chapter

1

Introduction

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In 2002, the Virginia Department of Transportation (VDOT) and VHB developed the Route 13 / Wallops Island Access Management Study (2002 Study). The goal of the 2002 Study was to develop a plan that VDOT and the jurisdictions could implement to make U.S. Route 13 a safe and more efficient transportation facility for the traveling public over the next 20 years. Since then, the 2002 Study has served as guidance for the Eastern Shore.

Fifteen years later this study provides an assessment of the corridor following current design practice and methods of achieving higher levels of safety on the corridor. The 2002 Study included access management and safety improvement recommendations, some of which were implemented since the 2002 study. As a result, VDOT requested that VHB assess the current safety conditions of the corridors and determine if the implemented modifications improved safety. The assessment includes evaluation of recommendations implemented, which treatments were effective, and what should be programmed for future implementation. This report documents the findings of the study and presents the following: comparative analysis to the 2002 Study, systemic analysis of intersections and corridor segments, crossover and intersection assessment, site specific location evaluation, recommendations, and the plan of action for implementation.

1.1 Study Area

The study area is the U.S. Route 13 corridor from Route 600, just north of the Chesapeake Bay Bridge-Tunnel toll facility, north to the Virginia – Maryland state line, a distance of approximately 69 miles. In addition, Route 175, serving the NASA facility at Wallops Island, is included from its intersection with U.S. Route 13 east to the bridge to Chincoteague. Figure 1.1 on the following page depicts the study area.

Regionally, U.S. Route 13 is the principal north-south corridor linking Virginia Beach to the Eastern Shore north to Maryland. On the Eastern Shore of Virginia, U.S. Route 13 traverses both Northampton and Accomack Counties.

For many on the Eastern Shore, U.S. Route 13 is considered the "main street" and economic lifeline. Not only does it serve the municipalities of Cheriton, Eastville, Nassawadox, Exmore, Painter, Keller, Melfa, Onley, and Accomac but also the unincorporated communities of Treherneville, Birdsnest, Weirwood, Nelsonia, Mappsville, Temperanceville, Oak Hill, and New Church.

U.S. Route 13 is a four-lane highway with uncontrolled access that has a variable width median separating northbound and southbound traffic throughout most of the corridor. Speed limits vary from 45 miles per hour (mph) to 55 mph. Route 175 is a two-lane undivided corridor providing access from U.S. Route 13 to Chincoteague Island. It has a posted speed limit of 55 mph within the study area.

1.2 Study Team and Coordination

The Study Team includes local and regional staff from VDOT and VHB. A team of Project Stakeholders augments the Study Team to guide the consultant through the duration of the study, review all technical documents, and provide direct input on recommendations. The Stakeholders include representatives from VDOT's Transportation Planning, Traffic Engineering, and Location and Design Divisions, the Hampton Roads District and Accomack Residency, in addition to representatives from Accomack County, Northampton County, Chincoteague, Charles City, and the Accomack-Northampton Planning District Commission. The Project Stakeholders met at critical decision points, meeting on average every other month.

1.3 Study Goals and Objectives

Specific goals and objectives were developed at the outset based on field reviews of the corridor, information received during the initial scoping process, and input from the initial stakeholder meeting. The goal of the study was to set forth a set of tiered recommendations of signs, pavement markings, geometric changes, traffic control techniques and other improvements to enhance safety of the U.S. Route 13 and Route 175 corridors. The recommendations were determined through an evaluation of crash history and proactively applying templates of proven safety techniques in combination with site specific modifications with proven safety results.

The objectives in comprehensively assessing the safety of the corridors are as follows:

- Annotate the existing safety attributes;
- Identify key issues affecting travel safety along the corridors;
- Identify the implemented 2002 Study recommended improvements and their effectiveness;
- Synthesize crash data, existing conditions, median crossovers, bicycle and pedestrian accommodations, and speed limits; and
- Develop recommendations that address deficiencies, present phased implementation, and provide planning level cost estimates.

This report provides the documentation of the study, results, and recommendations. It is generally organized with the comparative analysis between the 2002 Study and existing conditions, systemic evaluation, crossover and intersection assessment, site specific location evaluation, recommendations, and the plan of action.

Figure 1.1
Study Area
Eastern Shore Safety Study

chapter

2

Methodology

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2.1 Study Methodology

The study follows VDOT's Corridor Safety Assessment (CSA) Process Guideline prepared for Corridors of Statewide Significance (CoSS). The CSA process is a systemic approach to proactively reduce potential crashes using a series of templates with tiered application for various geometric conditions. With the 2002 Study on file and used as a guiding document for more than a decade, the methodology for this study layered the nine step CSA process, see Figure 2.1, with a historic comparison to the 2002 Study, an assessment of crossover and intersection closure and treatments, and speed limit review. The comparative analysis has value in confirming the status of the corridor; however, the final recommendations are a product of the systemic analysis, crossover and intersection assessment, and the site specific location evaluation.

Figure 2.1.
Study Process.

The historic comparison to the 2002 Study was addressed in tandem with the CSA process. Implemented improvements from the 2002 Study have been documented in the Comparative Analysis (Chapter 3) of this report. Three-year (1997-1999 to 2012-2014) crash data was used to measure how well the implemented improvements achieved the reduction in the number of crashes or the severity of crashes. The field documentation was used to supplement database inventory of roadway attributes of the existing conditions used in the Comparative Analysis. Speed limits, shoulder widths, and rumble strips were the most thoroughly documented attributes, as the scope of this study did not include an asset inventory.

Analysis of speed related crashes and documentation of current travel speeds throughout the corridor were included within the original scope of the study. Since speed was a contributory factor on crashes outside town limits, VDOT supplemented the data for segments within town limits with posted speeds less than 55 miles per hour (mph). The results were used in the post-review data synthesis. The evaluation of the speed limit became a separate task and the results are presented in Chapter 3, Section 2.

VHB took a hybrid approach to evaluating the corridors using a process that was created by VHB for VDOT's CSA (see Figure 2.2), whereby systemic and site specific approaches were combined to comprehensively review the U.S. Route 13 corridor and Route 175 corridor. With this approach, VHB utilized the latest Highway Safety Improvement Program (HSIP) network screening results developed in early 2015 to identify key segment types, intersection types, and geometric features where systemic countermeasure packages developed for the CoSS could be deployed. The VDOT approved CoSS templates were modified to be specific to the Eastern Shore and were used to identify up to three tiers of countermeasure treatments to enhance safety. The Eastern Shore Templates are provided in Appendix A. The findings of the systemic analysis can be found in Chapter 4.

Through the public involvement process and legislative representation, the citizens in Northampton and Accomack Counties expressed concern on two major elements of the corridors: crossover closure and speed limits within towns. The 2002 Study had provided a list of crossovers to be closed, and 16 of those closures have been implemented by VDOT. As part of the current study, the crossover closures were reevaluated in conjunction with intersections and specific treatments recommended based on crash data, current design guidelines, and land use. The results and recommendations are discussed in Chapter 5.

GIS mapping tools and crash data analysis for a five-year period along with VDOT's Target Safety Need (TSN) were used to identify specific areas of concern or locations that have a potential for safety improvement. The more in-depth review was conducted at the 25 site specific locations which is described in detail in Chapter 6.

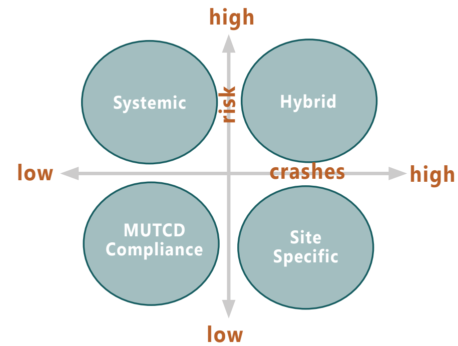

Figure 2.2.
Systemic Analysis Process.

The following items are detailed in the study report:

- Recommended upgrades of traffic control devices to meet current MUTCD standards outlined in the Virginia Supplement;
- Summarization of contributing driver behavior factors (e.g. DUI, occupant protection, and speed) where safety partners (e.g. Virginia State Police, local law enforcement, Department of Motor Vehicles) can be engaged to employ a comprehensive safety approach on U.S. Route 13 and Route 175;
- Recommended systemic countermeasure packages to address identified intersections and corridor segments;
- Recommended crossover and intersection closures and treatments; and
- Recommended site specific improvements for 25 locations along the corridor.

2.2 Public Involvement

This study relied heavily on the crash data to guide analysts to the site specific locations, to perform the systemic evaluation, and to apply the appropriate templates; nonetheless, there is always value in hearing citizens' perspectives and concerns. Crash history is a documentation of events, but does not capture the daily experience of the local community. The key components of the public involvement for this study were:

- Initial Scoping Meetings;
- Coordination with Elected Officials and Key Stakeholders; and
- Citizen Information Meetings.

Scoping meetings relied on VDOT's communication with multiple agencies, elected officials, and citizens over the past few years to define and refine the scope of the study. This process allowed the team to increase focus on the crossover and intersection assessment and on the speed limit evaluation.

Approximately every other month, coordination meetings with elected officials and key stakeholders were held to provide updates on the progress of the study. These meetings kept the leadership of the Eastern Shore informed and established a means for the leaders to provide input during the study process.

Additionally, two Citizen Information Meetings (CIM) were held; one during the initial investigation phase and one at the final stage. Citizen comments were solicited during the CIM#1 held on November 17, 2015 at the Eastern Shore Community College. A follow up CIM#2 was held on March 1, 2016 to report on analysis results and potential countermeasures which would be in the recommendations.

The CIM#1 included a 30-minute presentation about the study methodology and schedule. Boards were displayed for viewing and study team representatives engaged in conversation with citizens on their experiences along the corridors. A handout was provided for capturing comments which could be mailed in and was made available electronically after the meeting. The comment period was open until December 17, 2015.

Seventeen citizens provided comments (see Appendix B). Access management, especially near intersections, was mentioned several times. Seven comments referenced Location #2 requesting better access. The citizens recognize the value of connectivity between land uses so that local traffic can avoid using U.S. Route 13. Attentiveness to the needs of farmers was requested in recognition of the danger of the large, slow equipment mixing with the fast moving through traffic. Deficiencies of left turn lanes at median openings, and the subsequent danger, was highlighted as an issue, as well as the need for shoulders on Route 175.

Citizens expressed their concern of the Commonwealth's commitment to implement recommended treatments. Reference to public hearings in the past and the disappointment of not seeing more changes in making the corridors safer was included.

The comments received were reviewed during the analysis of the corridors and then again after the recommendations were drafted. The review was performed to ensure the concerns were taken into consideration during the study.

A second CIM (CIM#2) was held on March 1, 2016 as an update on the progress of the study. The study presentation provided an overview of the study process, some of the countermeasures which were in the recommendations, and the schedule. Additional comments were received and reviewed to ensure concerns were taken into consideration in the report.

2.3 Crash Modification Factors

A crash modification factor (CMF) is a factor, based on documented safety research studies, used to compute the expected number of crashes after implementing a given countermeasure at a specific site. CMFs provide some indication of the potential benefit, or lack thereof, associated with specific countermeasures. The Federal Highway Administration (FHWA) compiles CMF data from published safety studies and posts them in the CMF Clearinghouse (http://www.cmfclearinghouse.org/index.cfm) to help practitioners select the most effective safety treatments. While CMF data is not available for all potential countermeasures, the CMF Clearinghouse provides a useful and consolidated source of data to help engineers, planners, and project owners make informed decisions.

There are many countermeasure techniques recommended in this study and only some of them have CMFs associated with them. Table 2.1, below, is a sample of the techniques and the corresponding CMFs used in the study.

How do CMF's work?

CMFs are a multiplicative factor that can be used to estimate the number of crashes with implementation of the selected countermeasure. The following equation can be used to calculate the estimated crashes with the treatment:

$$\left(\text{Estimated Crashes WITH Treatment}\right) = \left(\text{CMF}\right) \times \left(\text{Estimated Crashes WITHOUT Treatment}\right)$$

Example:

A location had 10 crashes per year during the study period. The countermeasure has a CMF of 0.8, meaning according to research, this countermeasure may provide a 20% reduction in crashes. Therefore, the expected crashes after implementation of the countermeasure is 8 crashes per year.

$$\left(\text{Expected crashes}\right) = \left(0.8\right) \times \left(\text{10 crashes per year}\right) = \left(\text{8 crashes per year after implementation}\right)$$

Table 2.1.
Crash Modification Factors.

Countermeasure	CMF	Notes	Source
Install shoulder rumble strips	0.82 (18% reduction)	Roadway Departures - all severities	CMF Clearinghouse
Install center line rumble strips	0.82 (18% reduction)	All Crashes - fatal, serious injury	CMF Clearinghouse
Widen shoulder (paved) (from 2 to 4 ft)	0.89 (11% reduction)	All Crashes - all severities	CMF Clearinghouse
Installation of safety edge treatment	0.85 - 1.00 (0 - 15% reduction)	All Crashes - all severities	CMF Clearinghouse
Add dynamic intersection warning signs	0.814-0.918 (8.2%-18.6% reduction)	All Crashes - all severities	CMF Clearinghouse
Intersection lighting	0.881 - 0.92 (8 - 11.9% reduction)	Nighttime crashes - all severities	CMF Clearinghouse
Directional medians to allow left-turns and u-turns	0.77 (23% reduction)	All Crashes - all severities	CMF Clearinghouse
Replace a direct left turn with a right-turn/u-turn[1] (RCUT Intersection)	0.8 (20% reduction)	All Crashes - all severities	CMF Clearinghouse
Provide a right-turn lane on one major road approach	0.86 - 0.92 (8 - 14% reduction)	All Crashes - all severities	CMF Clearinghouse
Corridor Access Management	0.77 - 0.95 (5 - 23% reduction)		FHWA Proven Countermeasures

[1]RCUT: Restricted Crossing U-Turn (RCUT) Intersection.