

Safety Assessment

for

Germanna Highway Route 3

(Two Lane section From: 0.30 miles west of Route 600 -
west

To: 0.21 miles east of 750)

Total Distance: 4.62 miles

Culpeper County

Prepared by:

**VIRGINIA DEPARTMENT OF TRANSPORTATION
Region Operations for Culpeper District - Traffic Engineering**

May 2009

Introduction

This report has been prepared in response to a number of fatal crashes within the two lane section of Route 3 also known as Germanna Highway in the Culpeper District, which is generally located between the Culpeper and Lignum communities. It also serves as a response to local governing bodies and residents who cited safety concerns along this two lane section of Route 3 with emphasis along the horizontal curve area near Route 739 (Clay Hill Road)

Study Area

This Road Safety Assessment was conducted by the Virginia Department of Transportation, Regional Operations for Culpeper District, Traffic Engineering Section. This section of Route 3 is a Rural primary arterial and undivided two lane section in Culpeper County with a total length of approximately 4.62 miles. The general study limits along Route 3 (Germanna Highway) is shown on Page 3. The key objectives of this study are to evaluate existing operations, identify potential deficiencies, and propose feasible traffic safety countermeasures.

The safety assessment document is structured to include the following key elements:

- I. Inventory of Existing Conditions
- II. Traffic Counts and Speed data Information
- III. Sight distance
- IV. Speed Limit Study Review
- V. Crash Analysis
- VI. Roadway Geometrics and Land Use Analysis
- VII. Recommendations and Implementation Plan
- VIII. Appendices:
 - Appendix A: Straight Line diagram of Sign and Marking Inventory along Rte 3
 - Appendix B: Speed Study
 - Appendix C: Crash data
 - Appendix D: Super elevation data
 - Appendix E: Illustration of Stop Bar locations
 - Appendix F: Illustration of Modifications along Curve Section
 - Appendix G: Illustration of Transverse Rumble strips
 - Appendix H: Illustration of Passing Zone modifications
 - Appendix I: Turning Movement count at Route 3 and 663 intersection

I. Inventory of existing conditions

General Characteristics

This Section of Route 3 generally extends in an east-west direction between Stevensburg and Lignum in Culpeper County. The alignment of Route 3 is generally flat with areas of rolling horizontal and vertical curves. The Study area consists of a two-lane roadway with two 11 foot travel lanes and 4 foot paved shoulders that extend from the west end 4-lane section to just west of the Route 739 intersection. The remaining 2.6 miles also has two 11 foot travel lanes with 4 to 8 foot variable width paved and unpaved gravel/grass shoulders. Pavement markings include double yellow centerline and white edge lines. Marked Passing zones provide opportunities for drivers to pass slow moving vehicles along this section of roadway. Signing consists of secondary route markers, curve/crossroad warning, mileage/guide and regulatory 55 mph speed limit signs. Signing for the Primary roadway is considered to be appropriate at the present time. There are currently no stop bars on the side street approaches at their intersections with Rte 3, although this is not uncommon. Snow Plowable Pavement markers are present on some portions of the two lane section. However, it was noted that snow plowable markers are not present on other sections over the study area. An inventory of Signs currently in place can be found on the Straight Line Diagram attached in **Appendix A**

Route 3 is an important rural arterial route and carries both passenger car and truck traffic between the Culpeper and Fredericksburg. Secondary routes intersecting Route 3 in the study area include:

- a. Route 600 (York Road) which loops back to Rte 3,
- b. Route 663 Batna/Stevensburg Road),
- c. Route 739 (Clay Hill Road),
- d. Route 669 (Carrico Mills Road) and,
- e. Route 750 (Ellis Road).

Roadside environment includes approximately 32 private entrances along this corridor as well as commercial entrances consisting of a truck and equipment repair business, a local store/US Post Office, Equestrian center, and a greenhouse. A sweeping horizontal curve located approximately between MP 7.4 and MP 7.8 is part of the focus of this safety assessment. Photographs taken along this curve are shown on Pages 7 thru 10.

II. Traffic Volumes and Speed Data Summary

Information obtained from 2004 through 2007 is published in the VDOT Annual Average Daily Traffic (AADT) volumes and includes truck percentages. The AADT is noted to be as follows:

Culpeper County

Annual Average Daily Traffic (AADT)

Route 3 (Germanna Highway)

Fm: Rte 663 (Batna Road)

To: Rte 750 (Ellis Road)

Year	AADT	Percent Trucks
2004	10,000	5%
2005	9,100	9%
2006	9,400	9%
2007	9,500	9%
2009	7,739*	4%

* A new traffic count was conducted for this section as part of this study.

A 12 hour turning movement count was performed for the intersection of Rte 3 and Rte 663 (Stevensburg/Batna Rd) during this assessment review and included in **Appendix I**.

The Study section is currently posted as 55 mph. Speed data collected over three locations along the study section noted that the 85th percentile speeds were found to be approx. 64 mph with a pace speed of 55-64 mph.

III: Sight Distance:

Intersection Sight Distance

Intersection sight distance is a measure of the distance available to a driver to safely exit an intersecting roadway and execute a left or a right turn on to the roadway accessed. Intersection sight distance was measured at each intersecting roadway with Rte 3

All roadways intersecting with Rte 3, within this 4.62 mile section have intersection sight distance that exceeds the requirement for 55 mph, which is a minimum 610 feet for a two lane rural highway, per the VDOT Minimum Standards of Entrances to State Highways and in conformance with the guidelines provided in the AASHTO Green Book- A Policy on Geometric Design of Highways and Streets, 2004.

Stopping Sight Distance

Stopping Sight distance is the available distance that a driver has to come to a safe stop or adjust speed when traveling at the posted speed limit on the main line, in order to avoid an object or vehicle in the travel lane. Stopping Sight distance measurements were conducted at each of the intersections along Rte 3. In addition, the road segment from Route 669 to Route 750 has several rolling vertical curves and our field observations noted the actual Stopping Sight Distance to exceed the minimum required Stopping Sight distances. The minimum Stopping Sight Distance is 495 ft for the posted speed limit of 55 mph and level roadway.

IV: Speed Limit Review:

As part of the safety assessment, it was decided to conduct a Speed Study over the entire two lane section, which extends a total of 4.62 miles. The Speed Study included inventory, observations and field measurements that are included in the Speed Study attached with this assessment as **Appendix B**. On April 13 and 14, three spot speed samples were secured in the study area, which currently has a posted statutory speed of 55 MPH. Analysis of that speed data indicated the following results:

Speed Data:

<u>Sample Location</u>	<u>85th Percentile</u>	<u>50th Percentile</u>	<u>10 mph pace speed</u>
0.10 mi. E. Rt. 600	63.73 mph	57 mph	55-64 mph
0.04 mi. W Rt. 739	64.02 mph	59 mph	55-64 mph
0.10 mi. W Rt 750	64.55 mph	58 mph	55-64 mph

V: Crash Analysis-

Crash data was collected using HTRIS over a period between 2004 and 2007. The crash data collected is attached in **Appendix C**. This attachment describes the number and type of crashes that occurred during this time frame in addition of the fatal crash that occurred in March, 2009. The fatal crash that occurred on March 22, 2009 indicates it might have involved a driver under the influence of alcohol. A total of 85 crashes were reported from January 1, 2004 to March 22, 2009, based on available data (including the most recent fatality). Analysis of the crashes showed the following patterns: Fixed object crashes (24), Weather related crashes (20), Deer/Animal (16), Head on (3), Sideswipe in the opposite direction (7), Angle (14) and Rear end (11) crashes. In addition, there were six (6) daytime crashes, six (6) crashes during poor lighting conditions along the horizontal curve. In addition a total of four (4) fatal crashes occurred during this period. The most recent fatal crash occurred on March 22, 2009 involved several fatalities.

Horizontal Curve:

Along the horizontal curve between MP 7.4 and MP 7.7, there were a total of fourteen (14) crashes including four fatal crashes. Of the four fatal crashes, there were three (3) Head-on and one Side Swipe in the opposite direction. The remaining (10) crashes included two (2) Rear End, two (2) Fixed Object, two (2) Side Swipe in the opposite direction and four (4) Deer related crashes. The types of crashes that occurred along the curve indicate that there could be a benefit from some type of lane widening and paved shoulder which gives the errant driver an opportunity to get back into the travel lane while minimizing loss of control. It is also important to note that 12 of the 14 crashes along the curve occurred during dry conditions. In addition, six of these crashes occurred during poor lighting conditions. While the number of crashes during poor lighting conditions are a cause for concern, we feel that the recommended improvements that include pavement markings, reflectors, chevrons and oversized advanced curve signs will address these types of crashes since these types of devices will provide better delineation and guidance along the horizontal curve. In addition, illumination should only be considered in the future if Illumination warrants are met.

A review of the crashes also indicates approximately 20 % of crashes to be attributed to Driver behavioral causes such as in-attention, driving under the influence, etc.

The following photographs depict the general vicinity where the most recent fatal crash occurred along the horizontal curve in the vicinity of Rte 739.

Horizontal Curve Photographs in vicinity of Rte 739 (Clay Hill Rd)

E1—Along Rte 3 Horizontal Curve, west of Rte 739



E2—Westbound along Rte 3, approaching Rte 739(on right)



E3—Along Rte 3, exiting Rte 739, looking west



W1—Along Rte 3 Horizontal Curve, east of Rte 739



W2—Along Rte 3 Horizontal Curve, exiting Rte 739, looking east



W3—Along Rte 3 Horizontal Curve, looking east, showing access to Equestrian facility



Intersection of Rte 3 and Rte 663:

The total of 8 crashes at this intersection over a period of four and a half years included six (6) angle, one Rear End and one Side swipe type of crash. The angle type of crashes may be attributed to be failure to yield right of way. The intersection does not currently meet signal warrants. Turning movements conducted at the intersection are attached in this report in Appendix I.

Intersection of Rte 3 and 669:

The total of 5 crashes in the vicinity of this intersection included four (4) Angle, one Sideswipe and one Fixed Object type of crash over the period of four and a half years. The angle crashes may be attributed to failure to yield right of way exiting Rte 663.

Crashes at remaining intersections along Rte 3 did not present an identifiable pattern that could be addressed at the present time.

Overall Study Section:

The crash rate for the overall study section is 145.59 crashes per 100 million VMT, injury rate is 107.28 crashes per 100 million VMT, and fatality rate is 5.108 crashes per 100 million VMT, which has been calculated based on methodologies adopted by the Virginia Department of Transportation. While the Overall Crash rate is less than statewide (159.67) and district wide rates for Primary facilities, both the Injury rate and the Fatality rate are well above the averages for these types of crashes for the statewide (86.67 injury and 1.57 fatal) and district wide Primary facilities.

VI: Roadway Geometrics and Land Use Analysis**Roadway:**

The study section includes tangent sections with minor vertical curves and one large horizontal curve that is a part of the focus of this report. Field observations did not note any sight distance issues along the vertical curve portions of the roadway. In addition, our observations and research of the roadway design plans indicated no apparent design deficiencies for either the tangent section or the horizontal curves on this study section of Germanna Highway (Rte 3).

Land Use and Roadside Access:

Land Use along the rural highway is a mix of residential and commercial use via gravel or partially paved driveways. In addition, the inside of the curve serves as access to an Equestrian facility.

The density of private driveways, business entrances and intersecting secondary routes creates approximately 10 access points per mile which the Highway Capacity Manual considers to be low or rural type. However, the presence of a number of private driveways, the entrance to the equestrian facility and the several intersecting secondary roadways along Rte 3, indicates that there is the potential for a moderate number of vehicle conflicts, due to turning, slow moving or stopped vehicles, which may be attributed to the lack of turn lanes (on Rte 3) at state maintained intersections and the lack of a center turn lane on Rte 3 to service turning movements at several locations that serve as residential or commercial access.

Passing Zones:

Inventory identified locations where passing zones extend through intersections. It is possible that the current conditions can cause potential safety concerns due to the fact that traffic exiting Secondary roadways to access Rte 3 might not expect passing traffic in their travel path in the opposing direction.

Curve data:

In addition to field data collection, the horizontal curve was driven during night time conditions. Our observations indicate that although the posted advance warning curve signs reflected adequately and there exists both centerline and edge lines to delineate the travel way, the curve section currently does not have enhancements such as pavement markers. In addition, opposing vehicle headlight glare can cause the centerline to lose some of its effectiveness in guiding drivers through the curve.

In order to assess the ride quality of the horizontal curve, Ball bank runs were conducted along the curve section and it was determined that the curve could be driven comfortably at the posted speed of 55 mph based on thresholds identified in the AASHTO Green Book.

Field Survey indicates that the curve is adequately banked with a super elevation appropriate for the design speed. Details of the super elevation survey are included in the **Appendix D**.

Operational Analysis:

Using study data collected, the two lane section was analyzed for operational adequacy according to methodology outlined in the Highway Capacity Manual. The study section of Rte 3 currently operates at acceptable Levels of Service. In addition, capacity analysis conducted to determine the operational adequacy with the proposed Passing Zone closures along the two lane section indicate that the section of highway continues to operate at acceptable Levels of Service.

VII. Recommendations and Implementation Plan:

Summarized below are recommended Short Term and Long Term solutions to enhance operations and safety along the Rte 3 (Germanna Highway) in Culpeper County. The recommendations were developed as a result of a review of the existing physical conditions, research of design data, crash history data and analysis, traffic counts and field review of the site. In addition, these recommendations are identified with a target implementation date based upon available funding and resources. The list of recommendations and implementation schedule is documented in the attached spreadsheet. It is anticipated that this schedule will be updated periodically as milestones occur in the implementation. The Implementation plan is attached at the end of this report.

SHORT TERM SOLUTIONS

Signing and Marking along the Horizontal Curve :

We recommend increasing the size of the Advance Curve Warning signs, the installation of additional W1-8 CHEVRON signs on the outside of the horizontal curve for the east bound and west bound directions, and use of fluorescent sheeting on both types of signs. In addition it is recommended that we add reflective flex posts for a distance of approximately 200 feet / or to the Point of Tangent of Horizontal Curve outside of the last chevron in both directions along the outside of the horizontal curve. These actions will add emphasis to the curve and provide positive guidance for drivers who will be able to track the curve better both during daytime and during poor lighting conditions. Improvements along the horizontal curve are shown in **Appendix F**

Two sets of Transverse Rumble Strips are proposed to be implemented on the approaches to the curve in the east bound and west bound directions. The exact location of the rumble strips and the pattern will be field determined in consultation with Regional forces.

Advisory speed limit signs (50 mph) are recommended in advance of the curve in both the eastbound and westbound directions along with oversized signs.

Marking Details along the Curve can be found in **Appendices F and G.**

Markings along the Tangent Section of Rte 3:

Centerline Snow Plowable Pavement Markers are recommended for installation along the portions of the Study section that currently do not have these devices. This measure will assist in enhanced centerline delineation during poor lighting conditions

Intersections along Rte 3:

In order to provide positive guidance to traffic exiting the Secondary roadways, it is recommended that Stop Bars be placed on each approach on to Rte 3. Proposed Stop bar locations are shown in **Appendix E.**

Intersection of Rte 3 and Rte 663:

While the current turning movements do not warrant turn lanes, and intersection sight distance is adequate, we recommend that the intersection be monitored from time to time to determine whether additional measures are needed to enhance operations and safety at this location.

Intersection of Rte 3 and 669:

At the present time there are no evident operational issues at this intersection. This intersection should be monitored in the future to determine whether any enhancements to operational safety are warranted.

Passing Zones:

In order to enhance driver safety and still allow the opportunity for drivers to perform the passing maneuver along the two lane section of Route 3, our recommendations include closing or adjusting some of the passing zones in order to enhance and encourage safe passing practice. It is further recommended that No Passing Pennant Signs(W-14-3) be placed at appropriate locations in order to encourage safe passing practice by drivers. The Passing Zone adjustments and sign locations are illustrated in the attached **Appendix H**.

LONG TERM SOLUTIONSPavement Widening along the Curve Section:

We recommend that the curve section be widened with up to 6 ft of paved shoulder in each direction from a point starting where the current paved section ends, easterly for a distance of approximately 100 ft encompassing the horizontal curve. This will provide additional pavement width for drivers traversing the curve and provide an opportunity to better regain control in the event that a vehicle's wheels should cross outside the edge line.

The curve section along Rte 3 should be further enhanced with Center line Rumble Strips, Double row of Snow Plowable Pavement Markers and the existing Double yellow center line be replaced with six inch yellow lines as part of the refurbishment. In addition, 6 inch edge lines should be installed on both sides for enhanced visibility and guidance. These measures will assist in the delineation of the curve and provide better night time visibility. The Center line rumble strips will discourage drivers from hugging the center line thus reducing the potential for Sideswipe (opposite direction) and Head-on type of collisions

Further, the inside of the curve should be delineated with reflective flex posts from PC to PT once the widened shoulder is in place. It is recommended that these measures be implemented at the same time that pavement widening is performed, since drivers who will end up shying away from the center line will need additional pavement width to drive on.

Markings along the remaining Two Lane section:

In order to provide a more consistent driving environment we recommend that the entire Two Lane section studied should be upgraded with markings. This action will better guide drivers through this two lane section.

Illumination along the Curve:

We feel that the aforementioned measures recommended for the curve section would address the concern of crashes occurring during poor lighting conditions. Any future illumination plans should consider whether the location meets Illumination Warrants as adopted by Virginia Department of Transportation before any lighting standards are installed on the roadway.

Long Term Capacity Considerations:

It is recognized that future capacity considerations may warrant widening of the two lane section to a four lane divided facility to match the existing four lane termini, based on planning and growth potential. It is our understanding that while this type of improvement might be on the horizon, there is no funding currently dedicated to this project.

	PROPOSED IMPROVEMENT	Curve or Section	TYPE (SHORT, LONG)	COST	TIME TO COMPLETE	PERFORMED BY
1	Increase Size of Curve Warning Signs(Two W1-2 48x48 signs)	CURVE	SHORT	\$230	2 weeks	Regional Forces
2	Add 3 Chevrons on outside of Curve (6 Chevrons, 3 posts)	CURVE	SHORT	\$576	2 weeks	Regional Forces
3	Install Transverse Rumble strips (2 sets) approaching curve in both directions	CURVE	SHORT	\$900	2 weeks	Regional Forces
4	Install 50 mph Advisory Speed Signs (W13-1) before curve	CURVE	SHORT	\$125	2 weeks	Regional Forces
5	Add Centerline Snow Plowable Pavement Markers (4 miles, 261 RPM's @ 40 ft spacing)	SECTION	SHORT	\$4,950	30 days	Contract
6	Add STOP Bars on intersecting Roadways (6 Stop Bars @ 5 intersections)	SECTION	SHORT	\$1,000	1 week	Regional Forces
7	Adjust passing zones @ Rte. 600 East & West and provide No Passing Zone Signs (16, W14-3)	SECTION	SHORT	\$3,950	2 weeks	Regional Forces
8	Increase Size of Speed Limit Signs (6, R2-1 36x48)	SECTION	SHORT	\$740	2 weeks	Regional Forces
	SHORT-TERM SUBTOTAL			\$12,471		
9	Widen Shoulders on each side(approx. 1100 ft along curve)	CURVE	LONG	\$227,965	3 months	Residency Forces
9A	Install Flex posts along curve (outside (34) and inside (16), after paving)	CURVE	LONG	\$1,650	1 week	Regional Forces
9B	Install 6 inch B6-WR Tape Markings along Curve (1,300 ft. after paving)	CURVE	LONG	\$15,600	1 week	Regional Forces
10	Add Double row Centerline Snow Plowable markers and Centerline Rumble Strips along curve	CURVE	LONG	\$4,000	30 days	Contract
11	Upgrade Markings to Epoxy along entire Section (4 inch wide at 4.62 miles)	SECTION	LONG	\$29,272	30 days	Contract
12	Widen shoulders along Section, east of curve (2.5 miles)	SECTION	VERY LONG	TBD	12 months	Contract
	LONG-TERM SUBTOTAL			\$278,487		
	TOTAL COST OF ITEMS LISTED			\$290,958		
	FUNDING					
	Highway Safety Improvement Program (Curve Items only)	CURVE	BOTH	\$251,046		
	Operations/Safety Improvement Program (Section Safety Items, except 13. overlay)	SECTION	BOTH	\$39,912		
	District Maintenance Paving Program (12. Overlay)	SECTION	VERY LONG	TBD		
	TOTAL FUNDING			\$290,958		

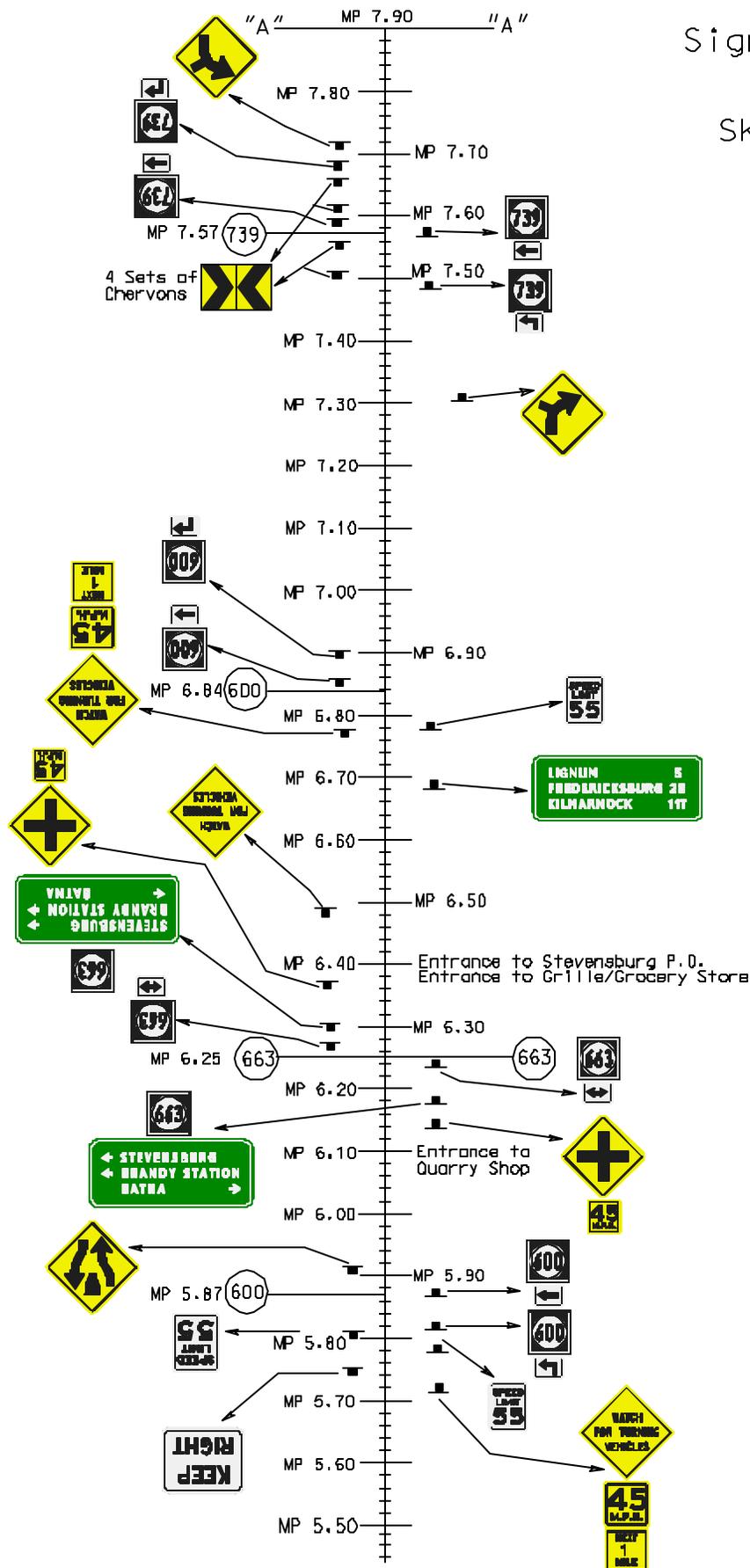
APPENDIX A

Straight Line Diagram of Sign and Marking Inventory

CULPEPER COUNTY ROUTE 3



Signs Presently
In Place
Sketch 1 of 2



APPENDIX B

Speed Study

Northwestern Region Traffic Engineering VDOT Speed Study – May 6, 2009

This Speed Study conducted under the direction of _____.

Vijay N. Kulkarni, PE, PTOE
Licensed Engineer

Study Area:

Location:	Route 0003
Street:	Germanna Highway
County:	Culpeper
From:	0.30 Mi. West of Route 600 (Westend)
To:	0.21 Mi. East of Route 750
Length:	4.62 Miles
Functional Class:	Rural Minor Arterial

Speed Zone(s) in Study Area

Route 3, in the study area, is currently governed by a posted statutory 55 mph speed limit.

Speed Zones(s) adjoining Study Area:

Adjoining the study area to the east and west, Route 3 is governed by a posted 55 mph statutory speed limit. Side roads intersecting Route 3 in the study area have the following posted speed limits:

Route 600 (York Road)	25 mph speed limit
Route 663 North (Stevensburg Road)	25 mph speed limit
Route 669 (Carrico Mills Road)	45 mph speed limit

Origin and Nature of Request:

Due to the number of fatal crashes within the two lane section of Route 3, the Department initiated a Speed Study as a part of a Roadway Safety Assessment (RSA) along this section of Rte 3. Local governing bodies and community residents also expressed concerns along this road section and the possibility of a speed reduction.

Study Results and Recommendation:

Our recommendations are as outlined below:

1. The two fatal crashes that occurred between the 7.45 and 7.70 milepost indicates a fatality rate that is more than twice the District Fatality Rate. This fact combined with the speed samples obtained within the curve (63 mph) lends us to encourage slower speeds along the curve. We therefore recommend a 50 mph advisory speed along the horizontal curve at M.P. 7.61. In addition we recommend that the existing regulatory speed limit of 55 mph be retained over the study section. This speed limit is currently at the lower end of the pace speed and appears to be adequately zoned.
2. We recommend that the curve section be widened to incorporate two 12 ft travel lanes and 5 ft paved shoulders to mitigate run off the road type of crashes. We also

recommend additional chevrons on the outside of the curve, increased advance curve warning signs approaching the curve and the addition of reflective flex posts when pavement widening and paved shoulder is completed.

3. In order to minimize crossing the centerline types of crashes, we recommend the installation of Center line rumble strips and double row of Centerline Snow Plowable Markers. Additionally, we recommend a wider 6 in centerline and 6 inch edge line to better delineate the curve and guide drivers to track the curve better.

A full discussion of the recommendations is documented in the Safety Assessment Report.

Study Details:

A. Speed Data:

On April 13 and 14, 2009, three spot speed samples were secured in the study area. Analysis of the speed data indicated the following results:

Sample Location	85 th Percentile	50 th Percentile	10 mph pace speed
0.10 mi. E. Rt. 600	63.73 mph	57 mph	55-64 mph
0.04 mi. W Rt. 739	64.02 mph	59 mph	55-64 mph
0.10 mi. W Rt. 750	64.55 mph	58 mph	55-64 mph

Ball bank runs conducted along the curve located in the vicinity of the intersection with Rte 739 Indicated that the curve can be driven comfortably at the posted 55 mph in accordance with guidelines in the AASHTO- Green Book- A Policy on Geometric Design of Highways and Streets, 2004 Edition.

B. Road Characteristics:

The alignment of Route 3 is generally flat with areas of gentle horizontal and vertical curves. The reviewed area consists of a two-lane roadway with two 11 foot paved lanes and 4 foot paved shoulders that extend from the west end four lane section to Route 739. The remaining 2.6 miles also has 22 foot total paved width with 4 to 8 foot variable gravel/grass shoulders. Pavement markings include double solid yellow centerline, with marked passing zones and white edge lines. Secondary routes intersecting Route 3 in the study area include: Route 600 (York Road), Route 663 (Batna/Stevensburg Road), Route 739 (Clay Hill Road), Route 669 (Carrico Mills Road) and Route 750 (Ellis Road). Stopping sight distance for the intersecting secondary routes was at least 850'-1200' which exceeds the minimum 495' required for a 55 mph speed limit. However, several private entrances along the reviewed area have limited intersection sight distance due to their location. The road segment from Route 669 to Route 750 has a series of gentle vertical curves and our observations indicate that these locations exceed the minimum required minimum stopping sight distance along Rte 3. Signing consists of secondary route markers, curve/crossroad warning, mileage/guide and regulatory 55 mph

speed limit signs. Please see the attached straight line diagram for sign locations. The ADT at the time of our review was recorded to be 7,739 vehicles per day.

C. Roadside Development and Environment:

Roadside development consists of approximately 32 private entrances. Commercial entrances consist of a truck and equipment repair business, a local store/post office, equestrian center, and a large greenhouse. The density of private driveways, business entrances and intersecting secondary routes creates approximately 10 access points per mile which the Highway Capacity Manual considers to be low.

D. Parking Practices and Pedestrian Activity:

Private entrances serve the development along this stretch of roadway with no on-street parking observed within the study area. There are neither sidewalks nor bike paths adjacent to the studied road segment and no pedestrian activity was observed. However it is possible that there might be some equestrian traffic usage due to the location of an equestrian facility along the inside of the horizontal curve located at approximately M.P. 7.61.

E. Reported Crash Experience for Most Recent 3-Year Period*:

*A shorter period is permitted only where extended data is not available.

Crash records obtained through "HTRIS" are for the period

From: August 1, 2005

To: July 31, 2008

Length of Period: 36 months

Note: Crashes where no injuries were sustained and property damage was below \$1,000 may not be recorded in HTRIS. Also, due to the time required to process and coded, crash data in HTRIS may not include occurrences in the past 2 months.

According to our records, the total number of reported **crashes** for this section of highway is:

57;

the total number of reported **injuries** for this section of highway is: 42; and

the total number of reported **fatalities** for this section of highway is: 2.

The **crash** rate for this section of highway is: 145.59 per 100 million VMT.

The **injury** rate for this section of highway is: 107.28 per 100 million VMT.

The **fatality** rate for this section of highway is: 5.10 per 100 million VMT.

For Interstate, Primary and Secondary highways: not applicable

For this type of roadway (primary):

The statewide average **crash** rate is: 159.67 per 100 million VMT.

The statewide average **injury** rate is: 86.67 per 100 million VMT.

The statewide average **fatality** rate is 1.57 per 100 million VMT.

*Alternatively, for primary highways: not applicable

The district average **crash** rate is: 1.29 per 100 million VMT.

The district average **injury** rate is: 63 per 100 million VMT.

The district average **fatality** rate is: 1.54 per 100 million VMT.

*For primary roads the district average may be used in lieu of the statewide average.

Discussion of crash experience and relevant information:

Summary of crashes:

<u>Crash Type:</u>	<u># Total:</u>	<u># Injured:</u>	<u># Fatalities:</u>
Rear End	7	8	0
Angle	9	7	0
Sideswipe (SD)	4	4	0
Sideswipe (OD)	6	7	1
Fixed Object	17	13	0
Head On	1	2	1
Non Collision	2	1	0
Deer/Animal	<u>11</u>	<u>0</u>	<u>0</u>
Totals:	57	42	2

Crash Analysis identified run off the road (fixed object), weather related, sideswipe and driver inattention as the leading causal factors. In addition, the fatality that occurred in March 2009 was tied to a driving under the influence type of crash. In addition, angle types of crashes were identified at the several intersections along Rte 3. Collisions with animals accounted for 11 of the 57 crashes during the analysis period.

A full discussion of the Crash Analysis is included in the Safety Assessment Report that accompanies this speed study. This report discusses the crashes along the curve section and the tangent section of Rte 3.

F. Enforcement Consensus :

This results of the Speed Study have been discussed with First Sergeant Grover Dean of the Virginia State Police and Sheriff H. Jim Branch of the Culpeper County Sheriff's Office.

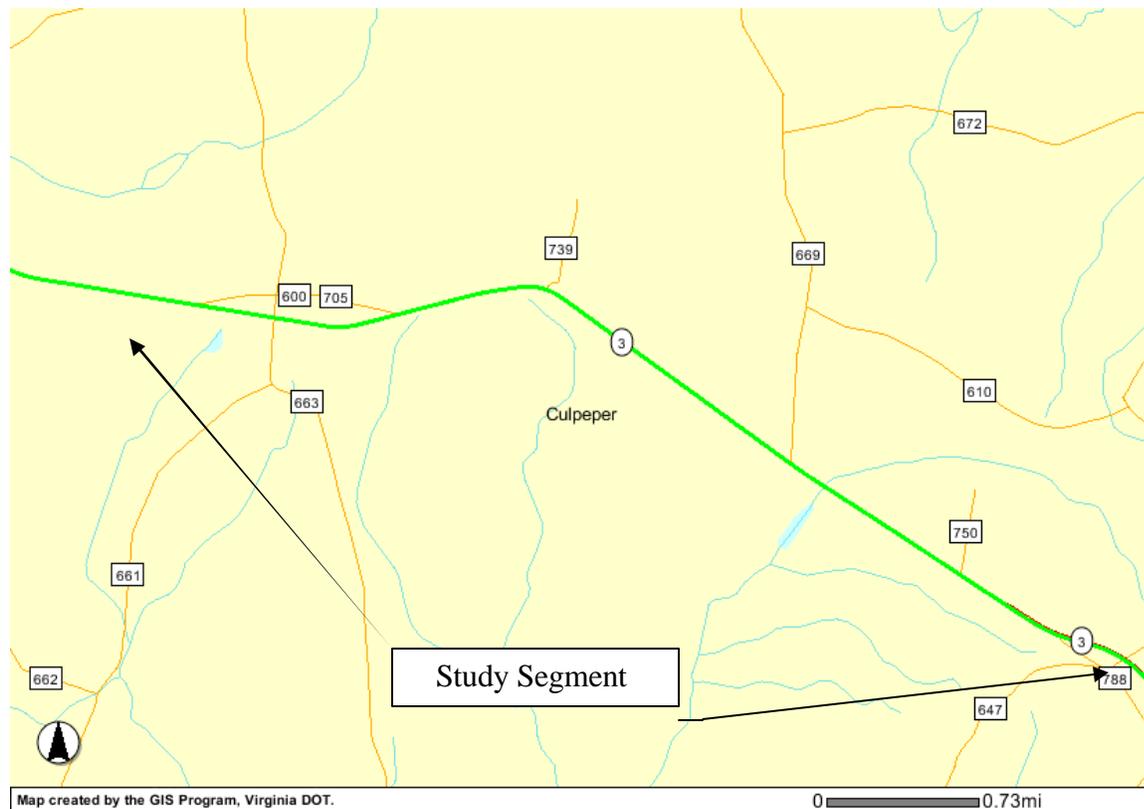
The State Police Officer:	The Sheriff/Deputy
<input checked="" type="checkbox"/> Concurs	<input checked="" type="checkbox"/> Concurs
<input type="checkbox"/> Opposes	<input type="checkbox"/> Opposes

If any officer opposes, please explain:

G. Additional Comments:

It is important to note the crashes in August 29, 2008 and March 22, 2009 that resulted in 5 fatalities, were not included in determining the injury and fatality rates which are well above the state and district averages for this type of roadway.

Study Area Map:



Note: Map is provided for illustrative purposes and may not accurately depict the most recent roadway conditions

APPENDIX C

Crash Data

CULPEPER COUNTY ROUTE 3



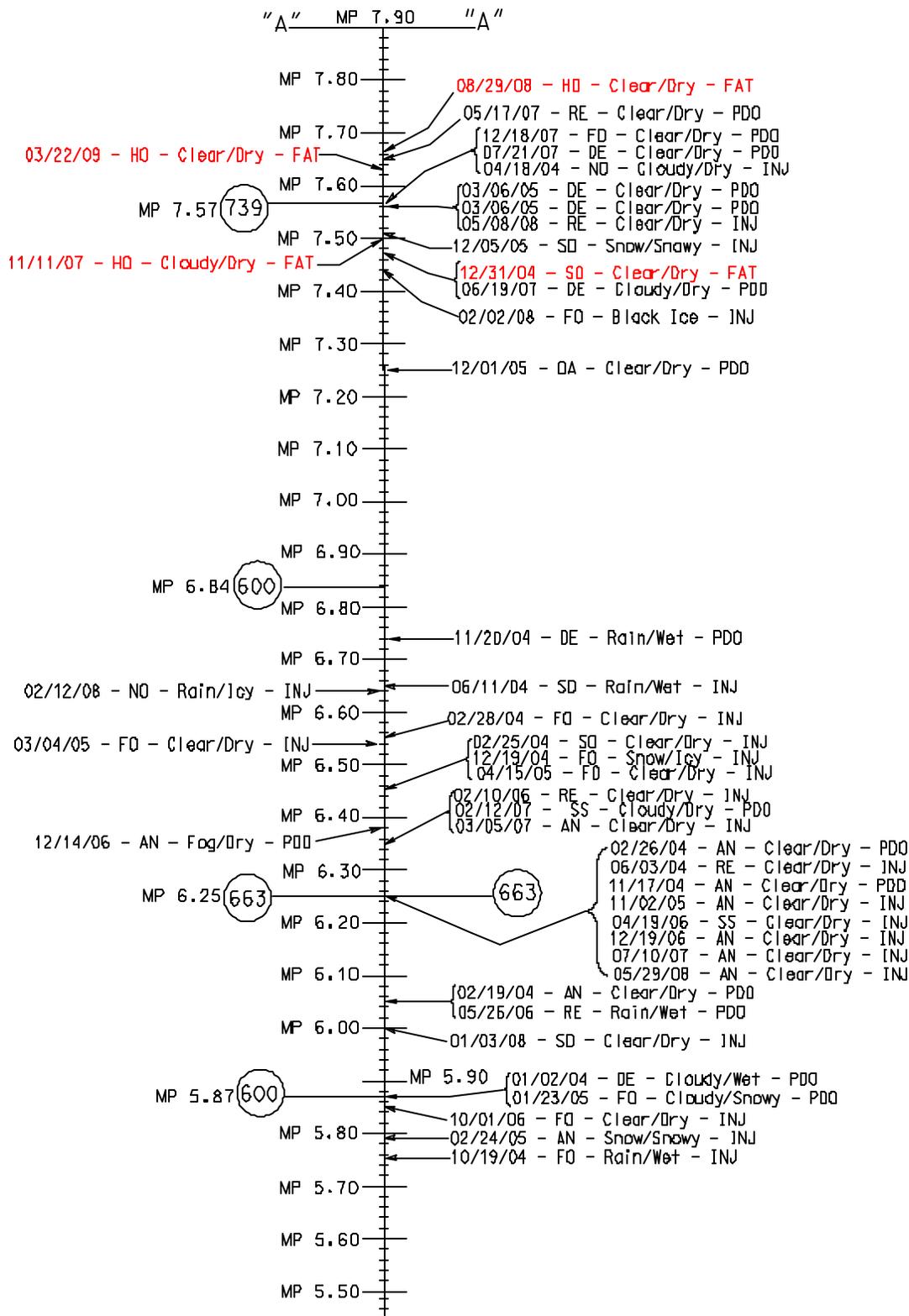
Straight Line Accident Diagram

Fm: 0.30 mile west of Rte 600 (W)
TO: 0.21 mile east of Rte 750

Fm: 01/01/04 To: 06/30/08

(Includes August 29, 2008 & March 22, 2009 Accidents)

SKETCH 1 of 2



CULPEPER COUNTY ROUTE 3

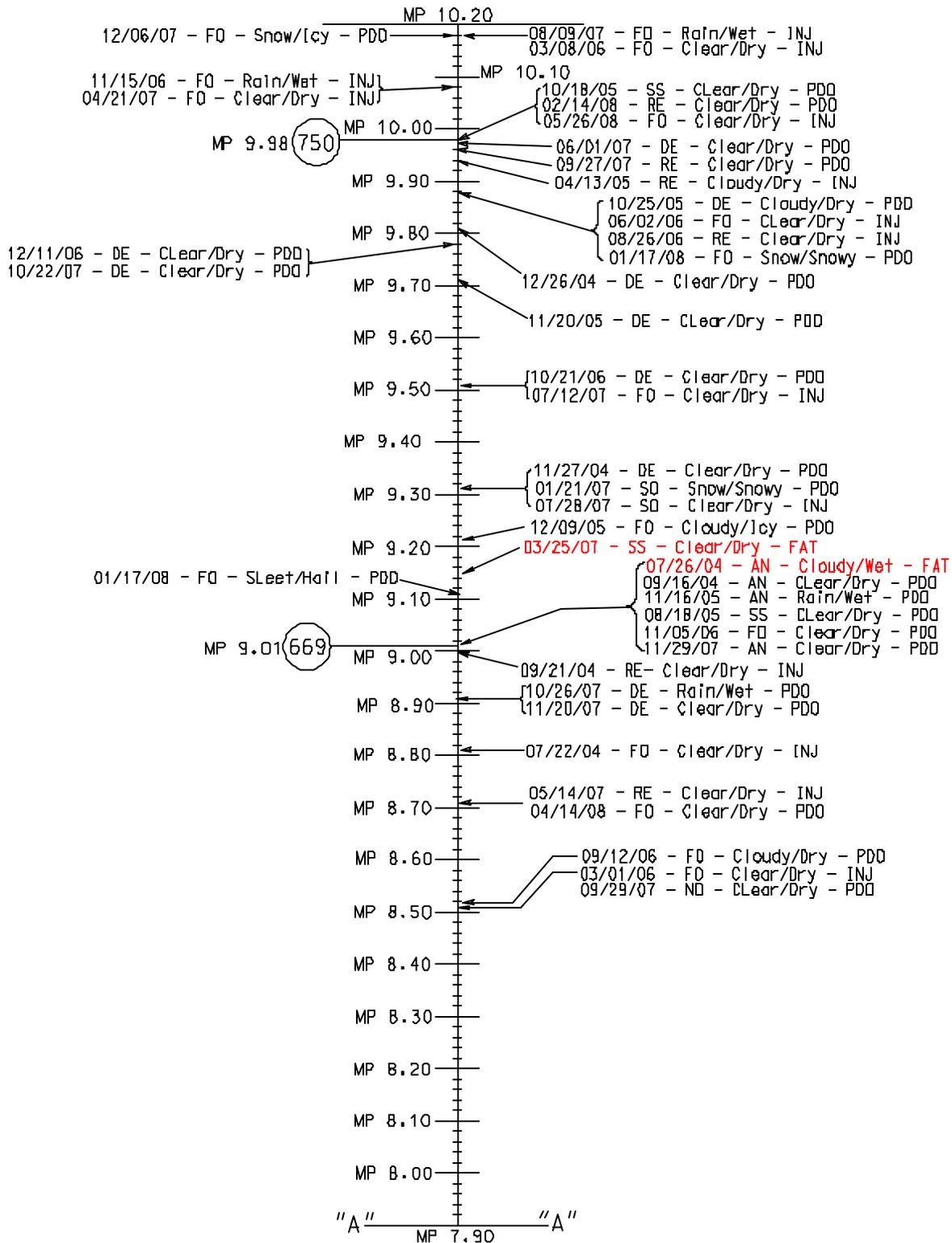


Straight Line Accident Diagram
Fm: 0.30 mile west of Rte 600 (W)
To: 0.21 mile east of Rte 750

Fm: 01/01/04 To: 06/30/08

{Includes August 29, 2008 & March 22, 2009 Accidents}

SKETCH 2 of 2



Straight Line Accident Diagram Legend

Location: Route 3
 From: 0.30 mile west of Route 600 (west intersection)-MP 5.57
 To: 0.21 mile east of Route 750 – MP 10.19
 Length: 4.62 miles
 Culpeper County

Abbreviations Legend:

Type of Accident:

AN	Angle Accident
RE	Rear End Accident
FO	Fixed Object/off road Accident
SS	Sideswipe/same direction Accident
SO	Sideswipe/opposite direction Accident
HO	Head On Accident
NO	Non-Collision Accident
OA	Other Animal Accident
DE	Deer Accident

Severity of Accident:

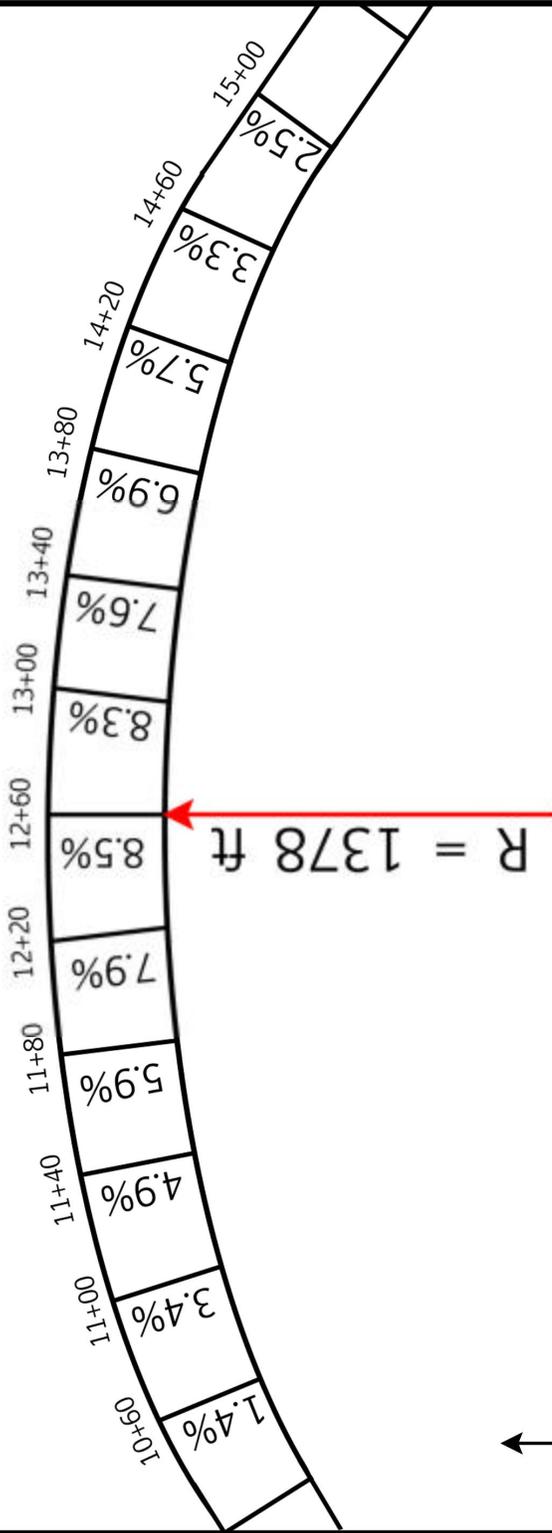
PDO	Property Damage Accident
INJ	Injury Accident
FAT	Fatal Accident

MP - Milepost

APPENDIX D

Super elevation data

Culpeper County
Route 3 to Route 739
From: 0.13 miles west of Rte. 739 (MP 7.44)
To: 0.13 miles east of Rte. 739 (MP 7.80)
Length = 0.2 miles



*All values are approximate
*Not to scale

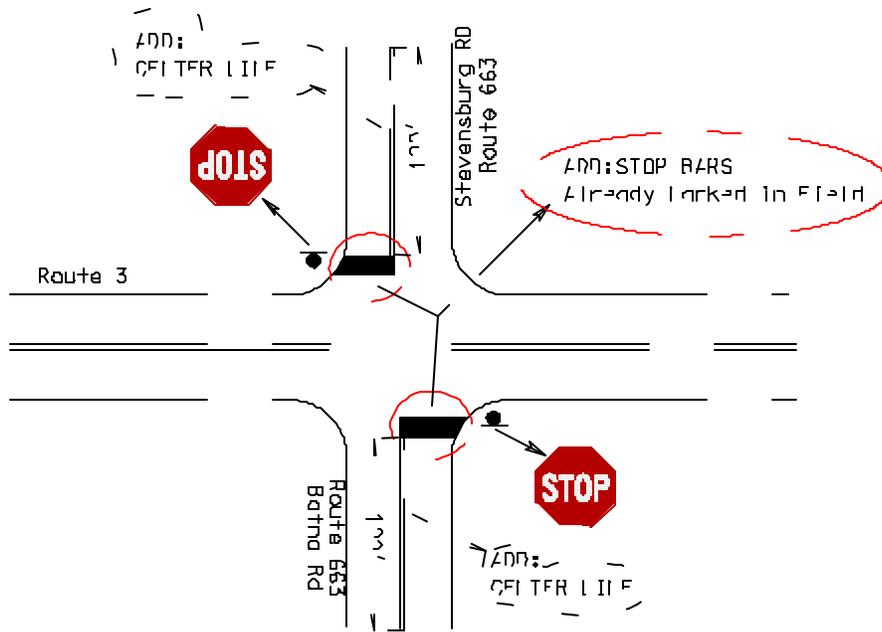
APPENDIX E

Stop Bar Locations

CULPEPER COUNTY
ROUTE 3 @ ROUTE 663
(Stevensburg Area)



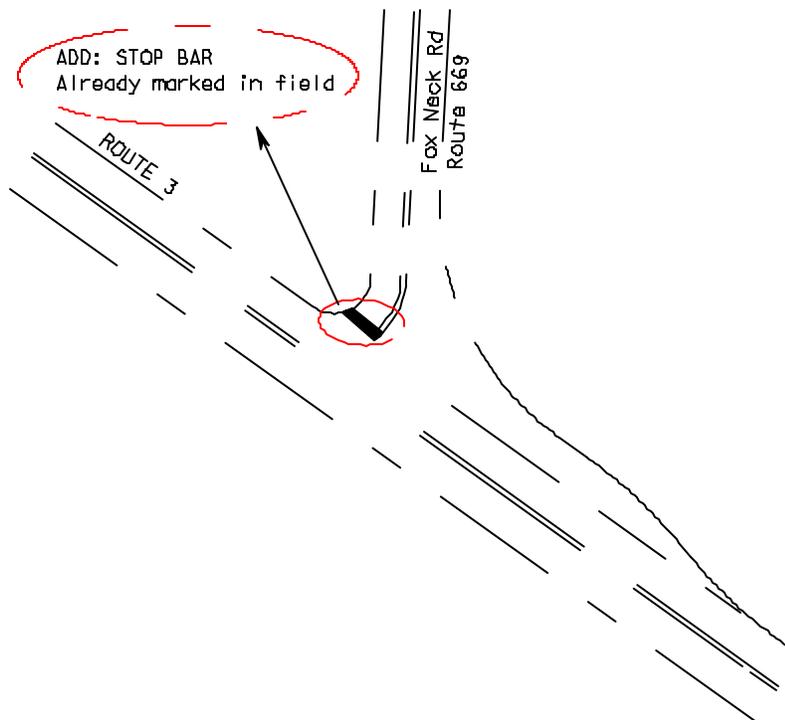
RECOMMENDED: PAVEMENT MARKINGS



CULPEPER COUNTY
ROUTE 3 @ ROUTE 669



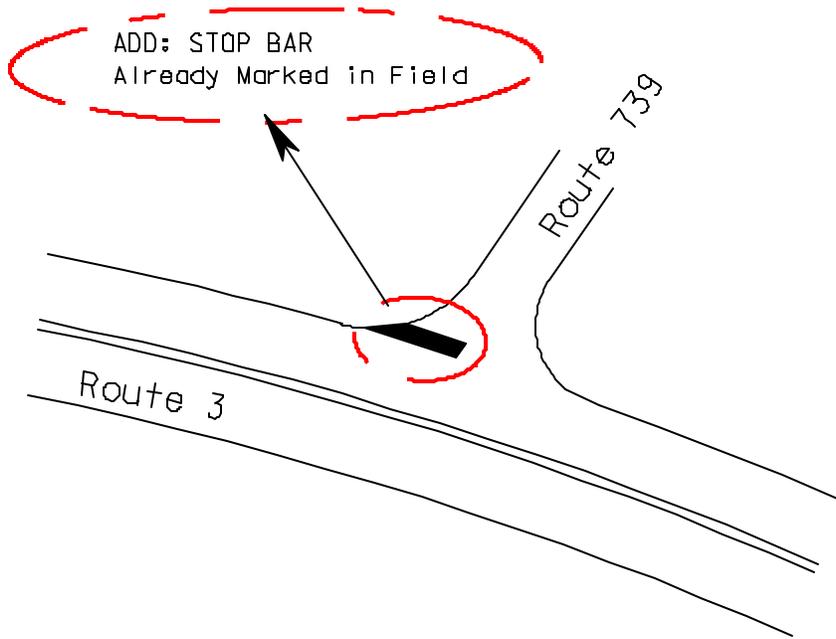
RECOMMENDED: PAVEMENT MARKINGS



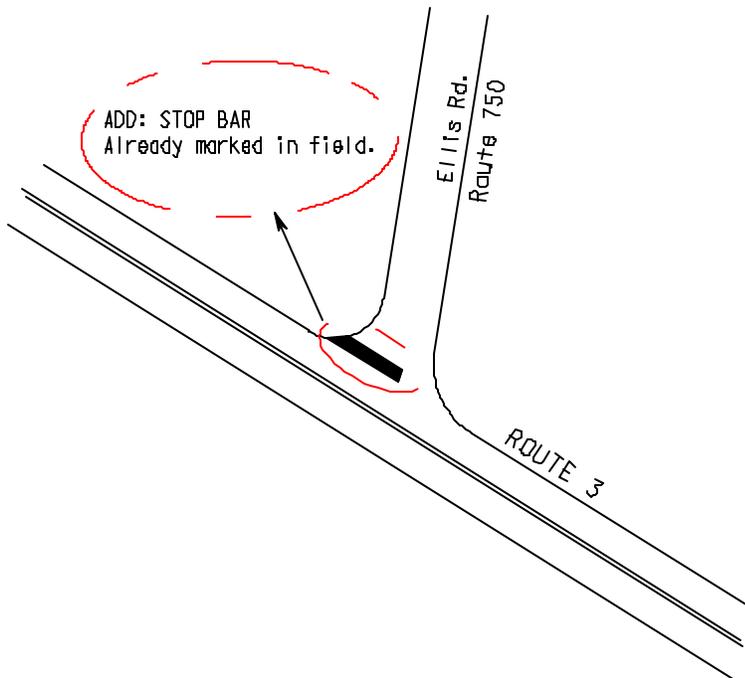
CULPEPER COUNTY
ROUTE 3 @ ROUTE 739



RECOMMENDED: PAVEMENT MARKING



CULPEPER COUNTY
ROUTE 3 @ ROUTE 750
RECOMMENDED: PAVEMENT MARKINGS



APPENDIX F

Modifications along Curve



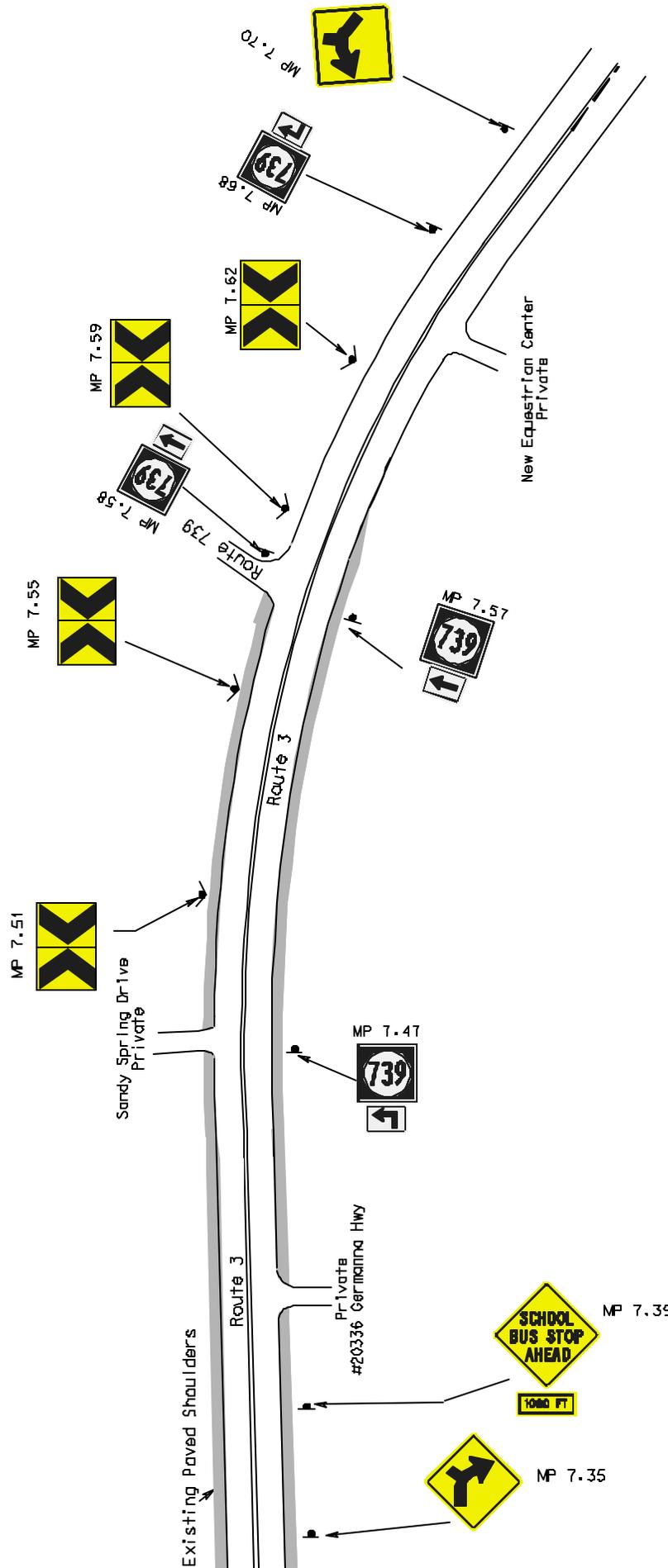
Culpeper County

Route 3

Fm: 0.13 mile west of Rte. 739 (MP 7.44)

To: 0.13 mile east of Rte. 738 (MP 7.70)

Length : 0.26 miles

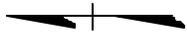


* All Signing Shown are In Place
* Not to Scale

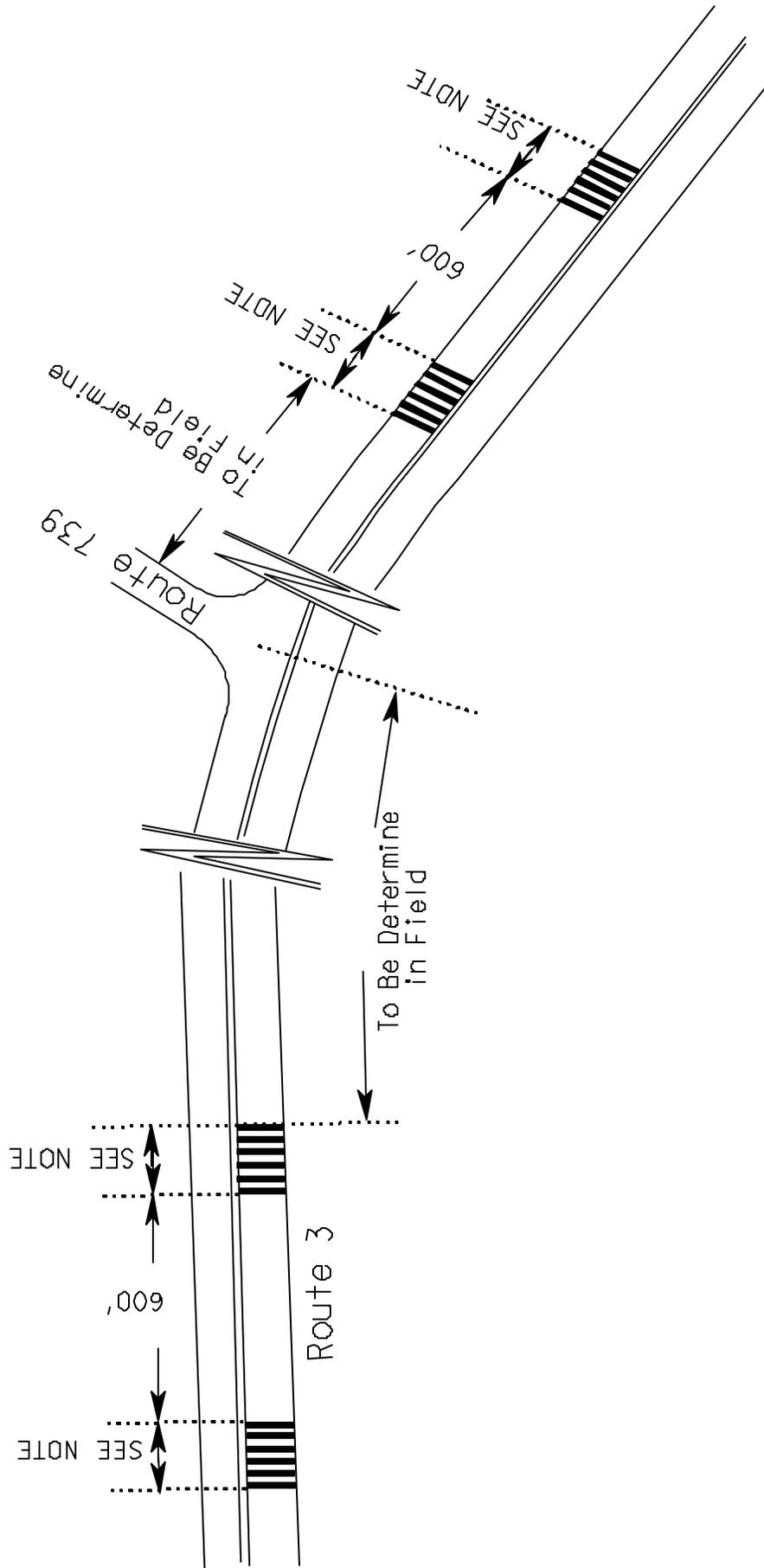
APPENDIX G

Transverse Rumble Strips

Culpeper County
Route 3



Rumble Strips Installation Diagram

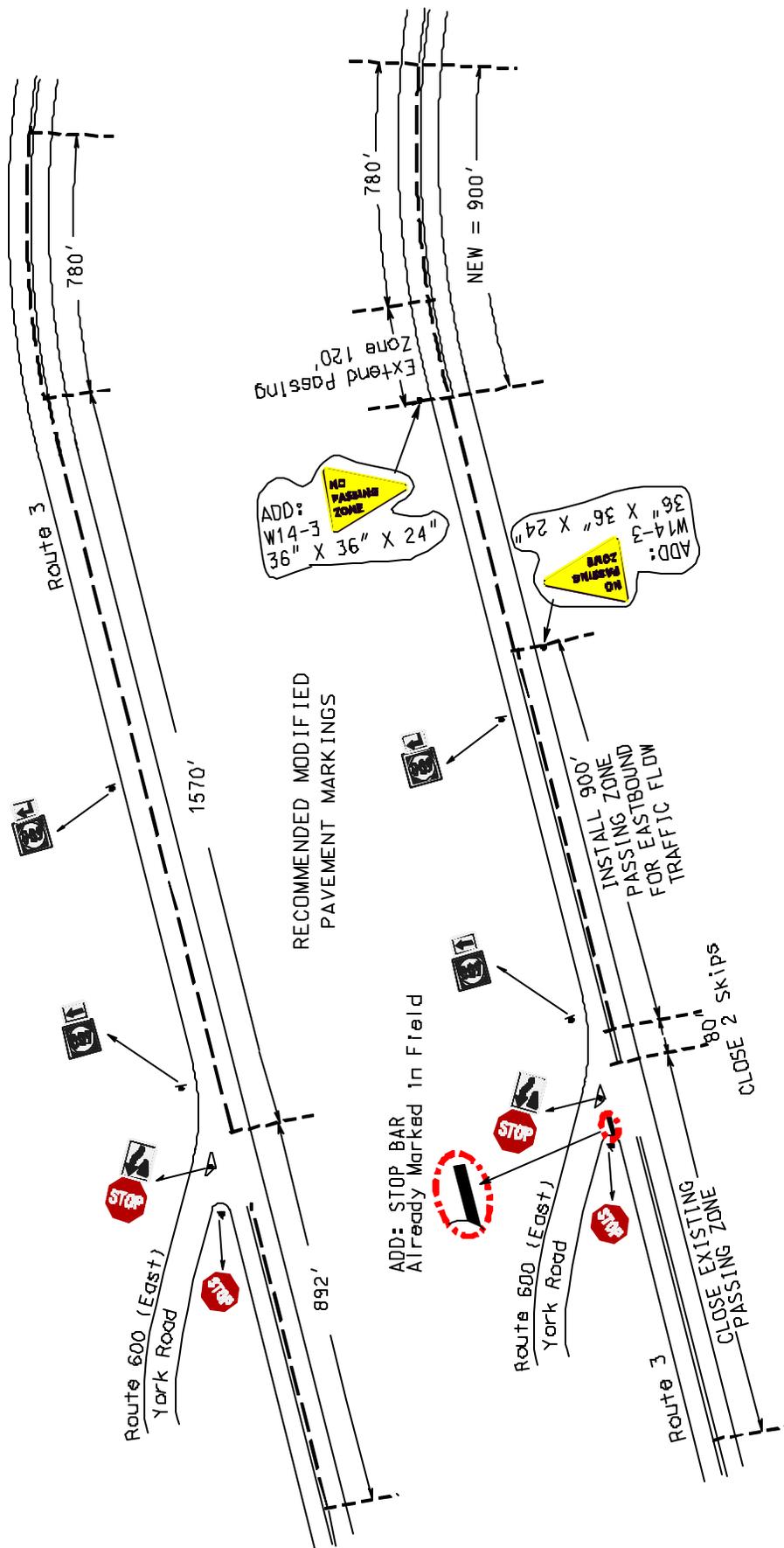


APPENDIX H

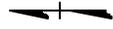
Passing Zone modifications

CULPEPER COUNTY
ROUTE 3 @
ROUTE 600 (East Intersection)
RECOMMENDED:
CLOSURE OF PASSING ZONE & PAVEMENT MARKINGS

PAVEMENT MARKINGS
PRESENTLY IN PLACE

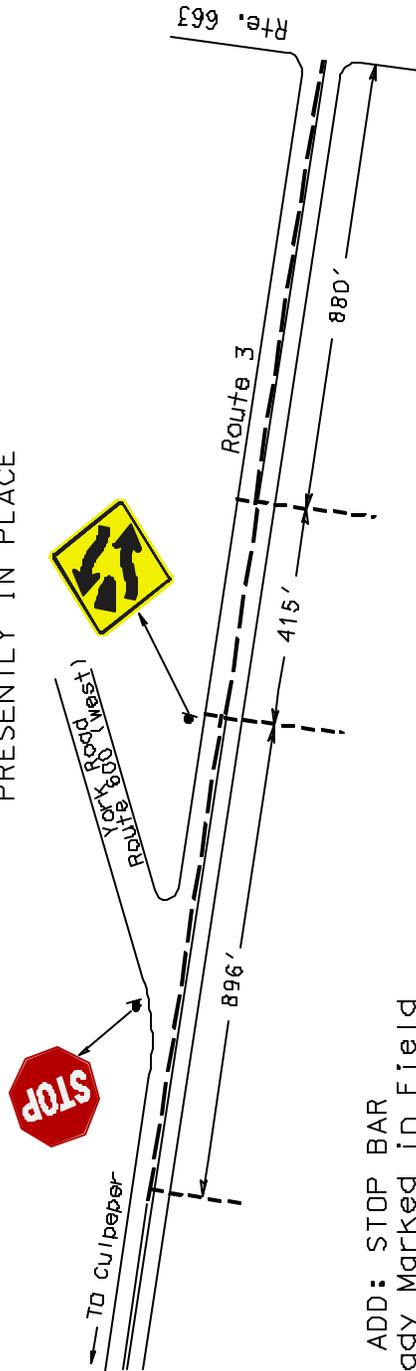


CULPEPER COUNTY
Route 3 @
ROUTE 600 (West Intersection)



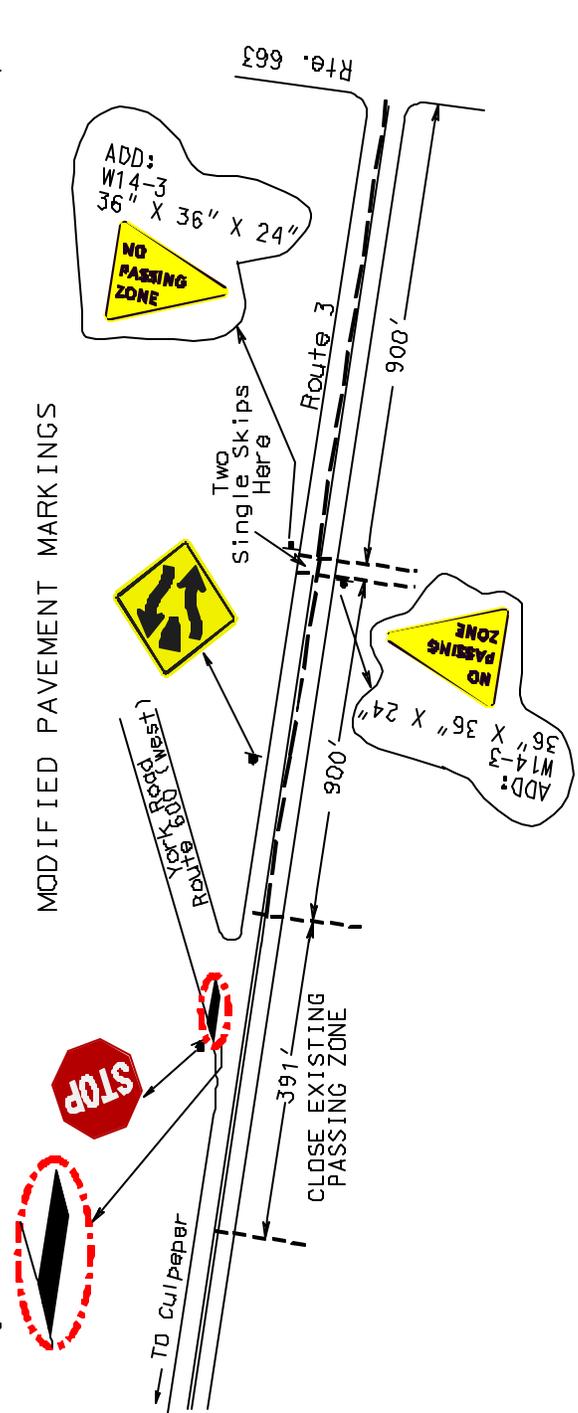
RECOMMENDED:
CLOSURE OF PASSING ZONE EASTBOUND
& PAVEMENT MARKING

PAVEMENT MARKINGS
PRESENTLY IN PLACE



ADD: STOP BAR
Already Marked in Field

MODIFIED PAVEMENT MARKINGS



APPENDIX I

Traffic Count – Intersection 663