SR 160 Corridor Study

SEPTEMBER 2023

Prepared by:

CDM Smith

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

The City of Morristown has made the proactive decision to initiate a comprehensive corridor study on State Route 160 (SR 160). This study provides a detailed transportation planning level analysis of SR 160 beginning at its intersection with US 11E in the west to Old Lowland Road/McClister Road to the east, approximately 12 miles. An overview of the SR-160 Corridor is shown Figure 1-1. The road is named Air Park Boulevard, Governor Dewitt Clinton Senter Highway, and Enka Highway throughout the study area, but will be referred to as SR 160 in this report for simplicity. This report identifies the existing conditions within the study area, identifies issues and opportunities along the corridor, and provides recommendations for the local jurisdictions moving forward with emphasis on safety and capacity improvements.

1.1 Project Background

The City of Morristown decided to analyze SR 160 to proactively address overall safety, traffic flow, and operations as more development occurs along the corridor and a new school is forthcoming along Dr MLK Jr Parkway. The majority of the corridor is within the City of Morristown's corporate limits except for an approximately 0.76-mile section between Merchants Greene Boulevard and Mayes Road and another approximately 0.96-mile section between Sulphur Springs Road and the intersection with SR 343.

Much of the study area corridor was constructed in the early nineties as a four-lane highway beginning in the east with the intersection of SR 343 then proceeding west to US 11E. The completed section served as a bypass of Morristown as well as an additional east to west connector between US 11E and Interstate 81. As the city has grown, the road has become a vital linkage with existing and new developments particularly with growth along SR 66 (Merchants Greene Boulevard), the location of several schools, and a new school under construction. Moreover, ample developable land remains available between the corridor and US 11E, which will likely result in additional demands on SR 160.

In addition to the operational concerns, safety issues exist along the corridor as documented by crash data. Between 2018 and 2022, a total of 560 crashes occurred in the study area. Of those crashes, six were fatal while an additional 25 serious injury crashes occurred. The crashes were distributed at major points of conflict in the corridor with concentrations at the intersections with Sulphur Springs Road and US 25E.

1.2 Project Purpose

The purpose of the study is to assess the immediate needs of the corridor from an operations and safety standpoint while proposing suggested improvements to support its integral role within the city and regional ecosystem. The study aims to address existing challenges and develop strategies to enhance the corridor's functionality and safety.

Transportation does not exist in a vacuum independent of the multitude of factors which impact a city. Utilizing a comprehensive approach, the study will analyze the contributing factors to the corridor's current and future ability to serve the resident and transient population including demographics, land use and development patterns, crash occurrences, roadway geometry, traffic patterns and congestion. Through this analysis, the study will identify areas of existing safety and operational concerns that can be resolved or mitigated through infrastructure modifications.

To improve safety, the study will focus on intersections and other areas with a high a occurrence of crashes. The location and types of severe crashes will also be closely analyzed. Potential safety countermeasures include reducing the number of conflict points at intersections, auxiliary lanes, and deceleration lanes. For traffic operations, the study will analyze existing and future traffic volumes and capacity constraints. The study provides the city recommended geometric improvements to improve traffic function and usability.

Overall, the corridor study seeks to provide a thoughtful and intentional approach to enhance safety, operations, and transportation options along SR 160 to serve the residents and visitors to Morristown.

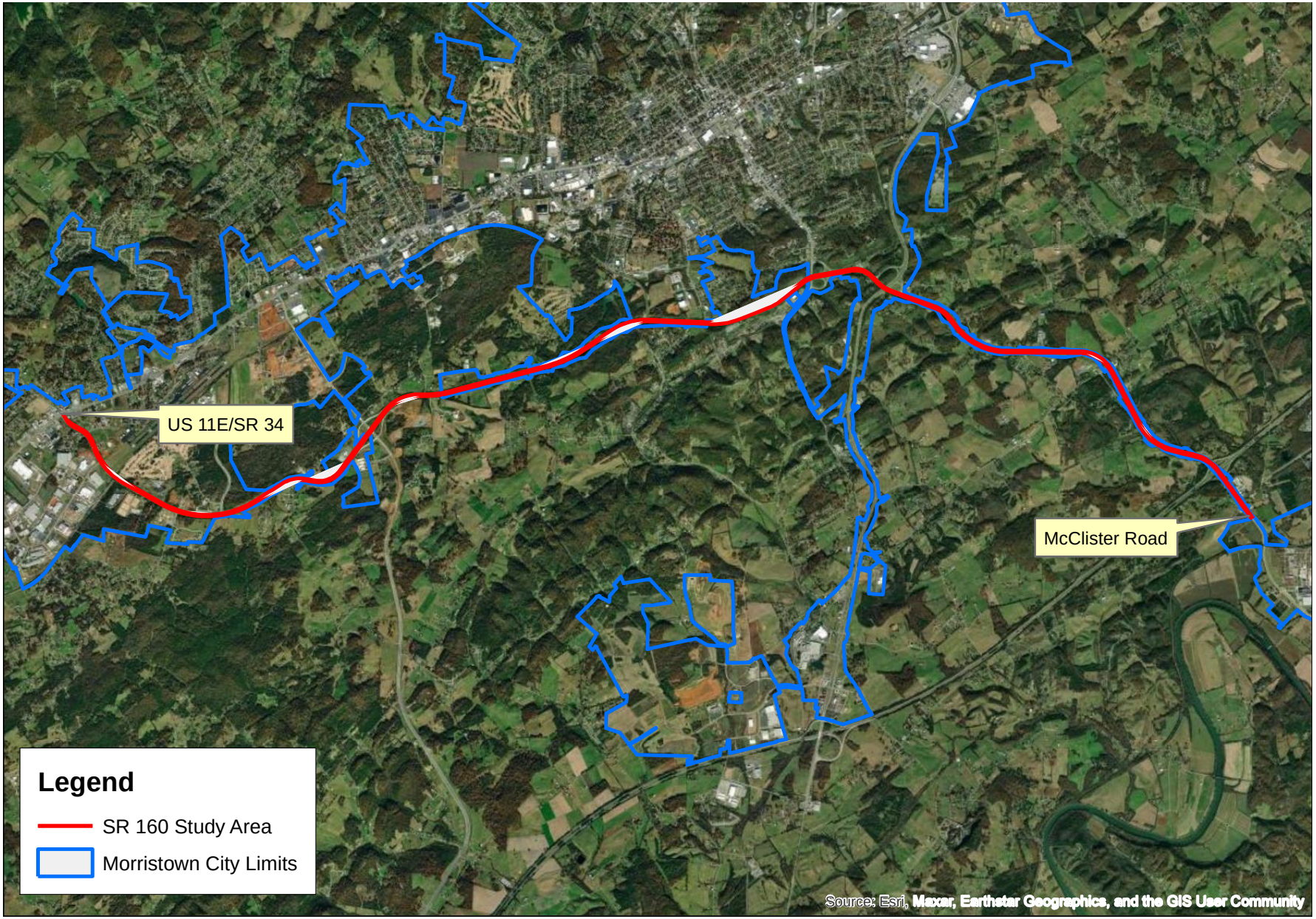


FIGURE 1-1 OVERVIEW OF THE STUDY AREA

2 EXISTING CONDITIONS

Located in East Tennessee, the City of Morristown is the county seat of Hamblen County and one of only two incorporated municipalities in the county. Morristown is centrally located between eight counties serving as a regional hub for employment, shopping, recreation, healthcare, and educational opportunities. The city has evolved from an agricultural-based economy to one oriented towards manufacturing and services. Due in part to its regional advantages, including access to Interstate 81, the manufacturing sector produces a wide range of projects such as plastics, automotive parts, and frozen cakes. The city also has ample quality of life amenities including outdoor activities such as boating, fishing, mountain biking, hiking, camping, and disc golf. The downtown is unique with its historic buildings, elevated sidewalk network and variety of shops and restaurants creating the sense of place vital to the heart of a community.

SR-160 is an east-west highway along the southern part of the City of Morristown. Most of the highway is within the city limits with varying degrees of frontage property having been annexed. The study area measures approximately 12 miles from US 11E to just beyond the intersection with Interstate 81 at Old Lowland Road/McClister Road.

2.1 Demographics

As of the 2020 Decennial Census, the population of the City of Morristown amounted to 30,431 constituting 47% of the Hamblen County's total population of 64,499. As shown in Table 2-1, population growth in the city has exceeded that of Hamblen County and the State of Tennessee over the past 30 years. This growth may be attributed to several factors such as migration, relocation, annexation, and natural population growth. Regardless, the increase in population size within the city limits provides the basis for active engagement with its resources and solidifies Morristown as the economic, social, and cultural hub of the Lakeway area.

TABLE 2-1 DECENNIAL CENSUS POPULATION INCREASES BY YEAR (%)

	Morristown	Hamblen County	Tennessee
1990	9.3	2.4	6.2
2000	17.02	15.2	16.7
2010	16.7	7.6	11.5
2020	4.4	3.1	8.9

SOURCE: U.S. CENSUS BUREAU DECENNIAL CENSUS

Population growth within the city is anticipated to continue. Using a simple linear projection model, the anticipated population for the city would result in an increased population of approximately of 4,256 people by 2050. Regardless of methodology, the city is experiencing significant growth in its retail and residential population which is expected to continue.

As a regional economic center, its daytime, or commuter-adjusted, population is strategically important to understand the demands on the city's infrastructure and services. The total number of people assumed to be present in the city limits during normal business hours amounts to 45,670. Relative to its regional economic competitors, the daytime population of Morristown is approximately 150% its resident population compared to 144% for Knoxville and 137% for Johnson City.

2.2 Land Use

Land use along the corridor and its periphery has and will continue to dictate the adaptations of the highway. Due to the low density of development directly fronting the highway, it has remained as a corridor aimed at moving traffic rather than providing access. Conflicts and concerns arise from intersections with adjoining roads containing land uses generating large traffic volumes. This section will evaluate the existing and future land use patterns in proximity to the highway.

As shown in Figure 2-1 and Figure 2-2, the existing land uses adjacent to SR 160 primarily consist of low-density residential development, agricultural, and similar large lot, low impact developments. The greatest level of land use intensity is at the intersection with US 11E with the confluence of commercial land uses. The existing land use data can be misleading without viewing the corridor within the context of its position in the overall development pattern of the city. The road runs roughly parallel to US 11E and provides linkages to many of the city's major commercial areas via SR 66, US 25E, and SR 343. Moreover, several high intensity land uses can be accessed from SR 160 including Morristown Landing (aquatics and recreation center), Morristown-Hamblen West hospital, Morristown-Hamblen West High School, West View Middle School, Alpha Elementary School, and an elementary school under construction on Dr MLK Jr Parkway. Continued growth in the area particularly between SR 160 and US 11E will have a substantial impact on the corridor.

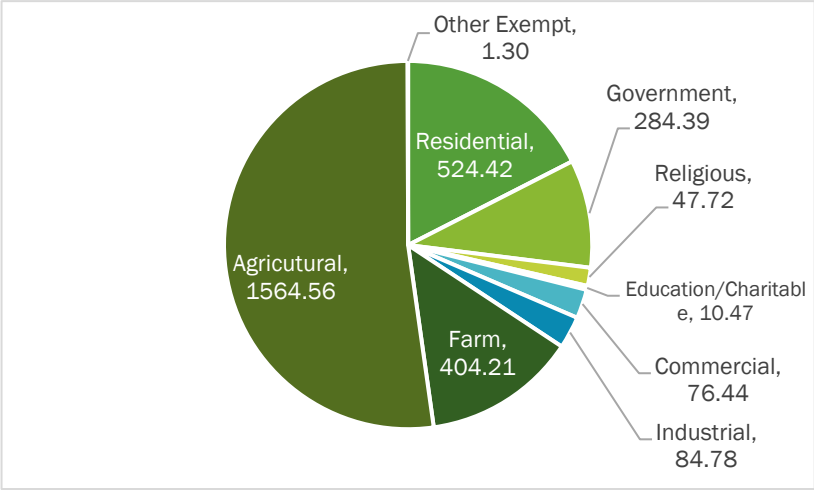


FIGURE 2-1 LAND USE BY AREA (ACRES)

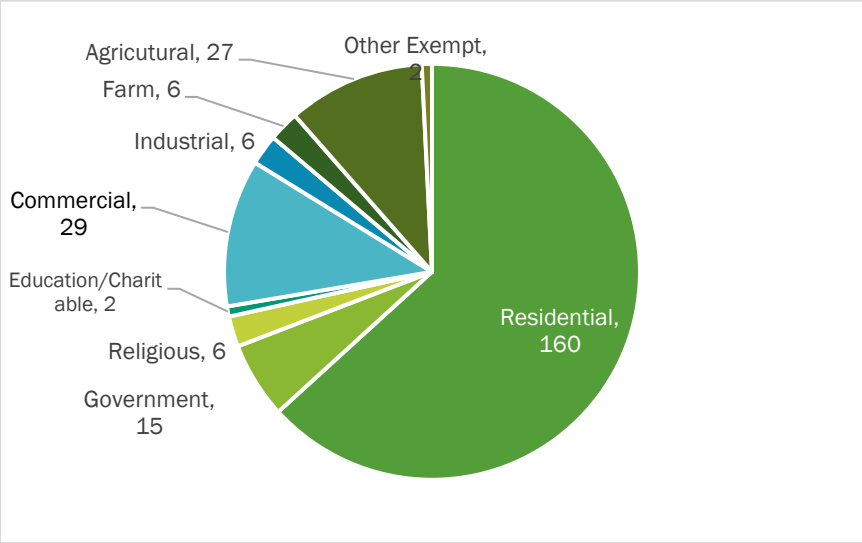


FIGURE 2-2 LAND USE BY FREQUENCY (LOTS)

The City of Morristown and Hamblen County have authority to regulate land use and development through zoning regulations, which both have adopted. Division of land into new lots or parcels would be regulated by the City of Morristown's Subdivision Regulations as a Municipal-Regional Planning Commission. As a state route, the Tennessee Department of Transportation (TDOT) regulates access in addition to any more stringent requirements the city may adopt. The Planning Commission has adopted restrictions for driveways on limited access highways[1] and the Zoning Ordinance[2] contains requirements for controlling access.

[1] Subdivision Regulations City of Morristown, Tennessee and Planning Region, Section 4.1(D)(10)(f)

[2] Zoning Ordinance City of Morristown, Tennessee, Section 14-216

Much of the zoning for the area reflects the existing land uses. A breakdown of the zoning for properties with access to the corridor is shown in Figure 2-3 and Figure 2-4 as the amount of land and the frequency of occurrence. Zoning jurisdiction is divided between the City of Morristown and Hamblen County. The zoning summaries have consolidated the jurisdictions zoning into categories. As a Municipal-Regional Planning Commission, the City of Morristown can make recommendations on zoning changes within the corridor. As shown in the figures, the majority of land area remains zoned for low density development including Agriculture-Forestry and Low Density Residential. Industrially zoned property also has a large presence in the corridor.

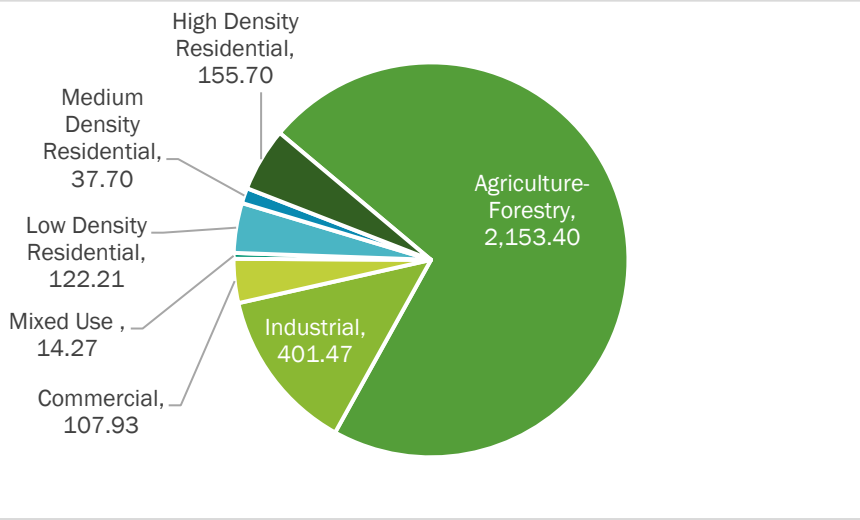


FIGURE 2-3 CITY AND COUNTY ZONING BY AREA (ACRES)

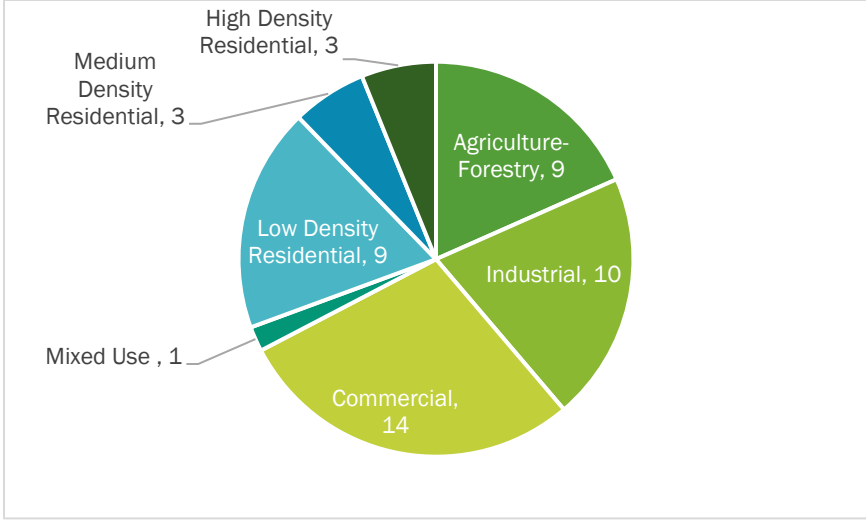


FIGURE 2-4 CITY AND COUNTY ZONING BY FREQUENCY (LOTS)

Given the growth in the area, the availability of land, and the proximity to regional attractions, demand for more intensive land uses is likely to be drawn to the corridor. The timing of which is largely dependent on market demand and the availability of utilities. In order to maintain the existing character of the corridor, adequate access control mechanisms will need to be maintained, enforced, and strengthened. Future impacts to the corridor can be mitigated through the city and county's existing land uses regulations and proper site design.

Future growth in employment in the area can be forecasted on a county level using the Land Use Forecasting dashboard from TDOT. Figure 2-5 provides projected growth through 2050 in population, households, and employment for the county.

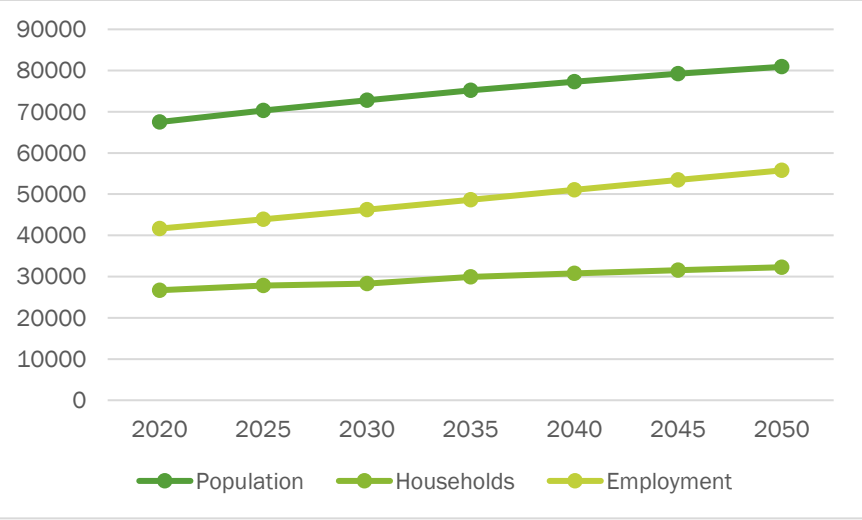


FIGURE 2-5 HAMBLEN COUNTY GROWTH 2020-2050

The county is forecasted to continue its historical trends in population growth while also showing a continued increase in employment. The forecasting tool also provides projected growth in employment sectors utilizing North American Industry Classification System (NAICS) codes.

Table 2-2 provides forecasts for the top three industry sectors in 2020, 2035, and 2050. Health Care and Social Assistance is forecasted to overtake Manufacturing as the top industry in the county. Construction is forecasted to overtake Public Administration.

TABLE 2-2 INDUSTRY GROWTH 2020-2050

Rank	2020	2035	2050
1	Manufacturing	Health Care and Social Assistance	Health Care and Social Assistance
2	Health Care and Social Assistance	Construction	Construction
3	Public Administration	Administrative and Support and Waste Management and Remediation Services	Administrative and Support and Waste Management and Remediation Services

2.3 Floodplain

Special Flood Hazard Areas (SFHAs) are designated by the Federal Emergency Management Agency's (FEMA) flood maps. These maps are important to help the city and property owners understand areas that have the highest risk of flooding. They are also used as part of the National Flood Insurance Program (NFIP) to calculate insurance policies. In the State of Tennessee, communities are required to adopt floodplain management regulations and participate in the NFIP to receive certain state assistance if SFHAs are identified by FEMA within their jurisdiction. The City of Morristown has adopted the necessary regulations for compliance with state law and participation in the NFIP.

The SR 160 corridor contains limited SFHAs as identified by FEMA and should not be an impediment to future development. These take the form of the 1% annual chance of flooding as shown on the maps in Appendix F. Official FEMA flood maps label these areas as zones A and AE. Designation of a property in a flood hazard area does not prohibit development but does place requirements on improvements. Absence of FEMA designated flood zones does not mean a property will not flood, only that the study which produced the flood maps did not identify a SFHA *at that time*. Changes in land development, drainage structures, and construction may alter these circumstances.

2.4 Soils and Geology

The United States Department of Agriculture's (USDA) National Resources Conservation Service (NRCS) provides soil survey information produced by the National Cooperative Soil Survey. This soil survey information is useful for high level review of an area or site and planning purposes. For this study, it can provide insight into the development potential in the corridor as well as future concerns for drainage. On-site studies and samples are necessary for specific construction and development activities.

The primary soil series found in the immediate area around surrounding the corridor are Dandridge, Dunmore, Talbott, and Litz. Varying slopes are noted and evident from topographic maps. All of these soil series are classified as being well drained with varying degrees of permeability. A summary table of the soil types is included in Appendix A.

2.5 Safety

To assess the need for safety improvements, a comprehensive review of intersections was conducted. The analysis included an examination of the traffic crash history, development of crash rates, and the quantification of crash severity for each intersection. The review period encompassed six years, between 2017 and 2022, to capture sufficient crash data and identify patterns over time.

Crash data was collected for the entire study area. Emphasis was placed on analyzing angle, left-turn, and rear end collisions. Crash summary diagrams were created for each intersection and segment, providing visual representations of the crash patterns and aiding in the identification of potential improvement opportunities. The corridor crash summary diagrams are provided in Appendix G.

Crash rates were calculated using the crash history data and intersection turning movement counts obtained specifically for this study. To determine the intersection crash rate, entering Average Daily Traffic (ADT) volumes and K-factors were developed. The PM peak-hour entering traffic was extrapolated to estimate an ADT volume using K-factors derived from automated traffic counts conducted during the study. These rates are reported in terms of crashes per million entering vehicle (MEV).

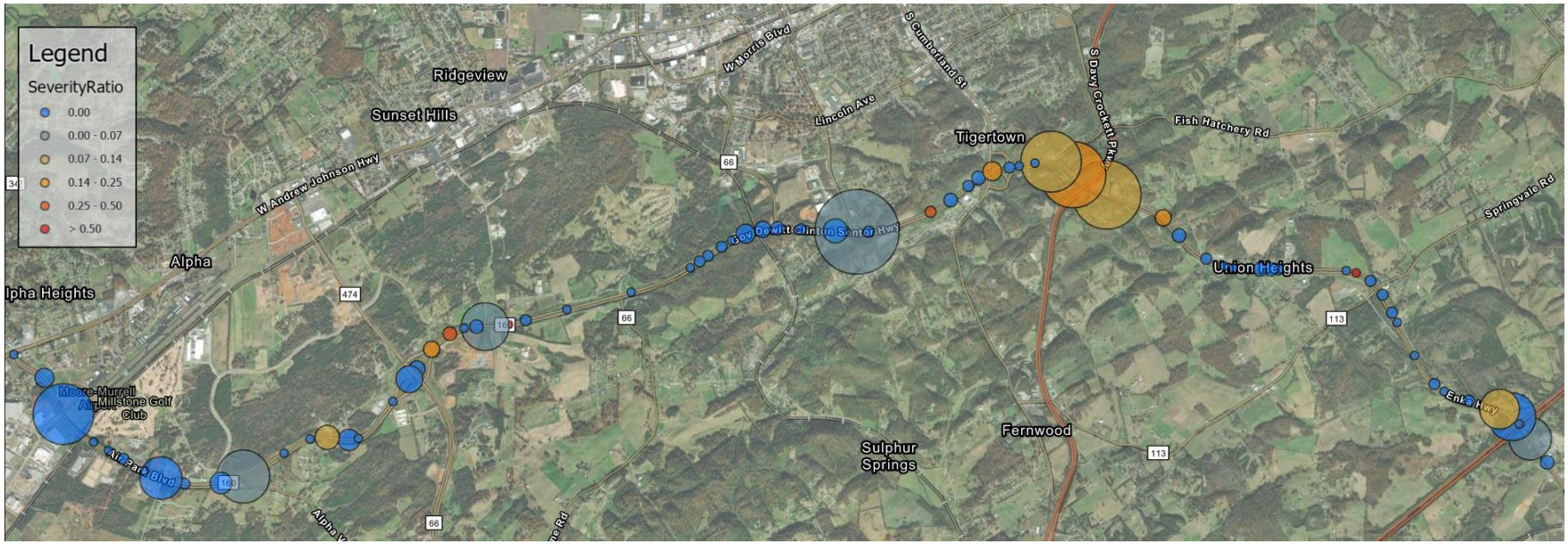


FIGURE 2-6 SUMMARY OF SR160 CRASHES BY NUMBER AND SEVERITY

The statewide average crash rate for an urban unsignalized multilane divided highway is 0.109/MEV and the statewide average crash rate for a rural unsignalized multilane divided highway is 0.08/MEV. The crash rates for all intersections within the study area can be found in Appendix G. The crash rates were compared to the Tennessee statewide averages as well as critical crash rates, which are calculated based on sample size and vehicle volumes to determine thresholds at which it can be said crash rates are elevated over statewide averages by a statistically significant margin.

Segment crash rates are also summarized in Appendix G, however Statewide average rates are not available for divided, rural multi-lane roadways.

Figure 2-6 shows crashes for the entire corridor aggregated to location and symbolized by circles, increasing in diameter based on the number of crashes occurring in the area. The symbols are shaded with various colors to reflect the severity ratio at the location, which is the ratio of fatal and serious injury crashes to the overall number of crashes.

Below Average: Locations with crash rates below the statewide average

Average: Locations with crash rates at or within 15 percent above the statewide average

Above Average: Locations with crash rates 15 percent above the statewide average

Significantly Above Average: Locations with crash rates at or above the critical statewide average

2.6 Roadway Characteristics

SR 160 is a four lane, divided highway with paved shoulders. Turning areas within the median are present at road intersections. A grass median separates the highway and contains an open concrete swale for stormwater drainage. No pedestrian or multi-modal amenities exist along the road. The study area begins at US 11E and proceeds east 12 miles to McClister Road on the eastern side of the I-81 interchange. Right-of-way width varies throughout the corridor with a minimum of 260'. The cross-section includes four 12-foot travel lanes, 12-foot paved outside shoulders, and a 50-foot median. Left turn lanes exist at different street intersections. A substantial amount of right-of-way on either side of the road exists beyond the road surface.

Access along the highway is regulated by TDOT as well as local jurisdictions. Direct driveways are limited on the corridor between in the area in the post 1990 westward expansion. Most access points are with intersections with existing roads or streets and their resulting turning movements. The section east of SR 343 contains more direct driveway access points the impact of which is somewhat limited given the adjoining low-density development.

TDOT's Functional Classification System (Figure 2-7) classifies SR-160 as a Principal Arterial from US 11E to the intersection with US 25E. The section from US 25E to I-81 is classified as a Minor Arterial. East of I-81, the highway transitions to a Major Collector. The Lakeway Area Metropolitan Transportation Planning Organization (LAMTPO) classifies SR 160 from US 11E to US 25E as an Urban Principal Arterial. LAMPTO classifies the remainder of the corridor east of US 25E as an Urban Minor Arterial.

The posted speed limit varies along the road. The majority of the corridor is posted at 55 miles per hour, except for a short segment between the southbound US 25E ramps and SR 343, which is 50 miles per hour.

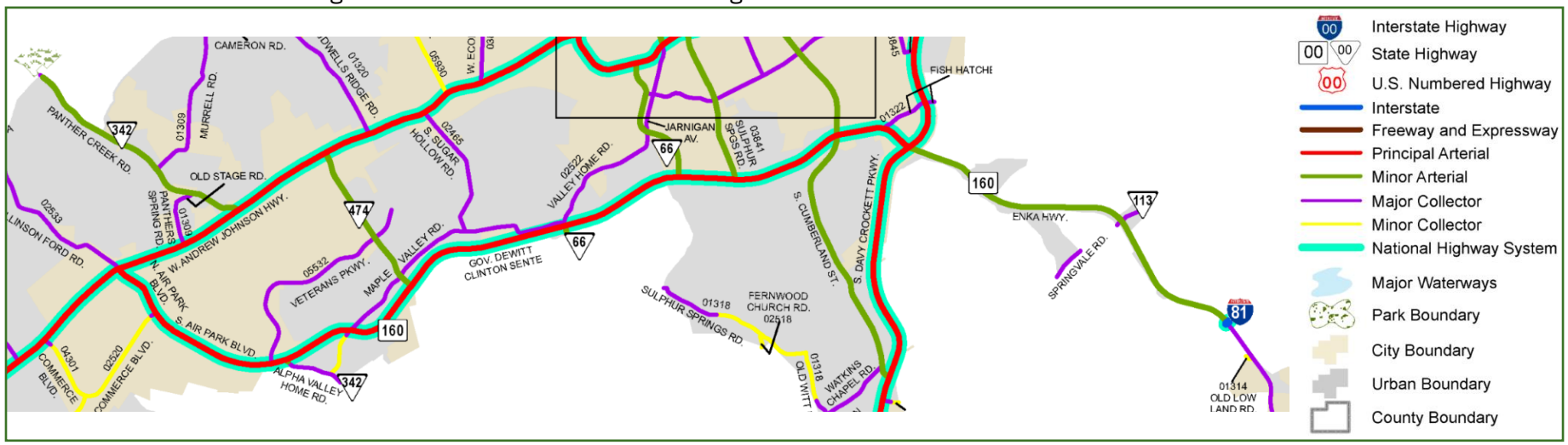


FIGURE 2-7. TDOT FUNCTIONAL CLASSIFICATION MAP

2.7 Existing Intersections

The existing intersection for the SR 160 study area are shown in Figure 2-8. The intersections along the project corridor primarily consist of stop-controlled side streets with uninterrupted flow on SR 160. Left-turn lanes at median openings are common, with right-turn lanes from SR 160 existing sporadically. Reduced left-turn conflict intersections, such as restricted crossing U-turn (RCUT) and median U-turn (MUT) intersections have been implemented in the area in the past several years. Existing geometry on the SR 160 corridor is shown in Figure 2-9.

Additional detail is provided for each intersection in the following sub-sections.

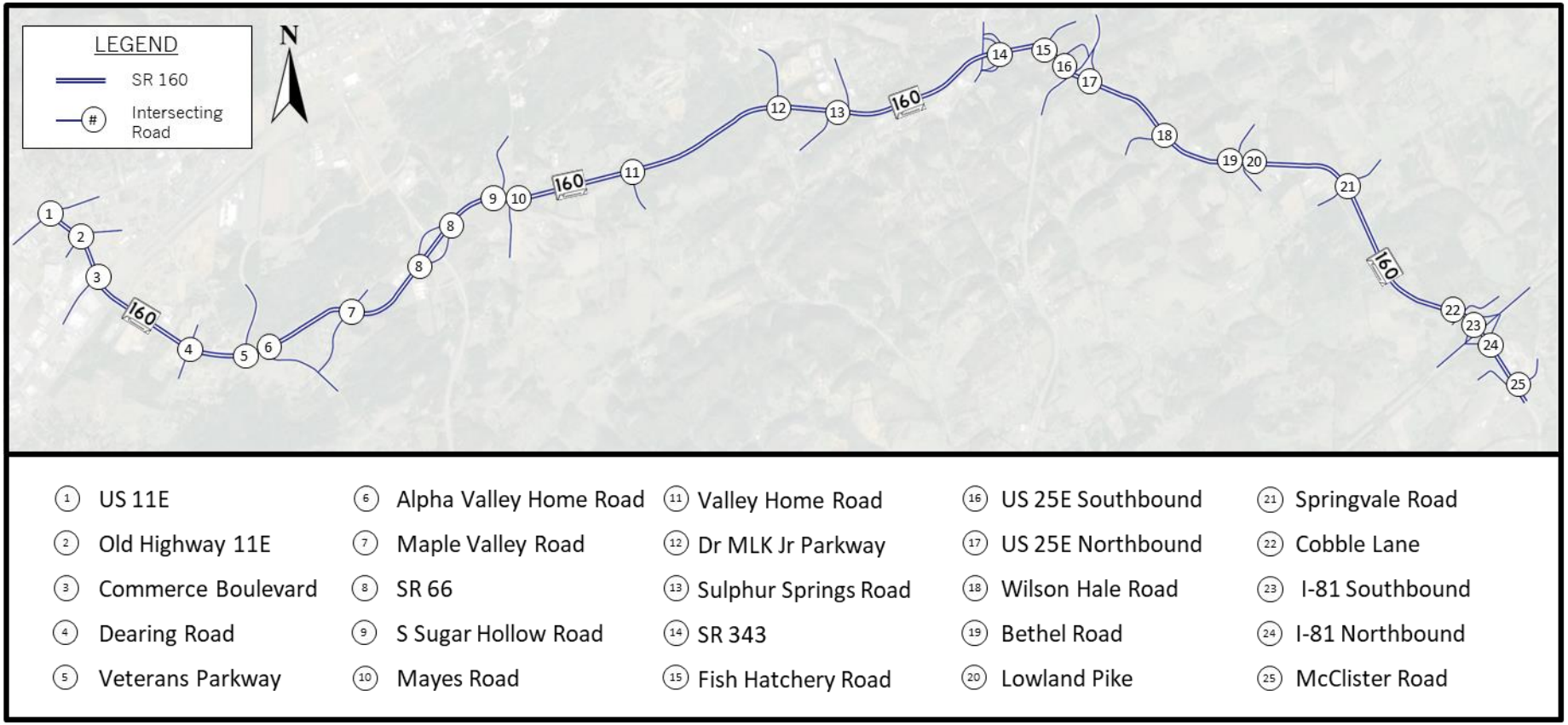


FIGURE 2-8. SR 160 CORRIDOR STUDY AREA

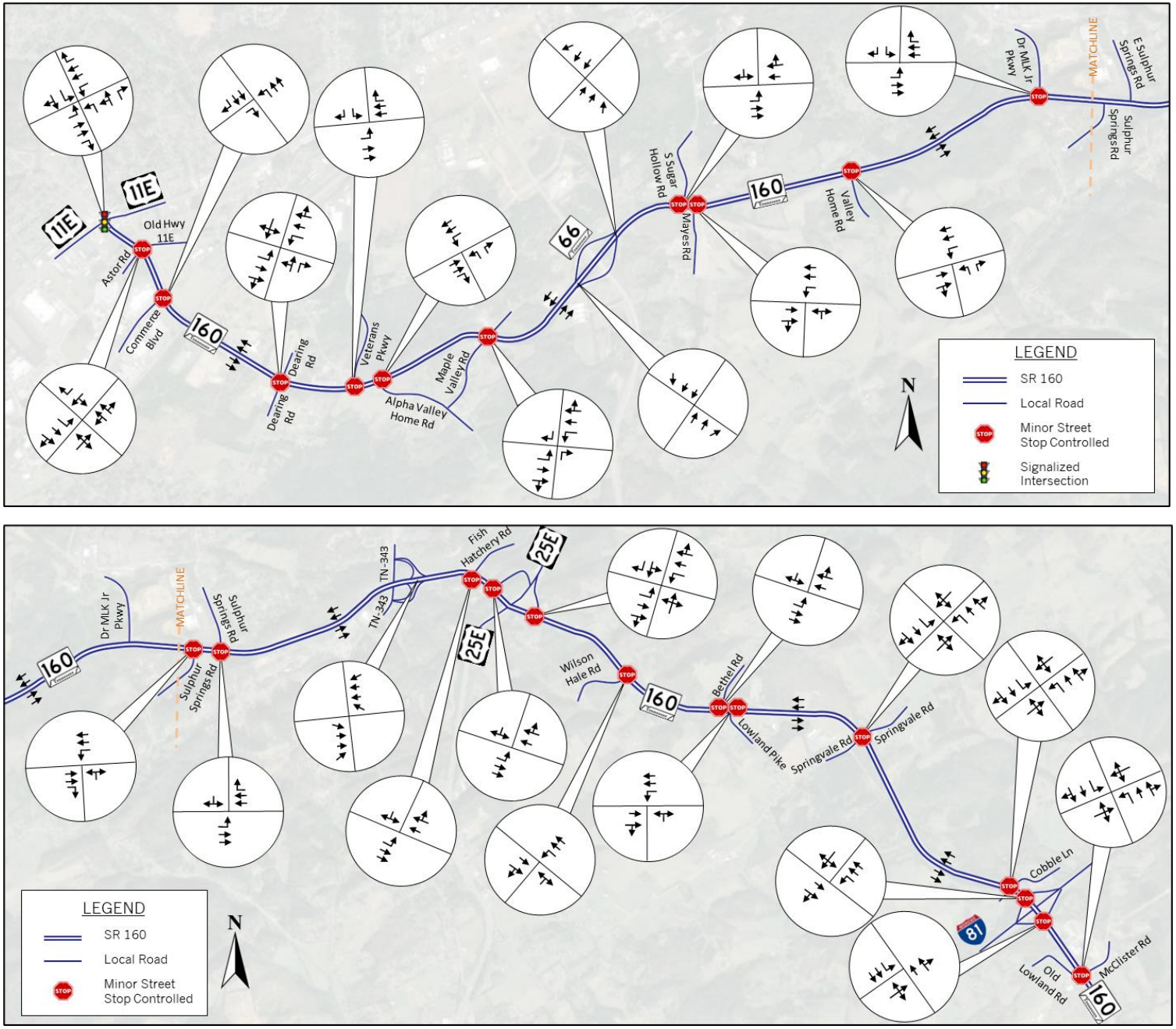


FIGURE 2-9. SR 160 EXISTING GEOMETRY

SR 160 & US 11E

Geometry

This intersection is the only signalized intersection existing on SR 160. US 11E is the higher volume roadway, aligned east to west, SR 160 approaches from the south, and Collinson Ford Road approaches form the north. Turn lanes exist for all four left-turn movements, as well as right-turns at each approach other than southbound. Left-turns from each approach of US 11E have their own signal phase. The northbound and southbound approaches each have their own phase (split-phased on phases 3 and 4).

Safety

Among the corridor intersections, US 11E stands out with the highest number of crashes, totaling 126 reported collisions, with most incidents resulting from rear-end collisions (52) and angle collisions (41). Property damage is the most common damage type to occur at the intersection with 107 reported incidents. Comparatively, the intersection's crash rate is significantly above the statewide average, more than doubling the critical rate.

SR 160 & OLD HIGHWAY 11E/ASTOR RD

Geometry

Old Highway 11E approaches from the east, providing a connection to Alpha Elementary School, Morristown Regional Airport, residential and commercial properties, as well as providing some cut-through opportunity between US 11E to the east and SR 160 to the south. The two heaviest turning movements at this intersection are the southbound and westbound left-turns, which are in direct conflict with each other. Both movements have left-turn lanes with considerable storage. Astor Road, to the west, is a no-outlet residential area with minimal volume.

Safety

The crash rate of this intersection is above the statewide average, with a total of 6 reported collisions. The majority of the reports were angle collisions that occurred during the daylight where all of which resulted in property damage.

SR 160 & COMMERCE BLVD

Geometry

This three-leg intersection was reconfigured in 2021 as an RCUT configuration. Left-turns are allowed from SR 160 onto Commerce Blvd, but only right-turns are allowed from Commerce Blvd. All possible turning movements currently have dedicated turn lanes provided.

Safety

Over the 6-year period, a total of 23 collisions were reported. The majority of these reports include angle collisions and rear-end collisions, primarily resulting in property damage. The intersection's crash rate is significantly above the statewide average, more than doubling the critical rate.

SR 160 & DEARING RD

Geometry

This is a four-legged intersection, with SR 160 running east-to-west and Dearing Road north-to-south. Left-turn lanes are provided on each approach of SR 160. The northbound approach of Dearing Road has a dedicated right-turn lane, but the southbound approach is a single lane.

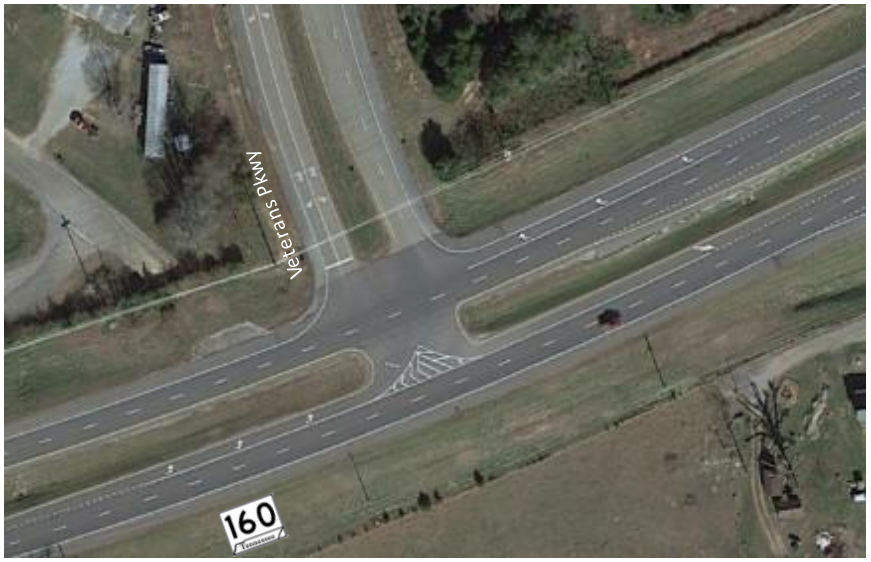
Safety

The intersection has received a total of 14 collision reports with 7 angle collisions and 4 single vehicle collisions, resulting in a crash rate significantly above the statewide average. Property damage has become the most common damage type with 10 cases reported.

SR 160 & VETERANS PKWY

Geometry

Veterans Parkway approaches from the north, to form a T-intersection with SR 160. A single turn lane exists for each turning movement from Veterans Parkway, as well as a left-turn and right-turn lane for the eastbound and westbound approaches of SR 160, respectively. Veterans Parkway is a four-lane, divided roadway.



Safety

Veterans Parkway does not have a predominant collision type having 6 total collision reports during the 6-year period. These collision reports have resulted in 4 cases of property damage and 2 cases of injuries where all but 1 incident occurred during daylight. The crash rate at the intersection is above the statewide average but below the critical rate.

SR 160 & ALPHA VALLEY HOME RD

Geometry

Alpha Valley Home Road approaches SR 160 from the south, intersecting SR 160, which is oriented east-to-west at this location. Alpha Valley Home Road provides a potential cut-through route for traffic seeking to proceed northbound on SR 160, coming from SR 66 and was relatively recently restricted to trucks. Left and right-turn lanes are existing at all approaches for which these movements are available. A wide median allows for storage of multiple vehicles.

Safety

A total of 18 collisions have been reported at this intersection, resulting in a crash rate above the statewide average and the critical rate. Of these collisions, the majority of these collisions (12) were angle crashes and resulted in 13 cases of property damage.

SR 160 & MAPLE VALLEY RD

Geometry

Maple Valley Road currently allows only right-turns onto SR 160. This RCUT intersection has channelized left-turns from SR 160 onto Maple Valley Road, with a downstream U-turn provided to service left-turn movements from the north. Left turns from the south can turn right and use the nearby interchange at SR 66 to proceed west, or they can instead use the intersection of SR 160 and Alpha Valley Home Road, which connects to Maple Valley Road approximately 0.4 miles south of this intersection.

Safety

Most of the 7 collision reports that occurred at the intersection were the product of either a rear-end collision (3) or an angle collision (2). Of these collisions, 6 resulted in property damage and a crash rate above the statewide average but below the critical rate.

SR 160 & SUGAR HOLLOW RD/MAYES RD

Geometry

Sugar Hollow Road approaches SR 160 from the north, and Mayes Road approaches from the south, approximately 250 feet to the east, to form this offset intersection. Sugar Hollow Road provides access to SR 160 from Maple Valley Road and Valley Home Road, to the north, as well as a direct connection between US 11E and SR 160. Mayes Road is a relatively low volume, no-outlet access to residential and agricultural properties, to the south. Left-turn lanes exist from SR 160 onto both side roads. The side roads are both single-lane approaches.

Safety

A total of 26 collisions have been reported at these intersections with the large majority of collisions occurring at the median south of the Sugar Hollow Rd approach. Of these collisions, 10 were angle, while 6 were single vehicle and 5 were rear-end collisions. The majority of these resulted in property damage (17) and injuries (6), creating a crash rate significantly above the statewide average, more than doubling the critical rate.

SR 160 & VALLEY HOME RD

Geometry

SR 160 is oriented east-to-west, at this T-intersection. Valley Home Road approaches from the south. All possible turning movements are provided dedicated turn lanes. The Valley Home Road approach has a channelized right-turn onto SR 160. The median is channelized, with a centerline and stop lines for both directions.

Safety

The majority of the 10 collision reports during the 6-year period were the product of angle collisions (5), resulting in 4 cases of property damage and 4 injuries. All 10 collisions occurred heading westbound SR 160 near the median. The crash rate of the intersection is above the statewide average and matches the critical rate.

SR 160 & DR MLK PKWY

Geometry

This T-intersection between SR 160 to the east and west, and Dr MLK Jr Parkway to the north, has dedicated turn lanes, acceleration, and deceleration lanes along SR 160 for each turning movement that is allowed. The median is well channelized, with plastic bollards.

Safety

The intersection at Dr Martin Luther King Jr Parkway had the second greatest number of collisions along the study area with 45 reported collisions. A breakdown of the collision data reveals 22 angle collisions, 7 opposing left collisions, and 6 rear-end collisions account for the majority of the reported collisions. Of these collisions, 33 resulted in property damage, 11 resulted in injuries, and 1 resulted in a fatality. The crash rate at the intersection is significantly above the statewide average, featuring a crash rate more than 4 times the critical rate.

SR 160 & SULPHUR SPRINGS RD WEST

Geometry

Sulphur Springs Road intersects SR 160 at an offset intersection, with the two intersection points approximately 750 feet apart. The westmost intersection occurs with Sulphur Springs Road approaching from the south. At this intersection, turn lanes are provided from both directions on SR 160.

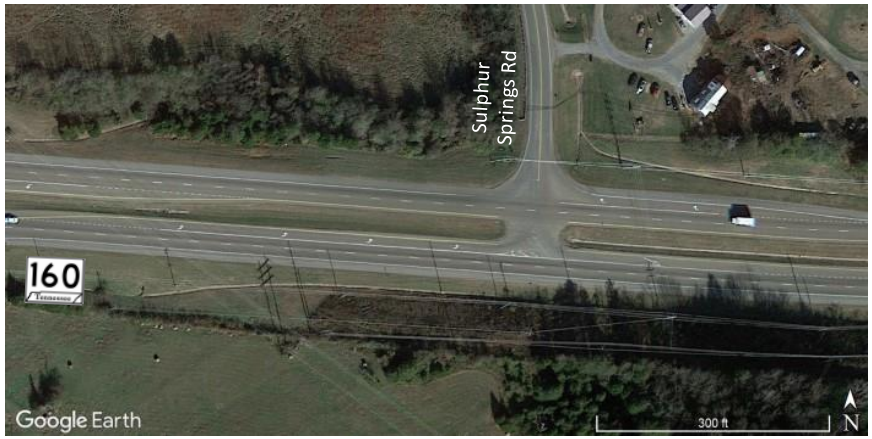
Safety

The intersection has received a total of 7 collision reports with 3 angle collisions and 2 rear-end collisions. This has resulted in a crash rate above the statewide average but below the critical rate. All reported 7 collisions during the 6-year period have resulted in property damage.

SR 160 & SULPHUR SPRINGS RD EAST

Geometry

An eastbound deceleration lane and left-turn lane spans the entire distance between the two intersections, providing storage for vehicles turning left to proceed northbound on Sulphur Springs Road. The southbound left-turn movement onto SR 160 has an acceleration lane provided. A westbound right-turn lane also exists for vehicles turning from SR 160 onto Sulphur Springs Road.



Safety

Throughout the corridor, N Sulphur Springs Rd has received the third largest number of collision reports, totaling 32. Most incidents were the product of rear-end collisions (15) and other/unknown (6), resulting in a crash rate significantly higher than the statewide average and more than 3 times greater than the critical rate. The most notable crash type that occurred during this period was property damage that occurred in 22 incidents.

SR 160 & SR 343

Geometry

The interchange between SR 160 and SR 343 is an AB2 partial cloverleaf, or "folded diamond" interchange. Eastbound and westbound sides of SR 160 each share a signalized intersection on SR 343, between their off-ramp diverge and on-ramp merge movements.

Safety

This section of the corridor has received a total of 19 reported collisions varying in type with the majority consisting of 6 single vehicles collisions, 5 rear-end collisions, and 3 sideswipe (same) collisions. Of these collisions, 14 resulted in property damage, 1 possible injury collision, 3 injury collisions, and 1 fatal collision. The crash rate for this segment is 1.238/MEV with no statewide average available to compare.

SR 160 & FISH HATCHERY RD

Geometry

Fish Hatchery Road is located approximately 600 feet west of the merge from the Southbound US 25E off-ramp. This single-lane approach from the north accesses a gas station and market. An eastbound left-turn lane exists from SR 160, but no right-turn lane exists westbound, nor do any turn lanes or acceleration lanes exist from Fish Hatchery Road for movements onto SR 160.

Safety

A total of 21 collisions have been reported at the intersection of Fish Hatchery Rd and SR 160. Most of the collisions can be accounted for by angle collisions (9) and sideswipe collisions (5) with most (13) resulting in property damage. The crash rate at the intersection is significantly above the statewide average, more than doubling the critical rate.

SR 160 & US 25E SB RAMP

Geometry

This T-intersection represents half of the partial cloverleaf between US 25E and SR 160, servicing the southbound US 25E ramps. The ramp approach is a single lane, however a channelized right-turn with merge lane does provide minimal separation of movements, with storage of one or two vehicles for the left-turn movement. The eastbound SR 160 approach does have considerable storage in a dedicated left-turn lane, however no right-turn lane exists for the westbound approach. The southbound approach does have an acceleration lane provided.

Safety

The intersection has received a total of 19 collision reports leading to 8 angle collisions and 5 opposing left collisions where 15 of which occurred during the daylight and 2 of which occurring during nighttime. All collision reports during the 6-year period have resulted in 13 property damage collisions, 5 injury collisions, and 1 fatal collision. Correspondingly, the crash rate significantly above the statewide average, more than doubling the critical rate.

SR 160 & US 25E NB RAMP

Geometry

This intersection is a four-leg intersection, although the south approach is a shared drive with minimal traffic. Left-turn lanes exist on the eastbound and westbound approaches of SR 160. The north and south approaches are single-lane approaches, but the north approach, from the northbound US 25E off-ramp, does have a large-radius channelized right-turn movement, which provides separated storage for several left-turning vehicles.

Safety

This intersection has experienced a wide array of collision reports, totaling 25. These collisions feature 9 angle collisions, 6 single vehicle collisions, 5 opposing left collisions, and 4 rear-end collisions where 16 of which occurred during the daylight and 9 occurred during nighttime. Of these collisions, 12 have resulted in property damage, 3 possible injuries, and 10 injuries. This has resulted in a crash rate significantly above the statewide average, tripling the critical rate.

SR 160 & WILSON HALE RD

Geometry

At this location, SR 160 is generally oriented north-to-south. Wilson Hale Road approaches from the west, with a left-turn lane existing for northbound SR 160 traffic. A large median opening provides opportunity for two-stage left-turn movements from Wilson Hale Road.

Safety

During the 6-year study period, Wilson Hale Rd has received 1 rear-end collision report that resulted in property damage. This has resulted in a crash rate below the statewide average.

SR 160 & BETHEL RD/LOWLAND PIKE

Geometry

Bethel Road and Lowland Pike form an offset intersection with SR 160. Bethel Road intersects from the north, approximately 250 feet west of Lowland Pike, which intersects from the south. Both intersections are single-lane approaches from the side street, with left-turn lanes provided from SR 160. However, no right-turn lanes are existing.

Safety

These intersections have received a total of 6 collision reports combined, all occurring westbound SR 160. Of these reports, there have been 2 angle collisions, 2 single vehicle collisions, 1 read-end collision, and 1 sideswipe (same) reported with all but 1 collision resulting in property damage. The crash rate at these intersections remain above the statewide average.

SR 160 & US 113/SPRINGVALE RD

Geometry

SR 160 is oriented north-to-south at this four-legged intersection. Springvale Road approaches with a single lane from the east and west. Left-turn lanes exist in both directions, along SR 160. Springvale Road proceeds roughly parallel to Interstate 81 in this vicinity, providing an alternative route, in case of emergency. Springvale Road also connects to Tornado Trail, which serves as access to Union Heights Elementary School for student pick-up and drop-off.

Safety

The majority of the 16 total collision reports during the 6

-year period were primarily the result of 9 angle collision reports. Of these cases, the large majority of collisions (10) were related to property damage. The crash rate of the intersection is significantly above the statewide average, more than doubling the critical rate.

SR 160 & COBBLE LN

Geometry

Cobble Lane intersects SR 160 from the north and south, at a four-leg intersection. Left-turn lanes from SR 160 exist in both directions.

Safety

A total of 16 collisions have been reported at this intersection, resulting in a crash rate significantly above the statewide average, nearly tripling the critical rate. The majority of these collisions can be accounted for by the 11 angle collisions with 12 of these reports resulting in property damage.

SR 160 & I-81 SB RAMP

Geometry

The southbound ramps of Interstate 81 intersect SR 160 at the west portion of this diamond interchange. The I-81 off-ramp is a single lane approach. A left-turn lane is existing for westbound left-turns from SR 160 to the I-81 on-ramp. No other dedicated turn lanes exist.

Safety

Rear-end collisions are the predominant accident pattern, with most resulting in property damage. A total of 16 collisions have been recorded, with rear-end collisions accounting for 8 of these collisions, and angle/single vehicle collisions representing 6. In terms of severity, all but 2 injury reports resulted in property damage. Moreover, this intersection experiences a crash rate significantly above the statewide average, nearly tripling the critical rate.

SR 160 & I-81 NB RAMP

Geometry

Immediately to the southeast of the I-81 southbound ramps intersection, the northbound ramps intersect in a similar fashion. A left-turn lane from southbound SR 160 to northbound I-81 exists, but no other turn lanes are present.

Safety

The primary accident pattern observed at the intersection is angle collisions followed by rear-end collisions, with property damage being the most common outcome. Out of the 11 reported collisions, 5 were angle collisions and 2 were rear-end collisions. These incidents resulted in 5 cases of property damage, 3 possible injuries, 2 injuries, and 1 fatal collision. Correspondingly, the crash rate at the intersection is significantly above the statewide average, more than doubling the critical rate.

SR 160 & OLD LOWLAND RD/MCCLISTER RD

Geometry

McClister Road and Old Lowland Road intersect SR 160 at a four-leg intersection. Left-turn lanes from each direction of SR 160 are existing, as well as a channelized right-turn without a dedicated turn lane from southbound SR 160. Both side street approaches are a single lane.

Safety

This is the only intersection within the corridor to not receive a collision report within the 6-year period.

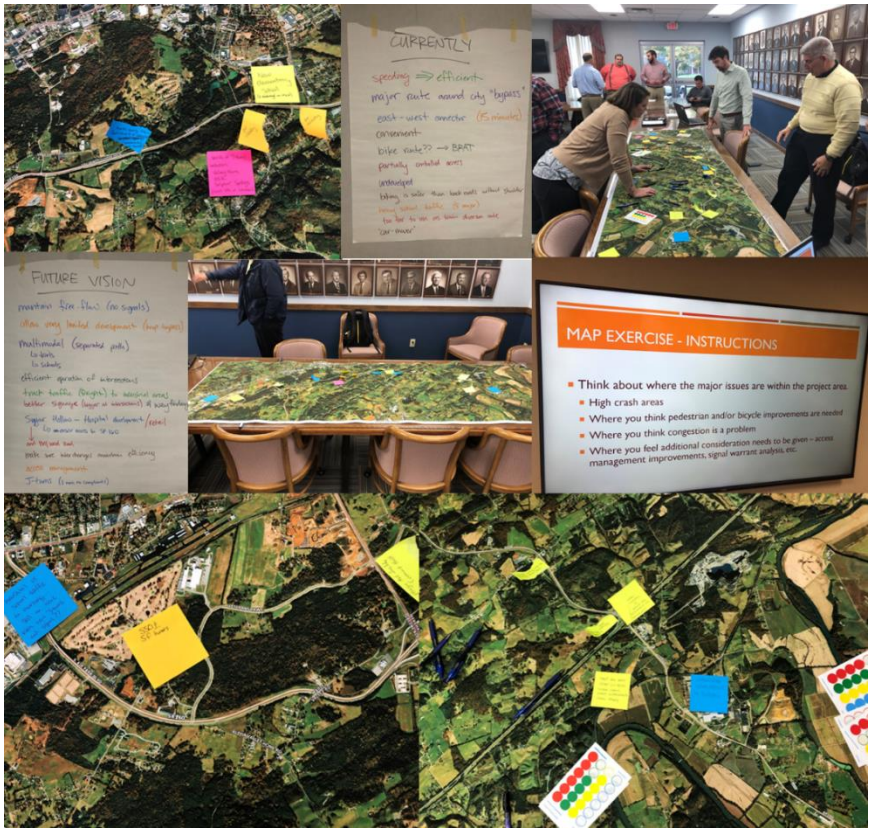
3 PUBLIC ENGAGEMENT

Public engagement in the study process is essential for the project team to understand and analyze existing conditions based on perception by the users. Ideally, such feedback would constitute a long-term feedback loop in which issues raised by the public are addressed, evaluated for real and perceived effectiveness, and modifications implemented. Throughout the study, the project team solicited feedback from a steering committee consisting of members from the Lakeway Area Metropolitan Transportation Planning Organization (LAMTPO), the City of Morristown, and the Tennessee Department of Transportation. Representatives from the city included members of the Chamber of Commerce, city staff, and elected officials. Hamblen County was also represented with the County Mayor. Residents and officials are in the best position to provide information and insights as they live and work in the area and travel the corridor every day. Steering committee meetings were utilized to solicit feedback from local policy makers and stakeholders and to ensure the study would result in useful outcomes. The general public were engaged through public meetings and an online survey.

3.1 Steering Committee Meetings

The project team conducted six meetings with the steering committee. Members of the steering committee were vital in providing technical expertise, information, and understanding of local conditions which may not be evident from data collection and visual observation. The meeting minutes from all of the stakeholder engagement meetings are provided in Appendix B. The kick-off meeting was held in-person while subsequent meetings were virtual.

October 18, 2022 (In-person) – The initial kick-off meeting was held at the Morristown Chamber of Commerce in which the project scope and schedule were reviewed. The project team conducted keyword and mapping exercises with the steering committee.



December 8, 2022 (Virtual) – The project team discussed components of a public survey and refined its approach with the steering committee.

February 7, 2023 (Virtual) – Discussed the schedule for the public survey and reviewed crash data and traffic volumes.

April 24, 2023 (Virtual) – Reviewed the results of the public survey and began reviewing intersection issues and potential improvements to mitigate.

June 30, 2023 (Virtual) – Reviewed recommendations and public meeting materials.

August 3, 2023 (In-person) – Review of final recommendations and cost benefit analysis with LAMTPO Technical Advisory Committee

3.2 Public Survey

The public survey was generated using MetroQuest studio and available beginning February 13, 2023, through March 10, 2023. The survey was advertised on the LAMTPO, City of Morristown, Nextdoor, LinkedIn, and social media websites. A press release was sent to the local paper, the Citizen Tribune. Flyers were distributed by LAMTPO staff.

The survey received 1,308 visitors of which 632 participated. It asked participants to comment and respond on areas where they felt improvements should be made as well as leave general comments. To ascertain public values for improving the corridor, a ranking exercise was included which asked respondents to prioritize categories of improvements. Safety was identified as the top priority by a wide margin followed by congestion relief and access.

Respondents were also presented a map with the ability to place markers on locations where they felt improvements were needed. The markers were categorized by the type of improvement. Respondents were also asked specific questions regarding the future of the corridor in four areas: access management, future development, bike facilities, and safety measures. Additionally, respondents identified access management, traffic operations, and lighting as priorities in which the city should invest.

A detailed summary of the survey responses is included in the April 24, 2023, stakeholder meeting minutes provided in Appendix B.

3.3 Public Meetings

Two public meetings were held to solicit feedback and allow the public to speak directly with the project team.

May 15, 2023 – The first meeting was held at Living Promise Lutheran Church at 5075 Dearing Road. The meeting site is located off an intersecting road within the study area and across from a residential development under construction. The project team reviewed the purpose of the project and identified the initial improvement recommendations. Results of the public survey were also presented. Attendees were encouraged to provide comments on the visual aids to help the project team understand how the public perceived the recommendations.

July 6, 2023 – The second meeting was a joint meeting with the LAMTPO Technical Advisory Committee at the Morristown City Center building at 100 W. 1st N. Street. The public portion of the meeting followed the steering committee's discussion of the project. The project team reviewed recommendations and provided maps on which the public could comment.

4 EVALUATION AND ANALYSIS

The project team evaluated the SR 160 corridor based on performance metrics and safety. Traffic volume counts were conducted to gather data on vehicular movements at roadway segments and signalized intersections. Volume data provides insights into traffic patterns, intersection capacity, and assists in evaluating the effectiveness of existing signal timing plans. The volume counts are provided in Appendix C and summarized in Figure 4-1. This section details the methods and results of that analysis.

4.1 Intersection Level of Service

Several major routes intersect with SR 160 within the study boundaries. These locations present capacity concerns in make cases, with high-volume movements in conflict with each other. Level of service analysis was performed using the methodology of the *Highway Capacity Manual 6th Edition* for the existing year 2022, a 5-year future Year 2027, and a 25-year horizon Year 2047.

Appendix D contains the results of all Synchro analysis for all unsignalized intersections within the corridor for the mentioned time periods. The following sections highlight some key areas of concern.

TABLE 4-1. HCM LOS FOR UNSIGNALIZED INTERSECTIONS

Level of Service	Average Control Delay (Sec/Veh)	Description
A	0-10	Free Flow
B	>10-15	Stable Flow (Slight Delays)
C	>15-25	Stable Flow (Acceptable Delays)
D	>25-35	Approaching Unstable Flow
E	>35-50	Unstable Flow
F	>50	Forced Flow (Congested and Queues Fail to Clear)

OLD HIGHWAY 11E / ASTOR ROAD

Vehicles turning left from SR 160 to Old US 11E and vehicles turning left from Old Highway 11E to SR 160 represent the heaviest turning volumes at this intersection. These two movements conflict, with westbound left-turning vehicles on Old Highway 11E required to yield to southbound left-turning vehicles. This movement is currently a LOS F in the AM peak. During the PM peak, the side street left-turn is currently a LOS C, but is projected to reach a LOS E by 2047. The single-lane approach of Astor Road is projected to worsen from the existing LOS C to a LOS E in the year 2047. Though the average delay for this approach is high, it applies to only a handful of vehicles in each peak period.

COMMERCE BOULEVARD

The only interrupted movement at this intersection is the northbound left-turn from SR 160 onto Commerce Boulevard. This movement currently operates at LOS B during the AM peak but is projected to reach a LOS F by 2047.

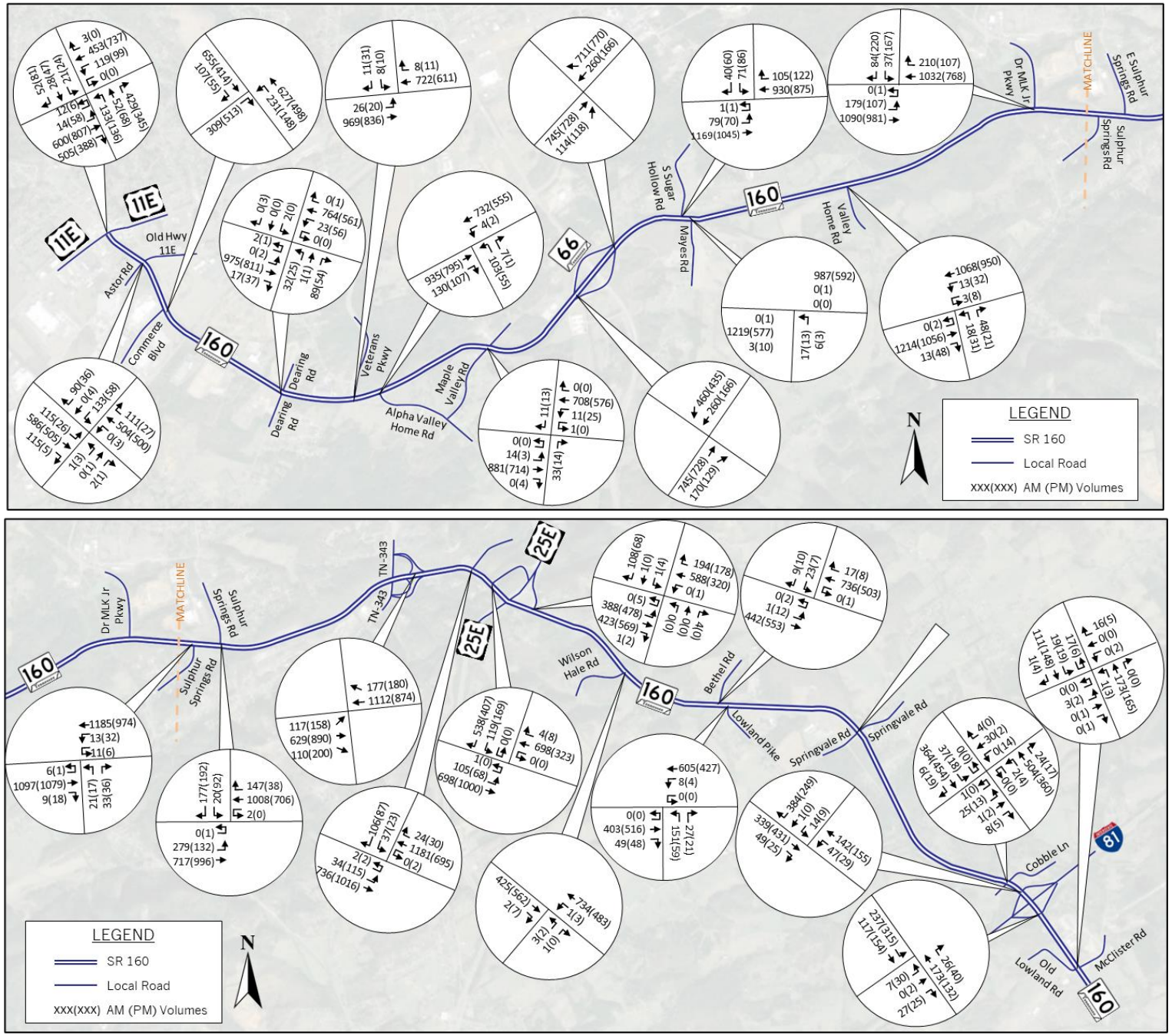


FIGURE 4-1. 2022 TRAFFIC VOLUMES WITHIN SR 160 STUDY AREA

DEARING ROAD

Northbound left-turns from Dearing Road onto westbound / northbound SR 160 are operating at a LOS E during both peaks in the existing period. These are projected to reach LOS F by 2047. The southbound Dearing Road approach is also projected to reach a LOS F by 2047, however this applies to a very small volume.

ALPHA VALLEY HOME ROAD

The northbound left-turn from Alpha Valley Road onto SR 160 currently operates at a LOS D during both peak hours and is projected to reach LOS F by 2047.

SUGAR HOLLOW ROAD / MAYES ROAD

The intersections between SR 160 and the two side roads Sugar Hollow Road and Mayes Road operate as a single, offset intersection. Both side roads are single-lane approaches. The Sugar Hollow Road approach already operates at a LOS F for both peak periods. Mayes Road operates at LOS D and C for the AM and PM peaks, respectively. Both these are projected to worsen to a LOS F by 2047.

VALLEY HOME ROAD

The northbound left-turn movement from Valley Home Road currently operates at LOS D for both peak periods and is projected to reach LOS F by 2047.

DR MLK JR PARKWAY

The left-turn movement from Dr Martin Luther King Jr Parkway onto SR 160 currently operates at LOS F during both peak periods. The left-turn from SR 160 and the southbound right-turn onto SR 160 both experience no worse than a LOS C. However, all three turn lanes are projected to reach LOS F in 2047 for at least one peak.

SULPHUR SPRINGS ROAD

This intersection is offset, with the northbound approach intersecting to the west of the southbound approach. The left and right-turn shared lane from northbound Sulphur Springs Road currently operates at LOS C in both peak periods and is projected to reach LOS F by 2047. The westbound left-turn from SR 160 is currently a LOS C in the AM but is projected to reach LOS F by 2047.

The single-lane, southbound Sulphur Springs Road approach already operates at LOS F. The eastbound left-turn from SR 160 is projected to increase from LOS C in the current year to LOS F by the year 2047.

FISH HATCHERY ROAD

The single-lane approach from Fish Hatchery Road currently operates at a LOS E in the AM peak but is projected to reach LOS F within 5 years.

US 25E SOUTHBOUND RAMPS

The southbound offramp approach is already operating at a LOS F during both the AM and PM peak. The eastbound left-turn is projected to remain satisfactory.

US 25E NORTHBOUND RAMPS

The southbound left-turn operates at a LOS F, although this is a low volume movement. If it queues beyond the available storage, it could restrict the adjacent right-turn movement, which is much heavier.

LOWLAND PIKE

The side road approach is a single shared left and right-turn lane. It operates at a LOS C but is projected to increase to LOS F and E in 2047, for the AM and PM peaks, respectively.

SPRINGVALE ROAD

The southbound Springvale Road approach has a LOS F for existing volumes in the AM peak. All other movements are projected to maintain satisfactory LOS over the analysis period.

I-81 W MERGE AND DIVERGE

This single-lane off-ramp approach is projected to worsen from the existing LOS C in the PM peak to a LOS F in 2047.

4.2 Auxiliary Lanes

Guidance for determining when turn lanes are appropriate along Tennessee State Routes can be found in TDOT's Highway System Access Manual (HSAM), which refers to American Association of State Highway and Transportation Officials (AASHTO) standards. Left-turn lanes are existing on SR 160 at most of the study intersections. Right-turn lanes are only present at a limited number of intersections. The project team has evaluated each location against existing traffic conditions to determine if the turn lanes provided are adequate.

4.2.1 LEFT-TURN LANES

Addition of left-turn lanes is warranted by AASHTO based on the volume of the left-turn movement versus the conflicting, opposite thru movement. The specific criteria are shown in Figure 4-2.

Existing left-turn lanes are present for each turning movement that is warranted along the corridor. The only left-turn movement from the major road that does not have an existing left-turn lane is the northbound left-turn from SR 160 onto Astor Road, at the Old Highway 11E intersection. Astor Road is a no-outlet roadway that never served more than 3 vehicles on this left-turn movement in any peak period. Minimal opportunity exists for further development or future connections to be made from Astor Road, so the likelihood of this left-turn movement meeting warrants in the future is low.

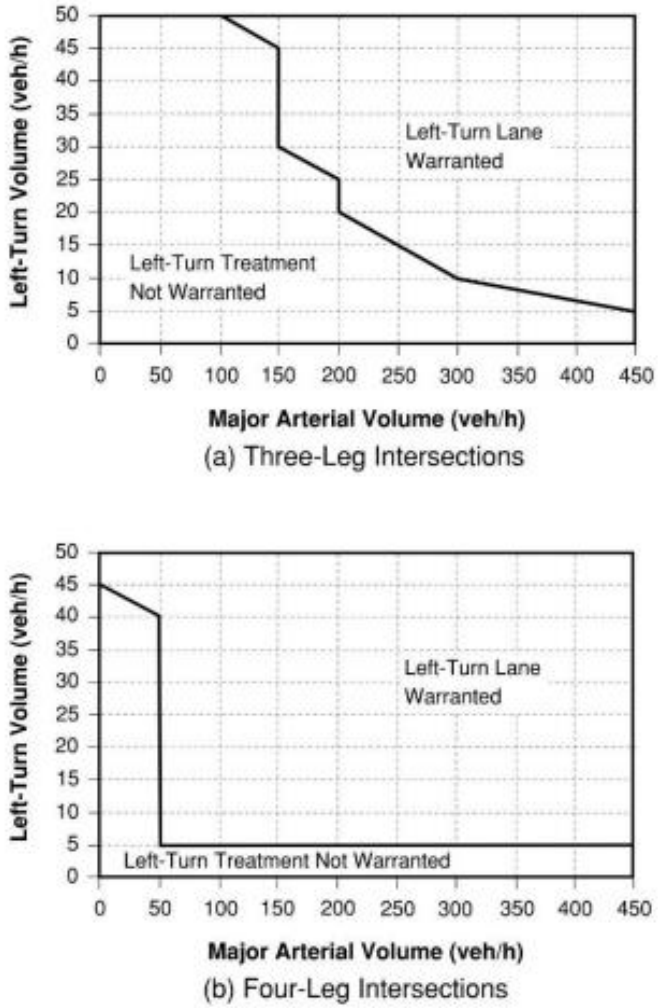


FIGURE 4-2 AASHTO LEFT-TURN LANE WARRANT FOR URBAN AND SUBURBAN ARTERIALS

4.2.2 Right-Turn Lanes

The criteria used to evaluate the need for a right-turn lane is based on thru volume and right-turn volume of the major road, as well as the speed of traffic. This relationship is shown in Figure 4-3.

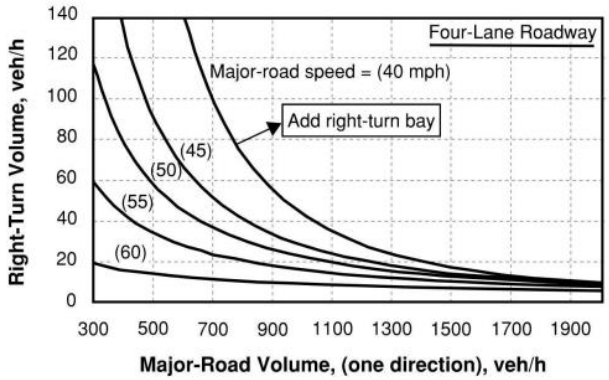


Figure 4-3 AASHTO Right-Turn Lane Warrant Along Four-Lane Roadway

Right-turn lanes exist on SR 160 at several intersections, including: US 11E, Commerce Boulevard, Veterans Parkway, Alpha Valley Home Road, Doctor MLK Jr Parkway, and Sulphur Springs Rd (both directions). The addition of a right-turn lane is warranted for the following movements:

- Old Highway 11E northbound right-turn
- Sugar Hollow Road westbound / northbound right-turn
- Valley Home Road eastbound / southbound right-turn
- Fish Hatchery Road westbound / northbound right-turn
- US 25 E northbound ramps westbound / northbound right-turn
- Bethel Road westbound / northbound right-turn
- Lowland Pike eastbound / southbound right-turn
- Springvale Road right-turns both directions
- Cobble Lane westbound / northbound right-turn

4.2.3 Acceleration & Deceleration Lanes

Acceleration and deceleration lanes help to separate high-speed thru vehicles from lower speed turning traffic at intersections. Turn lanes can serve as deceleration lanes if adequate length is provided. The minimum deceleration distance required for a 55 mile per hour roadway is 505 feet, according to AASHTO and TDOT design criteria. The required distance for 50 mile per hour traffic is 415 feet. The desirable turn lane length may exceed this number if additional length is needed for storage. Determination of total desirable lane length is based on the likelihood of encountering queued traffic in the turn lane, which is highlighted in Table 4-2.

Table 4-2 Queue Storage Length for Left-Turn Lanes

Left-Turn Volume (veh/h)	Storage Length (ft)				
	Opposing Volume (veh/h)				
	200	400	600	800	1,000
40	50	50	50	50	50
60	50	50	50	50	50
80	50	50	50	50	75
100	50	50	50	75	75
120	50	50	75	75	100
140	50	50	75	100	125
160	50	75	75	100	150
180	50	75	75	125	150
200	50	75	100	125	200
220	75	75	100	150	225
240	75	75	125	150	275
260	75	100	125	175	325
280	75	100	125	200	400
300	75	100	150	225	525

Even where warranted turn-lanes are existing, many could provide better separation of movements if their lengths are increased to satisfy needs for both vehicle storage and deceleration. Table 4-3 compares existing turn lane lengths with those recommended by TDOT and AASHTO design guidelines.

TABLE 4-3 EVALUATION OF EXISTING LEFT-TURN LANE DESIGN AGAINST AASHTO GUIDELINES

Cross Street	Direction	Req'd Storage Length (ft)	Req'd Decel Length (ft)	Req'd Total Length (ft)	Actual Length (ft)
US 11E	NB	75	505	580	510
Old Hwy 11E	SB	75	505	580	345
Commerce Blvd	NB	0	505	505	325
Dearing Road	NB	50	505	555	160
	SB	0	505	505	155
Veterans Pkwy	SB	50	505	555	470
Alpha Valley Home Rd	NB	0	505	505	405
Maple Valley Rd	NB	50	505	555	440
	SB	0	505	505	345
Sugar Hollow Rd	SB	75	505	580	250
Mayes Rd	NB	0	505	505	250
Valley Home Rd	NB	50	505	555	350
Dr MLK Jr Pkwy	SB	150	505	655	310
Sulphur Springs Rd	NB	50	505	555	400
	SB	400	505	905	660
Fish Hatchery Rd	SB	75	505	580	200
US 25E SB Ramps	SB	50	415	465	330
US 25E NB Ramps	NB	0	0	0	285
	SB	150	505	655	355
Wilson Hale Rd	NB	0	505	505	520
Bethel Rd	SB	0	505	505	730
Lowland Pike	NB	0	505	505	495
Springvale Rd	NB	0	505	505	720
	SB	50	505	555	805
Cobble Lane	NB	50	505	555	195
	SB	50	505	555	875
Interstate 81	NB	50	505	555	255
	SB	75	505	580	220
McClister Rd	NB	0	505	505	225
	SB	0	505	505	225

5 RECOMMENDATIONS

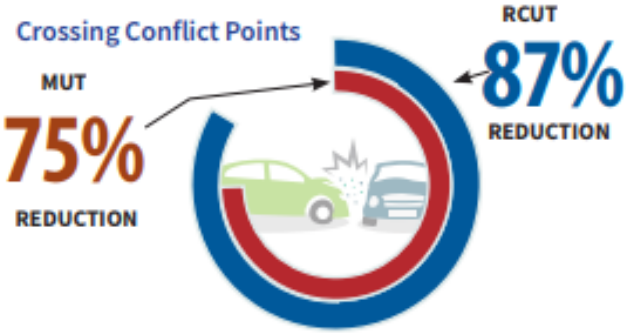
The following sections describe the recommendations that were developed based on data collection, existing conditions assessments, discussions with the steering committee, and comments received from the public engagement efforts. These recommendations are designed to address the identified challenges presented in the Existing Conditions and provide solutions to make the corridor safer.

Each recommendation includes a high-level planning cost that does not account for utility relocations or right-of-way acquisition. The costs were calculated using TDOT's Cost Estimate Tool, which is based on average unit prices from TDOT 2021 bids, and then inflated to 2023 dollars. Quantities were determined from the concept drawings presented in the subsequent sections and should be refined during the detailed design phase. The cost estimate worksheets are provided in Appendix E.

5.1 Reduced Left-Turn Conflict Intersections

Many of the improvements provided in the recommendations consist of reduced left-turn conflict intersections or variations thereof. These Federal Highway Administration (FHWA) approved countermeasures are proven to reduce the occurrence of crashes by reducing the number of conflict points at an intersection and also minimize the potential for head on and angle crashes.

Two commonly used reduced left-turn conflict intersections that utilize U-turns in lieu of certain left-turn movements are the Restricted Crossing U-turn (RCUT) and the Median U-turn (MUT).



The RCUT is often referred to as a J-Turn or Superstreet. This configuration maintains the left-turn movement from the major road onto the minor road but prohibits left-turn movements from the side street. Vehicles from the side street must instead make a right turn and then a U-turn at a designated location downstream. The implementation of the RCUT design has been proven to reduce the number of crashes at an intersection while also improving the overall roadway operations, especially during the peak periods. RCUTs are particularly effective when used consistently along a corridor; however, they work well as individual intersections also.

The MUT is often referred to as a Michigan Left. This configuration restricts the left-turn movements at the intersection. Instead of turning left at the main intersection, vehicles proceed through and make a U-turn downstream. From the side road, vehicles turn right and then make a U-turn at the designated location downstream. A partial MUT is where direct lefts are permitted from the side street.

OLD HIGHWAY 11E

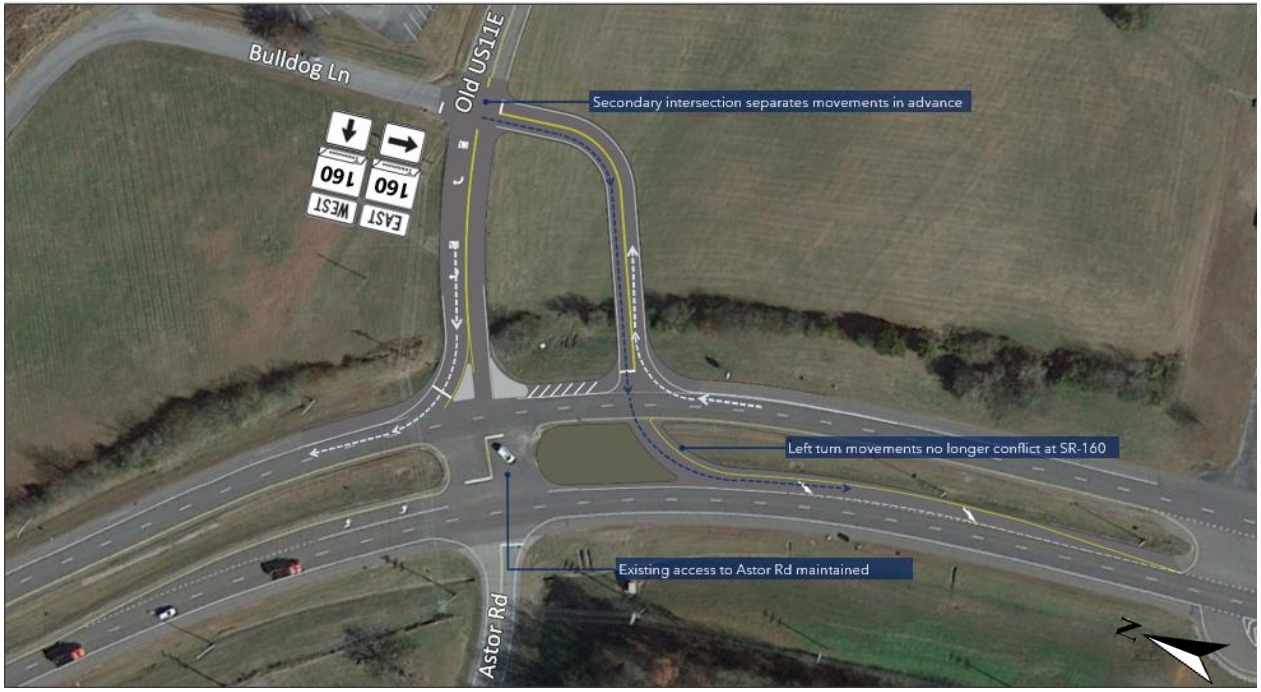
The main issue at the intersection of Old Highway 11E and SR 160 are the conflicting southbound (from SR 160) and westbound (from Old Highway 11E) left-turn movements. Currently, the westbound left-turns yield to the southbound left-turns, resulting in LOS F during the existing AM peak hour for the westbound approach. The recommendation at the Old Highway 11E intersection with SR 160 is a variation of a quadrant roadway, which displaces the left-turn movements from Old Highway 11E to a new alignment south of the existing intersection with SR 160.

TABLE 5-1: OLD HIGHWAY 11E LOS SUMMARY

Movement	Peak Hour	Year	Without Improvement			With Improvement		
			v/c	Delay	LOS	v/c	Delay	LOS
WB Left	AM	2022	1.00	118.0	F	0.50	29.0	D
		2027	1.39	266.0	F	0.66	43.6	E
		2047	2.99	996.6	F	1.24	201.6	F
	PM	2022	0.28	20.3	C	0.22	19.7	C
		2027	0.31	22.0	C	0.23	21.1	C
		2047	0.61	45.2	E	0.49	41.7	E

Table 5-1 summarizes the level of service for the westbound movement with and without the proposed improvement. The left-turn movement on the new alignment results in LOS D during the existing AM peak hour. In the future condition, the improvement is proposed to operate at LOS E in 2027 and LOS F in 2047 during the AM peak hour. Compared to the existing configuration, this is a considerable improvement during the AM peak hour as the delay is proposed to be ¼ of the 2047 delay without the realignment. The PM peak hour shows approximately the same operations with and without the improvement.

Cost Estimate: $358,000



ALPHA VALLEY HOME ROAD

The Alpha Valley Home Road intersection shows a significantly high crash rate, most of which are angle crashes. The intersection experiences a considerable amount of cut-through traffic from SR 66 to SR 160, resulting in a heavy left-turn volume onto SR 160. In addition to the cut-through traffic, the vehicles that turned left from Maple Valley Road prior to that intersection being converted to an RCUT also use Alpha Valley Home Road to head northbound/westbound on SR 160. The heavy left-turn traffic is in direct conflict with the heavy eastbound SR 160 volumes.

Two alternatives are proposed at the intersection that aim to reduce the conflicts for the left-turn movement from Alpha Valley Home Road onto SR 160.

Alternative One recommends prohibiting left-turns from SR 160 onto Alpha Valley Home Road while permitting the left-turn movement from Alpha Valley Home Road onto SR 160. Vehicles that currently turn left onto Alpha Valley Home Road would turn left at the Maple Valley Road intersection, which is an RCUT intersection.

Alternative Two recommends restricting left-turns onto and out of Alpha Valley Home Road. Vehicles wishing to turn left onto SR 160 would turn right and make a U-turn at a new downstream location.

Cost Estimate (Alternative 1): $31,600

Cost Estimate (Alternative 2): $326,000

SUGAR HOLLOW ROAD / MAYES ROAD

Three alternatives are proposed as recommendations for the Sugar Hollow Road and Mayes Road offset intersection to alleviate the existing delays and safety concerns.

The **first alternative** is a low-cost short-term solution aimed at reducing the high occurrence of angle crashes at the Sugar Hollow Road median opening. The proposed recommendation is to close the existing median opening and prohibit left-turns to and from Sugar Hollow Road. Southbound vehicles on Sugar Hollow Road would instead turn right onto SR 160 and use the SR 66 interchange to head southbound/eastbound on SR 160. Eastbound vehicles on SR 160 would also use the SR 66 interchange to either travel along SR 66 to US 11E or to Veterans Parkway to access Maple Valley Road and Sugar Hollow Road.

Cost Estimate (Alternative 1): $57,200

The **second alternative** proposes an offset RCUT intersection to allow left-turns from SR 160 onto Sugar Hollow Road and Mayes Road. A U-turn would be provided downstream for northbound vehicles on Mayes Road to head northbound/westbound on SR 160.

Cost Estimate (Alternative 2): $282,000

The **third alternative** consists of closing the median opening at Mayes Road and only allowing left-turns out of Sugar Hollow Road onto SR 160 eastbound. A U-turn would be provided downstream for northbound vehicles on Mayes Road to head northbound/westbound on SR 160. Westbound vehicles along SR 160 would use the SR 66 interchange as a U-turn to access Mayes Road. Eastbound vehicles along SR 160 would use the provided U-turn location downstream from Mayes Road to access Sugar Hollow Road.

Cost Estimate (Alternative 3): $453,000

DR MLK JR PARKWAY

The Dr. MLK Jr Parkway intersection is the highest priority for the City of Morristown due to the high rate of crashes experienced at this location and the opening of a new school in the near future. As part of the public survey, this location had, by far, the highest number of public comments, particularly related to safety concerns.

The **short-term** recommendation for this intersection is to restrict left-turns onto SR 160 and provide a downstream U-turn location. This configuration would help to alleviate confusion within the median opening for conflicting movements.

Cost Estimate: $469,000

Three **intermediate** alternatives were developed for the section of SR 160 between Dr. MLK Jr Parkway and Sulphur Springs Road. Each of these recommendations is designed to offer a longer-term solution for the anticipated increase in school-related traffic along Dr. MLK Jr Parkway compared to the short-term option above. Nevertheless, the traffic analysis shows that if traffic continues to grow at the current pace, these intermediate solutions may not adequately meet the long-term demand (over 20 years).

The primary objective of these intermediate alternatives is to separate left-turn movements onto and from SR 160. Additionally, each alternative aims to increase the storage capacity for queueing and the acceleration lanes for merging traffic.

ALTERNATIVE 1

The first alternative consists of a connector road between Dr. MLK Jr Parkway and Sulphur Springs Road. The purpose of the connector road is to create a parallel route that would remove local traffic from SR 160. This option proposes to shift the Dr. MLK Jr Parkway intersection to the east, allowing more storage for vehicles queueing along SR 160 to turn left. Left turns from Dr. MLK Jr Parkway onto SR 160 would be prohibited; instead, vehicles would turn right onto SR 160 and make a U-turn downstream (as presented in the short-term solution for the Dr. MLK Jr Parkway intersection). Two opportunities are provided for eastbound vehicles on SR 160 to turn left to access Dr. MLK Jr Parkway and Sulphur Springs Road: the left-turn lane at Dr. MLK Jr Parkway or the J-turn provided east of Sulphur Springs Road. Southbound vehicles on Sulphur Springs Road would be permitted to turn left onto SR 160. Southbound vehicles on Dr. MLK Jr Parkway would either turn right onto SR 160 and use the U-turn or utilize the new connector road to make the direct left from Sulphur Springs Road. The connector road is proposed to include a shared-use path on one side and a sidewalk on the other.

Cost Estimate: $4,230,000

PROS	CONS
Additional storage for left turn lane at Dr. MLK Jr Parkway	1 direct left-turn location from SR 160 (Dr. MLK Jr Parkway)
Ability to build off short-term improvement (J-turn)	1 direct left-turn location onto SR 160 (Sulphur Springs Road)
Sets up a parallel network to SR 160	All cost for the collector road is responsibility of locals
Potential for multimodal facilities	Not a viable option after 20 years
Potential for economic development opportunities along connector road	Potential conflicts with south school entrance on Dr. MLK Jr Parkway
Potential for school drive onto connector road	

ALTERNATIVE 2

The second alternative proposes to realign the westbound SR 160 lanes to the north, creating more storage space between the eastbound and westbound lanes for vehicles turning onto and from Dr. MLK Jr Parkway and Sulphur Springs Road. Vehicles heading eastbound from Dr. MLK Jr Parkway would be able to make a direct left turn at the existing intersection location and be provided an acceleration lane to merge onto SR 160. Left-turning vehicles from SR 160 onto Sulphur Springs Road would use the storage lane provided within the SR 160 median and proceed straight, which those heading for Dr. MLK Jr Parkway would turn left.

Cost Estimate: $10,400,000

PROS	CONS
Majority of cost would be TDOT responsibility	1 direct left-turn location from SR 160 (Sulphur Springs Road)
Dr. MLK Jr Parkway does not need to be realigned	1 direct left-turn location onto SR 160 (Dr. MLK Jr Parkway)
Does not conflict with school entrances on Dr. MLK Jr Parkway	Must travel on SR 160 if heading eastbound from Sulphur Springs Road
Provides direct left turn from Dr. MLK Jr Parkway for large trucks	Not a viable option after 20 years
	Significant undevelopable Right-of-Way acquisition

ALTERNATIVE 3

The third alternative builds upon the first alternative, maintaining the idea of the connector road and shifting the Dr. MLK Jr Parkway intersection to the east. The major difference between the third alternative and the first alternative is the addition of a new road midway between Dr. MLK Jr Parkway and Sulphur Springs Road. The new road introduces a secondary location to make direct left-turns from SR 160. This alternative also includes multiple U-turn opportunities along SR 160 and several conceptual roundabouts along the connector road. This recommendation is intended to depict the most robust configuration, allowing the maximum amount of access and free-flowing movements as possible. In reality, the City may opt for a hybrid of Alternatives 1 and 3.

Cost Estimate: $6,110,000

PROS	CONS
Multiple left-turn opportunities onto and from SR 160	Potential for weaving issues between acceleration lanes and U-turns
Additional storage for left turn lane at Dr. MLK Jr Parkway	Not a viable option after 20 years
Roundabouts allow for free-flow movements during school peaks to help prevent spillback onto SR 160	Improvements on SR 160 could be funded by TDOT, but connector road would be responsibility of locals
Potential for economic development opportunities along connector road	Potential conflicts with south school entrance on Dr. MLK Jr Parkway
Able to build off short-term improvement (J-turn)	
Sets up a parallel network to SR 160	
Potential for multimodal facilities	

SULPHUR SPRINGS ROAD

This location also received an extremely high number of comments in the public survey. The intersection is highly congested, especially in the AM peak hour due to school-bound traffic. There are also concerns with a vertical curve that obscures the sight distance coupled with westbound vehicles on SR 160 traveling at high speeds. Many drivers traveling southbound on Sulphur Springs Road currently turn right and make a U-turn instead of making a direct left onto SR 160. The recommendation at the offset Sulphur Springs Road intersection is to formalize an RCUT intersection to eliminate the conflicting left-turns onto and from Sulphur Springs Road.

Cost Estimative: $51,000

SPRINGVALE ROAD

Unlike other intersections along SR 160, both Springvale Road approaches converge at a single, four-legged intersection. There are many vehicles that go through on Springvale Road and attempt to do so in one uninterrupted movement. The through movements also conflict with the high southbound SR 160 left-turn movements onto Springvale Road. Therefore, the recommendation at Springvale Road is to implement an RCUT intersection.

Because Springvale Road is an alternative route to Interstate-81 during emergency closures, it is recommended that the median island for the RCUT is mountable to prevent large volumes of U-turns on SR 160 when the interstate is closed.

Cost Estimate: $487,000

5.2 Turn Lanes

Turn lanes along the major roadway can benefit operation and safety by separating slowing and stopped traffic from higher-speed thru traffic. The following locations would benefit from the addition or modification of turn lanes:

OLD HIGHWAY 11E

The observed existing northbound peak-hour right-turn volume from SR 160 onto Old Highway 11E was 111 vehicles per hour. Westbound right-turn volume onto northbound SR 160 was 90 vehicles per hour. A right-turn lane for each of these movements is recommended whether the more significant realignment recommendation is constructed or the existing configuration remains. The existing left-turn lane from southbound SR 160 to Old Highway 11E is approximately 375 feet in length. If this intersection is reconstructed, it is recommended that it be lengthened to 605 feet.

Cost Estimate: included in intersection cost estimate

SUGAR HOLLOW ROAD

The westbound/northbound SR 160 approach services existing peak hour volume of over 1,000 vehicles per hour, including 122 right-turning vehicles. Each of the alternatives at this location includes a westbound/northbound deceleration lane 605 feet in length to turn right onto Sugar Hollow Road.

Cost Estimate: included in intersection cost estimate

VALLEY HOME ROAD

Eastbound/southbound SR 160 traffic during the PM-peak period was observed to be 1,106 vehicles per hour, with 48 right-turning vehicles. A right-turn lane of 555 feet in length is recommended for this movements.

Cost Estimate: NEED

FISH HATCHERY ROAD

It is recommended to add a right-turn lane along the Fish Hatchery Road approach to help improve the level of service at the intersection. A westbound/northbound right-turn lane onto Fish Hatchery Road is also proposed at the intersection. Due to the proximity to the southbound US 25E off-ramp, which has an existing acceleration lane for the right-turn movement onto SR 160 westbound, this lane should be extended to the Fish Hatchery Road intersection. The new lane would function as a weave between the two movements. This would reduce rear-end conflicts between off-ramp traffic focused on merging and traffic ahead slowing down to prepare for the right turn onto Fish Hatchery Road.

Cost Estimate: $355,000

US 25E RAMPS

A westbound right-turn lane is recommended at the intersection of SR 160 and the US 25E southbound ramps. The existing left-turn lanes for eastbound / southbound SR 160 are 330 feet and 355 feet in length for the southbound and northbound ramps, respectively. It is recommended that the turn-lane onto the southbound ramps be extended to 465 feet and the northbound ramps be extended to 655 feet, to meet AASHTO guidelines.

Cost Estimate: included in intersection cost estimates

BETHEL ROAD

A right-turn lane from westbound / northbound SR 160 onto Bethel Road is recommended. Right-turning volume during the AM peak was 17 vehicles per hour. With projected growth, this will be warranted within 5-years. However, this is a relatively lower priority improvement.

Cost Estimate: $105,000

LOWLAND PIKE

A right-turn lane is recommended from eastbound / southbound SR 160 onto Lowland Pike.

Cost Estimate: $182,000

SPRINGVALE ROAD

Right-turn lanes are recommended in both directions at Springvale Road. They are warranted based on existing volumes.

Cost Estimate: $266,000

COBBLE LANE

A right-turn lane is recommended northbound / westbound, from SR 160 onto Cobble Lane. This improvement is only just above warrant thresholds, but the need is projected to increase in future years. In addition to the right-turn lane onto Cobble Lane, it is recommended that signage at the adjacent driveway be enhanced to help drivers recognize it is a right-in/right-out access.

Cost Estimate: $105,000

5.3 Signalized Intersections

Strong regional preference exists for SR 160 to remain an uninterrupted-flow facility. The project team has kept this in mind while proposing recommendations. However, where it is not realistic to restrict existing movements or otherwise resolve conflicts between major routes, installation of a traffic signal may be a necessary improvement to maintain safe and efficient operations.

US 25E RAMPS – TRADITIONAL SIGNAL

Many of the highest-volume movements at this location are turning movements between SR 160 and the US 25E ramps. A traffic signal which utilizes the existing intersection alignment could provide these conflicting movements with dedicated, protected phases in its cycle. This would interrupt the flow along SR 160 but would reduce the number of angle crashes, which are typically observed to be the highest severity.

Cost Estimate: $1,460,000

US 25E RAMPS – CONTINUOUS GREEN T SIGNAL

This alternative traffic signal design would provide the same safety benefits of the traditional signal, but it would also provide the opportunity for eastbound thru traffic to proceed through the interchange area uninterrupted.

In this design, the eastbound lanes are separated and channelized prior to reaching the first intersection. The southmost (outer) lane proceeds through both intersections and is separated from all other movements with some sort of physical separation, to prevent lane changes. The northmost (inner) lane interacts with both signalized intersections the same as in the traditional design.

Cost Estimate: $2,670,000

5.4 Interchanges

As mentioned above, there is a strong regional preference for SR 160 to remain an uninterrupted-flow facility. The only way to maintain that free-flow character at intersections with major local roadways is to provide grade-separated interchanges that remove conflicting turn movements from the mainline SR 160 traffic. These types of improvements require significant right-of-way acquisition, complex designs, and bridge structures in order to separate the intersecting facilities.Rough order of magnitude cost estimates are provided for the interchange recommendations. Generalizations were made regarding right-of-way costs, earthwork, and materials for structures.

DR MLK JR PARKWAY

The Dr MLK Jr Parkway intersection with SR 160 is Morristown's highest priority because of the very high occurrence of crashes and the future school that will add more traffic in the very near future. Due to the proximity of the Sulphur Springs intersection, any improvement should consider these two roadways as part of a system. The conceptual interchange layout was provided by TDOT and depicts a broad overview of how extensive a potential interchange at this location will be.

Cost Estimate: $45,000,000

US 25E

The existing partial cloverleaf interchange at US 25E is another high priority location for the City of Morristown. According to the public survey comments, there are a multitude of reasons why this intersection should be a focal point: line of sight issues related to the horizontal curvature, heavy conflicting movements, speeding, wrong way incidents due to ramp configurations, difficulty merging, and inadequate storage lengths for left-turn movements.

While the existing interchange provides free-flow movements for the westbound/northbound vehicles on SR 160 entering US 25E, the eastbound/southbound vehicles on SR 160 must cross heavy through movements to enter US 25E. The existing unsignalized intersections experience delays and queue back-ups into the through lane. Free-flow on-ramps for the eastbound/southbound SR 160 traffic are proposed as part of the interchange design.

Cost Estimate: $15,000,000

5.5 Segments

Safety analysis of the corridor indicated potential for some segment improvements to mitigate crashes both at and away from intersections. This section highlights those recommendations.

SPEED ZONE EXTENSION

A short speed limit reduction to 50 miles per hour exists between the southbound US 25E ramps intersection and the SR 343 overpass. Extending the 50 mile per hour speed limit west to some distance beyond the Dr Martin Luther King Jr Parkway intersection would help improve safety and operations at the Sulphur Springs Road and Dr Martin Luther King Jr Parkway intersections.

An RCUT configuration at the offset Sulphur Springs Road intersection would introduce vehicles moving at a rate slower than thru traffic as they weave to the median to execute a U-turn. These vehicles would accelerate from a stop and return to a stop within the 650-foot distance between the two intersections, so they will not reach mainline traffic speeds before decelerating. A reduced speed of thru traffic would make this situation safer.

Gaps in traffic for vehicles turning to and from Dr Martin Luther King Jr Parkway are already limited, contributing to long queues and safety concerns. Even if a left-turn movement is restricted, these conditions will still exist and will only worsen with the addition of traffic from the new school being constructed immediately adjacent to this intersection. Reduced speeds through this area could help to mitigate crash risk and reduce the required gap length for left-turning traffic.

LIGHTING

The crash data was analyzed along the corridor to determine where there were high occurrences of nighttime crashes. Based on this assessment, the following areas were identified as locations that could benefit from lighting:

- Commerce Boulevard (2 poles)
- Dearing Road (4 poles)
- Curve near Maple Valley Road (8 poles)
- Curve west of Dr MLK Jr Parkway (16 poles)
- US 25E Northbound Ramps (8 poles)
- Springvale Road (6 poles)

The number of poles at each location was estimated based on where the nighttime crashes occurred. At the Dearing Road location, most of the crashes occurred at the intersection, so a pole on each corner of the intersection would be sufficient. Within the curve near Maple Valley, crashes occurred within a span of approximately 1,200-feet. The assumption is that poles can be staggered on opposite sides of the roadway and placed approximately 200-feet apart.

The cost of the lighting was estimated as $20,000 per pole, which includes a 45-foot pole, foundation, conduit, wiring, and design costs.

Cost Estimate: $880,000

A possible/short-term alternative to lighting would be delineation and enhanced roadway markings in the locations of the nighttime crashes.

INTERSECTION WARNING SIGNS

Intersection warning signs are a low-cost, short-term improvement that could provide a safety benefit at intersections with particularly high left-turn volumes. These signs should be placed approaching a busy intersection to warn drivers that vehicles will be entering SR 160 when the beacons are flashing. A detector would be placed at the intersection that would activate the flashing beacons when a car is stopped at the side street approach. These signs coupled with a reduction in the speed limit could benefit the Dr MLK Jr Parkway and Sulphur Springs Road intersections.

Cost Estimate: $30,000

6 IMPLEMENTATION PLAN

This study provides several recommendations at key locations to help create a safer corridor that improves the mobility for all users. This section describes how each recommendation was ranked and prioritized to come up with a strategic implementation plan that categorizes projects into short-term (1-3 years), mid-term (3-10 years), and long-term (more than 10 years) timeframes.

6.1 Project Evaluation Factors

Each project identified in the Recommendations was assessed based on four criteria to aid in prioritization. Within each criterion, projects were scored based on a system where 1 represents a higher priority and 3 represents a lower priority. Each factor is described below:

COMPLEXITY

The complexity ranking is based on the level of design and thus the degree of procedural tasks that are anticipated with each project.

1 = low complexity; *examples include projects that do not require right-of-way acquisition or detailed survey to design*

2 = moderate complexity; *examples include projects that moderately alter the curb or require new pavement*

3 = high complexity; *examples include projects that require right-of-way acquisition, significantly alter the curb, or require an environmental analysis before construction*

SAFETY

The safety ranking is based on the existing safety concerns at the location of the project. If a project provides protection for vulnerable users, it is automatically given the highest ranking.

1 = highest safety priority; *project is located at an area where a pedestrian-involved crash occurred, or the crash rates are significantly above average (actual crash rate/critical rate > 1)*

2 = medium safety priority; *project is located at an area where the crash rates are above average (actual crash rate/statewide average > 1.15)*

3 = lowest safety priority; *project is located at an area where the crash rates are at or below average (actual crash rate/statewide average < 1.15)*

PUBLIC CONCERN

The public concern ranking is based on the number of comments were received at the project location on the mapping exercise in the public survey.

1 = high public priority; *over 150 comments*

2 = moderate public priority; *between 50 and 150 comments*

3 = low public priority; *less than 50 comments*

COST

The cost ranking is based on the level of financial investment that would be required as determined by the cost estimates.

1 = low cost; *projects less than $250,000*

2 = moderate cost; *projects greater than $250,000 and less than $1,000,000*

3 = high cost; *projects greater than $1,000,000 and less than $10,000,000*

4 = highest cost*; projects greater than $10,000,000*

6.2 Implementation Plan

The project evaluation summary is provided in Table 6-1. Green dots indicate highest priority rankings (1), yellow dots represent medium priority rankings (2), and red dots indicate the lowest priority rankings (3). The total score for each project was calculated by taking the average score across each evaluation category and is shown in the Priority Band column, which indicates timeframe the improvement should fall under. The following are suggestions, and the city may choose to prioritize the recommended improvements however they deem appropriate based on local feedback and available funding.

6.2.1 Short-Term Improvements

Short-term improvement projects are those that can be completed within one to three years or provide an exceptional safety benefit and should thus be implemented as soon as possible. The recommended short-term improvements are:

- Sulphur Springs Road RCUT
- Median Closure at Sugar Hollow Road *(do not implement if decide on Alt 2 or 3)*
- Remove left-turns onto Alpha Valley Home Road *(do not implement if decide on Alt 2)*
- Cobble Lane right-turn lanes and right-in/right-out driveway signage
- RCUT at Dr MLK Jr Parkway *(do not implement if decide on other alternative TBD)*
- Fish Hatchery Road right-turn lanes
- US 25E traditional signalization *(do not implement if decide on Continuous Green T)*

6.2.2 Mid-Term Improvements

Mid-term improvements are those that can be completed within three to ten years, either because of the complexity of the project or the cost. The recommended mid-term improvements are:

- Bethel Road right-turn lanes
- Springvale Road right-turn lanes
- Offset RCUT intersection at Sugar Hollow Road and Mayes Road OR left-turns from Sugar Hollow Road onto SR 160 with acceleration lane and downstream U-turn
- US 25E Continuous Green T signalization
- Lowland Pike right-turn lanes
- Restrict left-turns at Alpha Valley Home Road
- Springvale Road RCUT
- Dr MLK Jr Parkway Intermediate Alternative 1 *(do not implement if decide on Alt 2 or 3)*
- Dr MLK Jr Parkway Intermediate Alternative 3 *(do not implement if decide on Alt 1 or 2)*
- Dr MLK Jr Parkway Intermediate Alternative 2 *(do not implement if decide on Alt 1 or 3)*

If the City decides to implement either Intermediate Alternatives 1 or 3 at Dr. MLK Jr Parkway, it is strongly advisable to realign the intersection in the immediate near-term. This proactive approach will maximize the storage for the increase in traffic when the new school opens.

6.2.3 Long-Term Improvements

Long-term improvement projects are those that do not pose an immediate safety need and could be planned for a longer-term horizon. The recommended long-term improvements are:

- Dr MLK Jr Parkway Interchange
- US 25E Interchange ramps
- Old Highway 11E quadrant roadways

TABLE 6-1 PRIORITY RANKING FOR SR 160 RECOMMENDATIONS

Location	Recommendation	COMPLEXITY	SAFETY	PUBLIC CONCERN	COST	PRIORITY BAND	
Sulphur Springs Road	Formalize existing RCUT movements						$ 51,000
Sugar Hollow Road/Mayes Road	Median closure at Sugar Hollow Road						$ 57,200
Alpha Valley Home Road/Maple Valley Road	Remove left turns onto Alpha Valley Home Road						$ 31,600
Cobble Lane	Right Turn Lane						$ 105,000
Fish Hatchery Road	Right Turn Lane onto SR 160 and extend right turn lane onto Fish Hatchery						$ 355,000
MLK	Left Turn onto MLK - downstream U-turn						$ 469,000
US 25E	Signals, Do Not Enter Beacons, and Right Turn Lanes onto on-ramps						$ 1,460,000
Bethel Road	Right Turn Lane						$ 105,000
Springvale Road	Right Turn Lanes						$ 266,000
Sugar Hollow Road/Mayes Road	Left Turns onto Sugar Hollow Road and Mayes Road - downstream U-turn						$ 282,000
Sugar Hollow Road/Mayes Road	Left Turn from Sugar Hollow Road with acceleration lane - downstream U-turn						$ 453,000
US 25E	Continuous Green T						$ 2,670,000
Lowland Pike	Right Turn Lane						$ 182,000
Alpha Valley Home Road/Maple Valley Road	No left turns from or onto Alpha Valley Home Road - downstream U-turn						$ 326,000
Springvale Road	RCUT - Left Turns onto Springvale only - downstream U-turns						$ 487,000
MLK	Mid-Term Alternative 1						$ 4,230,000
MLK	Mid-Term Alternative 3						$ 6,110,000
MLK	Mid-Term Alternative 2						$10,400,000
US 25E	Interchange Ramps						$15,000,000
MLK	TDOT's interchange recommendation						$45,000,000
Old US 11E	Displaced Left Turn						$ 358,000

6.3 Funding Opportunities

Infrastructure projects can be costly to design and construct within the means of a city's exiting tax base. Intergovernmental assistance can alleviate funding shortfalls while allowing the local government to continue investing its resources in other priorities. Fortunately, a variety of state and federal programs are available to assist with transportation funding. Table 6-2 Available Funding Strategies provides summaries of available funding programs for implementing transportation improvements.

TABLE 6-2 AVAILABLE FUNDING STRATEGIES

Grant/Program	Agency	Examples of Eligible Activities	Funding
Multimodal Access Grant	TDOT Multimodal Division	Multimodal Access Grant funding is available to improve transportation access for pedestrians, bicyclists, and transit users along State Routes using the following improvement types: sidewalks; pedestrian crossing improvements; bicycle facilities; multi-use paths; transit stop amenities; complete streets, road diet or traffic calming measures; improvements that address ADA non-compliance; pedestrian-scale lighting; and other improvements which primarily improve access for multimodal users.	90% state 10% local match State portion may not exceed $1,125,000
National Highway Performance Program (NHPP)	FHWA funds distributed to TDOT	The National Highway Performance Program provides federal funding to support the condition and performance of the National Highway System and for the construction of new facilities on the National Highway System. Projects may include planning, design, and construction.	Conditional Apportionment based on TDOT discretion
Highway Safety Improvement Program	FHWA funds distributed to TDOT	HSIP funds can be used for safety projects that are consistent with the State's Strategic Highway Safety Plan and that correct or improve a hazardous road location or feature or address a highway safety problem. The following projects are eligible: installation of vehicle-to-infrastructure communication equipment; pedestrian hybrid beacons; and roadway improvements that provide separation between pedestrians and motor vehicles, including medians and pedestrian crossing islands	90% federal 10% local match
Congestion Mitigation and Air Quality Improvement Program (CMAQ)	FHWA funds distributed to TDOT	The Congestion Mitigation and Air Quality Improvement program provides dedicated federal funding for projects that improve air quality and reduce congestions. Air quality is improved by funding transportation projects and programs that reduce emissions from vehicles in designated air quality nonattainment and maintenance areas. Project involving carpooling and vanpooling, roundabouts, or traffic flow improvements/intelligent transportation systems are eligible for 100% federal funding. Other project types are eligible for 80% federal funding.	80-100% Federal Match

Grant/Program	Agency	Examples of Eligible Activities	Funding
Transportation Alternatives Program (TAP)	FHWA funds distributed to TDOT & TPO	All facilities must be hard-surfaced, ADA compliant, and provide adequate connectivity and separation from vehicular traffic. Sidewalk facilities must be a minimum of 5 feet wide and shared-use facilities must be a minimum of 10 feet wide. TAP funds can be used for sidewalks, walkways or curb ramps, bike lane striping, wide paved shoulders, bike parking and bus racks, traffic calming for the safety of bike/ped traffic, off-road trails, bike and pedestrian bridges/underpasses, and ADA compliance.	20% local match for construction Preliminary engineering, design, and ROW expenses are responsibility of local government
Surface Transportation Block Grant	FHWA funds distributed to TDOT & MPO	In general, STBG projects may not be on local roads or rural minor collectors. There are a number of exceptions to this requirement, such as the ability to use up to 15 percent of a state's rural suballocation on minor collectors. Other exceptions include: bridge and tunnel projects; safety projects; fringe and corridor parking facilities/programs; recreational trails, pedestrian and bicycle projects, and safe routes to school projects; boulevard/roadway projects largely in the ROW of divided highways; inspection/evaluation of bridges, tunnels, and other highway assets; port terminal modifications; and projects within the pre-FAST Act title 23 definition of "transportation alternatives."	80-100% federal 20% local match
Safe Streets and Roads for All (SS4A); Planning & Demonstration and Implementation Plan Grants	FHWA	The SS4A Action Plan Grant provides federal funds for Planning and Demonstration projects which can include an Action Plan. The goal of an Action Plan is to develop a strategy to prevent roadway fatalities and serious injuries in a locality. The SS4A Implementation Plan Grant provides federal funds for projects and strategies identified in an Action Plan that addresses roadway safety problems.	80% Federal Match 20% State or Local Planning & Demonstration: $100,000 - $10,000,000 Implementation Plan: $2,500,000 - $25,000,000
TN Highway Safety Office Grants	TN Highway Safety Office	The Tennessee Highway Safety Office provides grants to programs which are designed to reduce the number of fatalities, injuries and related economic losses resulting from traffic crashes on Tennessee's roadways. Grant areas include, but are not limited to: Alcohol and Impaired Driving Education & Enforcement, Bicycle and Pedestrian Safety, High Visibility Enforcement, Police Traffic Services, and Safe Communities.	Conditional

Grant/Program	Agency	Examples of Eligible Activities	Funding
Community Development Block Grant	TN Dept. of Economic and Community Development	Provide essential, pressing community development needs in underserved areas. Can go towards community livability projects.	89% federal 11% Local Match $400,000 Maximum
Healthy Built Environment Grants	TN Dept of Health	Healthy Built Environment grants are non-competitively provided to each county in Tennessee. These funds are to be used for transportation convening, planning, programming, and construction projects.	Conditional $20,000 (2019)
Built Environment Grants	TN Dept of Health	These grants aim to increase access to safe and publicly accessible places that provide opportunities for physical activity for a diverse group of users, including those who live, visit, work, play, worship, and learn in the community.	TBD
Project Diabetes	TN Dept of Health	Grants are awarded to community partners with a focus on reducing overweight and obesity as risk factors for the development of type 2 diabetes. Grant activities are geared toward interventions that are applied before there is any evidence of disease.	Category A – funded up to 3 years; max of $150,000/year Category B – funded up to 2 years; max of $15,000/year
AARP Community Challenge	AARP	The AARP Community Challenge provides small grants to fund quick-action projects that can help communities become more livable for people of all ages. Applications will be accepted for projects to improve public spaces, housing, transportation and civic engagement; support diversity, equity and inclusion; build engagement for programs under new federal laws; and pursue innovative ideas that support people aged 50 or older. Transportation and Mobility projects include options that increase connectivity, walkability, bikeability, wayfinding, access to transportation options and roadway improvements.	None Required.

Grant/Program	Agency	Examples of Eligible Activities	Funding
Rebuilding American Infrastructure with Sustainability & Equity (RAISE)	FHWA	The RAISE grant provides funds for surface transportation infrastructure projects that will improve: safety; environmental sustainability; qualify of life; mobility and community connectivity; economic competitiveness and opportunity including tourism; state of good repair, partnership and collaboration; and innovation. Funds can be used for planning and development as well as construction, including right-of-way acquisition.	Up to 20% match may be required. Minimum award for rural areas is $1,000,000.
Rural Surface Transportation Grant Program	FHWA	The Rural Surface Transportation Grant Program supports projects that improve and expand the surface transportation infrastructure in rural areas to increase connectivity, improve the safety and reliability of the movement of people and freight, and generate regional economic growth and improve quality of life.	80% match for planning grants and no more than 50% for capital projects.

Larger page for Maps