

ENGINEER'S PRELIMINARY REPORT

for the

██████████ COLLISION

By:

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October 3, 2005

INVESTIGATION OF THE [REDACTED] COLLISION

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1. INTRODUCTION

This two-vehicle, intersection collision occurred on November 4, 2004, at about 10:48 *p.m.*, in Eaton Township, Wyoming County, Pennsylvania. The collision involved:

- 1) a 1997 GMC Sonoma pick-up, driven by [REDACTED]; and
- 2) a 1993 Toyota Camry, four-door sedan, driven by [REDACTED].

This investigation was performed to determine if highway conditions were improper in a manner that caused the collision.

2. AVAILABLE INFORMATION

1. Police Crash Reporting Form, by Trooper Michael D. Maguire, of the Pennsylvania State Police.
2. Fourteen 4 x 6" color copies of photographs of the two vehicles and the crash site.
3. My September 24, 2005 inspection of the site, meeting with [REDACTED]'s mother) and inspection of the Camry. My inspections included measurements and photographs.

3. DESCRIPTION OF THE SITE CONDITIONS AND COLLISION

The collision occurred at the intersection of Route 29 and Montross Road (Township Road 367). Route 29 is a rural highway under the jurisdiction of the Pennsylvania Department of Transportation (PaDOT). Montross Road is a local road, under the jurisdiction of Eaton Township.

According to PaDOT Traffic Volume Maps, the Average Annual Daily Traffic (AADT) on Route 29 at the crash site was 6,100 vehicles per day in 2001. The collision site is located in a rural-area of mountainous terrain where the surrounding land-use is wooded.

Route 29 is a north-south highway, running from the New York border, south of Binghamton, to the Wilkes-Barre area. Through Wyoming County, Route 29 is normally two lanes. The collision site is located at the crest of steep grades. Route 29 has auxiliary

climbing lanes on both sides, and is four-lanes wide over the crest of the grades, where the intersection with Montross Road is located.

Route 29 has an asphalt surface, is divided by a concrete median, and marked with yellow edge lines at the median, broken white lane dividing lines and solid white edge lines. The edge lines and lane dividing lines are continued through the intersection. The crash occurred within Segment 211, for Route 29 southbound. Route 29 is 52 feet wide, including median.

Through the intersection, Route 29 is on a right curve and in an excavated cross section (a “cut”). The inside of the curve is an excavated embankment, which together with vegetation on the embankment limits daytime sight-distance for southbound traffic to Montross Road. I measured the following corner sight distances:

Location of eye from SB Route 29 edge line	Distance along SB Route 29 to vehicle approaching in right lane	Comment
20 feet	93 feet	normal initial stopping position; front of vehicle 8’ from edge line; drivers then inch forward before accelerating out into road.
15	114	
14		
8	148	

The speed limit is the rural, unposted 55-mph. Approaching the intersection southbound is an Side Road (right) warning sign, with a 40 mph advisory speed plate, and other warning signs related to the passing zone. At the intersection Route 29 southbound is sloping down and is superelevated down to the right for the right curve.

Montross Road intersects with Route 29 on both the east and west sides; however, the intersections are not directly across from each other, and the intersection is an offset-tee. The crash occurred at West Montross, which is west of Route 29 and south of the intersection with East Montross. West Montross Road is 16 feet wide and steeply downgraded to the intersection. This road services an elder care facility at the intersection, and scattered single family homes, tying back to Route 29 south of the intersection, where Route 29 is only two-lanes wide.

Right of way through the intersection is controlled by Stop signs on Montross Road.

The collision occurred as [REDACTED] was attempting to cross Route 29 from Montross Road West, and [REDACTED] was southbound on Route 29. According to the Police Report the

lighting conditions were “dark (no street lights)”, there were no adverse weather conditions but the road surface was wet.

4. HIGHWAY CONDITIONS

Chapter 441 of Title 67 of the PaCode, *Access to and Occupancy of Highways by Driveways and Local Roads*¹⁹⁸⁰ regulates the location of local roads within the State highway right-of-way for the purpose of “...safe and reasonable access”. The current edition was issued in 1980; there were prior editions.

Chapter 441 contains definitions, as follows.

Local road -- Every public highway other than a State highway. The term includes existing or proposed streets, lanes, alleys, courts and ways.

Minimum use driveway – A residential or other driveway which is used or expected to be used by not more than 25 vehicles per day.

Pavement edge – The edge of the main traveled portion of any highway, exclusive of shoulder.

As shown in Table 1 of Chapter 441, the “Safe Sight Distance” to the left for passenger cars and single unit trucks exiting from driveways onto two-lane roads for a posted speed limit of 55 –mph is 845 feet. The Safe Sight Distance left for passenger cars and single unit trucks exiting from driveways onto four-lane roads for a posted speed limit of 55 –mph is shown in Table 3 as 785 feet. Safe Sight Distance is “Measured from a vehicle ten feet back of the pavement edge.” For this objective criterion, the available corner sight distance at the crash site is only 110 feet. Using the same tables, the available corner sight distance at the crash site does not meet Safe Sight Distance criteria for posted speeds of even 25 mph, the lowest speeds shown on the tables.

Chapter 441 states that the sight distance values in Tables 1 and 3 are desirable for safe operation of a driveway. If it is impossible to achieve the desirable value, Chapter 441 will allow, as a minimum, a sight distance equal to the minimum Safe Stopping Sight Distance. For a 55-mph vehicle speed, and flat grade, the minimum safe stopping sight distance is 538 feet. This value is much greater than the available sight distance of about 180 feet to Montross Road. The available stopping sight distance, using the same criteria, is again not sufficient for even 25 mph.

The minimum safe stopping distance requires that the driver of the vehicle on the through roadway react properly to the exiting driver, while the safe sight distance permits the driver exiting the driveway to do so under fully controlled conditions. In one case the burden is entirely on the through driver. In the other case the burden is shared.

The police report diagram shows impact in the passing lane and identifies “gouge marks” resulting from this crash. I found gouge marks in a similar position during my inspection. Assuming [REDACTED] accelerated normally¹ from a stopped position with the front of her car 4’ from the travel lane, she took about 3.5 seconds to travel from stop to impact. For speeds of 55 mph (posted speed limit) and 40 mph (posted advisory speed), an approaching vehicle would be 280 and 230 feet away when [REDACTED] began to move. These distances are far in excess of the available sight distance. [REDACTED]’s speed is shown in the police report as 70 mph. [REDACTED] was not visible to [REDACTED] when she pulled out into the road.

Had the sight distance been at least 785 feet, the Safe Sight Distance required by PaDOT for passenger vehicles, [REDACTED] would have been visible to [REDACTED] for an additional 7 to 8 seconds. [REDACTED] required less than one additional second to clear. Thus, had the available sight distance met established criteria [REDACTED]’s collision would not have occurred.

Thus, the grossly substandard corner sight-distance made the intersection dangerous in a manner that was a cause of the collision.

5. TOWNSHIP AND PADOT ACTIONS.

PaDOT’s Publication 70, *Guidelines For The Design Of Local Roads and Streets*^{1990a}, contains a section “Intersection Design”. A driveway is an intersection. This section states,

The location of an intersection should be carefully selected to avoid sharp horizontal curvatures, steep profile grades and to ensure adequate approach sight distances particularly for motorists who are stopped on the cross route. An intersection should not be situated on or just beyond a sharp crest vertical curve or on a sharp horizontal curve. Where no practical alternative location exists, the approach sight distance on each leg should be carefully investigated to permit a vehicle on the minor intersection leg to cross the traveled way without affecting the speed of the approach through traffic. To provide additional sight distance, backslopes may be flattened and horizontal or vertical curves may be lengthened. As a general rule, there should be seven (7) seconds minimum available to the driver crossing the through lanes. On this basis, the suggested corner sight distances for each design speed should be as specified in Table 2.3.

Table 2.3 shows “minimum corner intersection sight distance” of 1170 feet for a 4-lane, rural arterial roadway with a design speed of 60 mph.

Similarly, PaDOT’s *Design Manual, Part 2, Highway Design*^{1990j}, states,

Since intersections represent points of conflict, the alignment and profile should allow users to maneuver safely and with minimum interference by other users. The alignment should be as straight as possible and the; gradients should be as flat as practical.

¹ *Traffic Accident Investigation Manual*, by J. Stannard Baker, Northwestern University Traffic Institute. (1975)

The combination of vertical and horizontal curvature should allow adequate sight distance at an intersection. A sharp horizontal curve following a crest vertical is very undesirable in the intersection area. (Section 3.3)

Where traffic on the minor roadway of an intersection is controlled by stop signs, the driver of the vehicle on the minor roadway must have sufficient sight distance for a safe departure from the stopped position even though the approaching vehicle comes in view as the stopped vehicle begins its departure movements. (Section 2.40)

There is little doubt that both the Township and PaDOT knew or should have known that sight distance at the intersection was grossly substandard and dangerous. Both should have taken action to remediate the condition. Failure to take appropriate action was not reasonable or prudent and was a cause of this crash.

6. FINDINGS

Based on the information available and within a reasonable degree of engineering and technical certainty, my professional opinion is that:

1. The available corner sight distance at the crash site does not meet Safe Sight Distance criteria for posted speeds of even 25 mph, the lowest speeds shown on the tables.
2. The available stopping sight distance is not sufficient for even 25 mph.
3. Sight distances at the crash site are grossly substandard.
4. [REDACTED] was not visible to [REDACTED] when she pulled out into the road.
5. [REDACTED] required less than one additional second to clear. Had the available sight distance met established criteria [REDACTED]'s collision would not have occurred.
6. The grossly substandard corner sight-distance made the intersection dangerous in a manner that was a cause of the collision.
7. Both Eaton Township and PaDOT knew or should have known that sight distance at the intersection was grossly substandard and dangerous. Both should have taken action to remediate the condition.
8. Failure of Eaton Township and PaDOT to take appropriate action to remediate the dangerous condition at the intersection was not reasonable or prudent and was a cause of this crash.

Lance E. Robson, P.E.

7. REFERENCES

- 1980 *Access to and Occupancy of Highways by Driveways and Local Roads, Chapter 441* of Title 67 Transportation, of the Pennsylvania Code. PaDOT Publication RR 441, The Pennsylvania Department of Transportation, Commonwealth of Pennsylvania. (1980)
- 1990a *Guidelines for the Design of Local Roads and Streets*, PaDOT Publication 70. (August 1990 edition.)
- 1990j *Design Manual, Part 2, Highway Design*, PaDOT Publication 13. (January 1990 edition).