



STATE HIGHWAY
ADMINISTRATION

MD 32 PLANNING STUDY

FROM I-70 TO MD 26



APRIL 2018

Figure 1.1 – Project Area

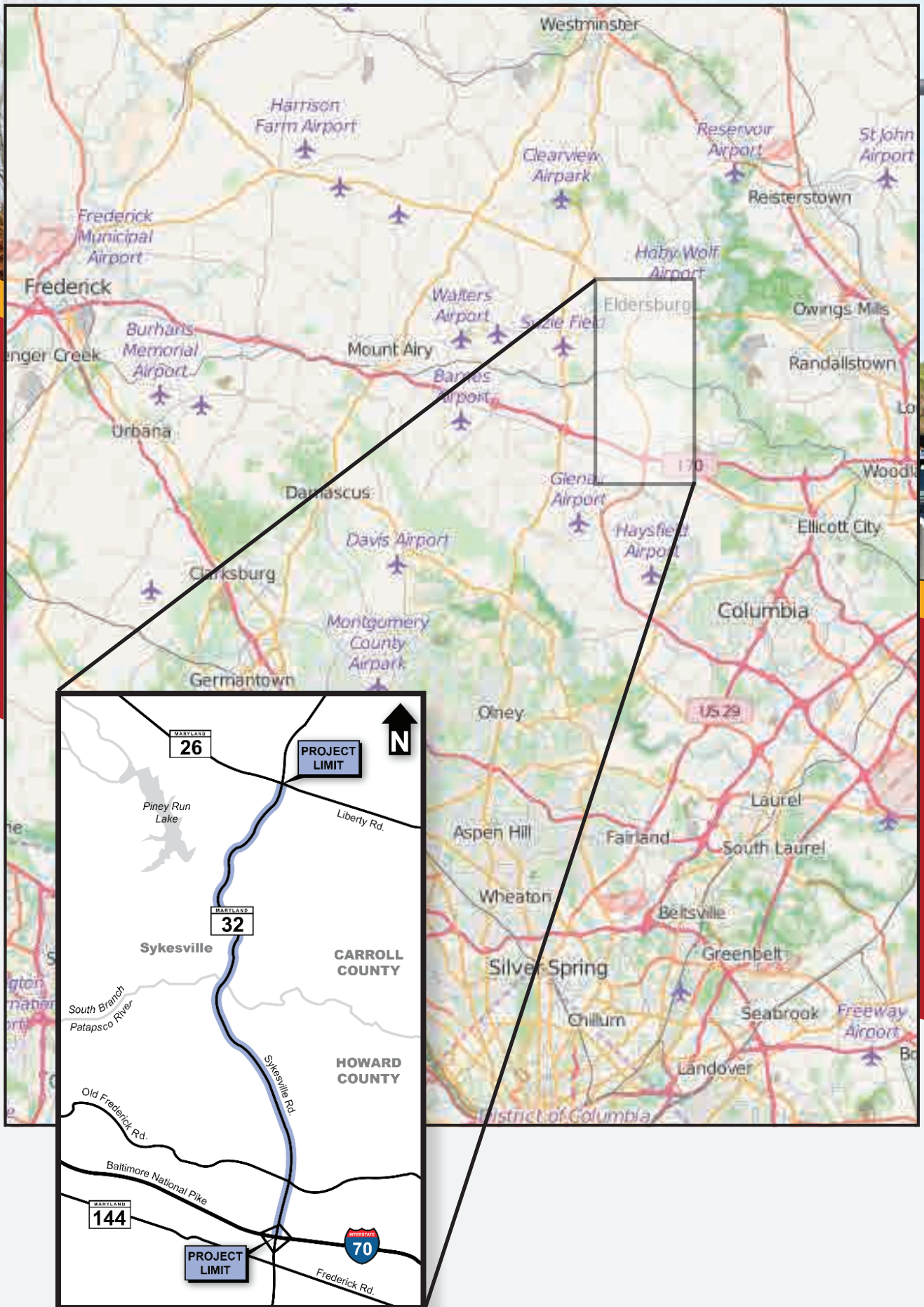


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Maryland Department of Transportation MD 32 Planning Study

From I-70 to MD 36

April 2018



STATE HIGHWAY
ADMINISTRATION

EXECUTIVE SUMMARY

Introduction

The Maryland Department of Transportation State Highway Administration (MDOT SHA), working cooperatively with Howard and Carroll Counties, has undertaken the MD 32 Planning Study to evaluate the transportation needs of the MD 32 corridor – which includes approximately 7.2 miles along MD 32 between I-70 in Howard County and MD 26 (Liberty Road) in Carroll County, Maryland. The purpose of the study was to develop a long-term vision for managing future traffic, while identifying short-term safety and operational improvements that would address more immediate needs and support economic development opportunities. This is consistent with regional and local plans calling for widening the corridor from two to four lanes in the future. This effort included public outreach as well as input from area stakeholders.

Study Methodology

The analysis consisted of three main phases: The initial phase focused on gathering information, engineering data, and environmental data for the study area. This also included soliciting feedback from the public and acquiring existing and future conditions data. The second phase consisted of analyzing the data, identifying the transportation needs, and developing conceptual solutions to address those needs. The third and final phase consisted of analyzing the proposed concepts to prioritize their projected effectiveness. This was based on safety and operational data, along with measures of effectiveness – such as improvement to access, and compatibility with long-term growth projections.

The MD 32 Planning Study was conducted in accordance with the FHWA Planning and Environment Linkages (PEL) Guidelines. PEL represents a collaborative and integrated approach to transportation planning that permits the use of information from this study as a basis for National Environmental Policy Act (NEPA) planning and evaluation.

Identified Issues

MD 32 is a major commuter corridor. While most intersections currently operate acceptably, the heavy peak hour traffic volumes make it difficult for drivers turning to and from MD 32. The average speed throughout the study corridor during peak periods is 10 mph less than the posted speed limit of 50 mph, resulting in travel time delay and congestion. Traffic modeling shows that by 2040, peak hour travel speeds may slow further to an average speed of approximately 30 mph. However, the entire corridor is not expected to exceed its capacity until beyond 2040.

Crash data for the period of 2012 to 2014 reveal that crash rates are below the statewide average for similar types of roadways. Rear-end collisions are the most common crash type, accounting for 36% of all crashes, which is indicative of a congested roadway. The westbound I-70 ramps in Howard County and the MD 26 (Liberty Road) intersection in Carroll County are the locations with the greatest crash volumes as well as the heaviest traffic volumes and turning movements.

There are a significant number of access points along MD 32. Although driveways do not generate significant volumes of traffic, they are a source of unexpected turning movements that can have an impact on traffic flow and safety.

The varying typical section along MD 32 influences driver expectations and may contribute to varying traffic flow. The roadway changes from divided to undivided, and from two lanes to three- and four-lane sections with and without shoulders. Though there are shoulders along most of the corridor, many areas do not have bicycle compatible shoulders. Sidewalks are provided only in the segment between MD 26 (Liberty Road) and Piney Ridge Parkway/Macbeth Way, and at signalized intersections within Sykesville which contain crosswalks.

Four-lane Corridor Vision

The ultimate vision for MD 32, as identified in local master plans, includes widening MD 32 to a four-lane divided roadway. However, based on current traffic forecasts, the entire corridor will not require four lanes until beyond the future design year 2040. A corridor concept and typical sections were developed to ensure that future roadway work, new development or redevelopment is compatible with the ultimate vision.

The four-lane corridor concept developed has been broken into three phases, each with a similar proposed typical section concept (see Figure ES-1). Phase C1 is the Howard County portion of the corridor and Phases C2 and C3 are the segments within Carroll County. The segment from Springfield Avenue to Piney Ridge Parkway /MacBeth Way (Concept C3) is identified as the segment first expected to need widening based on future traffic operation projections.

Operational Improvements

The study recommendations include a list of access consolidation and intersection concepts to improve safety and roadway operations, and address property access needs throughout the corridor. While the forecasted traffic analysis shows that a full corridor upgrade to a four-lane divided highway will not be needed until at least 2040, shorter term improvements should be designed to be compatible with the ultimate four-lane vision. The concepts are a guide for implementing improvements in the MD 32 corridor that will improve safety and operations and create a more consistent corridor. Further engineering design

and analysis of the concepts will be necessary prior to implementation. The top priorities to be addressed in the study corridor include:

- Howard County from I-70 to MD 99: Reconfigure I-70 ramp intersection, extend turn lanes and provide median barrier to reduce weaving conflicts and improve park & ride access. Approximate construction costs range from \$3.2 to \$3.5 Million. (See Figure ES-2 on the following page for mapping of this segment).
- Carroll County from 2nd Street to Main Street: Improve intersection geometry, extend turn lanes, modify access and evaluate signal warrant at Main Street. Approximate construction costs range from \$2.5 to \$2.8 Million. (See Figure ES-3 on page 7 for mapping of this segment).
- MD 32 / MD 26 intersection: Identify intersection improvements. MDOT SHA has begun a supplemental study of this intersection to identify potential concepts that would address the operational and safety needs. Initial cost estimates are in the range of between \$3.3 and \$3.8 million.

The design of a second northbound travel lane, a two-way left turn lane, and auxiliary lane improvements is underway for MD 32 between Main Street and Macbeth Way. These enhancements will support the National Guard Readiness Center at the Warfield Complex. Additional recommendations include reducing the number of access points through consolidation, additional turn lanes and auxiliary lanes, and pavement marking improvements. These improvements can be implemented incrementally over time as opportunities arise and funding becomes available.

Figure ES-1 – 4-Lane Divided Highway

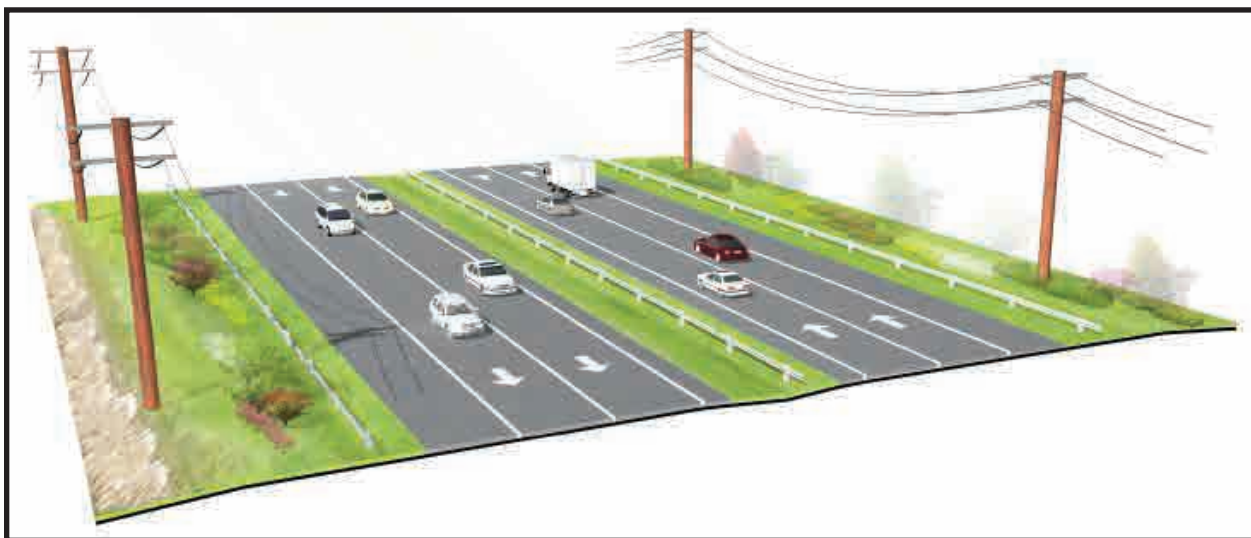
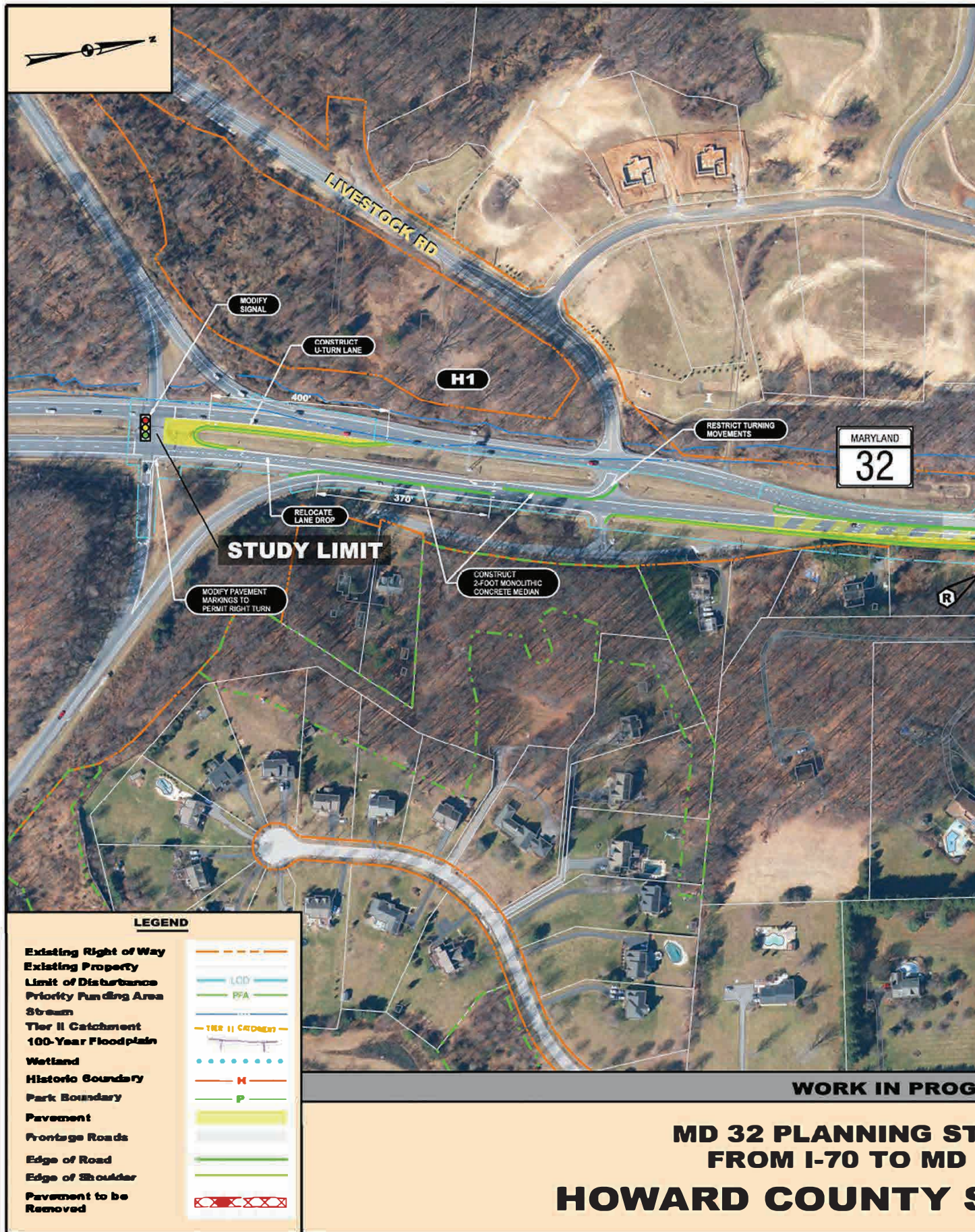
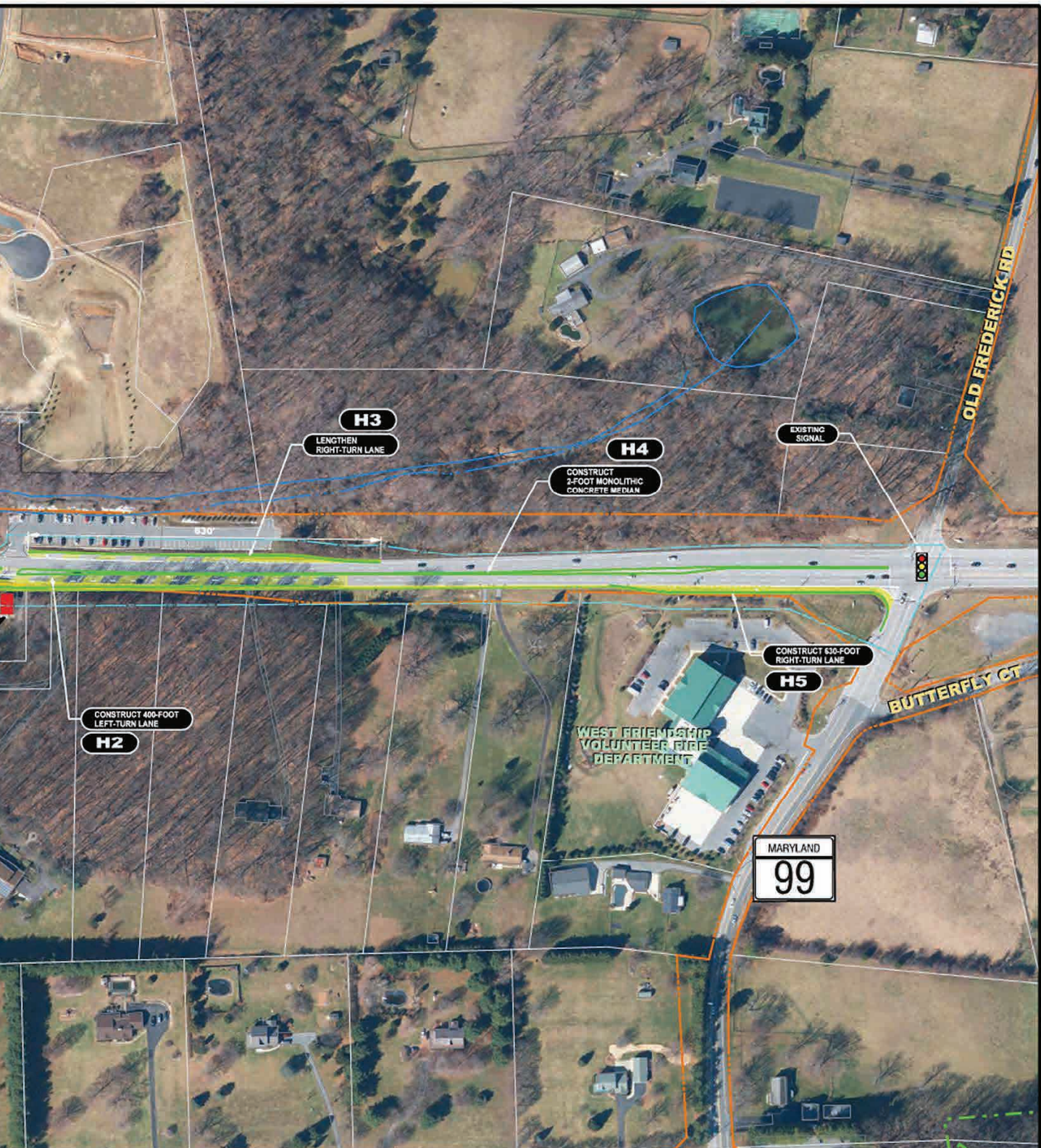


Figure ES-2 – MD 32 Planning Study From I-70 to MD 26 Howard County Segment





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SEGMENT**



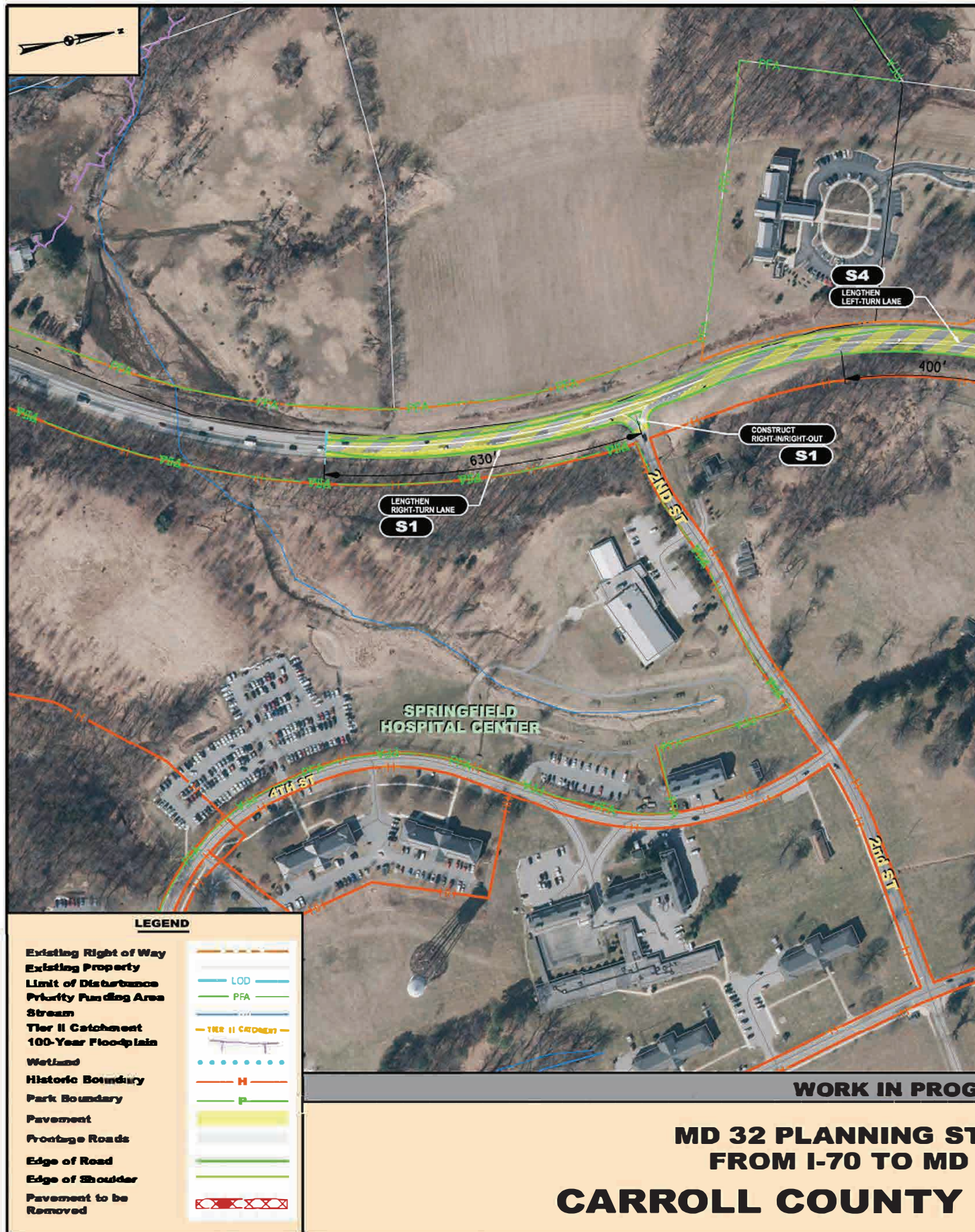
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**BACKGROUND AERIAL SOURCE
MDOT/SHA
2015**

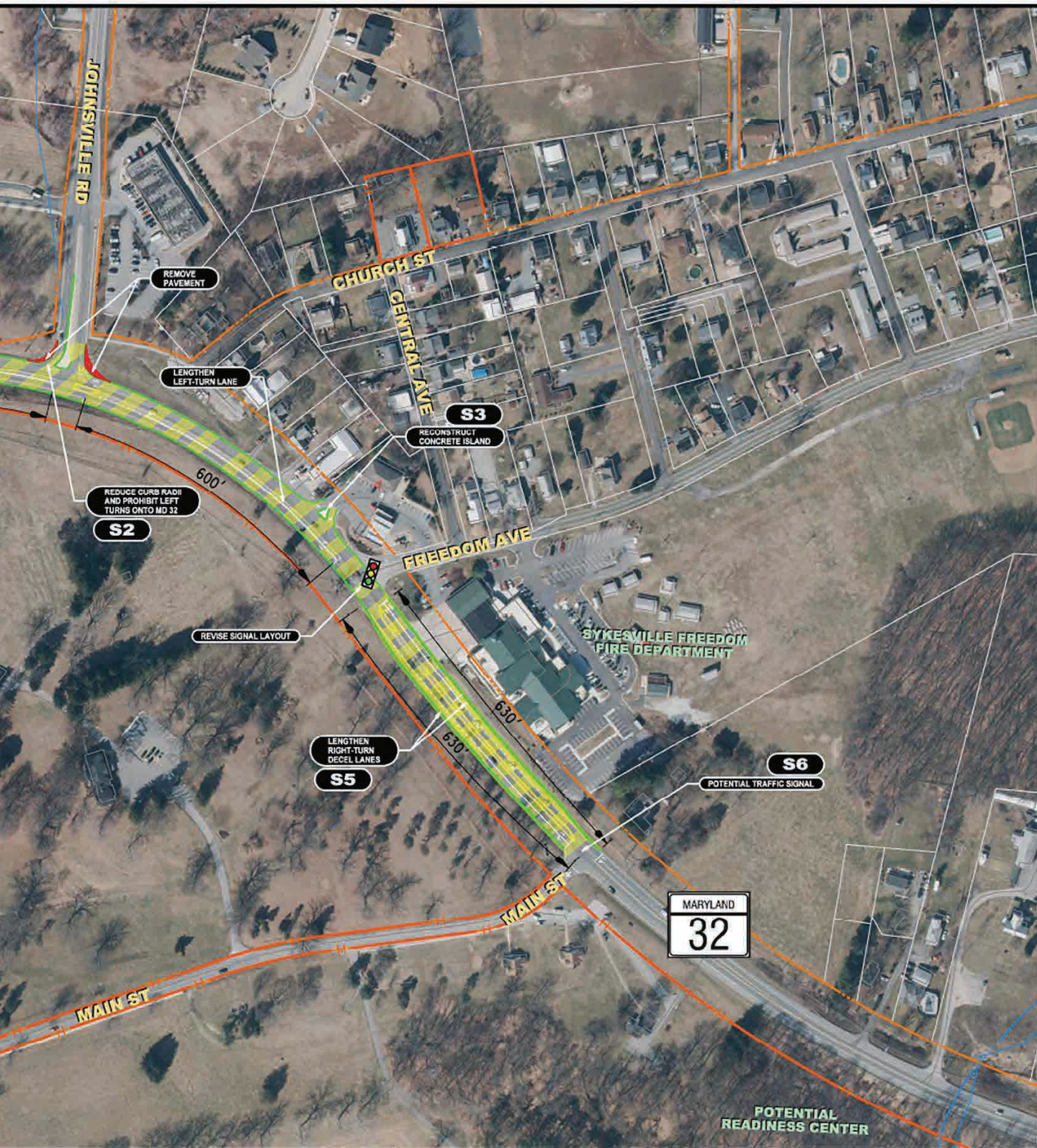
FIGURE ES-2

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Figure ES-3 – MD 32 Planning Study From I-70 to MD 26 Carroll County Segment



RYLAN
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GRESS
STUDY
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SEGMENT



NOT TO SCALE

BACKGROUND AERIAL SOURCE
 MDOT/SHA
 2015
FIGURE ES-3

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01 - INTRODUCTION

What is the study scope and purpose?



Study Area

The MD 32 study area extends approximately 7.2 miles along MD 32 from the interchange with I-70 in Howard County to MD 26 (Liberty Road) in Carroll County, Maryland (See Figure 1.1 on the inside cover) and focuses on the surrounding areas that create demand for the road.

MD 32 (also known as Sykesville Road) is the primary transportation route serving areas in both counties between I-70, Sykesville, Eldersburg, and locations further to the north and south. The roadway is a major thoroughfare that supports commercial and residential developments in Howard and Carroll Counties. The study area is a diverse mix of rural agricultural/residential areas, institutional grounds, suburban commercial, and developed residential areas. The MD 32 corridor contains the Town of Sykesville and the unincorporated area of Eldersburg.

Vehicular traffic in the study area increased significantly in the mid-1970s when US 40 was upgraded and designated as Interstate 70. The development of residential subdivisions and construction of single family homes contributed to increasing levels of traffic and congestion along the existing roadway infrastructure. Pedestrian and bicycle facilities were not built throughout much of the study area; and the lack of a well-connected street network forces much of the local traffic in the area onto MD 32.

Purpose of Study

The purpose of the study is to develop a long-term vision for managing future traffic and to identify short-term safety and operational improvements that will address more immediate needs and support economic development opportunities.

Economic development has shaped the existing character and operations of the corridor, and current forecasts project development to continue at a similar rate. Planning for these changes is essential to ensure that the roadway will continue to function efficiently. This study is intended to be the starting point to implement improvements in the future.

Vision

The vision statement is based on the analysis of the existing conditions and the input MDOT SHA received from the public and stakeholders. It defines the unique properties of the MD 32 corridor, its role as a vital transportation link between Howard and Carroll Counties, and the needs of residents, stakeholders and users alike.

The vision statement is as follows:

To improve in the short- and long-term, the ability of MD 32 to perform its role as a vital transportation link between Howard and Carroll Counties and to provide for a safe and efficient roadway for all types of users that encourages responsible economic development while preserving the unique character of surrounding communities.

Previous Studies

MDOT SHA conducted studies in 1998 and 2010 to determine the various needs along the MD 32 corridor between I-70 and MD 26 for the foreseeable future.

In 1998, a feasibility study was conducted for MD 32 from I-70 to MD 26. MDOT SHA completed the report to assess the expansion of MD 32 from a two-lane undivided road to a four-lane divided roadway with auxiliary lanes in appropriate locations. The report includes traffic analyses at corridor intersections, travel time studies, proposed improvements, evaluation of residential displacements, environmental impacts, and cost estimates. The study proposed removing seventeen access points in Howard County and replacing them with four service roads.

In 2010, MDOT SHA conducted an Access Management Corridor Study in Howard County. The study examined access management techniques and other strategies that could potentially be applied to MD 32 to provide permanent and/or long-term access, safety, and operational benefits. Improving safety on MD 32 from I-70 to the Carroll County line was important because of the annual growth in traffic from 2000 to 2007. The four-mile corridor was made a priority due to the high traffic volumes, the number of reported crashes, and the low number of access points.

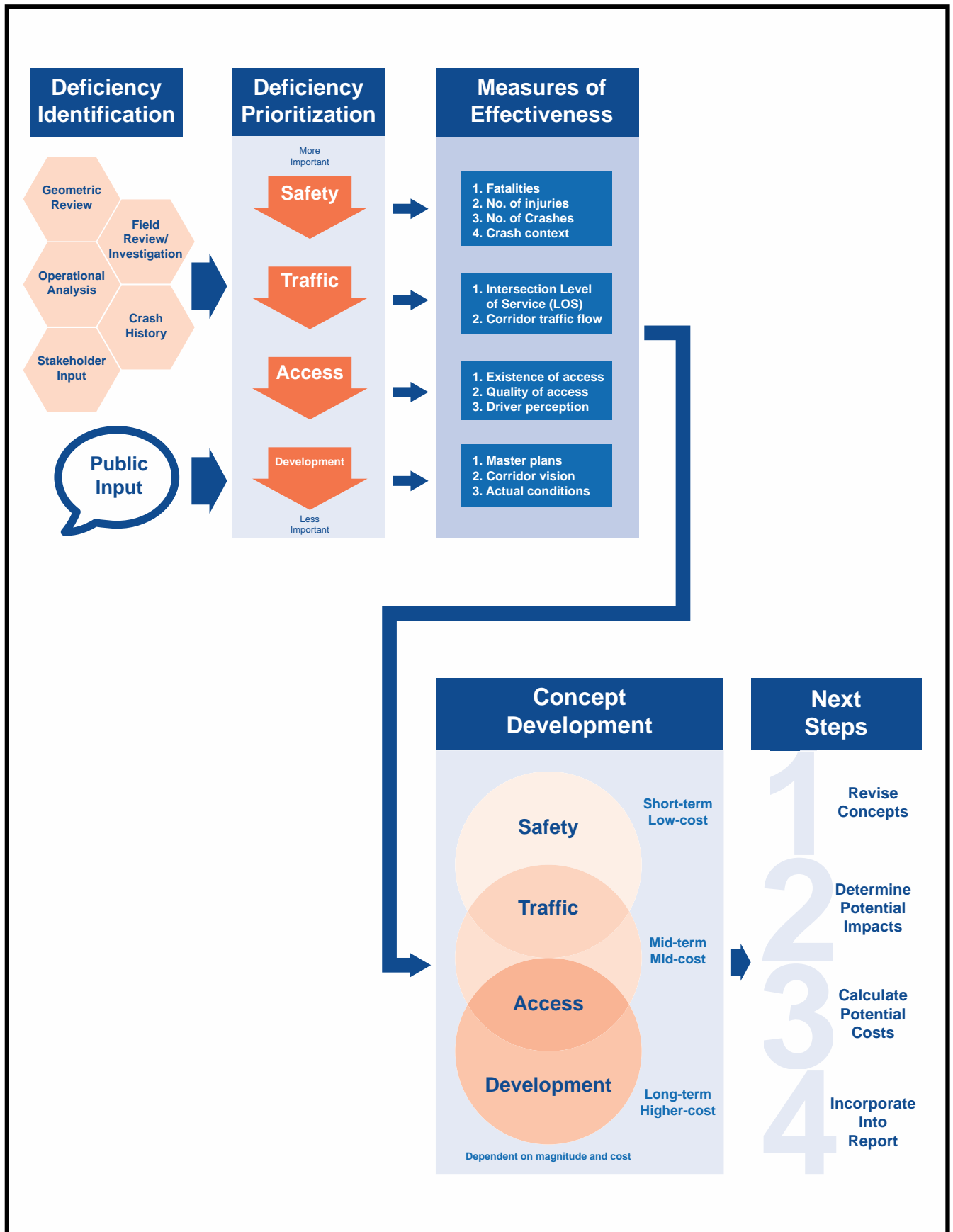
Planning Process

The study team collected data and identified needs in the corridor based on crash data, traffic operations, field investigation, geometric review, and stakeholder/public input. Public input was collected through an online survey, stakeholder interviews, and a public workshop held on June 9, 2016.

The identified issues were separated into four categories: safety, traffic, access, and development. Measures of effectiveness (MOEs) were identified for each category. Potential short- and mid-range concepts address specific needs, and a long-term concept addresses future needs. Individual concepts were developed and prioritized based on safety and operational data; concepts were also meant to incorporate MOEs such as improvement to access and compatibility with long-term growth.

Figure 1.2 is a graphical depiction of the process for developing, analyzing, and evaluating potential concepts to address identified issues throughout the MD 32 corridor.

Figure 1.2 – MD 32 Planning Study Concept Development and Analysis Process



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02 - Corridor Context

What is the character of corridor communities now and in the future?
What environmental resources exist in the corridor?



Existing Land Use

The Howard County portion of the study area is primarily rural. It has large areas preserved in agricultural easements and is comprised primarily of two rural zoning districts. One district includes the Rural Conservation (RC) zoning district that encompasses most of the area west of MD 32 and includes land that is mostly still uncommitted or already preserved. The second is a Rural Residential (RR) zoning district that encompasses most of the area east of MD 32 and includes land that is already highly subdivided. See the Land Use Figure in Appendix II for a map showing the generalized land uses discussed.

The Carroll County portion of the study area is more developed and includes a wide range of zoning districts. The northern section of the corridor contains neighborhood retail business and general business districts along the MD 26 corridor, and is also surrounded by high to medium residential districts. South of the residential areas, agricultural zoning districts encompass large areas east of MD 32, including the Springfield Hospital Center. South of this area is the Warfield Complex (previously a part of the hospital), which is primarily zoned as an employment campus along with a conservation district. A general industrial district is also located east of MD 32, south of the Warfield Complex. The Figure in Appendix II shows the wide range of zoning districts that allows for a variety of land development activities.

The Town of Sykesville includes small central business and neighborhood business districts surrounded by medium- to high-density residential districts as well as conservation districts and low-density residential districts interspersed throughout the town.

The Carroll County portion of the study area also contains large conservation zoning districts that encompass the Patapsco Valley State Park and surround Piney Run and Piney Run Lake.

Future Development

Continuing development in the corridor and the larger region is expected to lead to increasing traffic volumes. Most future development will occur in the developable areas of Carroll County. The Town of Sykesville provides a key example of future development through its promotion of office/commercial expansion via the Warfield Complex, and in the areas surrounding Springfield Hospital. In addition, the Maryland Military Department recently proposed to construct a new Maryland Army National Guard Readiness Center (Armory) on a parcel adjacent to and east of MD 32, just south of the park and ride opposite Circle Drive. The Howard County portion of the corridor and the conservation districts in Carroll County are primarily outside of the Priority Funding Area (PFA)¹ boundary with no existing or planned water and sewer service. Little additional development is expected in these areas.

1. The 1997 Priority Funding Areas Act directs state funding for growth related infrastructure to PFAs, providing a geographic focus for state investment in growth. This State of Maryland Act legislatively designated certain areas as PFAs and established criteria for locally designated PFAs.

Master Plans

The study area is covered by a number of master plans. There are county-wide master plans for Howard and Carroll Counties, and local plans for the Town of Sykesville and the Freedom Community. The Freedom Community is a designated planning area in Carroll County that lies within the north eastern section of the study area and includes Eldersburg.

Regional - Long Range

Maximize2040

The Baltimore Regional Transportation Board (BRTB) is the policy organization responsible for transportation planning in the Baltimore metropolitan area, of which Carroll County and Howard County are member jurisdictions. *Maximize2040: A Performance-Based Transportation Plan* is the board's long-range plan for the region from 2020 through 2040. *Maximize2040* was adopted by the BRTB in 2015 and replaces the previous document, *Plan It 2035*.

The plan includes two projects pertaining to MD 32 in their list of anticipated projects between 2030 and 2040. These projects will address the primary goals of mobility, accessibility, and safety. They are split into the two county segments and both recommend expanding capacity from two to four lanes. The Carroll County project recommends adding pedestrian and bicycle facilities, while the Howard County project recommends "safety, operational, and access improvements" consistent with those proposed for Carroll County.

Carroll County

2014 Carroll County Master Plan

The *2014 Carroll County Master Plan* is the first update, second revision, to the original *1964 Carroll County Master Plan*. The plan considers that the "suburb-to-suburb commute" will be the fastest growing traffic pattern in the future and will present special challenges for the local transportation network, given the county's location relative to the major suburban centers of Washington, DC and Baltimore, MD. MD 32 is the second busiest route for commuter traffic within the county (behind MD 140).

The county's most relevant recommendations regarding MD 32 are to:

1. Reduce traffic congestion by enhancing connectivity and upgrading inter- and intra-county connector transportation routes.
2. Enhance the safety of the county's roadways by enhancing connectivity and upgrading inter- and intra-county connector transportation routes.

The county's specific recommendation for MD 32 refers to the BRTB *Plan It 2035* document (since superseded by *Maximize2040*) which lists the corridor as a candidate for capacity and safety improvements. Carroll County does not currently have a bicycle master plan – although the general master plan does advocate for the development of pedestrian and bicycle opportunities.

Town of Sykesville

The *Town of Sykesville Master Plan (2010, as amended in 2014)* addresses transportation issues to provide safe, efficient, and convenient multi-modal transportation. The annexation of the Warfield Complex placed MD 32 within the town's corporate limits. The plan notes that the road has some positive attributes: it provides access to I-70 and Baltimore, and it removes high speed vehicles and trucks from Main Street. However, the plan also notes that there are some negative attributes associated with MD 32: citizens (particularly vulnerable groups such as the elderly and children) face difficulty crossing the roadway; its awkward configuration and infrastructure at the intersections with MD 32; and overall increased congestion on the roadway.

The plan recommends focusing efforts on improving existing intersections. The town also wants increased capacity along the MD 32 roadway, specifically suggesting a four-lane roadway with shoulders and signalized intersections.

The 2017 Freedom Community Comprehensive Plan: A Crossroads Community

The Freedom Community Planning Area (CPA) in Carroll County occupies approximately 44 square miles in the southeastern corner of the county, roughly bounded by MD 32 and MD 26. The plan integrates the goals and objectives of the Freedom Community and sets the direction for future development.

The plan contains general recommendations for transportation improvements within the CPA, including the construction of bicycle and pedestrian facilities on neighborhood streets to improve connectivity. The CPA plan recommends coordination with MDOT SHA and the County's elected officials to advance roadway and intersection projects along Sykesville Road (MD 32) and Liberty Road (MD 26).

Howard County PlanHoward 2030

PlanHoward 2030 is Howard County's general county-wide master plan that was implemented beginning in 2012. The plan emphasizes sustainability that comes from the "integrated dynamics" of the environment, the economy, the community, and the quality of life.

The plan recommends that the part of MD 32 within the county should receive a capacity improvement by 2035 (but not before 2025). The nature of this improvement is not detailed further within the plan; however, *Maximize2040*, the long range plan adopted by the BRTB in 2015, recommends expanding it to four lanes.

Bike Howard

Bike Howard is the bicycle master plan for Howard County which was initially implemented in 2015. The plan is derived from *PlanHoward 2030*, which desires to see transportation studies include elements related to bicycling and other relevant intermodal and multi-modal topics.

With regard to MD 32, the county's plan contains 'mid-term' improvements to the corridor which would address the lack of accommodations along the stretch between I-70 and MD 99. The county states a preference for parallel routes alongside major highways with limited access as opposed to shared use paths, cycle tracks, or shoulder use. The plan notes that within the study area, MD 32 contains on-road facilities up to the county line with exceptions between I-70 and MD 99.

Environmental Resources

The MD 32 corridor includes a number of environmental resources that need to be considered during the transportation planning process. The environmental inventory of the study area includes cultural resources (historic resources) and natural environmental resources, such as streams, 100-year floodplains, wetlands, and public parks and recreational areas. The following summarizes a more in-depth discussion of the environmental features that can be found in Appendix II.

Cultural Resources Historic Resources

Two Historic Districts are present in the study area: the Sykesville and Warfield Complex Historic Districts. These districts are listed on the National Register of Historic Places (NRHP), along with two churches (one along MD 26 and the other in the town). The historic MD 32 aluminum bridge that crosses the South Branch Patapsco River downstream of the current bridge has been determined eligible for listing on the NRHP. Impacts to historic structures would need to be identified once a project moves forward into further stages of planning and design. Structures currently included on the Maryland Inventory of Historic Places would also merit evaluation. The potential for archaeological resources would also be evaluated in the future.

Civic and Community

The MD 32 study area includes a variety of community facilities as illustrated in Appendix II and contained in Tables 2.1 and 2.2 below. Many of these facilities are focused in and around the more developed areas of the Town of Sykesville and the community of Eldersburg, part of the larger Freedom CPA of southeastern Carroll County. The Integrate-Fairhaven Retirement Community is located in this area on the west side of MD 32, north of Sykesville, and houses over 400 residents.

Table 2.1 Civic Amenities (Carroll County)

Carroll County	
Parks	Millard Cooper Park
	Freedom Park
	Sykesville Linear Trail Park
	Piney Run Park
Schools	Piney Ridge Elementary
	Sykesville Middle
Employers	Springfield Hospital Center
	Central Maryland Correctional Facility
	Maryland Police and Training Center
	Integrate-Fairhaven Retirement Community
	Northrup Grumman
Other	Sykesville Freedom Fire Station and Legacy Hall

The Howard County portion of the study area consists of farms and historic homes, and is interspersed with residential development that consists primarily of large homes on 1+ acre lots. Commercial development and small areas of higher density residential development are focused around the I-70 interchange.

Table 2.2 Civic Amenities (Howard County)

Howard County	
Parks	South Branch Park
	Pfefferkorn Natural Environmental Area
Schools	Mount View Middle
	Marriotts Ridge High
Churches	West Friendship Baptist Church
Other	Howard County Living Farm Heritage Farm
	Old Frederick Rd Scenic Route
	West Friendship Fire Station
	Willow Springs Golf Course

Natural Resources

Hydrology and Topography

The environmental study area encompasses approximately 11,500 acres surrounding the MD 32 corridor. Both counties have large areas of natural and agricultural resources that are preserved and protected by a wide variety of means. The Figure in Appendix II, illustrates the extent of sensitive natural resources including wetlands, streams, and floodplains. This area contains parts of four watersheds, but the majority of the study area is within the South Branch Patapsco River watershed, as shown in Appendix II. There is a small portion of the Liberty Reservoir watershed draining north to the City of Baltimore's reservoir. MD 26 (Liberty Road) generally forms the watershed boundary. The southern portion extends into the Middle Patuxent River and Little Patuxent River watersheds.

In Carroll County, Piney Run drains from the Piney Run Reservoir, a 300-acre lake owned by the

county, and eventually flows into the South Branch Patapsco River east of the study area. Piney Run and two of its unnamed tributaries cross under MD 32 using one large box culvert and two smaller culverts, respectively.

MD 32 crosses over the South Branch Patapsco River and its narrow 100-year floodplain using a three-span steel girder bridge that also spans River Road and an active railroad line. This bridge was constructed in 2002 to replace the historic aluminum box beam bridge that still stands approximately 60 feet downstream.

There are six stream crossings in Howard County, three of which are unnamed tributaries flowing to the South Branch Patapsco River and cross under MD 32 using culverts. One of these tributaries crosses under MD 32 just south of the Day Road intersection and is designated by the Maryland Department of the Environment (MDE) as a Tier II High Quality Stream within a Tier II Catchment. Table 2.3 details the stream crossings within the study area.

Table 2.3 Stream Crossings Along MD 32

County	Location	Name	Classification	Description
Howard County	south of I-70	Unnamed tributaries to Terrapin Branch of Middle Patuxent Branch	Use IV-P	Recreational Trout Waters and Public Water Supply
	south of I-70			
	south of I-70			
	south of Day Road	Unnamed tributaries to South Branch Patapsco River	Use 1	Water Contact Recreation, and Protection of Nontidal Warmwater Aquatic Life
	south of Day Road	Unnamed tributary to Terrapin Branch of Middle Patuxent Branch	Use 1/Tier II (High Quality Stream within a Tier II Catchment)	
south of River Road	Use 1			
Howard & Carroll Counties	County Line	South Branch Patapsco River	Use IV	Recreational Trout Waters
Carroll County	between Springfield Avenue and 2 nd St	Piney Run	Use III-P	Nontidal Cold Water and Public Water Supply
	between Main Street and Waite Ave	Unnamed tributary of Piney Run	Use III	Nontidal Cold Water
	between Circle Dr and Macbeth Way	Unnamed tributaries of Piney Run		

Rare, Threatened or Endangered Species

Approximately one quarter of the Howard County portion of the study area is forested, while just under one quarter of the Carroll County portion is forested. Over 10% of this forest cover includes potential habitat for forest interior dwelling species (FIDS) as defined by the Maryland Department of Natural Resources (MDNR). These species include various birds, turtles, bats, frogs, and salamanders that are known to make their habitats in the interior of large forests for optimal reproduction and survival.

In addition, the MDNR has designated a forested area in Howard County along the eastern edge of the study area as a Sensitive Species Project Review Area (SSPRA) because of the presence of a species that is protected in Maryland. This Project Review Area includes a Wetlands of Special State Concern (WSSC) designated by MDE since it provides a habitat for rare, threatened, or endangered species.

Public Parks and Recreational Areas

There are four identified publicly owned public parks within the study area boundary including:

- South Branch Park
- Millard Cooper Park
- Patapsco Valley State Park
- Hugg-Thomas Wildlife Management Area (WMA)

03 - TRANSPORTATION NETWORK

What the MD 32 corridor looks like today



Transportation Network

Roadway Network

MD 32 is the primary route between Eldersburg, Sykesville, and I-70. Road users wishing to travel between any of the areas served by MD 32 are required to use the road for at least a portion of their trip because of the unconnected nature of the road network and the lack of alternative crossings over the Patapsco River.

In Howard County, MD 99 and Old Frederick Road provide the primary east-west alternative to I-70. The alternative north-south routes are MD 97 approximately 3.5 miles to the west, and Marriottsville Road approximately 3.8 miles to the east. North of Old Frederick Road, Day Road and Forsythe Road provides the only alternative routes to locations to the west and north. River Road provides an alternative route via MD 851 (West Friendship Road) into Sykesville. Residential neighborhoods along MD 32 within Howard County are mostly cul de sacs – with the exception of River, Day, and Forsythe Roads.

Access to the Warfield Complex and the road network of Sykesville are provided by: College Avenue, Sandosky Road/Raincliffe Road, and Springfield Avenue/MD 851. The latter two intersections are signalized. There are no other access points within Sykesville besides these three intersections.

North of Sykesville, the density of access points increases. The unsignalized intersection with Johnsville Road provides an alternative western route to MD 26 (Liberty Road). The signalized

intersection with Freedom Avenue (adjacent to the Sykesville Freedom Fire Department) connects to local residential neighborhoods and Johnsville Road.

The intersections with Grandview Avenue and Circle Drive are unsignalized. Both roads connect to each other and provide access to residential neighborhoods. However, they are not connected to any other roads and residents must use MD 32 for access. There are also numerous individual residential driveway access points along the west side of MD 32 in this location.

North of this is the developed roadway network of Eldersburg. Piney Ridge Parkway and Macbeth Way intersect with MD 32 at a signalized intersection. Piney Ridge Parkway provides access to Johnsville Road, and has a direct connection to MD 26 approximately one mile west of MD 32. Macbeth Way provides access to residential neighborhoods east of MD 32 and an indirect connection to MD 26 via Georgetown Boulevard approximately 2,000 feet east of MD 32.

Within Eldersburg, there are side streets intersecting with MD 32 that provide local access; these side streets are also the access points for commercial properties such as the Princess Shopping Center.

MD 32 Roadway Features

The roadway within the study area does not have a consistent typical section. It varies from two-lanes to four-lanes, includes divided and undivided segments, and access points vary from individual residential driveways to signalized intersections with dedicated turn lanes.

From I-70 to MD 99, it is a four-lane undivided section. North of MD 99 it becomes a two-lane undivided section with painted median for approximately 0.4 miles before changing to a three-lane section with center turn lane. At the intersection with Amberwoods Way, it again becomes a two-lane undivided road. This section continues for approximately 0.5 miles to the intersection with Day Road, where it again becomes a three-lane section with center turn lane which continues to the intersection with MD 851 (West Friendship Road).

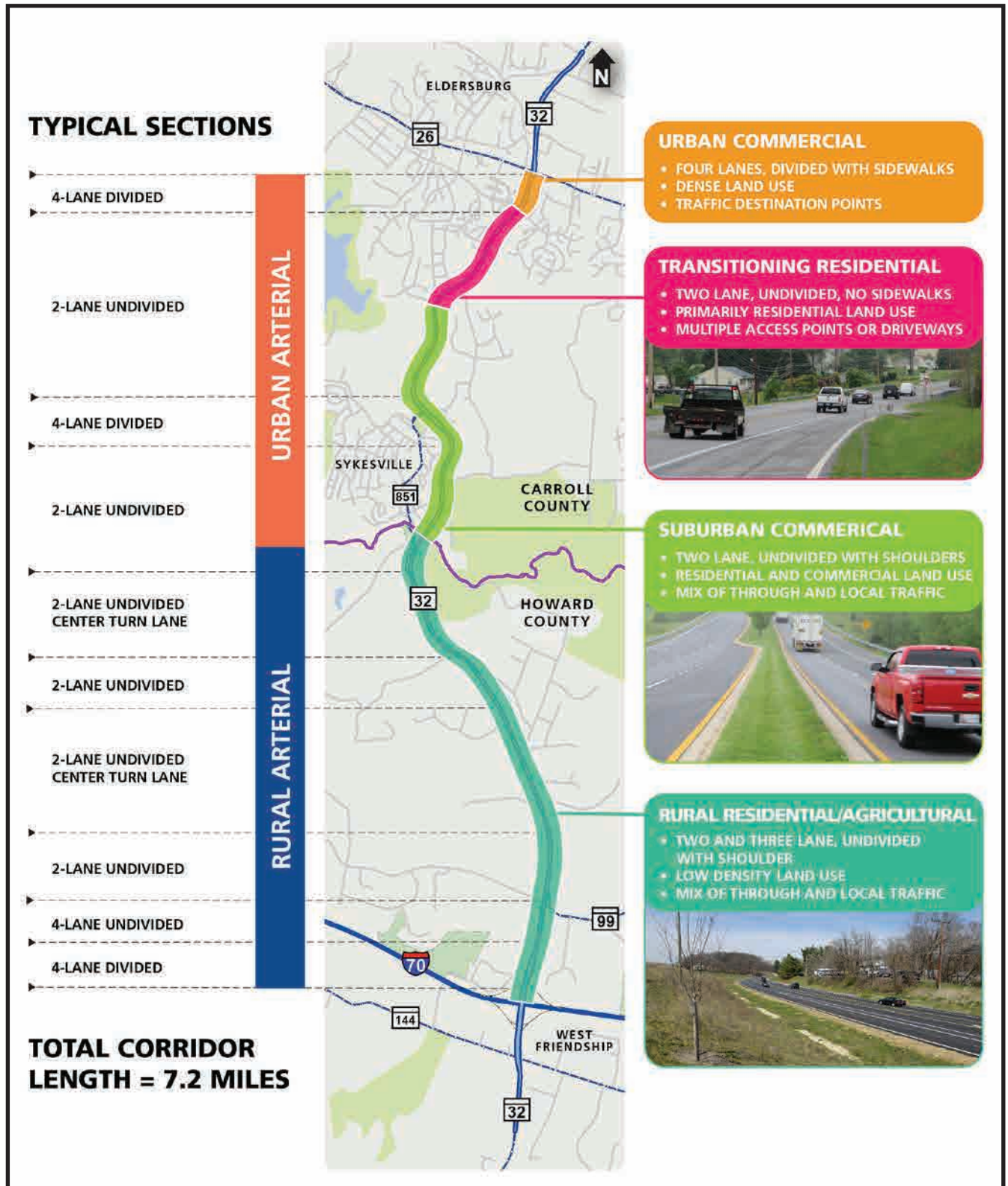
MD 32 is a two-lane undivided road as it crosses the Patapsco River into Carroll County and remains so until it nears the intersection with MD 851 and Springfield Avenue. Within approximately a quarter of a mile on either side of this intersection, MD 32 is a four-lane, divided roadway. North of this, MD 32 again becomes a two-lane undivided road and remains so until it reaches the intersection with Piney Ridge Parkway/Macbeth Way. Between this intersection and MD 26 (Liberty Road), MD 32 is a four-lane divided road with sidewalks on either side.

Within Howard County, MD 32 is classified as a Rural Minor Arterial roadway. Within Carroll County, it is considered an Urban Other Principal Arterial. Rural arterials generally do not have significant numbers of access points and intersections in close proximity to each other; whereas urban arterials may have both features in close proximity to each other. Rural intersections are also less likely to be signalized, and will encounter traffic travelling at higher speeds than those in urban areas. Urban roads are more likely to include features such as curbs, sidewalks, bicycle lanes, and pedestrian crossings.

Figure 3.1 shows the many, and varied, typical section changes along the corridor. Graphic representations of the various typical sections can be found in Appendix II.

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Figure 3.1 – Corridor Character Map



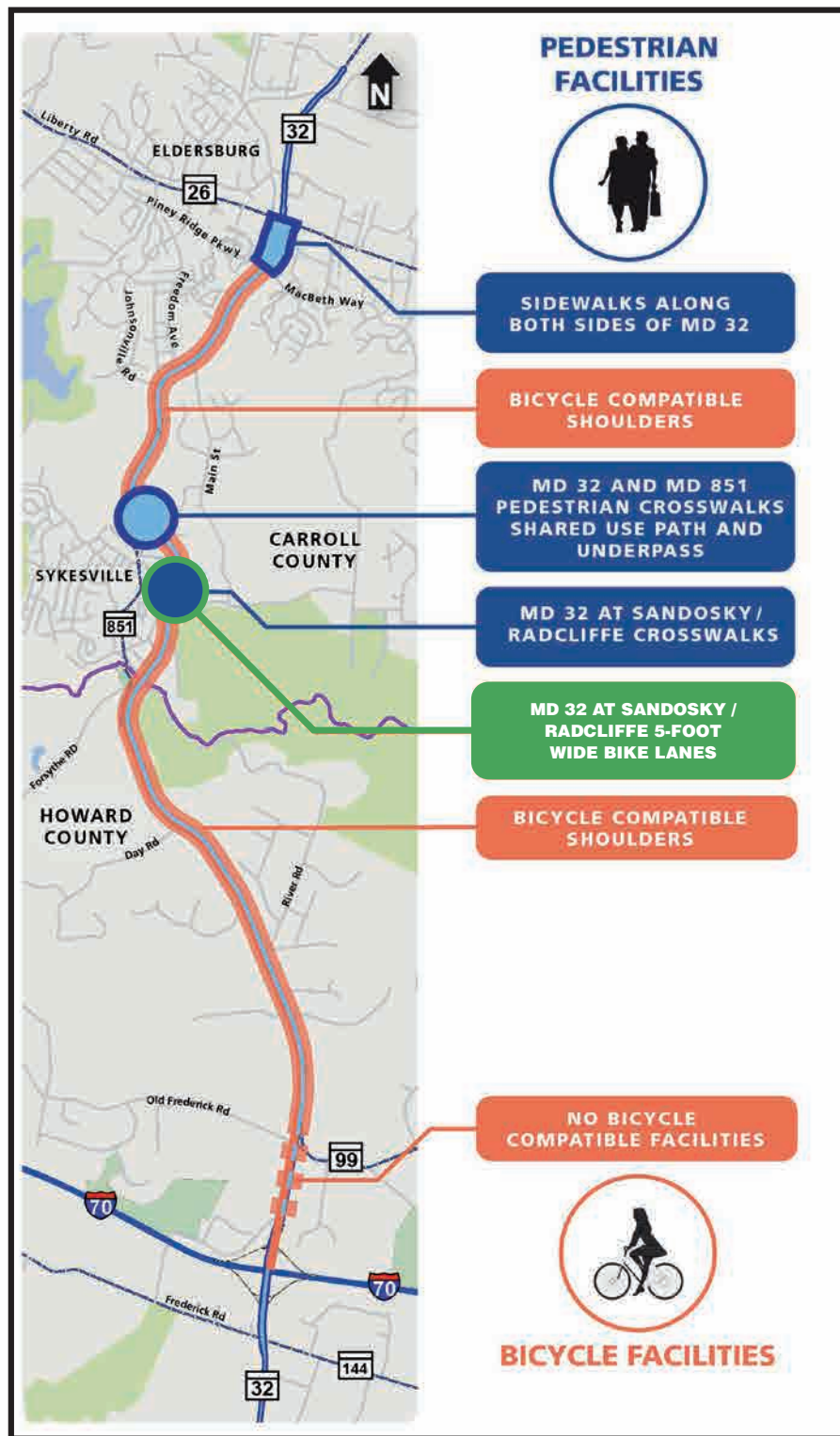
Bicycle and Pedestrian Facilities

Facilities for cyclists and pedestrians are discontinuous within the study area. MD 32 had been designated as a state bicycle route and some portions of the roadway contain bicycle-compatible shoulders with some identifying signage. However, their locations are inconsistent and do not cover the entire corridor. Some sections of the roadway do not feature shoulders that are wide enough to be considered bicycle-compatible. The intersection with Sandosky Road and Raincliffe Road is the only location along the corridor where dedicated bicycle lanes exist.

Pedestrian facilities along the corridor include sidewalks along the section between Piney Ridge Parkway/Macbeth Way and MD 26, and crossings at the signalized intersections with MD 851 (Springfield Avenue) and Sandosky Road/Raincliffe Road in Carroll County. The rural nature of Howard County means that there are no pedestrian facilities along the MD 32 roadway within the county.

Figure 3.2 provides an overview of the facilities provided along the corridor within the study area.

Figure 3.2 – Existing Bicycle and Pedestrian Map



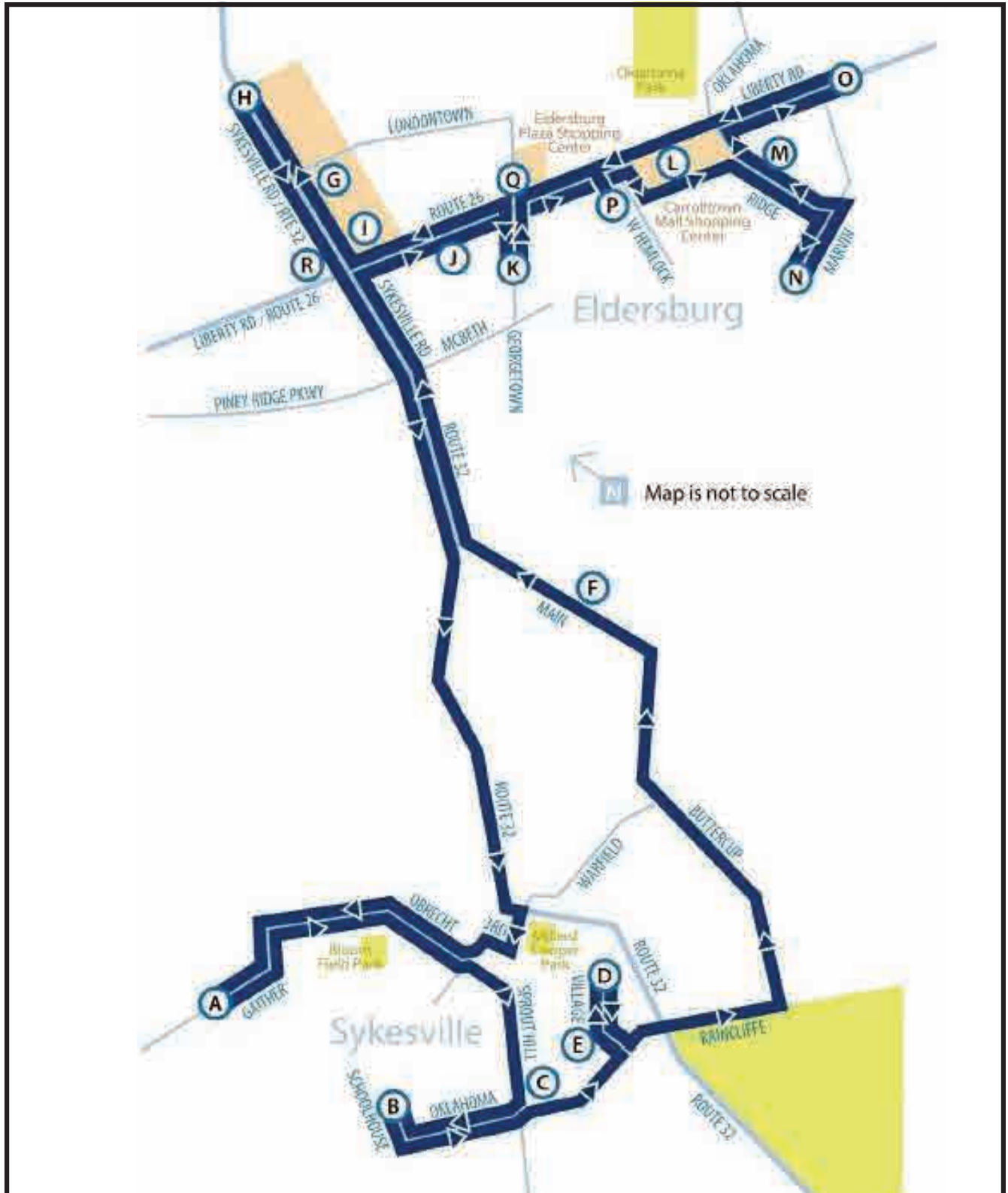
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Transit Routes

There is one public transit provider within the study area. Carroll Transit System offers four routes, two of which have stops on MD 32 within the study area. They are the South Carroll and Eldersburg to Westminster Trailblazer routes that operate every two to three hours. Destinations

include Eldersburg Commons/Walmart, Carroll Hospital Center, Carroll Community College, shopping centers on MD 140, and Piney Ridge Apartments. Figure 3.3 illustrates the routes traveled within the study area.

Figure 3.3 – Transit Routes

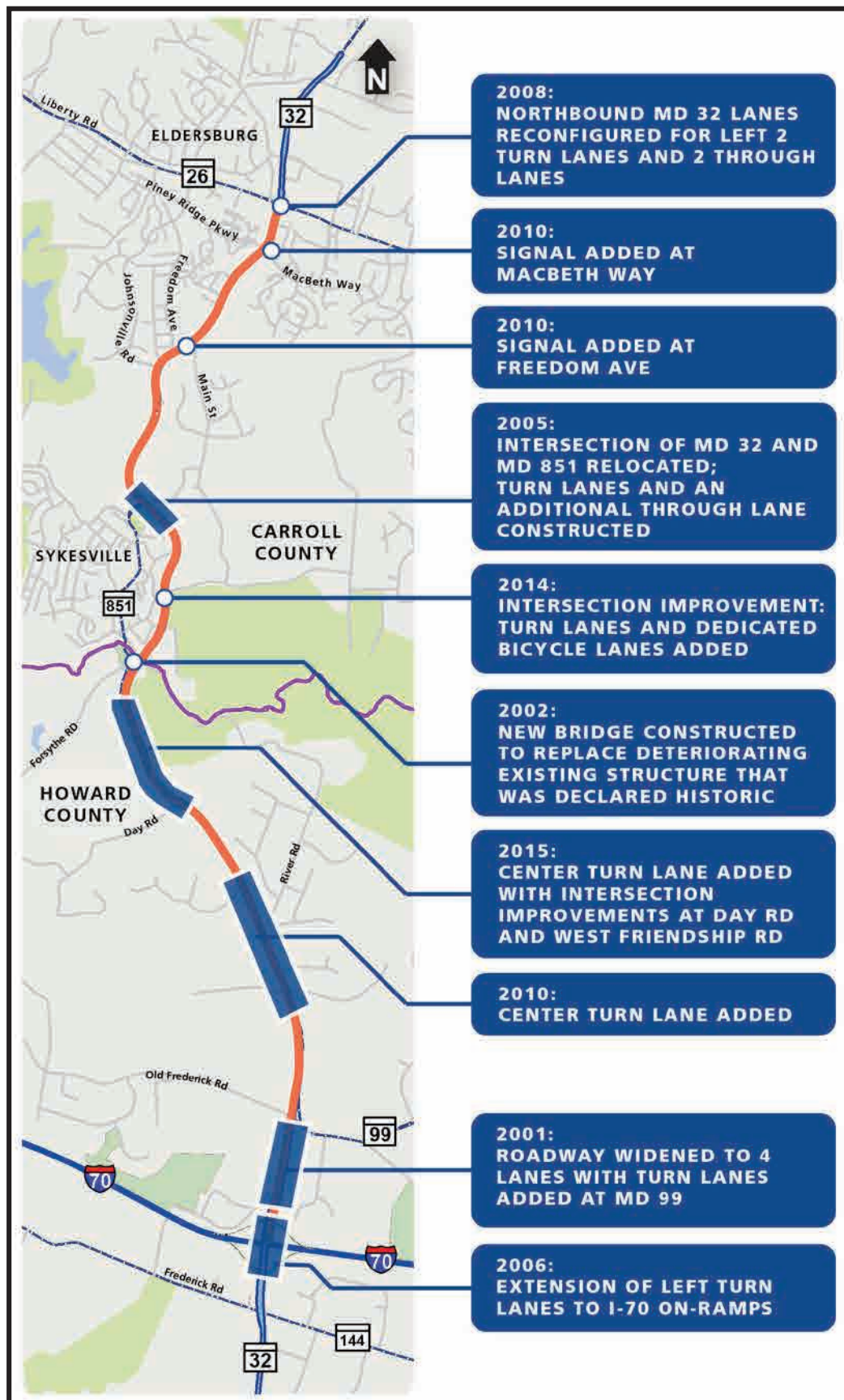


Recent Projects

Since 2001, several roadway improvement projects have been undertaken to address safety

and operational needs as they have arisen. Figure 3.4 illustrates these improvements.

Figure 3.4 – Recent Projects



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04 - CORRIDOR ANALYSIS

What are the transportation needs in the corridor?

Existing Traffic Conditions

Traffic Volume

The Annual Average Daily Traffic (AADT) along the corridor ranges from 25,000 to 27,000 vehicles per day (VPD), with the highest volumes north of MD 99 in Howard County. During peak periods, the traffic volume in the peak direction is twice that of the off-peak direction.

Travel Time and Speed

As shown in the following table, average travel speeds for the entire study corridor during peak

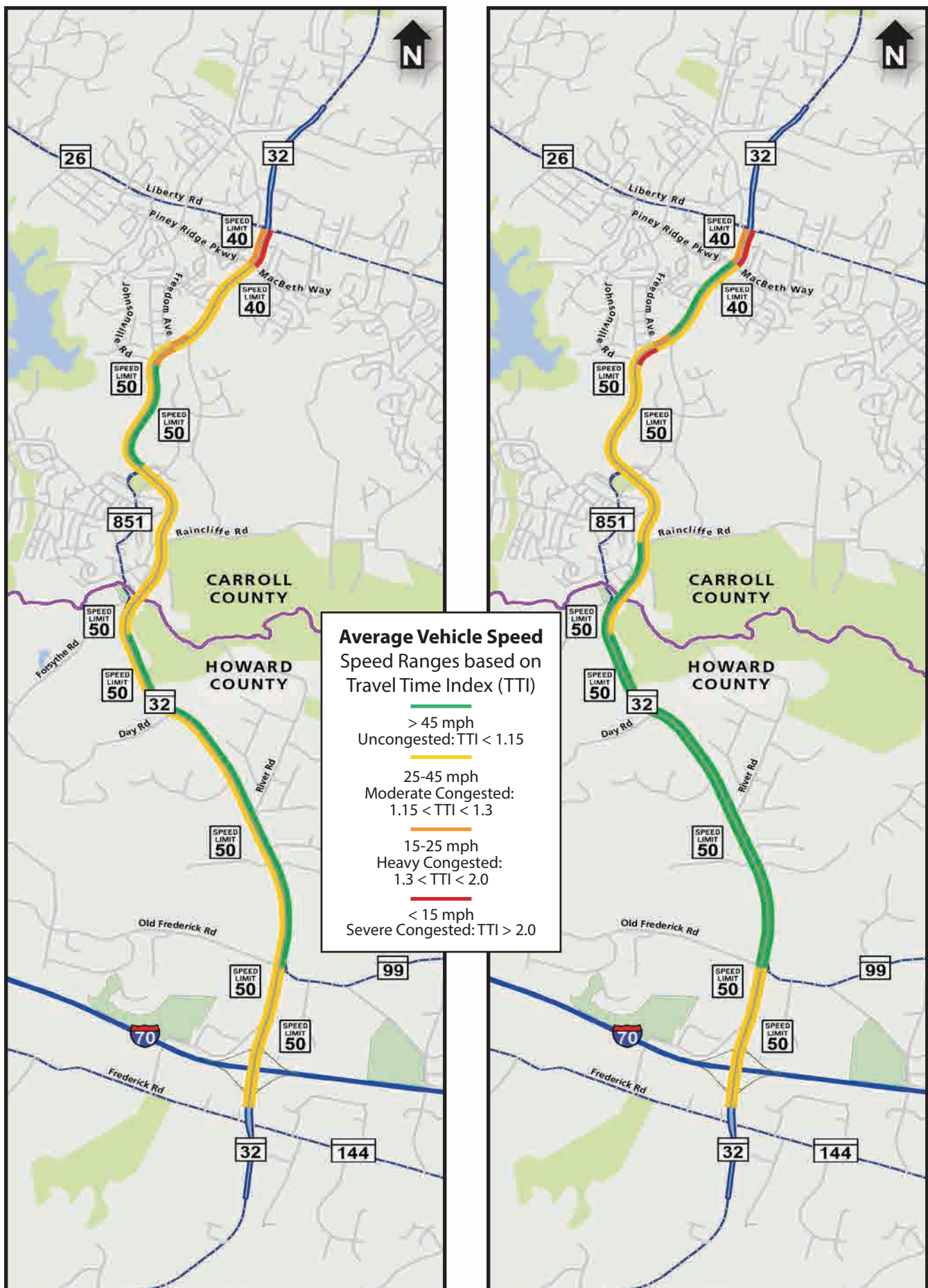
hours are 38 to 43 mph, which is below the posted speed of 50 mph. Figures 4.1 and 4.2 provide more detail, showing that travel speeds and congestion vary along the corridor, with the Howard County portion of the corridor generally experiencing higher speeds and less congestion than the Carroll County portion of the corridor. The northbound segment approaching the intersection with MD 26 experiences severe congestion in both the AM and PM peak hours. The Travel Time Index (TTI) illustrated in the maps is a measure of average congestion using the ratio of peak-period travel time to free-flow travel time.

Table 4.1 Average Travel Time

Period/Direction	Total Travel Time (Minutes)	Average Speed
AM Northbound	11.2	41 mph
AM Southbound	12.5	38 mph
PM Northbound	11.9	39 mph
PM Southbound	10.7	43 mph

Figure 4.1 – Existing Average Speed (AM)

Figure 4.2 – Existing Average Speed (PM)



Intersection Operations

Based on intersection Level of Service (LOS) analysis, all intersections currently operate acceptably during peak hours. LOS is a performance measure used to describe the operating conditions at intersections. At signalized intersections, LOS is a measure of average delay per vehicle. LOS is reported in alphabetical grades from 'A' through to 'F'. Acceptable peak hour ratings are 'A' through 'D.' Ratings of 'E' or 'F' would be considered a candidate for mitigation. The existing 2016 intersection LOS is summarized in the table below.

The queueing analysis shows that turn lane queues may extend into the through lanes along the corridor, especially in the AM peak period. Areas where queues may exceed the storage area or conflict with other intersecting roads under the 95th percentile queueing conditions are:

- At MD 26: The eastbound left movement may extend into the through lane by two to three vehicles in the PM; there are dual left turn lanes

- At Macbeth Way: The westbound through-right movement may block Barnett Avenue in the PM
- At Freedom Avenue: The northbound left turn bay may extend into the through lane by one vehicle in the PM

Areas where the storage lane is at or near capacity under the 95th percentile queueing conditions:

- At MD 26: In the PM, the northbound left turn bay
- At Main Street: In the AM, the southbound left turn bay
- At Freedom Avenue: In the PM, the northbound through lane queue may extend to Johnsville Road
- At MD 99: In the AM, the eastbound right turn bay

Further details on the existing conditions traffic operational analysis is available in Appendix II.

Table 4.2 Existing 2016 Intersection LOS

Intersection	Level of Service - AM (PM)
MD 26 (Liberty Road)	D (D)
Piney Ridge Parkway/Macbeth Way	B (B)
Freedom Avenue	C (C)
MD 851 (Springfield Avenue)	B (C)
Sandosky Road/Raincliffe Road	B (C)
MD 99 (Old Frederick Road)	B (B)
I-70 Westbound	B (C)

Future Traffic Conditions

Expected future traffic conditions were modeled for the years 2025 and 2040 to identify potential operational concerns within the corridor. Three different future scenarios were analyzed:

- 2025 assuming that the low- and mid-range concepts described in Chapter 5 (Corridor Concepts) have been implemented (2025 No Build)
- 2040 assuming that the low- and mid-range concepts described in Chapter 5 have been implemented (2040 No Build)
- 2040 assuming that the entire corridor has been upgraded to a four-lane divided roadway (2040 Four-Lane)

Traffic Volume

The forecasted traffic needs of MD 32 indicate that traffic volumes will continue to increase by about 1.5% per year if the roadway cross-section remains unchanged. A four-lane cross-section is expected to generate more trips, causing the volume along the corridor to grow at an annual average rate of 2.5%.

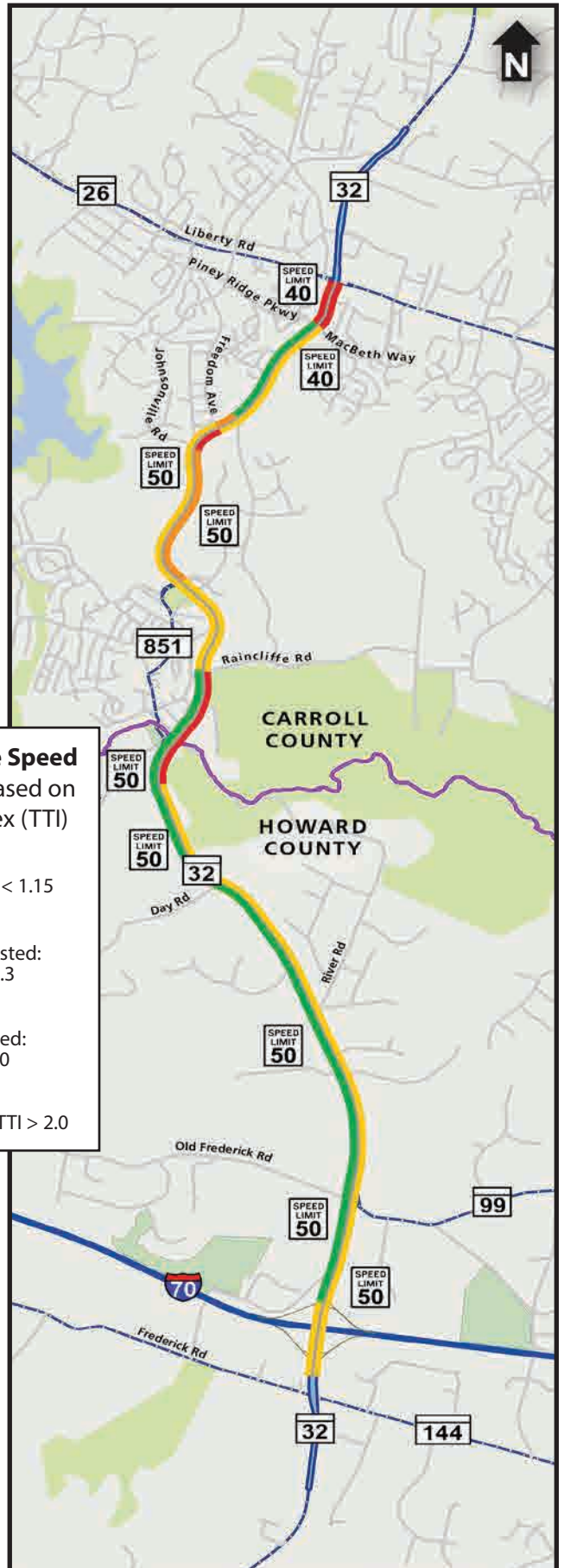
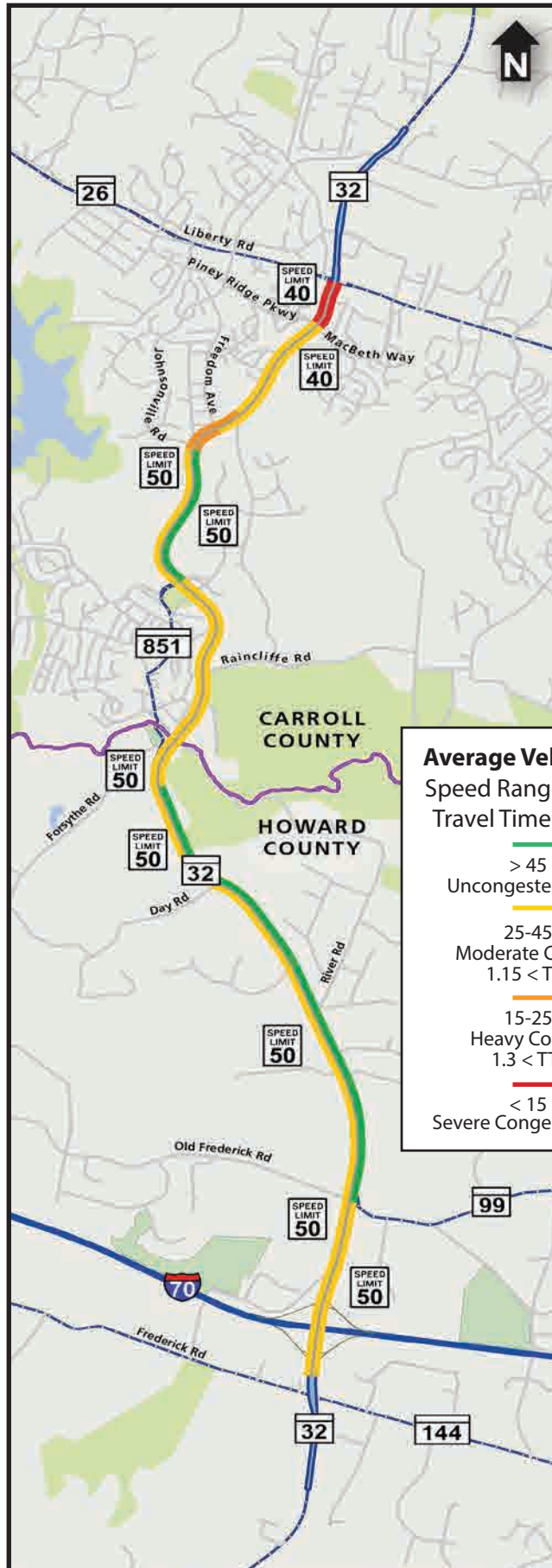
Travel Time and Speed

Unsignalized access roads and driveways, as well as the varying number of through lanes along the corridor and heavy peak hour volumes, are expected to produce unstable traffic operations in the future. By 2025, corridor travel times will increase by approximately two minutes assuming some incremental improvements such as consolidating access points, additional turn lanes, and intersection improvements are in place. By 2040 with these improvements in place, peak hour travel speeds will slow further to an average speed of approximately 30 mph. The 2040 four-lane scenario, which adds one travel lane in each direction throughout the study area, would produce intersection capacity and corridor travel times in 2040 that are comparable to 2016 values. However, travel speeds would still be below 40 mph. The segment from Springfield Avenue to Freedom Avenue is identified as the segment expected to need widening and dualization first.

Figure 4.3 and 4.4, Corridor Speed 2025 No Build AM and PM show the average vehicle speed along the corridor with only the minor improvements described above. Figures 4.5 and 4.6, Corridor Speed 2040 No Build AM and PM, and Figures 4.7 and 4.8, Corridor Speed 2040 Four-Lane AM and PM show the average vehicle speeds for the second and third scenarios respectively. The TTI depicting levels of congestion are color coded for uncongested, moderate congested, heavy congested, and severe congested.

**Figure 4.3 – Corridor Speed 2025
No Build AM**

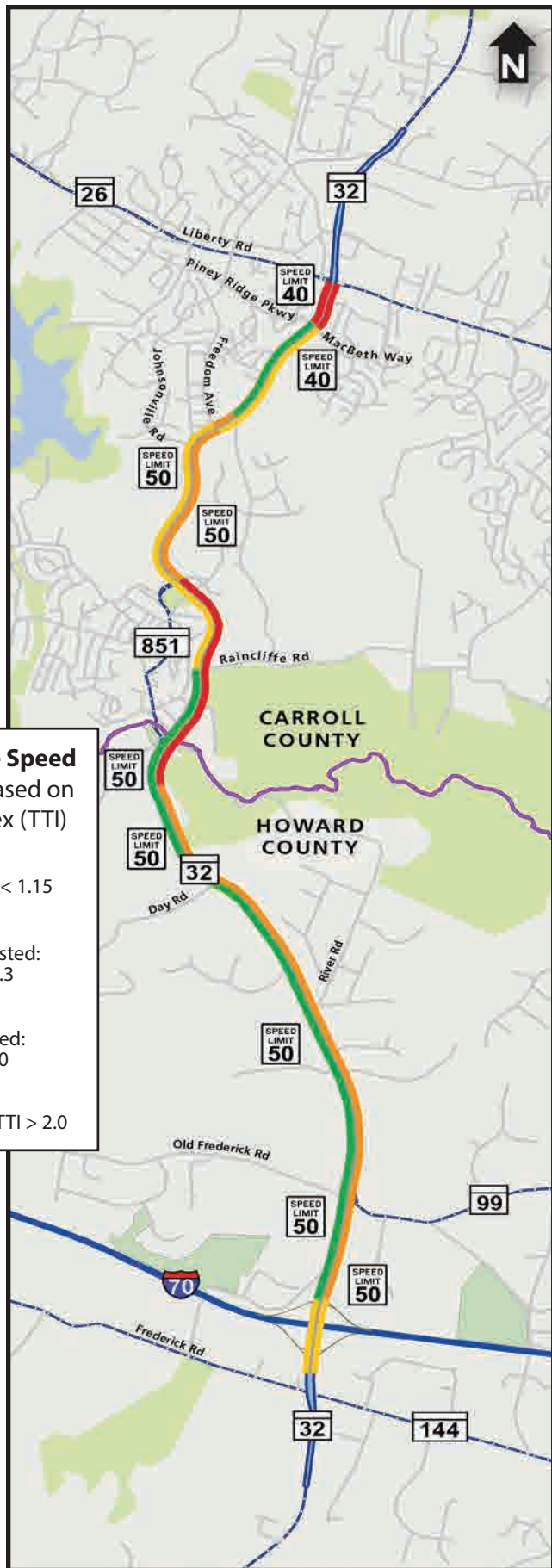
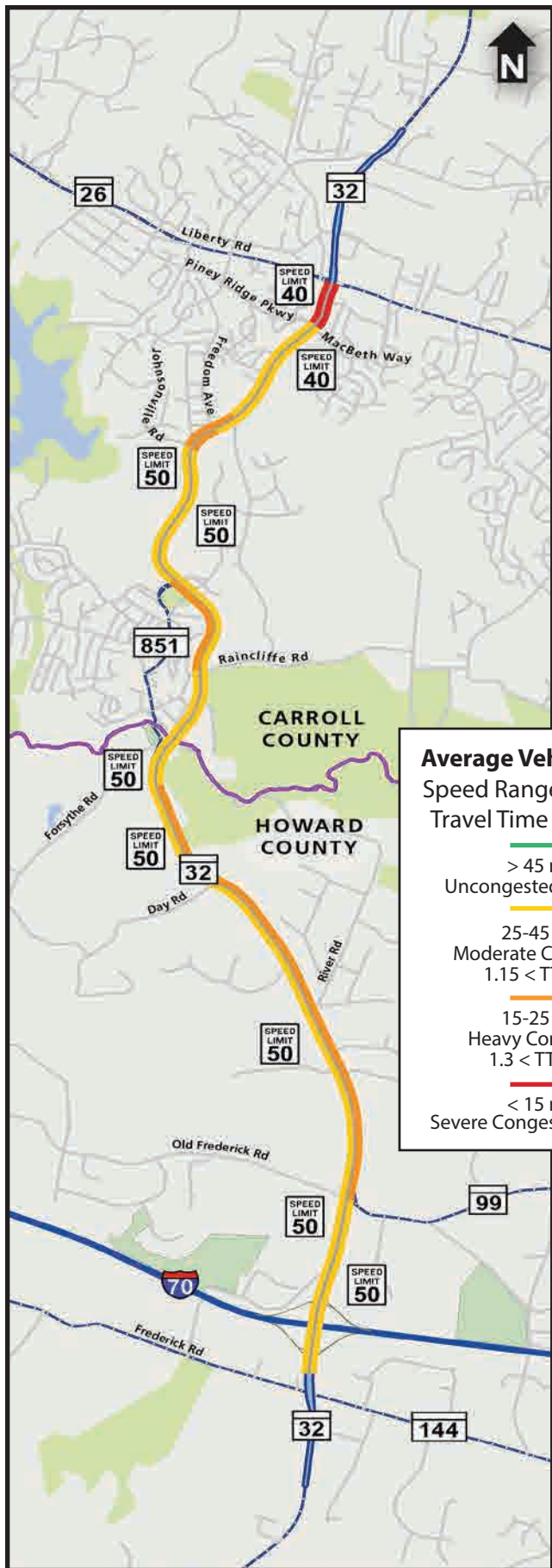
**Figure 4.4 – Corridor Speed 2025
No Build PM**



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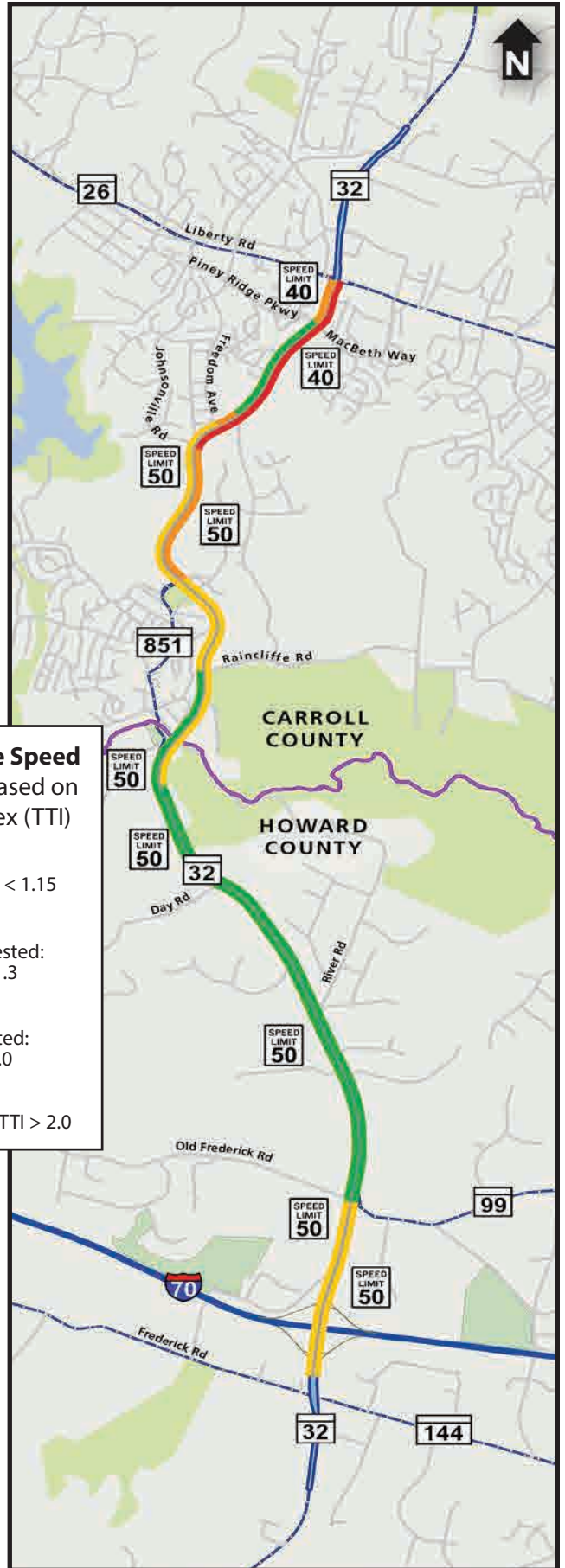
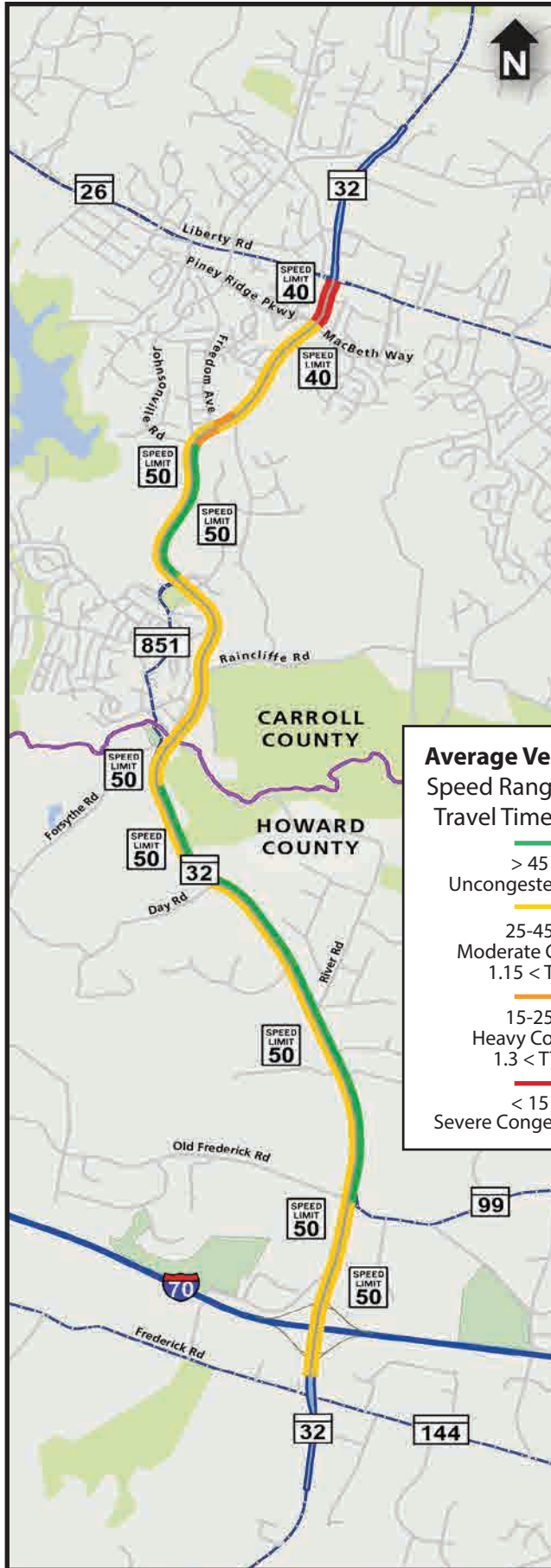
**Figure 4.5 – Corridor Speed 2040
No Build AM**

**Figure 4.6 – Corridor Speed 2040
No Build PM**



**Figure 4.7 – Corridor Speed 2040
Four-Lane AM**

**Figure 4.8 – Corridor Speed 2040
Four-Lane PM**



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Intersection Operations

The intersection with MD 26 is projected to become a significant bottleneck by 2040, with delays and queues in the PM peak extending as far south as Springfield Avenue.

By 2025, the intersections with Freedom Avenue and Sandosky Road/Raincliffe Road will reach capacity. The queue lengths at both intersections will also be exceeded, but only slightly. By 2040, the intersections with MD 99/Old Frederick Road and with I-70 ramps will have also reached capacity, and the intersections at MD 851/Springfield Avenue, MD 851 (West Friendship Road), and MD 99/Old Frederick Road will also experience queues in excess of storage capacity.

While peak hour travel speeds will slow over time, the entire corridor is not expected to exceed its capacity until beyond 2040. A summary of future traffic operations for the corridor is contained in Table 4.3 below; for details, please see the report contained in Appendix II.

Further details on the future traffic operation analysis is available in Appendix II.

Safety

Crash History

The corridor crash history was derived from the crash reports between 2012 and 2014 (inclusive) and is depicted on Figure 4.9 and is summarized below:

- A total of 202 crashes occurred on MD 32 within the study limits between 2012 and 2014.

- One of the crashes resulted in a fatality and 76 resulted in injury; while 62% resulted in property damage only.
- The most common type of crash is rear-end, accounting for 37%.
- The intersection with the highest occurrence of crashes is at MD 26, followed closely by the intersection at MD 99.
- A majority of the intersections experienced less than 10 crashes over three years, or an average of less than four crashes per year.
- The segment between the intersection at MD 99 and the I-70 westbound ramps experienced 34 crashes over three years, a third occurred either at night or on wet pavement.

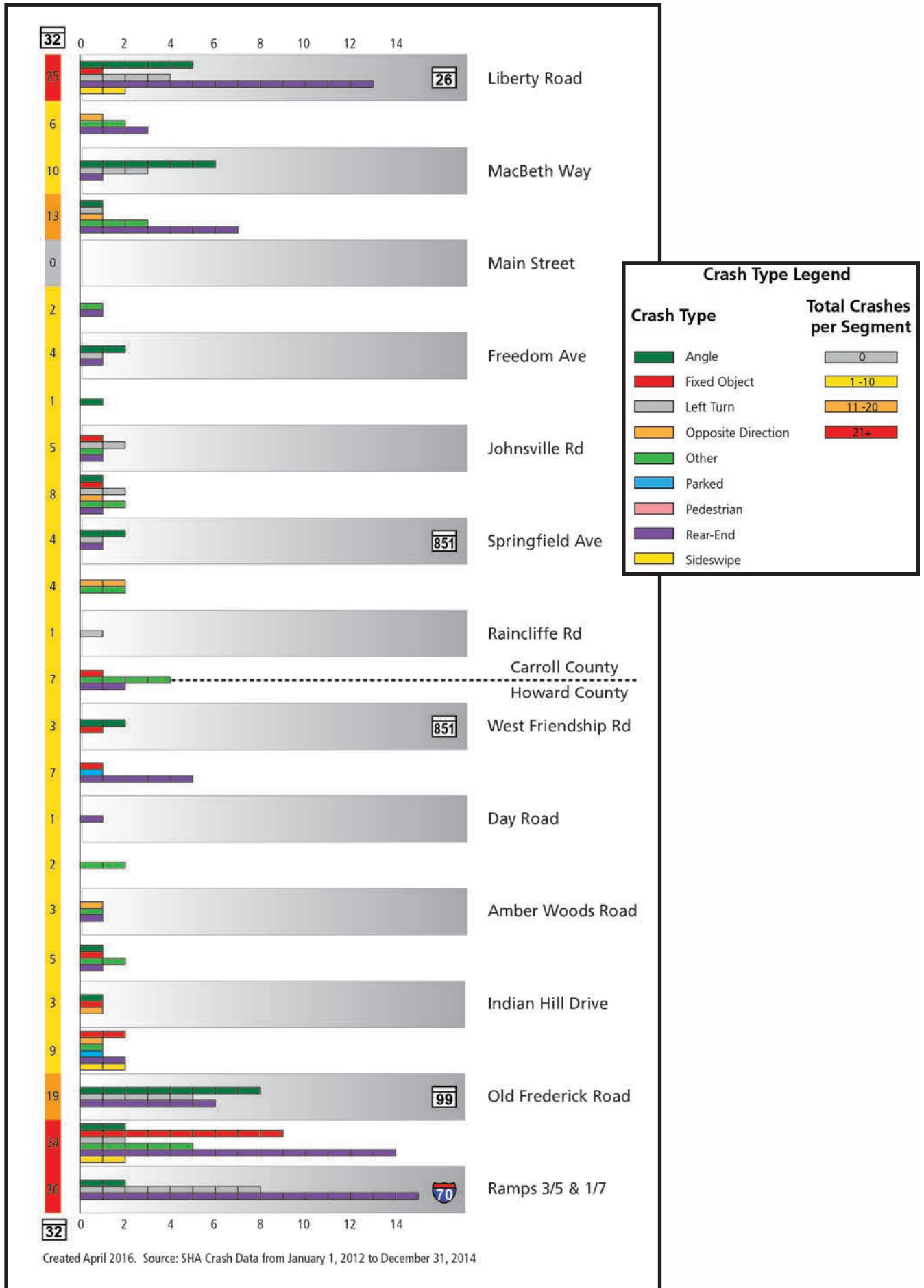
Though crash rates for the study period were not above the statewide averages for similar facilities, as traffic volumes increase so does the risk of crashes. Stop-and-go traffic tends to increase the likelihood of rear-end crashes. The existing number of uncontrolled access points and intersections, along with the undivided nature of the roadway, and the lack of full-width shoulders and turn lanes support the need for safety improvements along the corridor. Figure 4.9 shows the prevalence of each crash type by location.

Table 4.3 Forecasted Traffic Summary

	2016 Existing	2025 No Build	2040 No Build	2040 Four-Lane
Intersections Operating at LOS E or F	MD 26 (PM)	MD 26 (PM) Freedom Avenue (PM) Sandosky/Raincliffe (PM)	MD 26 (PM) Freedom Avenue (PM) Sandosky/Raincliffe (PM) MD 99 (PM) I-70 ramps (PM)	MD 26 (PM) Springfield Avenue (PM) MD 99 (PM)
Average Travel Time	11.8 Minutes	13.5 minutes	19.2 minutes	13 minutes
Average Speed	38 mph	33 mph	30 mph	36 mph

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Figure 4.9 – Crash Type Bar Graph



Access

Although MD 32 is an arterial roadway, it accommodates a significant number of movements related to access. In Howard County, there are several driveways and many residential developments whose only connection to a through road is with MD 32. In Carroll County, there are numerous private driveways in close proximity to each other in addition to the local roads of Sykesville and Eldersburg. In the segment between I-70 and MD 99, there are seven driveways that have direct access to the roadway but do not have adequate turn lanes or shoulders. In Carroll County, driveways are most densely spaced between Waite Avenue and Piney Ridge Parkway, where sixteen properties have direct access to MD 32 within the space of half a mile. Adequate shoulders are provided for right turns, but northbound vehicles wishing to turn left must wait within the travel lane.

In areas where MD 32 has two lanes, there are shoulders of adequate width for right turns; however, left turning vehicles must wait in a travel lane. In areas where the road has three lanes, shoulders are not of adequate width to accommodate a right turning vehicle, and there are no acceleration/deceleration lanes. Vehicles turning right must slow down in the travel lane. The center turn lane allows vehicles wishing to turn left to wait outside of the travel lane.

Although driveways do not generate significant volumes of traffic, they are a source of unexpected turning movements that can have a disproportionate impact on traffic flow and safety. Turning vehicles can obstruct traffic as they slow down to make their movement if suitable turning or acceleration/deceleration lanes are not provided. These effects are especially pronounced in areas where there are a significant number of driveways in close proximity to one another, or where driveways are relatively isolated from adjacent access points or intersections. Facilitating access is somewhat at odds with facilitating travel within the MD 32 corridor.

Unexpected slowing and turning at driveways can create a safety concern. If shoulders are of inadequate width or absent altogether, vehicles are forced to slow down within the travel lane. Consolidating access points and other access controls would help to reduce these types of rear-end collisions.

Roadway Design

The existing geometric design is generally compliant with current standards and there are no significant deficiencies along the corridor. There are, however, opportunities to improve roadway design to support roadway operations and driver expectancy, such as extending turn lanes and sight distances, providing full shoulders, and improving roadway lighting and visibility. Additionally, the varying typical section of the roadway switches between divided and undivided two; three; and four-lane segments influences driver expectations and potentially contributes to reduced traffic flow. A table outlining the existing roadway analysis can be found in Appendix II.

Public Input

Input from residents, business owners, employees, and other stakeholders was collected in three ways:

- Online survey
- Stakeholder interviews
- Public workshop

This input was an essential piece of the corridor analysis that helped gain a better understanding of the experience and concerns related to MD 32.

Public and stakeholder input verified that traffic congestion is considered a problem along the corridor and that making turns to or from MD 32 is a concern; a few specific locations were identified as particularly challenging. Respondents also said that the lack of turn lanes and certain intersections caused poor driver behavior. Additionally, respondents raised concerns regarding the impact to traffic that any proposed improvements would have.

Online Survey Results

MDOT SHA sent out 5,830 project informational newsletters to residents and businesses along the project corridor. The newsletter contained general information on the study including background, study goals, and timeline. The newsletter also solicited feedback from the public and asked that they complete the online survey that was active between March and June 2016. A total of 635 surveys were completed; these responses are included in Appendix II.

The online survey identified the general location of respondents, while gaining their insights

about the MD 32 corridor. The majority of respondents were located in zip code 21784 (472 respondents) which is the zip code that contains the corridor. Not all respondents answered every question.

Over 79% of respondents use the corridor on a daily basis. When asked what transportation features along the corridor were most beneficial, respondents mostly noted the turn lanes/center turn lane; the direct route to I-70, MD 99, and MD 26 the corridor provides; and areas with additional lanes. The top responses of transportation features that should be included or enhanced within the corridor were more travel lanes, more turn lanes, wider shoulders, and fewer traffic signals.

The top five issues that respondents want to see addressed are:

- Travel time/congestion
- Crossing/making turns onto or from MD 32
- Traffic safety
- Community character/appearance and design
- Median/guardrail separation

The biggest problems drivers in the corridor reported are:

- Access to MD 32 from driveway/street is unsafe
- Traffic/congestion
- Aggressive drivers using center lanes, shoulders, and merge lanes to pass
- Traffic signals

Nearly 65% of respondents identified impacts to future traffic as a top concern. Residential property impacts was the next most selected concern.

Stakeholder Interviews

In addition to the online survey, MDOT SHA conducted interviews with stakeholders along the corridor, such as the Sykesville – Freedom Fire Station, the Howard and Carroll Counties Public School Systems and the Haight Funeral Home. These interviews were conducted either in person or over the phone between April and July 2016. These stakeholders' responses were generally longer and more detailed than the online survey responses, and provided valuable additional information regarding the operation and efficiency of the corridor.

Like the online survey respondents, the stakeholders stated the following concerns/suggestions:

- Congestion
- Safety
- More lanes
- Consistent, wider shoulder widths
- Traffic circles/rotaries
- Replacing intersections with interchanges

Public Workshop

MDOT SHA conducted a public workshop for the MD 32 Planning Study on June 9, 2016 at the Sykesville Freedom District Fire Department, Legacy Hall from 5:00-7:30 PM. The workshop presented the data and information collected to the public; it was also a chance to solicit direct input about corridor needs and potential improvements. During the meeting, attendees were encouraged to ask questions and give feedback related to the project. A total of 84 citizens attended.

A hands-on map station was provided for participants to mark with issues and concerns they have at particular locations along the corridor. Two large-scale roll maps of the corridor with aerial imagery were laid out on tables, and attendees were invited to note areas where they experienced issues along the corridor. This method of direct input allowed attendees to either highlight an area of concern, detail the exact concern, or to provide a potential solution or improvement. Many attendees were grateful for the opportunity to provide such direct input in addition to the traditional comment cards. The maps also enabled attendees to see responses made by others and to note their agreement, disagreement, or propose an alternative solution. Subsequent to the meeting, both maps were analyzed and all notes were recorded and categorized according to the concern they highlight and/or the solution proposed.

Attendees were also invited to use stickers to indicate on a separate map where they live and where they work. Locations such as Washington, DC, Baltimore, Annapolis, and Frederick were identified as destinations by putting a sticker in the box associated with that location. Lastly, a total of 45 comment cards were completed by attendees with survey questions related to the meeting location, information presented, and staff knowledge, along with an area to make additional comments for the study corridor. Comments from the submitted cards and map stations are included in Appendix II.

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05 - CORRIDOR CONCEPTS

Potential Improvement Concepts and Evaluation



Concept Development

Potential concepts to address the identified needs were developed and grouped into the categories listed in the next column. Localized improvement concepts to address specific problem locations and access consolidation needs were developed, as well as the four-lane corridor long-term vision concept. The localized concepts were laid out to be compatible with the four-lane corridor concept. These potential improvements for the MD 32 corridor are conceptual. The concepts have been designed at a preliminary level to ensure feasibility and to allow preliminary cost estimates and potential environmental impacts to be determined. These improvements require further planning and engineering study before implementation.

The potential concepts contained in this report include pedestrian and bicycle facilities in accordance with current MDOT SHA guidelines. The corridor analysis revealed that there is a desire for pedestrian or bicycle facilities within the MD 32 corridor. Coordination with stakeholders will be a key part of implementation, so that pedestrian and bicycle facilities will be useful and attract users. Signal warrant analyses have not been completed and would be required for any proposed signals. The proposed signal at Main Street would also require coordination with the existing signal at Freedom Avenue and the Sykesville Freedom Fire Department to ensure that emergency vehicles are not unduly delayed by vehicles queuing at a signal on MD 32.

Localized Improvement Concepts

Approximately 30 individual improvement concepts were developed to address the needs that were identified through the corridor analysis. These concepts, listed in Tables 5.1 through 5.5 include:

- Reconfiguring intersection access
- Extending and providing new turn lanes
- Providing acceleration and deceleration lanes
- Providing sections of median separation
- Consolidating driveway access points by providing parallel frontage roads
- Pavement overlay and restriping

Many of these concepts are required before dualization of the corridor. These concepts can be implemented as funding and development opportunities occur.

Four-Lane Corridor Vision Concept

This concept includes widening MD 32 to a four-lane divided roadway with bicycle and pedestrian facilities throughout the study corridor. This concept is consistent with both counties' long-term vision for this corridor. **Based on current traffic forecasts, the entire corridor will not require four lanes until beyond 2040.** However, as other concepts are implemented over time, traffic operations, and safety should be monitored to further evaluate when and where widening may be needed.

This concept represents a significant roadway upgrade that would influence travel patterns throughout the study area. The four-lane divided concept would function as a partially access controlled highway. This roadway type limits access and limits most turning movements to designated intersections only. In many cases, existing access points and turning movements will be rerouted or reconfigured to larger intersections. Potential solutions such as a continuous-green T intersection (also known as a 'Maryland T' intersection), allowing left-turns from MD 32 only while restricting left-turns from the side road (J-turns), or other treatments would require additional study before implementation.

The two park and ride lots along the corridor located just north of I-70 in Howard County and opposite Circle Drive in Carroll County could be impacted by the widening required for the four-lane concept. Both lots are located adjacent to the existing MD 32 roadway within MDOT SHA right-of-way, and would likely need to be relocated if any expansions were to occur. Alternative sites would need to be considered and studied in detail.

The existing bridge structure over the Patapsco River was built in 2002 and was designed so that it could be widened for additional roadway capacity. The bridge is a replacement structure for the original MD 32 aluminum bridge, which is preserved as a historic resource. The close proximity to the historic bridge would necessitate further study of the crossing as part of the planning and design of this concept.

For the purposes of this study, the four-lane corridor concept has been broken into three phases, each with the same typical section design. Phase C1 is the Howard County portion of the corridor and Phases C2 and C3 are the segments within Carroll County.

Preliminary coordination with local stakeholders was used to solicit feedback on the needs of the project. Further outreach will be performed to gather input on potential improvements as subsequent studies are conducted and more detailed concepts are developed.

Concept Evaluation

Priority Ranking

The individual concepts were ranked in priority based on their effectiveness in addressing the four primary needs of the corridor and their cost. The following measures of effectiveness were used to assess the potential benefits of each concept:

- **Safety** – Number of crashes within one quarter mile of the concept's location or limits during the study period (2012 to 2014)
- **Traffic** – Improvement to intersection LOS and segment traffic flow
- **Access** – Improvement to the quality of access
- **Development** – Accommodates planned growth

Each concept was given a score for its effectiveness in each of the four measures, which were summed into a total score. Localized improvement concepts were assigned a priority of 'A' or 'B' based on their score and cost. The long-term four-lane concept was assigned priority 'C' due to the analysis showing that this concept may not be needed until beyond 2040, as well as the high cost and potential impacts of the concept. The evaluation matrix with each concept and its final ranking value is contained in Appendix II.

Concept Grouping

Corridor Segments

Several localized improvement concepts were clustered in two distinct segments of the roadway. The concepts within these two segments can be implemented individually; however, simultaneous implementation would ensure coordinated design, minimize disruption to roadway users, and likely reduce cost.

These two segment locations are as follows:

- Between 2nd Street and Main Street (including the intersections with Johnsville Road and Freedom Avenue) in Carroll County (0.5 miles)
- Between I-70 and MD 99 in Howard County (0.8 miles)

Mapping for the segment locations are shown in Figure 5.1.

MD 32/MD 26 Intersection

As stated in Chapter 4, the MD 32 and MD 26 intersection is one of the locations with the highest number of crashes and heaviest traffic and turning movements. The intersection is currently a major bottleneck in the corridor that will cause northbound delays and congestion along MD 32 as far south as MD 851 (Springfield Avenue) if it is not addressed. The development and recommendation of appropriate concepts to improve this intersection was beyond the scope of this study, but MDOT SHA is undertaking supplemental analysis to identify concepts for this intersection.

Corridor Improvement Concepts

Tables 5.1 through 5.5 list the Potential Improvement Concepts developed. Figures 5.1 through 5.3, Corridor Improvement Location Maps, show the location for each individual concept. Individual concept plates along with

concept display mapping for the corridor can be found in Appendix I.

The Intersection and Segments table are in order by their identified need. The remaining Access Consolidation and Miscellaneous tables are listed by direction.

Table 5.1 Corridor Segments

2 nd Street to Main Street (Carroll County)			
Direction/Location	Description	Need Addressed	Anticipated Cost
2 nd Street	Convert intersection to right-in/right-out configuration	Left-turn sight distances and traffic flow	\$2.6 - \$2.8 M
Johnsville Road	Reconfigure intersection layout	Difficulty making left turns onto northbound MD 32. Confusing intersection geometry.	
High's Dairy Store (northwest corner of Freedom Avenue intersection)	Right-in/right-out reconfiguration of channelization	Existing access point does not meet requirements and permits illegal left turns from northbound MD 32	
Freedom Avenue	Lengthen northbound left turn lane	Turn lane length	
Freedom Avenue Main Street	Lengthen existing right-turn deceleration lanes	Turn lane length	
Main Street	Potential new signal (signal warrant analysis)	Improve quality of access and accommodate increase in left turns resulting from the 2 nd Street Concept	
I-70 to MD 99 (Howard County)			
Direction/Location	Description	Need Addressed	Anticipated Cost
Northbound between ramp intersection and Livestock Road	Reconfiguration of existing northbound travel lanes	Northbound lane drop and two lane weave from I-70 off-ramp	\$3.2 - \$3.5 M
Northbound into Park and Ride	Construct left turn lane into park and ride lot from northbound MD 32	No left-turn lane provided	
Southbound MD 32 into Park and Ride	Extend right turn lane to 530'	Turn lane length	
MD 32 between Park and Ride and MD 99	Construct a 2' concrete median between travel lanes	Unseparated travel lanes	
Northbound MD 32 onto eastbound MD 99	Construct right-turn lane onto eastbound MD 99 from northbound MD 32	No right turn lane provided	

Table 5.2 Intersection

MD 32 at MD 26 (Liberty Road)					
Concept Number	Priority	Direction/ Location	Description	Need Addressed	Anticipated Cost
N/A	A	Intersection of MD 32 and MD 26 (Liberty Road)	At-grade solution to existing congestion and safety needs	TBD (under study)	TBD (under study)

Table 5.3 Access Consolidation

Direction along MD 32	Concept Number	Priority	Location	Number of access points consolidated	Anticipated Cost
Northbound	D1	B	Between I-70 and MD 99	7	\$2.2 - \$2.4 M
	D2	B	Extension to Butterfly Court	4	\$1.3 - \$1.4 M
	D3	A	South of Emory Farm Lane	5	\$1.1 - \$1.2 M
	D4	B	Emory Farm Lane, Friendship Baptist Church, and Indian Hill Road	4	\$1.2 - \$1.3 M
	D5	B	Opposite Day Road	3	\$1.9 - \$2.1 M
	D6	B	Between Day Road and Deer Hill Road	3	\$2.3 - \$2.5 M
	D7	B	Deer Hill Road extended	6	\$1.7 - \$1.8 M
Southbound	D8	B	Between Circle Drive and Piney Ridge Parkway	12	\$1.5 - \$1.6 M
	D9	B	Between Waite Avenue and Grandview Avenue	7	\$1.2 - \$1.3 M
	D10	B	Between River Road and Amberwoods Way	4	\$3.6 - \$4.0 M
	D11	B	Coventry Meadows Drive	3	\$2.0 - \$2.2 M
	D12	A	North of MD 99	2	\$0.6 - \$0.7 M

Combining the implementation of several concepts could result in some cost efficiencies.

Table 5.4 Miscellaneous Concepts

Concept Number	Priority	Direction/ Location	Description	Need Addressed	Anticipated Cost
M1	A	North of Sandosky Rd to 2 nd Street	Mill and overlay pavement	Poor quality of pavement and markings	\$5.1 – \$5.8 M
M2	B	College Avenue	Close access to College Ave (West) and realign roadway	Inadequate turn lane lengths and shoulder widths. Undesirable horizontal geometry through intersection.	\$1.4 - \$1.6 M
M3	B	From north of MD 99 to Emory Farm Lane	Add center turn lane	Inconsistent typical section, ability of vehicles to make left turns from MD 32	\$2.5 - \$2.8 M
M4	B	Coventry Meadows Drive	Construct acceleration and deceleration lanes	No facilities currently provided for turning vehicles	\$1.8 - \$2.0 M
		Emory Farm Lane to Indian Hill Drive	Construct acceleration and deceleration lanes with auxiliary lane in between		
M5	B	From Amberwoods Way to Day Road	Add center turn lane	Inconsistent typical section, safety of making left turns from MD 32	\$3.3 - \$3.7 M
M6	B	Circle Drive to Grandview Avenue	Extend deceleration lane at Circle Drive and construct auxiliary lane between it and Grandview Avenue	Deceleration lane is too short. No acceleration lane is currently provided for traffic turning onto southbound MD 32.	\$0.5 – \$0.6 M

Combining the implementation of several concepts could result in some cost efficiencies.

Table 5.5 Four-Lane Corridor Vision Concepts

Concept Number	Description	Anticipated Cost
C1	Four-lane divided roadway from I-70 to the County Line	\$26 - \$28 M
C2	Four-lane divided roadway from County Line to MD 851/Springfield Avenue	\$29 - \$31 M
C3	Four-lane divided roadway from MD 851/Springfield Avenue to Piney Ridge Parkway/Macbeth Way	\$52 - \$57 M

Figure 5.1 – Corridor Improvement Locations: Corridor Segments

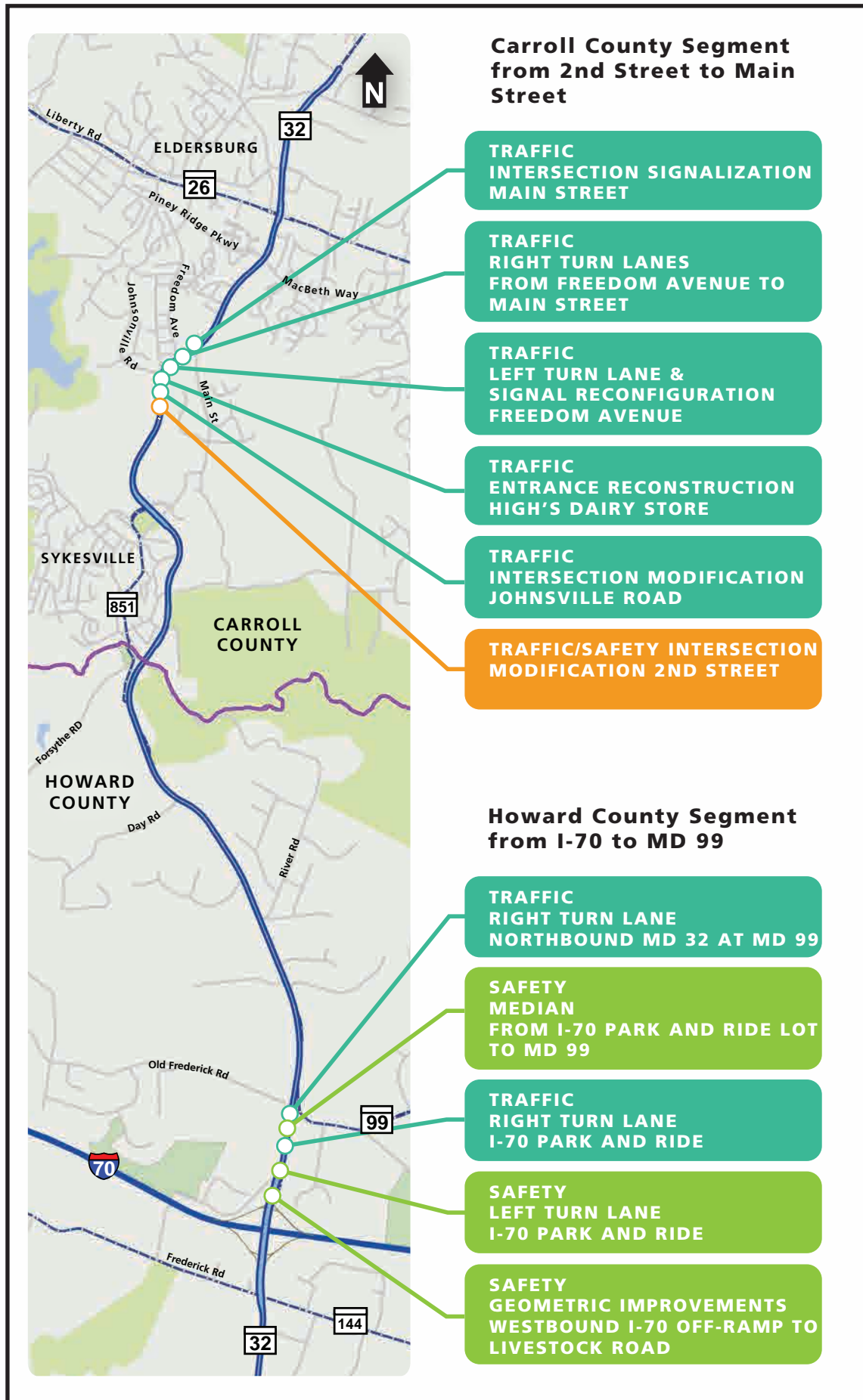


Figure 5.2 – Corridor Improvement Locations: D1-D12

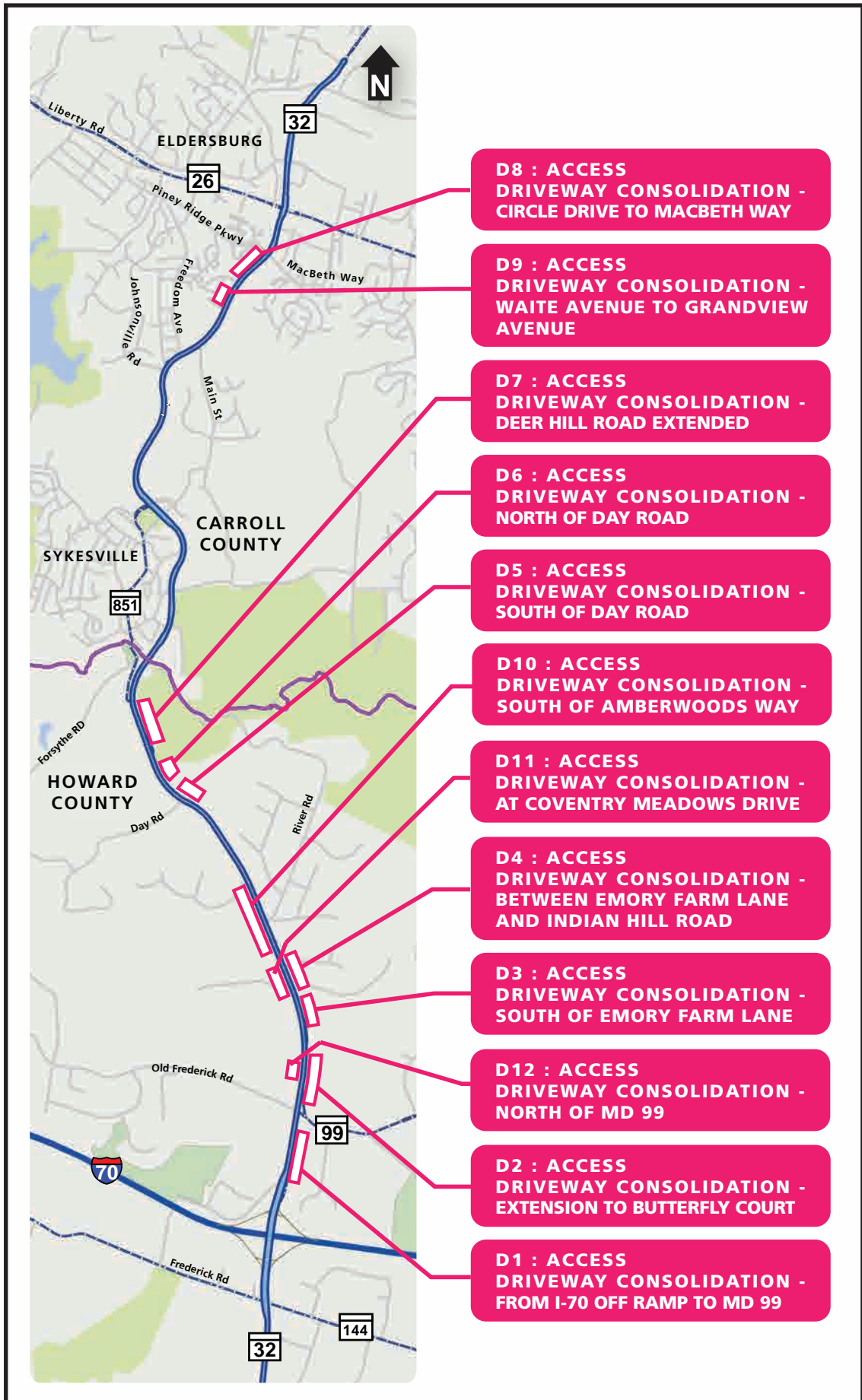
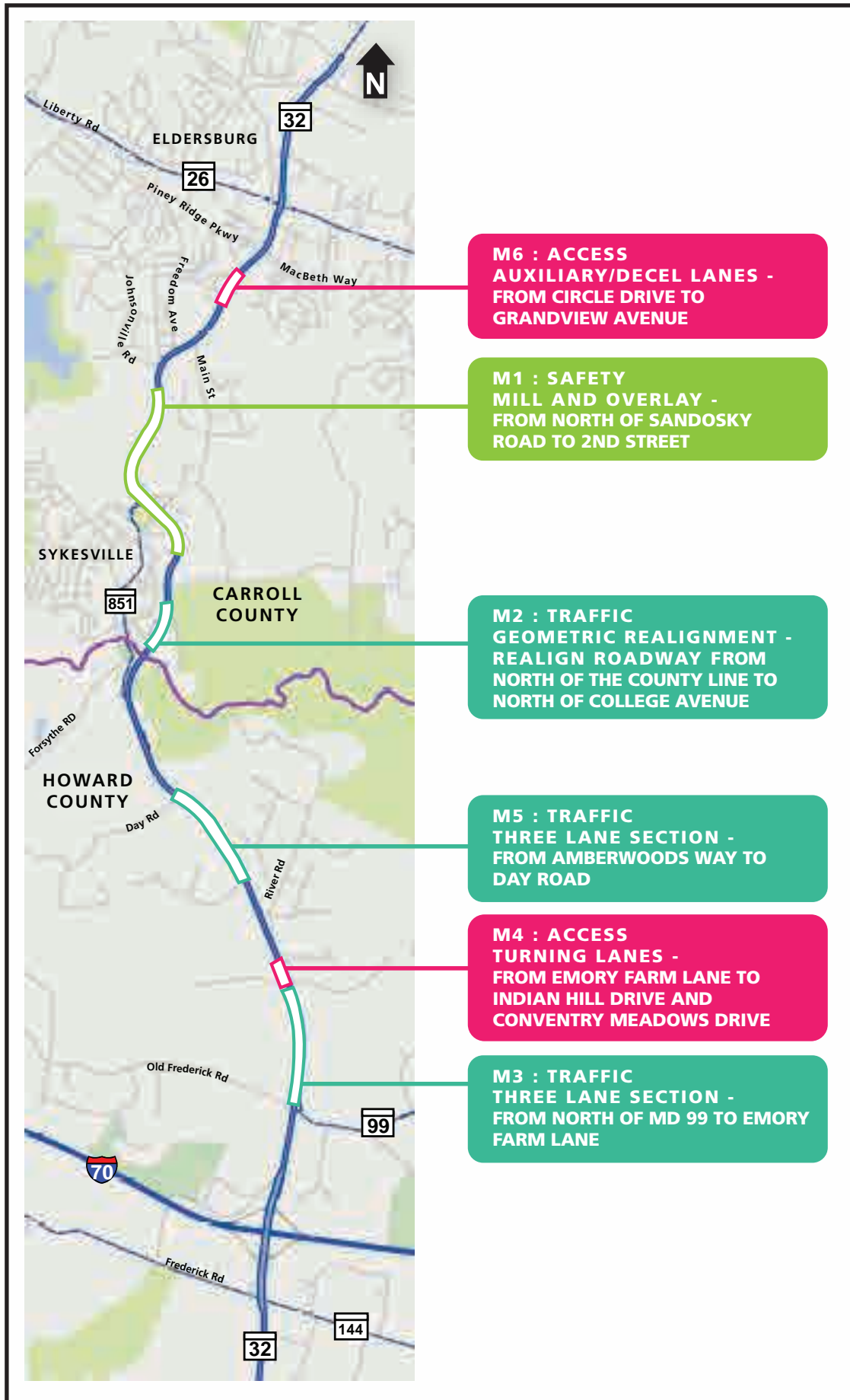


Figure 5.3 – Corridor Improvement Locations: M1-M6



Potential Environmental Impacts

The concepts were developed to a level of detail that enabled a preliminary limit of disturbance to be drawn and to quantify the potential impacts that were associated with constructing the proposed improvements. The preliminary impact assessment used the secondary source data collected and compiled in the study's Geographic Information Systems (GIS) database. Impacts were divided into three separate categories: Land Use Impacts, Cultural/Historic Resources Impacts, and Natural Environmental Resources Impacts.

This study determined the worst case scenario for potential impacts to the known resources that were associated with the proposed improvement concepts; the study was also intended to identify potential environmental issues and concerns early in the process. The findings will be used to identify the anticipated level of future investigations and documentation that may be required moving forward - particularly during the studies that must comply with the National Environmental Policy Act of 1969 (NEPA), the Maryland Environmental Policy Act (MEPA), and related federal and state laws and regulations. The Potential Impacts Analysis Technical Memorandum can be found in Appendix II.

Table 5.6 includes a summary of the potential impacts related to right-of-way needs for the construction of the proposed improvements. For the most part, the concepts focus on existing MD 32 intersections and on extending and adding deceleration/acceleration and turning lanes that require only minor disturbances outside of the existing roadway limits. Therefore, encroachments into protected resources are expected to be minimal. However, the driveway consolidation concepts that require new connecting roadways parallel to the existing MD 32 and the four-lane vision concept are anticipated to have encroachments outside of the existing right-of-way, and outside of the limits of disturbance anticipated for the localized improvement concepts.

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Table 5.6 Summary of Potential Impacts

Concept ID	Concept Name	Additional Right-of-Way (acres)	Number of Parcels	P R S D
Low-Mid Range Concepts				
S1 S2, S3 S4, S5	2 nd Street to Main Street	0	0	
H1 H2, H3 H4, H5	I-70 to MD 99	0.9	12	
Driveway Consolidation				
D1	NB between I-70 and the West Friendship Fire Department	2.4	12	
D2	NB Butterfly Court extended	0.9	6	
D3	NB Properties south of Emory Farm Lane	0.3	12	
D4	NB Emory Farm Lane to Indian Hill Road	1.9	6	
D5	NB south of Day Road	0.2	4	
D6	NB north of Day Road	0.6	5	
D7	NB Deer Hill Road extended	0.4	8	
D8	SB between Circle Drive to MacBeth Way	0.6	15	
D9	SB between Waite Avenue to Grandview Avenue	0.3	12	
D10	SB south of Amberwoods Way	1.6	9	
D11	SB Properties north and south of Coventry Meadow Drive	0.8	4	
D12	SB 2 Properties north of MD 99	0.2	2	
Miscellaneous A Priority				
M1	Mill and overlay from north of Sandosky Road to south 2 nd Street	Resurfacing project – no impact		
Miscellaneous B Priority				
M2	Close access to College Avenue (west leg) and realign roadway	0	0	
M3	Three-lane section from MD 99 to Emory Farm Lane	0.2	3	
M4	SB Coventry Meadows Drive accel/decel lane NB Emory Farms Lane accel/decel lane with auxiliary lane between Emory Farm Lane and Indian Hill Drive	1.00	10	
M5	Three-lane section from Amberwoods Way to Day Road	0	0	
M6	SB accel/decel lane for Circle Drive with auxillary lane between Circle Drive and Grandview Avenue	0.3	9	
Future Vision				
	4 Lane Divided Partially Access Controlled - Boulevard	26.7	112	

* Total linear feet including existing

** Same property potentially relocated by either concept

Potential residential structure placements	Forestland (acres)	Wetlands (acres)	Streams (linear feet)	Floodplains (acres)	Parkland (acres)	Historic Property (square feet)
0	0	0	145 LF* UNT South Branch Patapsco River	0	0	0
1**	0.12	.07	525 LF* Roadway Terrapin Branch	0	0	0
1**	1.04	.13	0	0	0	0
0	0.01	0	0	0	0	0
0	0.06	0	0	0	0	0
0	0.09	0	0	0	0	0
0	0	0	0	0	0	0
1	0.03	0	0	0	0	0
0	0.01	0	0	0	0	0
0	0	0	90 LF* UNT Piney Run	0.1	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	1.08	0	0	0	0	0
0	0	0	0	0	0	0
Impacts anticipated other than temporary traffic management						
0	0	0	0	0	0	0
0	0.71	0	0	0	0	0
0	0.16	0	0	0	0	0
0	0.49	0	255 LF* UNT South Branch Patapsco River	0	0	0
0	0	0	84 LF* Piney Run	0.10	0	0
13	18.58	1.0	560 LF* UNT S.B. Patapsco 280 LF* UNT S.B. Patapsco 330 LF* S.B. Patapsco 275 LF* UNT Piney Run 265 LF* Piney Run 210 LF* UNT Piney Run 240 LF* UNT Piney Run	2.3	South Branch Park (0.4) Millard Cooper Park (0.1) Hugg- Thomas WMA (1.8)	9,440
			Total = 2,160			Total = 2.3

06 - RECOMMENDATIONS

Recommended priorities and concluding remarks



Findings

The MD 32 corridor currently experiences some congestion during peak hours, which is expected to increase if roadway improvements are not implemented. While the crash history shows that the corridor is not currently experiencing a concerning rate of crashes, the frequent driveway access points and turning movements without dedicated turn lanes create both safety and operational concerns. Furthermore, the history of incremental spot upgrades along the corridor has led to a very inconsistent roadway section, which contributes to unstable traffic operations and gives inconsistent cues to drivers about the function and expected access along the road.

Access consolidation and intersection improvements along the corridor are recommended to better meet the existing and anticipated traffic demands. While the forecasted traffic analysis shows that a full corridor upgrade to a four-lane highway will not be needed until at least 2040, shorter term improvements should be designed to be compatible with the ultimate four-lane vision. The localized improvement concepts included in this study can be advanced as individual projects that will address immediate needs, while also building toward an ultimate vision for a four-lane divided roadway.

Implementation Priorities

Corridor Segment Improvements

The two corridor segments below combine several localized improvement concepts and would address multiple safety and operational needs.

- 2nd Street to Main Street (Carroll County): Improve intersection geometry, extend turn lanes, modify access, and evaluate signal warrant at Main Street (0.5 miles, \$2.6-2.8 million).
- I-70 to MD 99 (Howard County): Reconfigure I-70 ramp intersection to reduce weaving, extend turn lanes at MD 99 and Park & Ride lot (0.8 miles, \$3.2-3.5 million).

Access Management and Consolidation

Access management and consolidation throughout the corridor will provide immediate operational and safety benefits. It is also a necessary step toward implementing the four-lane corridor vision. The access management concepts identified in Chapter 5 can be implemented as opportunities arise.

MD 32/MD 26 Intersection

The intersection with MD 26 (Liberty Road) is currently experiencing significant peak hour congestion and is a bottleneck in the corridor. MDOT SHA is undertaking further study of improvement concepts for this intersection that will be issued separately.

Four-lane Corridor Vision

The ultimate vision for MD 32 includes widening to a four-lane divided roadway with bicycle and pedestrian facilities throughout the study corridor. Based on current traffic forecasts, the entire corridor will not require four lanes until beyond 2040. However, as other concepts are implemented over time, traffic operations and safety should be monitored to further evaluate when widening may be needed.

The four-lane concepts included in Chapter 5 serve as a guide for the corridor's ultimate future plan to reserve right-of-way, manage access, and build toward a coordinated vision as development and roadway projects occur. The segment from Springfield Avenue to Piney Ridge Parkway/MacBeth Way (Concept C3) is identified as the segment expected to need widening and dualization first.

Conclusion

This report summarizes the activities that MDOT SHA has undertaken to make recommendations for the MD 32 corridor. The report identifies transportation needs and incremental projects that will address those needs and build toward the four-lane divided roadway vision.

The concepts outlined in this report represent a guide to how the MD 32 corridor should be improved for the foreseeable future. This report will be used by MDOT SHA, Howard County, and Carroll County to help identify and prioritize improvements to the MD 32 corridor. This may include incorporating improvements in future development plans or access permits, MDOT SHA system preservation projects or safety improvement projects, major corridor improvements, county projects and/or other funding opportunities. Additionally, this report can be used to guide future access and improvements to MD 32 associated with private development. The concepts presented in the report are preliminary and will require detailed design, environmental study, and coordination with stakeholders before implementation. Corridor operations and safety will continue to be monitored to confirm the priorities and timeline for upgrades to MD 32.

Maryland Department of Transportation
MD 32 Planning Study

April 2018

