

WEAVER PIKE/SR 358 CORRIDOR STUDY

Sullivan County, TN

September 2023



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1 INTRODUCTION

Sullivan County was awarded a Tennessee Department of Transportation (TDOT) Transportation Planning Grant (TPG) in 2022 for a study of the Weaver Pike/SR 358 corridor (hereafter referred to as Weaver Pike). This study provides a detailed transportation planning level analysis of the Weaver Pike corridor from Old Jonesboro Road to the Holston River, approximately 4.8 miles. It identifies existing conditions within the study area, identifies issues and opportunities along the corridor, and provides recommendations for the County, emphasizing safety and capacity improvements. Figure 1-1 illustrates the study area.

1.1 PROJECT BACKGROUND

Sullivan County applied for the TDOT Transportation Planning Grant to address the overall safety, traffic flow, and operations along Weaver Pike in the unincorporated county. Weaver Pike serves as a vital corridor for the county. Two of the county's schools are located on the road: Sullivan East Middle School and Sullivan East High School. Beyond the schools, low-density residential development is the predominant land use, although several commercial and light industrial uses are also present.

In a broader context, Weaver Pike is a north-to-south connector between Bristol, TN, to the north, and SR 44, to the south. It provides an alternate route between Bristol and Piney Flats/Bluff City to the south. Moreover, Weaver Pike intersects with SR 394 and provides access to US 421. This interconnectivity is an integral part of the regional transportation network.

A corridor study is timely given development pressures, future changes, and the recently opened middle school. The area surrounding the corridor contains ample land that may be converted to more intensive uses, such as residential subdivisions. A park and trailhead for the Overmountain Victory Trail is also planned adjacent to Sullivan East Middle School. Intensification of land development along the corridor will place pressure on the road's capacity and infrastructure, necessitating proper planning to anticipate changes.

Within the study area, there are 14 intersecting roadways resulting in conflict points, sight distance concerns, and dysfunctional geometry. A limited roadway shoulder compounds concerns with safety and future growth. Between January 2018 and December 2022, a total of 118 vehicular crashes occurred on Weaver Pike, with none resulting in fatalities and 7 resulting in serious injury. The most common crash type was single-vehicle roadway departures, representing 35 crashes, with angle and rear-end crashes occurring 24 times each. A total of 35 crashes occurred at dark, 22 of which were roadway departures.

1.2 PROJECT PURPOSE

The purpose of the corridor study is to undergo a comprehensive analysis of the Weaver Pike corridor with the objective of providing recommendations for safety enhancements, operational improvements, and the integration of multimodal infrastructure. The study aims to address existing challenges and develop strategies to make the road safer for all users.

With changes to the land use in the area, the study seeks to identify existing area of improvement on the corridor while anticipating future changes which may require intervention from a physical modification or regulatory adjustment.

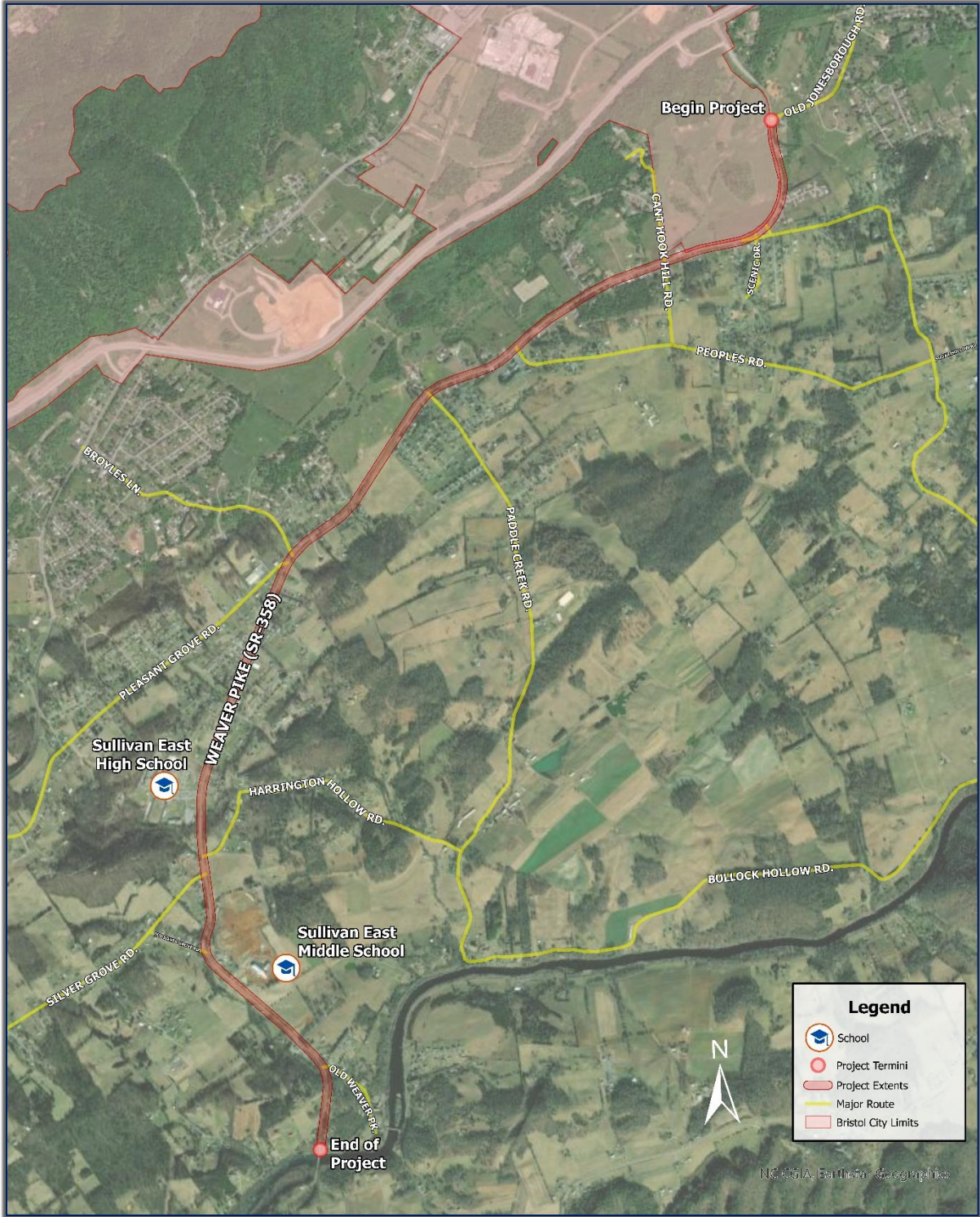


Figure 1-1 Overview of the Study Area

2 EXISTING CONDITIONS

This section will focus on the existing conditions of the study area and establish the foundation upon which recommendations of the study are based.

2.1 DEMOGRAPHICS

Demographics of a county provide a window into its present and future needs as well as its future capacity. A single dataset provides a snapshot of a given point in time. Multiple snapshots over time reveal developing patterns of significance. As of the 2020 Decennial Census, Sullivan County's total population is 158,163 people. This is a 0.9-percent increase or 1,340 people, from the 2010 population of 156,823. Since 1990, the county has grown in population by 10-percent. Neighboring counties in Northeast Tennessee have experienced varying rates of population growth in the last ten years, with Washington County experiencing the greatest level of growth by 8.1-percent or 10,022 people, between 2010 and 2020. Neighboring Hawkins, Carter, and Johnson Counties experienced negative population growth in the same time period.

Utilizing data from the University of Tennessee's Boyd Center for Economic (CBER), Sullivan County's population is expected to grow approximately 0.9-percent by the year 2040, with an overall increase of 0.4 percent by 2050. CBER's model indicates marginal increases through the year 2070. These projections should be used with caution as they are subject to a variety of factors that could alter their trajectory. These estimates are more helpful as an indicator of health in terms of population growth than predicting a definite outcome. The State of Tennessee is experiencing significant in-migration, resulting in overall population growth despite deaths outnumbering births¹. If Sullivan County captured additional in-migration, it would alter its population trends.

As shown in Table 2-1, the county's racial composition has seen changes between the last two census counts, with a notable increase in those of two or more races in a percentage of the total population and the most significant increase among groups.

TDOT provides a land use forecasting tool that details information for current and future employment growth on a county level. Using North American Industry Classification Codes (NAIC), the top three industries within the county are healthcare and social assistance (11.3%), manufacturing (10.6%), and construction (10.6%). The State of Tennessee Department of Economic and Community Development's County Profile Tool² shows similar concentrations with Manufacturing and Health Care being the top two industries. The top employers within the county include the Eastman Chemical Company, Holston Valley Medical Center, and the Sullivan County school system. The TDOT land use forecasting tool also estimates growth and changes in employment sectors based on NAIC codes. Using this forecast, the overall employment mix in the county is projected to remain relatively stable with the construction and health

¹ Tennessee State Data Center, [Breaking Down the 2022 Population Estimates: What Drove Tennessee's Big Gain Last Year? | Tennessee State Data Center \(utk.edu\)](#)

² Tennessee Department of Economic and Community Development County Profile Tool (<https://tnecd.com/county-profiles/>)

care industries to remain significant over the next 30 years. The projected top three industries are shown in Table 2-2.

Table 2-1 2010 and 2020 Population with Racial Composition Between Decennial Census Years

	2010	% of the population	2020	% of the population	Change in % of the population	% Population Change
Hispanic or Latino	2,321	1.5%	3,548	2.2%	0.8%	52.9
Not Hispanic or Latino	154,502	98.5%	154,615	97.8%	-0.8%	0.1
White alone	148,033	94.4%	143,354	90.6%	-3.8%	-3.2
Black or African American alone	3,272	2.1%	3,197	2.0%	-0.1%	-2.3
American Indian and Alaska Native alone	379	0.2%	350	0.2%	-0.2%	-7.7
Asian alone	881	0.6%	1,270	0.8%	0.2%	44.2
Native Hawaiian and Other Pacific Islander alone	28	0.0%	36	0.0%	0.0%	28.6
Some other race alone	110	0.1%	457	0.3%	-0.1%	315.5
Two or more races	1,799	1.1%	5,951	3.8%	2.6%	230.8
Two races including Some other race	1,909	1.2%	6,408	4.1%	-1.2%	235.7
Two races excluding Some other race, and Three or more races	1,723	1.1%	5,736	3.6%	2.5%	232.9
Total Population (Decennial Census)	156,823	100%	158,163	100%		0.9%

Source: US Census Bureau 2010 and 2020 DEC Redistricting Data (PL94-171), Table P2

Table 2-2 Industry Growth 2020-2050

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

Source: TDOT Land Use Forecasting Dashboard

The TDOT tool also provides growth projections, as shown in Figure 2-1 for a 30-year time period.

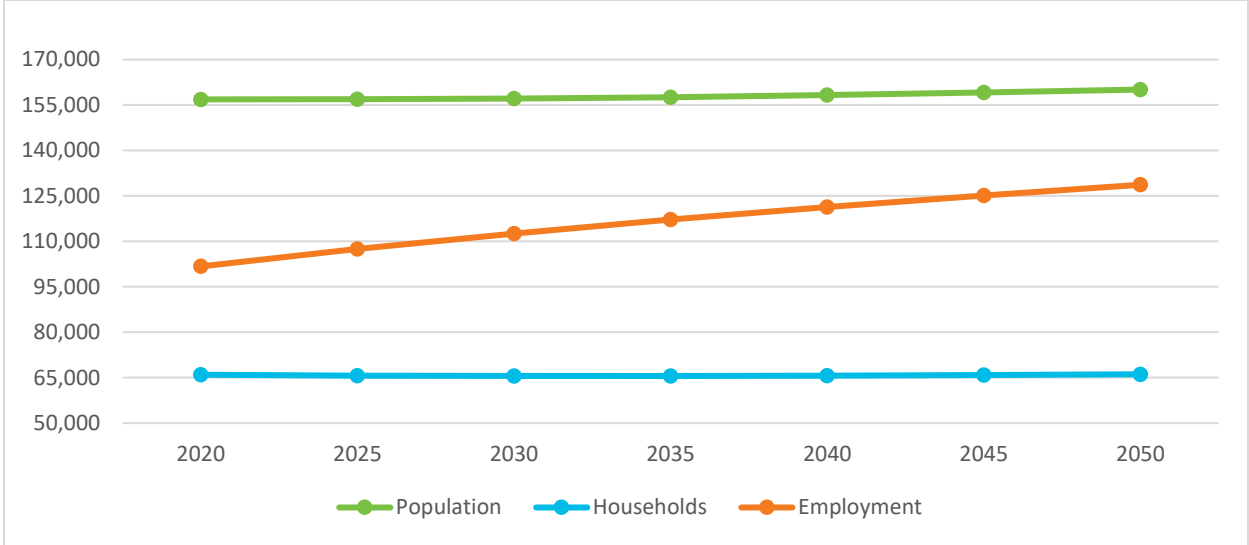


Figure 2-1 Sullivan County Growth 2020-2050

2.2 LAND USE

Land use along Weaver Pike and the immediate area primarily consists of low-intensity land uses. As shown in Figure 2-2 and Figure 2-3, residential and agricultural land uses make up most of the land fronting and adjacent to the corridor. Commercial uses are generally clustered in certain areas. Several county-owned properties are also present, reflecting the location of the schools.

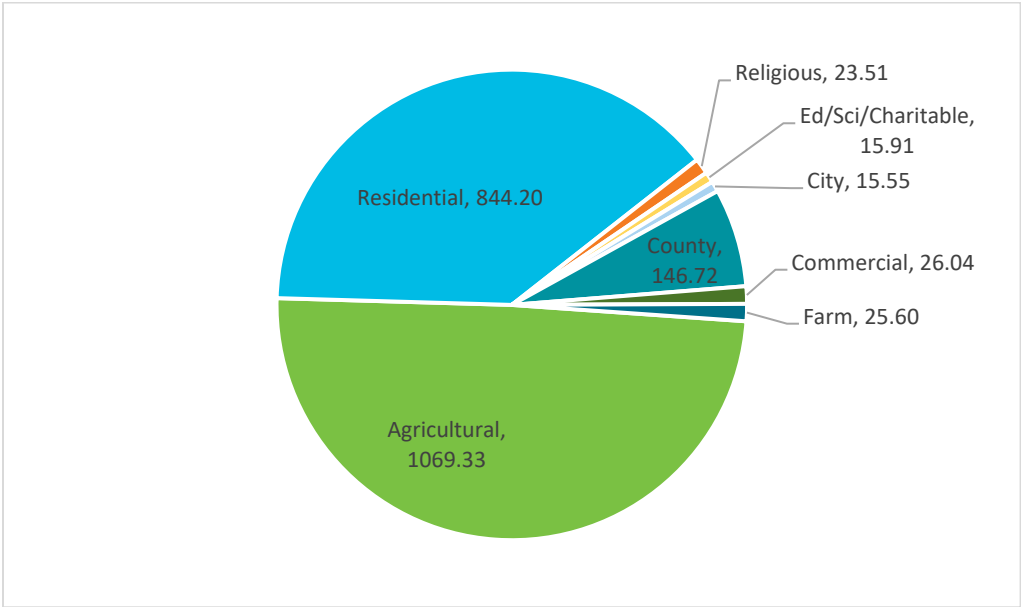


Figure 2-2 Land Use by Acres

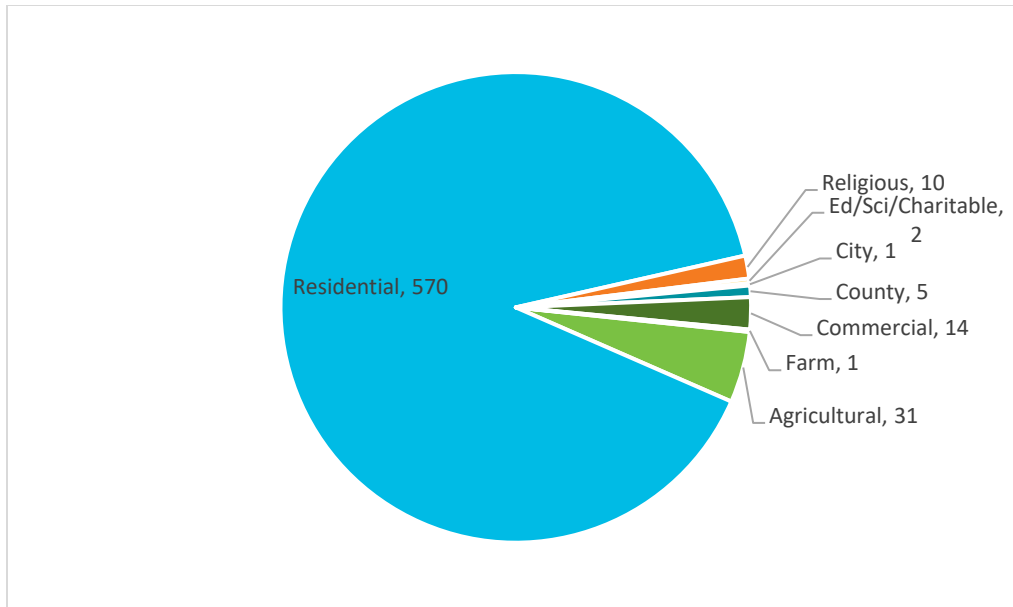


Figure 2-3 Land Use by Frequency (Lots)

Future development in the corridor will be subject to local jurisdictions' zoning and subdivision regulations. With the exception of a 130-acre area at Cant Hook Hill Road and Weaver Pike in the City of Bristol, the land around the corridor is in unincorporated Sullivan County. The county controls and enforces zoning standards for the area, which includes density. Future subdivisions will be subject to approval from the City of Bristol's Municipal-Regional Planning Commission and its Subdivision Regulations on the northwestern side of Weaver Pike. Subdivisions on the southwestern side of Weaver Pike will be subject to approval from the Sullivan County Regional Planning Commission and its Subdivision Regulations.

Growth and development along the corridor will be constrained by the availability of sanitary sewer. A 4" force main was extended from the former Weaver Elementary School at 3341 Weaver Pike down the road to serve the new Sullivan East Middle School, but its capacity is limited. The limited access to sanitary sewers will restrict commercial and industrial intensity as well as residential density. If development proceeds with subsurface sewage disposal systems (SSDS), septic tanks, then developable land will be reserved for field line areas. The County's zoning regulations specify a 20,000 square feet minimum lot size for the R-1 district and a 43,560 square feet minimum lot size for the A-1 district when connected to public water. If a lot is connected to sanitary sewer, the minimum size in the R-1 district decreases to 15,000 square feet while the minimum lot size in the A-1 district is unchanged. The R-1 and A-1 zoning districts comprise 87-percent of the land in proximity to the corridor and most of the land in the surrounding area.

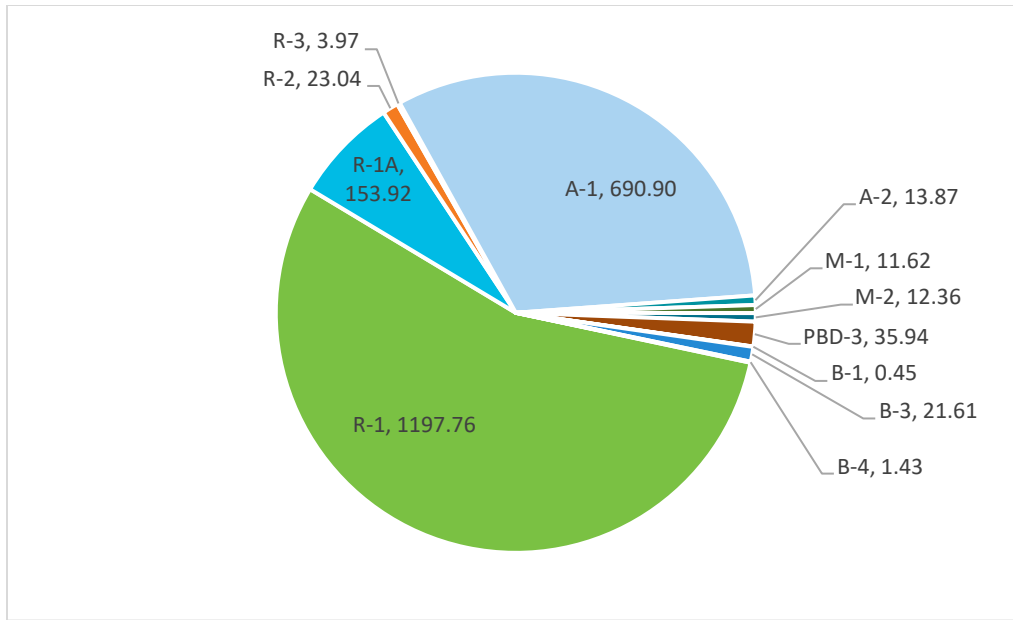


Figure 2-4 Zoning by Acres

The county’s zoning largely reflects existing land uses. Commercially and industrially zoned properties are situated at intersections or where commercial land uses appear to have been historically present. Many of these properties are underutilized in their current use compared to the potential uses allowed for in their zoning district. For example, the property at 3877 Weaver Pike is a 2.11-acre lot used as a single-family residence but zoned B-4 Arterial Business District. The B-4 district allows restaurants and general retail trade by-right.

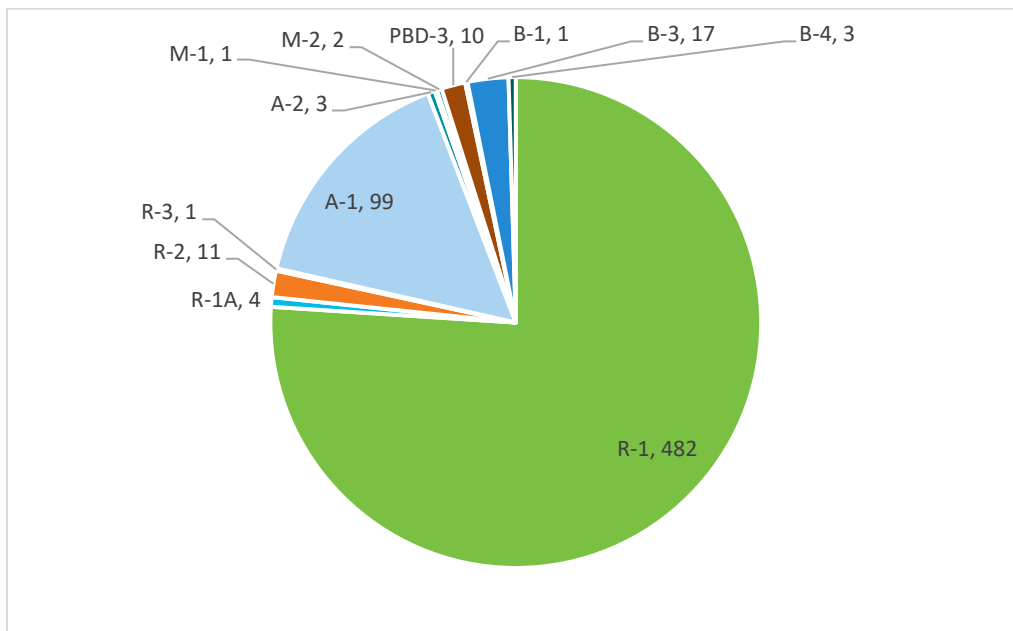


Figure 2-5 Zoning by Frequency (Lots)

Future commercial development is possible for the former site of the Weaver Elementary School now under private ownership. The property is a 5.4-acre lot at the intersection of Weaver Pike and Peoples Road, 3341 Weaver Pike, zoned PBD-3 with existing buildings on-site amounting to 33,987 square feet. The current zoning allows multiple high-intensity uses subject to review and approval from the Sullivan County Planning Commission. The heaviest concentration of commercially zoned properties is between Pleasant Grove Road and Rogers Drive, which includes a Dollar General store and a Convenience Store/Gas Station. These properties are zoned B-3, General Business Service District, which permits multiple high-intensity land uses by-right. Another concentration is at Old Silver Grove Road across from the new middle school. An 8.6-acre property here is zoned B-3 and used for agricultural purposes. Given the underutilization of these properties with their current zoning, additional development pressure on the corridor could occur if more intensive land uses were to develop. Additional development is planned for the property adjacent to the new Sullivan Middle School and a proposed park and trailhead for Overmountain Victory Trail.

Residential development is predominant along the corridor and the more likely land use to expand, particularly with most of the existing zoning allowing single-family residential by-right. Ample land exists on either side of the corridor that could be subdivided into residential lots. The county's lot size requirements, limited sanitary sewer service, topography, availability of land for sale, and market demand will serve as limitations on the extent to which this land transitions to a more intensive use. Moreover, the suitability of soils for subsurface sewage disposal systems will determine how much of the land can be developed without expanding the sanitary sewer system. Given the relatively low population growth projected for the county and the limiting factors for development, a scenario where a level of growth in residential development occurs along the corridor in a timeframe in which necessary improvements cannot be implemented is unlikely.

If the total number of acres zoned A-1, as shown in Figure 2-4, were converted to a residential subdivision(s), the maximum density would be 690 units at the present minimum lot size. This does not factor in the land that would be utilized for infrastructure and, therefore, unavailable for lots. Using the average household size of 2.36 for the county, adding 690 new housing units would result in an additional 1,628 people. This would amount to 91-percent of the county's population increase projected by CBER for the next fifty years concentrated in a single area, a highly unlikely scenario.

The more likely scenario is a slow, piecemeal development of individual large parcels as they become available for purchase. The presence of the schools is a strong attractor to families, and a reasonable assumption is that they would induce some demand for development. A defined indicator approach to the corridor would assist the county in determining if intervention is needed to address development. Such an approach would monitor overall housing demand for the county and monitor permit requests. Pre-determined yellow and red conditions based on established levels of development would signal when a regulatory intervention would be appropriate. Such intervention may include taking steps to phase development, elongate its build-out, or halt it as may be practical.

Restrictions which limit direct access to Weaver Pike are valuable to reduce points of conflict and anticipate future development. Driveways and new roads should be placed only where adequate sight distance can be achieved and other safety measures implemented as appropriate. When large-scale development is proposed and permitted, the use of frontage roads may also be necessary. The county ultimately controls the intensity of development along the corridor through its zoning regulations and can

amend them as necessary to achieve its desired outcome for the corridor and time development with existing infrastructure.

2.3 ROADWAY CHARACTERISTICS

The limits of this study include an approximate 4.9-mile long section of Weaver Pike (SR 358), which proceeds generally north-to-south. The north terminus of the project is the intersection with Old Jonesboro Road, and the south terminus is the overpass at Riverside Road. Weaver Pike is a two-lane, undivided roadway. Horizontal alignment is winding, with many curves, typically with large radius.

The surrounding area is rural, with driveway density varying from very sparse for most of the corridor, to tightly spaced in a few sections. The legal posted speed along the entire project corridor is 45 miles per hour. Two advisory speeds are posted. The first is southbound.

TDOT's Functional Classification System (Figure 2-6) classifies Weaver Pike as a Minor Arterial from the beginning of the study area at Old Jonesboro Road then transitions to a Major Collector at Old Silver Grove Road through the end of the study area. Sullivan County classifies the road as a Collector on its Major Thoroughfare Plan³.

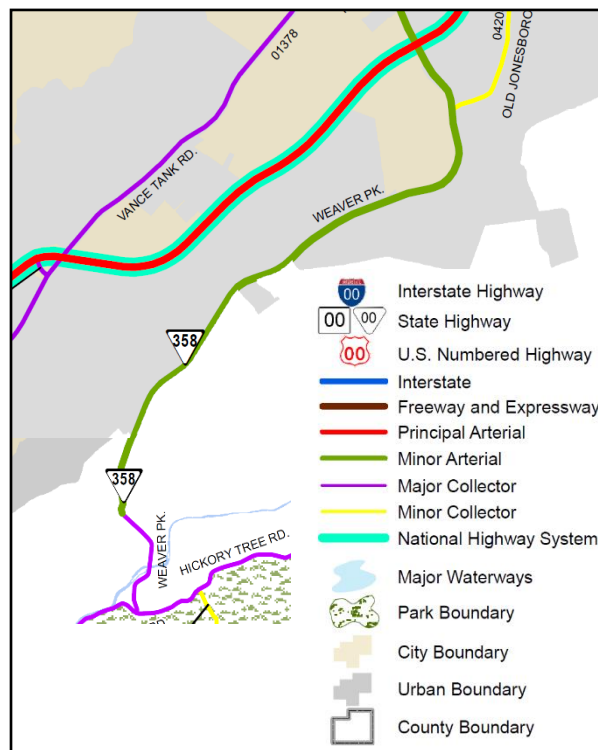


Figure 2-6 TDOT Functional Classification Map for SR 358

Pavement width is approximately 24 to 26 feet along the corridor. One approximately 11-foot travel lane exists in each direction, and shoulder is minimal, varying from approximately 1 to 2 feet. A double solid-yellow centerline as well as solid white edge line exists for the length of the study corridor, with the

³ [Major Road Plan List | Sullivan County TN](#)

exception of two passing zones, where the centerline is broken temporarily. No curb and gutter sections are present in the area. Grass drainage swales are common.

2.4 DATA COLLECTION AND ANALYSIS

Data collection and analysis is a critical component of the corridor study and plays a vital role in understanding the intersections' existing conditions and operational performance. The following data collection efforts were undertaken to gather comprehensive information for analysis and decision-making.

24-Hour Segment Counts and Turning Movement Counts (TMC)

Traffic volume counts were conducted to gather data on vehicular movements at roadway segments and intersections. The findings from this analysis provide valuable insights for optimizing traffic flow, enhancing safety, and improving the overall operational efficiency of the transportation network. The traffic volumes are utilized for the crash rate calculations and operational analysis.

The turning movement counts collected for these signalized intersections are found in Appendix B, respectively. Figure 2-7 contains the annual average daily traffic (AADT) volumes published by the Tennessee Department of Transportation for 2022 and collected by CDM Smith for the study.

Identification of Intersection Attributes

Detailed information on intersection attributes was gathered to better understand an intersection's geometric layout and design features. This included documenting intersection geometry, lane configurations, the presence of turn lanes, crosswalks, and other infrastructure elements.

Procurement of Crash Reports

Crash reports from the Tennessee Integrated Traffic Analysis Network (TITAN) were procured to gain insights into intersection safety performance. These reports provided valuable information on the types of crashes, contributing factors, and severity levels at signalized intersections. Analyzing crash data helps identify high-crash locations, potential safety issues, and guides the development of strategies to enhance intersection safety.

Crash data was analyzed within an approximate 250-foot radius of each intersection's approach. If intersections are closer than 500 feet from each other, half the distance was used for assigning crashes to the respective intersection.

Field Inventory of Traffic Signs & Markings

A thorough field inventory was conducted to assess the functionality of traffic signs and pavement markings. This involved documenting the location and type along the Weaver Pike corridor. Warning signs are prevalent along Weaver Pike. Most intersections and curves have warning signs associated with them. The two school zones are also signed, with speed reductions and flashing beacons. The traffic sign inventory is presented in Figure 2-8. The entire length of Weaver Pike has centerline and edge line markings. The double-solid-yellow centerline markings are replaced with 10-foot line and 30-foot gap passing zone patterns in two straight sections. One passing zone straddles the Cant Hook Hill Road intersection, and the other is south of Broyles Lane. The passing zone locations are shown in Figure 2-9 and Figure 2-10.

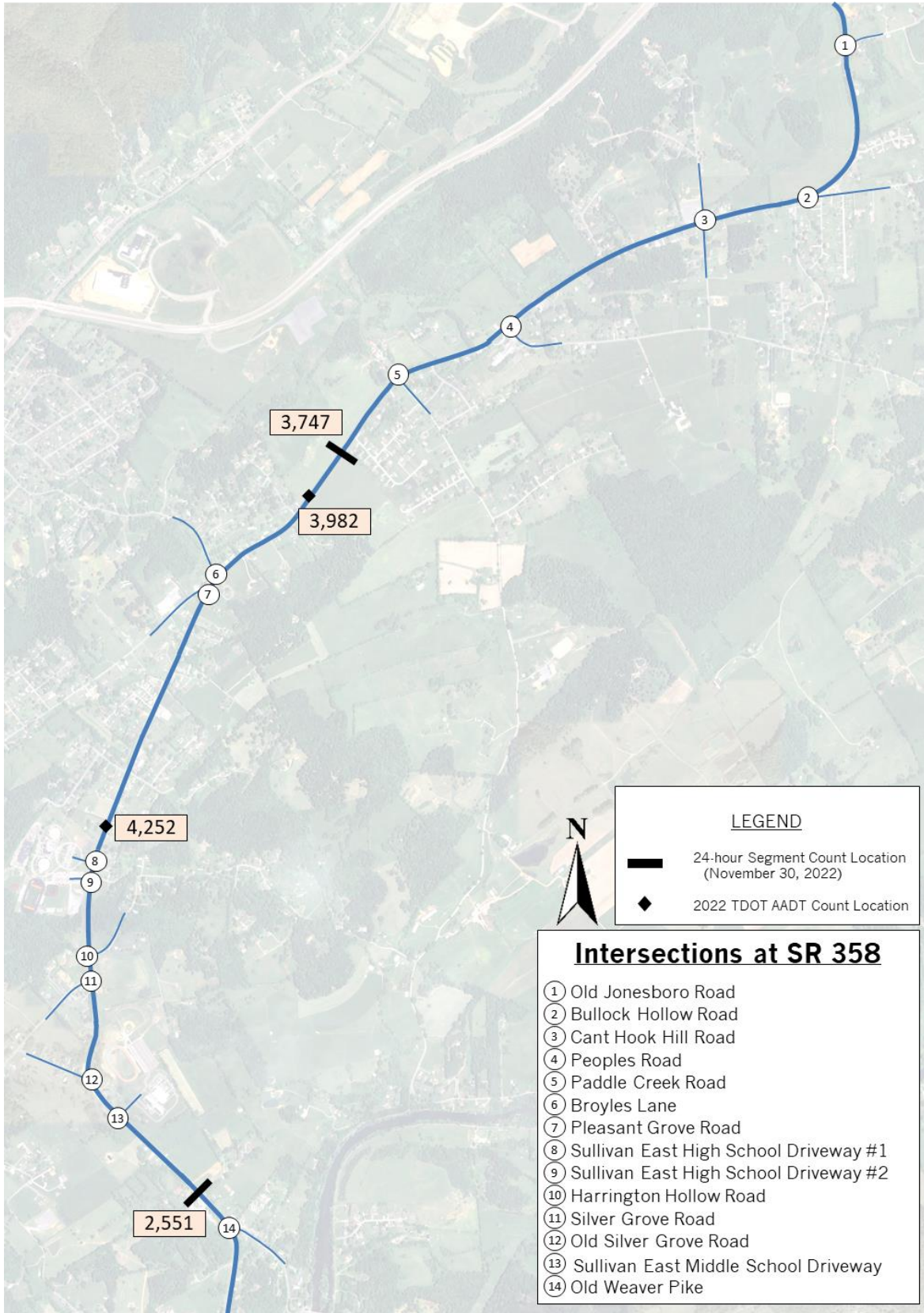


Figure 2-7 SR 358 Daily Volumes and Intersections

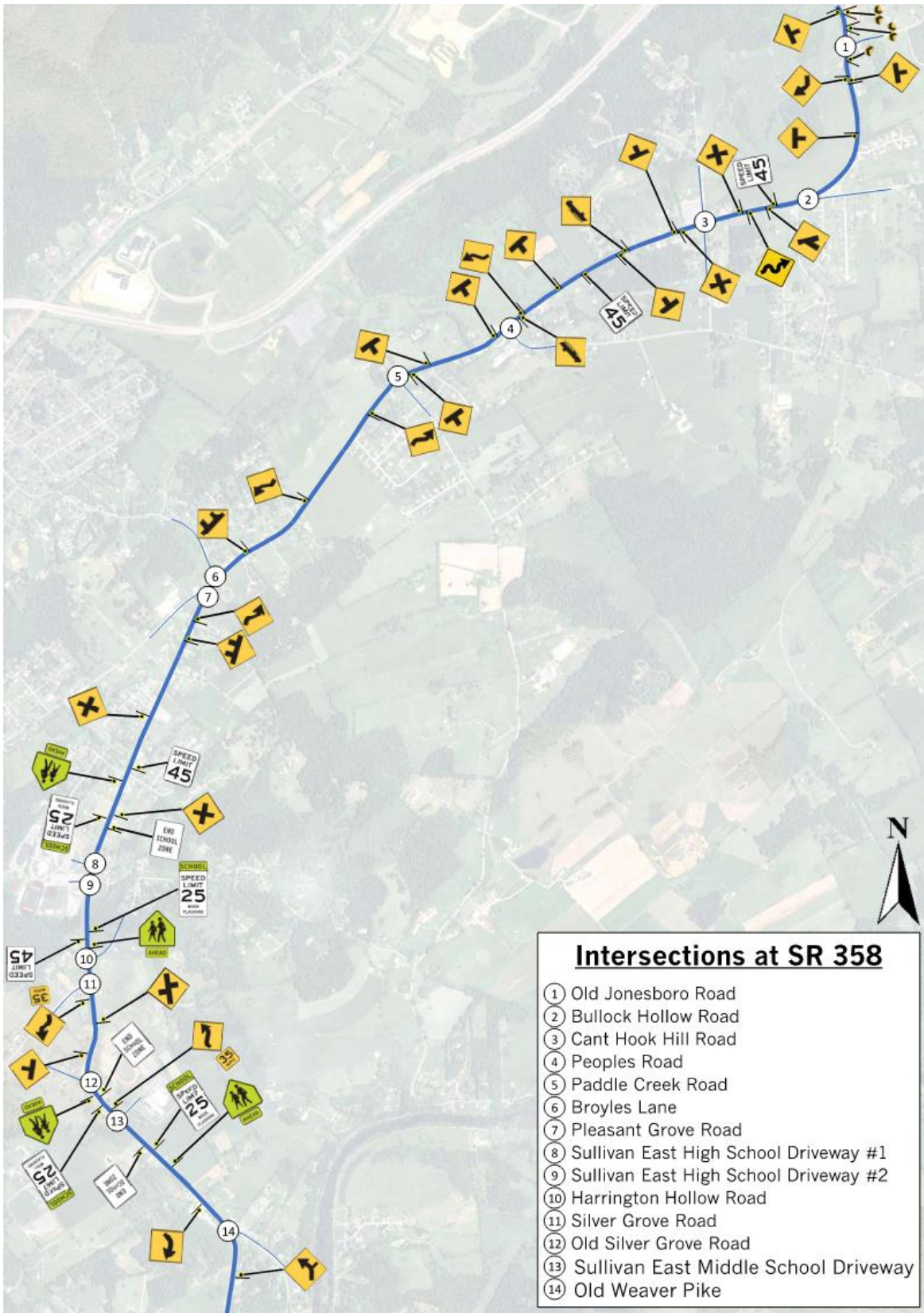


Figure 2-8 Existing Traffic Sign Inventory



Figure 2-9 Passing Zone at Cant Hook Hill Road



Figure 2-10 Passing Zone at Pleasant Grove Road

2.5 SAFETY

To assess the need for safety improvements, a comprehensive review of crash history was conducted. The analysis included an examination of the traffic crash history, the development of crash rates, and the quantification of crash severity for each intersection. The review period encompassed five years, from January 2018 to December 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 C.

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 (ratios of peak hour volume to 24-hour daily volume) were developed. The PM peak-hour entering traffic was used to estimate an ADT volume based on K-factors derived from automated traffic counts conducted during the study. This ADT was extrapolated to determine the traffic exposure, expressed in million entering vehicles (MEV).

Intersections are grouped according to various characteristics, including area type (rural or urban), traffic control, lane configurations, and median type. A statewide average for each unique combination of these characteristics is used for comparison. A critical crash rate marks the rate that is above the statewide average by a statistically significant margin. For this study, a significance of 99% was used. A ratio of actual-to-critical crash rates above 1 signifies that a location has a significantly elevated crash rate likely due to unique circumstances, not random variance.

Table 2-3 presents the crashes and crash rates for the intersections along Weaver Pike. The crash rates were compared to the Tennessee statewide averages based on the following metrics:

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

Table 2-3 SR 358 Intersection Crash Rates

Intersection at SR 358	Entering ADT Volume	Total Crashes	Actual Avg. Rate (Acc/MEV)	Statewide Crash Rate (Acc/MEV)	Critical Crash Rate (Acc/MEV)	Actual/Critical Ratio
Old Jonesboro Road	6340	28	2.42	0.141	0.441	5.49
Bullock Hollow Road (East)	4520	2	0.242	0.141	0.506	0.48
Bullock Hollow Road (West)	4520	2	0.242	0.141	0.506	0.48
Cant Hook Hill Road	4680	3	0.351	0.141	0.499	0.71
Peoples Road	4760	1	0.115	0.141	0.495	0.23
Paddle Creek Road	4850	4	0.452	0.141	0.491	0.92
Broyles Lane	5440	3	0.302	0.141	0.469	0.65
Pleasant Grove Road	6480	6	0.507	0.141	0.437	1.16
High School Accesses	3471	3	2.17	1.567	4.402	0.49
Harrington Hollow Road	7440	0	0	0.113	0.362	0
Silver Grove Road	7460	9	0.661	0.113	0.362	1.83
Old Silver Grove Road	6460	2	0.339	0.113	0.383	0.89
Middle School Access	1205	2	0.215	1.567	6.569	0.59
Old Weaver Pike	1205	3	1.364	0.113	0.868	1.57

Congested Area

Most of the Weaver Pike corridor has low driveway density. However, the middle of the corridor is congested with a notably high driveway density. The segment from approximately Rutledge Drive to Rogers Lane is the only section along Weaver Pike with crash rates above the critical rate. Most of these crashes were driveway related.

2.6 EXISTING INTERSECTIONS

Very few four-leg intersections exist on this section of Weaver Pike. Many side streets intersect in close proximity to adjacent intersections, sometimes acting as a single offset-intersection for east-to-west routes across Weaver Pike. Sight distance concerns are common, along the corridor.

The existing intersection for the Weaver Pike study area are shown in Figure 2-7. The intersections along the project corridor primarily consist of stop-controlled side streets with uninterrupted flow on Weaver Pike. Existing geometry on the SR 160 corridor is shown in Figure 2-11.

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

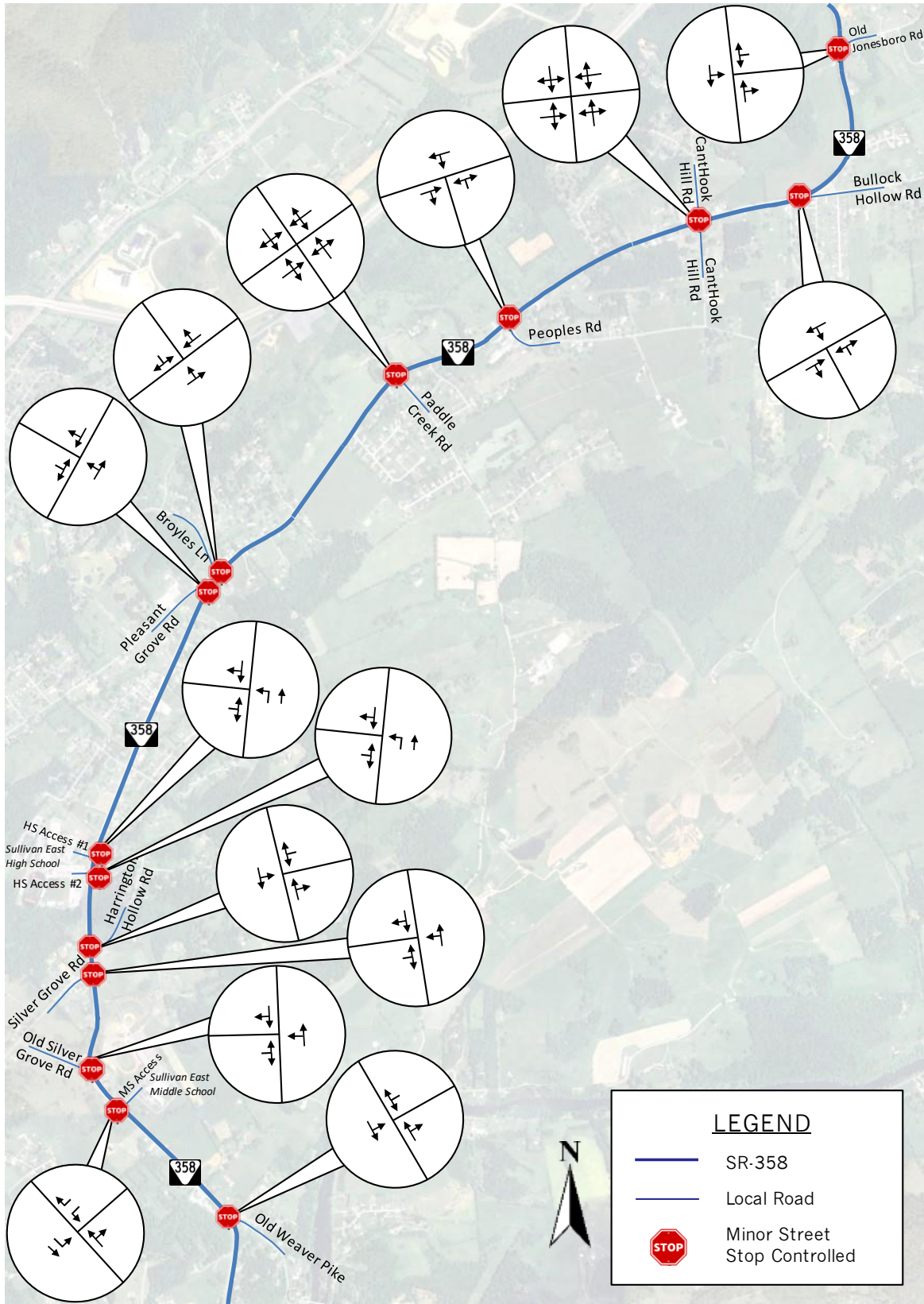


Figure 2-11 SR 358 Existing Geometry at Intersections

OLD JONESBORO ROAD

Intersection Characteristics

Old Jonesboro Road approaches Weaver Pike from the east. The two roadways intersect with an approximate 30-degree skew. Additionally, Old Jonesboro Road approaches with a steep grade that does not level before intersecting the edge of Weaver Pike, and it does so with a wide-throat that is over 100 feet from the points where the radius of the edge lines meets those of the major road. These characteristics can result in awkward turning movement interactions, depending on where vehicles queue to turn from Old Jonesboro Road.

Weaver Pike is winding in this area, and this intersection is placed between two large curves, with trees on both shoulders. Trees on the southeast corner of the intersection, combined with the elevation profile of the approach, create a potential sight-distance obstruction. A winding road sign (W1-5) faces southbound traffic before the curve, approximately 0.25 miles north of the intersection. Another winding road sign faces northbound traffic approximately 0.55 miles south of Old Jonesboro Road. Intersection warning signs (W2-2) exist on the northbound and southbound approaches.



Safety

Among the corridor intersections, Old Jonesboro Road stands out with the highest number of crashes, totaling 28 reported collisions. The majority of these incidents can be attributed to angle collisions (11), single vehicle collisions (4), and head-on collisions (4). At least 8 of these crashes were attributed to southbound left-turning vehicles turning too tightly around a vehicle stopped at the stop line on Old Jonesboro Road. Several additional crashes can be attributed to the skew and/or approach grade of Old Jonesboro Road. The overall crash rate is significantly above the statewide average and more than five times the critical rate.

BULLOCK HOLLOW ROAD

Intersection Characteristics

Five intersections exist at this location, between four roads. The result is four intersections (including nearby Grandor Street) along Weaver Pike, within approximately 650 feet. Two secondary intersections, between the three total side streets exist within a very short distance from Weaver Pike. The intersections all exist within a curve.

Bullock Hollow Road approaches from the east, and Weaver Pike approaches from the north and the west. In the eastbound direction, Weaver Pike is in near perfect alignment with Bullock Hollow Road, before curving to the left. The right-turn movement eastbound from Weaver Pike onto Bullock Hollow Road is aligned straight, potentially creating the appearance that this is the thru street to unfamiliar drivers and allowing very high-speed turns.

A winding road warning sign (W1-5) faces northbound traffic just to the south (west) of Bullock Hollow Road. The curve through this intersection has curve warning signs (W1-2) on each approach. An intersection warning sign also exists on each approach along Weaver Pike. The southbound sign is a graphic T-intersection (W2-2), and the northbound sign is a skew intersection sign (W2-3).



Safety

With 2 collision reports, the intersection at Bullock Hollow Road does not have a predominant collision pattern. Despite the low number of collisions, the crash rate at the intersection is above the statewide average but below the critical rate.

CANT HOOK HILL ROAD

Intersection Characteristics

The intersection with Cant Hook Hill Road is one of only two four-approach intersections along the corridor. In this area, Weaver Pike is generally oriented east-to-west, and Cant Hook Hill Road intersects north-to-south. Both sides of Cant Hook Hill Road have steep downward grades as they approach Weaver Pike, and both are stop-controlled. Cant Hook Hill Road is signed 25 miles per hour to the south and 20 miles per hour to the north. A passing zone is marked on Weaver Pike, which starts approximately 830 feet east for westbound traffic and approximately 0.25 miles west for eastbound traffic. Four-leg intersection warning signs (W2-1) exist on both approaches.

A drainage ditch runs along the north shoulder, with a relatively steep drop-off. The ditch is shielded by a guardrail on the northeast and southeast corners of the intersection. The guardrail does not wrap around the radius of the intersection but does have Sequential Kinking Terminal (SKT) end treatments. Cant Hook Hill Road is slightly lower to Weaver Pike, immediately north of the intersection. This could allow the guardrail to present a sight distance restriction to drivers, depending on vehicle height.



Safety

There has been a total of 3 collisions reported within the vicinity, including 1 non-incapacitating injury. Similar to Bullock Hollow Road, Cant Hook Hill Road has received very few collision reports and has a crash rate above the statewide average but below the critical rate.

PEOPLES ROAD

Intersection Characteristics

Weaver Pike is oriented mostly east-to-west in this area, with Peoples Road approaching generally from the south. Peoples Road is stop-controlled. The stop line is marked approximately 17 feet from the edge of the traveled way. An embankment is present at the southeast corner of the intersection, potentially restricting sight distance to vehicles when vegetation is overgrown. All three legs are generally straight in the vicinity of the intersection, but have horizontal curves on their approaches.

A T-intersection warning sign (W2-2) exists on the westbound approach; however, the corresponding sign to the west exists beyond a much smaller intersection between Weaver Pike and Long View Drive. It is unclear which intersection this sign is intended to warn of. Centerline and edge line markings exist on Weaver Pike. Due to the wide radii on the corners of the intersection, the pavement markings are broken for approximately 85 feet through the intersection.



Figure 2-12 Peoples Road Aerial View



Figure 2-13 Peoples Road View From Behind Stop Line Looking East

Safety

Over the 5-year period, this intersection has received only 1 reported angle collision that resulted in property damage. Public comment has raised concern over sight distance.

PADDLE CREEK ROAD

Intersection Characteristics

The second four-leg intersection is the intersection between Weaver Pike and Paddle Creek Road. The north approach functions as a shared access for 3474 and 3478 Weaver Pike. Paddle Creek Road to the south passes through a large agricultural area, with potential for future development. The south approach is stop-controlled. An embankment with vegetation growth exists on the southeast corner, which combines with the horizontal curve to the east to limit sight distance.

No stop line exists to assist drivers in pulling up to the appropriate stopped position to get the best sight availability. Centerline markings exist on both roadways. Weaver Pike has an edge line, which is broken on the south side but carries through the driveway on the north side.



Figure 2-14 Paddle Creek Road Aerial View



Figure 2-15 Paddle Creek Road View from Driver Eye Position Looking East

Safety

A total of 4 collisions have been reported at this intersection, including 1 non-incapacitating injury. Despite the few number of crashes, Paddle Creek Road has a crash rate above the statewide average and nearing the critical crash rate.

BROYLES LANE

Intersection Characteristics

Broyles Lane intersects Weaver Pike in close proximity to Pleasant Grove Road. This is a wide-throat intersection, located in a curve. For a complete description of the conditions in the area, see the following section labeled for Pleasant Grove Road.



Safety

Having only received 3 collisions reports over the 5-year period, the intersection at Broyles Lane has a crash rate above the statewide average but below the critical rate. Of these reports, there were 2 instances of rear-end collisions and 1 opposing-left, angle crash. Only one of these crashes resulted in injury, which was not incapacitating.

PLEASANT GROVE ROAD

Intersection Characteristics

Pleasant Grove Road approaches Weaver Pike approximately 22-degrees from parallel. However, it curves just before the point of intersection, effectively reducing the skew from 68-degrees on approach to 25-degrees at the intersection itself. The Pleasant Grove Road approach has a guardrail along the north shoulder, starting approximately 175 feet from Weaver Pike and terminating at the edge of the shoulder. Pleasant Grove Rd has a centerline and a stop line. Because of the approach's upward slope and horizontal curvature, the stop sign at the intersection can be obstructed (Figure 2-17).

A reverse curve sign (W 1-4) and double T-intersection warning sign (W 2-8) exist to the north and south of this pair of intersections. Weaver Pike is striped with centerline markings and edge line markings. The centerline and west edge line are broken for approximately 115 feet through the Pleasant Grove Road intersection, resume for approximately 100 feet, and then break again for approximately 90 feet through the Broyles Lane intersection. The centerline is double-solid-yellow north of Broyles Lane, but once it resumes south of the intersection, a southbound passing zone exists for approximately 1,300 feet. The

northbound portion of this passing zone terminates approximately 550 feet prior to the Pleasant Grove Road intersection.

Pleasant Grove Road intersects approximately 150 feet south of Broyles Lane. This alignment is complicated even further because several driveways exist in the area, both on Weaver Pike and Pleasant Grove Road, including one driveway between Pleasant Grove Road and Broyles Lane.



Figure 2-16 Aerial View of Pleasant Grove Intersection



Figure 2-17 Driver View Approaching Intersection From Pleasant Grove Road



Figure 2-18 Driver Eye Position Looking South



Figure 2-19 Driver Eye Position Looking North

Safety

The intersection at Pleasant Grove has received 6 collision reports, 3 of which were roadway departure crashes on Pleasant Grove Road in the curve approaching the intersection. The vehicles struck the existing guardrail in all 3 crashes. An additional roadway departure crash occurred in advance of this curve. The side street was considered outside the scope of this study, but this curve may warrant further study. The crash rate at the intersection is above the critical rate.

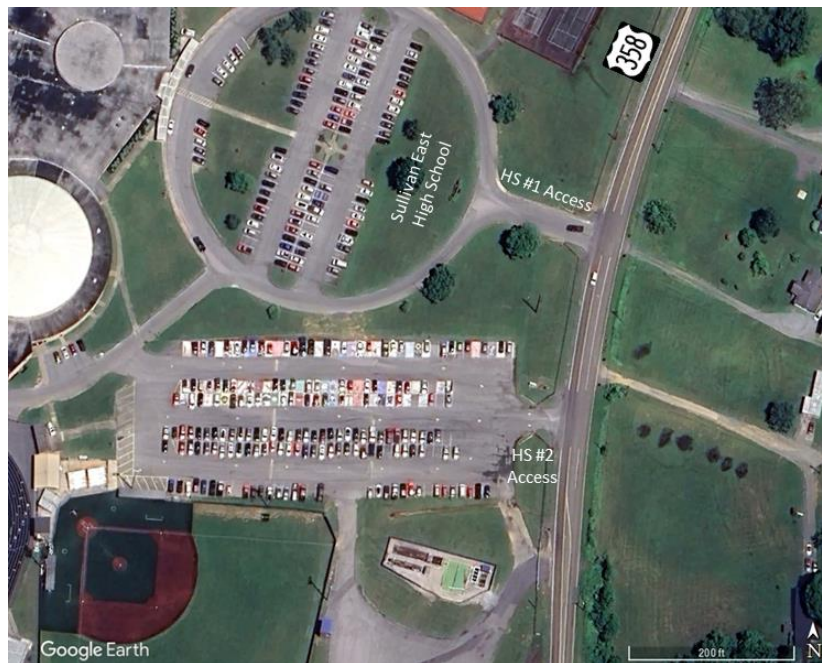
HIGH SCHOOL ACCESS #1 AND #2

Intersection Characteristics

Sullivan East High School is accessed via two main driveways, located in a slight curve on Weaver Pike, intersecting from the west. The northmost driveway provides primary access to the school itself, with a one-way ring road circling two aisles of visitor parking and connecting directly to the front door. The next driveway to the south provides two-way access to the student parking lot. A circulation road connects the ring road to the rear of the student parking lot. Both driveways are used during peak student arrival and release periods. There is a third driveway to the south that allows access to the sport facility parking area but is locked during regular school operation hours.

A fence encompasses the school property. It separates the school from Weaver Pike, approximately 10 to 15 feet west of the traveled way. Each driveway is gated, with the gates recessed from Weaver Pike approximately 40 feet. A drainage swale runs along the west shoulder, between the roadway and the fence. Underground storm sewer follows the ditch line, and several inlets exist, including to either side of the school driveways.

Weaver Pike widens to three-lanes in the immediate area, and a left-turn lane provides storage for northbound left-turning vehicles into both driveways. The turn lane has an approximate 50-foot taper length and 50-foot storage in advance of access #2 and then carries through the intersection and resumes with approximately 165 feet of storage for access #1. No lighting exists along this section of Weaver Pike. During arrival and release periods, school resource officers and staff direct traffic at the intersections.



Safety

Of the 3 collisions that have occurred between both Sullivan East High School accesses, 2 cases were angle collisions and 1 single vehicle collision, resulting in property damage and possible injuries. While there are few crashes, these high school accesses have achieved a crash rate significantly above the statewide average but well below the critical rate.

HARRINGTON HOLLOW ROAD

Intersection Characteristics

At the intersection between Weaver Pike and Harrington Hollow Road, Weaver Pike is aligned north-to-south. Harrington Hollow Road intersects from the east, and a church driveway intersects from the west, aligned directly across from Harrington Hollow Road. Weaver Pike is very straight and has a slight downward grade in the southbound direction. The approach on Harrington Hollow Road has a slightly upward slope, but the sight distance is generally good.

Silver Grove Road, intersecting approximately 330 feet to the south, acts in conjunction with Harrington Hollow Road almost as an offset-intersection. A significant portion of traffic proceeds east-to-west along these routes, traversing Weaver Pike for the short distance between them. Harrington Hollow Road will serve as future access for Patriot Park, a future park planned to the southeast of this intersection, which will connect to the Overmountain Victory National History Trail along shared-use path to Sullivan East High School.



Safety

The intersection at Harrington Hollow Road has received 0 collision reports over the 5-year period between 2018 and 2022.

SILVER GROVE ROAD

Intersection Characteristics

This intersection is only approximately 330 feet south of Harrington Hollow Road. Silver Grove Road intersects Weaver Pike from the west. This wide-throat intersection has large radius turns, especially on the northwest corner. The approach to the intersection from Silver Grove Road has a horizontal curve with an embankment on the inside of it.

Centerline and edge striping on Weaver Pike break through the intersection for approximately 100 feet. Silver Grove Road also has both centerline and edge line striping. A stop line is present but is set back approximately 45 feet from the edge of Weaver Pike. Sight distance to the south is restricted by the tree line off the west shoulder, especially when stopped at the existing stop line.

An overhead flashing beacon is mounted on a span wire, above the intersection. The beacon flashes red for the side street and yellow on Weaver Pike. A large, double-arrow sign (W1-7) is mounted directly across the intersection from Silver Grove Road, on the east shoulder of Weaver Pike, and guardrail approximately 115 feet in length is in place to shield against drivers proceeding through the intersection. An offset-intersection warning sign (W2-7) exists on the northbound approach to the intersection. Although a corresponding sign southbound is reflected in TDOT maintenance GIS inventory, it was not present during field visits.



Safety

Silver Grove Road has received a total of 9 collision reports with the most common of these (4) due to opposing left collisions between EB Silver Grove Road and NB SR 358. Only one of the crashes resulted in a non-incapacitating injury. The crash rate at this intersection is significantly above the statewide average and nearly two times the critical rate.

OLD SILVER GROVE ROAD

Intersection Characteristics

Old Silver Grove Road cuts between Silver Grove Road to the north and Weaver Pike to the southeast. It provides a potential cut-through route for traffic moving to and from Silver Grove Road and the southern portion of Weaver Pike, including Sullivan East Middle School. The intersection exists outside of a curve, which reverses just to the north, prior to the Silver Grove Road intersection. Old Silver Grove Road intersects with a significant upward grade. This slope, combined with the superelevation of the curve on Weaver Pike, can create sight distance restrictions depending on the location of a stopped vehicle.

An improved property exists on the northwest corner of the intersection. Its large parking area connects continuously to the shoulder of the roadway, creating a large expanse of asphalt from the intersection to approximately 200 feet north. Because Sullivan East Middle School restricts left-turns exits from its driveway during pick-up and drop-off periods, many drivers use the large parking area as a turnaround.

The reverse curve through this area is signed on both approaches with a reverse curve warning sign (W1-4) with a 35 mile per hour advisory speed (W13-1P). A T-intersection warning sign (W2-2) exists southbound, but the northbound sign shown in TDOT inventory was not observed during field inspection. Centerline and edge line markings on Weaver Pike break for approximately 80 feet through this intersection. A stop line and centerline markings on Old Silver Grove Road stop approximately 50 feet from the edge of the traveled way.



Safety

There has been a total of 2 collisions reported at Old Silver Grove, including a rear-end and a roadway departure. These collisions resulted in 1 case of possible injuries and 1 case of incapacitating injuries. This intersection has a crash rate above the statewide average but just below the critical rate.

MIDDLE SCHOOL ACCESS

Intersection Characteristics

This T-intersection provides access to Sullivan East Middle School. The driveway has turn lanes for both directions onto Weaver Pike. There is also an existing left-turn lane for southbound Weaver Pike into the school. The turn lane on Weaver Pike has approximately 160 feet of storage, plus a 75 foot taper, however the median widening from two lanes to three is used for additional storage while parents queue to wait for student pick-up.

The school zone includes 25 mile per hour speed limit flashers (S5-1) in both directions, preceded by school advance crossing signs (S1-1) with ahead plaques (W16-9P). The end of the school speed zones are marked by end school zone (S5-2) signs. The centerline on Weaver Road tapers to add an additional 12 foot width for the turn lane into the school. This taper is approximately 250 feet long. South of the driveway, another 250 foot taper back to two lanes immediately precedes a bi-directional passing zone.



Safety

Within the 5-year study period, only 1 collision was reported near East Sullivan Middle School, an angle crash at a driveway south of the school. Due to the school recently opening in January of 2020, there is a lack of collision history possibly leading to the low number of collision reports.

OLD WEAVER PIKE

Intersection Characteristics

This T-intersection has a skew angle of approximately 23 degrees and is located in a horizontal curve. Old Weaver Pike approaches from the east and is stop-controlled. Both roadways have centerline and edge line markings, and Old Weaver Pike has an existing stop line. Guardrail is carried through this intersection on both sides of every approach. A curve warning sign (W1-2) exists southbound, and a combined curve and intersection warning sign (W1-10) exists northbound.



Safety

The intersection at Old Weaver Pike has a crash rate above the critical rate. There has been a total of 3 collisions reported with 2 instances of property damage, and 1 instance of injury.

Of particular note is the fact that the only bicycle crash on the corridor occurred at this location. A younger rider was pedaling southbound on the east shoulder, when a vehicle pulled out from the stop sign at Old Weaver Pike. This crash was reported as a serious injury.

3 PUBLIC ENGAGEMENT

Public engagement in the study process is essential for the project team to understand and analyze existing conditions based on the perception of 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 are implemented. Throughout the study, the project team solicited feedback from a steering committee consisting of representatives from the Bristol Metropolitan Planning Organization (BMPO), Sullivan County, the First Tennessee Development District (FTDD), and the Tennessee Department of Transportation (TDOT).

3.1 STEERING COMMITTEE MEETINGS

The project team conducted four 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 the steering committee meetings are provided in Appendix D. All these meetings were held virtually.

October 17, 2022 – Initial kick-off meeting in which the project scope, schedule, and details were reviewed, with existing areas of concern being mapped.

December 16, 2022 – Discussion of the public survey for the project.

February 28, 2023 – Review of the public survey results and discussion of potential safety countermeasures.

May 11, 2023 – Crash data review and presentation of initial recommendations from the consultant team.

3.2 PUBLIC SURVEY

The public survey was generated using MetroQuest Studio and was available from February 6, 2023, through February 27, 2023. The home page of the MetroQuest survey is shown in Figure 3-1. Information about the survey was posted on the BMPO and Sullivan County websites and social media sites to garner public interest and participation. A press release was sent to the Bristol Herald-Courier, and flyers were mailed to community members.

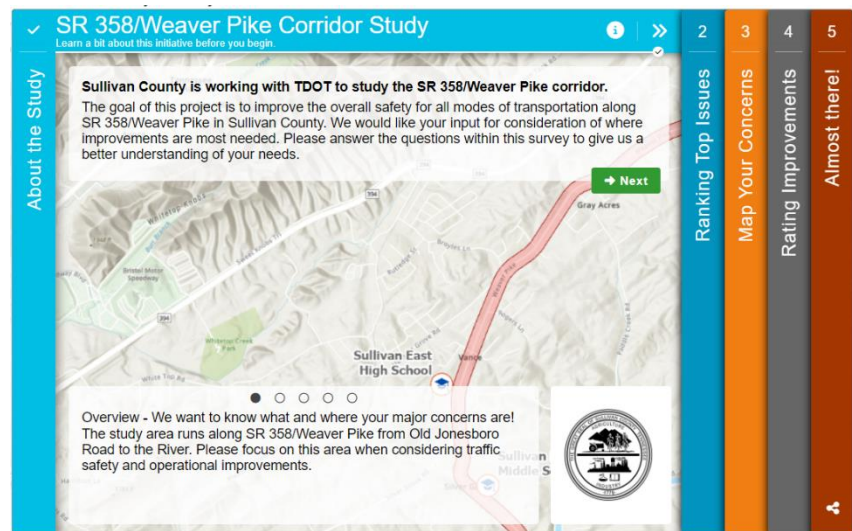


Figure 3-1 MetroQuest Survey Home Page

The survey received 694 visitors, of which 375 participated in the survey. The survey asked respondents to rank what they perceived as the major issues in the corridor. School traffic, speeding, and lack of turn lanes at intersections were the three highest-ranked issues. Additionally, respondents were presented with a map and the ability to place markers on locations where safety improvements should be made. The markers were divided into five categories of improvements: Line of Sight, Speeding, Safety, Bike/Ped, and Other. Safety was the highest marked improvement, followed by speeding and line of sight. Within the safety category, most respondents identified turn lanes and intersection improvements as the most helpful safety countermeasures, as shown in Figure 3-2. Respondents were further asked to rate various safety improvements, resulting in turn lanes, widened shoulders, and center lanes with the highest scores. In addition to improvements to the existing roadway, respondents expressed interest in the addition of a sidewalk along the corridor.

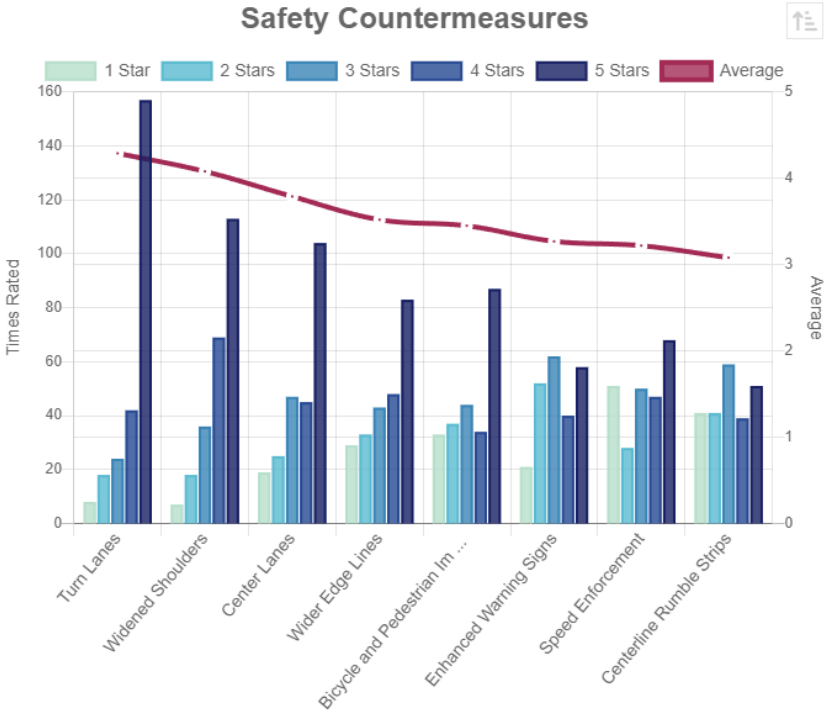


Figure 3-2 Safety Countermeasures Ranking from Public Survey

3.3 PUBLIC MEETINGS

Two public meetings were held to solicit feedback and allow the public to speak directly with the project team. Both meetings were held at Sullivan East High School.

June 6, 2023 – The project team reviewed the purpose of the study and identified the initial improvement recommendations. Results of the public survey were presented. Following the presentation, attendees could speak with



the project team and participate in a “dot exercise,” indicating their favorability towards different types of safety countermeasures, as shown in Figure 3-3.

SR 358/Weaver Pike Corridor Study Improvements Feedback			
IMPROVEMENT TYPE	LOVE	LIKE	HATE
Multiuse Path	10 dots (7 blue, 2 yellow, 1 green)	2 dots (1 blue, 1 green)	0 dots
Horizontal Curve Enhancements	10 dots (5 blue, 3 yellow, 2 green)	3 dots (2 blue, 1 green)	0 dots
Turn Lanes at Busy Intersections	15 dots (8 blue, 4 yellow, 3 red)	3 dots (2 blue, 1 green)	0 dots
Centerline Rumble Strips	8 dots (4 blue, 2 yellow, 2 red)	4 dots (2 yellow, 1 red, 1 green)	2 dots (1 red, 1 green)
Wider Shoulders	7 dots (3 blue, 2 green, 2 yellow)	3 dots (2 yellow, 1 green)	2 dots (1 yellow, 1 blue)

Figure 3-3 Dot Exercise from the First Public Meeting

July 25, 2023 – The project team reviewed the purpose of the study for those who may be hearing about it for the first time. The revised concepts were presented to the public, and attendees were encouraged to provide comments on the final recommendations.



4 EVALUATION AND ANALYSIS

The project team evaluated the Weaver Pike corridor based on performance metrics and safety. Traffic volume counts were conducted to gather data on vehicular movements at intersections. Volume data provides insights into traffic patterns, intersection capacity, and assists in evaluating the need for additional turn lanes or changes to traffic control. This section details the methods and results of that analysis.

4.1 INTERSECTION OPERATIONAL ANALYSIS

Capacity and 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. Volume to capacity ratios were calculated based on the peak hour volumes and capacity dependent on intersection geometry. Capacity ratios between 0.80 and 0.90 represent acceptable and efficient use of the intersection's geometry, whereas capacity ratios over 0.90, intersections operating near or over capacity, may be less stable and greater delays may occur more often. In saturated traffic or over-capacity conditions, delay may be reduced, but capacity may only be marginally improved. Capacity issues often require intersection geometric improvements.

LOS and capacity measure an intersection's ability to accommodate traffic volumes. LOS for intersections ranges from A to F. LOS A is the best, and LOS F is failing. For unsignalized intersections, a LOS of A has an average estimated intersection delay of less than 10 seconds, and LOS F has an estimated delay of greater than 50 seconds. A LOS of C and D are typical design values. Table 4-1 presents a description of the intersection LOS.

The Weaver Pike corridor was modeled using Synchro 11, a modeling software developed by Trafficware. Synchro is often used in the evaluation of signal timing and its optimization. Traffic turning movement count (TMC) data was entered in the Synchro models for the AM and PM peak hours and then growth was projected for future years. Appendix E contains the results of all Synchro analysis for all signalized intersections within the corridor for the mentioned time periods. The following sections highlight some noteworthy observations.

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)

4.2 EXISTING ANALYSIS (NO BUILD)

Though the overall intersection levels of service are acceptable for the corridor, queuing and poor levels of service can be experienced for some minor approaches. Side street LOS is shown in Table 4-2, with a more extensive LOS summary table in Appendix E.

Five- and Twenty-Five-year Analysis

Further analyses were conducted for a 5-year (2027) and 25-year horizon (2047) of the corridor to determine the capacity and level of service of the future analysis years. Historical AADT values from the past 5 years were reviewed, and a growth rate of 1.5% was selected to be applied corridor-wide and compounded annually.

Level of service was reported at every study intersection for each lane. Values were satisfactory for all analysis periods, with the exception of the driveways for Sullivan East High School and Sullivan East Middle School. Both driveways are currently LOS F during the AM peak and will only experience higher delays in future periods. It should be noted that the PM peak analysis period for the corridor differs from the student release timeframe, and these performance measures do not reflect the impact of school staff directing traffic. Afternoon release periods likely experience similar levels of service to the AM peak values. All other locations were projected to reach no worse than LOS D by year 2047, with most locations at a LOS C or better.

Table 4-2 Performance of Side Street Approaches (No Build)

Intersecting Street	AM Peak 2022		PM Peak 2022		AM Peak 2027		PM Peak 2027		AM Peak 2047		PM Peak 2047	
	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)
Old Jonesboro Road	B	12.8	B	13.3	B	13.4	B	14.0	C	18.3	C	20.5
Bullock Hollow Road	B	12.9	B	10.8	B	13.4	B	11.0	C	18.4	B	13.0
Cant Hook Hill Road (NB)	B	11.0	B	10.0	B	14.2	B	11.4	C	18.6	B	13.2
Cant Hook Hill Road (SB)	B	13.3	B	11.3	B	10.3	B	10.3	B	11.1	B	11.0
Peoples Road	B	13.6	B	10.8	B	14.1	B	11.1	C	18.6	B	12.4
Paddle Creek Road	B	11.1	B	10.8	B	11.4	B	11.0	B	13.2	B	12.5
Broyles Lane	B	10.7	B	10.3	B	10.9	B	10.5	B	12.7	B	11.8
Pleasant Grove Road	B	12.8	B	11.9	B	13.3	B	12.3	C	18.9	C	15.4
High School Access #1	F	210.0	B	11.9	F	312.4	B	12.2	F	1484.4	C	15.3
High School Access #2	C	15.4	B	11.4	C	16.4	B	11.7	D	27.6	B	14.2
Harrington Hollow Road	C	17.4	B	10.8	C	18.2	B	11.0	D	28.9	B	12.5
Silver Grove Road	C	24.6	B	11.8	D	29.5	B	12.1	F	161.3	B	14.9
Old Silver Grove Road	B	10.9	A	9.6	B	11.1	A	9.7	B	13.6	B	10.3
Middle School Access	C	15.6	B	10.2	C	16.7	B	10.3	E	38.9	B	11.4

4.3 PROPOSED CONCEPT ANALYSIS (BUILD)

Proposed improvements indicated some improved delay values from the minor approaches, but more importantly added intersection capacity and provided increased storage for traffic queues, enhancing the intersection operation and safety. Table 4-3 and Table 4-4 contains the analysis results for the below proposed concepts.

Bullock Hollow Road

At the intersection of Bullock Hollow Road and Weaver Pike, the current geometric layout presents challenges with three access points along Weaver Pike converging within a 500-foot span, all situated on a curve. Such a configuration can lead to visibility concerns and potential traffic conflicts. To enhance safety and improve traffic flow, our proposal recommends consolidating these three access points into a single, strategically positioned access point that maximizes sight distance. In addition to this consolidation, the introduction of a dedicated left turn lane for southbound Weaver Pike traffic was proposed. This will facilitate safer turns onto Bullock Hollow Road by allowing vehicles to decelerate and queue without obstructing the through lane, thereby mitigating rear-end collision risks.

Although the geometric modifications at the intersection of Bullock Hollow Road and Weaver Pike did not yield significant improvements in the overall performance or throughput of the intersection, they are projected to markedly enhance safety. By streamlining access points and introducing dedicated turn lanes, we're addressing potential traffic conflict zones and sight distance issues, paving the way for safer vehicular movements and reduced accident potential.

Cant Hook Hill Road

At the Cant Hook Hill Road Intersection, where future residential development is anticipated, we have proposed the introduction of two left-turn lanes leading onto the minor street. Presently, the existing traffic volumes and the projected figures for 2047 do not justify such an enhancement. However, should the anticipated residential development materialize in the future, this infrastructure modification would become increasingly relevant and beneficial. It's prudent to consider these geometric changes as part of proactive planning to accommodate potential increases in traffic demand.

Sullivan East High School Access #1

Current evaluations at the East Sullivan High School Access #1 intersection indicate LOS F during the AM period for exiting vehicles. To address this issue, we have proposed the addition of a separate right-turn lane at the High School access, aiming to augment both the capacity and storage. However, challenges persist, notably for left-turning egress movements. These are chiefly impacted by the northbound Weaver Pike traffic, which offers limited gaps for vehicles turning left out of the high school. To further streamline ingress and egress, a southbound right-turn lane leading into the school is also proposed.

Even with these improvements, the LOS for the left turns out remain at a LOS F; however, the delay experienced is more than halved. As an additional measure to bolster both operation and the safety of vehicles, we recommend the continuous deployment of school crossing guards at the entrance, a collaborative effort involving both the school and the broader community.

Sullivan East High School Access # 2 Alternative 1

At East Sullivan High School Access #2, two distinct concept alternatives to optimize traffic flow and safety were devised. For the first alternative, it is proposed to relocate the access point further south. This relocation is designed to merge the student parking lot access with the gated entrance associated with the sport facilities. The key advantage of this shift is the additional length it offers to the left-turn lane at High School Access #1. For this newly positioned access, the alternative entails the introduction of separate exit lanes for both right and left turns, coupled with a dedicated entrance lane directing traffic straight to the student parking lot. In addition, this alternative configuration also makes provisions for a left-turn lane for vehicles entering the access, ensuring smoother transitions and reduced conflicts.

While the proposed geometric alterations at East Sullivan High School Access #2 might not significantly enhance the intersection's overall performance metrics, they are crucial in elevating safety standards.

Additionally, these modifications are poised to facilitate a more streamlined and efficient flow of traffic within the campus boundaries. By addressing potential conflict points and offering clearer vehicular paths, we aim to reduce the chances of incidents while ensuring smoother transitions for all users of the school's facilities.

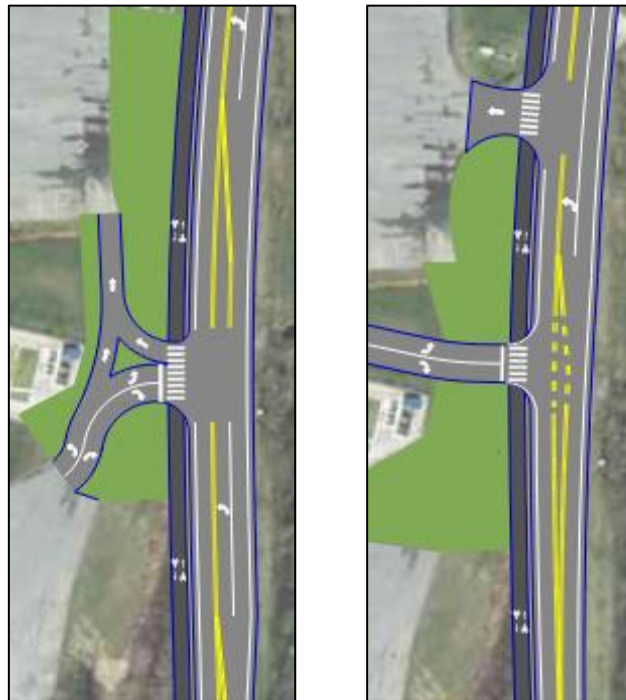


Figure 4-1 High School Access # 2 Realignment Alternative 1 (Left) and Alternative 2 (Right)

Sullivan East High School Access # 2 Alternative 2

The second alternative utilizes the existing student parking lot access point as an entry-only drive. Traffic would circulate around to exit via the existing access point 150 feet to the south. Left-turns out of the parking lot only compete with a single thru lane in each direction in this alternative and are no longer forced to yield to northbound left-turns, which are queued separately to the north of the exit. This alternative did reduce the delay for vehicles turning left out of the parking area considerably, in the analysis.

Sullivan East Middle School Access

The middle school driveway already has dedicated left and right-turn lanes for exiting vehicles, as well as a left-turn lane from Weaver Pike southbound. A proposed right-turn lane and extension of the left-turn lane on Weaver Pike provided some reduction of delay, but not enough to cross any LOS thresholds for any analysis period or lane group.



The primary benefit of this added storage is to allow queues during student drop-off and pick-up periods more room to keep stopped traffic separated from the thru lanes. Queuing analysis cannot be completely reflective of real world conditions, because access to the school is artificially interrupted to allow for release of school buses. This interruption is not reflected in the queues, which currently back up and stop the flow of traffic on Weaver Pike altogether.

Table 4-3 Analysis of Proposed Concepts (Build Condition)

Unsignalized Intersections at SR 358	Approach	No Build Lane Group	Peak Hour	2027 No Build (5yr)			2047 No Build (25yr)			Build Lane Group	2027 Build (5yr)			2047 Build (25yr)		
				V/C	Delay (sec)	LOS	V/C	Delay (sec)	LOS		V/C	Delay (sec)	LOS	V/C	Delay (sec)	LOS
Bullock Hollow Road	WB Bullock Hollow Rd	LT RT	AM	0.24	13.4	B	0.4	18.4	C	LT RT	0.17	11.8	B	0.41	18.7	C
			PM	0.14	11	B	0.23	13	B		0.13	11.2	B	0.22	13.5	B
	SB SR 358	LT TH	AM	0.02	8.2	A	0.03	8.7	A	LT	0.02	8	A	0.03	8.7	A
			PM	0.07	7.8	A	0.1	8.1	A		0.08	7.8	A	0.12	8.1	A
Cant Hook Hill Road	NB Cant Hook Hill Rd	LT TH RT	AM	0.08	14.2	B	0.14	18.6	C	LT TH RT	0.08	14.2	B	0.14	18.6	C
			PM	0.03	11.4	B	0.05	13.2	B		0.03	11.4	B	0.05	13.2	B
	SB Cant Hook Hill Rd	LT TH RT	AM	0.03	10.3	B	0.05	11.1	B	LT TH RT	0.03	10.3	B	0.05	11.1	B
			PM	0.02	10.3	B	0.03	11	B		0.02	10.3	B	0.03	11	B
	EB SR 358	LT	AM	0.003	7.8	A	0.005	8	A	LT	0.003	7.8	A	0.005	8	A
			PM	0.003	7.7	A	0.005	7.9	A		0.003	7.7	A	0.005	7.9	A
	WB SR 358	LT	AM	0.001	8.1	A	0.001	8.5	A	LT	0.001	8.1	A	0.001	8.5	A
			PM	0.02	7.6	A	0.02	7.8	A		0.02	7.6	A	0.02	7.8	A
Sullivan East High School Access #1	EB HS Access #1	LT TH RT	AM	1.58	312.4	F	4.15	1484.4	F	LT TH	1.05	142.4	F	2.95	995.7	F
			PM	0.19	12.2	B	0.32	15.3	C		0.11	13	B	0.19	16.4	C
		-	AM	-			-			RT	0.33	12.1	B	0.51	15.8	C
			PM	-			-				0.08	9.8	A	0.12	10.5	B
	WB Public Driveway	LT TH RT	AM	0.09	34.5	D	0.26	108.9	F	LT TH RT	0.09	33.3	D	0.23	93.9	F
			PM	0.02	11.8	B	0.03	13.6	B		0.02	11.8	B	0.03	13.6	B
	NB SR 358	LT	AM	0.22	9.2	A	0.35	10.7	B	LT	0.22	9.2	A	0.35	10.7	B
			PM	0.02	7.8	A	0.02	8	A		0.02	7.8	A	0.02	8	A
	SB SR 358	LT TH RT	AM	0.001	7.8	A	0.001	8.1	A	LT TH	0.001	7.8	A	0.001	8.1	A
			PM	0.002	7.6	A	0.003	7.7	A		0.002	7.6	A	0.003	7.7	A
Sullivan East Middle School Access	SW MS Access	LT	AM	0.3	26.9	D	0.73	85.8	F	LT	0.29	25.7	D	0.69	75.5	F
			PM	0.07	12.3	B	0.12	14.7	B		0.07	12.2	B	0.11	14.5	B
		RT	AM	0.58	15.2	C	0.86	31.9	D	RT	0.55	14.3	B	0.81	26.2	D
			PM	0.13	9.7	A	0.19	10.4	B		0.13	9.6	A	0.19	10.3	B
	SE SR 358	LT	AM	0.23	8.6	A	0.34	9.5	A	LT	0.23	8.6	A	0.34	9.5	A
			PM	0.04	7.7	A	0.06	7.8	A		0.04	7.7	A	0.06	7.8	A

Table 4-4 Analysis of Proposed Alternatives at East Sullivan High School Access #2 (Build Conditions)

Scenario	Unsignalized Intersections at SR 358	Approach	No Build Lane Group	Peak Hour	2027 No Build (5yr)			2047 No Build (25yr)			Build Lane Group	2027 Build (5yr)			2047 Build (25yr)		
					V/C	Delay (sec)	LOS	V/C	Delay (sec)	LOS		V/C	Delay (sec)	LOS	V/C	Delay (sec)	LOS
Alternative 1	HS Access # 2	EB HS Access #2	LT RT	AM	0.07	16.4	C	0.18	27.6	D	LT	0.02	19.7	C	0.04	30.6	D
				PM	0.18	11.7	B	0.28	14.2	B		0.06	11.9	B	0.1	13.9	B
		-	-	AM	-						RT	0.01	10.3	B	0.02	11.2	B
				PM	-							0.07	9.8	A	0.11	10.5	B
		NB SR-358	LT TH	AM	0.13	8.7	A	0.19	9.5	A	LT TH	0.09	8.4	A	0.14	9	A
				PM	0.02	7.9	A	0.03	8.1	A		0.02	7.8	A	0.03	8	A
Alternative 2	HS Access # 2	EB HS Access #2	LT RT	AM	0.07	16.4	C	0.18	27.6	D	-	-					
				PM	0.18	11.7	B	0.28	14.2	B		-					
		-	-	AM	-						-	-					
				PM	-							-					
		NB SR-358	LT TH	AM	0.13	8.7	A	0.19	9.5	A	LT	0.13	8.7	A	0.19	9.5	A
				PM	0.02	7.9	A	0.03	8.1	A		0.02	7.9	A	0.03	8.1	A
	HS Access # 3	EB HS Access #3	-	AM	-						LT	0.01	15.8	C	0.03	21.4	C
				PM	-							0.06	11.6	B	0.1	13.1	B
		-	-	AM	-						RT	0.01	10	B	0.02	10.7	B
				PM	-							0.07	9.9	A	0.1	10.5	B
		-	-	AM	-						-	-					
				PM	-							-					

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, more efficient, and more accessible to all users.

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, 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 F.

5.1 SIGNAGE AND PAVEMENT MARKING UPGRADES

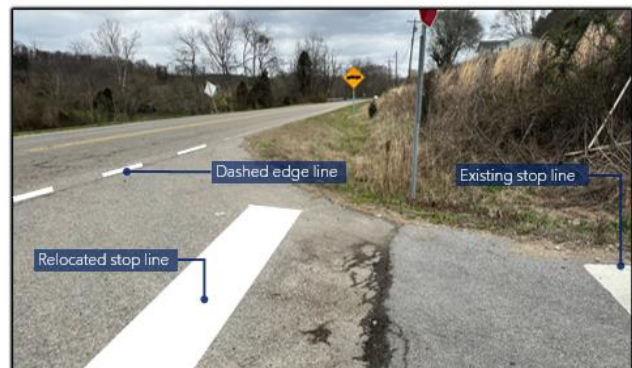
Instead of roadway reconfigurations or intersection geometry changes, many recommendations along Weaver Pike pertain to signage and pavement marking improvements. The following sections detail the improvement recommendations and the locations of each.

STOP BARS AND EDGE LINES

There were several public comments about visibility obstructions when turning onto Weaver Pike. Several side roads are either missing stop bars or are located too far from the edge of Weaver Pike, making it difficult to see approaching vehicles. The recommendation at these locations is to move the stop bar closer to the edge of the roadway and to stripe the Weaver Pike edge line with dashed pavement markings. This will help to provide a visual cue to drivers on the side road as to where the edge of the road is located, allowing drivers to feel comfortable pulling up close enough to have a clear line of sight of oncoming vehicles.

- Old Jonesboro Road
- Peoples Road
- Paddle Creek Road
- Rogers Lane
- Harrington Hollow Road
- Silver Grove Road
- Old Silver Grove Road

Cost Estimate: \$5,000



SIGNING PLAN

A holistic assessment was completed of the traffic signs along Weaver Pike. Several opportunities exist to optimize sign placement. These modifications aim to provide clear, accurate, prioritized information to drivers and to do so efficiently to avoid information overload. Signs need to be spaced adequately, and warning signs need to be provided within reasonable distances from the condition they warn of. In some cases, two signs can be combined into a single sign or placed on the same post.

The ***Manual on Uniform Traffic Control Devices*** (MUTCD) indicates that signs should be spaced at least 100 feet apart. It also recommends warning signs on a 45 mph roadway should be approximately 175 feet in advance of a condition which could require drivers to come to a complete stop, as an intersection with no turn lanes might.

Speed Limit Signage

Periodic speed limit sign installations are necessary to ensure drivers are informed of the speed limit soon upon entry to the corridor and reminded regularly. Existing speed limit sign locations can be optimized to minimize the distance traveled from any of the major points of entry to Weaver Pike prior to encountering a sign. It is recommended that signs be located just after each major cross street, with some streets being paired to reduce the overall number of speed limit signs. The major entry points to receive a pair of speed limit signs are the following:

- Old Jonesboro Road
- Cant Hook Hill and Bullock Hollow Road
- Peoples Road and Paddle Creek Road
- Broyles Lane and Pleasant Grove Road
- Harrington Hollow Road, Silver Grove Road, and Old Silver Grove Road
- Old Weaver Pike

School Zone Signing

Part 7 of the MUTCD outlines signing and marking requirements for school zones. The existing school zone (S1-1) signs are mounted above supplemental plaques with the legend AHEAD (W16-9P). This combination is intended to provide advance warning of a school-related crossing. Because no crossing is signed or marked, the assumed intent of these sign assemblies is to act as school zone signs instead. To more appropriately communicate this, it is recommended that the AHEAD plaques be replaced with SCHOOL (S4-3P) plaques.

Optionally, speed limit signs may be mounted above the END SCHOOL ZONE signs, marking the end of the school speed limits. To reduce sign clutter, it is recommended that this be done at both school zones to help with the consistent marking of speed limits along the corridor.

Warning Signs

It is recommended that several signs along the corridor be relocated and/or redesigned to more accurately convey the intended information. As much as possible, warning signs should be located at shorter distances from the condition they intend to warn about.

Curve warning signs should be placed to provide indication an adequate distance from the curve, but reasonably close to the beginning of the curve. The intersection warning signs for Paddle Creek Road and Long View Drive can be combined into a single warning sign. Graphic curve and intersection combination

signs are recommended at Bullock Hollow Road, as well as northbound Old Silver Grove Road. It is recommended that existing curve warning signs be supplemented with chevron signs to delineate the curves at Pleasant Grove Road and Bullock Hollow Road. At Old Jonesboro Road and Silver Grove Road, warning signs are recommended to be supplemented with road name plaques.

Ball bank analysis was performed during field review. A ball bank indicator is the procedure outlined in the MUTCD for determining appropriate advisory speeds for curve warning signs. The existing 35 mile per hour advisory speeds at Old Jonesboro Road and Silver Grove Road were deemed adequate, and no additional advisory speed warnings were necessary. A summary diagram of all sign recommendations along the corridor is included in Figure 5-1.

Cost Estimate: \$26,000

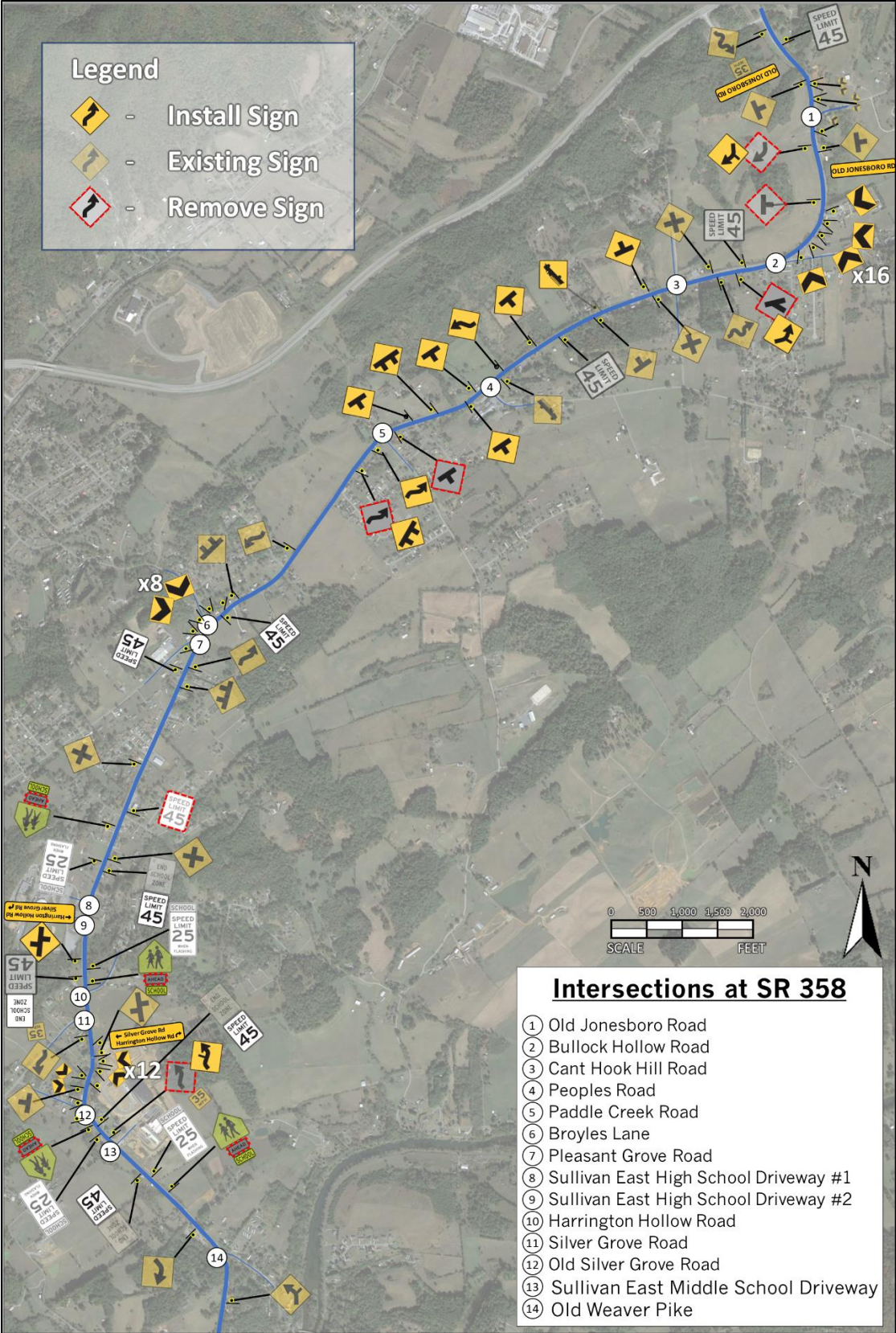


Figure 5-1 Corridor Signing Recommendations

CURVE DELINEATION

Single-vehicle roadway departure crashes are relatively frequent along Weaver Pike. It is recommended that several curves on the corridor with existing curve warning signs be supplemented with chevrons and raised pavement markers to visually delineate the curve, especially during dark conditions.

Reflective pavement markings along the centerline of the roadway help to provide a visual path through the curve. It is recommended that they be installed at 20-foot spacing to provide a continuous visual cue. Chevron signs provide a vertical element to this delineation, further enhancing the conspicuity of the curve.



Reflective Pavement Markers

It is recommended that snow plowable reflectors are recessed into the pavement to reduce ongoing maintenance needs in the winter. Marker installation should begin approximately 300 feet in advance of the point of curvature, in each direction. The recommended centerline reflector locations are shown in Figure 5-3.

Cost Estimate: \$15,000

Pavement Marking Enhancements

The curve at the intersections with Pleasant Grove Road and Broyles Lane has an existing passing zone beginning at Broyles Lane (see Figure 2-10). Due to its proximity to the two intersections and the complication of occurring in a horizontal curve, extending the double-yellow striping south is recommended outside of the curve. Large gaps in the centerline and edge line striping due to the wide-throat intersections diminish the channelization through the curve, which would be aided by adding dashed lane guidelines through both intersections. These improvements are pictured in Figure 5-2.



Figure 5-2 Pavement Marking Improvements at Pleasant Grove Road and Broyles Lane

Cost Estimate: \$1,400



Figure 5-3. Centerline Reflector Recommendation for SR 358

5.2 SPEED DETERRENCE

Based on responses from the public survey and comments made at the public meetings, speeding is a major concern for residents and daily users of Weaver Pike. Reducing the speed limit of a roadway alone does not significantly change driver behavior because drivers often base their speed on their perceived sense of safety rather than posted speed limits. In order to effectively get drivers to lower their speeds, physical countermeasures should be introduced to influence driving at a slower speed. Typical recommendations fall under three categories: Engineering, Enforcement, and Education.

The posted speed limit on Weaver Pike is 45 mph, which is too high to safely recommend conventional traffic calming measures such as speed humps, chicanes, or other vertical deflection and horizontal shifts. The recommendation for reducing speed is strategically placing speed radar signs in the straight sections of the roadway where drivers naturally increase speeds. The real-time feedback from the sign helps to make drivers aware of their speed relative to the posted speed limit.



Additional speed deterrence strategies are inherent in other recommendations presented in this report, including: advisory speed signs, enhanced signing and marking, curve warning signs, and optimizing the placement of speed limit signs. One of the most effective ways to reduce speeding is to increase the enforcement along the roadway, but it needs to be frequent and consistent.

It is recommended to install speed radar signs south of the Pleasant Grove Road intersection in both directions. If the radar signs are installed, the speed limit signs at this location called out in the signing plan do not need to be installed.

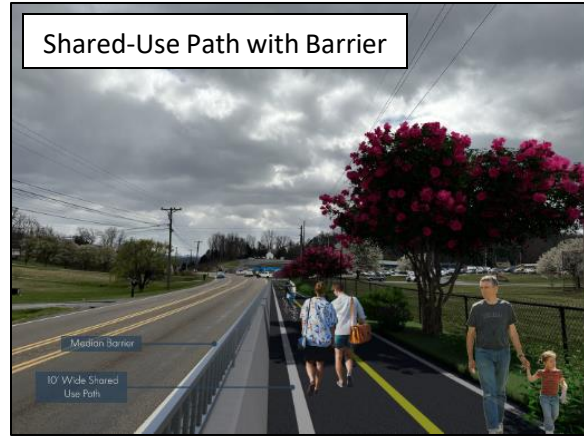
Cost Estimate: \$17,000

5.3 SHARED USE PATH

Multimodal facilities such as shared-use paths provide numerous benefits to the community: active transportation opportunities, safe infrastructure for vulnerable users, connectivity, recreational spaces, community cohesion, environmental benefits, and are known to boost economic development. A shared-use path is recommended along Weaver Pike, specifically between the Middle School and the High School, to provide a safe refuge for students to walk and bike. Figure 5-4 shows the proposed location for the shared-use path. The first phase would begin at the future Patriot Park and extend north to Rogers Drive. A high visibility crosswalk with pedestrian signalization is recommended for pedestrian conspicuity at the Rogers Drive intersection due to the number of students who frequent the convenience store. The second phase of the shared-use path is recommended to extend from the Middle School south to Old Weaver Pike.



Figure 5-4 Proposed Shared-Use Path Location Map



The shared-use path provides a space for vulnerable users away from the roadway; however, a barrier wall may be included to offer added protection. Since much of the shared-use path is proposed to run along Weaver Pike, a barrier wall would provide protection from vehicles that may run off the road.

As shown in the renderings above and the cross-sections in Figure 5-5 and Figure 5-6, when the barrier wall is utilized, the shared-use path can be located closer to the roadway, reducing the right-of-way impacts to adjacent properties. The drawbacks of the barrier wall are the increased costs and the visibility constraints that it may present at driveways and side road crossings. The cost estimate for each phase with and without the barrier are shown below.

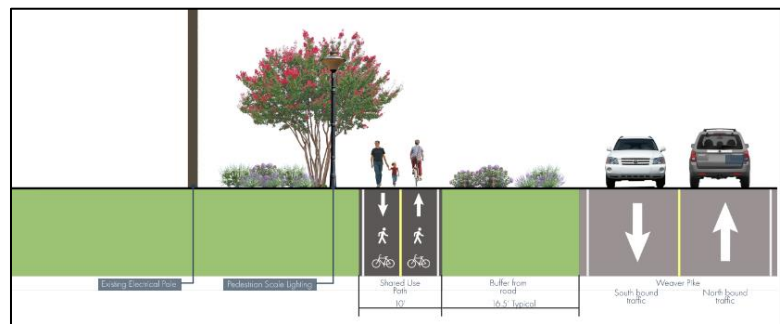


Figure 5-5 Shared-Use Path Cross-Section without Barrier

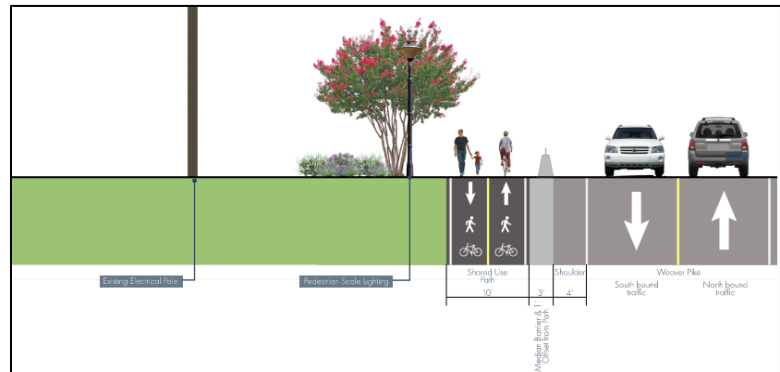


Figure 5-6 Shared-Use Path Cross-Section with Barrier

Cost Estimate (Phase 1 without barrier): \$502,000

Cost Estimate (Phase 1 with barrier): \$857,000

Cost Estimate (Phase 2 without barrier): \$362,000

Cost Estimate (Phase 2 with barrier): \$656,000

5.4 INTERSECTION IMPROVEMENTS

TURN LANES

Based on feedback from the public survey, one of the top public concerns is the lack of turn lanes at intersections. In addition to operational improvements, dedicated turn lanes offer safety improvements because they provide a refuge from the through lane for vehicles turning off the main roadway. The following describes key locations where turn lanes are recommended.

Cant Hook Hill Road

The current volumes at the Cant Hook Hill Road intersection do not warrant a dedicated left turn lane; however, proposed residential development in the area is likely to lead to an increase in traffic along Weaver Pike and Cant Hook Hill Road. The left-turn lane configuration at the Cant Hook Hill Road intersection, shown in Figure 5-7, provides a generalized rendering that can be used along Weaver Pike at intersections where volume growth presents a need for auxiliary lanes in the future.

Cost Estimate: \$210,000



Figure 5-7 Proposed Left-Turn Lanes at Cant Hook Hill Road

Bullock Hollow Road

The existing southbound left-turn lane volumes at Bullock Hollow Road warrant a dedicated left-turn lane. This will facilitate safer turns onto Bullock Hollow Road by allowing vehicles to decelerate and queue without obstructing the through lane, thereby mitigating rear-end collision risks. The realignment of Bullock Hollow Road and the consolidation of the three access points are a *separate recommendation from the turn lane and are described further in the following section.*



Cost Estimate: \$267,000

Sullivan East High School Access #1

School-related traffic was the highest concern to the public survey participants. One recommendation to manage traffic at the High School is to provide a dedicated southbound right-turn lane into the main access drive. The right-turn lane grants storage for queuing vehicles while maintaining a clear through lane for vehicles bypassing the school during dropoff and pickup. In addition to the southbound right-turn lane at Access #1, it is recommended that the drive is restriped to allow for two egress lanes – one turning left and one turning right.

Cost Estimate: \$182,000

Sullivan East High School Access #2 – Alternative 1

Two alternatives were developed to help enhance the access and operations of the additional High School access drives. The first alternative proposes closing the existing student parking lot access (Access #2). By doing so, more storage is available for the northbound left-turn lane into Access #1. As shown in Figure 5-8, a second northbound left-turn lane is proposed approaching Access #3, which would be used by students as ingress into the student parking area.

Cost Estimate: \$133,000

Sullivan East High School Access #2 – Alternative 2

The second alternative maintains the existing Access #2 into the student parking lot, as shown in Figure 5-9. Under this recommendation, Access #2 is converted to an entrance-only access and minimal additional storage is provided for northbound left-turn queues at Access #1 and Access #2. The benefit of this alternative is that the ingress and egress volumes are separated between Access #2 and Access #3, reducing the potential conflict points for opposing traffic. Additionally, the distance between exiting volumes during the afternoon peak hour is increased, which may help with finding appropriate gaps.

Cost Estimate: \$112,000



Figure 5-8 Sullivan East High School Access Alternative 1



Figure 5-9 Sullivan East High School Access Alternative 2

Sullivan East Middle School

Traffic at the Middle School blocks through traffic along Weaver Pike in both the eastbound and westbound directions. There is an existing eastbound left-turn lane into the Middle School, which is recommended to be extended to accommodate the existing queues. In addition to extending the left-turn lane, it is recommended that the school zone sign be relocated to before the influence area of the left-turning traffic into the school. A westbound right-turn lane is also proposed at the Middle School.

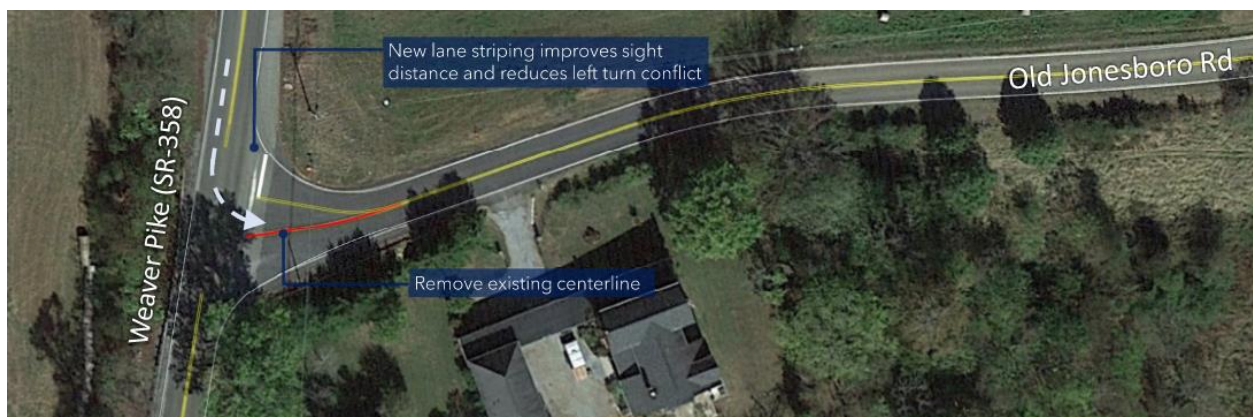


Cost Estimate (Right-Turn Lane): \$74,500

Cost Estimate (Left-Turn Lane): \$224,000

OLD JONESBORO ROAD REALIGNMENT

The short-term improvement at Old Jonesboro Road is to restripe the existing double yellow centerline to align at more of a 90-degree angle to Weaver Pike. This will help keep vehicles stopped on Old Jonesboro Road out of the path of southbound left-turn vehicles from Weaver Pike.



The long-term improvement includes realigning Old Jonesboro Road to intersect Weaver Pike at a 90-degree angle. This will help to improve visibility for vehicles turning onto Weaver Pike.



Cost Estimate: \$213,000

BULLOCK HOLLOW ROAD REALIGNMENT

Additional recommendations for Bullock Hollow Road include consolidating the three existing access points into a single, strategically positioned access point that maximizes sight distance for vehicles turning onto Weaver Pike. Consolidating multiple roadways will help enhance safety and improve traffic flow by providing drivers with an improved ability to anticipate the movement of traffic turning from Weaver Pike onto Bullock Hollow Road.



Cost Estimate: \$464,000

OLD SILVER GROVE ROAD SHOULDER TREATMENT

The recommendation at Old Silver Grove Road is to provide a grass strip between the edge of the shoulder along Weaver Pike and the asphalt parking area for the property located in the northwest quadrant of the intersection. Redefining the shoulder and confining the access locations will help to reduce the number of potential conflict points and prevent vehicles from using the property as a turnaround location for Middle School traffic.



Cost Estimate: \$3,500

5.5 SCHOOL ACCESS

Two alternatives are proposed to enhance the circulation at the High School access drives. The following describes the details of the access recommendations.

Sullivan East High School Access #2 – Alternative 1

The Alternative 1 recommendation is to relocate the student parking access drive further south. This relocation is designed to merge the student parking lot access with the gated entrance associated with the sport facilities. The new Access #3 consists of separate exit lanes for right- and left-turns. The entrance lane directs traffic straight to the student parking lot, and a one-way access drive connects the student parking area to the overflow parking lot.

Cost Estimate: \$10,400





Sullivan East High School Access #2 – Alternative 2

The Alternative 2 recommendation maintains Access #2 but converts it to an entrance-only drive. A new exit-only Access #3 with separate right- and left-turn lanes is proposed to run along the north side of the water treatment facility. A two-way drive provides access between the student parking area and the overflow parking lot.

Cost Estimate: \$78,700

5.6 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:

- Bullock Hollow Road to Old Jonesboro Road (11 poles)
- Paddle Creek Road (2 poles)
- Pleasant Grove Road to Broyles Lane (2 poles)
- Old Silver Grove Road to Silver Grove Road (8 poles)
- Old Weaver Pike (2 poles)
- High School (2 poles)
- Middle School (2 poles)

The number of poles at each location was estimated based on where the nighttime crashes occurred. At single intersections, a pole on each corner of the intersection should be sufficient. Nighttime crashes occurred throughout the curve between Bullock Hollow Road and Old Jonesboro Road and within the stretch between Old Silver Grove Road and Silver Grove Road. Additional lighting is proposed within these two segments of Weaver Pike. The assumption is that poles can be staggered on opposite sides of the roadway and placed approximately 200-feet apart. The lighting locations are depicted in Figure 5-10.

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: \$580,000

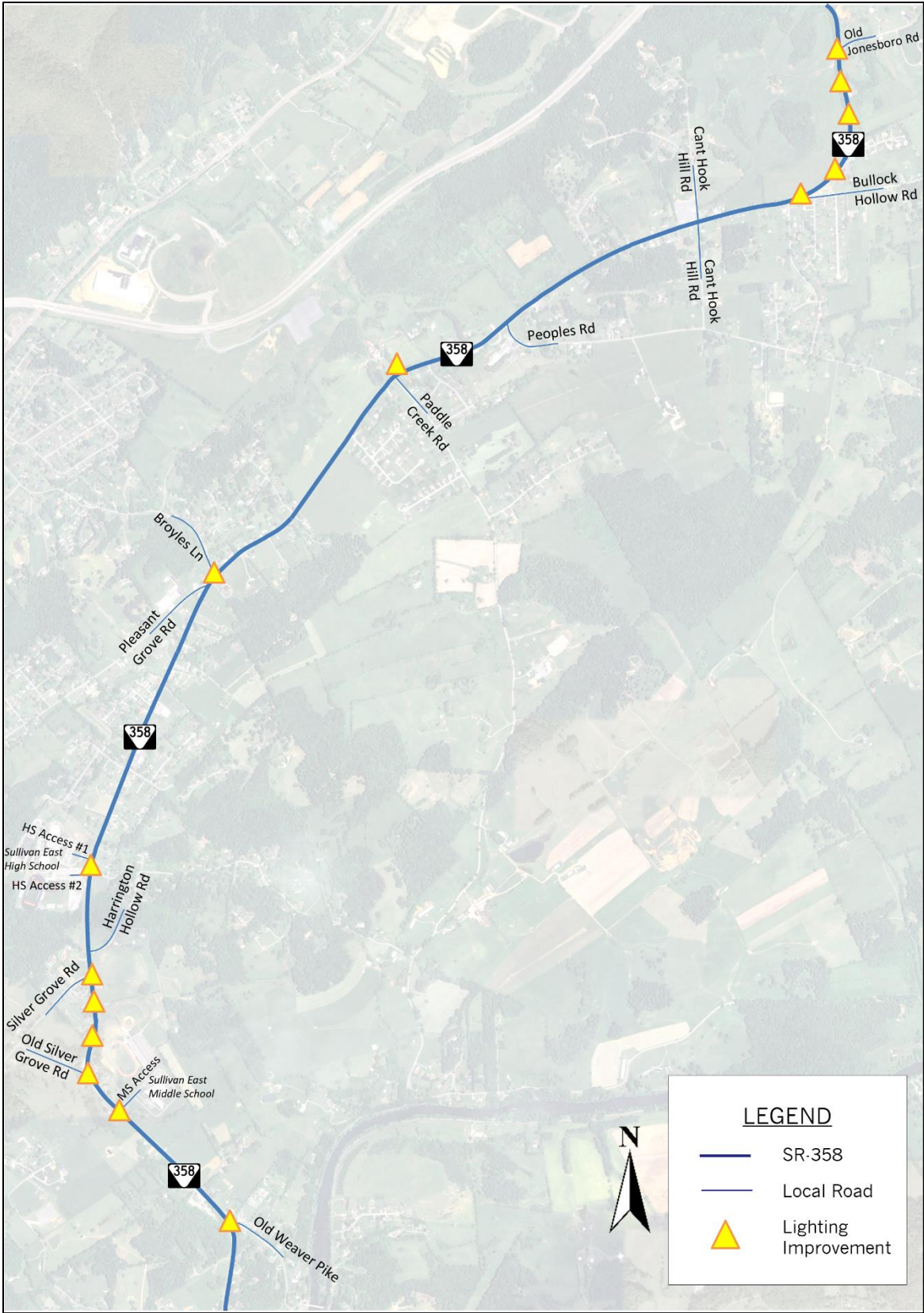


Figure 5-10 SR 358 Lighting Recommendations

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 section of the study 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 is denoted by a green dot, 2 represents a medium priority and is denoted by a yellow dot, and 3 represents a lower priority and is denoted by a red dot.

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 detailed design, such as signage and pavement marking enhancements*
- 2 = moderate complexity; *examples include projects that propose turn lanes or require new pavement but do not require right-of-way acquisition*
- 3 = high complexity; *examples include projects that require right-of-way acquisition, significantly alter the landscape, or require an environmental analysis before construction*

Public Priority

The public priority ranking is based on how well the improvement aligns with how the public prioritized the major issues for the corridor in the public survey.

- 1 = highest public priority; *the project is related to improving school traffic or speeding*
- 2 = medium public priority; *the project is related to adding turn lanes at intersections or providing a facility to prevent students from walking along Weaver Pike*
- 3 = lowest public priority; *the project is related to improving visual obstructions, lighting, or signage*

Public Concern

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

- 1 = high public concern; *over 50 comments*
- 2 = moderate public concern; *between 25 and 50 comments*
- 3 = low public concern; *less than 25 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 \$100,000
- 2 = moderate cost; projects greater than \$100,000 and less than \$300,000
- 3 = high cost; projects greater than \$300,000

6.2 IMPLEMENTATION PLAN

The project evaluation summary is provided in Table 6-1. The scores in the table are categorized by the following:

-  highest priority rankings (1)
-  medium priority rankings (2)
-  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 desires and available funding.

Table 6-1 Project Implementation Plan

Location	Recommendation	COMPLEXITY	PUBLIC PRIORITY	PUBLIC CONCERN	COST	PRIORITY BAND	Cost Estimate
Corridor-wide	Speed Radar Signs (2)	1	1	1	1	1	\$ 17,000.00
Middle School	Northbound Right-Turn Lane	2	1	1	1	1	\$ 74,500.00
Pleasant Grove Road and Broyles Lane	Pavement Marking Improvements	1	3	1	1	1	\$ 1,400.00
Old Silver Grove Road	Grass Strip Along Parking Lot	1	3	1	1	1	\$ 3,500.00
High School	Alternative 1	3	1	1	1	1	\$ 10,400.00
High School	Alternative 2	3	1	1	1	1	\$ 78,700.00
High School	Northbound Left-Turn Lane (Alternative 2)	2	1	1	2	1	\$ 112,000.00
High School	Northbound Left-Turn Lane (Alternative 1)	2	1	1	2	1	\$ 133,000.00
High School	Southbound Right-Turn Lane	2	1	1	2	1	\$ 182,000.00
Middle School	Southbound Left-Turn Lane	2	1	1	2	1	\$ 224,000.00
Corridor-wide	Stop Bar/Edge Lines	1	3	2	1	2	\$ 5,000.00
Corridor-wide	Centerline Reflectors	1	3	2	1	2	\$ 15,000.00
Corridor-wide	Signing Plan	1	3	2	1	2	\$ 56,000.00
Cant Hook Hill Road	Eastbound and Westbound Left-Turn Lanes	2	2	3	2	2	\$ 210,000.00
Bullock Hollow Road	Southbound Left-Turn Lane	2	2	3	2	2	\$ 267,000.00
Old Weaver Pike to Sullivan East Middle School	Shared-Use Path Phase 2 without barrier	3	2	1	3	2	\$ 362,000.00
Sullivan East Middle School to Rutledge Drive	Shared-Use Path Phase 1 without barrier	3	2	1	3	2	\$ 502,000.00
Old Weaver Pike to Sullivan East Middle School	Shared-Use Path Phase 2 with barrier	3	2	1	3	2	\$ 656,000.00
Sullivan East Middle School to Rutledge Drive	Shared-Use Path Phase 1 with barrier	3	2	1	3	2	\$ 857,000.00
Old Jonesboro Road	Realignment	3	3	2	2	3	\$ 213,000.00
Corridor-wide	Lighting	3	3	2	3	3	\$ 580,000.00
Bullock Hollow Road	Realignment	3	3	3	3	3	\$ 464,000.00

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:

- Speed Radar Signs
- Middle School – Northbound Right-Turn Lane
- Pleasant Grove Road and Broyles Lane – Pavement Marking Improvements
- Old Silver Grove Road – Grass Strip Along Parking Lot
- High School – Access Improvement (Alternative 1 OR Alternative 2)
- High School – Northbound Left-Turn Lanes (Alternative 1 OR Alternative 2)
- High School – Southbound Right-Turn Lane
- Middle School – Southbound Left-Turn Lane Extension

MID-TERM IMPROVEMENTS

Mid-term improvement projects 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:

- Stop Bar/Edge Lines
- Centerline Reflectors
- Signing Plan
- Cant Hook Hill Road – Left-Turn Lanes
- Bullock Hollow Road – Southbound Left-Turn Lane
- Shared-Use Path Phase 1 (with OR without barrier)
- Shared-Use Path Phase 2 (with OR without barrier)

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:

- Old Jonesboro Road Realignment
- Lighting
- Bullock Hollow Road Realignment

6.3 FUNDING OPPORTUNITIES

Transportation projects can often be costly to design and construct. Without intergovernmental assistance, a single government entity may find it difficult to adequately resolve its transportation needs solely from its own tax base. Fortunately, a variety of state and federal programs are available to assist with transportation funding. Table 6-2 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 congestion. Air quality is improved by funding transportation projects and programs that reduce vehicle emissions 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.	83% federal 17% Local Match \$4,000,000 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; quality 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, generate regional economic growth and improve quality of life.	80% match for planning grants and no more than 50% for capital projects.