TH 10 Road Safety Audit Review
-
Randall, MN

1. Background

1.1 Purpose and Need for a Road Safety Audit Review

In less than a two year span (Jan. 1, 2003 – Dec. 29, 2004), there were four fatal crashes resulting in six fatalities along a short segment of Trunk Highway (TH) 10 as it by-passes the City of Randall, MN in Morrison County (see **Figure 1-1**). The City of Randall and Morrison County are located in the Minnesota Department of Transportations (Mn/DOT) district 3, headquartered in Baxter. Due to the short timeframe that these fatalities occurred; the City of Randall, Morrison County and State Senator Paul Koering contacted Mn/DOT and requested assistance in improving the area's safety. A letter from Senator Koering (January 5, 2005 addressed to Lieutenant Governor Carol Molnau) specifically asked that the posted speed limit be lowered.

In response, Mn/DOT organized a Road Safety Audit Review (RSAR). The goal of the RSAR was to identify existing deficiencies and to provide Mn/DOT District 3 with potential mitigation strategies.

It is expected that strategies discussed and recommended by this report will require more investigation and a detailed review by District 3 staff. This will be necessary before any formal decisions can be made for project programming and implementation. Also, the issue of limitations of available funding was considered by suggesting short-term (i.e., relative low cost) and long-term (i.e., relative high cost) strategies.

1.2 Road Safety Audit Study Limits

The four fatal crashes occurred in a short segment of TH 10 through Randall. Two of the fatal crashes were at the intersection with County State Aid Highway (CSAH) 14, a third was at the intersection with CSAH 104, and the fourth was a head-on between the intersections of TH 115 and CSAH 104 (see **Figure 1-2)**. The fatal crash that occurred between CSAH 104 and TH 115 was an alcohol impaired driver that was driving south in the northbound lanes. It was determined that this driver turned onto TH 10 heading the wrong way at CSAH 104. Since three of the fatal crashes occurred at an intersection and the fourth was related to a poor decision made at an intersection, the RSAR focused on the three intersections of TH 10 with:

- TH 115,
- CSAH 104, and
- CSAH 14.

FIGURE 1-1
Randall, Minnesota

1.3 Road Safety Audit Review Team

An interdisciplinary team was assembled on June 6, 2005 to perform a field review as part of the RSAR (see **Table 1-1**). The RSAR Team also met with local officials to get their perspective on the safety issues at the intersections. Local officials at the meeting included:

- a Morrison County Commissioner,
- Morrison County Engineer,
- Mayor for the City of Randall,
- a Randall City Council Member,
- City of Randall Public Works,
- City of Randall Fire Department, and
- Mn/DOT staff from District 3.

TABLE 1-1
Road Safety Audit Review Team

Name	Agency
Susan Groth	Mn/DOT – Assistant State Traffic Engineer
Loren Hill	Mn/DOT – State Traffic Safety Engineer
Dan Brannan	Mn/DOT – Traffic Safety Specialist
Jim Rosenow	Mn/DOT – State Geometric Design Engineer
Rick Sunstrom	Mn/DOT – Signing Specialist
Mike Kamnikar	Mn/DOT – Traffic Safety Engineer
Lieutenant Dave ZumBerge	Minnesota State Patrol
Dave Kopacz	FHWA – Operations & Safety Engineer
Howard Preston	CH2M HILL – Traffic Engineer
Richard Storm	CH2M HILL – Traffic Engineer

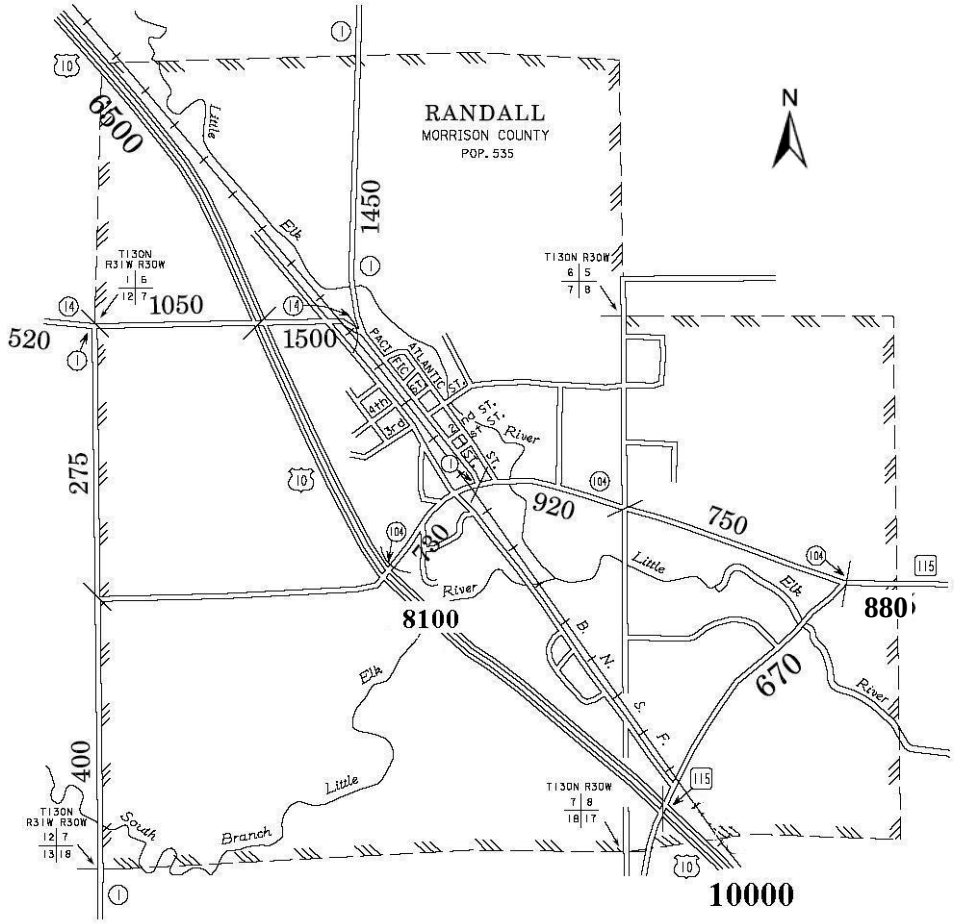


FIGURE 1-2
Study Location

NOTE: TH volumes are 2004 while county road volumes are 2001.
Source: Mn/DOT Office of Transportation Data & Analysis

2. Data Gathering Review and Analysis

2.1 Geometry and Intersection Traffic Control

TH 10 is designated as an east-west route, but the segment of TH 10 reviewed is generally in a northeast-southwest direction and many of the cross streets are east-west. Therefore, TH 10 will be considered a north-south route and the cross streets will be considered east-west for this report.

TH 10 is a four-lane divided expressway with a posted speed limit of 65 mph through the area. At the intersections reviewed, TH 10 has left and right turn lanes for each direction of travel with a length of 300 feet. The minor streets have a single approach lane to serve the left-turn, through, and right-turn maneuvers.

In examining plan sheets for the TH 10 alignment, it was noted that each intersection is located near a horizontal or vertical curve or the intersection is skewed.

- TH 115 intersects TH 10 at the north end of a horizontal curve.
- CSAH 104 intersects TH 10 along a horizontal curve and approximately 700 feet south of a crest vertical curve.
- CSAH 14 intersects TH 10 at a 24° skew angle and is just south of a horizontal curve.

In the Randall area, the three intersections under consideration are thru-STOP controlled with TH 10 as the free movement.

2.2 Vehicle Speeds

A spot speed study was conducted on TH 10 near the intersection of CSAH 14 on January 18, 2005. During the study, the speed for 84 northbound and 100 southbound vehicles were recorded. The speed profiles from the study are presented in **Figure 2-1 and 2-2**.

The 85th percentile speed for northbound TH 10 was 71 mph and approximately 69 mph for southbound traffic, both of which are within 6 mph of the posted speed limit (65 mph). Furthermore, 79% of the northbound vehicles were in the 10 mph pace and 86% of the southbound traffic was in the pace. Both of these statistics indicate that there is a very consistent travel speed along the corridor and that most vehicles are at or near the posted speed limit.

2.3 Traffic Volumes and Preliminary Signal Warrant Analysis

The most recent traffic volumes available, which are from 2001 for county roads and 2004 for trunk highway routes (TH 10 and TH 115), are shown in **Figure 1-2**. Using the most recent daily traffic volumes, and the ADT thresholds from the research report TAU 390, a preliminary signal warrant analysis was completed (see **Figures 2-3** and **2-4**). Even though the three intersections generally do not fall into either of the definitive areas ("Warrant Met" or "Warrant Not Met"), the intersections tend to be close to the "Warrant Not Met" category. Based on this information, it is unlikely that the minimum traffic volume threshold would be met, as contained in the Minnesota Manual in Uniform Traffic Control Devices MNMUTCD), if hourly volumes were collected and a detailed study was completed.

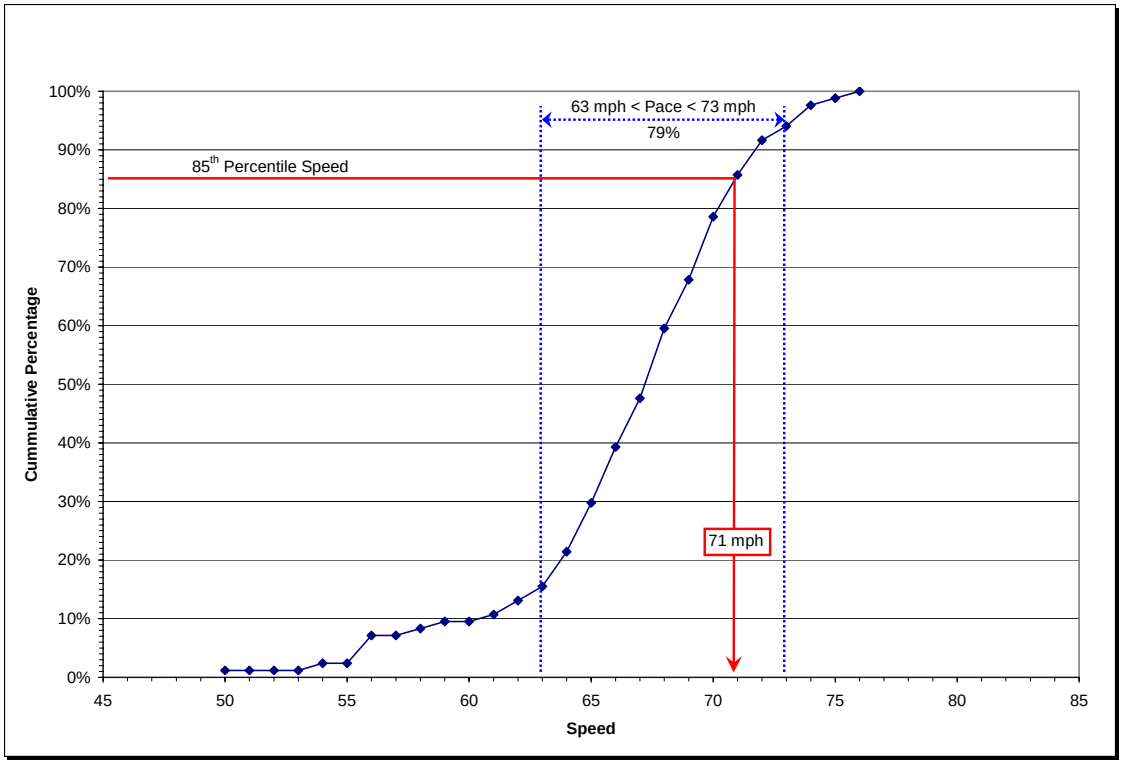


FIGURE 2-1
Speed Profile for TH 10 Northbound near CSAH 14

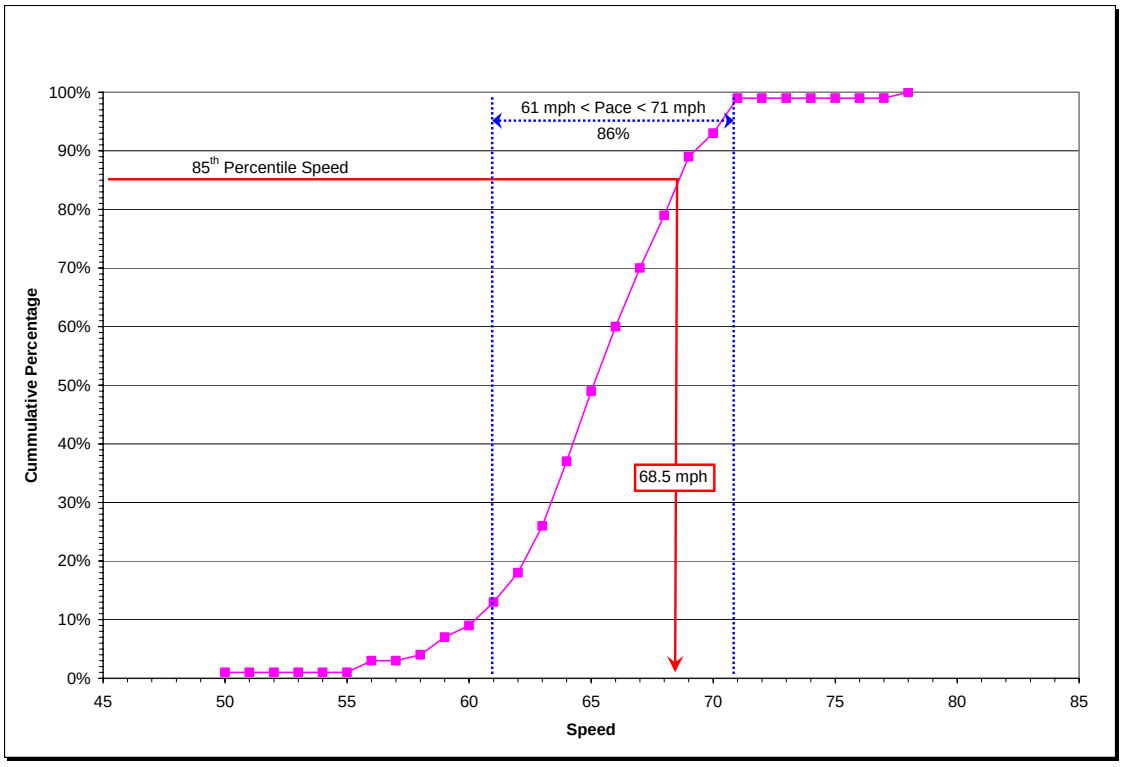


FIGURE 2-2
Speed Profile for TH 10 Southbound near CSAH 14

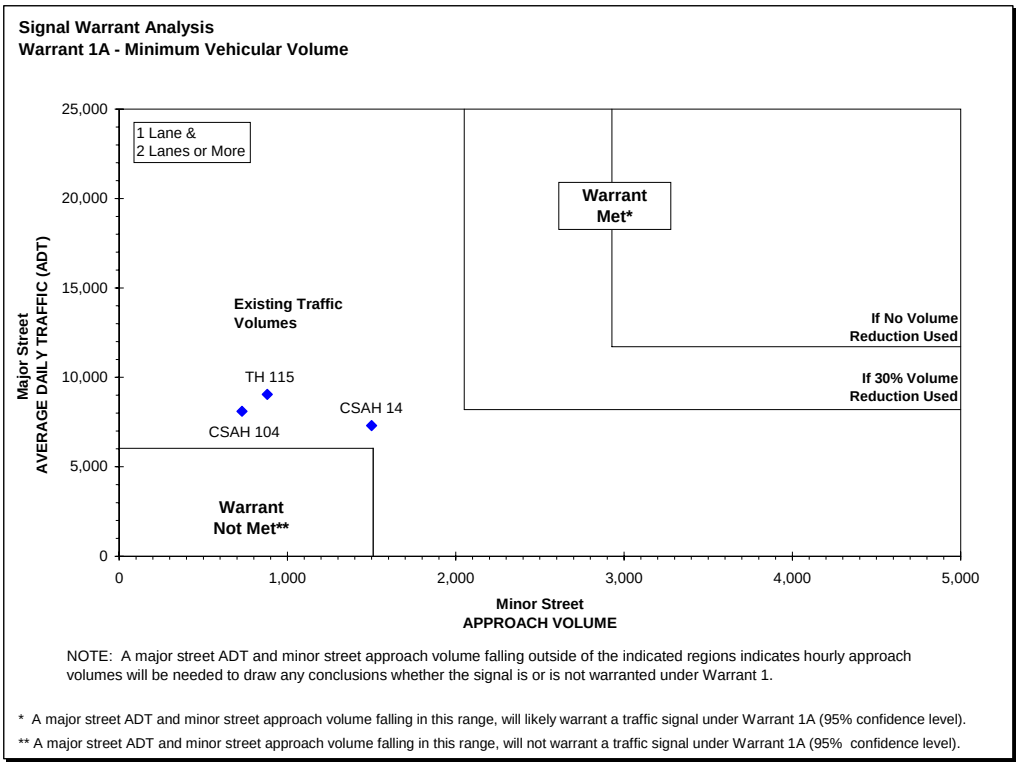


FIGURE 2-3
Signal Warrant 1A – Minimum Vehicular Volume

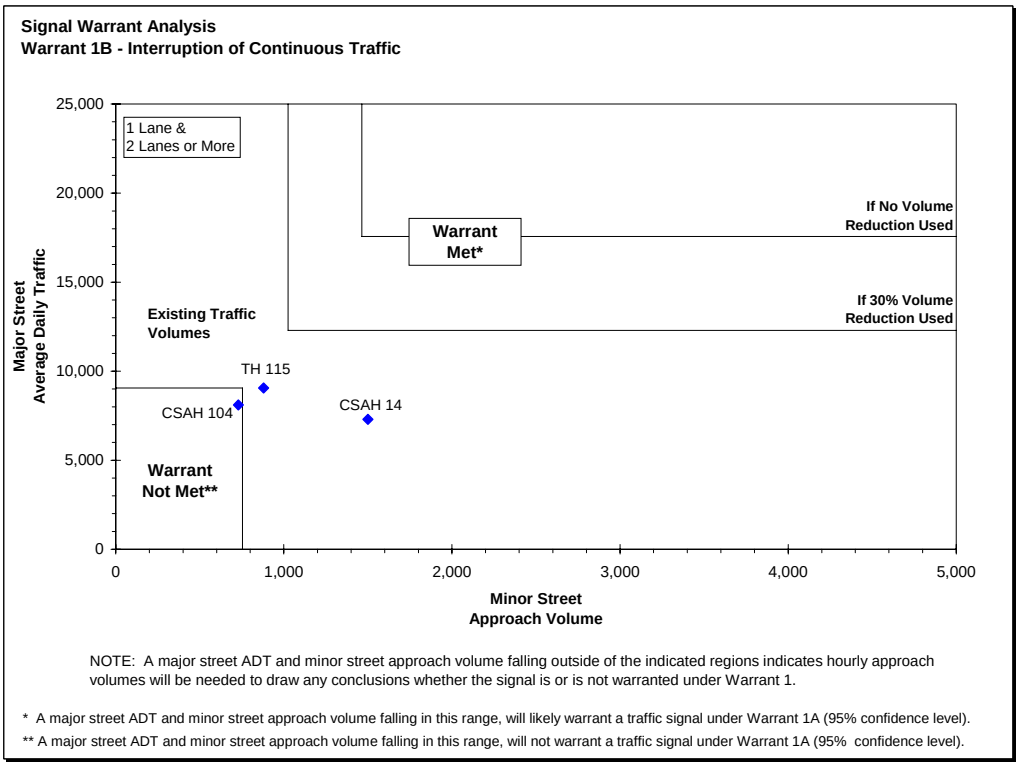


FIGURE 2-4
Signal Warrant 1B – Interruption of Continuous Traffic

2.4 Crash Data

A review of the crash records was performed to identify if any patterns existed at these intersections. This review included crash diagrams for each intersection prepared by District 3 staff (see **Appendix A**), a summary of the crash characteristics (see **Table 2-1**), and a review of the officer accident reports of the four fatal crashes.

CSAH 104 had three crashes, which was the fewest number of crashes of the three intersections during the timeframe studied (January 1, 2001 through September 30, 2004). There were seven crashes at the intersection of TH 115 and ten crashes at CSAH 14. The crash rates (crashes per million entering vehicles) were calculated for each intersection. The crash rate at TH 115 (0.5) and CSAH 104 (0.3) was at or below the expected crash rates (Statewide = 0.4; District 3 = 0.5). The intersection of CSAH 14 had a crash rate of 0.8 which is above the expected rates. The crash rate was also found to be at or near the critical crash rate[1] (CCR) using either the statewide average (CCR = 0.8) or the District 3 average (CCR = 0.9).

The most frequent crash type was the right angle crash, which was 57% of the crashes at TH 115, 67% at CSAH 104, and 70% at CSAH 14. Weather, road surface, and daylight conditions was not a factor in most crashes, but dark driving conditions was found to be a factor in 43% (3 crashes) of the crashes at the TH 115 intersection.

For the three fatal crashes at the intersections, reviewing the officer reports revealed that all three were unrelated to the driver's ability to identify they were approaching an intersection (i.e., run-the-STOP). Instead, these crashes were caused by the driver's inability to either recognize the presence of a vehicle on TH 10 or safely judge the size of the gap being selected (i.e., stopped & pulled-out). This observation is consistent with several Minnesota studies that have found that right angle crashes are the most common crash type at rural, thru-STOP, high-crash intersections (*Review of Minnesota's Rural Intersection Crashes: Methodology for Identifying Intersections for Intersection Decision Support*. MN/RC-2004-31, May 2004.) and that right angle crashes are predominately related to gap recognition as opposed to intersection recognition. (*Reducing Crashes at Controlled Rural Intersections*. MN/RC 2003-15, July 2003.)

3. Field Review Observations

The RSAR team conducted the field review on Monday, June 6, 2005. Following a morning meeting with local officials and District 3 traffic engineers, the team reviewed the intersections from 12:00 PM to 2:30 PM. Many observations were made during both the morning meeting and during the field observation. Some of the deficiencies observed may not be directly linked to the safety problem, but they are listed here for consideration by District 3 staff.

3.1 General Observations

Geometric Design

- The three intersections generally have design features consistent with recommended guidelines, but each also has a geometric factor that makes the location less than optimum. TH 115 intersects just north of a horizontal curve, CSAH 104 intersects along a horizontal curve and near a crest vertical curve, and CSAH 14 has a 24° skew angle.

[1] The critical crash rate is a rate set that is statically significantly higher than the expected crash rate. Therefore, it is unlikely that the increased crash frequency at an intersection with a crash rate at or above the critical crash rate can be described as a random phenomenon. Instead, the increased crash frequency is likely due to a safety deficiency.

- The median width is consistent through out the area. Between the edges of the turn lanes, the median is approximately 75 feet wide.
- The rolling alignment and horizontal curves can essentially "hide" an intersection making it difficult for a driver on TH 10 to realize they are approaching an intersection (see **Figure 3-1**).
- Vehicles stopped at the STOP sign or in the median generally have 10 seconds or more of available sight distance, which is more than adequate to safely pull out. However, if the grass in the median gets much taller, it may obscure a driver's line of sight when trying to enter or cross TH 10.

TABLE 2-1
Intersection Crash Summary (Jan. 1, 2001 – Sept. 30, 2004 and within 300 feet of the intersection)

	TH 10 & TH 115	TH 10 & CSAH 104	TH 10 & CSAH 14
Daily Entering Vehicles (Estimated)	9,600	8,600	8,600
Crash Frequency*	7	3	10
Crash Rate	0.5	0.3	0.8
D3 Critical Crash Rate (R_a = 0.5)	0.9	0.9	0.9
State Critical Crash Rate (R_a = 0.4)	0.7	0.8	0.8
Crash Severity			**
Fatal	0 (0%)	1 (33%)	1 (10%) *
Serious Injury	0 (0%)	0 (0%)	0 (0%)
Major Injury	0 (0%)	0 (0%)	4 (40%)
Minor Injury	1 (14%)	0 (0%)	1 (10%)
Property Damage	6 (86%)	2 (67%)	4 (40%)
Crash Type			
Other/Unknown	1 (14%)	0 (0%)	3 (30%)
Rear End	1 (14%)	0 (0%)	0 (0%)
Left Turn	1 (14%)	0 (0%)	0 (0%)
Right Turn	0 (0%)	0 (0%)	0 (0%)
Right Angle	4 (57%)	2 (67%)	7 (70%)
Ran-off Road	0 (0%)	1 (33%)	0 (0%)
Head-On	0 (0%)	0 (0%)	0 (0%)
Sideswipe - Passing	0 (0%)	0 (0%)	0 (0%)
Sideswipe - Opposing	0 (0%)	0 (0%)	0 (0%)
Weather Conditions			
Clear/Cloudy	5 (72%)	2 (67%)	9 (90%)
Rain	1 (14%)	0 (0%)	1 (10%)
Snow	1 (14%)	0 (0%)	0 (0%)
Sleet/Hail/etc.	0 (0%)	1 (33%)	0 (0%)
Road Surface Conditions			
Dry	5 (72%)	1 (33%)	8 (80%)
Wet	1 (14%)	1 (33%)	2 (20%)
Snow/Slush	1 (14%)	0 (0%)	0 (0%)
Ice/Packed Snow	0 (0%)	1 (33%)	0 (0%)
Light Conditions			
Daylight	4 (57%)	2 (67%)	8 (80%)
Dawn	0 (0%)	0 (0%)	0 (0%)
Dusk	0 (0%)	0 (0%)	1 (10%)
Dark (Street Lights On)	0 (0%)	0 (0%)	1 (10%)
Dark	3 (43%)	1 (33%)	0 (%)

* A second fatal crash occurred on 12/29/2004.
** Fourth fatal crash occurred between intersections.

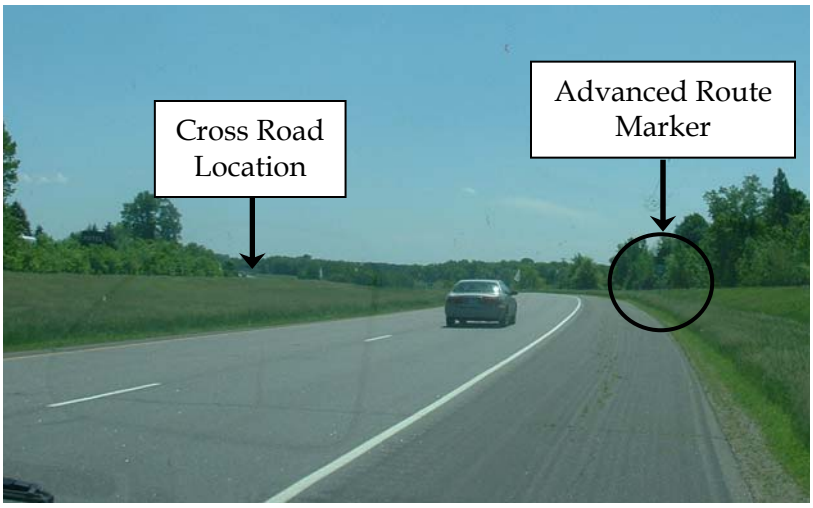


FIGURE 3-1
A Rolling TH 10 Alignment and Advance Route Markers that are Difficult to See can "Hide" Intersections (SB approach to CSAH 104)

Signing and Pavement Markings

- When driving on TH 10, the advanced route markers for the cross streets appeared to be undersized, making them difficult to see at the posted speed limit (see **Figure 3-1**). The placement of the route markers also do not appear to be consistent with current practices.
- The new traffic control practice on a four-lane divided highway is to provide signs or pavement markings for right and left turn lanes. The right and left turn lanes on TH 10 are inconsistent with current traffic control practices since they are neither signed as turn lanes nor have pavement markings identifying them as turn lanes (see **Figure 3-2**).
- STOP signs, ONE WAY signs, and DIVIDED HIGHWAY signs are one size smaller than what is currently being recommended for expressway intersections.

FIGURE 3-2
TH 10 Left and Right Turn Lanes are Unmarked (NB approach to TH 115)

Traffic Operations

- A small sampling of vehicles found that speeds were consistent with posted speed limits. (A State Patrol Officer commented that the speeds of the vehicles involved in the

collisions were not in excess of the posted limit at a majority of the crashes and at none of the fatal crashes.)
- Parallel routes to the east and west of TH 10 provide for local circulation within Randall and also connect CSAH 14, CSAH 104, and TH 115 (see **Figure 1-2**).

Emergency and Medical Response

- City and county officials reported that the BNSF railroad through Randall currently carries 60 trains per day and is projected to increase to 80 trains per day. Since the railline is located between TH 10 and the fire station, City staff reported that first responders have been delayed in responding to emergencies, including vehicle crashes, when the crossings are blocked by either a long or low speed train.

3.2 Site Specific Observations

TH 10 & TH 115 Intersection

- Because of the horizontal curve located south of TH 115, a vehicle in the right turn lane (northbound TH 10) can obscure a driver's line of sight for a large portion of TH 10 (driver stopped on east approach of TH 10 & TH 115 intersection). This scenario has been simulated in **Figure 3-3**.
- Sign assembly combines regulatory and guide signs on same supports, which is inconsistent with current guidelines (see **Figure 3-4**).
- The only development in the vicinity of the intersection is a gas/convenience store located in the northeast quadrant.
- There is no intersection lighting at the intersection, but the signing and lights at the gas station do provide limited destination lighting.

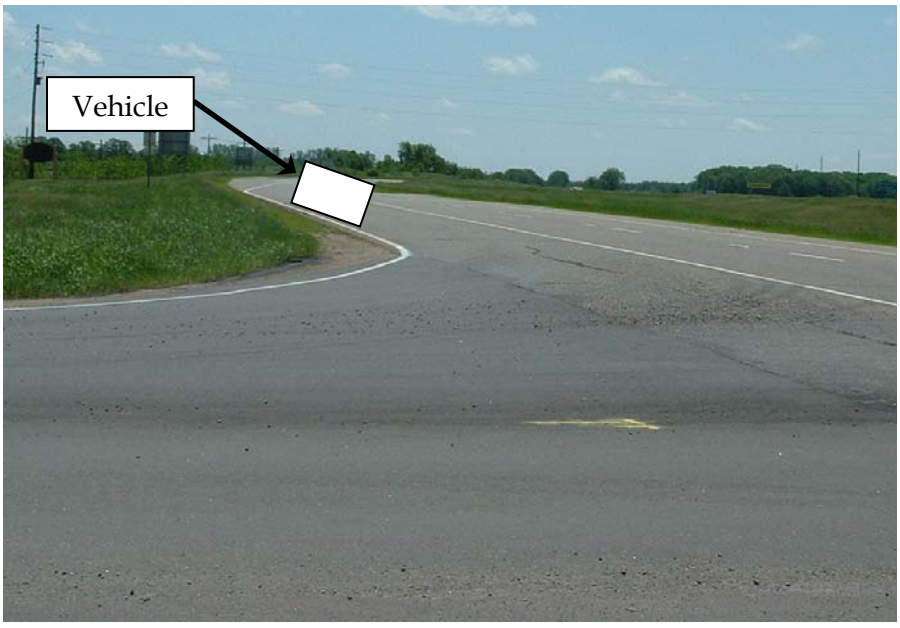


FIGURE 3-3
A Vehicle in Right Turn Lane can Obstruct a Driver Stopped on TH 115 (looking south from east approach)

FIGURE 3-4
STOP Sign and Route Marker Assembly

TH 10 & CSAH 104 Intersection

- The northbound and southbound TH 10 alignments at different elevations combined with the vertical curve make it more difficult to see an approaching vehicle from the north when stopped on the east approach. If the grass in the median grows taller than what was observed, it could further reduce sight distance.
- There is no street lighting at the intersection.
- The only development in the vicinity of the intersection is a motel located in the northeast quadrant.

TH 10 & CSAH 14 Intersection

- Due to the skew angle of the intersection, for a driver stopped on either CSAH 14 approach, it appears that a vehicle in the TH 10 right turn lane can "hide" another vehicle in a large portion of the TH 10 alignment. This scenario has been simulated in **Figure 3-5**.
- There is one non-standard street light in the northeast quadrant of the intersection that would illuminate only the east approach(see **Figure 3-6**).
- The only development in the vicinity of the intersection is residential.

4. Potential Mitigation Strategies

The RSAR Team developed and then evaluated a wide range of potential safety improvement strategies that included elements in all four of the safety E's – Enforcement, Engineering, Education and Emergency Services. In addition, consideration was given to both lower cost items that could be more easily implemented in the short term and higher cost items that could take a number of years in order to secure necessary funds and move through Mn/DOT's project

development process. The primary evaluating criteria was – Does the strategy really solve the problem?

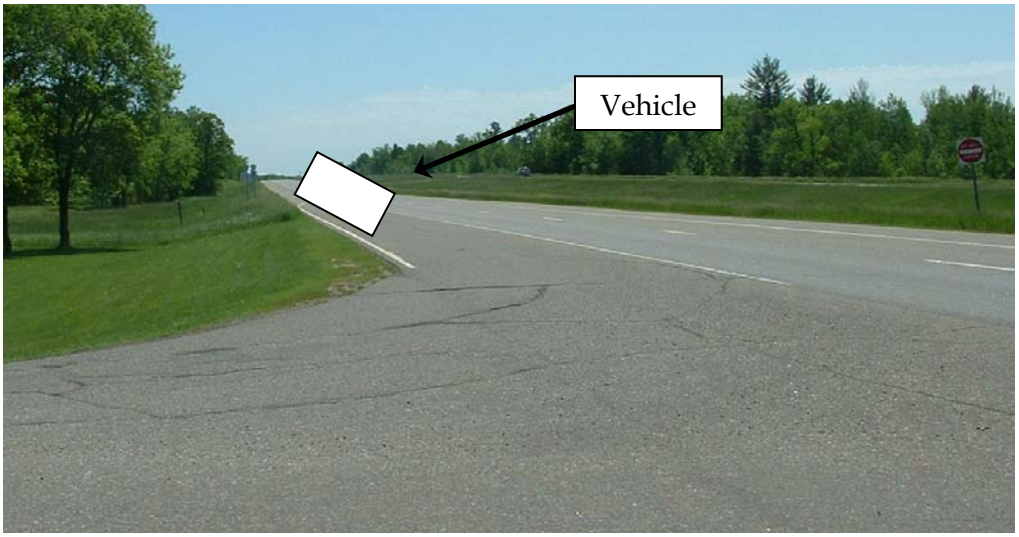


FIGURE 3-5
A Vehicle in Right Turn Lane can Obstruct a Driver Stopped on CSAH 14 (looking south from east approach)

FIGURE 3-6
Intersection Lighting at TH 10 & CSAH 14

The results of the technical analysis and the field observations indicate four key points that heavily influenced the development and evaluation of alternative safety strategies.

1. Something does need to be done, especially at the CSAH 14 intersection because both the frequency and severity of crashes is much higher than what would be expected.
2. The factor contributing to 65% of intersection crashes and three out of the four fatal crashes is poor gap selection by the drivers on the minor street approaches.

3. The basic design features for TH 10 and the three intersections are in substantial compliance with current design guides. However, the intersections are often difficult to recognize from the mainline due to the rolling topography and curvilinear alignment.

4. Intersection sight distance is adequate in all cases but lines of sight on the minor approaches can be intercepted by vehicles in the auxiliary turn lanes or vegetation adjacent to the shoulders.

The first strategy that was considered was lowering the present 65 MPH speed limit along TH 10. It was the consensus of the RSAR Team that this strategy should be dropped for three primary reasons. First, law enforcement officers that investigated the crashes along this segment of TH 10 indicated that speed was NOT in excess of the posted speed limit. Second, simply posting a lower speed limit has never been successful by itself at either lowering actual vehicle speeds or reducing intersection related crashes. Finally, this segment of TH 10 has a crash rate below the statewide average and an actual speed profile that is entirely consistent with the 65 MPH posted speed limit. It is entirely reasonable to assume that these two statistics are related – a very high percentage of the drivers traveling at about the same speed provide a level of consistency that is associated with fewer crashes. It is also reasonable to assume that artificially lowering the speed limit would introduce more variability into the speed profile and this is a condition that has been associated with a higher frequency of crashes.

The second strategy that was considered was installing a traffic signal, with the most likely candidate intersection being CSAH 14. It was also the consensus of the RSAR Team that this strategy should be dropped. The primary reason for not pursuing this idea is that traffic signal installation at similar high speed rural expressway intersections have not demonstrated a consistently positive effect on either crash frequency or crash severity. A review of Mn/DOT data after the installation of a signal shows a consistent increase in crashes and a short term decrease in severity. However, a recent study of similar rural Iowa intersections by Iowa State University showed both an increase in crashes and an increase in severity. In addition to the lack of a proven ability to reduce intersection crashes, especially along rural expressways, an overview of the guidelines in the Minnesota Manual on Uniform Traffic Control Devices (MNMUTCD) (**Figure 2-4** and **2-5**) demonstrates that none of the intersections have minor street volumes that come anywhere close to approaching the established minimum traffic volume thresholds. Finally, it was noted that a traffic signal installation at Randall would adversely effect traffic operations along the mainline, similar to the effects of the signal at the City of Royalton which has been observed to produce mainline queues in excess of twelve miles on holiday weekends.

4.1 Suggested Short Term Safety Strategies

The short term strategies that are recommended for further consideration by Mn/DOT District 3 staff include improving traffic control devices, reviewing maintenance practices, revising a few minor geometric features and incorporating access restrictions that will eliminate the minor street crossing maneuvers that directly contributed to three of the four fatal crashes.

Signing and Lighting

- Revising the intersection signing at all three intersections so that it is consistent with MNMUTCD guidelines (**Figure 4-1**).

- At the TH 115 intersection, revising the STOP sign assembly so that the junction signing is on a separate structure.
- Upgrade the advance junction/junction signing from the present county route markers to large green signs. This is intended to provide drivers on TH 10 with more information about the presence of major intersections (with a higher probability of conflicts) that are not readily apparent to drivers because of the rolling topography and curvilinear alignment.
- In line with increasing the conspicuity of the intersections, street lighting could also be installed. TH 115 is the only intersection where night time crashes are over represented. Street lighting is a low cost proven safety device which would help identify the presence of the intersections during both day light and night time hours.

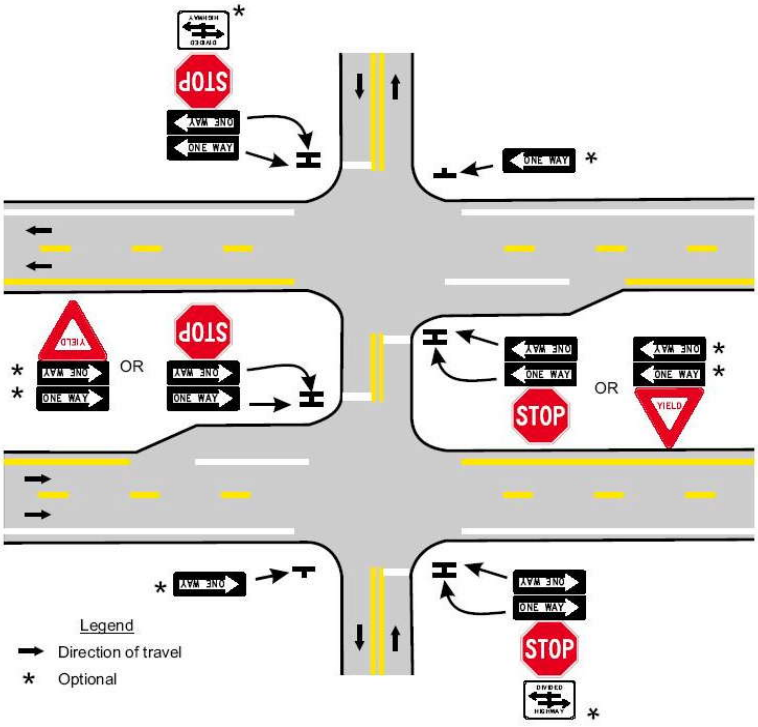


FIGURE 4-1
Example of ONE Way Signing for Divided Highways with Medians Greater Than 30 ft

Source: Minnesota MUTCD (Figure 2B-3b)

Maintenance

- The District's maintenance practices relative to grass cutting and tree trimming in this area should be reviewed. The field observations found that the intersection sight distance at all intersections were at or above recommended minimums at all three intersections. However, it was also determined that because of the rolling topography the sight lines were often just above the present height of the grass. This suggests that if the grass isn't cut periodically during the growing season, the tall grass could impair the visibility of drivers on the minor streets.

Geometric

- The minor geometric improvements consist of detaching the right turn lanes (the NB right turn lanes at TH 115 and at CSAH 14 would be the highest priority based on usage). This geometric change would improve intersection sight distance for drivers on the minor street approaches by moving right turning vehicles out of their line of sight.

Comprehensive Access Restriction Plan (Indirect Left Turn) – Primary Short Term Safety Strategy

The comprehensive access restriction plan consists of basically closing the median cross-overs at all three intersections and then providing an indirect left turn by way of substituting a right turn/weave/u-turn for the direct left turn. **Figure 4-2** illustrates an indirect left turn concept that has been tried (very successfully) in Maryland. This access concept basically allows right and left turns from TH 10 and right turns onto TH 10, but eliminates the minor street crossing and left turn onto TH 10 which are the vehicle movements that contributed to all of the right angle crashes at the three intersections (including three out of four fatal crashes). This strategy is suggested because of the very high fraction of "gap-related" crashes and the fact that there are virtually no other treatments that have proven to be as effective at reducing these types of intersection crashes. This strategy would probably be considered an experiment because it has not yet been tried anywhere in Minnesota, but it appears to have a very high potential for success from a safety standpoint.

This strategy also has the benefit of median openings for the u-turn movement already in place except for the cross-over that would be needed between CSAH 14 and CSAH 104. Furthermore, a quality network of parallel streets exists on the east and west side of TH 10 to help provide for circulation of local traffic.

If it is decided to implement the access restrictions that utilize the indirect left turn concept, the District should also consider developing an educational campaign in partnership with local schools and service organizations in order to help inform local drivers as to how to best navigate the new design. The Department should also continue to work closely with state, county and local law enforcement officials in order to help focus their enforcement efforts and to maintain the channel of communication for feedback about the effectiveness of the strategies that are implemented.

It should be noted that no other short term strategies are suggested for implementation because an extensive review of the safety literature failed to identify any other known technique that has proven to be effective at addressing the gap-related crash problem at rural intersections. A variety of other states have invested in significant upgrades to advance warning signs and devices on the minor street approaches or minor geometric improvements, but none of these efforts have proven to be successful at reducing the gap selection problem observed at the Randall intersections. In addition, consideration was given to the strategies that are emerging from the Intersection Decision Support research that Mn/DOT is participating in. However, while promising, the actual driver interface has not yet been designed and the concept has not yet been submitted to the FHWA for approval for a field operational test. Current estimates suggest that the field operational test is more then a year away and routine deployment of the device could be several years away.

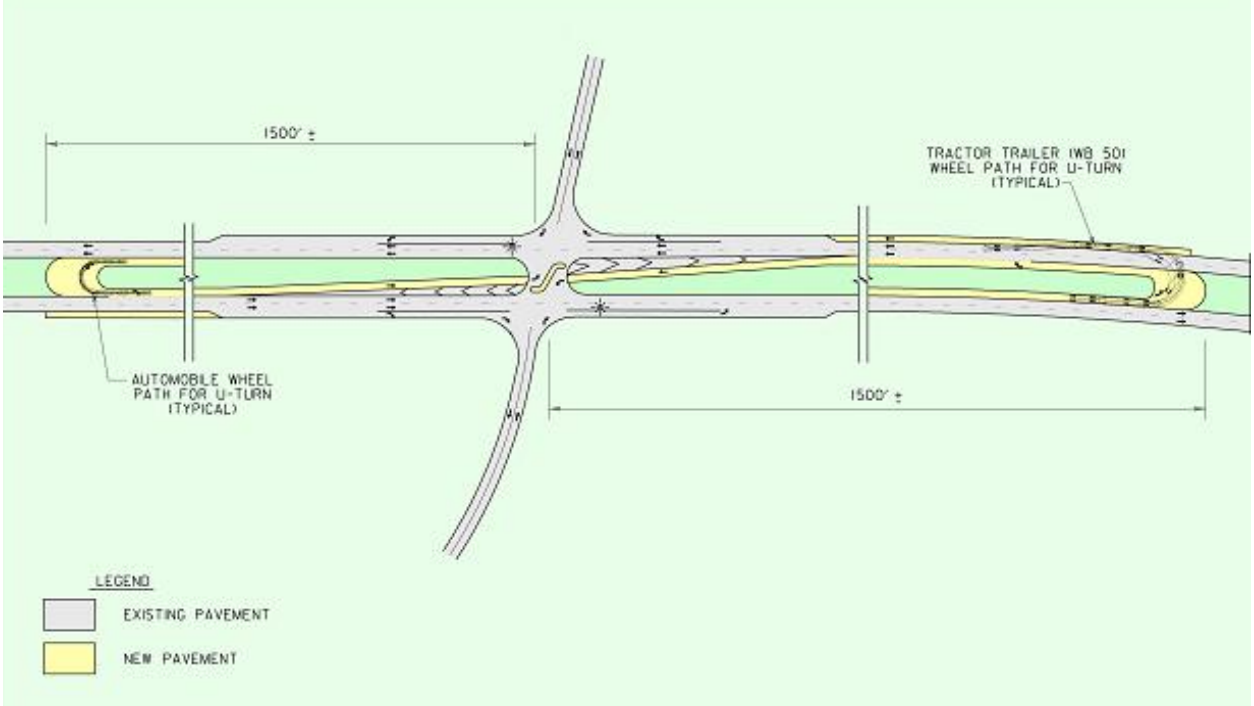


FIGURE 4-2
Example Indirect Left

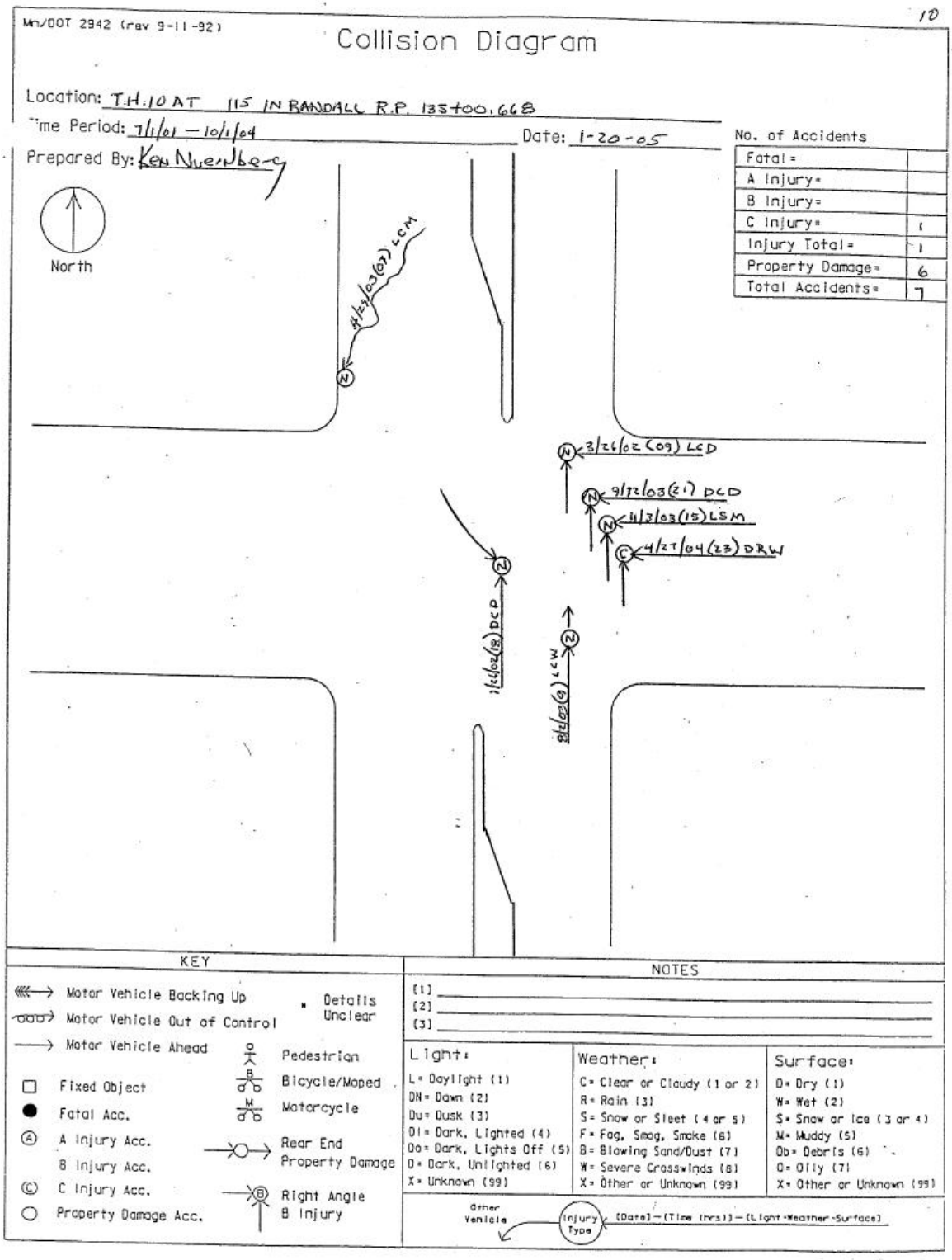
Source: Maryland DOT

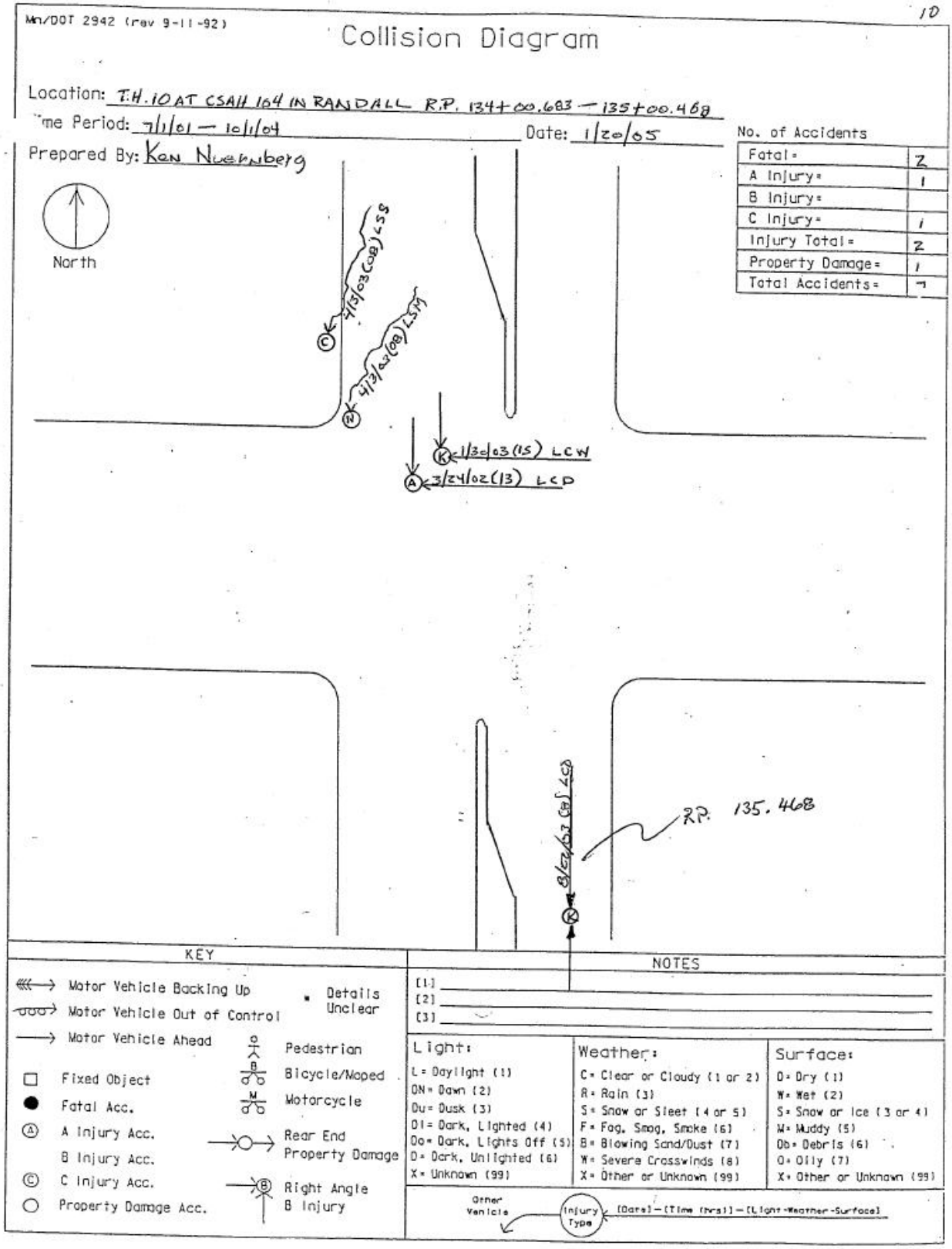
4.2 Potential Long Term Strategies

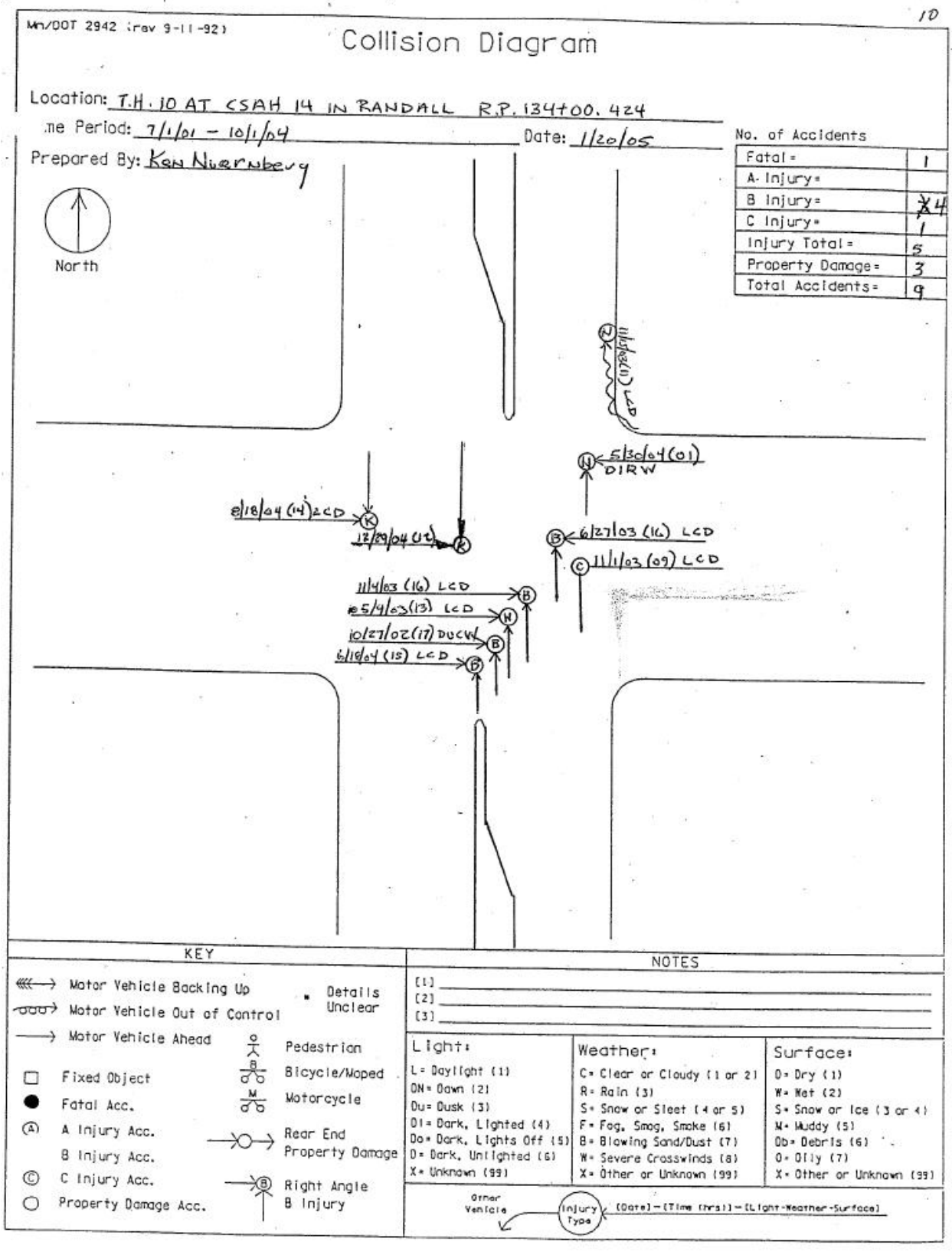
Two potential higher cost long term strategies were discussed by the RSAR Team. First, if it is decided to not implement the indirect left turn concept and the other minor improvements fail to address the crash problem at CSAH 14, consideration should be given to realigning the legs in order to "square up" the intersection. Current research suggests that there is between a 20% and 30% crash penalty at skewed intersections but the research is not detailed enough to forecast reductions in either crash type or severity. It should be noted that the current crash rate at the CSAH 14 intersection is 100% greater than the statewide average.

Finally, if traffic volumes and crash frequencies continue to rise in the future (and the latest research suggests that intersection crash rates at these types of rural intersections are directly related to the volume of traffic on the minor street approaches), the District staff is encouraged to consider the possibility of implementing a more restrictive access management program that would consist of closing two of the three intersections and providing a grade separated access at either the CSAH 14 or the TH 115 intersection. One side benefit of a grade separation at TH 10 is the proximity to the railroad line would likely also require that the crossing of the railroad be grade separated and this would provide uninterrupted access for emergency services.

Appendix A: Intersection Crash Diagrams




Mn/DOT 2942 (rev 9-11-92)
10
Collision Diagram
Location: T.H. 10 AT CSAH 164 IN RANDALL R.P. 134+00.683 – 135+00.468
Time Period: 7/1/01 – 10/1/04
Date: 1/20/05
Prepared By: Ken Nuernberg
North
No. of Accidents
Fatal = 2
A Injury = 1
B Injury =
C Injury = 1
Injury Total = 2
Property Damage = 1
Total Accidents = 3
7/15/03 (08) LSS
4/3/04 (08) LSW
1/30/03 (15) LCW
3/24/02 (13) LCD
8/24/03 (8) LCD
RP. 135.468
KEY
Motor Vehicle Backing Up
Motor Vehicle Out of Control
Motor Vehicle Ahead
Fixed Object
Fatal Acc.
A Injury Acc.
B Injury Acc.
C Injury Acc.
Property Damage Acc.
Details Unclear
Pedestrian
Bicycle/Moped
Motorcycle
Rear End Property Damage
Right Angle B Injury
NOTES
[1]
[2]
[3]
Light:
L = Daylight (1)
DN = Dawn (2)
Du = Dusk (3)
Dl = Dark, Lighted (4)
Do = Dark, Lights Off (5)
D = Dark, Unlighted (6)
X = Unknown (99)
Weather:
C = Clear or Cloudy (1 or 2)
R = Rain (3)
S = Snow or Sleet (4 or 5)
F = Fog, Smog, Smoke (6)
B = Blowing Sand/Dust (7)
W = Severe Crosswinds (8)
X = Other or Unknown (99)
Surface:
D = Dry (1)
W = Wet (2)
S = Snow or Ice (3 or 4)
M = Muddy (5)
Ob = Debris (6)
O = Oily (7)
X = Other or Unknown (99)
Other Vehicle
Injury Type
[Date] – [Time (hrs)] – [Light-Weather-Surface]


Mn/DOT 2942 (rev 9-11-92)
10
Collision Diagram
Location: T.H. 10 AT CSAH 14 IN RANDALL R.P. 134+00. 424
me Period: 7/1/01 - 10/1/04
Date: 1/20/05
Prepared By: Ken Nuernberg
North
No. of Accidents
Fatal = 1
A- Injury =
B Injury = X4
C Injury = 1
Injury Total = 5
Property Damage = 3
Total Accidents = 9
11/19/02(11) LCD
5/3/04(01) DIRW
6/18/04(14) LCD
12/29/04(12)
6/27/03(16) LCD
11/1/03(09) LCD
11/4/03(16) LCD
5/4/03(13) LCD
10/27/02(17) DUCW
6/19/04(15) LCD
KEY
Motor Vehicle Backing Up
Motor Vehicle Out of Control
Motor Vehicle Ahead
Fixed Object
Fatal Acc.
A Injury Acc.
B Injury Acc.
C Injury Acc.
Property Damage Acc.
Details Unclear
Pedestrian
Bicycle/Moped
Motorcycle
Rear End Property Damage
Right Angle B Injury
NOTES
(1)
(2)
(3)
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X = Other or Unknown (99)
Other Vehicle
Injury Type
(Date) - (Time (hrs)) - (Light-Weather-Surface)