

ENGINEER'S REPORT
of the
Left Rear Passenger COLLISION

By:

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January 14, 2010

Left Rear Passenger COLLISION

ENGINEER'S REPORT

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1. INTRODUCTION

This single-vehicle run-off-the-road crash occurred June 15, 2006, at about 2:20 *p.m.* on Glenwood Avenue, in City, NH. The crash involved a 1995 Hyundai two-door hatchback, driven by Driver, and occurred within a construction work zone. Left Rear Passenger was injured as a result of the crash.

The construction underway was being performed by Contractor under contract to the City. Engineering and construction management services for the project were provided by Engineer.

This investigation was performed to determine if dangerous roadway conditions were a cause of the crash, and if those conditions were present due to improper actions of Contractor or Engineer.

2. AVAILABLE INFORMATION

1. State of New Hampshire Uniform Police Traffic Accident Report, by Officer Yerardi, of the City Police Department. This report includes:
 - a. Diagram of the crash site and movement of the vehicle;
 - b. Voluntary Statement of Anthony Camarato.
 - c. Voluntary Statement of Maurice Olivier.
 - d. Voluntary Statement of Driver.
 - e. Voluntary Statement of Spencer Williams.
 - f. 19 Incident Supplements.
2. City Police Department Accident Reconstruction Report, by Lieutenant Carey R. Beaulieu, including scene and vehicle photographs, post-collision vehicle inspection report, and a scale diagram of the crash site.
3. Photos.
 - a. Forty-three 8-1/2 x 11" numbered color copies of photos of the crash scene, Exhibit Driver 10. (No. 19 is missing.)
 - b. Seven 8-1/2 x 11" numbered color copies of photos of the crash site, Exhibit Driver 11.
 - c. Two 8-1/2 x 11" color copies of photos of the crash site, date stamped 6/23/06, Exhibit Driver 12.
 - d. Sixty-five color digital photos of the crash site, date stamped 6/23/06.

- e. Fourteen 4 x 6" color copies of photos of the crash site, Exhibit Sklarz 5.
4. Information related to the construction contract:
- a. Agreement between City and Engineer for Final Design and Bid Phase Services.
 - b. Agreement between City and Engineer for Services During Construction Services
 - c. Plans of Glenwood Avenue Reconstruction Project, City of City, New Hampshire. By K&K, December 2005.
 - d. As Built construction drawings for the project.
 - e. Project specifications.
 - f. Contractor's submittal of shop drawing for Traffic Control and Construction Signs.
 - g. Construction meeting minutes.
 - h. Daily job reports by Joseph Sklarz, Contractor superintendent. The last of these reports is 6/15/06.
 - i. Daily reports by Jim West, Contract Manager for Engineer. The last of these reports is 6/7/06.
 - j. Letter from Naclerio to West about the crash, dated 6/23//06.
5. Information from defendants:
- a. Engineer Response to Plaintiffs' First Request for Production of Documents.
 - b. Contractor's Answers to Plaintiffs' First Request for Production of Documents.
6. Deposition transcripts:
- a. Anthony Camarato, Contractor equip. operator March 19, 2009
 - b. Driver January 12, 2009
 - c. Jonathan Marshall March 19, 2009
 - d. Left Rear Passenger November 4, 2009
 - e. Left rear passenger's father November 5, 2009
 - f. Salvatore Naclerio, Engineer's on site representative October 11, 2009
 - g. Maurice Olivier, local resident October 19, 2009
 - h. Left rear passenger's "stepfather" November 3, 2009
 - i. Contractor President November 2, 2009
 - j. Joseph Sklarz, Contractor superintendent November 2, 2009
 - k. Spencer Williams March 19, 2009
7. My June 1, 2007, site inspection.

3. DESCRIPTION OF THE CRASH and CRASH SITE

The Police Accident Reconstruction report:

On June 15, 2006 at approximately 14:23 hours, Driver was driving west on Glenwood Avenue, having left the area of Broadway in the city of City... Driver eventually turned west onto Glenwood Avenue and reached the area of the construction. At that stage Driver was traveling at speeds of between 52 and 66 mph. After Driver left the paved portion of the roadway, for some unknown reason, he lost control of the vehicle. The most likely explanation is that the vehicle lost traction on the loose particulate due to his excessive speed. Driver's vehicle left the right side of the roadway and stuck the tree in front of #67 Glenwood Avenue...

At the crash visibility was daylight, the weather was partly cloudy, and the normally paved roadway surface was disrupted due to construction activity and dry.

Glenwood Avenue is oriented generally east-west and is a two-way, two-lane urban street under the jurisdiction of the City. Adjacent land use is residential. The police report states the speed limit was posted 30 mph for the entire length of Glenwood Avenue, both directions.

At the crash, Glenwood Avenue west of the Spaulding Turnpike bridge was being reconstructed. The construction crew was working at west of the crash site, and the crash site was in a partial stage of construction. The work was being done Contractor, under Contract No. 218681L for the City. Engineering and construction management services for the project were provided by Engineer.

Driver testified (D 84) that he turned left onto Glenwood Avenue at Horne Street. This is about ½ mile prior to the end of the bridge. Over this section, Glenwood Avenue curves slightly to the right and is generally level.

Driver approached the site by traversing Glenwood Avenue, where there had been no construction, crossing a concrete surface bridge over the Spaulding Turnpike, and then a dirt/gravel-surfaced Glenwood Avenue for 285 feet (to the struck tree).

The transition from the paved bridge to the dirt/gravel surface road was smooth according to Naclerio (deposition page 31, and memo of 6/26/06) and sloped slightly down due to excavation of the road.

The police described the road surface: "The road surface was comprised of loose gravel, with the particulate ranging in size from sand to egg size pebbles."

The police "...inspected the mechanical components of the vehicle to see if there was some sort of mechanical defect that could have contributed to the crash." The police did not find any mechanical defect that contributed to the crash.

I conclude that the collision occurred due to Driver traveling at high speed and the road surface changing from paved to dirt/gravel as a result of construction activity.

The roadway pavement had been removed on Glenwood Avenue west of the Spaulding Turnpike Bridge several weeks before the crash¹. The crash occurred within a long-term construction work site.

Although it is claimed^{2,3} that various signs related to the construction were present, no signs are seen in the scene photos⁴ at the end of the bridge pavement and beyond the bridge towards the intersection with Whittier Street. There were no flagmen on the job per Sklarz who notes the presence of flagmen and their hours in his daily reports (JS 58)

4. DANGEROUS ROADWAY CONDITIONS

Testimony indicates that Glenwood Avenue was used as a “cut through” by non-local traffic, and that Driver and others routinely drove through the construction site at high speed. This was a dangerous condition that should have lead to the closing of the construction area to all but local traffic.

Failure to close the work zone to all but local traffic resulted in high speed traffic going through the work zone and the collision that occurred.

5. WORK ZONE TRAFFIC CONTROL at the CRASH SITE

The control of traffic through work areas is an essential part of street and roadway construction⁵.

According to Contractor’s Contract,

The Contractor will be responsible to provide all construction traffic detour-signing, barrels with flashing beacons, and flaggers as needed to maintain traffic flow in a safe orderly manner. (Notice to Bidders)

All provisions of the “Manual On Uniform Traffic Control Devices” 1988 edition and the “Standard Specifications for Road and Bridge Construction”, State of New Hampshire,

¹ Per Jim West daily reports pavement milling started 4/26/06. Per Joe Sklarz daily reports reclaiming of the road started 4/26/06.

² Naclerio memo of 6/26/06. “The Contractor had all the traffic signs in position to warn drivers of the on-going construction on the road. Sample – Const. Ahead, Road Closed, Detour, local traffic only – I have pictures of all signage on the site that day.” The pictures were not seen by Naclerio and have not been made available for review.

³ Police Report page Request for Administrative Action. “There were signs posted restricting travel to Local Residents Only.” And, Police Report Supplement #7, “Driver claimed there was no sign indicating that Glenwood Avenue was closed to local travel west of the Whittier Street intersection. However, responding police officers report the sign was in fact in place.”

⁴ See particularly Driver Exhibit 10, Photos 12, 31

⁵ MUTCD, 1988 edition, Revision 3, 1993. Page 6.

1990, sections 615 and 618 shall apply except as may be modified or changed below or approved by the ENGINEER. (Specifications, Section 03900, Traffic Control and Construction Signs)

Maintenance of traffic shall consist of providing and maintaining construction signs, barricades, delineators, lights, flashers and other warning devices as ordered by the ENGINEER or as needed. The contractor shall develop a traffic control plan including a detour sign package for review and approval. (Specifications, Section 03900, Traffic Control and Construction Signs)

If acceptable traffic control is not maintained, then the ENGINEER can suspend all work. (Specifications, Section 03900, Traffic Control and Construction Signs)

The Engineer is defined in the specifications as

ENGINEER – Shall mean the City Engineer for the City, New Hampshire, and his representative(s)

Engineer served as the City’s professional engineering representative on the project⁶. Salvatore Naclerio was the on-site Engineer employee who was the Resident Project Representative for the Engineer. Jim West was Engineers Contract Manager⁷.

Contractor submitted two sheets titled TRAFFIC CONTROL & CONSTRUCTION SIGNS, dated 4/19/06. Engineer responded to Contractor by Transmittal of May 1, 2006, saying that Contractor’s submittal was “Approved as Noted”. The first sheet showed seven traffic control and construction signs

- A Road Work Ahead
- B Be Prepared to Stop
- C End Road Work
- D Flagman Ahead
- E Local Traffic Only
- F Message Board
- G Arrow Board

and located Signs A, B and C at positions along Glenwood Avenue and intersecting streets. The second sheet showed the same list of signs and had the notes:

Daily package per “Manual on Uniform Traffic Control Devices”, 1988 edition as necessary.

Detours onto Horne St. & Whittier St. may be needed as work continues.

The Remarks on Engineer’s Transmittal were:

⁶ Agreement between City and D&K for services during construction.

⁷ Preconstruction conference notes.

1. Will need to erect signs “A” and “B” in both directions on South Street and Central Avenue when work is being performed at the intersections.
2. If and when detours are planned, proper detouring signs need to be erected.

Photos of the crash scene do not show any signs in place for westbound traffic on the bridge or on the approach to the bridge. Records show that flagmen were not on site.

Driver entered Glenwood Avenue at Horne Street. Based on Contractor’s submittal, and the scene photographs, the only construction sign Driver encountered in his approach to the crash site was a Road Work Ahead sign on Horne Street. There was⁸ also a Local Traffic Only sign; however it is not likely that Driver passed it on the day of the crash.

6. DEFICIENCIES in WORK ZONE TRAFFIC CONTROL at the CRASH SITE

It is well established by the depositions⁹ that non-local motorists used Glenwood Avenue as a cut-through and that Driver and others were speeding through the site. Camarato, for example, testified (pages 38 - 59)

- He had been on the job for a couple of months prior to the crash.
- During that time he observed Driver speeding through the job site “a couple times a week anyways”.
- “On one occasion I did stop him, tell him that he was going way too fast for the road conditions.”
- Driver was “...stopped at least three times that I know of.” Once by Camarato and other times by other workers.
- He didn’t know when the stop occurred, but after the stop he continued to see Driver speeding up and down the area.
- He discussed this with Joe Sklarz before the accident.
- After his discussions with Sklarz, Driver continued to speed up and down the site.
- He observed other guys (than Driver) speeding through the site.
- He thought that the people who sped up and down that site were not local residents, “...because that road’s a big shortcut.”
- A Local Traffic Only sign was always up, but “People weren’t paying attention to the local traffic sign.”

⁸ There is no documentation that shows where this sign may have been placed. However, Driver testified (D 56) he was aware that traffic in the construction work zone was restricted to local travel for people living in that area. Meeting Minutes No. 3, dated 6/7/06, about a week prior to the collision, contained the note “DW would like a road closed sign except for residents, erected at each end of the project.” In addition, Naclerio said in his memo of 6/23/06 “The contractor had all the traffic sign in position to warn drivers of the on-going construction on the road. Sample – Const. Ahead, Road Closed, Detour, local traffic only ...”

⁹ See: Camarato, starting on page 38; Naclerio, page 21-24; Contractor President page 26, insofar as more than just Camarato were aware of this; Olivier, starting on page 10. Also police reports statements of Camarato and Olivier.

The persistent high-speed non-local traffic through the construction site was dangerous to both the construction workers and the traffic. Contractor and Engineer were aware of, or should have been aware of, the speeding through traffic prior to the collision. The Local Traffic Only signs that were present were not effective in stopping the speeding through traffic. Contractor and Engineer should have changed the traffic control plan prior to the crash. Contractor and Engineer should have taken effective steps to detour the non-local traffic.

The portion of the 1988 MUTCD which pertains to work zone traffic control is Part VI, Traffic Control for Street Highway Construction, Maintenance, Utility and Emergency Operations.

The MUTCD is issued by the Federal Highway Administration (FHWA). In September 1993 the FHWA issued a total revision of Part VI as the *1988 Edition of the MUTCD, Revision 3*. Section 01000, Paragraph I of the contract specifications states

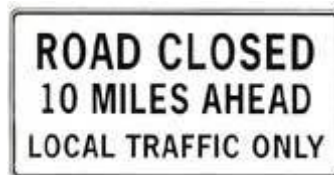
Standard specifications such as ... Federal specifications which are referred to in these specifications shall be the latest revisions thereof and shall include all applicable amendments and revisions which are in effect thirty (30) days prior to the date of submission of bids.

Therefore, the 1993 Revision of the 1988 MUTCD is considered applicable to the work being done by Contractor¹⁰.

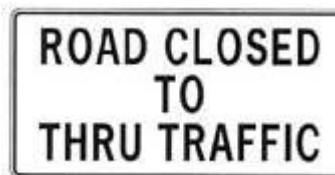
Regarding the Local Traffic Only sign, the 1993 Revision of the 1988 MUTCD states

(5) LOCAL TRAFFIC ONLY Signs (R11-3, R11-4)

The LOCAL TRAFFIC ONLY signs should be used where through traffic must detour to avoid a closing some distance beyond the sign, but where local traffic can move up to point of closure. The sign shall carry the legend ROAD CLOSED [10] MILES AHEAD-LOCAL TRAFFIC ONLY or, optionally for urban use, ROAD (STREET) CLOSED TO THRU TRAFFIC, and should be accompanied by appropriate warning and detour signing. The words BRIDGE OUT or BRIDGE CLOSED may be substituted for ROAD CLOSED where applicable.



R11-3
60"x30"



R11-4
60"x30"

Contractor appears to have had available a sign that said Road Closed, Local Traffic Only as seen in the extract from the photo in Exhibit Camarato 2 below, as opposed to Local Traffic Only

¹⁰ In 2000 and 2003 the FHWA issued entirely new editions of the entire MUTCD. Although presented differently, Part VI of these later editions mirrored the 1993 revision as they relate to the Glenwood Avenue Project. However, D&Ks specifying the 1988 edition was not the appropriate standard.

as shown on their TRAFFIC CONTROL & CONSTRUCTION SIGNS submittal. Note that this photo was taken 6/23/06, a week following the collision. There is no claim that Glenwood Avenue was closed with a barricade the day of the collision.



The sign used by Contractor is similar to R11-3, with the distance to the closure point omitted.

The 1988 MUTCD also contains Typical Applications.

6G-1. TYPICAL APPLICATIONS

Typical applications include a variety of traffic control methods, but do not include a layout for every conceivable work situation. Typical applications should be altered, when necessary, to fit the conditions of a particular temporary traffic control zone. Standards presented in sections 6A-6F should be given priority over the examples given in the typical applications.

The typical applications illustrated in section 6H generally represent highway agency norms. Other devices may be added to supplement the devices shown in the typical applications, and sign spacings and taper lengths may be increased to provide additional time or space for driver response. In some situations, however, such as an urban setting, too many devices can spread signing over too long a distance to be meaningful. When conditions are not as difficult as those depicted in the typical application, fewer devices may suffice.

The Typical Application appropriate to closing of Glenwood Avenue to through traffic is Detour for Closed Street, TA-20.

Detour for Closed Street

1. Display similar signs and devices for the opposite movement.
2. Use this plan for city streets and for county or township roads. See figure TA-9 for the procedure for detouring a numbered highway.
3. The use of a street name sign mounted with the M4-9 DETOUR sign is optional. When used, the street name plate is placed above the DETOUR sign. The plate may have either a white-on-green or a black-on-orange legend.

4. An M4-9 DETOUR sign with an advance turn arrow may be used in advance of a turn. On multilane streets, such signs should be used.
5. Flashing warning lights and/or flags may be used to call attention to the advanced warning signs.
6. Warning lights may be used on Type III barricades.
7. M4-9 DETOUR signs may be located on the far side of the intersections.

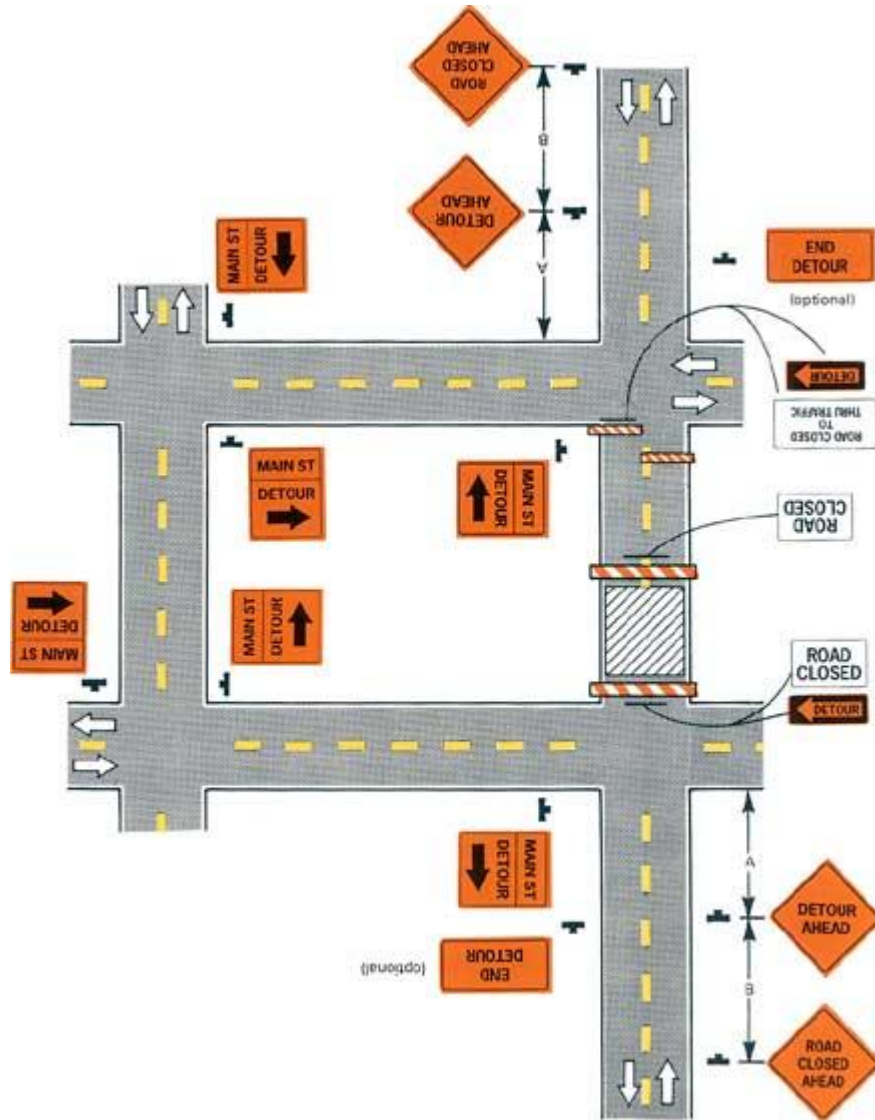


Figure TA-20. Detour for closed street

The orange cross-hatched devices shown at the Road Closed to Thru Traffic sign are barricades

Section 6F-5 Channelizing Devices, speaks to the application of barricades when a local road is closed to all but local traffic.

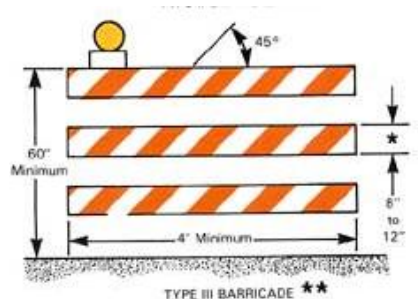
f. (2) Application

Type I or Type II barricades are intended for use in situations where traffic is maintained through the temporary traffic control zone. They may be used singly or in groups to mark a specific condition, or they may be used in a series for channelizing traffic. Type I barricades normally would be used on conventional roads or urban streets and arterials. Type II barricades have more retroreflective area and are intended for use on expressways and freeways or other high-speed roadways.

Type III barricades used at a road closure may extend completely across a roadway or from curb to curb. Where provision is made for access of authorized equipment and vehicles, the responsibility for the Type III barricades should be assigned to a person to ensure proper closure at the end of each work day.

When a highway is legally closed but access must still be allowed for local traffic, the Type III barricade should not be extended completely across a roadway. A sign with the appropriate legend concerning permissible use by local traffic shall be mounted. (See section 6F-1.a.5.)

A Type III barricade has three striped rails and is at least 5' high and 4' wide, as seen in the following extract from the MUTCD.



- * Nominal lumber dimensions are satisfactory for barricade rail width dimensions
- ** Rail stripe widths shall be 6 inches except where rail lengths are less than 36 inches; then 4 inch wide stripes may be used.
- The sides of barricades facing traffic shall have retroreflective rail faces

Glenwood Avenue should have been closed to through traffic as shown on Typical Application - 20, with Type III barricades at Whittier Street. Positioned as shown on TA-20 the barricades constitute a traffic calming measure called a chicane¹¹. Chicanes are used for speed reduction and together with positioning of the sign would have been an effective deterrent to through traffic such as Driver¹². In addition the black and white sign is a regulatory sign. Regulatory signs give notice of traffic laws or regulations which are enforceable by police.

¹¹ See Ewing, R., 'Traffic Calming, State of the Practice', Report No. FHWA-RD-135, Institute of Transportation Engineers under contract with Department of Transportation, Federal Highway Administration, Washington D.C., U.S.A., 1999

¹² In "Traffic Calming...", page 110, chicanes are shown to reduce collisions by 82%.

If application of signing and barricades per TA-20 proved ineffective at controlling high speed traffic through the construction site, the next step would have been to involve the local police as flaggers at the detour point. The use of police as flaggers is anticipated in the MUTCD

6E-3

Uniformed law enforcement officers may be used as flaggers in some locations, such as an urban intersection, where enforcement of traffic movements is important.

and was discussed¹³ at the construction site.

7. RESPONSIBILITIES

According to Contractor's Contract,

The Contractor will be responsible to provide all construction traffic detour-signing barrels with flashing beacons, and flaggers as needed to maintain traffic flow in a safe orderly manner. (Notice to Bidders)

All provisions of the "Manual On Uniform Traffic Control Devices" 1988 edition and the "Standard Specifications for Road and Bridge Construction", State of New Hampshire, 1990, sections 615 and 618 shall apply except as may be modified or changed below or approved by the ENGINEER. (Specifications, Section 03900, Traffic Control and Construction Signs)

Maintenance of traffic shall consist of providing and maintaining construction signs, barricades, delineators, lights, flashers and other warning devices as ordered by the ENGINEER or as needed. The contractor shall develop a traffic control plan including a detour sign package for review and approval. (Specifications, Section 03900, Traffic Control and Construction Signs)

If acceptable traffic control is not maintained, then the ENGINEER can suspend all work. (Specifications, Section 03900, Traffic Control and Construction Signs)

Contractor's employees knew that Driver and others were speeding through the construction site and that the site was being traversed by through traffic. Contractor should have employed barricades and signs as in TA-20 to effectively close the road to local traffic.

Engineer knew that Driver and others were speeding through the construction site and that the site was being traversed by through traffic. Engineer prepared the design documents, which included the specification for Traffic Control and Construction Signs. Engineer reviewed and approved Contractor's traffic control plan. Engineer was the on-site representative of the City.

¹³ Camarato, page 51;Sklarz, pages 28 and 42.

Engineer should have instructed Contractor to employ barricades and signs as in TA-20 to effectively close the road to local traffic.

Failure of Contractor and Engineer to employ reasonable and established measures to effectively close Glenwood Avenue to through traffic was not prudent, was contrary to established standards and was a substantial cause of the collision in which Left Rear Passenger was injured.

8. FINDINGS

Within the bounds of reasonable engineering certainty, and subject to change if additional information becomes available, it is my professional opinion that:

1. The collision occurred due to Driver traveling at high speed and the road surface changing from paved to dirt/gravel as a result of construction activity.
2. The crash occurred within a long-term construction work site.
3. The only construction sign Driver encountered in his approach to the crash site was a Road Work Ahead sign on Horne Street. There were no flagmen on site.
4. Glenwood Avenue was used as a “cut through” by non-local traffic, and Driver and others routinely drove through the construction site at high speed.
5. The persistent high-speed non-local traffic through the construction site was dangerous to both the construction workers and the traffic.
6. Contractor and Engineer were aware of, or should have been aware of, the speeding through traffic prior to the collision, but made no change to the traffic control plan prior to the crash.
7. Contractor and Engineer should have taken effective steps to detour the non-local traffic.
8. Glenwood Avenue should have been closed to through traffic using provisions shown in TA-20 of the 1988 MUTCD, Revision 3 of 1993.
9. Use of devices and signs as shown in TA-20 would have been an effective deterrent to through traffic such as Driver.
10. If the devices and signs shown in TA-20 had not proved effective at controlling high speed traffic through the construction site, the local police should have been involved.
11. Failure of Contractor and Engineer to employ reasonable and established measures to effectively close Glenwood Avenue to through traffic was not prudent, was contrary to established standards and was a substantial cause of the collision in which Left Rear Passenger was injured.



Lance E. Robson, P.E. (NY)