



SR 93 and SR 1 Corridor Study

September 2023

Prepared by:



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SECTION 1

INTRODUCTION

The City of Kingsport was awarded a Tennessee Department of Transportation (TDOT) Transportation Planning Grant (TPG) in 2022 for the SR 93/SR 1 Traffic and Transportation Study. The study area encompasses E Stone Drive (SR 1) from Brookside Drive in the west to the eastern most entrance of the Kingsport Pavilion shopping center in the east, approximately 1.8 miles. Also included is N John B Dennis Highway (SR 93) from its intersection with Memorial Boulevard (SR 126) in the south to Bloomingdale Road in the north, approximately 3.8 miles.

This study provides a detailed transportation planning level analysis of N John B Dennis Highway (SR 93) and East Stone Drive (SR 1). It identifies the existing conditions within the study area, identifies issues and opportunities along the corridors, and provides recommendations for the City of Kingsport moving forward with an emphasis on safety and capacity improvements.

1.1 Project Background

The City of Kingsport applied for the TDOT Transportation Planning Grant to address overall safety, traffic flow, and operations for all transportation modes within the study area. Known for its livability and quality of life, the City aims to improve pedestrian and bicycle infrastructure where possible while strengthening its existing assets.

E Stone Drive is part of State Route 1 and US 11W, a broader highway that stretches from Memphis to Bristol, known as the first state road. Within Kingsport, it is an east-west route located in the northern half of the city. It shares the designation of US 11W within the entirety of its length in Kingsport. The road is a major regional commercial corridor and the primary one within the city. It provides integral access to regional destinations such as Bristol, TN to the northeast and Knoxville to the southwest. Several incorporated communities also access Kingsport from the road including Rogersville, Mt. Carmel, and Surgoinsville. As part of US 11W, the road was part of Lee Highway, one of the historical federal auto trails and has been a major commercial corridor for the City of Kingsport for decades.

E Stone Drive is heavily developed with multiple large traffic generators, including big-box retail, restaurants, and car dealerships. Reflecting its archaic, auto-oriented built environment, an incomplete pedestrian network is present on the road with intermittent sidewalks and pedestrian crossings. The Kingsport Greenbelt runs roughly parallel to E Stone Drive to the south following Reedy Creek offering an opportunity to tie it in with the road and extend it to the north.

N John B Dennis Highway is part of State Route 93, which begins in Greeneville to the south and terminates at the Tennessee/Virginia state line to the north of Kingsport. The road is a significant north-to-south connector within the city, intersecting with SR 126, SR 36, and Interstate 26. Tennessee College of Applied Technology Elizabethton – Kingsport Instructional Service Center is located on the eastern side of N John B Dennis Highway.

An overview of the study area is illustrated in Figure 1-1.

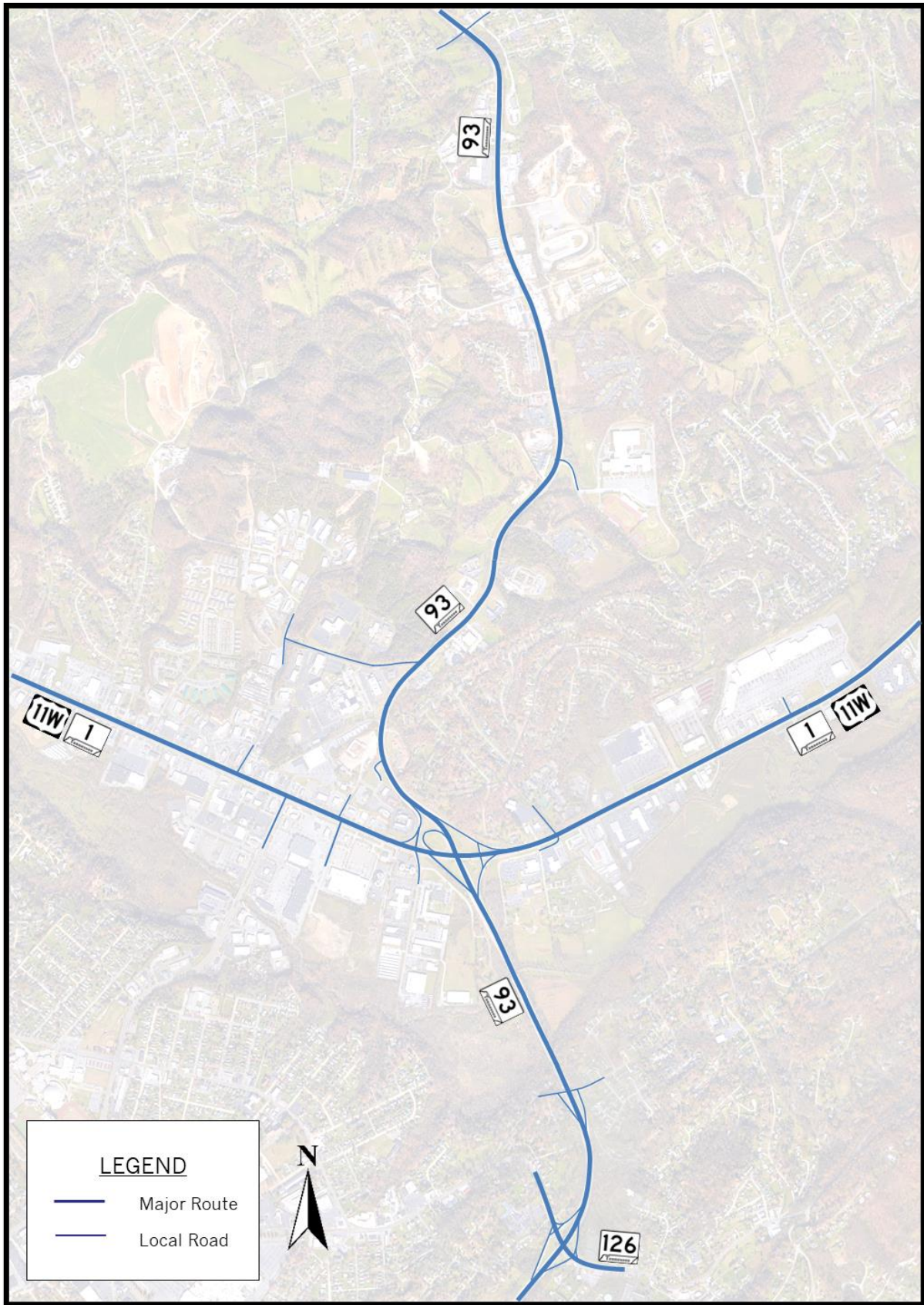


Figure 1-1 Corridor Study Area

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1.2 Project Purpose

The corridor study's purpose is to comprehensively analyze the E Stone Drive and N John B Dennis Highway study area 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 this integral corridor safer for all road users.

The study will assess the existing conditions along the corridor, including demographics, land use and development patterns, crash occurrences, roadway geometry, traffic patterns, and congestion. By analyzing this data, the study will identify areas where there are existing safety concerns and operational inefficiencies that infrastructure modifications can address.

To improve safety, the study will focus on intersections and other areas with a high occurrence of crashes (as compared to the statewide averages for similar facilities), locations of severe crash types, and crashes that involve pedestrians or bicyclists. Potential safety countermeasures include reducing the number of conflict points at intersections, signal optimization, deceleration lanes, and pedestrian infrastructure at intersections: marked crosswalks, pedestrian signal equipment, and ADA-compliant curb ramps.

Regarding traffic operations, the study will analyze existing and future traffic volumes, capacity constraints, and signal operations to determine signal timing alterations and geometric improvements that will improve travel times for the current and future demand.

Multimodal infrastructure facilities prioritize the needs of bicyclists and pedestrians, resulting in safer, healthier, and more sustainable communities while enhancing overall transportation options and quality of life. The study provides opportunities for the city to implement a shared-use path, repair sidewalks in poor condition, and add sidewalks to rectify existing gaps in the network.

In addition to operational concerns, there are safety concerns throughout the study area. Between 2018 and 2022, 340 crashes were reported on N John B Dennis Highway, with four of those resulting in fatalities and two serious injuries. A total of 658 crashes were reported on Stone Drive during the same period, with one fatality and eight serious injuries. Notably, three pedestrian crashes were reported on Stone Drive, west of John B Dennis Highway.

Overall, the corridor study seeks to provide a thoughtful and intentional approach to enhance safety, operations, and multimodal connectivity along Stone Drive and John B Dennis Highway to serve the residents and visitors of Kingsport.

SECTION 2

EXISTING CONDITIONS

This section will focus on the existing conditions of the study area and will establish the foundation upon which the recommendations of this study are based. Henceforward, E Stone Drive (SR 1) and N John B Dennis Highway (SR 93) will be referred to as Stone Drive and John B Dennis Highway.

2.1 Demographics

The City of Kingsport's population as of the 2020 Decennial Census is 55,442. City residents constitute 35-percent of Sullivan County's total population of 158,163. As a major population center in the Tri-Cities area, the city is a vital economic and cultural hub for the region. Population growth between Decennial Censuses has been significant, with a 15% increase between 2010 and 2020, preceded by a 7.3% increase between 2000 and 2010. This outpaces Sullivan County's growth of 0.9% from 2010 to 2020 and 2.5% from 2000 and 2010. The difference in the population growth between the city and county can likely be attributed to migration of existing residents into the city limits and annexation of unincorporated areas into the city limits.

Using a simple linear trend method, which assumes the city could maintain its average growth rate from the past twenty years, Kingsport could reach a population of almost 77,000 by the year 2050. Population projections depend on various internal and external factors impacting an area. Given the factors influencing growth, they should be taken more as a sign of health than a definite outcome. The city's ability to grow, considering tepid growth in the county, is a sign of its strength and competitiveness. Moreover, its importance as an economic engine in the region can also be viewed in its daytime population of 75,444- 137% of its resident population.

While Kingsport is growing, its racial composition, as shown in Table 2-1, does not present significant changes between the 2010 and 2020 Census.

Table 2-1 Kingsport Population by Race (2010-2020)

	2010	% of the Population	2020	% of the Population	Change in % of Population	% Population Change
Hispanic or Latino	1,036	2.1%	1,719	3.1%	1.0%	65.9%
Not Hispanic or Latino	47,169	97.9%	53,723	96.9%	-1.0%	13.9%
White alone	43,798	90.9%	48,212	87.0%	-3.9%	10.1%
Black or African American alone	1,926	4.0%	2,024	3.7%	-0.3%	5.1%
American Indian and Alaska Native alone	112	0.2%	144	0.3%	0.1%	28.6%
Asian alone	481	1.0%	754	1.4%	0.4%	56.8%
Native Hawaiian and Other Pacific Islander alone	13	0.0%	15	0.0%	0.0%	15.4%
Some other race alone	52	0.1%	205	0.4%	0.3%	294.2%
Two or more races	787	1.6%	2,369	4.3%	2.7%	201.0%
Two races including Some other race	839	1.7%	2,482	4.5%	2.8%	195.8%
Two races excluding Some other race, and Three or more races	787	1.6%	2,164	3.9%	2.3%	175.0%
Total Population (Decennial Census)	48,205	100.0%	55,442	100.0%		15.0%

2.2 Land Use

Stone Drive is one of Kingsport's major commercial corridors defined by intensive commercial uses. Multiple retail and restaurant uses are located along the corridor, including several large-scale retailers such as Target, Lowe's, Kroger, and Aldi. Multiple branded car dealerships are located along the road. The greatest concentration of commercial is located on the west side of the John B Dennis Highway.

Land use along John B Dennis Highway correlates to the type of access allowed. The section south of Stone Drive is a controlled access freeway. Adjoining land uses are primarily residential except for a small commercial area at the interchange with Memorial Boulevard. The highway relinquishes its controlled access north of Stone Drive, resulting in more intensive uses locating on and accessing the road. Residential areas are interspersed between the commercial uses in the northern section. At the northern edge of the study is Bloomingdale Road; here, the land uses return to residential in nature with some dispersed commercial uses. Notable traffic generators along the northern part of John B Dennis Highway include Indian Path Community Hospital and adjacent complementary medical uses, the Tribe Athletic Complex, TCAT of Elizabethton – Kingsport Instructional Service Center, and Kingsport Motor Speedway. Near the intersection with Stone Drive, several commercial properties have access to both roads.

Overall, existing land use in the area is defined by its heavy intensity of commercial except for the northern and southern ends of John B Dennis Highway. Figure 2-1 and Figure 2-2 display the land uses within the study area by total acreage and number of lots.

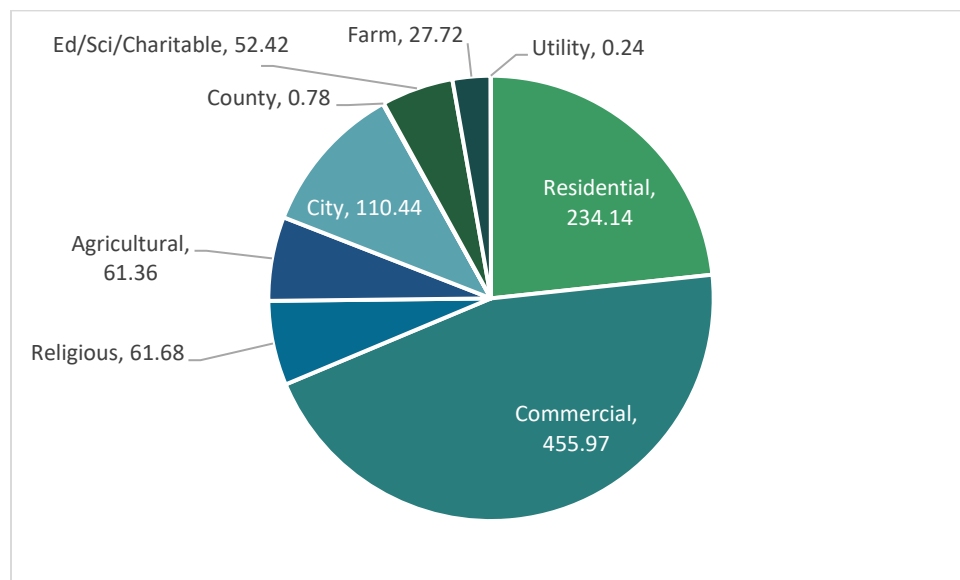


Figure 2-1 Land Use by Area (Total Acres)

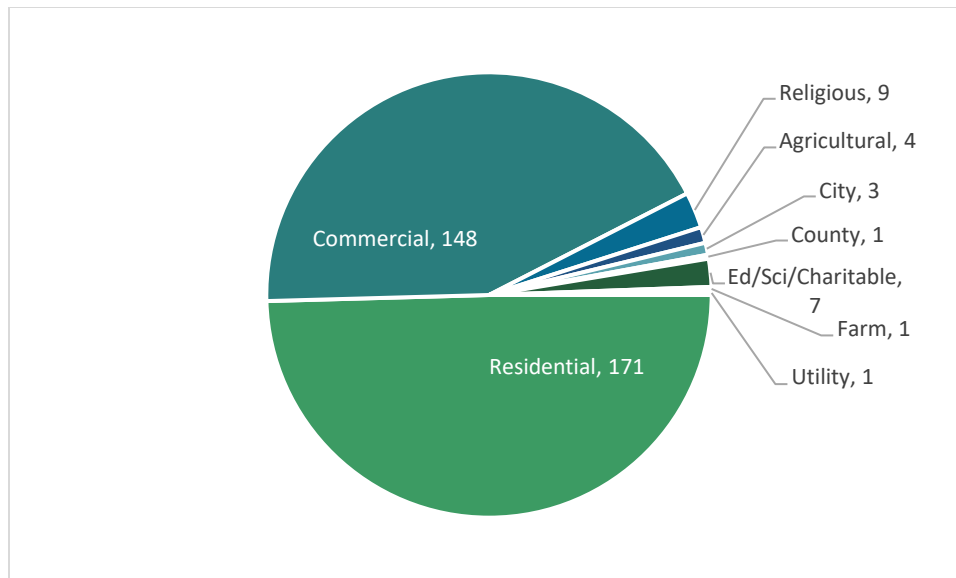


Figure 2-2 Land Use by Frequency (Total Number of Lots)

Future land use at Stone Drive would be expected to continue the present pattern established as an intensive commercial area. The City of Kingsport's Future Land Use Map generally follows the established land use pattern. All relevant zoning district acronyms and names are listed in Table 2-2. Figure 2-3 and Figure 2-4 present the zoning by frequency and area along the study area. Likewise, zoning for the area matches existing uses and significant changes to the land use along the southern part of John B Dennis Highway would not be expected. Also, Stone Drive would be expected to remain an intensive commercial corridor due to its high traffic counts, integral role in the overall transportation network for the city, and existing infrastructure. The zoning map for the study area is displayed in Figure 2-5.

Table 2-2 List of all Zoning Names and Acronyms

Acronym	District Names	Acronym	District Names
A-1	Agricultural District/General Agricultural	B-2E	Central Business Edge District
A-5	Large Tract Rural and Agricultural District	B-3	Highway Oriented Business District
R-1	Low Density/Single-Family Residential District	B-4	Arterial Business District
R-1A	Residential District	B-4P	Planned Business District
R-1B	Residential District	M-1	Light Manufacturing District
R-1C	Residential District	M-1R	Light Manufacturing Restricted District
R-2	Medium Density/Two-Family Residential District	M-2	Heavy/General Manufacturing District
R-2A	Medium Density Residential District	PBD-3	Planned Corridor Business District
R-3	Manufactured Residential Dwelling District/Apartment District	PBD/SC	Planned Business and/or Shopping Center District
R-3A	High Density/Multi-Family District	PVD	Planned Village District
R-3B	High Density/Single Family District	PD	Planned Development District
R-4	Medium Density Apartment District	P-1	Professional Offices District
B-1	Neighborhood Business District	B-3	Highway Oriented Business District
B-2	Central Business District		

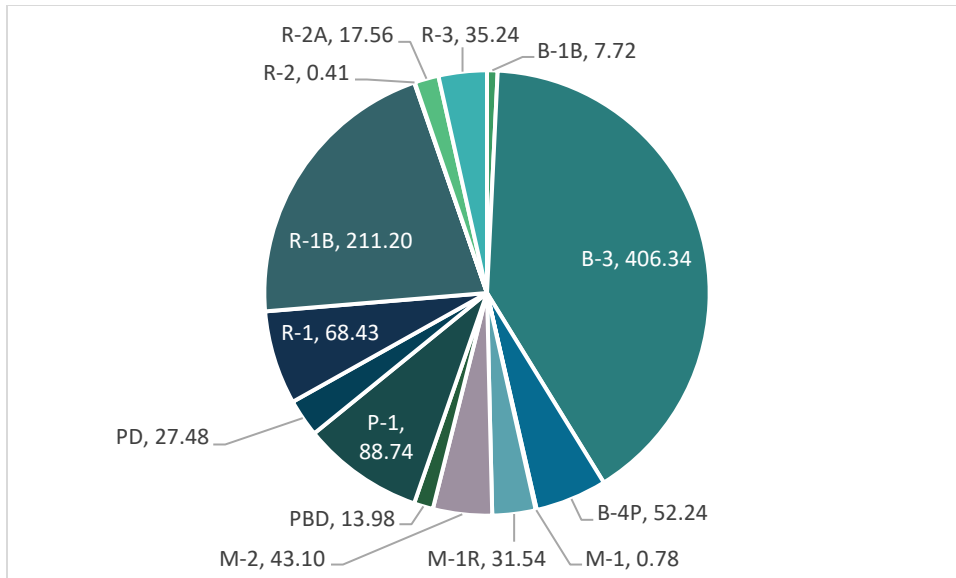


Figure 2-3 Zoning by Area (Total Acres)

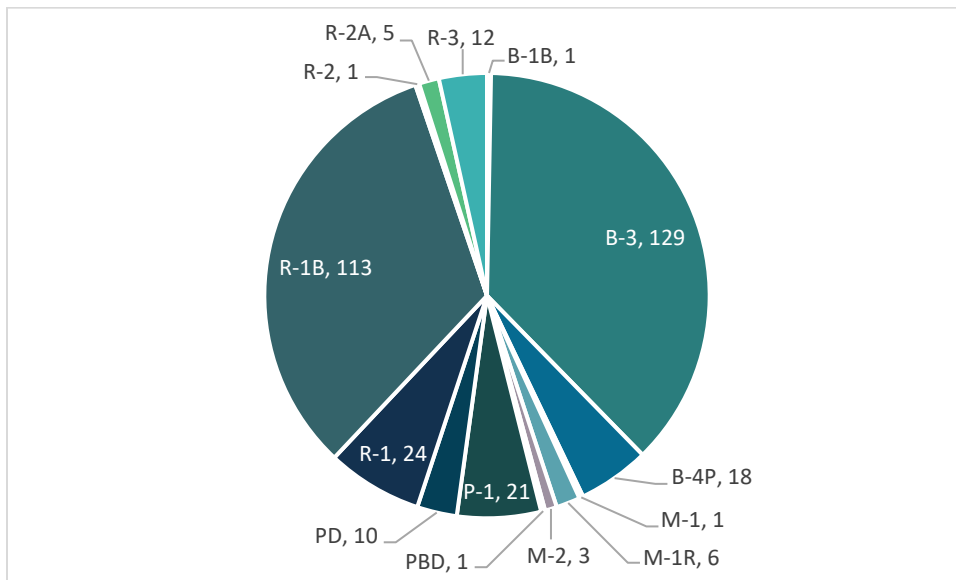


Figure 2-4 Zoning by Frequency (Lots)

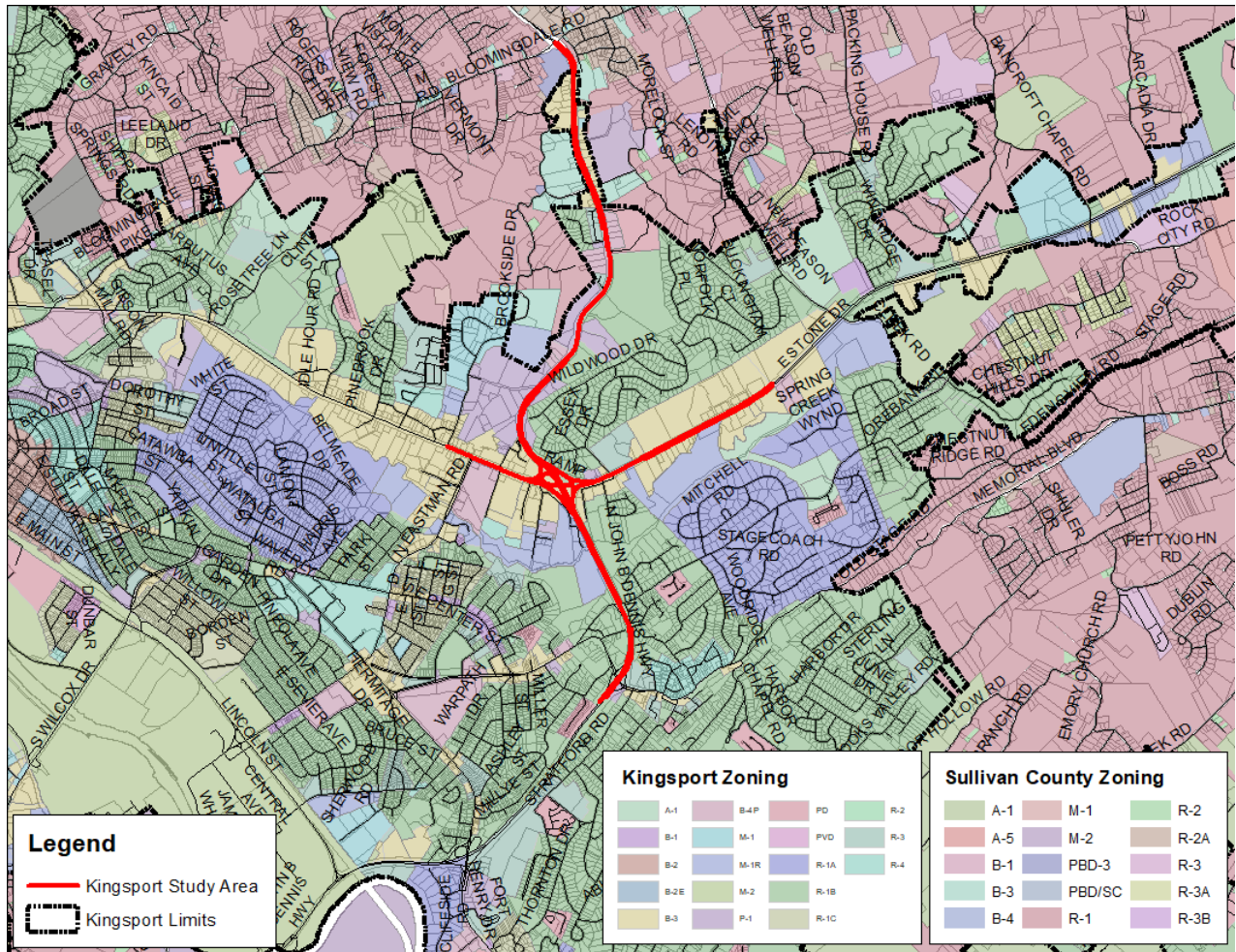


Figure 2-5 Zoning Map

The most likely land use changes would be typical turnover from a commercial area or redevelopment along Stone Drive. One large 20 -acre property at 2550 Stone Drive (former Mason and Dixon Truck Lines) appears available and suitable for rehabilitation. Pressure on the existing infrastructure on Stone Drive will continue if the underutilized land or greenfield on the edges of the study area are developed for intensive purposes.

The northern section of John B Dennis Highway between Stone Drive and Bloomingdale Road represents the area with the potential to experience significant changes. The patchwork of land uses between commercial and residential indicates an uneven demand market and entrenchment of historical land uses. As evident by the development pattern on Stone Drive west of John B Dennis Highway, access control for future development should be made a priority to limit points of conflict.

2.3 Safety

The project corridors include a diverse combination of roadway characteristics in a relatively short distance. Each facility was reviewed contextually and compared to the expected safety performance of facilities with similar characteristics.

Crash data was extracted from the Enhanced Tennessee Roadway Information Management System (E-TRIMS) for a period from January 2018 through December 2022. Individual crashes were associated with the nearest intersection if they were located within 250 feet. Crashes outside this radius were related to the segment they occurred on. In some cases, crashes were reviewed in more detail to determine which facility they were most closely associated with.

Roadway and intersection characteristic data was extracted from E-TRIMS. Based on these characteristics, values were assigned to roadway features representing the Statewide average crash rate values as reported by TDOT for the period of January 2019 through December 2021. Critical crash rates were calculated, representing the crash rate threshold necessary to declare with 99% confidence that crashes occurred at an elevated rate for each facility. A comparison of the actual crash rate to the critical crash rate for each intersection, segment, and spot analysis is shown in Figure 2-6. When the Actual to Critical crash ratio exceeds 1.0, the location is considered to be significantly above the expected crash frequency.

Approximately 1,500 crashes occurred in total over the entire study area, for the 5-year study period. Intersections accounted for approximately 68% of all crashes in the study area. Based on traffic volumes and Statewide average crash rates, only approximately 38% of expected crashes would be at intersections. A higher than expected portion of the intersection crashes occurred at unsignalized intersections, but many of these may in fact be segment-related crashes occurring near an intersection.

Many intersection and segment locations with crash rates above the critical rate are in congested areas, with a high number of driveway access points. These congested areas occur on Stone Drive, immediately west and east of John B Dennis Highway, as well as on the northmost section of John B Dennis Highway, between Armstrong Drive and Brookside Drive. Some isolated intersections were also identified as crash risks. Crashes in these areas were examined in more detail according to crash manner to identify specific safety concerns that could potentially be mitigated with recommendations for improvements. Appendix C contains the crash summary sheets for intersections and segments within the study area.

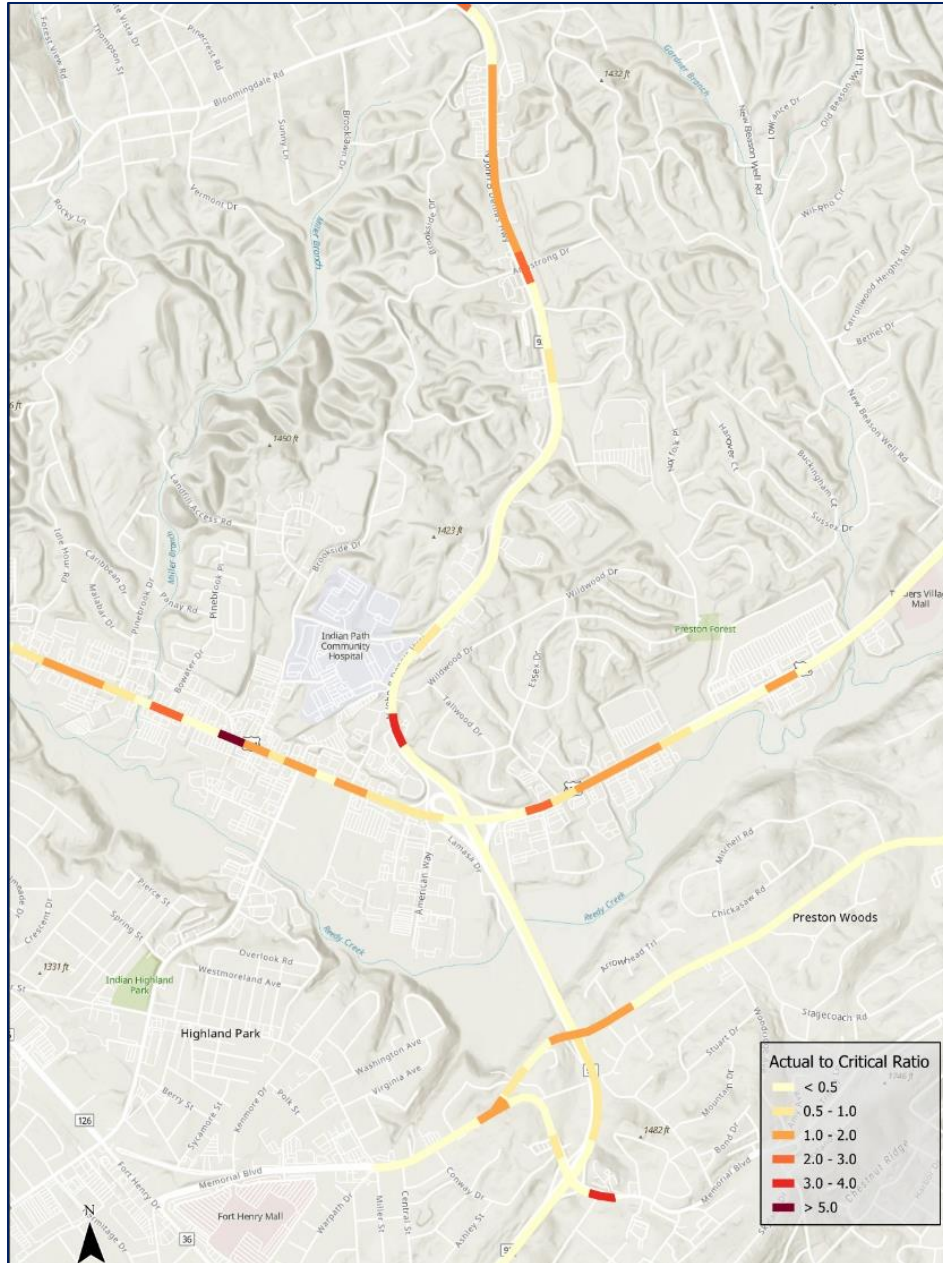


Figure 2-6 Actual Crash Rate-to-Critical Ratio by Location

2.4 Roadway Characteristics

According to TDOT's Functional Classification System map provided in Figure 2-7, John B Dennis Highway is classified as a Freeway and Expressway south of its intersection with Stone Drive. North of that intersection, the roadway is considered to be a Minor Arterial. Stone Drive is considered to be a Principal Arterial. The posted speed limit is 50 mph throughout John B Dennis Highway, with the exception of the school zone encompassing Tennessee College of Applied Technology Elizabethton – Kingsport Instructional Service Center, where the speed limit is 30 mph during school hours. The posted speed limit is 45 mph throughout Stone Drive.

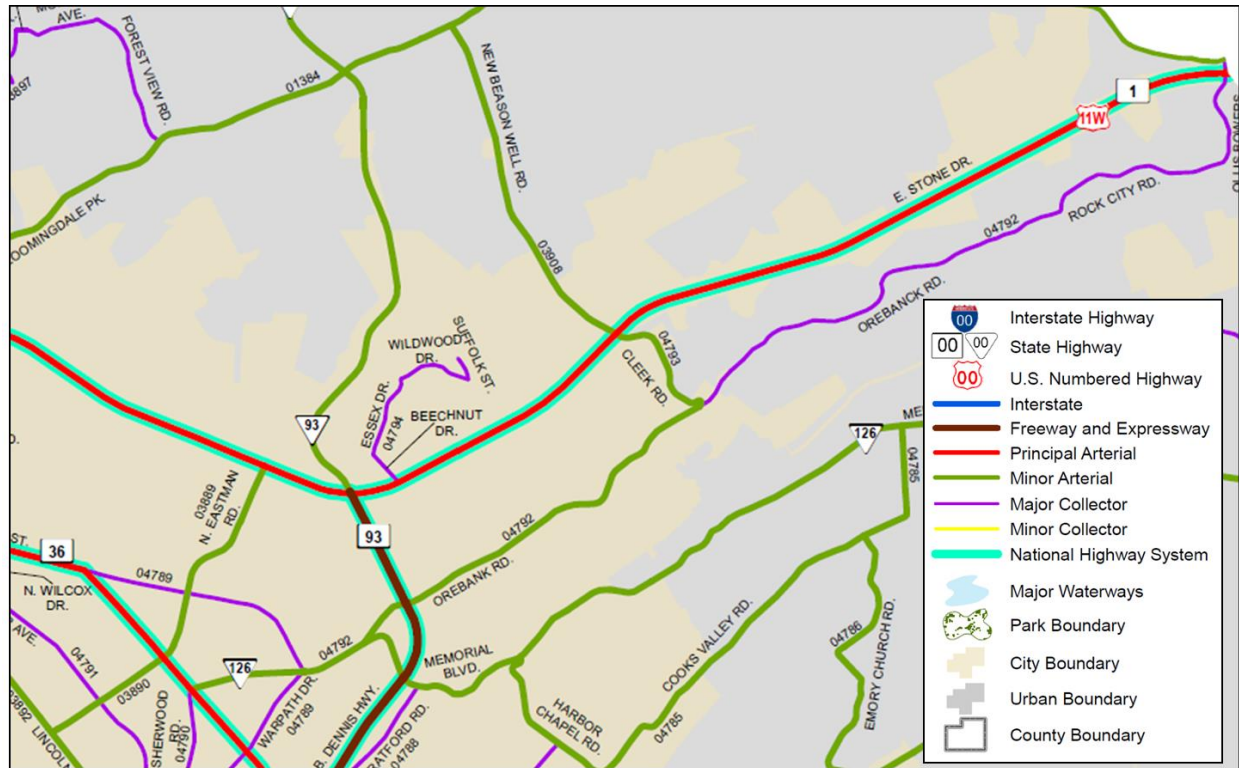


Figure 2-7. TDOT Functional Classification Map

The cross section of N. John B Dennis Highway (SR 93) consists of two 12-foot travel lanes in each direction. The paved outside shoulder varies between 4-feet and 12-feet, the paved inside shoulder varies between 0-feet and 12-feet. There is a grass median throughout the corridor that varies in width between 4-feet and 30-feet. The cross section of East Stone Drive (SR 1/US 11W) consists of three 12-foot travel lanes in each direction in the western area of the corridor and a 12-foot two-way left turn lane. This section of the corridor also has 3-foot bike lines on either side. The cross-section then transitions to two 12-foot travel lanes in each direction with a median. This median varies in width between 4-feet and 30-feet wide, and varies in material between concrete, grass, and a painted median. The paved outside shoulder varies between 6-feet and 14-feet. In areas with a grass or concrete median, the inside shoulder varies between 1-foot and 4-feet.

2.5 Traffic Volumes

Both Stone Drive and John B Dennis Highway are primary routes that carry a high volume. Stone Drive volumes are approximately 31,000 vehicles per day and 26,000 vehicles per day immediately west and east of John B Dennis Highway, respectively. John B Dennis Highway carries approximately 26,000 vehicles per day to the south of Stone Drive. North of the interchange, John B Dennis Highway carries approximately 16,000 vehicles per day. Figure 2-8 presents the 2022 average daily traffic recorded by TDOT. Appendix B contains the turning movement counts collected for the corridors' operational analysis.

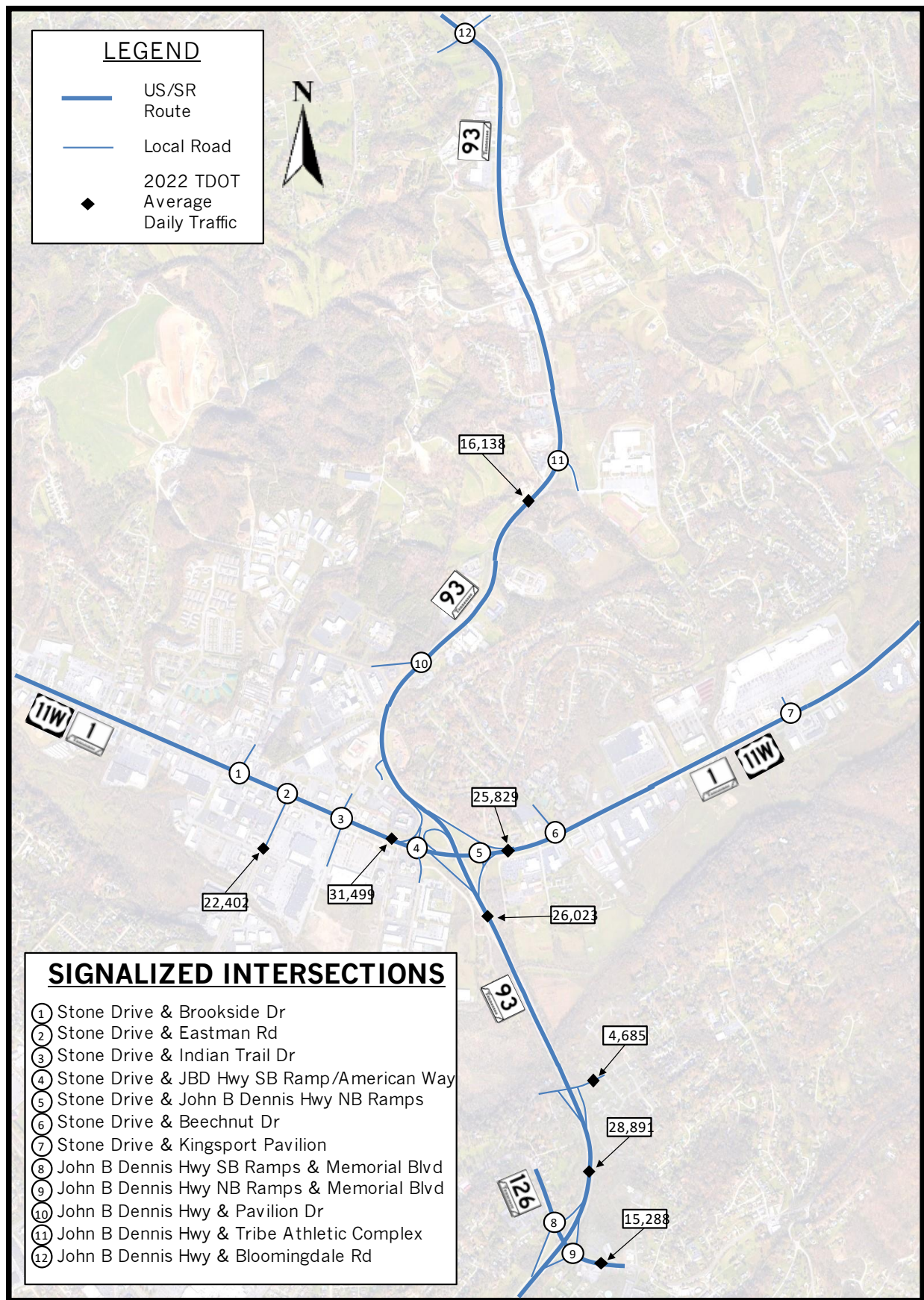


Figure 2-8. 2022 TDOT Average Daily Traffic

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2.6 2022 Level of Service & Capacity

To evaluate the current operations of the traffic control devices, capacity, and level of service (LOS) were calculated using the Highway Capacity Manual (HCM), published by the Transportation Research Board (TRB). Signalized and unsignalized intersections are evaluated based on estimated intersection delays, which may be related to LOS.

The capacity of an intersection represented by the intersection V/C (volume/capacity) ratio is the calculation of traffic volumes in relation to the intersection geometry, signal phasing, and the green time assignment for any traffic movement. 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. Signalized delays are attributed to the intersection geometry and the signal timing employed. In saturated traffic or over-capacity conditions, delay may be reduced, but capacity may only be marginally improved. Signal phasing improvements may improve capacity and decrease delays, but 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 signalized 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 80 seconds. A LOS of C and D are typical design values. Within urban areas, a LOS D, with a delay between 35 and 55 seconds, is considered acceptable by the Institute of Transportation Engineers (ITE) for signalized intersections. Table 2-3 presents a description of the signalized LOS.

Table 2-3 Level of Service Description for Signalized Intersection

LOS	Average Control Delay per Vehicle (seconds)	Description
A	≤ 10	Very low delay with extremely favorable progression. Most vehicles don't stop.
B	> 10.0 and ≤ 20.0	Generally good progression. Increased number of stops from that described for LOS "A" resulting in higher delays.
C	> 20.0 and ≤ 35.0	Fair Progression with increased delay. Number of stopping vehicles become significant; however, many still pass through the intersection without stopping. Stable flow.
D	> 35.0 and ≤ 55.0	The influence of congestion becomes more noticeable. Longer delays resulting from unfavorable progression, longer cycles, or high V/C ratios. Approaching unstable flow.
E	> 55.0 and ≤ 80	Limit of acceptable delay. Long delays associated with poor progression, long cycles, or high V/C ratios.
F	> 80.0	Unacceptable operation resulting from oversaturation (flow rates exceed capacity). Poor progression, long cycles, and high V/C ratios.

SOURCE: Highway Capacity Manual, TRB Special Report 209

Network level-of-service (LOS) was calculated using Highway Capacity Manual (HCM) methodology. A model was constructed using Synchro software, and HCM 2000 analysis was reported for at-grade intersections. Merge and diverge LOS analysis was performed for the controlled-access portion of John B Dennis Highway using Highway Capacity Software (HCS). LOS for the controlled access portion of Stone Drive and John B Dennis Highway are shown in Table 2-4 Signalized Intersection Levels-of-Service. Segment and ramp analysis using HCS are shown in Table 2-5 Segment and Ramp Levels-of-Service for John B Dennis Highway.

Table 2-4 Signalized Intersection Levels-of-Service

SIGNAL GROUP	PEAK HOUR	EXISTING		
		V/C	Average Delay	Level of Service
Stone Drive & Brookside Drive	AM	0.61	23.3	C
	MID	0.76	39.3	D
	PM	0.76	37.8	D
Stone Drive & N Eastman Road	AM	0.39	18.1	B
	MID	0.74	25.2	C
	PM	0.76	40.7	D
Stone Drive & Indian Trail	AM	0.38	24	C
	MID	0.63	21.9	C
	PM	0.73	30.4	C
Stone Drive & JBD Hwy SB/ American Way	AM	0.32	11.6	B
	MID	0.51	18.1	B
	PM	0.61	12.3	B
Stone Drive & John B Dennis Hwy NB	AM	0.37	18.8	B
	MID	0.66	25.4	C
	PM	0.87	45.2	D
Stone Drive & Beechnut Drive/Springdale Lane	AM	0.35	9.3	A
	MID	0.55	10.1	B
	PM	0.73	15.2	B
Stone Drive & Pavilion Shopping Center	AM	0.37	14.8	B
	MID	0.63	25.6	C
	PM	0.74	29.2	C
Memorial Blvd & John B Dennis Hwy SB	AM	0.47	10.8	B
	MID	0.32	16.6	B
	PM	0.61	22.1	C
Memorial Blvd & John B Dennis Hwy NB	AM	0.5	9.9	A
	MID	0.24	9.1	A
	PM	0.48	14	B
John B Dennis Hwy & Pavilion Drive	AM	0.32	13.7	B
	MID	0.36	19.4	B
	PM	0.59	29.9	C
John B Dennis Hwy & Tribe Athletic Complex	AM	0.28	2.7	A
	MID	0.27	3.5	A
	PM	0.44	4.2	A
John B Dennis Hwy & Bloomingdale Road	AM	0.49	34.4	C
	MID	0.33	27.3	C
	PM	0.57	30.6	C

Table 2-5 Segment and Ramp Levels-of-Service for John B Dennis Highway

Section	Southbound LOS			Northbound LOS		
	Type	AM	PM	Type	AM	PM
North of Stone Dr	Segment	A	A	Segment	A	A
Stone Dr Ramp	Diverge	A	A	Merge	A	B
Stone Dr Overpass	Segment	A	A	Segment	A	A
Stone Dr WB Ramp	Merge	A	A			
Stone Dr EB Ramps	Merge	A	B	Diverge	B	B
Stone Dr to Orebank Rd	Segment	A	B	Segment	B	B
Orebank Rd Ramp	Merge	B	B	Diverge	B	B
Memorial Blvd Ramp	Diverge	A	B	Merge	B	B
Memorial Blvd Overpass	Segment	A	B	Segment	A	B
Memorial Blvd Ramp	Merge	B	B	Diverge	B	B
South of Memorial Blvd	Segment	A	B	Segment	A	B
Facility		A	B		B	B

Existing signalized intersection LOS values are all a D or better, with PM peak values generally performing worse than AM. Additionally, the intersection of Pavilion Drive and Brookside Drive is operating with a LOS B on the stop-controlled westbound approach and LOS A for the Brookside Drive approaches for all peak periods.

2.7 Intersection Characteristics

Stone Drive & Brookside Drive

Geometry & Operation

The traffic signal is a steel strain pole and span wire installation providing signalized access for Brookside Drive to the north and a driveway to the south. This signal is situated at the far western edge of the project area. For vehicles approaching from the north and south, the signal allows one side to go before the other (this is known as 'split-phased'). The Brookside Drive and driveway approaches include separate left-turn lanes. These minor approaches are also provided with right-turn overlaps but without the right-turn lanes, limiting the efficiency it could provide. Stone Drive has protected-only left-turn phasing.

The intersection has a sidewalk in the northwest quadrant adjacent to McDonald's with a center handicap curb ramp. Stone Drive has a marked bike lane through the intersection with an eastbound bike lane ending east of Brookside Drive. Notably, the intersection lacks designated crosswalks and signals for pedestrians.



Safety

Brookside Drive stands out among the corridor intersections with the highest number of crashes, totaling 115 reported collisions. Most of these incidents can be attributed to rear-end collisions that account for 66 reports and angle collisions reported in 37 incidents. The most common injury types were 73 cases of possible injuries and 26 cases of inflicted injuries. Comparatively, the intersection's crash rate is significantly above the statewide average, nearly doubling the critical rate.

Stone Drive & N Eastman Road

Geometry & Operation

The signal is a steel strain pole and span wire installation providing signalized access for N Eastman Road to the south and a driveway to the north. The north and south approaches are split-phased. Stone Drive has protected-only left-turn phasing. The northbound approach is a major arterial approach with double left-turn movement and a separate right-turn lane with a right-turn overlap. Similar geometry is provided for the driveway approach.

The intersection does not have sidewalks or curb handicap ramps. There are pedestrian heads and push buttons for the N Eastman Road approach, but the pushbutton for the southeast corner is inaccessible due to brush.



Safety

This intersection had 107 reported collisions varying in types, with the majority consisting of 46 rear-end collisions and 38 angle collisions. Of these collisions, 72 have resulted in possible injuries, 17 property damage reports, and 18 cases of injuries, resulting in a crash rate significantly above the statewide average and the critical rate.

Stone Drive & Indian Trail Drive

Geometry & Operation

The signal is a mast arm installation. The north and south approaches are split-phased. Stone Drive has protected-permissive left-turn phasing.

The intersection has a sidewalk limited to the north side to the west. Crosswalks are provided across Stone Drive and Indian Trail Drive north approach with markings and signal control. A refuge area is provided in the median.



Safety

With a crash rate significantly above the statewide average and critical rate, the Indian Trail Drive intersection has received a total of 84 collision reports over the 5-year period. Most of these reports occurred due to either a rear-end collision (47) or angle collision (22), resulting in 50 cases of possible injuries, 18 injuries, and 16 reports of property damage.

Stone Drive & John B Dennis Highway Southbound Ramp

Geometry & Operation

The signal is a steel strain pole and span wire installation. The northbound and southbound approaches to the signal control are single lanes—the large southbound channelized yield-controlled right-turn movement from John B Dennis Highway. The intersection does not have sidewalks with handicap curb ramps. The north and south approaches are concurrently phased. Stone Drive has protected/permissive left-turn phasing. The channelized yielding right-turn movement from southbound John B Dennis Highway to westbound Stone Drive can significantly conflict with westbound traffic on Stone Drive. This conflict is increased if traffic from John B Dennis Highway is destined for any commercial businesses on Stone Drive's southside.



Safety

There has been a total of 37 collisions taking place at the intersection. Like several other locations throughout the corridor, the majority of reported incidents can be accounted for by 14 angle collisions and 14 rear-end collisions. Despite the number of collisions at the intersection, the crash rate is below the statewide average and the critical rate.

At the right-turn off-ramp from southbound John B Dennis Highway, a majority of the 8 collision reports were the product of rear-end collisions (3), angle collisions (2), and sideswipe (same) collisions (2). The intersection's crash rate is above the statewide average but below the critical rate.

Stone Drive & John B Dennis Highway Northbound Ramps

Geometry & Operation

The signal is a steel strain pole with span wire installation. The northbound off-ramp approach includes a double left-turn movement and a large, channelized yield-controlled right-turn movement. Eastbound Stone Drive has protected/permissive left-turn phasing. Adverse traffic queues develop during the afternoon peak hours, which spill over to the eastbound thru traffic movement, impeding the traffic movement and presenting a significant conflict that could result in rear-end collisions. The intersection does not have any sidewalks or pedestrian signal phasing.



Safety

At the northbound on- and off-ramps, there have been 14 collisions within the 5-year period, with most occurring due to either rear-end collision or opposing left collision. Despite the crash rate being below the statewide average and critical rate, there has been one incident resulting in a fatal injury and the remaining reports resulting in primarily possible injuries and property damage.

Stone Drive & Beechnut Drive/Springdale Lane

Geometry & Operation

The signal is a steel strain pole with a span wire configuration. The northbound approach is a single lane, and the southbound approach includes two lanes with a separate right-turn lane. The intersection does not have sidewalks or pedestrian traffic control. The north and south approaches are concurrently phased, and Stone Drive has protected/permissive left-turn phasing.



Safety

The 40 total collision reports were primarily due to 27 rear-end collision reports. Of these incidents, the large majority of collisions were related to possible injuries and property damage. Despite the volume of collisions, the crash rate of the intersection remains below the statewide average and the critical rate.

Stone Drive & Pavilion Shopping Center

Geometry & Operation

The signal is a mast arm installation. The north and south approaches are split-phased. Stone Drive has protected-only left-turn phasing. Vehicle detection is video for the driveway approaches. The intersection has a sidewalk limited to the north side with curb handicap ramps. There are not any pedestrian crosswalks or signal control.



Safety

A total of 83 collisions have been reported at this intersection, resulting in a crash rate significantly above the statewide average and the critical rate. Most of these reports result from either a rear-end or an angle collision that took place in 50 and 22 incidents, respectively. The large majority of collisions (71) resulted in possible injury and property damage.

John B Dennis Highway & Pavilion Drive

Geometry & Operation

The signal installation is a mast arm signal configuration. The Pavilion Drive and driveway approaches are split-phased. John B Dennis Highway has protected-permissive left-turn phasing. The controller is an older Econolite ASC/3-2100 and an age that exceeds the recommended life of the controller.



Safety

The crash rate of this intersection is above the statewide average, with a total of 32 collisions. Most of these collisions that occurred were the product of either an angle collision (11) or rear-end collision (11), resulting in 22 cases of possible injuries. Despite the number of collisions, the intersection's crash rate is above the statewide average and below the critical rate.

John B Dennis Highway & Tribe Athletic Complex

Geometry & Operation

The signal is a steel strain pole with a span wire configuration. The westbound driveway approach is two lanes. John B Dennis Highway has protected-permissive left-turn phasing. The controller is an older Econolite ASC/3-2100 and an age that exceeds the recommended life of the controller.



Safety

Over the 5 years, a total of 8 collisions were reported. The reported collisions include 4 single vehicle collisions, 2 angle collisions, and 2 rear-end collisions, primarily resulting in cases of possible injuries. The intersection's crash rate is below the statewide average and the critical rate.

John B Dennis Highway & Bloomingdale Road

Geometry & Operation

This signal is a wood pole with a span wire configuration. The intersection operates with a 4-phase Peak Transyt traffic signal with left-turn phasing provided for the John B Dennis Highway and Bloomingdale Road approaches. The signal is a Sullivan County signal. The controller is significantly aged, over 30 years.

The Tennessee Department of Transportation identified this signalized intersection for reconstruction in its Traffic Signal Modernization and Maintenance (TSM&M) Program conducted by CDM Smith in the Spring of 2021. This survey and review identified many deficiencies of the intersection requiring improvements.



Safety

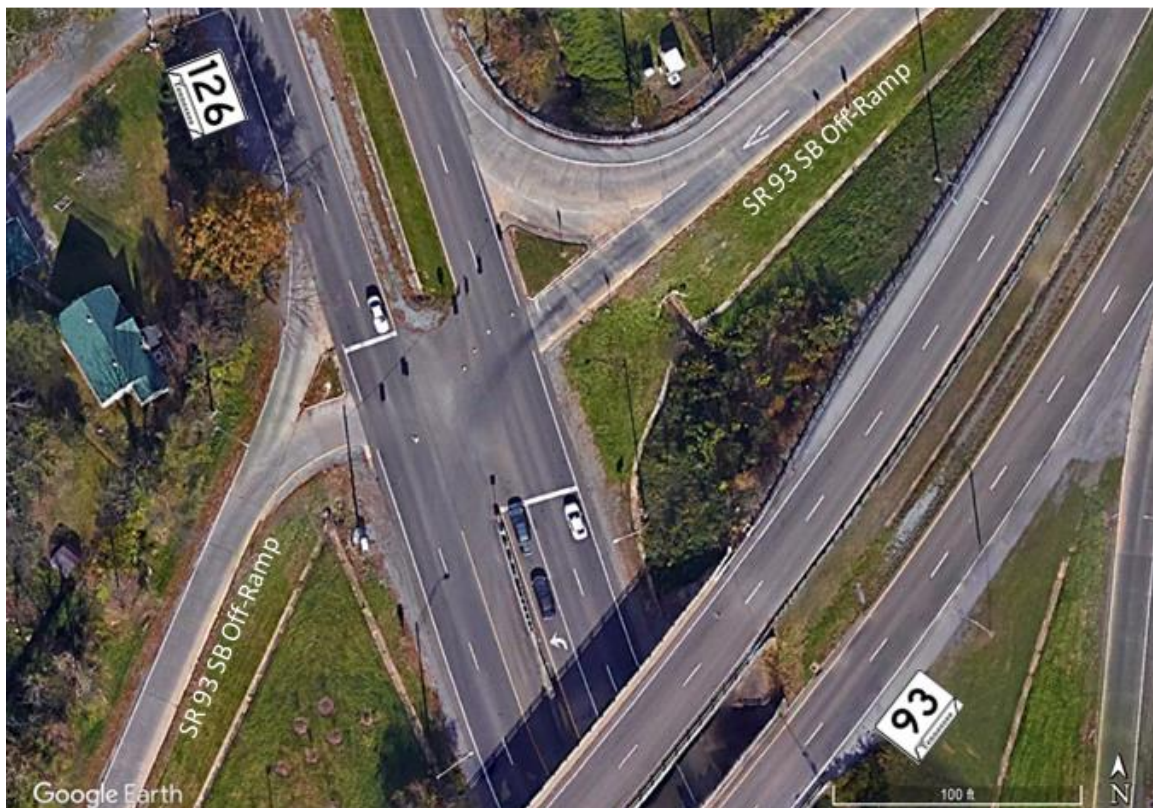
The intersection at Bloomingdale Road has the greatest number of collisions along John B Dennis Highway, with 105 reported collisions. A breakdown of the collision data reveals most can be attributed to either a read-end collision (57), angle collision (20), or opposing left collision (20). Of these collisions, 68 resulted in possible injuries, 28 injuries, and 9 cases of property damage. With this many reported collisions, the intersection's crash rate is significantly above the statewide average, more than doubling the critical rate.

John B Dennis Highway Southbound Ramps & Memorial Boulevard

Geometry & Operation

This signal is a steel strain pole with diagonal span wire installation providing signalized access from John B Dennis Highway. It has protected/permissive left-turn phasing from westbound Memorial Boulevard to southbound John B Dennis Highway. Adverse queuing from the southbound off-ramp extending back to mainline John B Dennis Highway is observed. There are not any sidewalks or pedestrian traffic control.

Improvements are planned for Memorial Boulevard to increase the capacity and storage of the southbound off-ramp and upgrade the traffic signal. The upgrade should include nearside auxiliary signal heads for the westbound approach for increased visibility due to the horizontal alignment and the overpass structure, which may limit the visibility of the approach displays.



Safety

The majority of the 8 collision reports during the 5-year period were the product of rear-end collisions, resulting in 6 reports of property damage and 2 incidents of possible injuries. All 8 reported collisions occurred at the southeast-bound approach. The intersection's crash rate is below the statewide average and the critical rate.

John B Dennis Highway Northbound Ramps & Memorial Boulevard

Geometry & Operation

The signal is a steel strain pole with diagonal span wire installation providing signalized access from John B Dennis Highway. It has protected/permissive left-turn phasing from eastbound Memorial Boulevard to northbound John B Dennis Highway. There are not any sidewalks or pedestrian traffic control.



Safety

There have been 5 collision reports within the 5-year period where only 3 rear-end collisions and 2 opposing left collisions have occurred. Of these collisions, 3 resulted in possible injuries and 2 resulted in property damage. With such few collisions, the crash rate at the intersection is below the statewide average and the critical rate.

John B Dennis Highway & Indian Center Court

Geometry & Operation

This intersection is partial-stop controlled on both approaches of Indian Center Court. To the east, Indian Center Court is an access point for a small assisted living apartment complex. To the west, it connects to various businesses and eventually connects to Stone Drive via Indian Trail Drive. John B Dennis Highway is divided, with approximately 30 feet of median as it intersects Indian Center Court. The roadways intersect in the middle of a long, sweeping horizontal curve, but sight distance is adequate without obstructions due to traffic.

The west approach of Indian Center Court is a two-lane, undivided road, but widens to four lanes divided at the approach to the intersection. Channelized right-turn lanes exist to turn onto and off from John B Dennis Highway, but no acceleration or deceleration lanes exist on John B Dennis Highway itself to serve these right-turn movements. Left-turn lanes on John B Dennis serve both northbound and southbound left-turns from the major route. An acceleration lane exists in the median as well to serve left-turning vehicles from Indian Center Court onto northbound John B Dennis Highway.



Safety

The intersection at Indian Center Court has experienced 26 collisions over the 5-year period, where most were due to 12 angle collisions, 7 single vehicle collisions, and 4 sideswipe (same) collisions, resulting in a crash rate significantly above the statewide average, more than tripling the critical rate. The severity of the collisions included 16 possible injuries, 7 injuries, and 3 property damage cases, where all reports occurred heading northbound SR 93.

Brookside Drive & Pavilion Drive

Geometry & Operation

This three-approach intersection to the northwest of the Stone Drive and John B Dennis Highway interchange serves a growing volume of mixed-use developments. It is directly behind the Indian Path Community Hospital campus and related healthcare facilities and provides a connection to a number of commercial properties to the north.

Brookside Drive traverses north-to-south, between Stone Drive to the south and commercial and industrial areas to the north. Pavilion Drive approaches from the east, connecting to John B Dennis Highway. The Pavilion Drive approach is stop-controlled, and both approaches of Brookside Drive are uncontrolled. Brookside Drive is a relatively narrow, two-lane, undivided road that carries a considerable number of heavy vehicles. Pavilion Drive is signed with a no-trucks sign at either end, although multiple healthcare facilities have no access other than to Pavilion Drive. A handful of trucks were recorded using Pavilion Drive during each of the count periods.



Safety

Over the 5-year analysis period, 13 total crashes occurred at this location. A large portion of the crashes are either roadway departures or collisions between vehicles due in some part to the fact that the roadway is relatively narrow with limited space to maneuver vehicles in a curve, especially larger vehicles. Many of the roadway departure crashes are not necessarily intersection-related.

John B Dennis Highway Merge/Diverge Ramps & Orebank Road

Geometry & Operation

The ramps serving Orebank Road from John B Dennis Highway are in a partial diamond configuration. Ramps only exist to the south of Orebank Road, which serves the northbound off-ramp from John B Dennis Highway as well as the southbound on-ramp to the highway. Both intersect Orebank Road at a three-approach intersection. The northbound off-ramp is stop controlled on its approach. No other traffic control exists at either intersection. Each ramp is approximately 550 feet in length, with no additional deceleration lane for the off-ramp. The on-ramp has a short acceleration lane, approximately 300 feet in length including taper.



Safety

Only two crashes were reported at these ramp intersections at Orebank Road. Both involved westbound rear-ends due to stopped traffic turning left onto the southbound ramp.

Between the Orebank Road and Memorial Boulevard ramps, 6 crashes were reported on John B Dennis Highway, including: 1 conflict between the southbound on-ramp merge and thru traffic, 3 collisions with deer on the highway, and 1 unrelated roadway departure.

2.8 Transit

Kingsport Area Transit Service (KATS) operates four bus routes in the City of Kingsport. Routes 3 and 4 both provide service along Stone Drive. Route 4 proceeds briefly along John B Dennis Highway to provide service to Indian Path Community Hospital. It also crosses John B Dennis Highway along Memorial Blvd. Stone Drive west of John B Dennis Highway receives westbound service via Route 3 and eastbound service via Route 4. Route 3 proceeds both directions along Stone Drive between John B Dennis interchange and the Kingsport Pavilion Shopping Center. Between the two routes, most of Stone Drive has transit service both eastbound and westbound.

Route 3

Stone Drive is primarily serviced by Route 3. This route originates at the transit office to the southwest and is generally a counter-clockwise loop. It approaches from the south at Eastman Road and turns east onto Stone Drive. Two way service is provided along Stone Drive between John B Dennis Highway and the Kingsport Pavilion Shopping Center. When crossing John B Dennis again for the westbound portion, Route 3 follows John B Dennis Highway north and provides service to Indian Path Community Hospital, via Pavilion Drive. It proceeds down Brookside Drive, but does not rejoin Stone Drive until after proceeding west through the Holston Terrace neighborhood, eventually re-entering Stone Drive from Pinebrook Drive and proceeding west. From Pinebrook Drive to the west, the route is westbound only, with stops along the north shoulder of Stone Drive. A route diagram is shown in Figure 2-9.

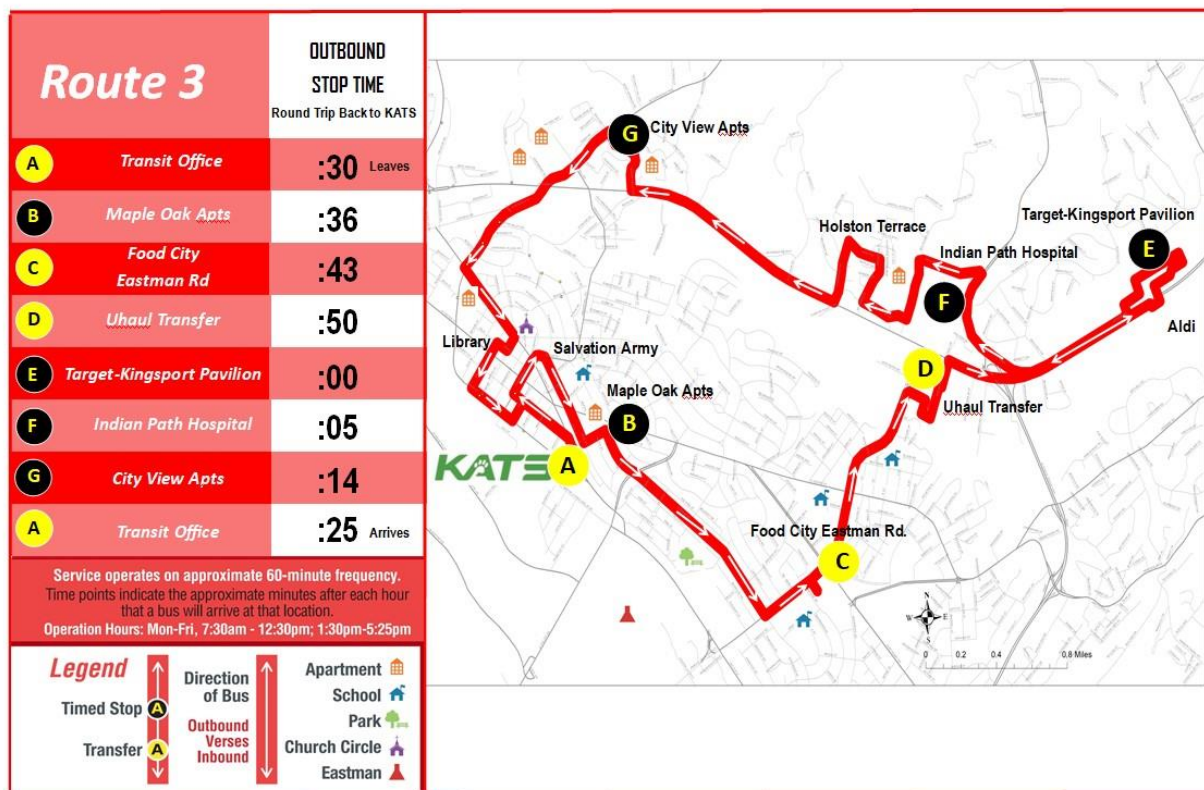


Figure 2-9 Kingsport Area Transit Service Route 3 Map (<https://www.kingsporttransit.org/routes/>)

Route 4

Eastbound service along Stone Drive west of the John B Dennis interchange is provided by Route 4, shown in Figure 2-10 below. This route enters the project area from the west, proceeds eastbound along Stone Drive to Indian Trail Drive. It then turns left and adds a short counter-clockwise loop to provide service to the Kroger shopping center, before crossing Stone Drive at Eastman Road and proceeding south.

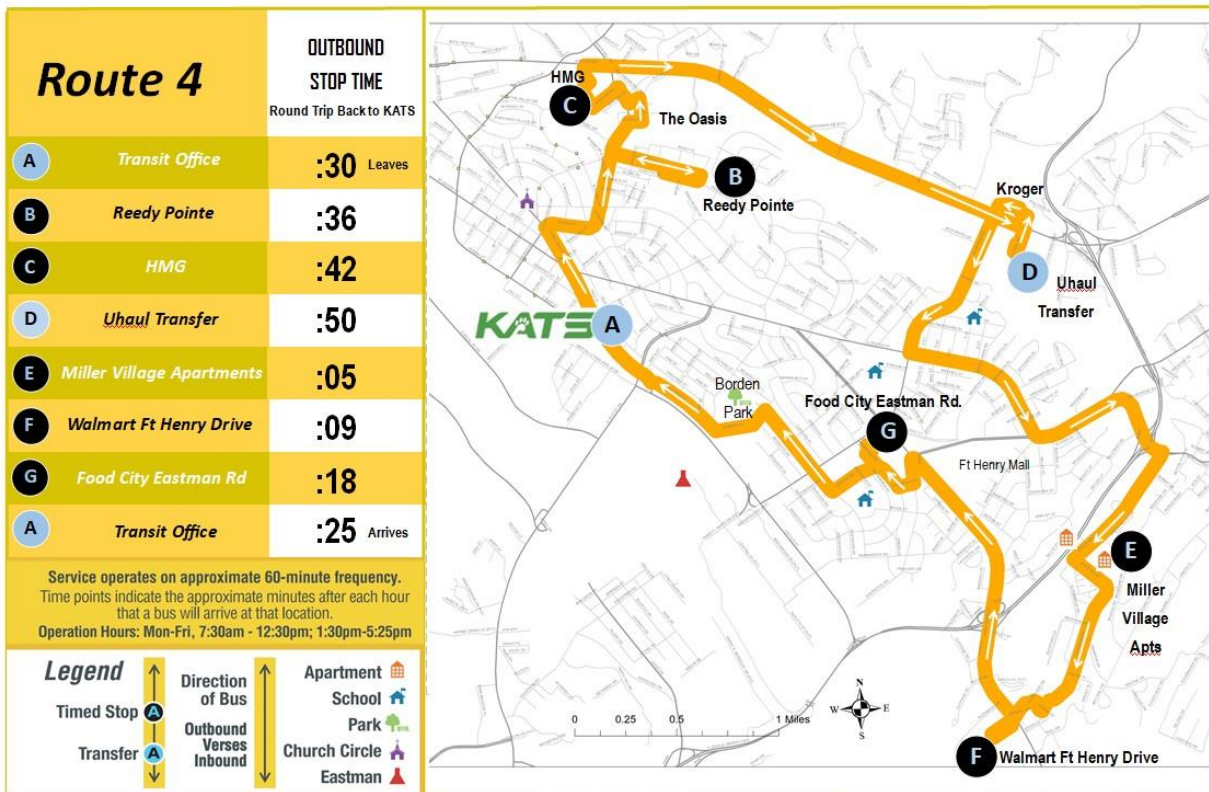


Figure 2-10 Kingsport Area Transit Service Route 4 Map (<https://www.kingsporttransit.org/routes/>)

SECTION 3 PUBLIC ENGAGEMENT

Public engagement in the study process is essential for the project team to understand and analyze existing conditions based on user perceptions. Throughout the study, the project team solicited feedback from a steering committee consisting of representatives from the City of Kingsport, the Kingsport Metropolitan Transportation Planning Organization (MTPo), the Kingsport Area Transit Service (KATS), and the Tennessee Department of Transportation (TDOT). Public engagement meetings were held to solicit public feedback and understand the corridor users' concerns, opportunities, and values. To maximize opportunities for public engagement, the project team also conducted an online public survey.

3.1 Steering Committee Meetings

Including the kick-off, a total of six meetings were held 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 are provided in Appendix J. All steering committee meetings were virtual.

September 30, 2022 – Initial kick-off meeting in which the project scope and schedule were reviewed, the approach to the operational and safety analysis was discussed, and existing areas of concern along the corridor were mapped.

November 17, 2022 – Status update meeting and discussion of online survey questions for public engagement.

January 13, 2023 – Review of traffic volume counts and initial capacity analysis. Overview of public survey responses to date.

March 17, 2023 – Review of public survey responses.

April 17, 2023 – Review of crash data, discussion of initial recommendations, and review of materials for the first public meeting.

June 12, 2023 – Discussion of findings and feedback from the first public meeting and review of updates to initial recommendations.

3.2 Public Survey

The public survey was generated using MetroQuest Studio and was available from January 2, 2023, through January 31, 2023. To publicize the survey, information was posted on the Kingsport MTPO and City of Kingsport websites and Facebook pages. A press release was sent to the Kingsport Times-News newspaper.

The home page of the MetroQuest survey is shown in Figure 3-1. The survey received 881 visitors, of which 505 participated in the survey. The survey asked respondents to comment and respond on areas where they felt improvements should be made as well as leave general comments. A ranking exercise was included to ascertain public values for improving the corridor, which asked respondents to prioritize areas of importance. Driver behavior, lack of lanes for the amount of traffic, and improper signal timing were the top three ranked categories. In addition to ranking values, a funding exercise was presented to respondents asking them to identify projects they would fund with limited resources. Respondents funded an improved interchange at Stone Drive and John B Dennis Highway as the top priority, followed by signal timing improvements and improvements to signage, pavement markings, and lighting.

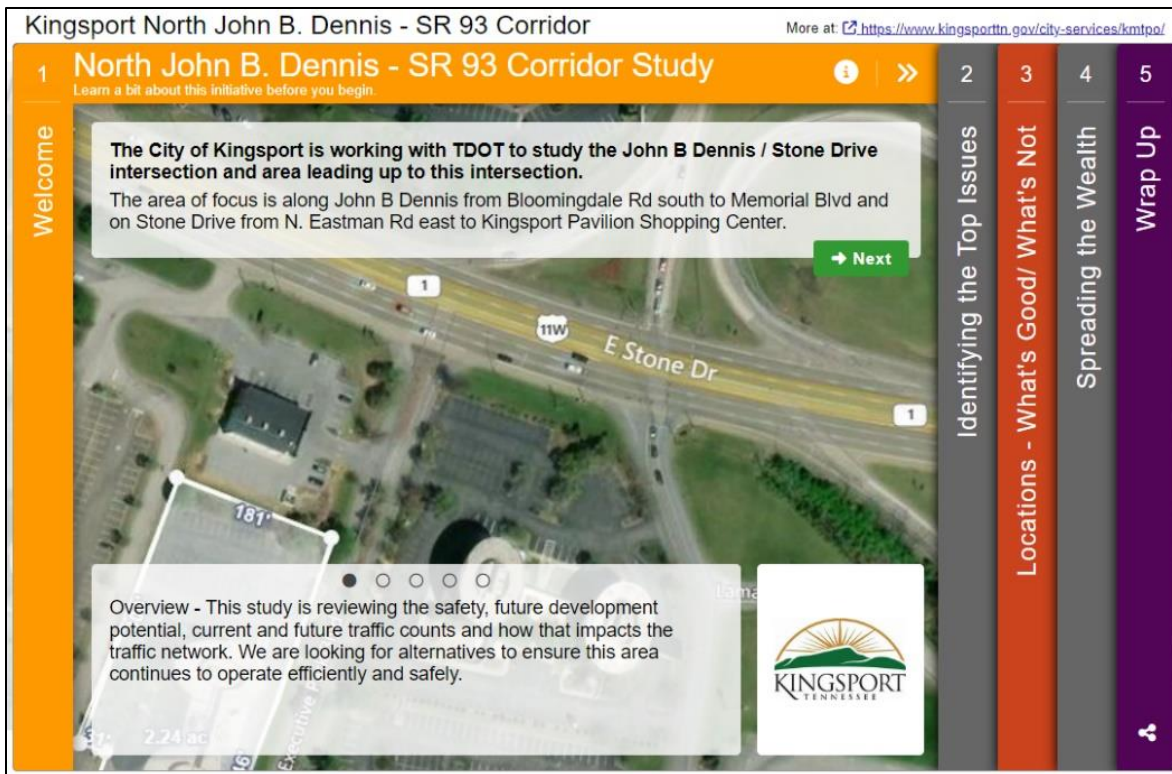


Figure 3-1 MetroQuest Snapshot of Public Survey

Respondents were also presented with a map and the ability to place markers on locations where they felt improvements were needed. The type of improvement categorized the markers. Congestion and Safety received the most markers, followed by Traffic Signals. The Congestion markers were highly concentrated in proximity to the Stone Drive and John B Dennis Highway interchange. The Safety markers were more evenly dispersed but showed a significant concentration at Stone Drive and John B Dennis Highway interchange.

Regarding Traffic Signals, respondents' concerns were evenly distributed amongst existing signals indicating they are in need of improvement. A detailed summary of the survey responses is provided in the Stakeholder Meeting Minutes from March 17, 2023, in Appendix J.

3.3 Public Meetings

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

May 9, 2023 – The first public meeting was held at the City of Kingsport City Hall. The project team reviewed the purpose of the project and identified improvement opportunities. Results of the public survey were presented. Following the presentation, attendees were encouraged to engage in conversation with the project team around the display boards and to provide comments on the initial recommendations.

June 28, 2023 – The second public meeting was also held at the City of Kingsport's City Hall. The project team reviewed the project's purpose for individuals who may be hearing about the corridor study for the first time. The revised concepts were presented to the public, and attendees were encouraged to provide comments on the recommendations. Maps were available with proposed improvements, and attendees could leave comments and discuss the area with the project team.

SECTION 4

FUTURE CONDITIONS

Capacity analysis of the network was performed on a 25-year horizon. Traffic volumes collected in 2022 were projected to Year 2047 based on a flat background growth of 0.8% per year, resulting in a total 20% increase to the system. The 0.8% growth is a conservative estimate relative to the growth rates from present to 2045 that are calculated in the travel demand model contained in the Kingsport 2045 Long Range Transportation Plan. Using these volumes, future year LOS is reported according to the same methodology as existing conditions.

4.1 Intersection Levels of Service

Most signalized intersections on the two study corridors are projected to perform considerably better with the optimized network timing provided in the TSMO Plan. In almost all cases, the existing LOS thresholds are the same or improved in the future year 2047 with timing improvements alone. In fact, the only exception to this is the intersection of Stone Drive & Pavilion Shopping Center, which is reduced from a LOS C during the year 2022 PM peak to a LOS D in the year 2047 PM peak. A full summary of the performance measures at each signalized intersection in both analysis years is included in the TSMO Plan Table 9 and a summary table in Part 1 of Appendix F.

4.2 Freeway Level of Service

The controlled access portion of John B Dennis Highway is projected to have satisfactory LOS in the future analysis period. No location or peak period performed at less than a LOS B in the HCS analysis, the results of which are displayed in Table 4-1 and Table 4-2 below.

Table 4-1 John B Dennis Highway Southbound Performance

Section	Type	Existing Year 2022				Future Year 2047			
		LOS		Density/ Capacity		LOS		Density/ Capacity	
		AM	PM	AM	PM	AM	PM	AM	PM
North of Stone Dr	Segment	A	A	.13	.21	A	A	.16	.21
Stone Dr Ramp	Diverge	A	A	.13	.21	A	A	.15	.21
Stone Dr Overpass	Segment	A	A	.09	.14	A	A	.11	.14
Stone Dr WB Ramp	Merge	A	B	.15	.30 ¹	A	B	.18	.30 ¹
Stone Dr EB Ramps	Merge	A	B	.20	.44	A	B	.24	.44
Stone Dr to Orebank Rd	Segment	A	B	.20	.44	A	B	.24	.44
Orebank Rd Ramp	Merge	B	B	.22	.45	B	B	.27	.45
Memorial Blvd Ramp	Diverge	A	B	.22	.45	B	B	.27	.45
Memorial Blvd Overpass	Segment	A	B	.17	.32	A	B	.21	.32
Memorial Blvd Ramp	Merge	B	B	.25	.37	B	B	.30	.37
South of Memorial Blvd	Segment	A	B	.25	.38	B	B	.30	.38
Facility		A	B			A	B		

¹Ramp d/c reported when it exceeds freeway d/c

Table 4-2 John B Dennis Highway Northbound Performance

	Existing Year 2022				Future Year 2047				
	Type	LOS		Density/ Capacity		LOS		Density/ Capacity	
Section	Type	AM	PM	AM	PM	AM	PM	AM	PM
North of Stone Dr	Segment	A	A	.20	.23	A	A	.23	.23
Stone Dr Ramp	Merge	A	A	.19	.22	A	A	.23	.22
Stone Dr Overpass	Segment	A	A	.15	.13	A	A	.17	.13
Stone Dr Ramp	Diverge	B	B	.39 ¹	.49 ¹	B	B	.47 ¹	.49 ¹
Stone Dr to Orebank Rd	Segment	B	B	.32	.35	B	B	.38	.35
Orebank Rd Ramp	Diverge	B	B	.02	.08	B	B	.39	.38
Memorial Blvd Ramp	Merge	B	B	.22	.21	B	B	.39	.38
Memorial Blvd Overpass	Segment	A	B	.23	.29	B	B	.28	.29
Memorial Blvd Ramp	Diverge	A	B	.05	.16	B	B	.30	.36
South of Memorial Blvd	Segment	A	B	.25	.36	B	B	.31	.36
Facility		A	B			B	B		

¹Ramp d/c reported when it exceeds freeway d/c

SECTION 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, which is based on average unit prices from TDOT 2021 bids, and then inflated to 2023 dollars. Quantities were determined from the concept drawings presented in the subsequent sections and should be refined during the detailed design phase. The cost estimate worksheets are provided in Appendix K.

5.1 Stone Drive

Within the study area, Stone Drive is a four-lane roadway with a center two-way left-turn lane for most of its length. The high driveway density leads to several conflicts. Pedestrian infrastructure is limited but is being added as property redevelops in the area. The single block between Eastman Road and Indian Trail Drive with a raised median provides a good model for an access management strategy that can be expanded along the corridor. Access management also improves pedestrian safety by reducing the number of conflicts and decision points for both drivers and pedestrians. Combining this with separate facilities for pedestrians will go a long way towards making this a more walkable corridor.

5.1.1 Brookside Drive to Eastman Road Median Treatment

The existing raised median east of Eastman Road is recommended to be extended an additional block to Brookside Drive. Excluding crashes within the two intersections, 33 crashes occurred on this block of Stone Drive, during the 5-year study period, with approximately half (15) being angle crashes. Three of these resulted in injury. The rest of the crash occurrences were primarily rear-ends, which may be related more to congestion.

A raised median would significantly reduce angle conflicts away from the intersections and is likely to minimize angle crashes by approximately 50%, potentially reducing the overall crash total in this segment by 25% or more.

Cost Estimate: \$37,600



5.1.2 Stone Drive Intersection Improvements

Crosswalk Markings

Existing crosswalk markings at the intersection of Stone Drive and Indian Trail Drive match the specification found in TDOT Standard Drawing T-M-4 (see Figure 5-1) for longitudinal crosswalk markings, with 24" thermoplastic lines separated by 24" gaps. This is the preferred style of crosswalk design for roadways with vehicle speeds over 40 miles per hour.

It is recommended that new crosswalks implemented on Stone Drive follow these guidelines and all additional TDOT specifications.

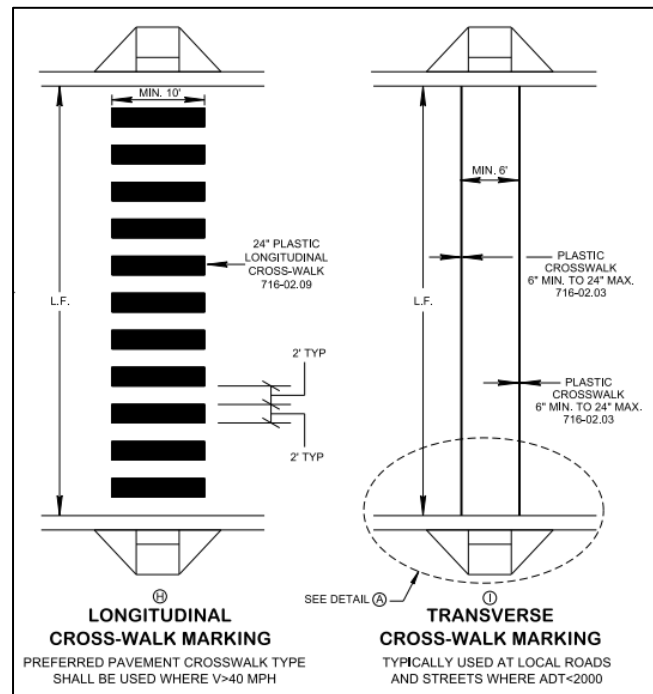
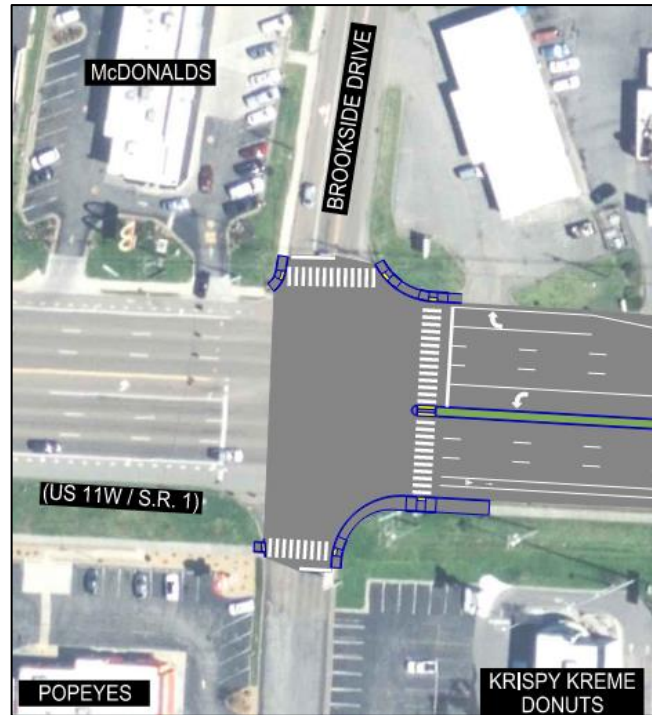


Figure 5-1 Crosswalk Marking Excerpt From TDOT Standard Drawing T-M-4

Brookside Drive

Pedestrian crossings, landings, and signal infrastructure are recommended on the north, east, and south approaches of the Brookside Drive intersection.

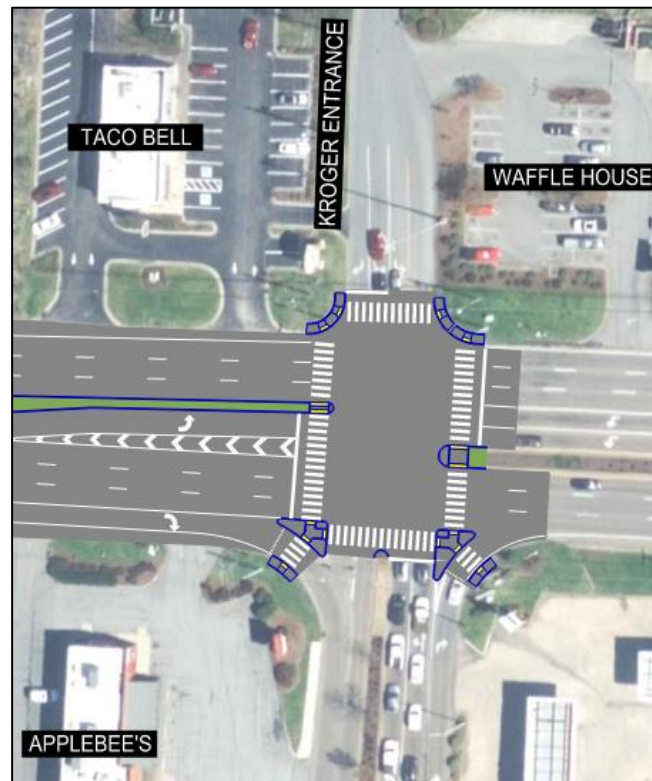
Cost Estimate: \$127,000



Eastman Road

Dual-left turn lanes on the westbound approach of Stone Drive create a sight obstruction for left-turning vehicles eastbound. An offset turn lane eastbound is recommended to mitigate this. The reduced median would have a small area remaining for pedestrian refuge but inadequate space for a full refuge island. Pedestrian crossings are recommended on all four approaches, with refuge islands in the east approach median, as well as splitter islands for channelized right-turn lanes on the southwest and southeast corners of the intersection.

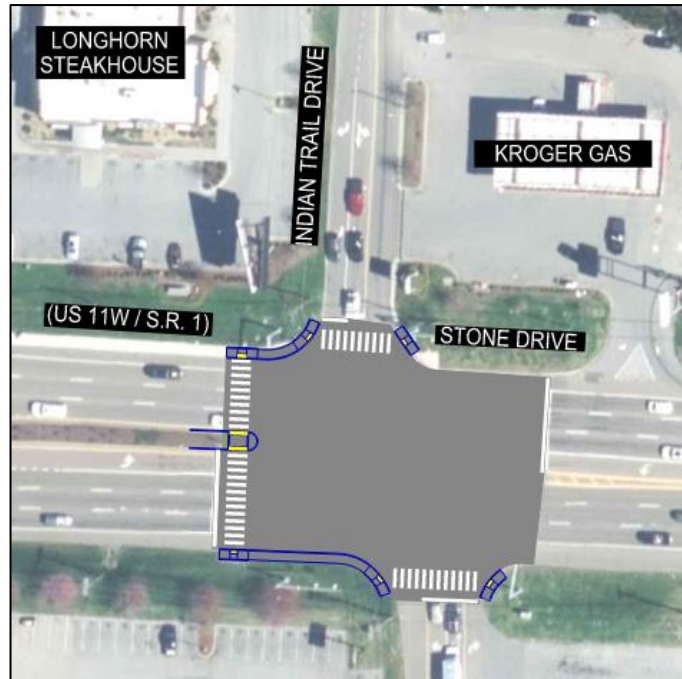
Cost Estimate: \$190,000



Indian Trail Drive

This offset intersection has limited existing pedestrian infrastructure. Pedestrian crossing signals are recommended on the north, west, and south approaches for the existing crosswalks. The existing median refuge island on the west approach crossing will remain.

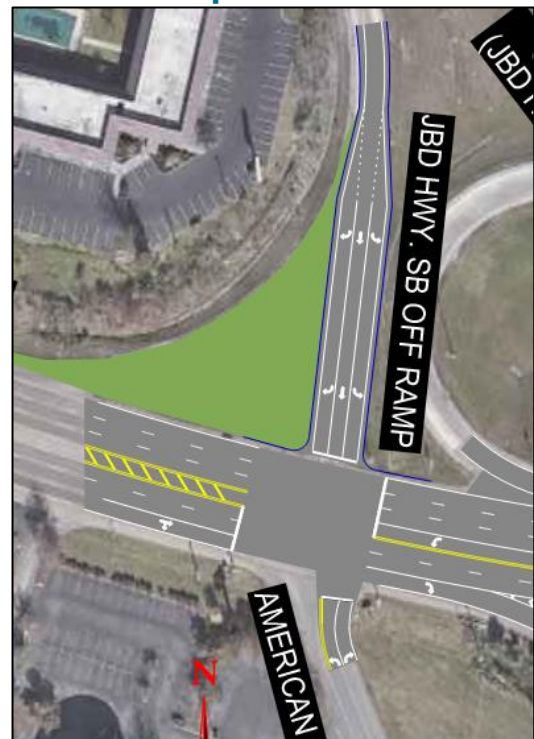
Cost Estimate: \$127,000



American Way / John B Dennis Southbound Off-Ramp

Development along American Way has led to an increase in volumes. American Way is directly aligned with the John B Dennis Highway southbound off-ramp left-turn and through movements, which share a single lane. This causes driver confusion at the American Way approach because vehicles cannot discern whether an opposing car will turn left or go through the intersection. The southbound right-turn movements onto westbound Stone Drive currently have a sweeping ramp into a merge condition. Removing the sweeping ramp will eliminate the merge condition and minimize the likelihood of rear-end crashes entering onto Stone Drive. Providing separate left-turn, through, and right-turn lanes along the southbound off-ramp approach will help vehicles on American Way discern which direction opposing traffic will travel. Signal timing modifications have also been proposed in the TSMO report, which will help the overall operations at the intersection and along the coordinated signal system on Stone Drive.

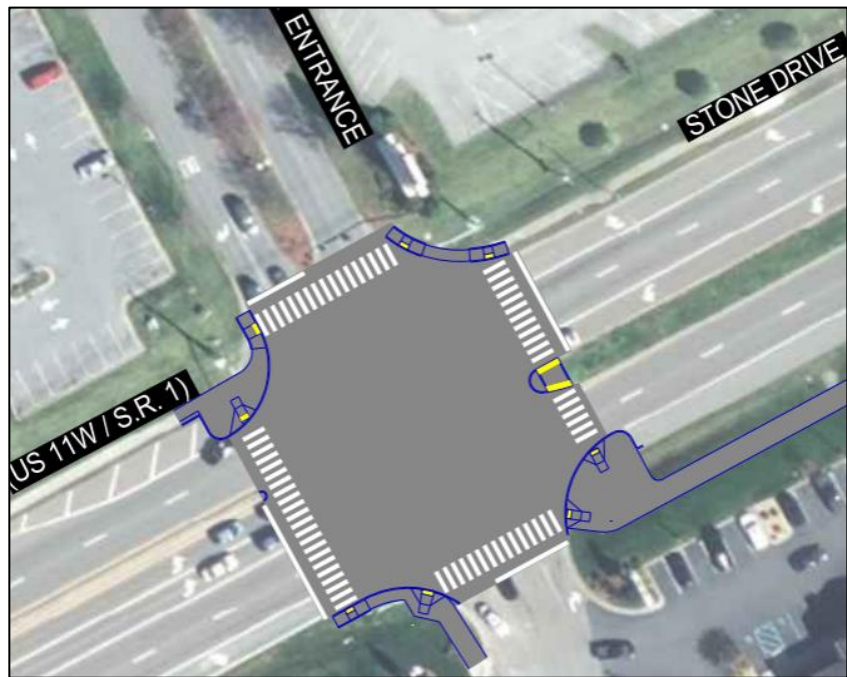
Cost Estimate: \$145,000



Target Entrance Intersection

Pedestrian infrastructure is again prioritized at the intersection for this commercial access drive. Pedestrian crossings are recommended on all four approaches, with a refuge island in the median of the east approach on Stone Drive. A large curb extension on the northwest and southeast corners helps shorten pedestrian crossing distances.

Cost Estimate: \$187,000



EXISTING CONDITIONS



PROPOSED IMPROVEMENTS

5.1.3 John B Dennis Off-Ramp to Lowe's Entrance Median Treatment & Eastbound Lane Reduction

Land use along Stone Drive east of the John B Dennis interchange includes many large commercial developments with multiple access points. This provides an opportunity to perform access management along the segment while directly impacting the access of relatively few businesses. It is recommended that a raised median be constructed between John B Dennis Highway and the existing raised median that begins at the eastmost Lowe's driveway. Periodic intersections with offset left-turn lanes are provided to allow access to businesses either directly or via U-turns. Additionally, the introduction of the median utilizes the eastbound lane shift proposed at the John B Dennis interchange, removing the need for the innermost through lane and eliminating the lane drop.

Cost Estimate: \$360,000



Beechnut Drive Intersection Thru Lane

In this section of Stone Drive, the roadway transitions from six-lanes to the west into a four-lane section to the east. In the westbound lanes, this change happens abruptly when a third lane is added after the Beechnut Drive intersection. The outer-most right lane is currently hatched out; however, many drivers disregard the hatching and utilize this lane as a right-turn or third through lane. It is proposed that this third lane be extended from the Brandy Mill Apartments entrance to the Beechnut Drive intersection to improve safety and reduce confusion for drivers.

Cost Estimate: \$20,000



5.2 John B Dennis Highway

This north-to-south arterial functions with higher mobility and lower access than Stone Drive. It is controlled access to the south of Stone Drive, but even to the north it has relatively fewer access points, with the exception of a few short sections with commercial development on either side of the highway. Recommendations along John B Dennis Highway focus more on vehicular access and safety than walkability.

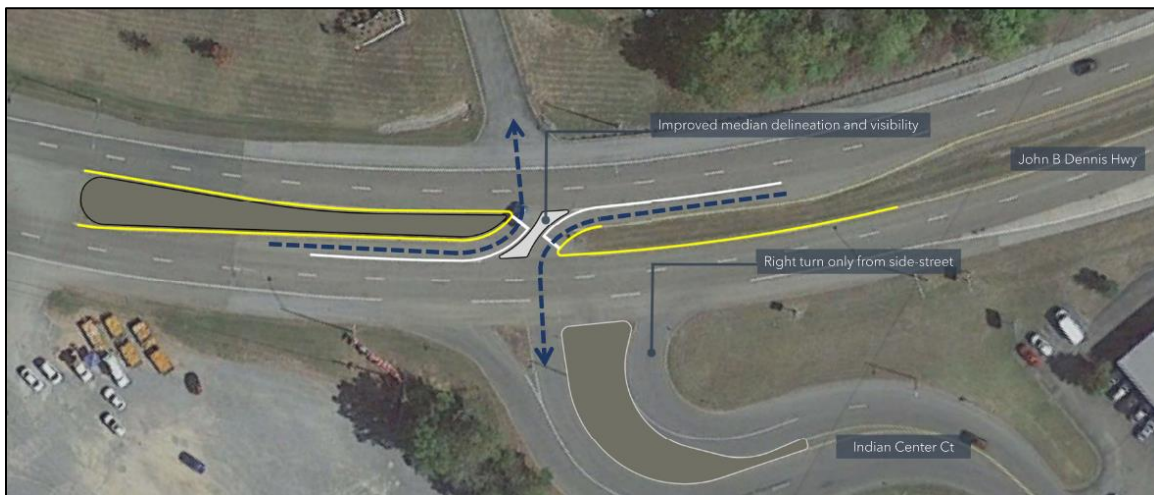
5.2.1 Indian Center Court Left-Turn Restriction

Conflicting left-turn movements at this intersection are a major safety concern. Crash rates are significantly elevated for left-turns to and from the major road. Several alternatives exist to reduce the number of conflict points.

Alternative 1 – Restricted Crossing U-Turn (RCUT) Intersection

Crossing maneuvers and left-turns are prohibited from the side street in this alternative. Full access is maintained from John B Dennis Highway, but traffic from Indian Center Court would need to find an alternate route to turn left onto northbound John B Dennis. The assisted living facility to the east would have its access restricted similarly. Depending on the needs of this facility, the channelizing island in the median may need to be constructed in a "mountable" fashion to preserve emergency vehicle access.

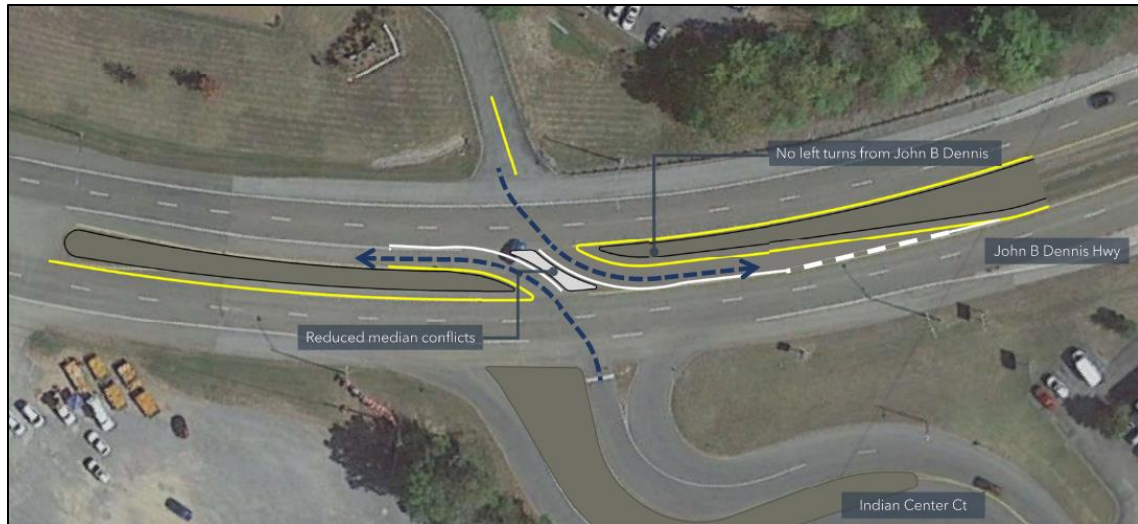
Cost Estimate: \$33,400



Alternative 2 – Left-Turns Restricted from John B Dennis

Left-turns from John B Dennis onto the side street are restricted in this alternative. The existing acceleration for the eastbound left-turn is maintained, and a short acceleration lane is added for westbound left-turns. The channelizing median in this alternative would be in the route between Indian Path Community Hospital and the assisted living facility, so it may need to be designed to allow emergency vehicle access.

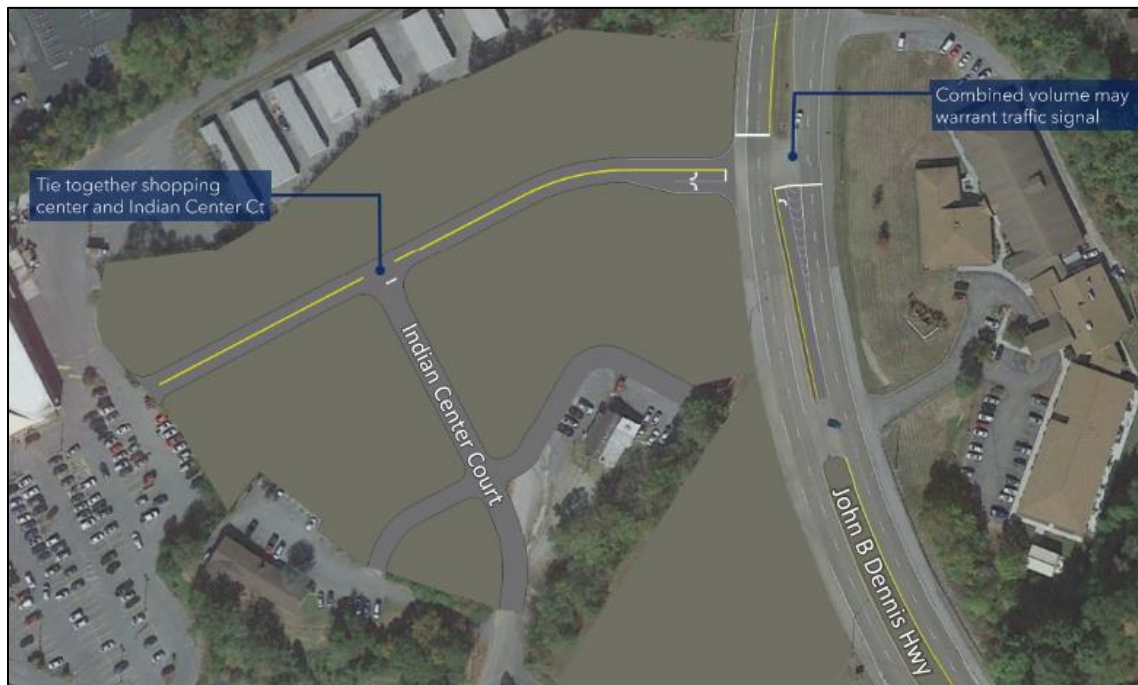
Cost Estimate: \$95,900



5.2.2 Indian Center Court Realignment

The shopping center to the west of the Indian Center Court intersection has an existing rear access road that intersects John B Dennis Highway immediately next to the Indian Path Community Hospital access drive. Long term, it is recommended that the existing Indian Center Court intersection be eliminated and Indian Trail Drive be realigned to tie into a new access road to the front of the Kroger shopping center. An offset left-turn lane is provided for northbound John B Dennis Highway, as well as a southbound right-turn lane. Depending on how much traffic is diverted to this new intersection, it could then be evaluated for a traffic signal.

Cost Estimate: \$694,000



5.2.3 Access Management with Fire Station Access

A raised median exists through this short commercial area with very high driveway density, however a 200 foot long median opening provides a very large, undefined space to access several driveways. This space only serves to confuse drivers and create additional conflict. It is recommended that the space be narrowed and well-defined left-turn lanes be installed. Property access can be provided via left-turns or downstream U-turns. Channelization within the median may need to be mountable by emergency vehicles to maintain adequate access to the fire station.

Cost Estimate: \$76,300



5.3 Stone Drive / John B Dennis Interchange

The recommended improvements at the Stone Drive at John B Dennis Highway interchange consist of striping changes to the existing eastbound lanes. By dropping the outer-most eastbound through lane at the southbound on-ramp and maintaining two through lanes, it allows room to shift the eastbound left-turn lane into what was the inner-most eastbound through lane. There would then be more storage for the left-turn traffic onto the northbound on-ramp. The storage space gained from the recommended configuration prevents vehicles from queuing in the through lane. This is particularly beneficial in helping to prevent rear-end crashes due to the spill back into the through lane. It is also recommended that the eastbound left-turn lane be protected-only phasing to help prevent the serious angle crashes that have occurred at this intersection.

Cost Estimate: \$47,100



5.4 John B Dennis Northbound Off-Ramp

Three alternatives are proposed for the intersection of Stone Drive and the John B Dennis Highway northbound off-ramp. Each alternative assumes the eastbound left-turn lane and two through lanes proposed in Section 5.3.

5.4.1 Alternative 1

The first alternative maintains the existing free-flow right-turn lane and utilizes the outer through lane as an auxiliary lane. The auxiliary lane eliminates the merge condition from the northbound off-ramp onto Stone Drive. This configuration is possible with the elimination of the third through lane through the interchange and would only require striping adjustments to implement.

Cost Estimate: \$40,400



5.4.2 Alternative 2

The second alternative proposes two right-turn lanes and two left-turn lanes at the intersection. By bringing the right-turn lanes under signal control, operations are impacted slightly because there is no longer a free-flow condition. Right turns on red would be permitted, which will help with any degradation in the operation of the off-ramp movements. Additionally, by providing a second right-turn lane, the inner-most lane could be utilized more efficiently by vehicles bound for Beechnut Drive. Advanced overhead signage or road shields would need to be provided to warn those drivers to use the appropriate lane.

Cost Estimate: \$174,000



5.4.3 Alternative 3

The third alternative is a hybrid approach to Alternatives 1 and 2. As with Alternative 1, the free-flow right-turn lane is maintained and becomes an auxiliary lane along Stone Drive to eliminate the merge condition. A second right-turn lane is also provided at the intersection, which would permit right-turn-on-red movements. Vehicles bound for Beechnut Drive would be instructed to use this lane to help prevent a merge condition across two lanes of Stone Drive within a short span of approximately 900 feet.

Cost Estimate: \$157,000



5.5 Multimodal Improvements

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.

5.5.1 Shared-Use Path Connection

The Kingsport Greenbelt is a linear park that runs parallel to Stone Drive along Reedy Creek within the study area. There are several plans for connections from the main Greenbelt to other areas of interest, as indicated in the snapshot of the Kingsport Greenbelt map in Figure 5-2. According to the map, the desire is to connect the existing Greenbelt to the Kingsport Pavilion shopping area and then extend further north to Preston Forest Park.



Figure 5-2 Kingsport Greenbelt Brochure Map¹

¹ Source: https://assets.website-files.com/618eea75fa3c221ff2f27712/62b274d18507727e41a16dcb_brochure-with_cover-proof.pdf (Note: The future greenbelt portion has been completed November 2020.)

Two of the future connections (Shopping Area Connection and Preston Forest Connection) were assessed as part of the corridor study. The difficulty with the Shopping Area Connection is that it must cross Reedy Creek at some point. Figure 5-3 depicts the approximate location for the Reedy Creek crossing, which attempts to avoid considerable terrain constraints. In addition to connecting to Preston Forest Park, the proposed shared-use path extends north to the Tribe Athletic Complex (TAC) site. The neighborhood connection between the park and the TAC site offers an asset that encourages physical activity, provides access for users of all ages and abilities, and fosters community interaction.

Cost Estimate: \$673,000



Figure 5-3 Proposed Shared-Use Path

5.5.2 Sidewalks

The sidewalk inventory along Stone Drive west of the John B Dennis interchange is provided in Figure 5-4. Green lines indicate the existing sidewalks and yellow lines depict where sidewalk connections are recommended. This area of Stone Drive is heavily developed with commercial and retail frontage with residential development located behind the commercial development. There are several multi-family residential units on the north side of Stone Drive and the south side of Stone Drive is comprised of mostly single-family residences. Additionally, the Greenbelt parallels Stone Drive and two bus routes service this area. These characteristics make this portion of Stone Drive attractive to non-motorized users.

Although the study area begins at Brookside Drive, sidewalks are proposed along the south side of Stone Drive between west of Pinebrook Drive and Brookside Drive to fill in the existing gap. The parcel located on the south side of Stone Drive west of Pinebrook Drive currently has front-facing parking along Stone Drive, making it difficult to construct a sidewalk without impacting the value of the property. It is recommended to meander the sidewalk behind this parcel as a shared-use path connection to the Kingsport Greenbelt via the Boys and Girls Club. Sidewalk could then be provided along Positive Place to connect back to the Stone Drive sidewalks.

There are several Route 3 and Route 4 transit stops along Stone Drive, so it is critical to provide pedestrian accommodations for the transit riders in this vicinity. Sidewalks are recommended along Eastman Road and Indian Trail Drive to allow for uninterrupted access for transit riders accessing the bus stops located along these roads.

Cost Estimate (Stone Drive): \$386,000

Cost Estimate (Eastman Road): \$14,700

Cost Estimate (Indian Trail Drive): \$25,100

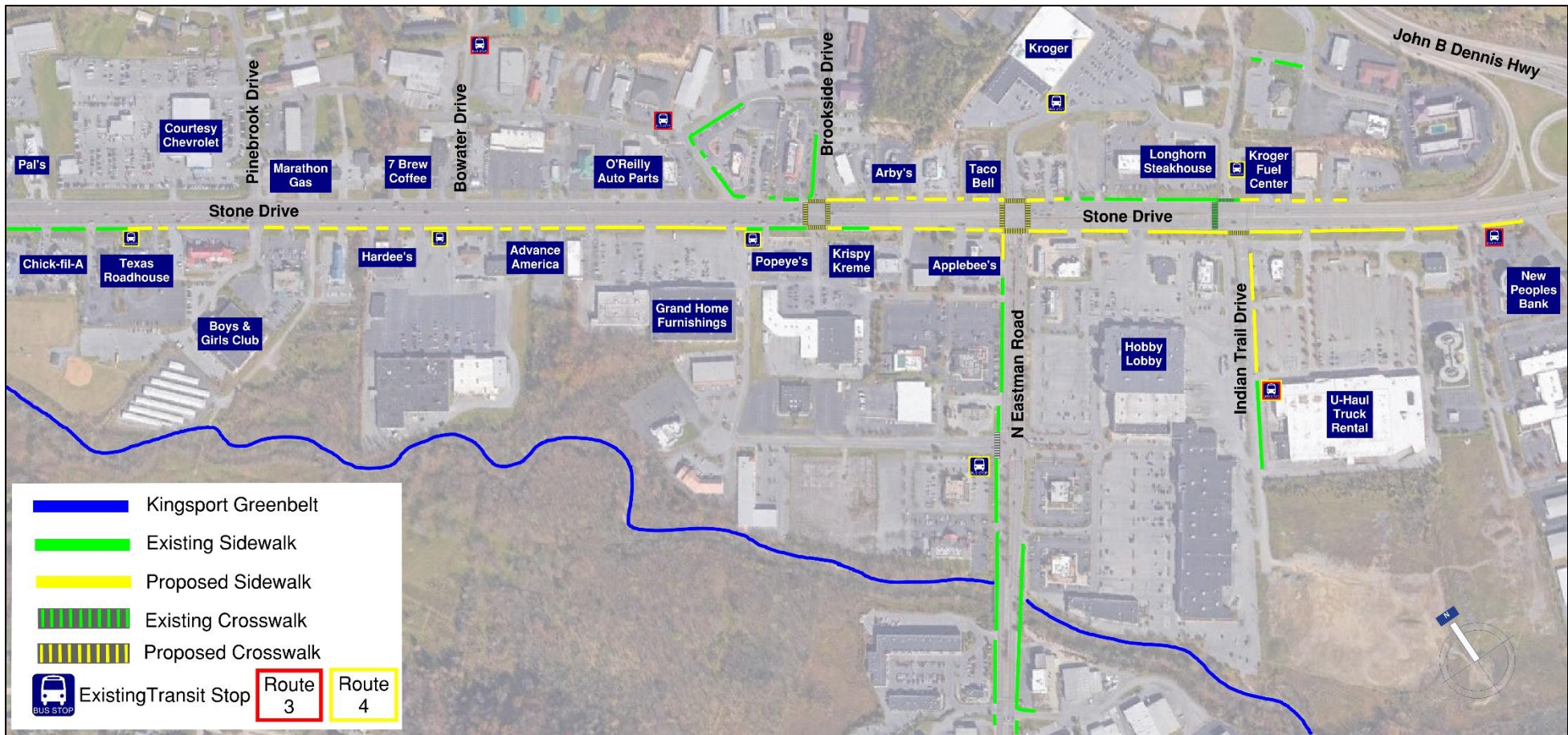


Figure 5-4 Existing and Proposed Sidewalk Locations

5.6 Orebank Road & Memorial Boulevard Interchanges with John B Dennis Highway

The distance between the Memorial Boulevard and Orebank Road interchange is less than a half mile. The convergence points of the ramps are approximately 1,000 feet apart, with no auxiliary lane. AASHTO guidelines recommend a minimum ramp spacing of 2,000 feet for freeway ramps servicing local roads, in the absence of a collector-distributor or similar facility.

Exiting traffic from southbound John B Dennis Highway to Memorial Boulevard may also spill back to mainline John B Dennis Highway further reducing the available distance between the ramps. Planned improvements of Memorial Boulevard and the interchange by the Tennessee Department of Transportation (TDOT) should address the spill back with a double left-turn movement and additional left-turn storage from southbound John B. Dennis Highway to eastbound Memorial Boulevard.

It is recommended that at a minimum, an auxiliary lane be constructed along the outside shoulders of John B Dennis Highway, between the merge and diverge lanes for Orebank Road and Memorial Boulevard. To provide added separation, a barrier could be constructed between the thru lanes and the auxiliary lane, effectively creating a collector-distributor road between the interchanges. This would require two additional ramps to the north of Orebank Road, completing the diamond interchange. A diagram of this circulation is included in Figure 5-5.

In absence of any improvements between these interchanges, consideration should be given to closing the Orebank Road interchange (Figure 5-6). The planned TDOT improvements of Memorial Boulevard includes the realignment of the Orebank Road intersection which would facilitate Orebank Road access to John B. Dennis Highway using the Memorial Boulevard interchange. It is recommended that operations in this area be monitored after the completion of the planned improvements. Additional improvement opportunities may present themselves based on to what degree of operations in the interchange areas improve.

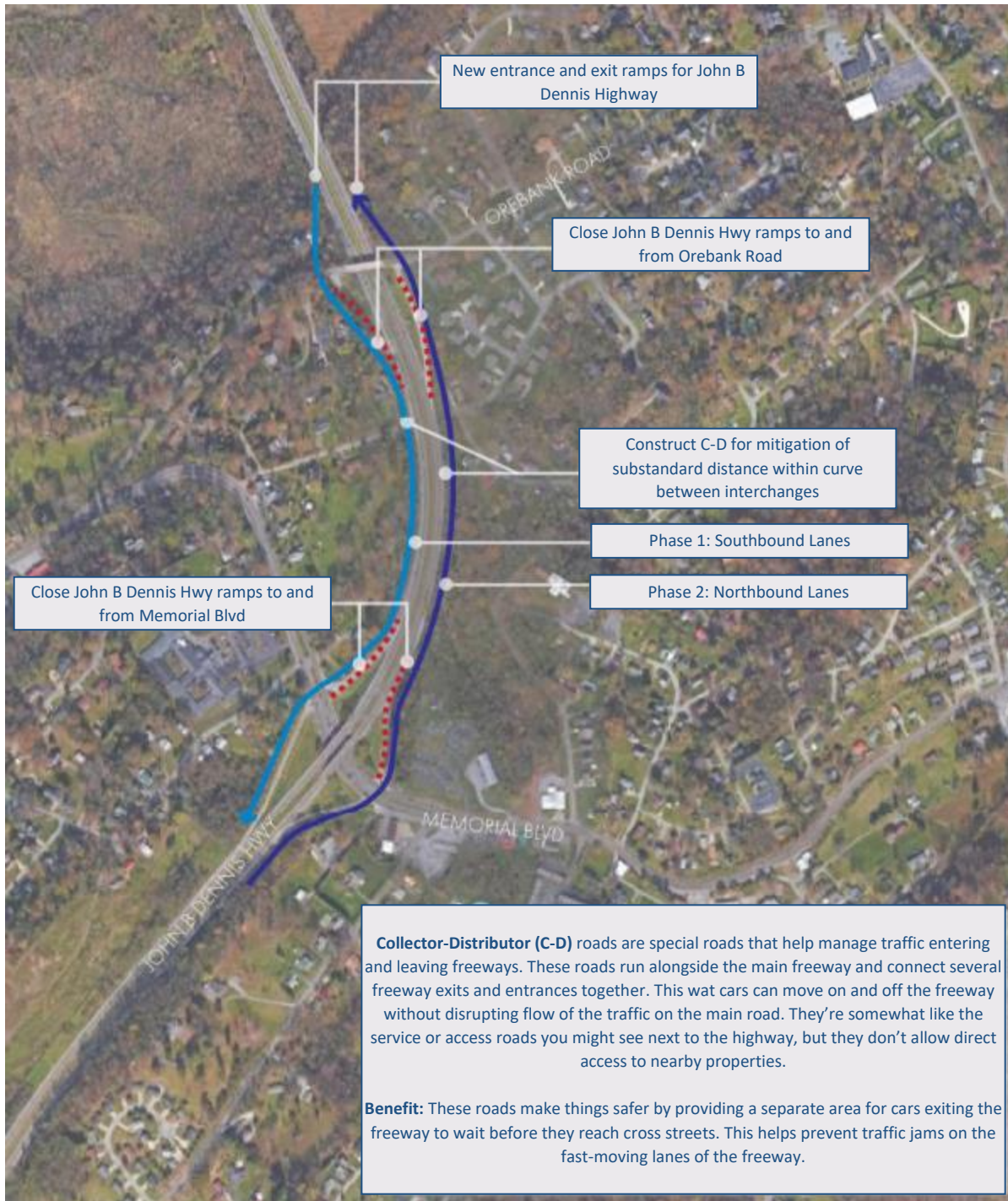


Figure 5-5 Collector-Distributor Road Between Orebank Road and Memorial Boulevard Interchanges



Figure 5-6 Orebank Road Interchange Closure

SECTION 6

IMPLEMENTATION PLAN

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

6.1 Project Evaluation Factors

Each project identified in the Recommendations was assessed based on four criteria to aid in prioritization. Within each criterion, projects were scored based on a system where 1 represents a higher priority and 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 right-of-way acquisition or detailed survey to design*
- 2 = moderate complexity; *examples include projects that moderately alter the curb, propose changes to the median, or require new pavement*
- 3 = high complexity; *examples include projects that require right-of-way acquisition, significantly alter the curb, or require an environmental analysis before construction*

Safety

The safety ranking is based on the existing safety concerns at the location of the project. If a project is located in a location where a fatal crash has occurred, it is automatically given the highest ranking.

- 1 = highest safety priority; *project is located at an area where a fatal crash occurred, or the crash rates are significantly above average (actual crash rate/critical rate > 1) and there was a pedestrian-involved crash at the project location*
- 2 = medium safety priority; *project is located at an area where the crash rates are significantly above average (actual crash rate/critical rate > 1) but there were no pedestrian-involved crashes at the project location*
- 3 = lowest safety priority; *project is located at an area where the crash rates are below average (actual crash rate/critical rate < 1) and there were no fatal crashes or pedestrian-involved crashes at the project location*

Additionally, the sidewalk and shared-use path improvements were given slightly higher priority and assessed by the following:

A multimodal improvement was given a highest safety priority ranking if there was a pedestrian-involved crash at the project location. If no pedestrian-involved crashes occurred, the multimodal improvement was given a medium safety priority ranking.

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 priority; *over 100 comments*

2 = moderate public priority; *between 50 and 100 comments*

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

Cost

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




1 = low cost; *projects less than \$50,000*

2 = moderate cost; *projects greater than \$50,000 and less than \$250,000*

3 = high cost; *projects greater than \$250,000*

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 the 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.

6.2.1 Short-Term Improvements

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

- Stone Drive – Eastman Road Intersection Improvements
- Stone Drive – Median Treatment between Brookside Drive and Eastman Road
- Stone Drive at John B Dennis Interchange – Reconfigure Lanes
- John B Dennis Northbound Off-Ramp Terminus – either Alternative A, B, **OR** C

6.2.2 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:

- Stone Drive – Brookside Drive Intersection Improvements
- John B Dennis – Indian Center Court Left Turn Restriction (Alternative 1 **OR** 2)
- New Sidewalks along Eastman Road
- New Sidewalks along Indian Trail Drive
- Stone Drive – Beechnut Drive Thru Lane
- Stone Drive – Indian Trail Drive Intersection Improvements
- Stone Drive – Pavilion Shopping Center Intersection Improvements
- John B Dennis – Access Management with Fire Station Access
- New Sidewalks along Stone Drive

6.2.3 Long-Term Improvements

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

- Stone Drive – John B Dennis Southbound Off-Ramp Realignment and American Way Signal Phasing
- Stone Drive – Median from John B Dennis Off-Ramp to Lowe's Entrance
- John B Dennis – Realignment of Indian Center Court
- Shared-Use Path Connection from Existing Greenbelt to Tribe Athletic Complex

Table 6-1 Priority Ranking Table

Location	Recommendation	COMPLEXITY	SAFETY	PUBLIC CONCERN	COST	PRIORITY BAND	Cost Estimate
John B Dennis NB Off-Ramp	Alt A - free flow to add lane	●	●	●	●	●	\$ 40,400
Stone Drive	Eastman Road Intersection	●	●	●	●	●	\$ 190,000
Stone Drive	Brookside Drive to Eastman Road Median Treatment	●	●	●	●	●	\$ 37,600
Stone Drive @ John B Dennis	Restripe existing outside through lane	●	●	●	●	●	\$ 47,100
John B Dennis NB Off-Ramp	Alt B - dual left and dual right at signal	●	●	●	●	●	\$ 174,000
John B Dennis NB Off-Ramp	Alt C - free flow to add lane and 2nd right turn lane at signal, dual lefts at signal	●	●	●	●	●	\$ 157,000
Stone Drive	Brookside Drive Intersection	●	●	●	●	●	\$ 127,000
John B Dennis	Indian Center Court Left Turn Restriction - ALT 1	●	●	●	●	●	\$ 33,400
Eastman Road	Proposed Sidewalks	●	●	●	●	●	\$ 14,700
Indian Trail Drive	Proposed Sidewalks	●	●	●	●	●	\$ 25,100
Stone Drive	Beechnut Drive Thru Lane	●	●	●	●	●	\$ 35,000
Stone Drive	Indian Trail Drive Intersection	●	●	●	●	●	\$ 127,000
Stone Drive	Pavilion Shopping Center Intersection	●	●	●	●	●	\$ 187,000
John B Dennis	Indian Center Court Left Turn Restriction - ALT 2	●	●	●	●	●	\$ 95,900
John B Dennis	Access Management in front of Fire Station	●	●	●	●	●	\$ 76,300
Stone Drive	Proposed Sidewalks (nearby Brookside and from Eastman Rd to Indian Trail Dr)	●	●	●	●	●	\$ 386,000
Stone Drive	JBD Southbound Off-Ramp and American Way	●	●	●	●	●	\$ 145,000
Stone Drive	Median from NB Off-Ramp to Lowe's Entrance	●	●	●	●	●	\$ 360,000
John B Dennis	Indian Center Court Realignment	●	●	●	●	●	\$ 694,000
Stone Drive	Shared-Use path from Existing Greenbelt to Tribe Athletic Complex	●	●	●	●	●	\$ 673,000

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 drawing 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 congestions. Air quality is improved by funding transportation projects and programs that reduce emissions from vehicles in designated air quality nonattainment and maintenance areas. Project involving carpooling and vanpooling, roundabouts, or traffic flow improvements/intelligent transportation systems are eligible for 100% federal funding. Other project types are eligible for 80% federal funding.	80-100% Federal Match

Grant/Program	Agency	Examples of Eligible Activities	Funding
Transportation Alternatives Program (TAP)	FHWA funds distributed to TDOT & TPO	All facilities must be hard-surfaced, ADA compliant, and provide adequate connectivity and separation from vehicular traffic. Sidewalk facilities must be a minimum of 5 feet wide and shared-use facilities must be a minimum of 10 feet wide. TAP funds can be used for sidewalks, walkways or curb ramps, bike lane striping, wide paved shoulders, bike parking and bus racks, traffic calming for the safety of bike/ped traffic, off-road trails, bike and pedestrian bridges/underpasses, and ADA compliance.	20% local match for construction Preliminary engineering, design, and ROW expenses are responsibility of local government
Surface Transportation Block Grant	FHWA funds distributed to TDOT & MPO	In general, STBG projects may not be on local roads or rural minor collectors. There are a number of exceptions to this requirement, such as the ability to use up to 15 percent of a state's rural suballocation on minor collectors. Other exceptions include: bridge and tunnel projects; safety projects; fringe and corridor parking facilities/programs; recreational trails, pedestrian and bicycle projects, and safe routes to school projects; boulevard/roadway projects largely in the ROW of divided highways; inspection/evaluation of bridges, tunnels, and other highway assets; port terminal modifications; and projects within the pre-FAST Act title 23 definition of "transportation alternatives."	80-100% federal 20% local match
Safe Streets and Roads for All (SS4A); Planning & Demonstration and Implementation 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 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: \$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.	86% federal 14% Local Match \$400,000 Maximum
Healthy Built Environment Grants	TN Dept of Health	Healthy Built Environment grants are non-competitively provided to each county in Tennessee. These funds are to be used for transportation convening, planning, programming, and construction projects.	Conditional \$20,000 (2019)
Built Environment Grants	TN Dept of Health	These grants aim to increase access to safe and publicly accessible places that provide opportunities for physical activity for a diverse group of users, including those who live, visit, work, play, worship, and learn in the community.	TBD
Project Diabetes	TN Dept of Health	Grants are awarded to community partners with a focus on reducing overweight and obesity as risk factors for the development of type 2 diabetes. Grant activities are geared toward interventions that are applied before there is any evidence of disease.	Category A – funded up to 3 years; max of \$150,000/year Category B – funded up to 2 years; max of \$15,000/year
AARP Community Challenge	AARP	The AARP Community Challenge provides small grants to fund quick-action projects that can help communities become more livable for people of all ages. Applications will be accepted for projects to improve public spaces, housing, transportation and civic engagement; support diversity, equity and inclusion; build engagement for programs under new federal laws; and pursue innovative ideas that support people aged 50 or older. Transportation and Mobility projects include options that increase connectivity, walkability, bikeability, wayfinding, access to transportation options and roadway improvements.	None Required.

Grant/Program	Agency	Examples of Eligible Activities	Funding
Rebuilding American Infrastructure with Sustainability & Equity (RAISE)	FHWA	The RAISE grant provides funds for surface transportation infrastructure projects that will improve: safety; environmental sustainability; 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, and generate regional economic growth and improve quality of life.	80% match for planning grants and no more than 50% for capital projects.

