time and budget limitations allow. To the extent possible, the findings have been separated into line items so that the 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 findings and decide which items can be completed in the immediate future (within 1 year). Many of the deficiencies can be corrected in the short term if the roadway owners dedicate both the time and financial resources to the task. The Level of Effort (an estimate of expenditures and man hours) indicated on the finding sheets of the report represent the team's best effort at categorizing each item.

It is felt that addressing solutions for the crash experience at the Sunoco Gas Station driveway (Item #1), the installation of shoulder rumble strips along the more sparsely developed sections of the road (Item #7), and the installation of a flashing signal at the intersection of Pittsfield Road (Item #23) will have the most significant impact upon the crash experience along the road. Additionally, the swale along the northbound side of the road between Pittsfield Road and the Crossroad Community Church (Item#25) is considered to be a significant safety deficiency. We acknowledge that installing a shoulder rumble strip on other than limited access road is very unusual and may require a special design. This is a matter that may require further research before implementation can be considered.

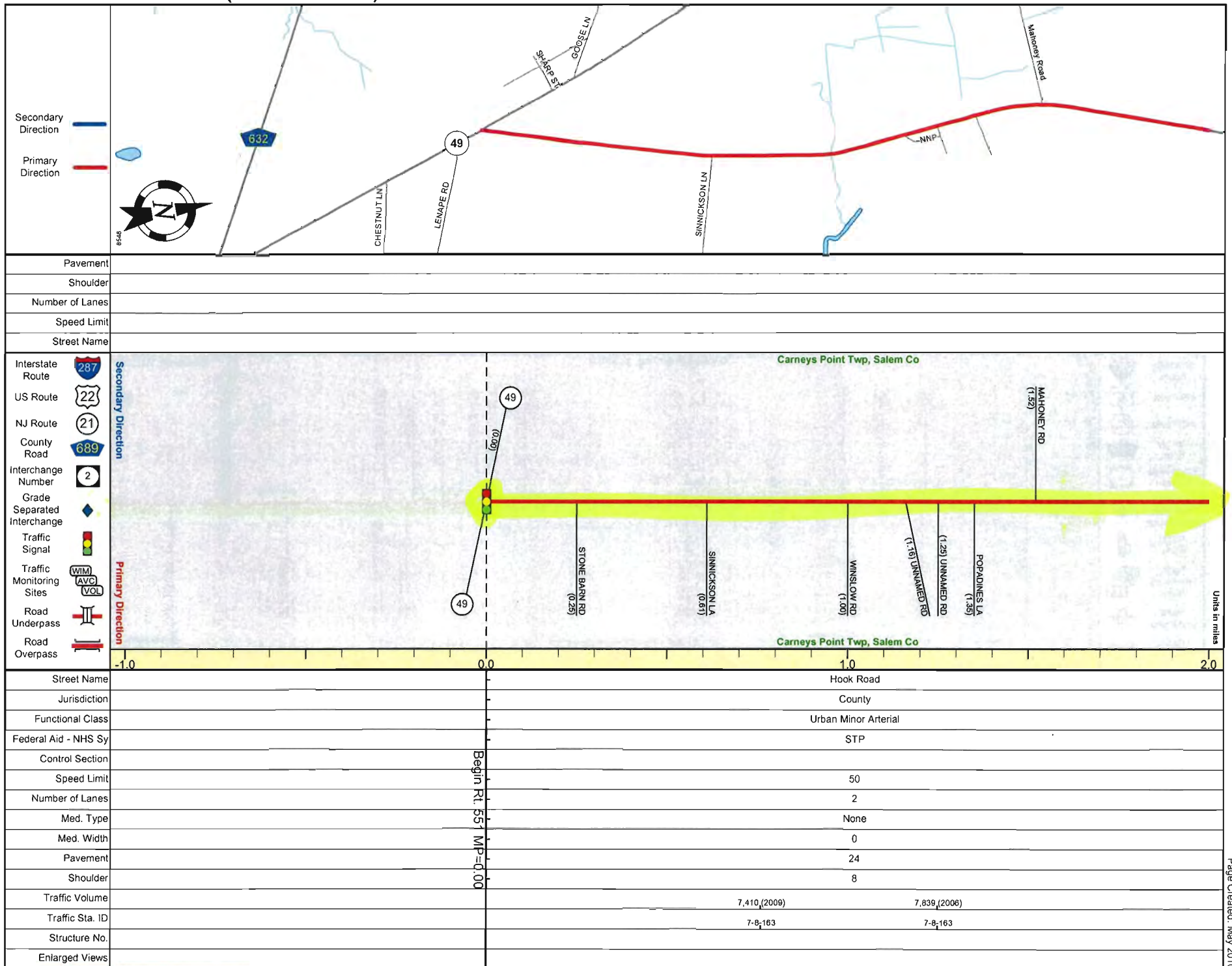
The opinions found in the findings of this Safety Audit report are those of the Safety Audit Team, as a whole, and not necessarily the opinions of the SJTPO or the individual team members.

# Appendix

- Map of Hook Road
- Straight-line plan on which are plotted crashes, existing traffic control devices, and traffic volumes.
- Crash Data Summary Sheets
- Crash Data Charts
- Photographs
- Checklists

# ROUTE 551 (South to North)

Mile Posts: 0.000 - 2.000

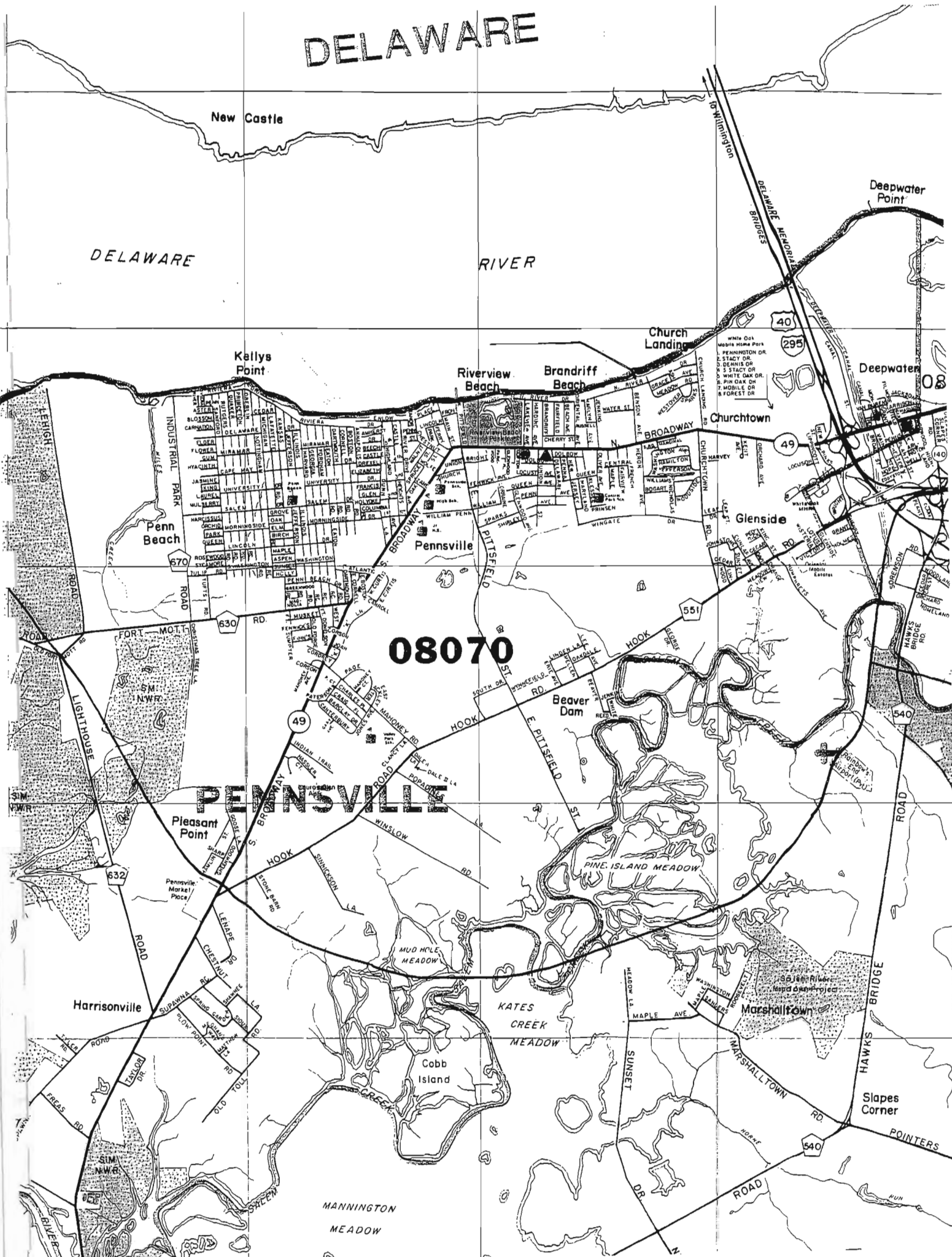


SRI = 0000551\_\_

Date last inventoried: August 2006

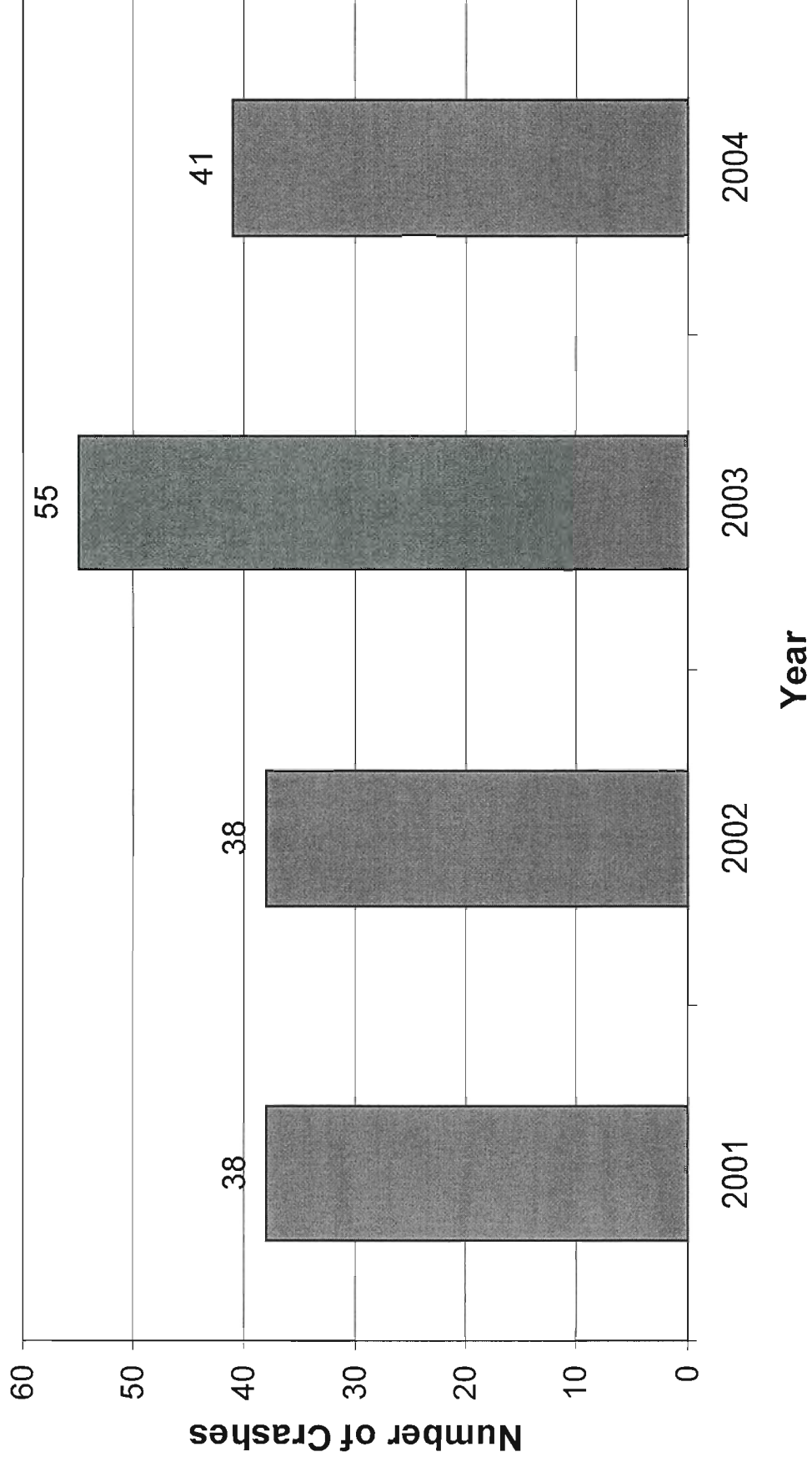


# DELAWARE

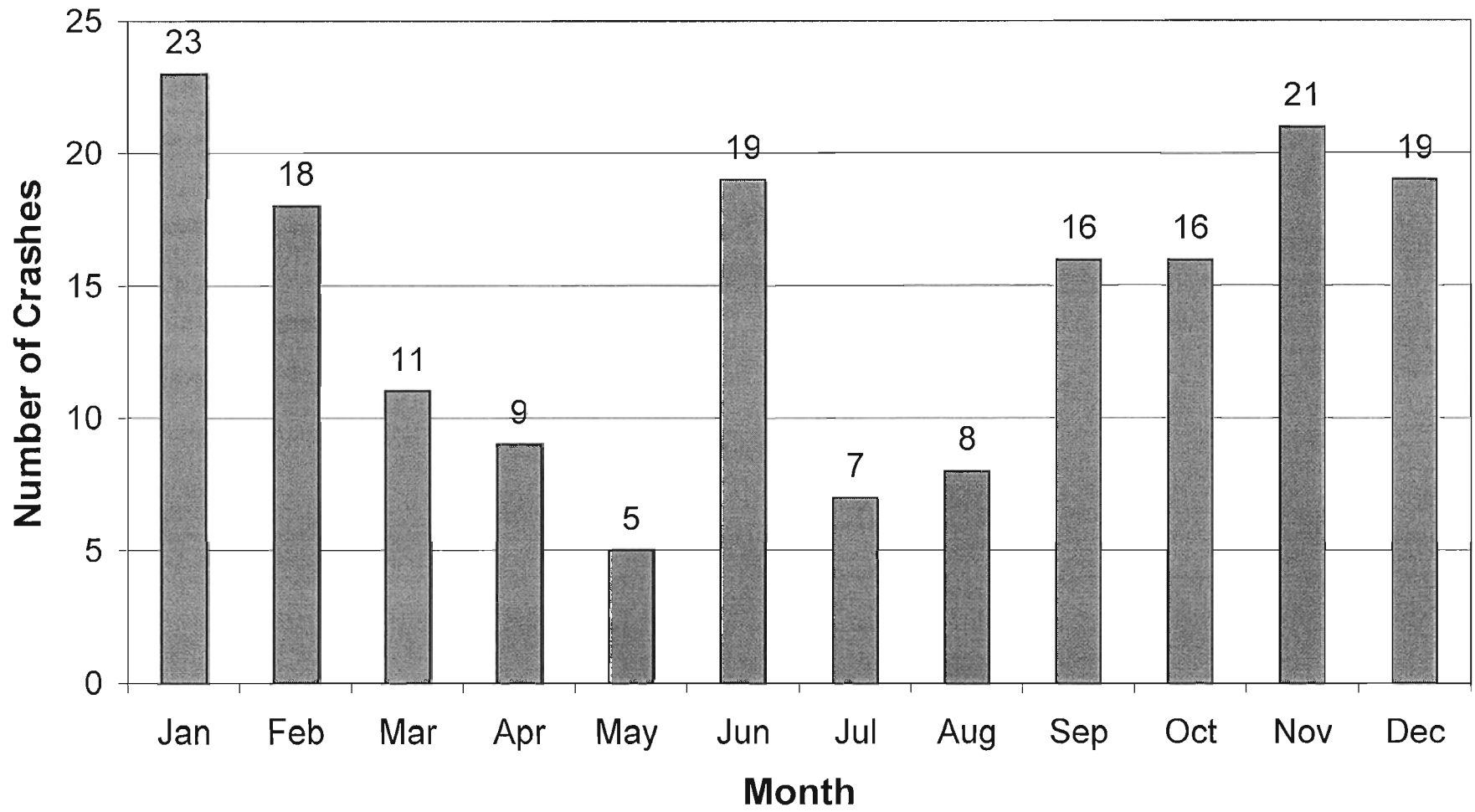




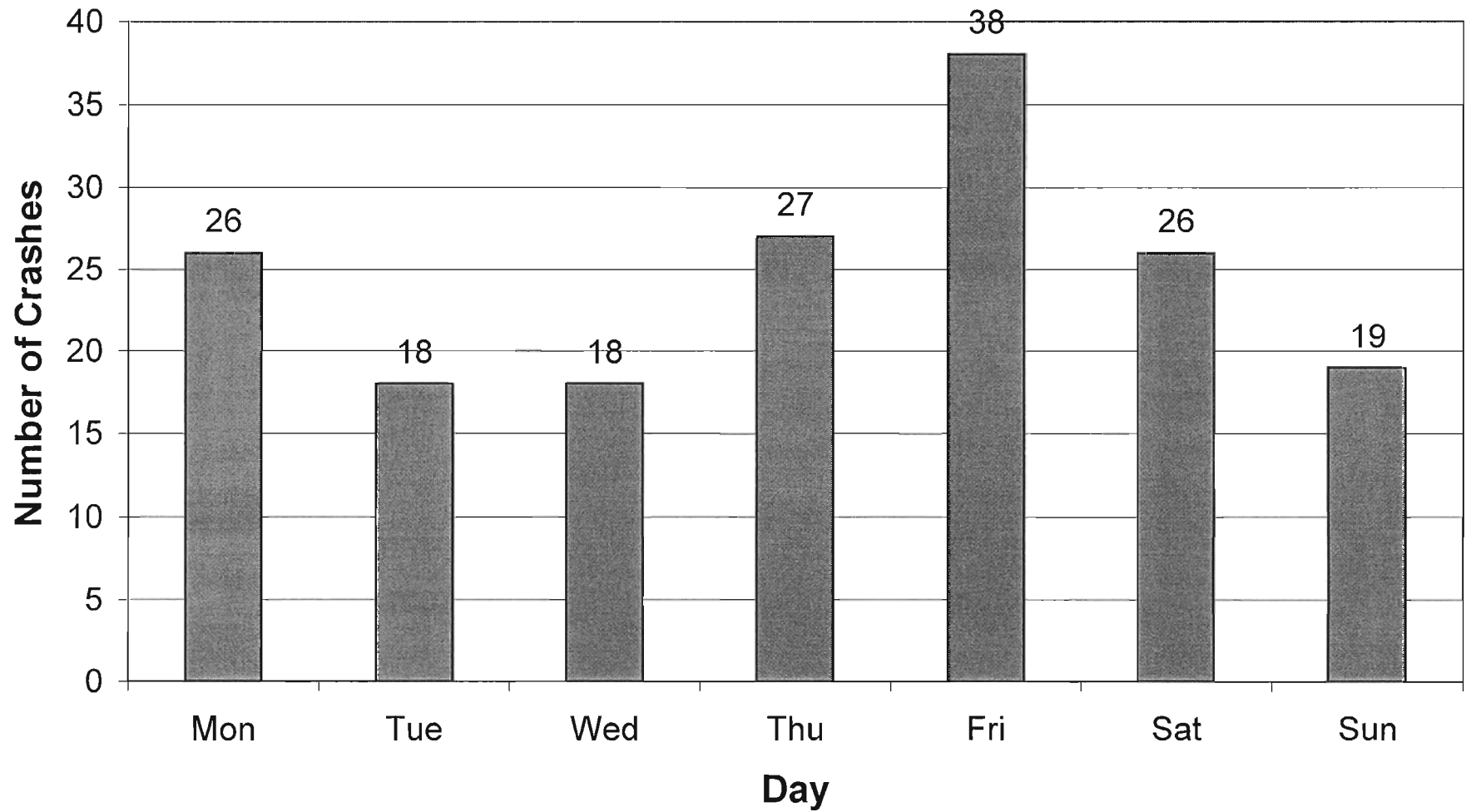
# Hook Road 4 Year Trend



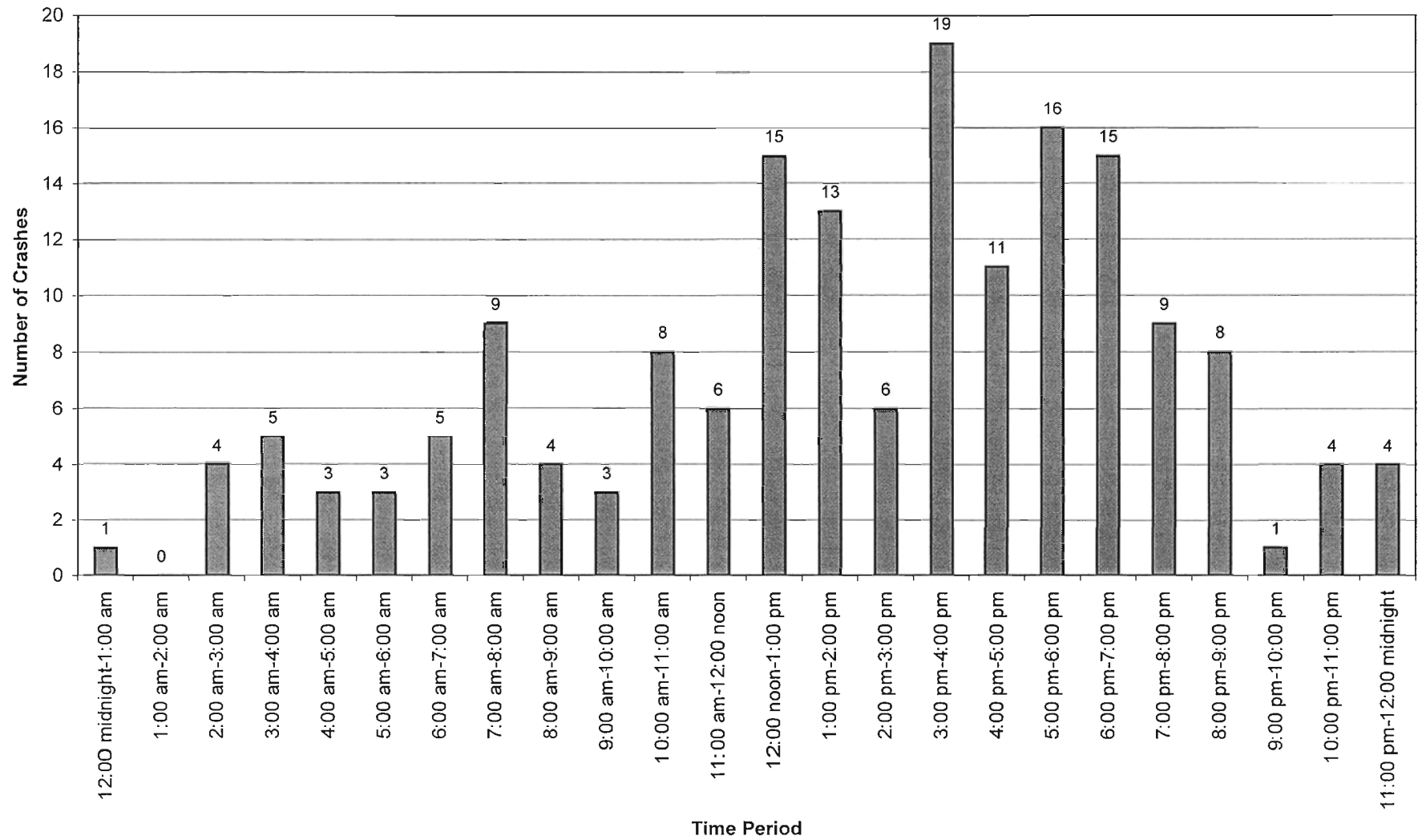
## Hook Road Crash Occurrence by Month



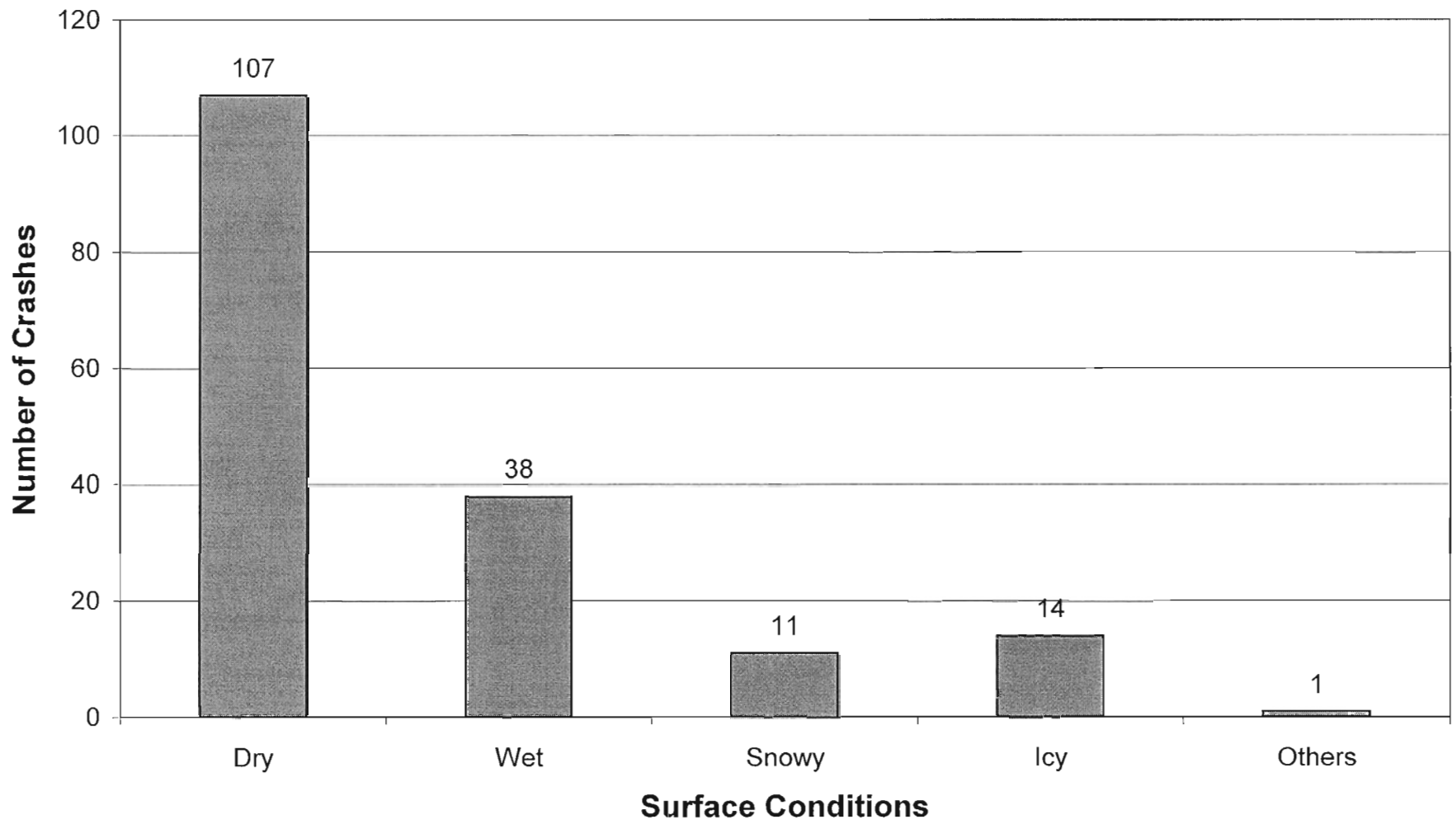
## Hook Road Crash Occurrence by Day of Week



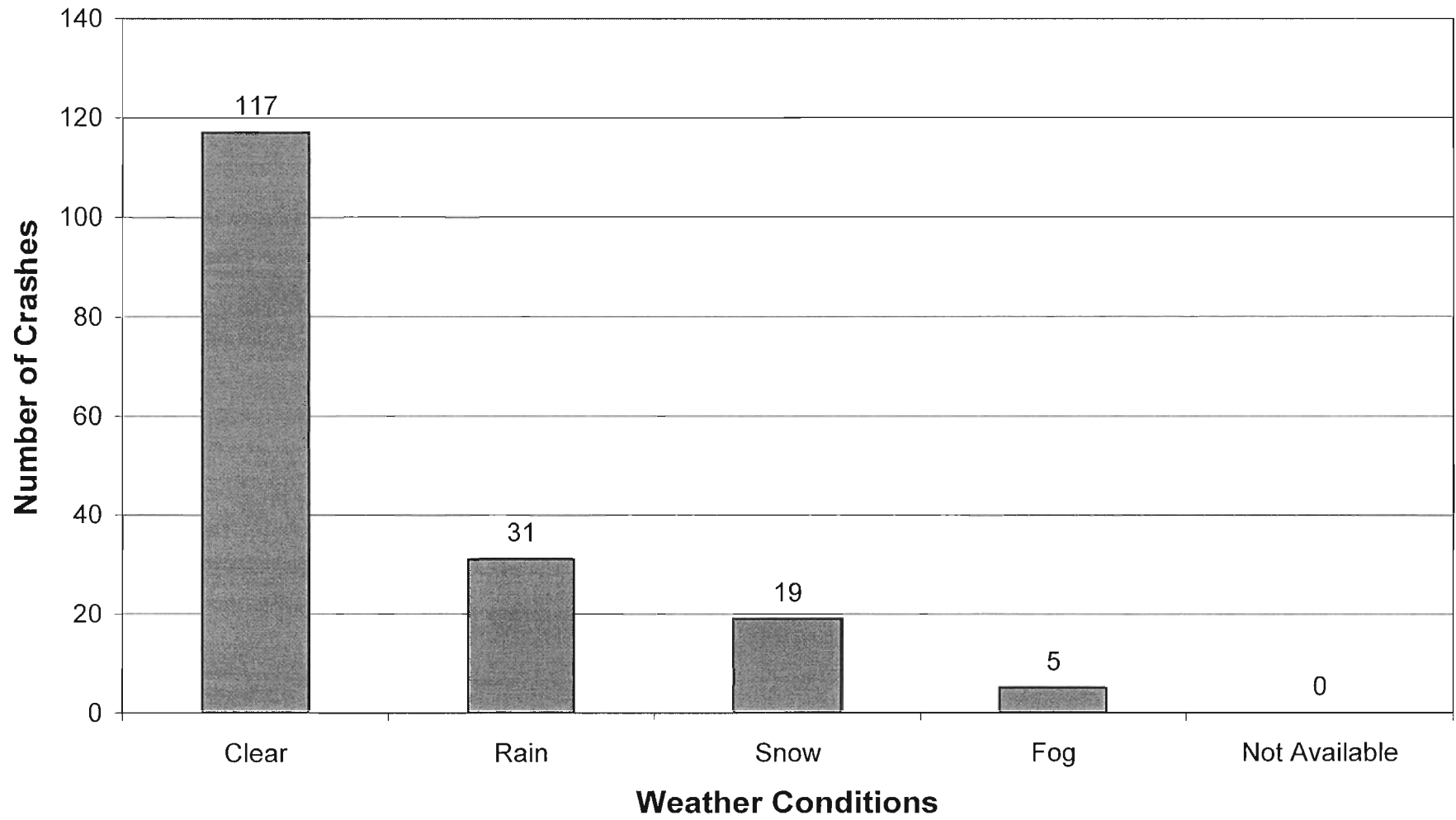
# Hook Road Crash Occurrence by Time of Day



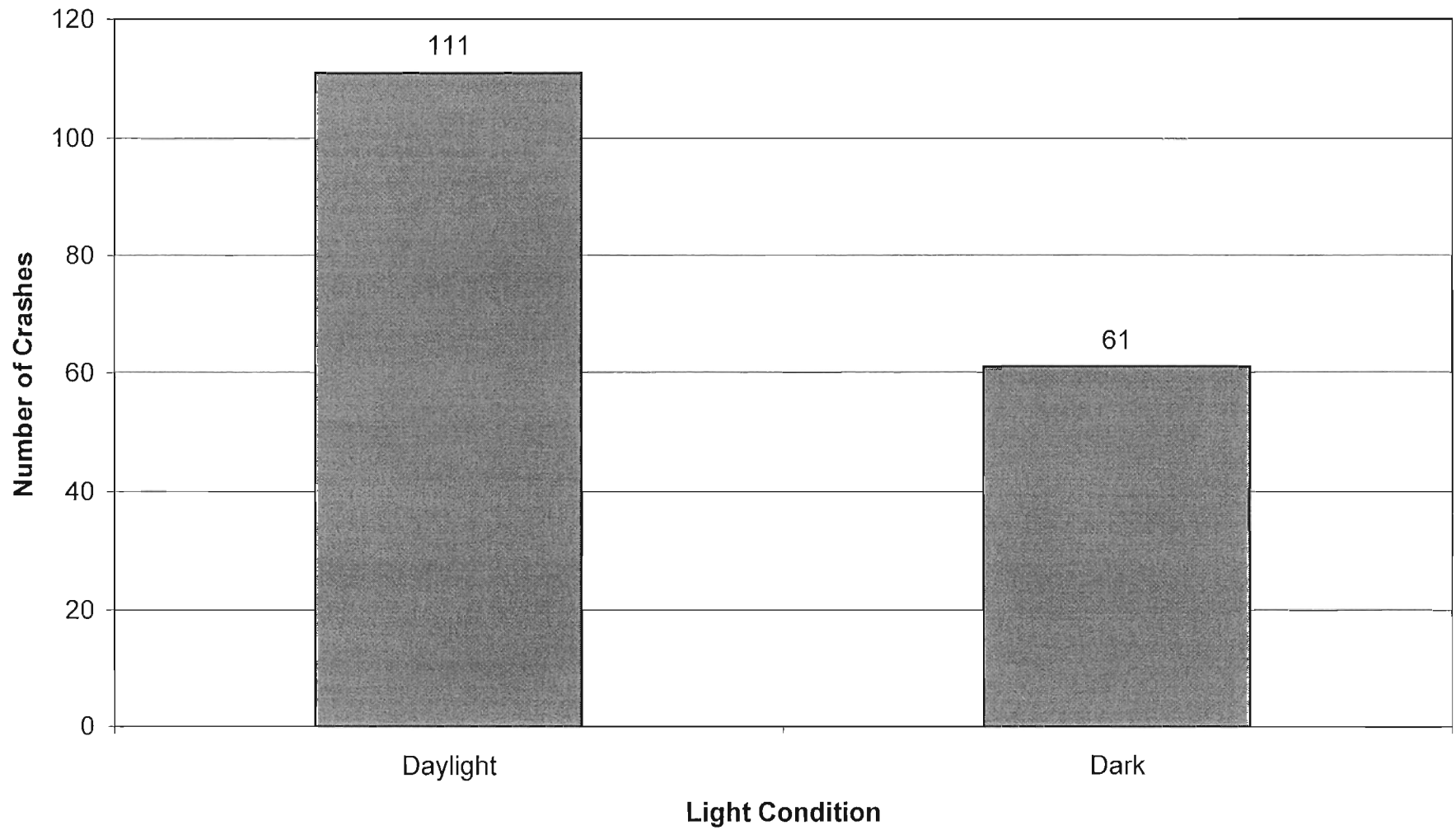
# Hook Road Crash Occurrence by Surface Conditions



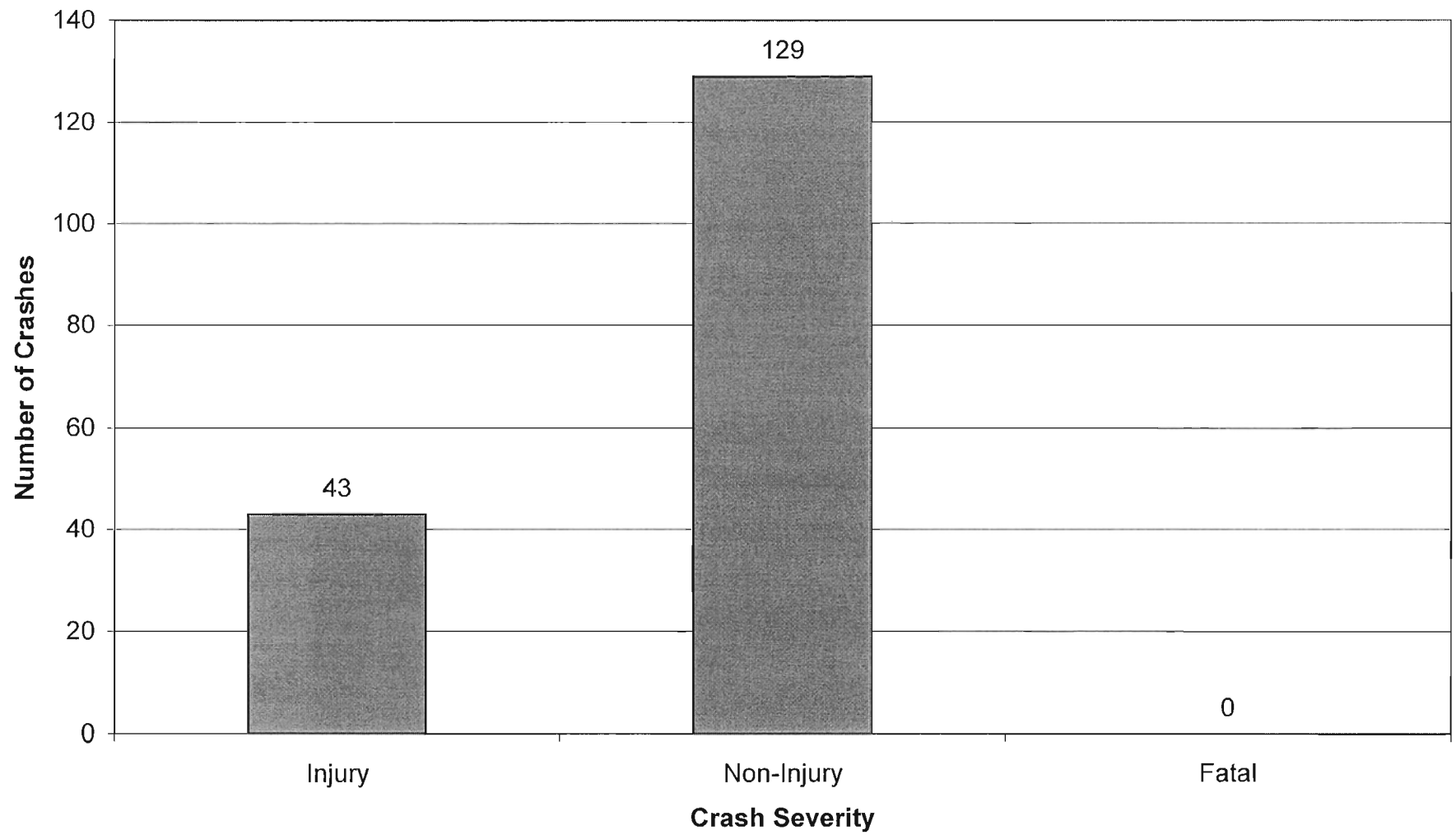
# Hook Road Crash Occurrence by Weather Conditions



# Hook Road Crash Occurrence by Light Condition

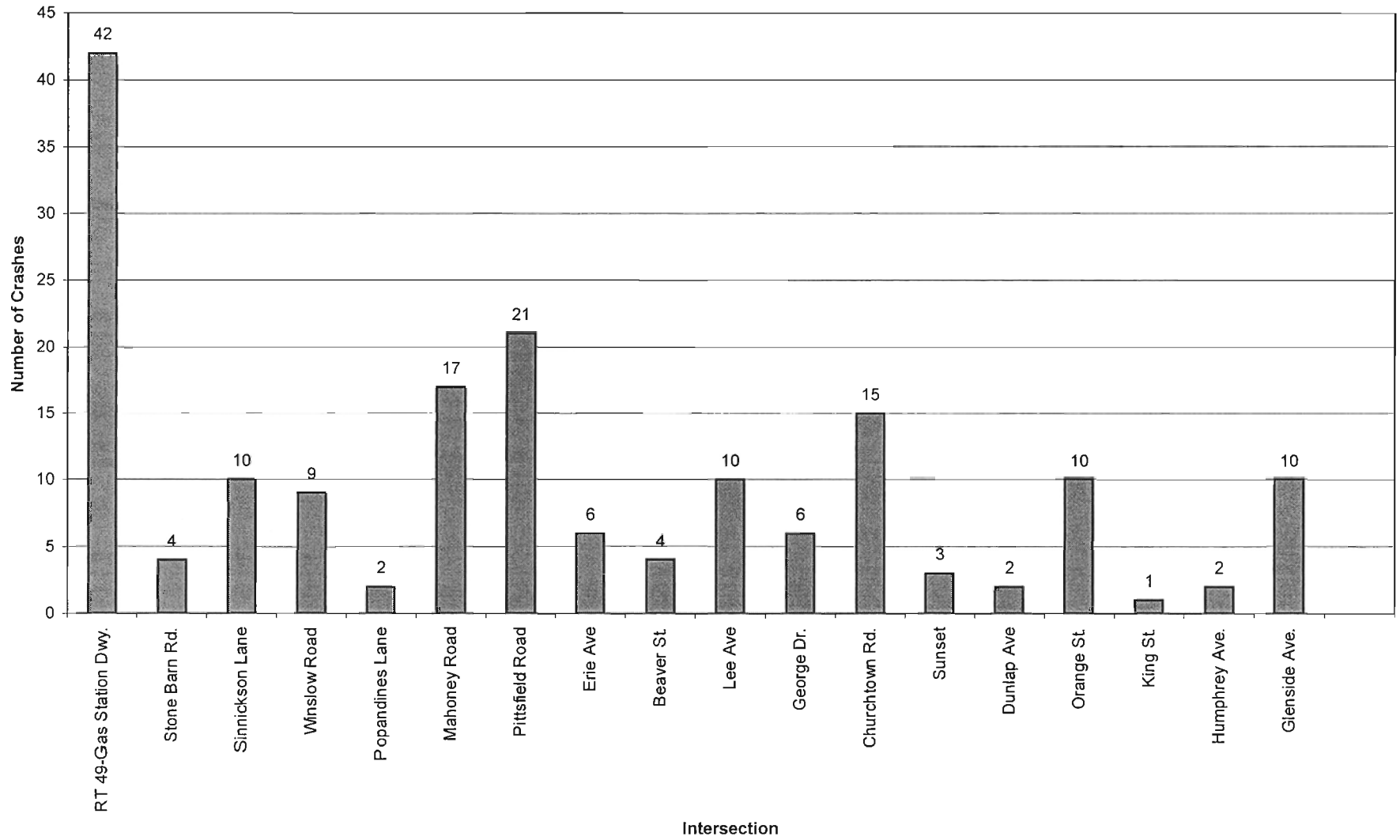


# Hook Road Crash Severity

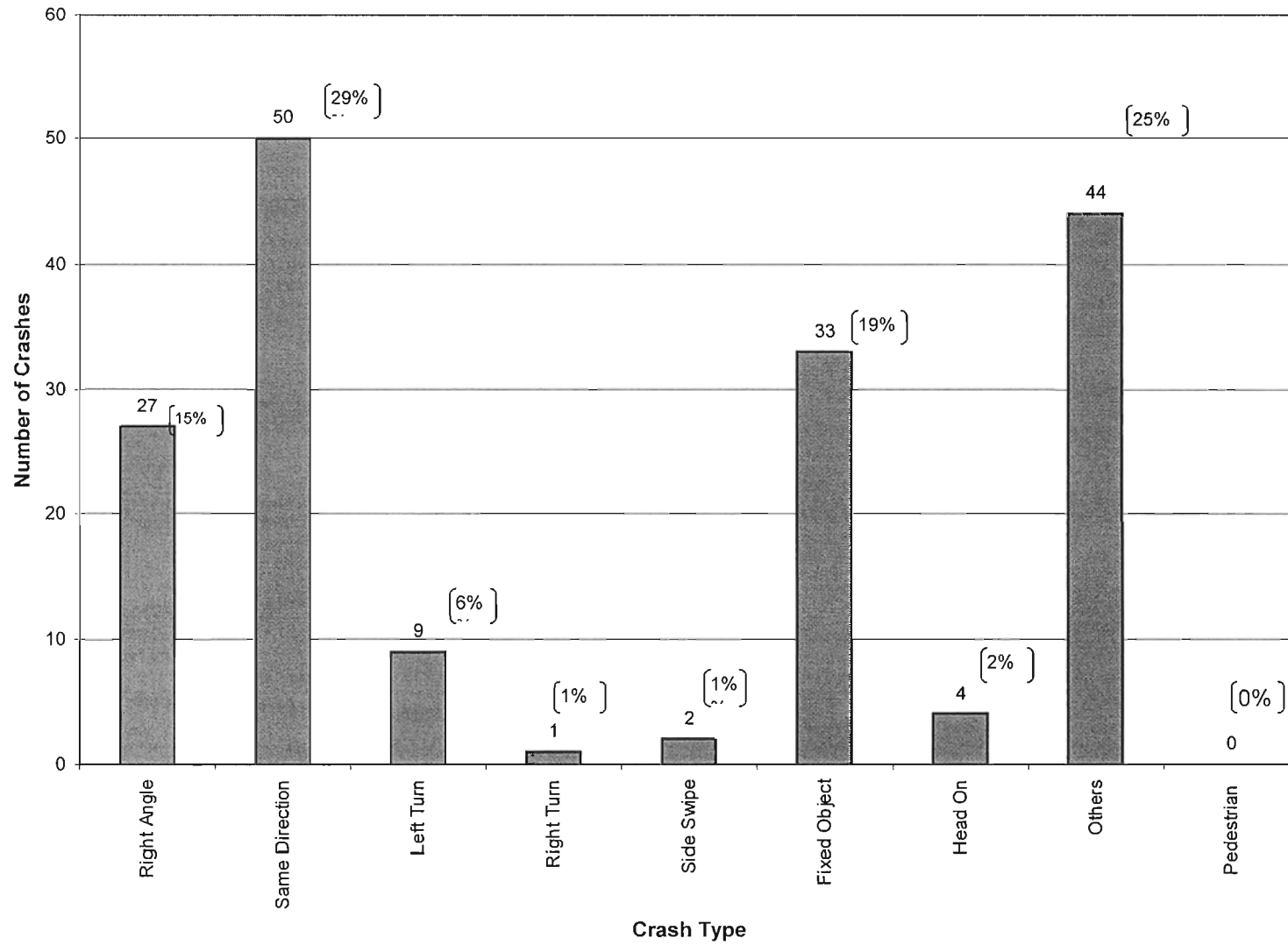




Hook Road  
Spot Location of Crashes (Proximity to Nearest Intersection)



# Hook Road Crash Type



**HOOK ROAD (CR 551)**  
**CRASH SUMMARY 2001**  
**TOTAL-38 CRASHES**  
**Month**

|          |          |          |          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Jan.     | Feb.     | Mar.     | Apr.     | May      | June     | July     | Aug.     | Sept.    | Oct.     | Nov.     | Dec.     |
| <u>3</u> | <u>4</u> | <u>4</u> | <u>4</u> | <u>2</u> | <u>3</u> | <u>3</u> | <u>1</u> | <u>7</u> | <u>2</u> | <u>3</u> | <u>2</u> |

| Time of Day     |           |                 |           | Day of Week |           |
|-----------------|-----------|-----------------|-----------|-------------|-----------|
| AM              | Number of | PM              | Number of |             | Number of |
| Midnight - Noon | Crashes   | Noon - Midnight | Crashes   |             | Crashes   |
| Midnight – 1:00 | 0         | 12:00-1300      | 5         | Monday      | 7         |
| 1:00 – 2:00     | 0         | 1300-1400       | 5         | Tuesday     | 4         |
| 2:00 – 3:00     | 0         | 1400-1500       | 1         | Wednesday   | 4         |
| 3:00 – 4:00     | 1         | 1500-1600       | 3         | Thursday    | 6         |
| 4:00 – 5:00     | 1         | 1600-1700       | 3         | Friday      | 8         |
| 5:00 – 6:00     | 0         | 1700-1800       | 2         | Saturday    | 4         |
| 6:00 – 7:00     | 2         | 1800-1900       | 3         | Sunday      | 5         |
| 7:00 – 8:00     | 4         | 1900-2000       | 2         |             |           |
| 8:00 – 9:00     | 1         | 2000-2100       | 1         |             |           |
| 9:00 – 10:00    | 0         | 2100-2200       | 0         |             |           |
| 10:00 – 11:00   | 1         | 2200-2300       | 0         |             |           |
| 11:00 – 12 Noon | 2         | 2300-2400       | 1         |             |           |

**Crash Caused By**

Local Resident 14 County Resident 7 State Resident 9 Out-of-State Resident 6 Unknown 2

DAY 29  
NIGHT 9

DRY 27 WET 8 SNOWY 1 ICY 2 OTHERS 0

CLEAR 25 RAIN 7 SNOW 3 FOG 3

INJURY 11 NON-INJURY 27 FATAL 0

|             |                |           |            |            |
|-------------|----------------|-----------|------------|------------|
| Right Angle | Same Direction | Left Turn | Right Turn | Side Swipe |
| <u>5</u>    | <u>19</u>      | <u>3</u>  | <u>0</u>   | <u>0</u>   |

|              |          |          |            |          |
|--------------|----------|----------|------------|----------|
| Fixed Object | Head On  | Other    | Pedestrian | Bike     |
| <u>5</u>     | <u>1</u> | <u>5</u> | <u>0</u>   | <u>0</u> |

Parking Related 1

**Hook Road ( CR 551 )**  
**CRASH SUMMARY 2002**  
**TOTAL-38 CRASHES**  
**Month**

| Jan.     | Feb.     | Mar.     | Apr.     | May      | June     | July     | Aug.     | Sept.    | Oct.     | Nov.     | Dec.     |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <u>4</u> | <u>2</u> | <u>1</u> | <u>1</u> | <u>1</u> | <u>5</u> | <u>0</u> | <u>4</u> | <u>5</u> | <u>6</u> | <u>6</u> | <u>3</u> |

| Time of Day     |                   |                 |                   | Day of Week |                   |
|-----------------|-------------------|-----------------|-------------------|-------------|-------------------|
| AM              | Number of Crashes | PM              | Number of Crashes |             | Number of Crashes |
| Midnight - Noon |                   | Noon - Midnight |                   |             |                   |
| Midnight – 1:00 | 1                 | 12:00-1300      | 1                 | Monday      | 6                 |
| 1:00 – 2:00     | 0                 | 1300-1400       | 3                 | Tuesday     | 6                 |
| 2:00 – 3:00     | 0                 | 1400-1500       | 0                 | Wednesday   | 5                 |
| 3:00 – 4:00     | 2                 | 1500-1600       | 8                 | Thursday    | 6                 |
| 4:00 – 5:00     | 2                 | 1600-1700       | 2                 | Friday      | 6                 |
| 5:00 – 6:00     | 0                 | 1700-1800       | 7                 | Saturday    | 5                 |
| 6:00 – 7:00     | 0                 | 1800-1900       | 4                 | Sunday      | 4                 |
| 7:00 – 8:00     | 0                 | 1900-2000       | 1                 |             |                   |
| 8:00 – 9:00     | 1                 | 2000-2100       | 1                 |             |                   |
| 9:00 – 10:00    | 1                 | 2100-2200       | 0                 |             |                   |
| 10:00 – 11:00   | 0                 | 2200-2300       | 1                 |             |                   |
| 11:00 – 12 Noon | 2                 | 2300-2400       | 1                 |             |                   |

**Crash Caused By**

Local Resident 16 County Resident 4 State Resident 7 Out-of-State Resident 9 Unknown 2

DAY 22 NIGHT 16

0 DRY 25 WET 10 SNOWY 3 ICY 0 OTHERS 0

CLEAR 28 RAIN 7 SNOW 3 FOG 0

INJURY 7 NON-INJURY 31

| Right Angle | Same Direction | Left Turn | Right Turn | Side Swipe |
|-------------|----------------|-----------|------------|------------|
| <u>7</u>    | <u>10</u>      | <u>1</u>  | <u>0</u>   | <u>0</u>   |

| Fixed Object | Head On  | Other                      | Pedestrian | Bike     |
|--------------|----------|----------------------------|------------|----------|
| <u>6</u>     | <u>0</u> | <u>12</u> ( 9 struck deer) | <u>0</u>   | <u>0</u> |

Parking Related 1

**HOOK ROAD ( CR 551)**  
**CRASH SUMMARY 2003**  
**TOTAL- 55 CRASHES**  
**Month**

|          |           |          |          |          |          |          |          |          |          |          |          |
|----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Jan.     | Feb.      | Mar.     | Apr.     | May      | June     | July     | Aug.     | Sept.    | Oct.     | Nov.     | Dec.     |
| <u>8</u> | <u>10</u> | <u>3</u> | <u>1</u> | <u>2</u> | <u>5</u> | <u>4</u> | <u>0</u> | <u>3</u> | <u>4</u> | <u>6</u> | <u>9</u> |

| Time of Day     |           |                 |           | Day of Week |           |
|-----------------|-----------|-----------------|-----------|-------------|-----------|
| AM              | Number of | PM              | Number of |             | Number of |
| Midnight - Noon | Crashes   | Noon - Midnight | Crashes   |             | Crashes   |
| Midnight – 1:00 | 0         | 12:00-1300      | 6         | Monday      | 9         |
| 1:00 – 2:00     | 0         | 1300-1400       | 2         | Tuesday     | 4         |
| 2:00 – 3:00     | 1         | 1400-1500       | 3         | Wednesday   | 4         |
| 3:00 – 4:00     | 2         | 1500-1600       | 4         | Thursday    | 9         |
| 4:00 – 5:00     | 0         | 1600-1700       | 4         | Friday      | 14        |
| 5:00 – 6:00     | 1         | 1700-1800       | 5         | Saturday    | 9         |
| 6:00 – 7:00     | 2         | 1800-1900       | 5         | Sunday      | 6         |
| 7:00 – 8:00     | 1         | 1900-2000       | 4         |             |           |
| 8:00 – 9:00     | 1         | 2000-2100       | 4         |             |           |
| 9:00 – 10:00    | 2         | 2100-2200       | 0         |             |           |
| 10:00 – 11:00   | 5         | 2200-2300       | 1         |             |           |
| 11:00 – 12 Noon | 2         | 2300-2400       | 0         |             |           |

**Crash Caused By**

Local Resident 19 County Resident 14 State Resident 9 Out-of-State Resident 10 Unknown 3

DAY 35

NIGHT 20

DRY 30 WET 10 SNOWY 5 ICY 9 OTHERS 1

CLEAR 34 RAIN 9 SNOW 11 FOG 1

INJURY 16 NON-INJURY 39

|             |                |           |            |            |
|-------------|----------------|-----------|------------|------------|
| Right Angle | Same Direction | Left Turn | Right Turn | Side Swipe |
| <u>7</u>    | <u>10</u>      | <u>4</u>  | <u>0</u>   | <u>1</u>   |

|              |          |                            |            |          |
|--------------|----------|----------------------------|------------|----------|
| Fixed Object | Head On  | Other                      | Pedestrian | Bike     |
| <u>10</u>    | <u>3</u> | <u>20 (10 struck deer)</u> | <u>0</u>   | <u>0</u> |

Parking Related 1

**HOOK ROAD ( CR 551)**  
**CRASH SUMMARY 2004**  
**TOTAL- 41 CRASHES**  
**Month**

|          |          |          |          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Jan.     | Feb.     | Mar.     | Apr.     | May      | June     | July     | Aug.     | Sept.    | Oct.     | Nov.     | Dec.     |
| <u>8</u> | <u>2</u> | <u>3</u> | <u>3</u> | <u>0</u> | <u>6</u> | <u>0</u> | <u>3</u> | <u>1</u> | <u>4</u> | <u>6</u> | <u>5</u> |

| Time of Day     |           |                 |           | Day of Week |           |
|-----------------|-----------|-----------------|-----------|-------------|-----------|
| AM              | Number of | PM              | Number of |             | Number of |
| Midnight - Noon | Crashes   | Noon - Midnight | Crashes   |             | Crashes   |
| Midnight – 1:00 | 0         | 12:00-1300      | 3         | Monday      | 4         |
| 1:00 – 2:00     | 0         | 1300-1400       | 3         | Tuesday     | 4         |
| 2:00 – 3:00     | 3         | 1400-1500       | 2         | Wednesday   | 5         |
| 3:00 – 4:00     | 0         | 1500-1600       | 4         | Thursday    | 6         |
| 4:00 – 5:00     | 0         | 1600-1700       | 2         | Friday      | 10        |
| 5:00 – 6:00     | 2         | 1700-1800       | 2         | Saturday    | 8         |
| 6:00 – 7:00     | 1         | 1800-1900       | 3         | Sunday      | 4         |
| 7:00 – 8:00     | 4         | 1900-2000       | 2         |             |           |
| 8:00 – 9:00     | 1         | 2000-2100       | 2         |             |           |
| 9:00 – 10:00    | 0         | 2100-2200       | 1         |             |           |
| 10:00 – 11:00   | 2         | 2200-2300       | 2         |             |           |
| 11:00 – 12 Noon | 0         | 2300-2400       | 2         |             |           |

**Crash Caused By**

Local Resident 14 County Resident 5 State Resident 9 Out-of-State Resident 10 Unknown 3

DAY 25  
NIGHT 16

DRY 25 WET 10 SNOWY 3 ICY 3 OTHERS 0

CLEAR 30 RAIN 8 SNOW 2 FOG 1

INJURY 9 NON-INJURY 32

|             |                |           |            |            |
|-------------|----------------|-----------|------------|------------|
| Right Angle | Same Direction | Left Turn | Right Turn | Side Swipe |
| <u>8</u>    | <u>11</u>      | <u>1</u>  | <u>1</u>   | <u>1</u>   |

|              |          |                          |            |          |
|--------------|----------|--------------------------|------------|----------|
| Fixed Object | Head On  | Other                    | Pedestrian | Bike     |
| <u>12</u>    | <u>0</u> | <u>7 (5 struck deer)</u> | <u>0</u>   | <u>0</u> |

Parking Related 1

**HOOK ROAD (CR 551 )**  
**ACCIDENT SUMMARY 2001-2004**  
**TOTAL-172 CRASHES**  
**Month**

|           |           |           |          |          |           |          |          |           |           |           |           |
|-----------|-----------|-----------|----------|----------|-----------|----------|----------|-----------|-----------|-----------|-----------|
| Jan.      | Feb.      | Mar.      | Apr.     | May      | June      | July     | Aug.     | Sept.     | Oct.      | Nov.      | Dec.      |
| <u>23</u> | <u>18</u> | <u>11</u> | <u>9</u> | <u>5</u> | <u>19</u> | <u>7</u> | <u>8</u> | <u>16</u> | <u>16</u> | <u>21</u> | <u>19</u> |

| Time of Day           |                      |                       |                      | Day of Week |                      |
|-----------------------|----------------------|-----------------------|----------------------|-------------|----------------------|
| AM<br>Midnight - Noon | Number of<br>Crashes | PM<br>Noon - Midnight | Number of<br>Crashes |             | Number of<br>Crashes |
| Midnight – 1:00       | 1                    | 12:00-1300            | 15                   | Monday      | 26                   |
| 1:00 – 2:00           | 0                    | 1300-1400             | 13                   | Tuesday     | 18                   |
| 2:00 – 3:00           | 4                    | 1400-1500             | 6                    | Wednesday   | 18                   |
| 3:00 – 4:00           | 5                    | 1500-1600             | 19                   | Thursday    | 27                   |
| 4:00 – 5:00           | 3                    | 1600-1700             | 11                   | Friday      | 38                   |
| 5:00 – 6:00           | 3                    | 1700-1800             | 16                   | Saturday    | 26                   |
| 6:00 – 7:00           | 5                    | 1800-1900             | 15                   | Sunday      | 19                   |
| 7:00 – 8:00           | 9                    | 1900-2000             | 9                    |             |                      |
| 8:00 – 9:00           | 4                    | 2000-2100             | 8                    |             |                      |
| 9:00 – 10:00          | 3                    | 2100-2200             | 1                    |             |                      |
| 10:00 – 11:00         | 8                    | 2200-2300             | 4                    |             |                      |
| 11:00 – 12 Noon       | 6                    | 2300-2400             | 4                    |             |                      |

**Crashes Caused By**

Local Resident 63 County Resident 30 State Resident 34 Out-of-State Resident 35 Unknown 10

DAY 111  
NIGHT 61

DRY 108 WET 38 SNOWY 11 ICY 14 OTHERS 1

CLEAR 117 RAIN 31 SNOW 19 FOG 5

INJURY 43 NON-INJURY 129 FATAL 0

|             |                |           |            |            |
|-------------|----------------|-----------|------------|------------|
| Right Angle | Same Direction | Left Turn | Right Turn | Side Swipe |
| 27          | 50             | 9         | 1          | 2          |

|              |         |              |            |      |
|--------------|---------|--------------|------------|------|
| Fixed Object | Head On | Other        | Pedestrian | Bike |
| 33           | 4       | 44 (24 deer) | 0          | 0    |

Parking Related 2

## SJTPO Safety Audits



P1010264.JPG



P1010265.JPG



P1010266.JPG



P1010267.JPG



## SJTPO Safety Audits



P1010268.JPG



P1010269.JPG



P1010270.JPG



P1010271.JPG



## SJTPO Safety Audits



P1010272.JPG



P1010273.JPG



P1010274.JPG



P1010275.JPG



## SJTPO Safety Audits



P1010276.JPG



P1010278.JPG



P1010279.JPG



P1010280.JPG



## SJTPO Safety Audits



P1010281.JPG



P1010282.JPG



P1010283.JPG



P1010284.JPG



## SJTPO Safety Audits



P1010285.JPG



P1010286.JPG



P1010287.JPG



P1010288.JPG

Route \_\_\_\_\_

Date \_\_\_\_\_

**Safety Audit Stage 5****Operation/Existing Roads****Checklist 5-1****General Topics**

| Item                 | Issues to be Considered  | Check | Comments |
|----------------------|--|-------|----------|
| 1<br>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<br>Parking         | Are provisions for parking satisfactory in relation to traffic operations and safety?  |       |          |
| 3<br>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<br>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 |
|--|---|-------|----------|
| 1<br>Visibility,<br>sight<br>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<br>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<br>Overtaking                | Are adequate passing opportunities provided?                       |       |          |
| 4<br>Readability<br>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 5-2****Alignment and Cross Section****Project** \_\_\_\_\_**Audit Team Members** \_\_\_\_\_**Date** \_\_\_\_\_

| Item             | Issues to be Considered   | Check | Comments |
|------------------|---|-------|----------|
| 5<br>Widths      | Are all traffic lanes and roadway widths, including bridges, adequate?        |       |          |
| 6<br>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<br>Side slopes | Are the side slopes and table drains safe for run off vehicles to traverse?   |       |          |

## Checklist 5-3

## Intersections

Project \_\_\_\_\_

Audit Team Members \_\_\_\_\_

Date \_\_\_\_\_

| Item          | Issues to be Considered   | Check | Comments |
|---------------|---|-------|----------|
| 1<br>Location | Are intersections located safely with respect to horizontal and vertical alignment?   |       |          |
| 2<br>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<br>Controls | Are pavement markings and intersection control signing satisfactory?  |       |          |
| 4<br>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<br>Visibility,<br>sight<br>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<br>Tapers          | Are starting and finishing tapers located and aligned correctly?                         |       |          |
| 2<br>Shoulders       | Are appropriate shoulder widths provided at merges in accordance with design guidelines? |       |          |
| 3<br>Signs           | Is signing and marking installed in accordance with standards?                           |       |          |
| 4<br>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<br>Visibility,<br>sight<br>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<br>Paths                | Are there appropriate travel paths and crossing points for pedestrians and cyclists?   |       |          |
| 2<br>Barriers and fencing | 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)?  |       |          |
|                           | Where necessary, is crash barrier installed to separate vehicle, pedestrian and cyclist flows?   |       |          |
| 3<br>Bus stops            | Are bus stops appropriately located with adequate clearance from the traffic lane for safety and visibility?   |       |          |
| 4<br>Elderly and disabled | Are there adequate provisions for the elderly, the disabled, children, wheelchairs and baby carriages (e.g., holding rails, curb and median crossings, ramps)? |       |          |
|                           | Where necessary, are hand rails provided (e.g., on bridges, ramps), and are they adequate?   |       |          |

## 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<br>- cycle length<br>- pedestrian clearance time<br>- 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<br>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<br>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<br>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)? |       |          |

## Checklist 5-6

## Signs and Lighting

Project \_\_\_\_\_

Audit Team Members \_\_\_\_\_

Date \_\_\_\_\_

| Item                            | Issues to be Considered  | Check | Comments |
|---------------------------------|--|-------|----------|
| Marking and delineation (cont.) | On light colored pavement surfaces (e.g. concrete) are RRPMS used to simulate traffic lanes?                                 |       |          |
|                                 | 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<br>Operation        | Are traffic signals operating correctly? Is the number and location of signal displays appropriate?   |       |          |
| 2<br>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<br>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<br>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<br>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<br>(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<br>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<br>Line markings                         | Are all line markings (center line, edge line, transverse lines) in good condition?   |       |          |
| 2<br>Guide posts                           | Are guide posts correctly placed, clean, and visible?                                 |       |          |
| 3<br>Raised and Recessed Pavement Markings | Are RPM's in good condition?  |       |          |
| 4<br>Chevron Alignment Markers             | Are Chevron Alignment Markers placed correctly, and used only according to standards? |       |          |

## Safety Audit Stage 5

## Operation/Existing Roads

### Checklist 5-10

### Pavement

Project \_\_\_\_\_

Audit Team Members \_\_\_\_\_

Date \_\_\_\_\_

| Item                  | Issues to be Considered   | Check | Comments |
|-----------------------|---|-------|----------|
| 1<br>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<br>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<br>Ponding          | Is the pavement free of areas where ponding or sheet flow of water may occur with resultant safety problems?  |       |          |
| 4<br>Loose screenings | Is the pavement free of loose screenings?   |       |          |