US 231
CORRIDOR STUDY

Bedford County, Tennessee

TDOT
Department of
Transportation

May 2023

BEDFORD COUNTY BOARD OF COMMISSIONERS

RESOLUTION No. 24-8

Bedford County Corridor Study Transportation Planning Grant

WHEREAS, the Bedford County Board of Commissioners submitted an application with approved Resolution 21-39 for consideration of grant request to the Tennessee Department of Transportation for the Transportation Planning Grant; and

WHEREAS, Bedford County Government was awarded the Tennessee Department of Transportation Planning Grant to develop a corridor study in Northern Bedford County on April 19, 2022; and

WHEREAS, a Steering Committee was created and conducted meetings specific to grant guidelines; and

WHEREAS, public engagement collected was an asset in gaining valuable community input to assist with the completed study; and

WHEREAS, Bedford County has completed the corridor study identifying existing and projected needs in regard to the safety, mobility, and connectivity of State Route 231 north and south as well as adjacent roadways connecting State Route 269 and State Route 16/41A;

WHEREAS, the Bedford County Regional Planning Commission voted at their regular session meeting of May 23, 2023 to favorably recommend the acknowledgement of the completed study to the Bedford County Board of Commissioners.

NOW, THEREFORE, BE IT RESOLVED by Bedford County Board of Commissioners:

1. That the Mayor and Bedford County Board of Commissioners acknowledge the completion of the 231 North Corridor Study.
2. That the Mayor and Bedford County Board of Commissioners will support the implementation of the recommendations contained within.

PASSED AND SO ORDERED THIS 11TH DAY OF JULY, 2023.

Chad Graham, Bedford County Mayor — 7-12-2023 Date

Robert Daniel, Bedford County Finance Director — 7/13/23 Date

Donna Thomas, Bedford County Clerk — 7-13-23 Date

Prepared by

Funded by

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1.0 Introduction

The following corridor plan was developed for Bedford County through the Community Transportation Planning Grant (CTPG) program. A CTPG is a planning grant available from the Tennessee Department of Transportation's (TDOT) Long Range Planning Division. There are six categories of plans, studies, and evaluations that may qualify for a CTPG. Each grant type shares a common goal of assisting local communities to plan for a transportation need, such as safety, accessibility, or economic growth. Corridor studies like this one aim to evaluate access and mobility, land use, operational efficiency, and development for the benefit of all those using the transportation system.

1.1 Study Area Overview

The study area is in north-central Bedford County, between Shelbyville and Murfreesboro. This area includes US 231/State Route (SR) 82/SR 10 (US 231) from Unionville-Deason Road/Edd Joyce Road to Peacock Lane as well as major intersecting east-west roadways maintained by Bedford County (Figure 1-1).

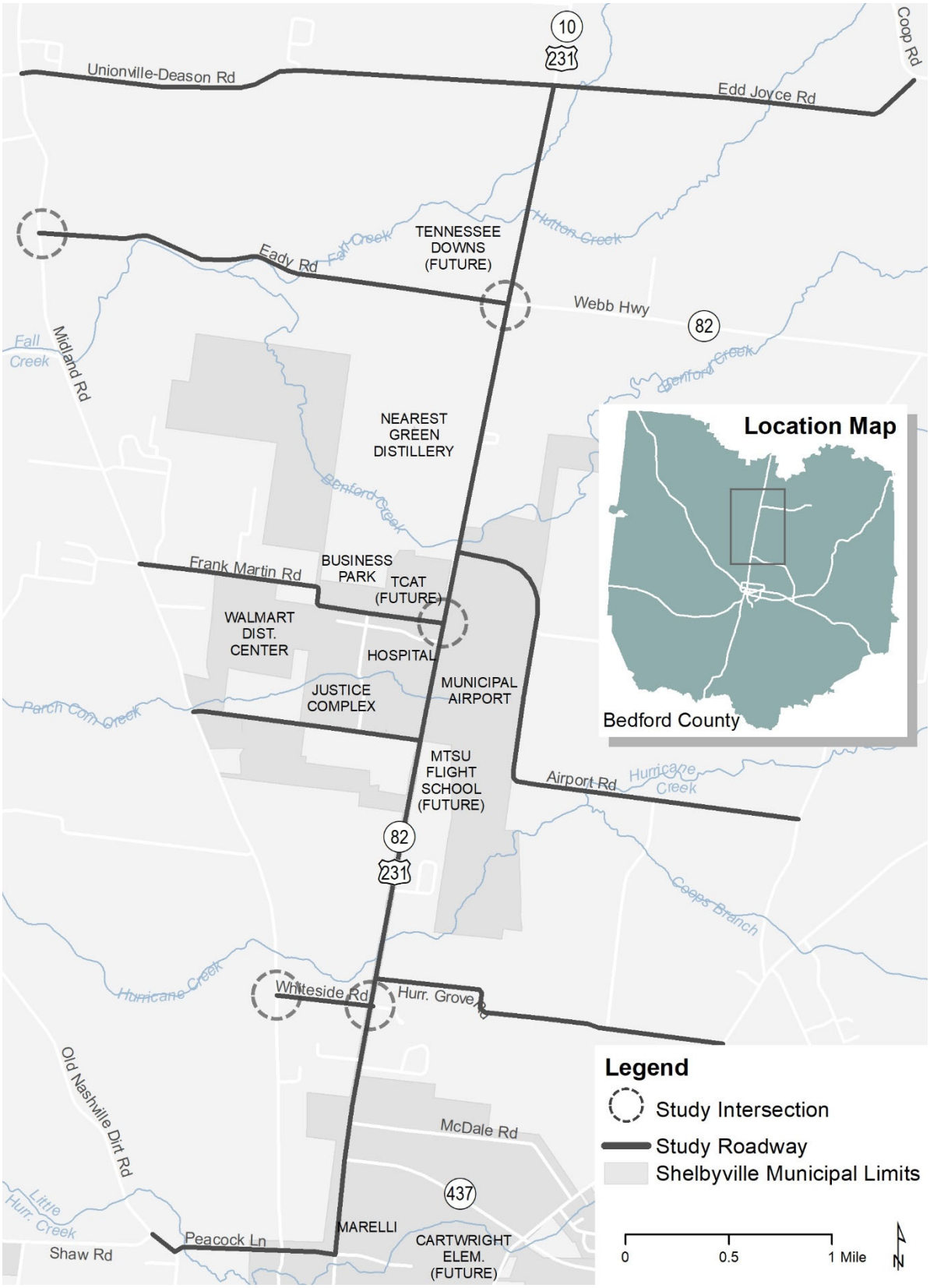
This section of the corridor is home to a Walmart Distribution Center, Shelbyville Municipal Airport, Vanderbilt Bedford Hospital, 231 North Business Park, Bedford County Justice Complex, and Nearest Green Distillery, which has plans to expand as an event center, including an outdoor amphitheater. Future developments in the study area include a Middle Tennessee State University (MTSU) flight school, a relocated and expanded Tennessee College of Applied Technology (TCAT) campus, and Tennessee Downs, an elite automobile club track, that is expected to break ground in the near future. Duksan Electera America is currently constructing a new factory in the 231 North Business Park that is expected to provide 101 new jobs for the community, while a new 800-student elementary school will break ground soon off Fairfield Pike.

In addition to study roadways, five intersections were selected for further in-depth evaluation based on their proximity to the study area and presumed role in regional traffic patterns and area traffic operations. These include:

- Eady Road/Webb Highway/SR 82 at US 231;
- Eady Road at Midland Road;
- Frank Martin Road at US 231;
- Whiteside Road at US 231; and,
- Whiteside Road at Midland Road.

US 231 South of Eady Road/Webb Highway /SR 82 Intersection (Southbound)

Figure 1-1. Study Area



1.2 Plan Need and Purpose

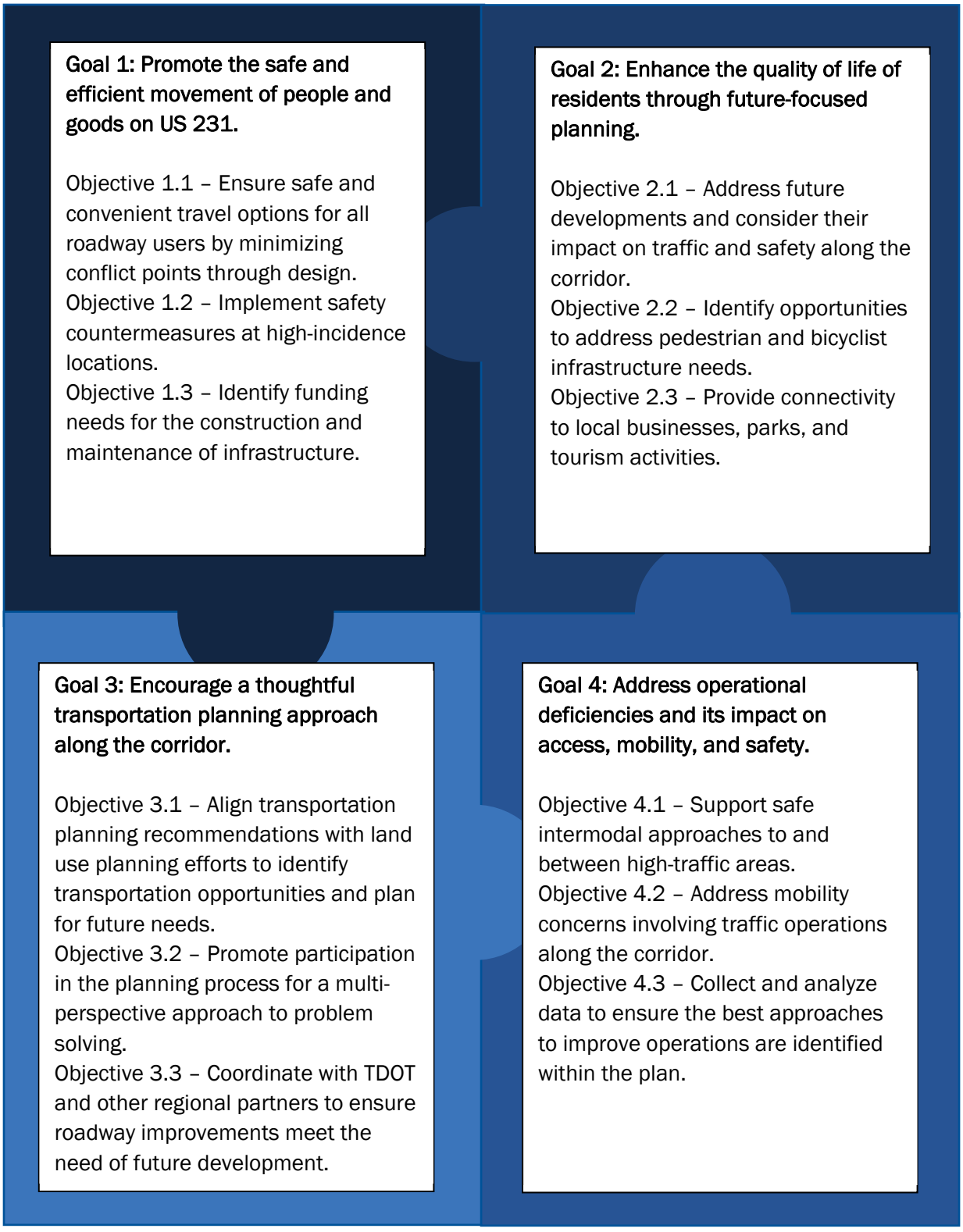
US 231 serves as a major connector between Shelbyville and Murfreesboro; however, it is quickly becoming more of a destination than a transitional space. Investment in educational facilities, economic development, and tourism each draw different frequencies and modes of traffic. Increases in daily traffic and/or shifts in time-of-day travel patterns can exacerbate safety and congestion concerns, creating more difficult and unique challenges as the corridor develops. It is important to begin the planning process now to understand and prepare for anticipated challenges influenced by these changes.

The purpose of this study is to understand the relationship of existing and future land uses to the roadway network, identify opportunities to increase operational efficiency and recommend projects to improve safety, mobility, and access as this area of Bedford County continues to grow.

Vision, Goals, and Objectives

The project team drafted the Vision, Goals, and Objectives statements in coordination with the project committee. These statements help focus the corridor study to best meet the needs of the community through an aligned purpose.

US 231 is a thoughtfully planned corridor that supports growth and economic development while providing safe, efficient, and reliable connectivity for residents and visitors alike.


Goal 1: Promote the safe and efficient movement of people and goods on US 231.
Objective 1.1 – Ensure safe and convenient travel options for all roadway users by minimizing conflict points through design.
Objective 1.2 – Implement safety countermeasures at high-incidence locations.
Objective 1.3 – Identify funding needs for the construction and maintenance of infrastructure.
Goal 2: Enhance the quality of life of residents through future-focused planning.
Objective 2.1 – Address future developments and consider their impact on traffic and safety along the corridor.
Objective 2.2 – Identify opportunities to address pedestrian and bicyclist infrastructure needs.
Objective 2.3 – Provide connectivity to local businesses, parks, and tourism activities.
Goal 3: Encourage a thoughtful transportation planning approach along the corridor.
Objective 3.1 – Align transportation planning recommendations with land use planning efforts to identify transportation opportunities and plan for future needs.
Objective 3.2 – Promote participation in the planning process for a multi-perspective approach to problem solving.
Objective 3.3 – Coordinate with TDOT and other regional partners to ensure roadway improvements meet the need of future development.
Goal 4: Address operational deficiencies and its impact on access, mobility, and safety.
Objective 4.1 – Support safe intermodal approaches to and between high-traffic areas.
Objective 4.2 – Address mobility concerns involving traffic operations along the corridor.
Objective 4.3 – Collect and analyze data to ensure the best approaches to improve operations are identified within the plan.

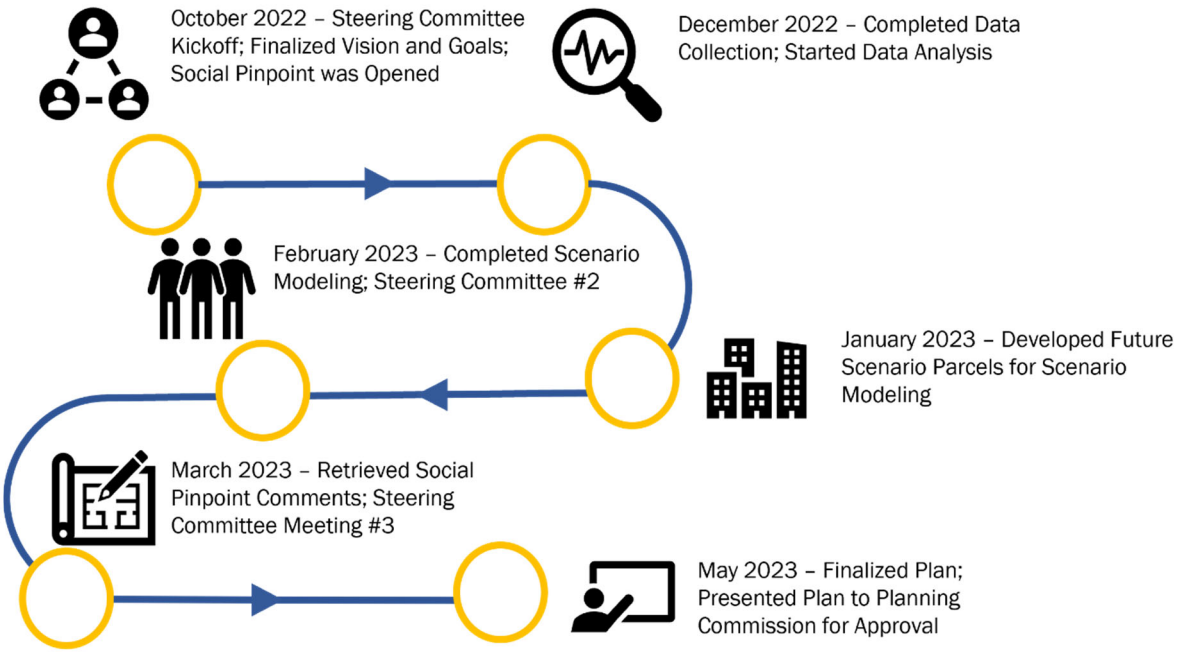
1.3 Plan Development Process

The plan development process officially began with a formal project kick-off meeting in September of 2022 and was organized around virtual online engagement with the public and stakeholders, as well as a series of Steering Committee meetings. Key participants of the Committee included:

- Bedford County representatives and elected officials;
- TDOT;
- South Central Tennessee Development District (SCTDD); and,
- Local business owners.

Throughout the plan development process, the Committee met to discuss progress made on the plan, key milestones and deliverables, and, most importantly, topics that needed additional input. In total, the Committee met three times over the study period. The full timeline of the project is illustrated in Figure 1-2.

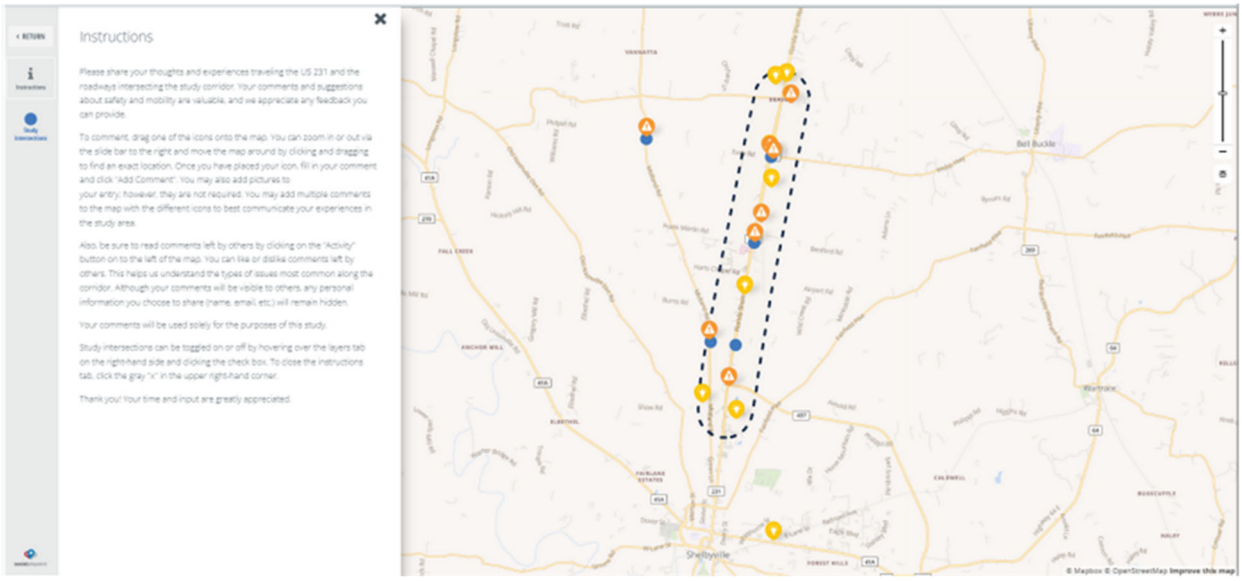
Figure 1-2. Project Timeline



1.4 Public Input, Data Collection, and Analysis

Public input was solicited through the project website between October 2022 and March 2023 using an interactive map. This map allowed users to comment directly on the location of their concern using drag and drop symbology. Overall, 23 comments were received through the interactive map over the study period. The project website, in general, had over 1,300 visits with almost 350 unique users visiting the site over the course of the plan development process. Figure 1-3 displays the comments received on the interactive map.

Figure 1-3. Social Pinpoint Interactive Map



Comments were supportive of safety enhancements to the corridor as well as the need for traffic control and traffic calming measures. Near miss crashes, high speeds, and fatal crashes were listed as primary reasons for community concern. Potential solutions listed were an increase in traffic lights and beacons, a reduction in the speed limit, turn lanes on US 231 from and to the Shelbyville Bypass, and an increase in police presence. A summary of these comments, as well as other public and stakeholder involvement documentation, can be found in Appendix A – Public and Stakeholder Engagement Documentation.

In addition to public input, a wide variety of data related to the study area was collected and analyzed. The types of data collected comprised of existing plans, including comprehensive, land use, and development plans, population data from the US Census Bureau, prior studies, zoning and land use maps, historic traffic counts, crash data, and other relevant documents. Crash data and roadway characteristics used in corridor analysis was taken from TDOT's Enhanced Tennessee Roadway Information Management System (E-TRIMS), while detailed crash reports were pulled from the Tennessee Highway Patrol's database known as Tennessee Integrated Traffic Analysis Network (TITAN).

In addition to the data from Bedford County, information was also gathered regarding the City of Shelbyville as the study area includes some parcels identified as being within the Shelbyville City

limits. Data gathered from the City of Shelbyville included existing and future land use and zoning maps, comprehensive plans, subdivision plans, and other documents that had information relevant to the project corridor.

Although the data gathered for this study was centered around Bedford County and the City of Shelbyville, information was also collected from Bell Buckle, Normandy, and Wartrace, TN. To best focus planning efforts on US 231, data gathered in these locations was minimal and consisted mainly of land use plans and other planning documents that specifically mentioned US 231. The types and range of information collected were shared with the project committee to ensure that all relevant data had been gathered for analysis. Regional plans were also gathered, including the Comprehensive Economic Development Strategy (CEDS) Plan completed by SCTDD in 2018.

Collected documents provided the necessary data and background information for corridor analysis, with greater emphasis being placed on current and future land use maps, planned developments, and community vision for the corridor. This not only helps to provide a more accurate analysis of the corridor, but also improves recommendations to address specific needs and concerns. Additionally, planning documents for areas outside of the study area were used to ensure that recommended improvements were not obstructing the vision or goals of the surrounding communities.

US 231 Approaching Eady Road/Webb Highway/SR 82 Intersection (Southbound)

2.0 Existing Conditions

The development and needs of a community's transportation system is best understood as one element of the broader demographic, socioeconomic, and geographical landscape. Multiple factors such as population growth, land use types, employment sectors, economic development, and the central location of Bedford County within Tennessee each play a role in planning for a safe, sustainable, and reliable transportation network. This chapter will both detail these conditions and analyze needs in Bedford County within and around the study area.

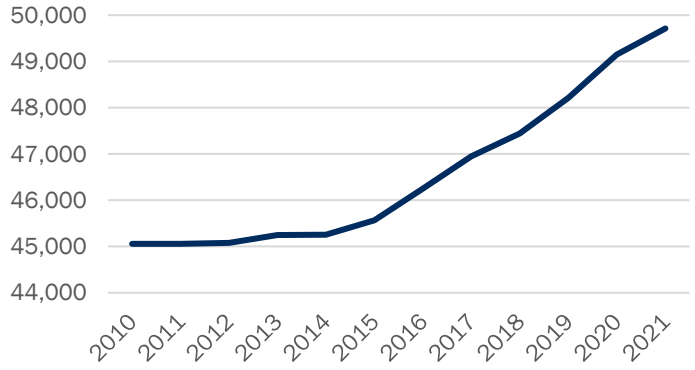
2.1 Demographics

Demographic data was collected from the US Census Bureau to provide an overview of population and employment trends within Bedford County. These data include population growth, employment statistics, and educational attainment, as these influence travel patterns and development opportunities in the study area and within Bedford County more broadly.

Population Growth

Approximately 50,000 residents call Bedford County home, making it the 32nd most populous of Tennessee's 95 counties. Between 2010 and 2020, Bedford County's population grew from 45,058 to 50,237, resulting in a growth rate of 11.5% (Figure 2-1), which is faster than the statewide average growth rate during the same ten-year period of just under 9%.

Figure 2-1. Bedford County Population (2010 – 2020)

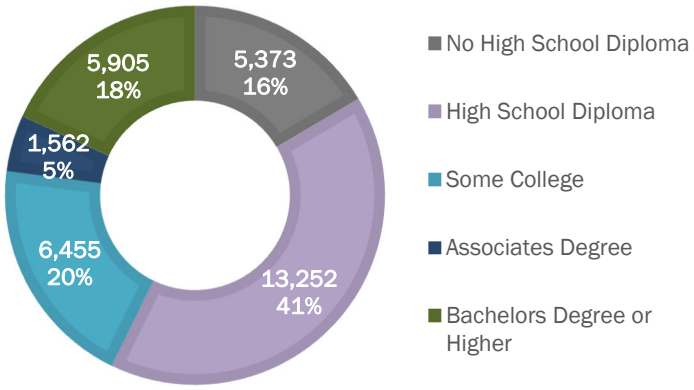


Source: US Census Bureau; 2010 and 2020 Decennial Census

Educational Attainment

Educational attainment is closely linked to commuter travel, as a high relative percentage of educational attainment may require residents to drive further from where they live for their profession, depending on what occupations are available locally. Conversely, low educational attainment may increase in-bound commuter traffic as there may not be enough residents that meet the educational requirements of the local job market. Low educational attainment may also signify that there is enough demand for persons without

Figure 2-2. Educational Attainment



Source: US Census Bureau, 2016-2020 American Community Survey 5-Year Estimates

a degree that residents decide to forgo higher education. These jobs typically would include manufacturing, industrial, construction, food or retail service, and other labor-intensive occupations.

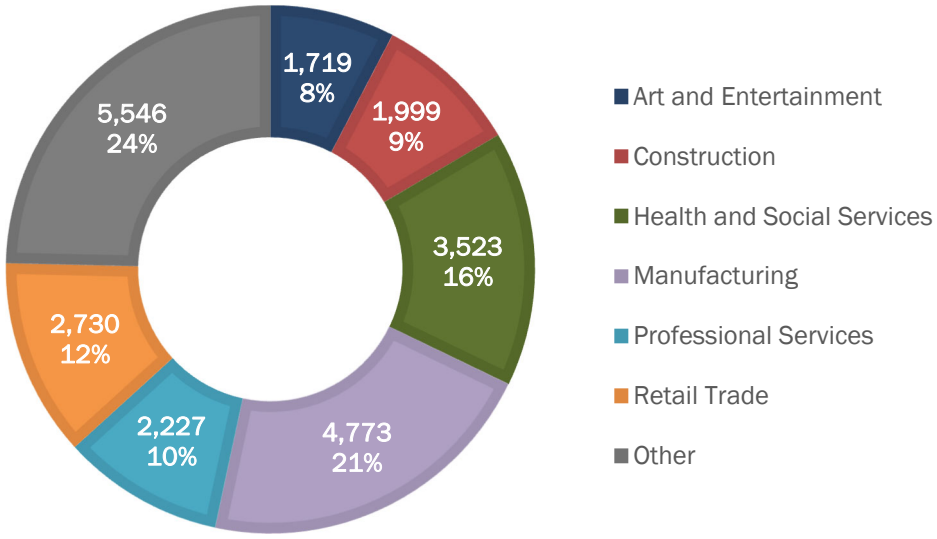
Of adults 25 years of age and older, most Bedford County residents have a High School degree or equivalent, while nearly 23% have at least a college degree. Of those with a college degree, approximately 21% have an associate degree, 53% have a bachelor's degree, and 26% have an advanced degree. A breakdown of Bedford County residents and their respective educational attainment is shown in Figure 2-2.

Existing Employers

The types of employers and their workforce needs can influence both the kinds and frequency of traffic that utilizes the transportation network in the study area. For example, high levels of industrial employers would likely produce more freight traffic. Conversely, high levels of occupations that require a degree, such as health or professional services, may draw less freight traffic, but could attract persons with higher educational attainment from outside of the area if there are not enough employees locally to fill those positions.

Manufacturing is the largest single employer type in Bedford County with 4,773 employees (Figure 2-3). Only "other", which represents all other employment types that were not included in the six largest types of employers, is higher than manufacturing. Both professional services and health and social services are in the top six employers, which may indicate the need for higher educational attainment in these areas to reduce inbound commuter traffic. Commuting patterns are discussed in more detail in the Transportation section under Travel Characteristics.

Figure 2-3. Largest Employer Type by Number of Employees



Source: US Census Bureau, 2020 County Business Patterns

2.2 Land Use and Economic Development

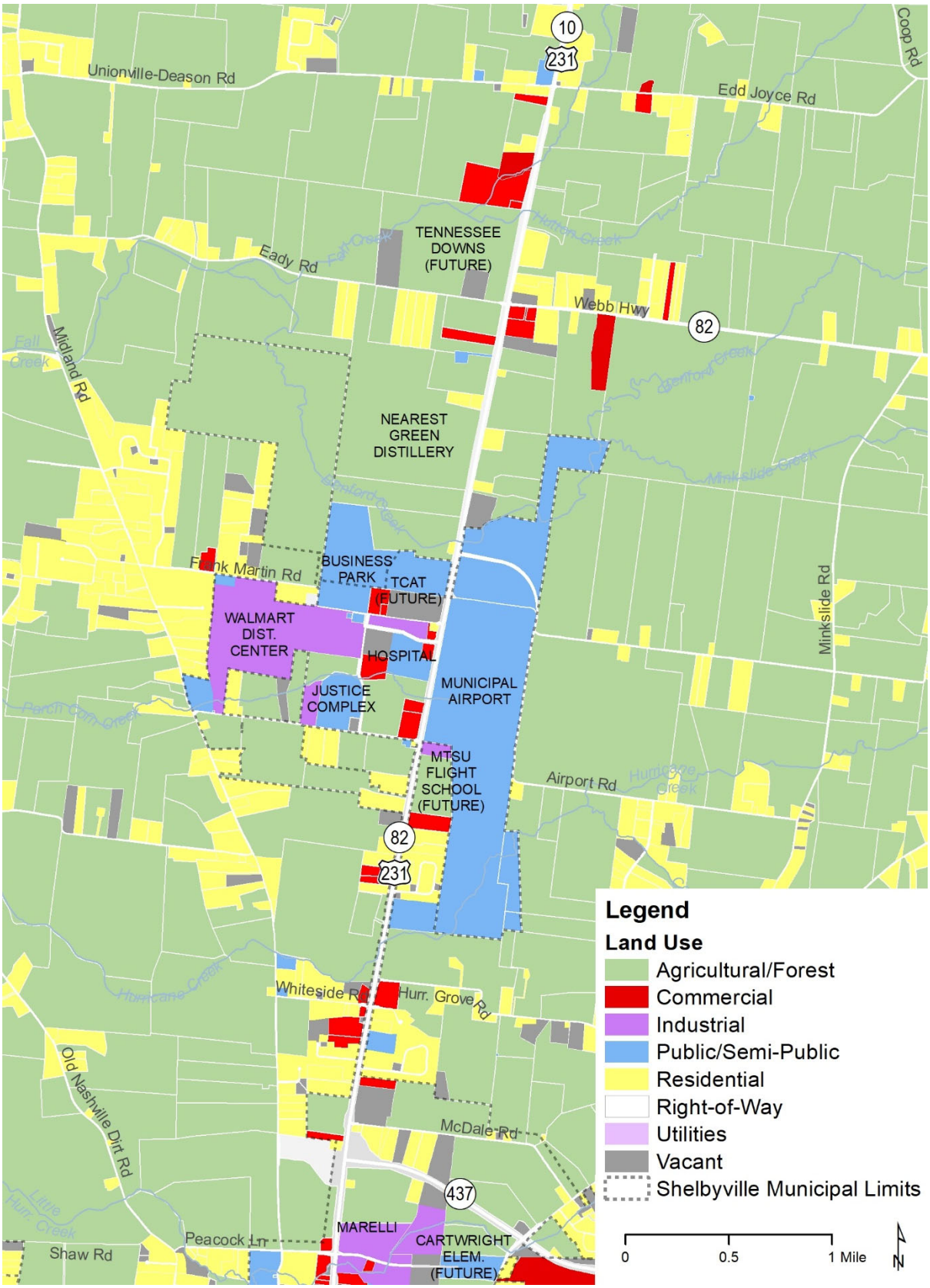
Land use and transportation are intricately connected, and different land uses require different transportation solutions and facilities to support travel needs. For example, industrial areas should anticipate higher numbers of heavy trucks to transport goods and materials, while residential areas can anticipate fewer heavy vehicles, higher numbers of pedestrians and cyclists, and a larger number of commute- and retail-related trips. Land uses within the corridor are largely agricultural, light industrial, commercial, single-family residential, and public use.

Traffic patterns stemming from future development will be mixed as light industrial land uses continue to grow alongside residential and commercial land uses. This is likely to increase freight, commuter, and destination-driven traffic. The Bedford-Shelbyville Partnership, the economic development authority for both the City of Shelbyville and Bedford County, advocates for strategically planned development, specifically within the 231 Business Park, that encourages industries to locate in the county that match workforce needs and are conscious of environmental impacts. Specific industries being targeted by the Partnership for future development include auto manufacturing, electric/electronic manufacturing, and food manufacturing.

Figure 2-4 illustrates the current land uses within the US 231 corridor study area, as accessed through the Tennessee Comptroller of the Treasury's dataset.

231 Business Park located at Frank Martin Road and Airport Business Park Road

Figure 2-4. Land Use



2.3 Transportation

Roadway geometrics play a pivotal role in the safety and operation of transportation systems. Lane width can influence vehicle speeds as narrow lanes tend to slow vehicles, while wider lanes encourage higher traveling speeds. The Federal Highway Administration (FHWA) has established a functional classification for each major road type to describe how that roadway engages with the transportation network to support mobility and access (Figure 2-5). The four roadway classifications are interstates, arterials, collectors, and locals, and each have characteristics based off their intended purpose. Higher classification roadways, such as interstates, will have greater speed limits, wider traveling lanes, and limited access points that are more controlled. The inverse is true for lower classification roadways, as local roads tend to have lower speeds, narrower lanes, and have the most direct connectivity to local destinations.

Figure 2-5. Roadway Classifications

Higher traveling speeds can also make vehicular collisions more dangerous, especially when combined with relatively straight road geometrics leading up to an intersection, curve, and/or merging vehicular traffic. US 231 does not have many horizontal curves, which require changes to the roadway alignment or direction, however the geometrics are rolling, and the roadway follows the rise and fall of the hilly terrain. These hills, like horizontal curves, can reduce sight distance and may require drivers to change their speed abruptly due to unseen traffic conditions or hazards.

Transportation Network Characteristics

According to Average Annual Daily Traffic (AADT) counts acquired from TDOT and tube counts collected by KCI Technologies, the largest volume of traffic within the study area occurs on US 231. The two second highest traffic volume locations are both to the east of US 231 and include Eady Road and the Shelbyville Bypass. Additional details regarding each roadway's functional class and AADT of the study area is included in Figure 2-6.

Within the study area, US 231 retains a consistent 12-foot lane width, however, intersecting roads are often much narrower, with some having lane widths as narrow as 8 feet (Figure 2-7). Although wider and higher numbers of lanes may be more efficient in moving vehicular traffic, these roads are often more dangerous for vulnerable road users, such as cyclists and pedestrians. This trade-off is of particular concern for areas experiencing development of industrial and manufacturing facilities that may require wider lanes to accommodate heavier truck traffic and freight movements.

Figure 2-6. Functional Classification and AADT

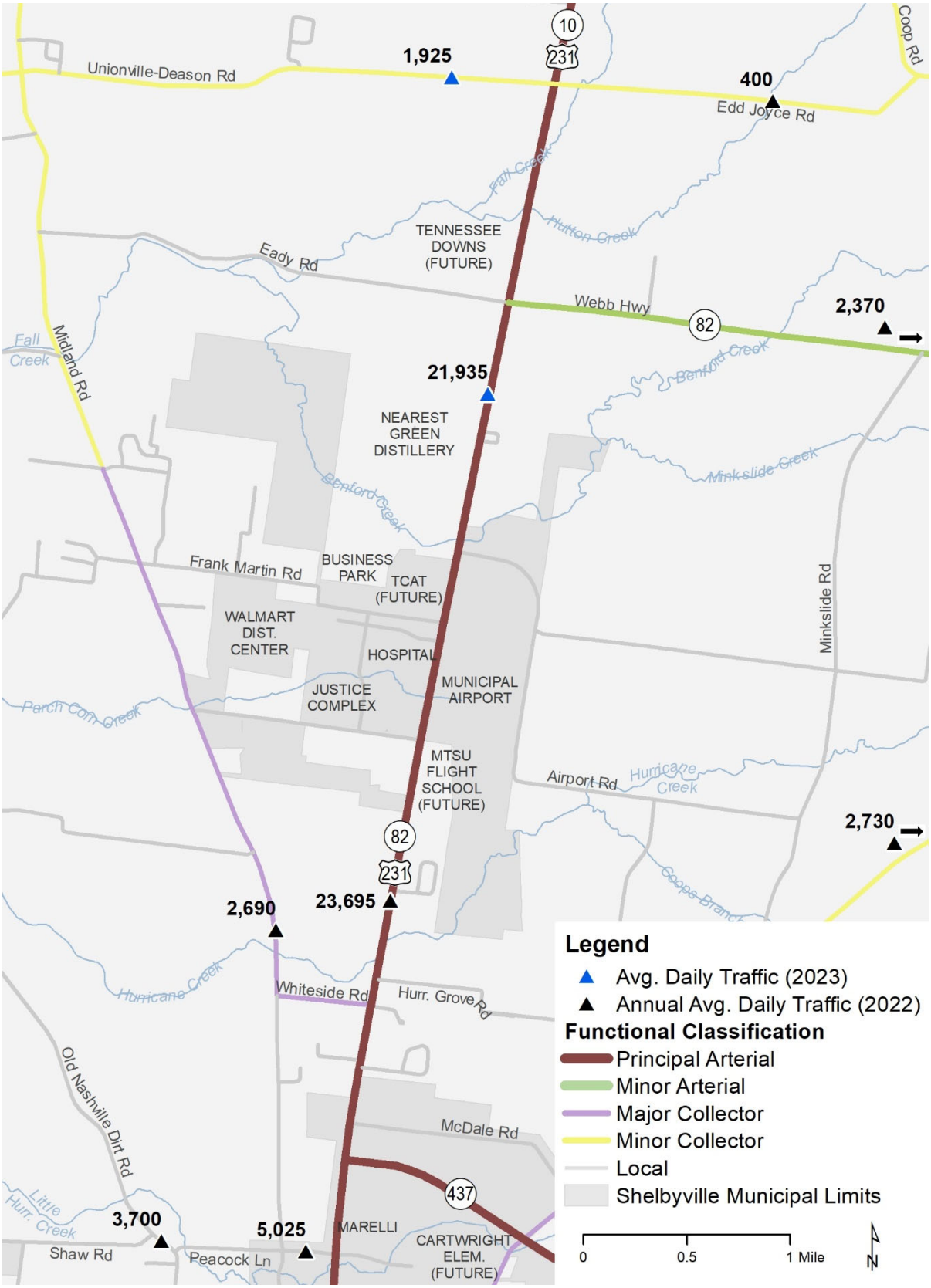
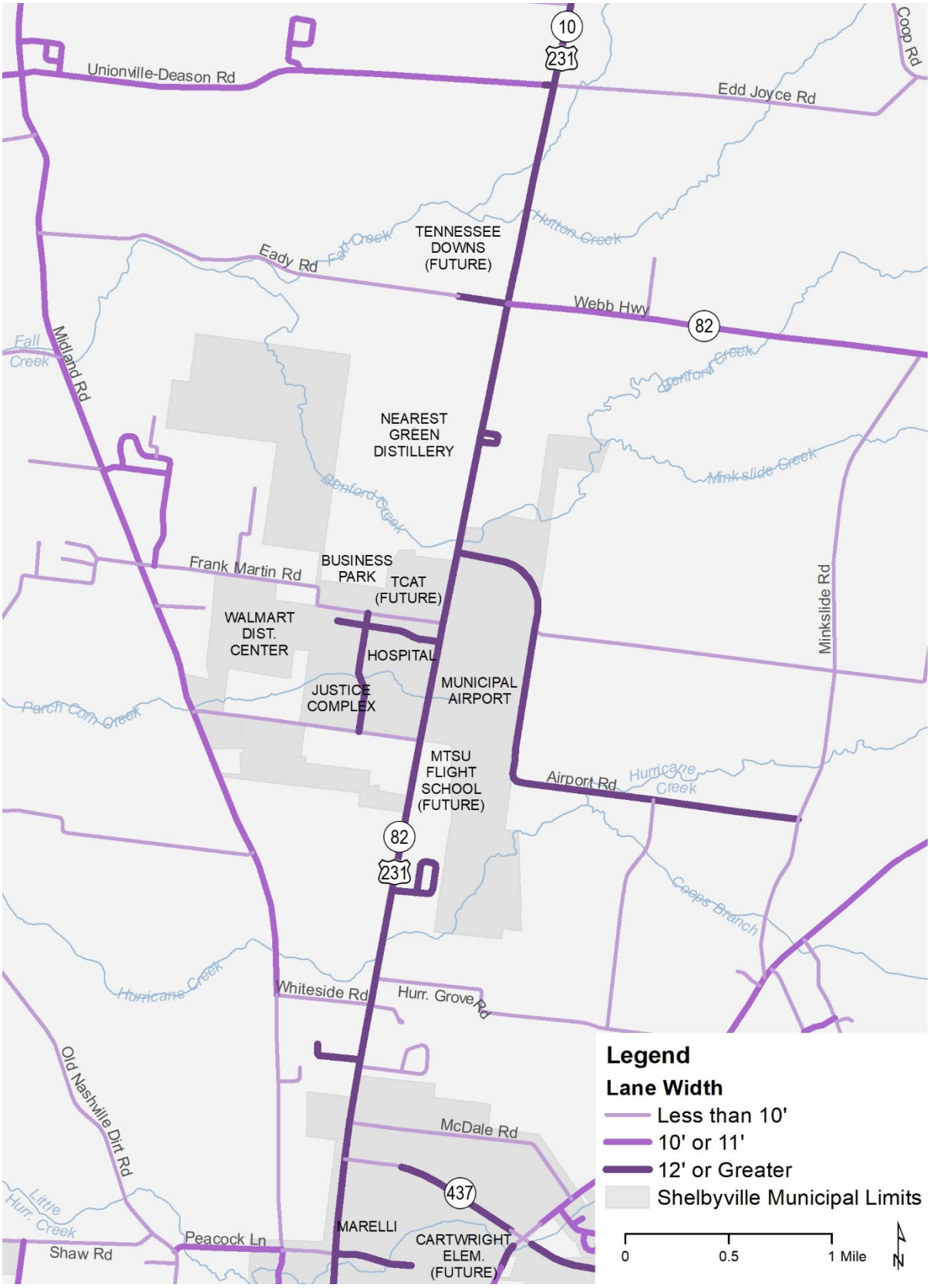


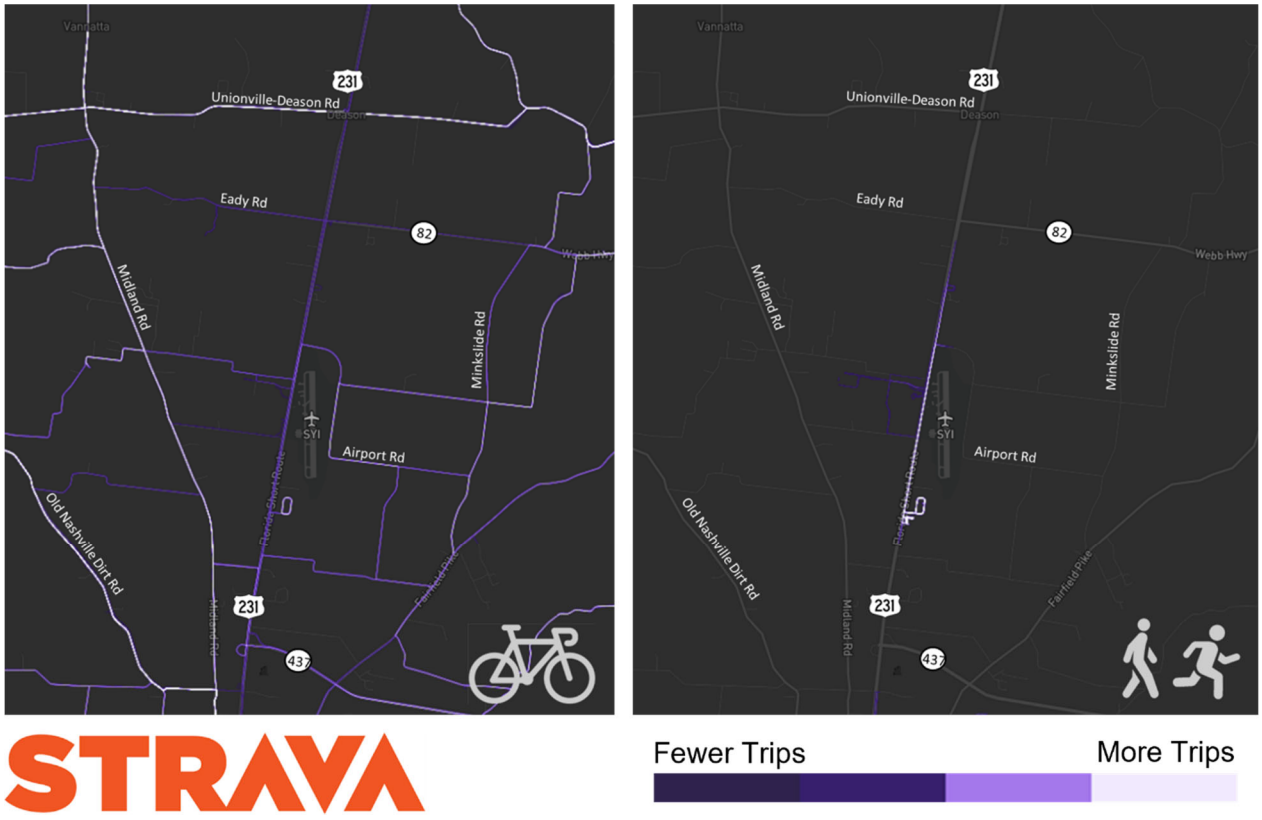
Figure 2-7. Lane Widths



US 231 is a signed regional bike route through the entirety of the study corridor. However, high vehicle speeds and semi-trailer truck traffic make the route uncomfortable for cycling. Although there is a wide shoulder for use by bicyclists (10'), road debris and rumble strips (albeit gapped) can create an unsafe and uncomfortable bicycling experience. Additionally, a small portion of the southern section of the route (southbound) has time-of-day restrictions approaching Marelli North America, Inc. According to STRAVA, an online personal tracking application for walking and bicycling trips, the highest numbers of rides (of those using the self-reported tool) occur on Old Nashville Dirt Road, Unionville-Deason Road, and Edd Joyce Road, which do not have paved shoulders (Figure 2-8).

Sidewalks within the study area are limited to Horseshoe Court, which has sidewalks on both sides of the street. South of the US 231/Peacock Lane/Calsonic Way intersection (the southern termini of the corridor study), sidewalks are present on both sides of US 231 into downtown Shelbyville. The STRAVA tool shows people walking or running along US 231 between North Point Circle and Horseshoe Court, as well as along the streets surrounding the Hospital where no facilities are present.

Figure 2-8. Self-Reported Bicycling and Walking Trips (Strava)



Safety and Crashes

In addition to roadway classifications and geometrics, historic crash data was analyzed to determine where crashes occur, their severity, and frequency. Data from 2018-2022 was pulled from E-TRIMS for crashes along US 231 and intersecting study roadways. Within this five-year window, a total of 324 crashes occurred (Table 2-1). Figure 2-9 illustrates crash locations within the study area.

Table 2-1. Reported Crashes (2018 – 2022)

Crash Description	2018	2019	2020	2021	2022	Total
Nonmotorized	2	0	1	0	0	3
Motorized	67	50	58	72	74	321

Table 2-2 displays the motorized crash summary, including reported crash types and associated injuries or property damage. Of the 321 total crashes, the majority (67.3%) consisted of property damage only, 73 (22.5%) crashes resulted in suspected minor injuries, 20 (6.2%) crashes resulted in suspected serious injuries, and one crash was fatal (0.31%). Of the three vehicle crashes involving pedestrians along US 231 and Peacock Lane, one crash resulted in minor injuries and one resulted in serious injuries. Of the 94 total crashes that resulted in an injury or fatality, 34 (36.2%) were angle crashes, 32 (34%) were rear ends, and 23 (24.5%) were single-vehicle crashes.

Table 2-2. Motorized Crash Summary (2018 – 2022)

Crash Type	Angle	Head-On	Single Vehicle	Rear-End	Sideswipe (Opposing Direction)	Sideswipe (Same Direction)	Unknown /Other	Total
Fatal	0	0	1	0	0	0	0	1
Serious Injury[1]	5	1	6	8	0	0	0	20
Minor Injury[1]	29	0	16	24	3	0	1	73
Property Damage (Over)[2]	43	2	90	57	5	16	5	218
Property Damage (Under)	0	0	1	3	0	0	8	12
Total	**77**	**3**	**114**	**92**	**8**	**16**	**14**	**324**

[1] This represents the total # of crash events, total # of injured person(s) may be higher
[2] Filed crash reports per provisions of 55-12-104 T.C.A. in excess of $400 to any person involved

Although crashes occur for a variety of reasons, each crash type has specific characteristics which can be analyzed to better understand why they take place. Angle crashes typically occur during a turning movement when one or both vehicles are at an angle (i.e., when turning at an intersection or changing lanes). This type of crash may occur when drivers feel pressure to make a dangerous turn, are distracted, or fail to see a vehicle. Rear-end crashes often happen at intersection approaches, when fast-moving traffic encounters congestion, or in areas with limited sight distance. Rear-end crashes can also happen in response to crossing wildlife or when a vehicle brakes suddenly due to an unforeseen road hazard.

Crashes that only involve one vehicle may include, for example, roadway departures, overturns, or collisions with objects. It is worth noting that not all roadway departures are reflected in the data as some drivers may return to the roadway and continue their commute without the police being notified. The single fatal crash within the study area involved a vehicle traveling along US 231 going off the roadway and striking an embankment near the intersection of SR 437 during early morning hours.

Of the multi-vehicle crashes, 90 (42.9%) occurred at intersections while 120 (57.1%) occurred along a segment of a roadway. Further analysis of crash clusters revealed that the intersections of US 231 and Eady Road/Webb Highway/SR 82 and Midland Road and Frank Martin Road experienced numerous angle crashes. The Eady Road/Webb Highway/SR 82 intersection experienced 11 angle crashes in the last five years, with an additional four angle crashes occurring within 250 feet of the intersection. TDOT is currently designing a traffic signal to address safety and operational concerns at this location. The Midland Road and Frank Martin Road intersection experienced 12 collisions overall, 7 of which resulted in an injury with 9 being an angle collision. To better understand potential factors influencing this higher crash rate, crash reports were pulled from the statewide Tennessee Integrated Traffic Analysis Network (TITAN) database. A diagram detailing the conditions of each crash is provided in Appendix B – Midland Road and Frank Martin Road Collision Diagram. Of the 9 angle crashes that occurred at this location, 5 involved a vehicle moving from the eastern leg of Frank Martin Road across or onto Midland Road and being struck by a northbound vehicle on Midland Road.

Shaw Road at Old Nashville Dirt Road Looking West

Figure 2-9. Study Roadway Crashes (2018 -2022)

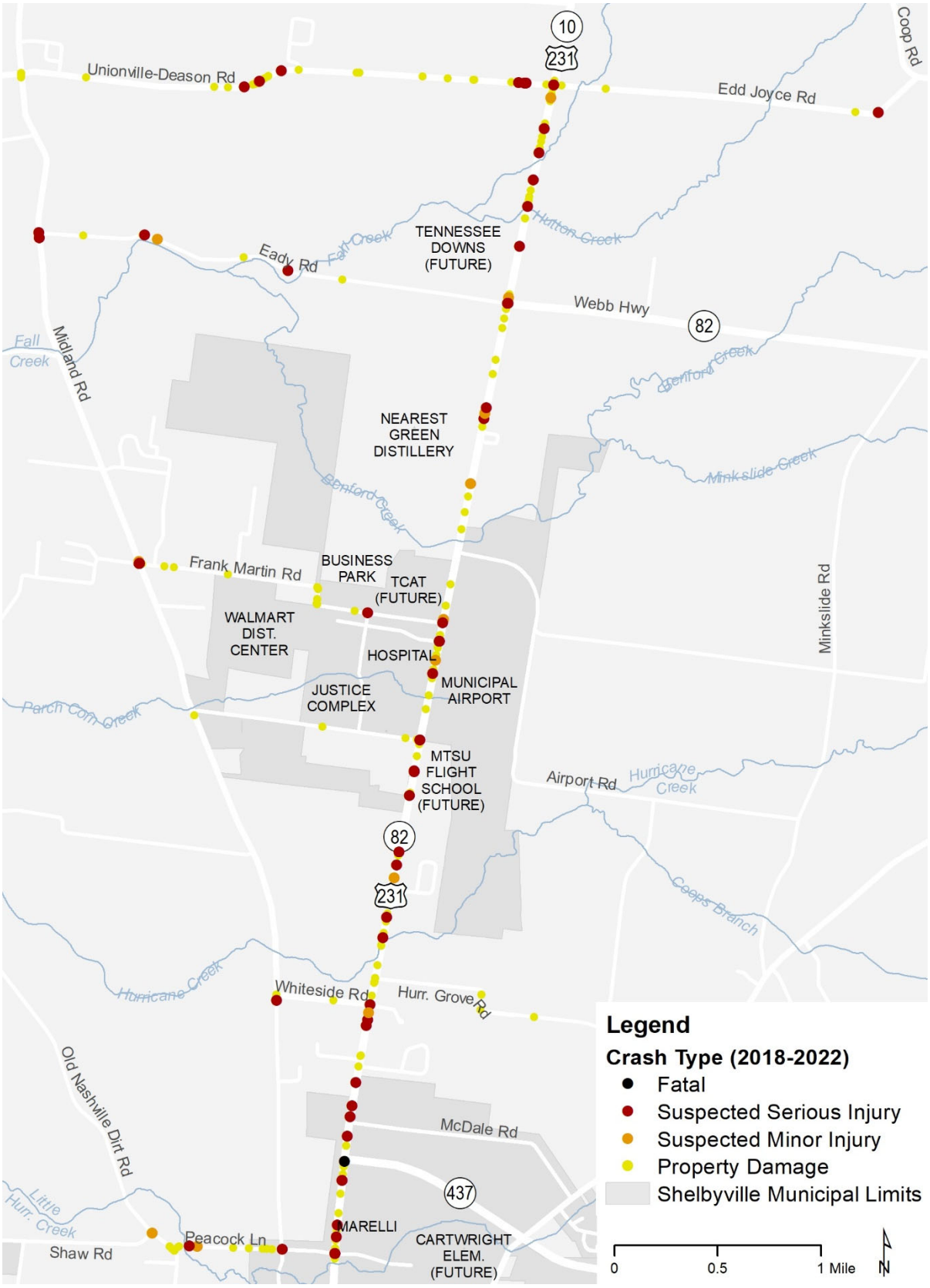


Table 2-3 summarizes the transportation network characteristics of the study roadways, including right-of-way widths, volumes, speed limits, lane widths, and total crashes. As expected, the principal arterial carries the highest traffic volumes and experiences the most crashes. Peacock Lane and Old Nashville Dirt Road (both classified as locals) carry a relatively high amount of traffic for their classification, which mirrors the input provided during the stakeholder engagement in terms of important east-west travel. These roadways are essentially acting as the extension of SR 437 which currently terminates at US 231.

Table 2-3. Transportation Network Characteristics Summary

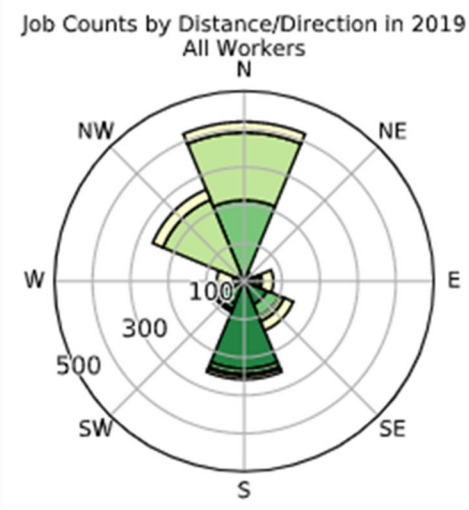
Roadway	Functional Classification	Jurisdiction	ROW	Traffic Volume (Vehicles/Day)	Speed Limit (MPH)	Lane Width (Feet)	Total Crashes
US 231/ SR 82/ SR 10	Principal Arterial	TDOT/ Bedford Co/ Shelbyville	100'-200'	21,935	45-55	12'	207
Webb Highway/ SR 82	Minor Arterial	TDOT	60'	2,370	55	11'	2
Whiteside Road	Major Collector	Bedford Co	40'	--	None posted	9'	6
Unionville-Deason Road	Minor Collector	Bedford Co	50'	1,925	45	10'	34
Edd Joyce Road	Minor Collector	Bedford Co	50'	400	45	9'	4
Eady Road	Local	Bedford Co	50'	--	45	9'	11
Frank Martin Road	Local	Bedford Co/ Shelbyville	44'	--	30	9'	27
Airport Road	Local	Bedford Co/ Shelbyville	60'	--	45	12'	0
Harts Chapel Road	Local	Bedford Co/ Shelbyville	44'	--	30	8'	4
Hurricane Grove Road	Local	Bedford Co	48'	--	30	9'	7
Peacock Lane	Local	Bedford Co/ Shelbyville	44'-52'	5,025	30	10'	18
Old Nashville Dirt Road	Local	Bedford Co	50'	3,700	30	10'	4

Travel Characteristics

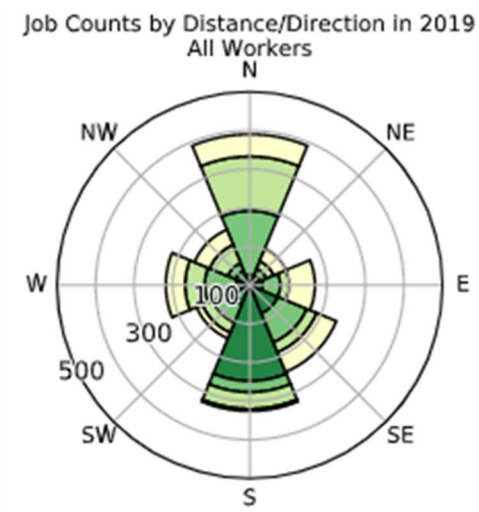
The U.S. Census Bureau's Longitudinal Employer-House Dynamics (LEHD) dataset was utilized to analyze travel characteristics within the study area. The LEHD OnTheMap tool details commuter travel patterns with a series of diagrams to help illustrate the origins and destinations of commuting traffic. Figure 2-10 illustrates how many people commute into or outside of the study corridor and their direction of travel.

Figure 2-10 LEHD Diagrams

Employed persons who live in the study area and commute out for their occupation.



Employed persons who do not live in the study area and commute in for their occupation.



Source: U.S. Census LEHD 2019 Survey

Of the workers that live within the study area (1,339), 31.2% commute less than 10 miles, 22.6% commute between 10 and 24 miles, 32.9% commute between 25 and 50 miles, and 13.3% commute greater than 50 miles for their employment. Shelbyville had the largest cluster of workers who commuted from the study area. Other notable employer clusters exist in Murfreesboro, Smyrna, and Nashville.

Of those who work within the study area (1,751), 31.3% commute less than 10 miles, 27.9% commute between 10 and 24 miles, 22.0% commute between 25 and 50 miles, and 18.7% commute greater than 50 miles. Shelbyville had the largest cluster of workers who commuted in, however clusters appeared throughout Bedford County and Murfreesboro. A smaller, but noticeable, cluster of employees also came from Tullahoma.

Overall, more workers (1,751) commute to the study area to work than commute out (1,339), while 46 workers both live and work within the study area. The greater percentage of workers who are willing to commute over 50 miles for their job within the study area signifies that economic development in the region pulls their workforce from multiple surrounding counties. This is supported by the low unemployment rate in the area, which suggested that employers may be unable to hire locally to fill their workforce needs.

Operations

Modeling is an important component of corridor analysis. Using modeling software, engineers can better understand how current road characteristics and adjacent developments affect the ability of the roadway to meet traffic needs, as well as how the corridor is expected to perform in the future with forecasted population and developmental growth. This type of analysis is used to inform recommendations so that any recommended adjustment is both data-driven and conscientious of future travel demand.

For this model, turning movement counts were collected at the five study intersections on a typical weekday while schools were in session in December 2022 to evaluate current and projected operations. The AM and PM peak hours, or when traffic volumes are highest during a given day, were used in the model. Given the increase in off-peak traffic volumes over the past several years due to tourist attractions along US 231, turning movement counts were also collected on a typical Saturday to determine which condition had higher traffic volumes during peak hours. The highest peak hours for the Saturday collection, which were in the early afternoon, did not surpass the volumes experienced during weekday peak hours and thus were not used in the operations model. These counts, however, are included in Appendix C.

The AM and PM turning movement counts were used to set a baseline for existing traffic volumes, analyze corridor capacity, and identify performance-related issues. Along US 231, the intersections of Eady Road/Webb Highway, Frank Martin Road, and Whiteside Road experienced the highest levels of traffic of the five study intersections, and the US 231 intersection with Eady Road had the highest overall volumes on the minor approach movements in both the morning and afternoon peaks. Traffic signals are not currently present at any of the five primary study intersections, however, each of the minor approaches on US 231 (Eady Road, Frank Martin Road, and Whiteside Road) and Midland Road (Eady Road and Whiteside Road), are stop-controlled. The AM and PM turning movement counts for each of the study intersections are included in Figure 2-11 and Figure 2-12 respectively.

Frank Martin Road at US 231 Looking North

Figure 2-11. Existing Peak Hour Turning Movement Counts (AM)

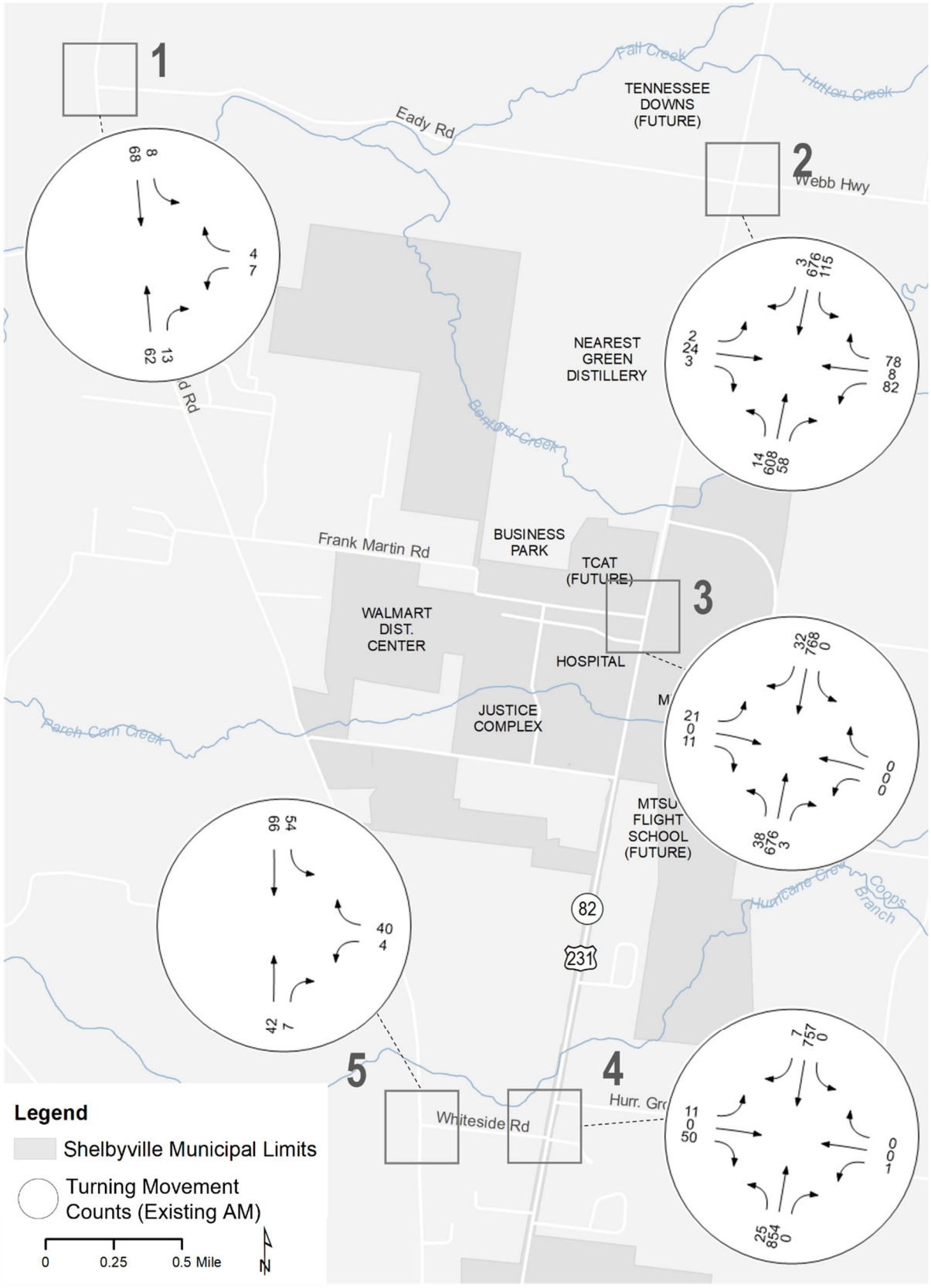
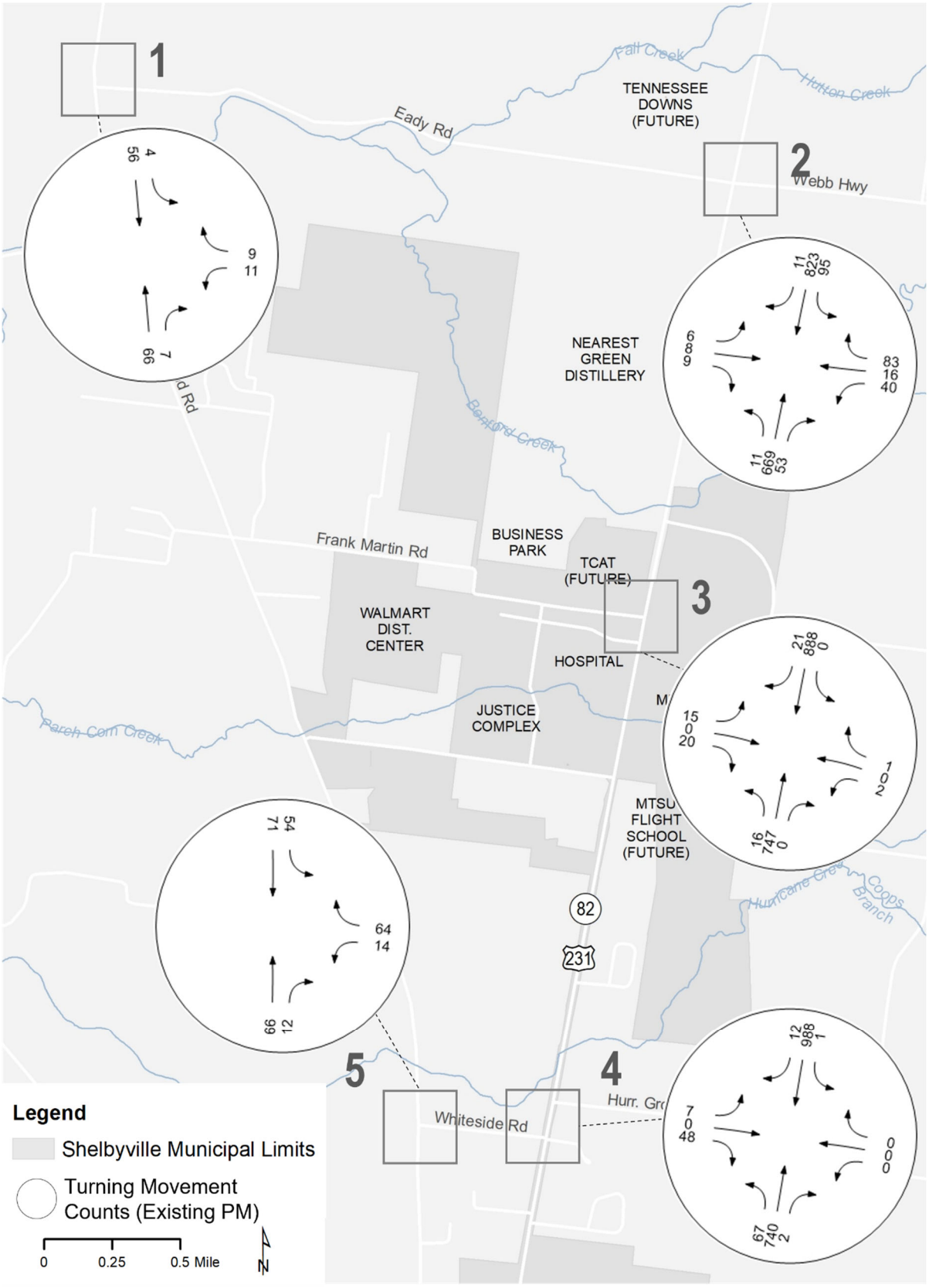


Figure 2-12. Existing Peak Hour Turning Movement Counts (PM)



The capacity analyses were completed according to the procedures outlined in the *Highway Capacity Manual* (HCM), 7th Edition. These analyses resulted in the determination of a Level of Service (LOS) for each study intersection based on the delay experienced by entering and exiting vehicles (Table 2-4). LOS is graded on a six-point scale from A to F, with LOS A through D considered an acceptable score and that the roadway meets capacity needs. A grade of LOS E or F signifies that the vehicle volumes are greater than what the roadway can easily manage, resulting in congestion. The LOS for a signalized intersection is typically presented for the overall intersection while the LOS for unsignalized intersections is typically presented by intersection approach and movement.

LOS is one of several tools engineers use to evaluate operations and safety along roadways and/or intersections when making an engineering evaluation. It is important to note that LOS only measures the roadway capacity for vehicular traffic and does not incorporate considerations for bicyclists or pedestrians. Also, failing approaches and/or movements do not always warrant traffic control or signalization changes. For example, a vehicle at a minor roadway approach with a major highway carrying high traffic volumes may experience more than 80 seconds of delay; however, stopping the mainline for one vehicle to enter the intersection is not always feasible and/or make operational sense when evaluating the network as a whole.

Table 2-4. Vehicular Level of Service for Intersections

LOS Score	Description	Unsignalized Intersection Delay (Seconds per Vehicle)	Signalized Intersection Delay (Seconds per Vehicle)
A	Uncongested operations/Little to no delay	≤ 10	≤ 10
B	Very light congestion/Short delay	>10 and ≤ 15	>10 and ≤ 20
C	Light congestion/Average delay	>15 and ≤ 25	>20 and ≤ 35
D	Significant congestion, but intersection functional/Long delay	>25 and ≤ 35	>35 and ≤ 55
E	Severe congestion/Very long delay	>35 and ≤ 50	>55 and ≤ 80
F	Saturated; Demand exceeds capacity/ Very long delay	> 50	> 80

Source: HCM, 7th Edition

As determined through the existing conditions model, all northbound and southbound approaches received a score of LOS A, indicating that both US 231 and Midland Road corridors are uncongested and existing traffic flows freely. Of the minor approaches, Eady Road had the highest delay, with both eastbound and westbound traffic receiving scores of LOS F in the AM and LOS E in the PM. Some delay was experienced at the Frank Martin Road intersection with US 231, resulting in a score of LOS D, which indicates that the intersection remains functional. Figure 2-13 illustrates the existing intersection LOS scores, with the left half of each circle representing the AM LOS scores and the right side reflecting the PM results. Scores for each individual approach are displayed in Table 2-5.

Figure 2-13. Existing Level of Service (LOS)

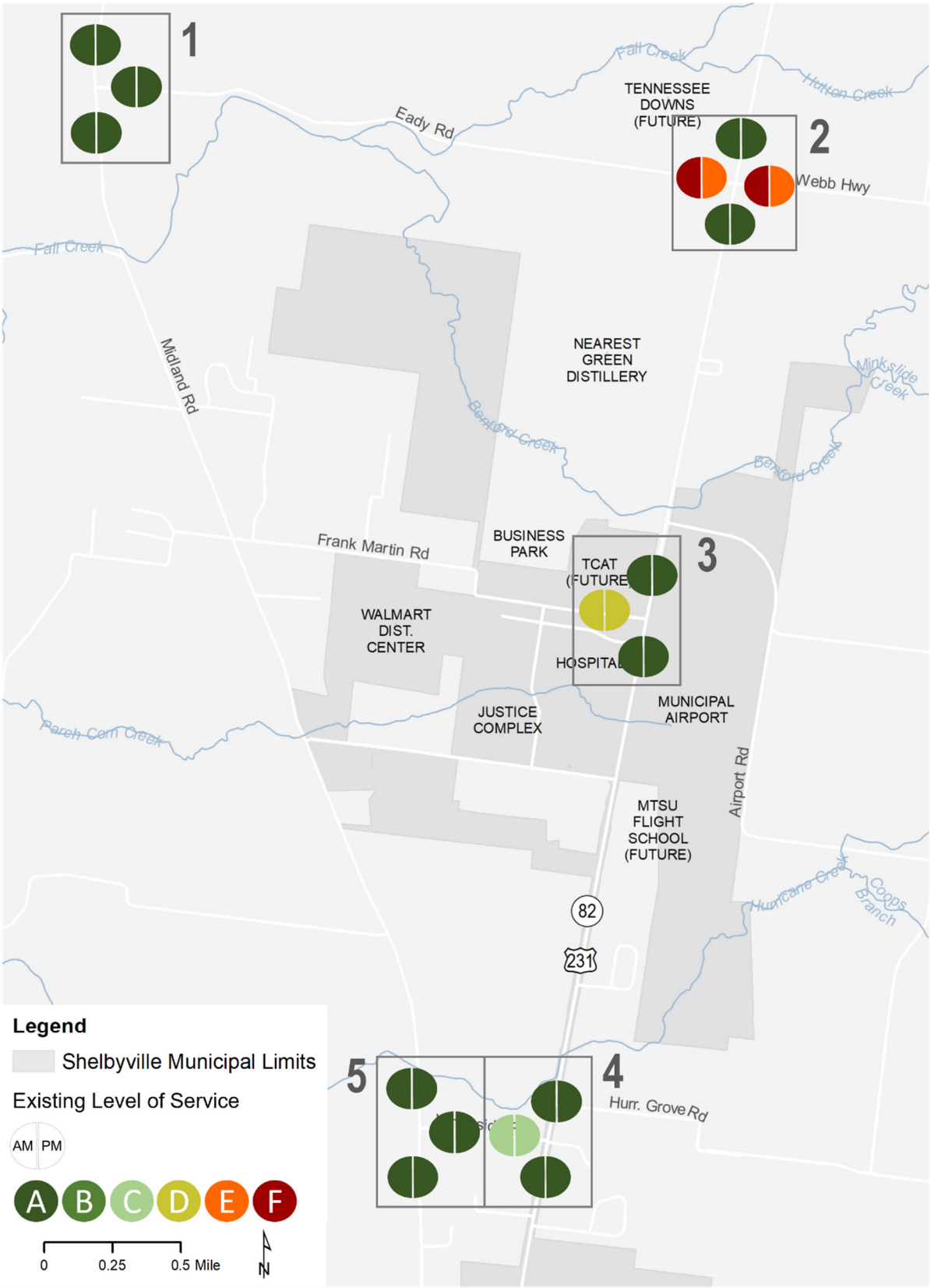


Table 2-5. Peak Hour Level of Service by Study Intersection

ID	Intersection	Intersection Approach/Turning Movement	Peak Hour Level of Service (Average Delay in Seconds per Vehicle)	
			Existing	
			AM	PM
1	Midland Road and Eady Road	Northbound Approach	--	--
		Southbound Left-Turn	A (7.4)	A (7.4)
		Southbound Approach	A (0. 8)	A (0.5)
		Westbound Approach	A (9.1)	A (9.0)
2	US 231 and Eady Road/ Webb Highway/ SR 82	Northbound Approach	A (0.2)	A (0.1)
		Northbound Left-Turn	A (9.0)	A (9.6)
		Southbound Approach	A (1.4)	A (0.1)
		Southbound Left-Turn	A (9.5)	A (9.6)
		Eastbound Approach	F (55.6)	E (48.6)
		Westbound Approach	F (111.5)	E (49.9)
		Westbound Left/Through	F (198.9)	F (112.1)
		Westbound Right-Turn	B (11.2)	B (11.5)
3	US 231 and Frank Martin Road	Northbound Approach	A (0.5)	A (0.2)
		Northbound Left-Turn	A (9.6)	A (9.9)
		Southbound Approach	--	--
		Eastbound Approach	D (28.7)	D (25.5)
4	US 231 and Whiteside Road	Northbound Approach	A (0.3)	A (0.9)
		Northbound Left-Turn	A (9.4)	B (10.8)
		Southbound Approach	--	A (0.01)
		Southbound Left-Turn	--	A (9.2)
		Eastbound Approach	C (16.8)	C (19.9)
		Westbound Approach	E (38.3)	--
5	Midland Road and Whiteside Road	Northbound Approach	--	--
		Southbound Approach	A (3.7)	A (3.2)
		Southbound Left-Turn	A (7.4)	A (7.4)
		Westbound Approach	A (8.8)	A (9.3)

Failing LOS

-- *Either no vehicles were observed making this movement during TMC collection during peak hours, or no delay was recorded for existing volumes at this location.*

3.0 Projected Conditions

Building off the existing conditions model, future traffic conditions in the study area were projected out to the horizon year of 2032 using a development scenario. The outputs of this analysis assist practitioners in understanding the effect of continual growth on the transportation system, specifically the operations of study intersections. These outputs also inform recommended improvements aimed at addressing transportation needs for projected conditions.

3.1 Future Development Scenario

To account for projected changes in traffic along the corridor, background traffic volume growth trends were established. Historic AADT data was obtained from four TDOT count stations located in the vicinity of the study area and used to determine an overall background traffic volume growth rate of 1.5% per year for 10 years. This equates to an approximately 16% increase over that time period. This growth factor was then used to grow existing traffic volumes to the horizon year to establish background conditions for the year 2032.

In addition, future developments within the study area were identified to evaluate the impacts of additional traffic on future network operations (Figure 3-1). Scenario parcels for a 100-room hotel, 50-home subdivision, and 20-employee warehouse were selected based upon their general proximity to study intersections and are simply for purposes of evaluating projected conditions only. Coming developments, including anticipated land uses and sizes, were provided by the steering committee and County staff, while scenario parcels and associated assumptions were informed by general development trends locally and in the region as well as committee input.

Envisioned future phases of the Nearest Green Distillery were not included in the projected scenario due to uncertainty in timeline and scope; however, traffic currently generated from the site was captured in the turning movement counts and pneumatic tube volume collection and, thus, included in the development of the background future conditions. Should the envisioned phases be pursued, a traffic impact study would likely be required to evaluate additional traffic impacts associated with expansion.

The vehicular trips generated by each future development and scenario parcel were estimated using the Institute of Transportation Engineer's (ITE) *Trip Generation Manual,* 11th Edition, which is the national resource used for traffic modeling. Table 3-1 details the average number of trips generated per development variable (e.g., hotel room, single family home, and student) over the course of a day. Generated trips were distributed to the study area's transportation network to determine forecasted traffic volumes in 2032 for purposes of evaluating modeled conditions. Additional details regarding future traffic volumes and development assumptions are included in Appendix C – Operations and Development Assumptions.

Figure 3-1. Development Scenario Parcels

Table 3-1. Development Scenario Modeled Trip Generation

Parcel ID	Development (Coming or Scenario)	Modeled Trips Generated per Day
1	Tennessee Downs	2,046
2a	Scenario Industrial Park Parcel – General Light Industrial (20 employees)	120
2b	Industrial Park Parcel – Duksan Electera America Factory (101 employees)	390
3	TCAT (900 students)	1,035
4	Justice Complex (400 beds)	392
5	Scenario Hotel (100 beds)	660
6	MTSU Flight School (Phase 1)	1,027
7	Scenario Subdivision (50 single-family detached homes)	533
8	Cartwright Elementary School (800 students)	1,816

3.2 Projected Operations

To evaluate operations of the study area intersections under the projected traffic conditions, capacity analyses were performed for the AM and PM peak hours. These capacity analyses were used to determine the need for roadway and traffic control improvements at the study intersections. The same lane configurations and traffic control were used as the existing condition with two exceptions. As previously mentioned, the intersection of US 231 and Eady Road/Webb Highway/SR 82 will be signalized by TDOT in the next 12 to 18 months. Detailed signal and intersection design plans are under development; therefore, the intersection was modeled using optimal signal phasing and assumed the addition of warranted turn lanes. This signalization is expected to improve intersection operations from an LOS F in the existing AM and PM peak hours to an overall intersection score of LOS C in the future morning peak and an LOS B in the future afternoon peak.

The results of the capacity analysis indicate the eastbound approach of Whiteside Road at US 231 operates at poor LOS under existing and projected conditions. Based on preliminary lane warrant analyses, it is recommended that a two-lane approach be installed, and this improvement is modeled under the improved scenario. The traffic signal warrant at this location is close to meeting the necessary basic volumes for a signal, and, therefore, should be more closely monitored for potential need for signalization. While a two-lane approach is warranted on Frank Martin Road at US 231, this portion of Frank Martin Road is anticipated to be closed with traffic being rerouted to the adjacent intersection to the south (Airport Business Park Road), which is currently signalized.

The results of the projected conditions capacity analyses are shown in Table 3-2 and Figure 3-2. Note that for signalized intersections, LOS scores are reported for the intersection as a whole, rather than by each individual turning movement. Additional details regarding future conditions LOS results can be found in Appendix C – Operations and Development Assumptions.

Figure 3-2. Projected Level of Service (LOS)

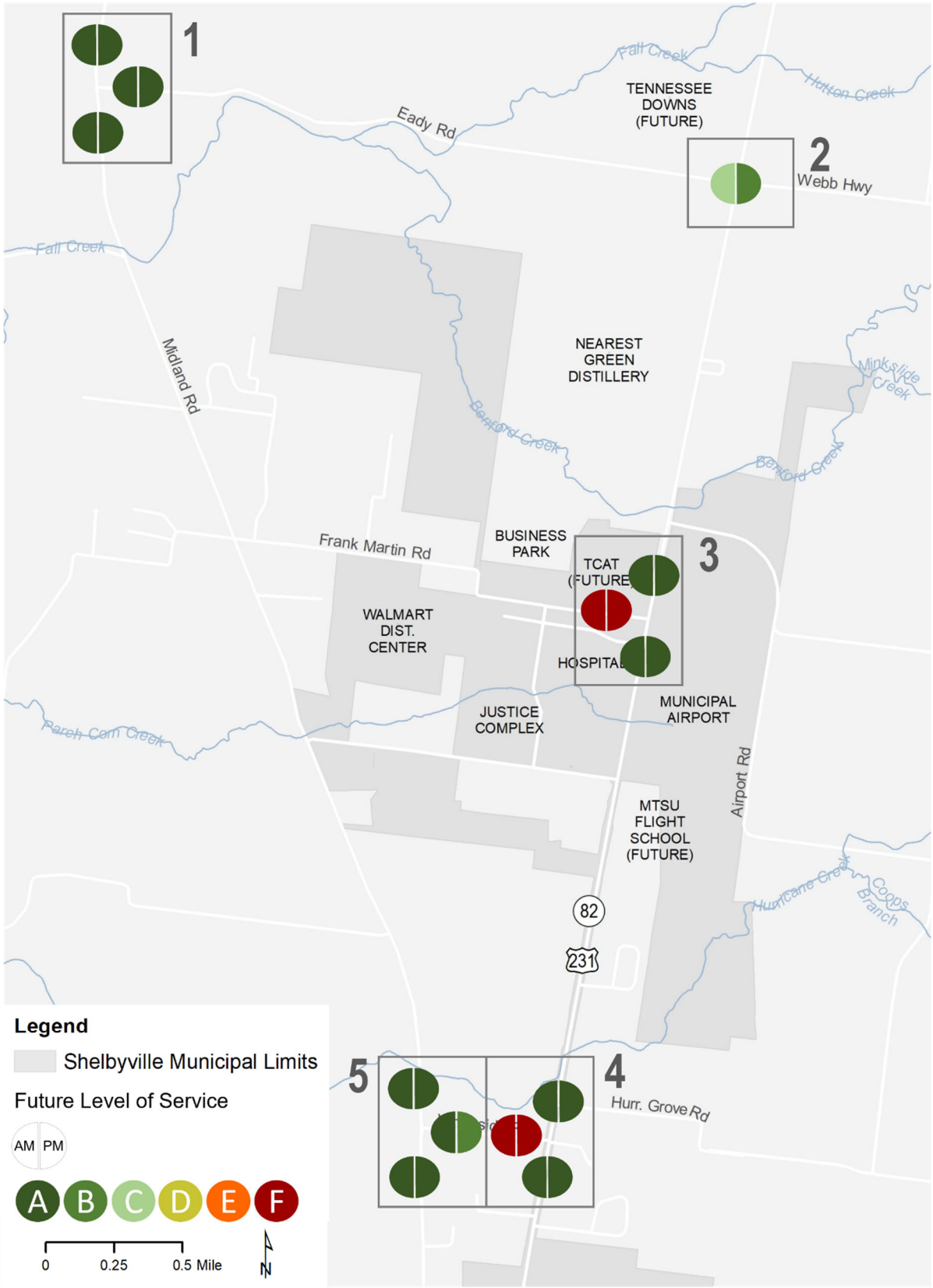


Table 3-2. Projected Level of Service by Study Intersection

ID	Intersection	Intersection Approach/Turning Movement	Peak Hour Level of Service (Average Delay in Seconds per Vehicle)			
			Existing		Future (2032)	
			AM	PM	AM	PM
1	Midland Road and Eady Road	Northbound Approach	--	--	--	--
		Southbound Approach	A (0.8)	A (0.5)	A (1.47)	A (1.5)
		Southbound Left-Turn	A (7.4)	A (7.4)	A (7.5)	A (7.4)
		Westbound Approach	A (9.1)	A (9.0)	A (9.4)	A (9.3)
2	US 231 and Eady Road/ Webb Highway/ SR 82	Overall Intersection	N/A	N/A	C (21.6)*	B (19.9)*
		Northbound Approach	A (0.2)	A (0.2)	N/A	N/A
		Northbound Left-Turn	A (9.0)	A (9.6)	N/A	N/A
		Southbound Approach	A (1.4)	A (1.0)	N/A	N/A
		Southbound Left-Turn	A (9.5)	A (9.6)	N/A	N/A
		Eastbound Approach	F (55.6)	E (48.6)	N/A	N/A
		Westbound Approach	F (111.5)	E (49.9)	N/A	N/A
		Westbound Left/Through	F (198.9)	F (112.1)	N/A	N/A
		Westbound Right-Turn	B (11.2)	B (11.5)	N/A	N/A
3	US 231 and Frank Martin Road	Northbound Approach	A (0.5)	A (0.2)	A (0.7)	A (0.3)
		Northbound Left-Turn	A (9.6)	A (9.9)	B (12.1)	B (11.7)
		Eastbound Approach	D (28.7)	D (25.5)	F (117.2)	F (96.5)
4	US 231 and Whiteside Road	Northbound Approach	A (0.27)	A (0.89)	A (0.3)	A (1.0)
		Northbound Left-Turn	A (9.4)	B (10.8)	B (11.1)	B (13.4)
		Southbound Approach	--	A (0.01)	--	A (0.01)
		Southbound Left-Turn	--	A (9.2)	--	B (10.3)
		Eastbound Approach	C (16.8)	C (19.9)	F (171.5)	F (263.8)
					F (104.9)**	F (144.8)**
		Westbound Approach	E (38.3)	--	F (106.8)	--
5	Midland Road and Whiteside Road	Northbound Approach	--	--	--	--
		Southbound Approach	A (3.7)	A (3.2)	A (2.9)	A (3.0)
		Southbound Left-Turn	A (7.4)	A (7.4)	A (7.5)	A (7.5)
		Westbound Approach	A (8.8)	A (9.3)	A (9.6)	B (10.1)

Failing LOS score

**Reflects overall intersection LOS score if a signal is constructed at US 231 and Eady Road.*

***Reflects LOS score if an eastbound two-lane approach is constructed at US 231 and Whiteside Road.*

-- Either no vehicles were observed making this movement during TMC collection during peak hours, or no delay was recorded for existing/future volumes at this location.

Turn Lane Analyses

The study intersections and site accesses were evaluated for the need to provide left- and right-turning lanes based on projected traffic volumes during the AM and PM peak hours. The results of these analyses are included in Table 3-3, and these analyses were based off the following procedures:

- Right-turning lanes – based on the procedures outlined in the HCM, which indicates that an exclusive right-turn lane shall be considered when the right-turn volumes exceed 300 vehicles-per-hour (vph), and the adjacent through-lane volume also exceeds 300 vph.
- Left-turning lanes – based on the procedures outlined in *Evaluating Intersection Improvements: An Engineering Study Guide* (National Cooperative Highway Research Program 457).

Table 3-3. Turn Lane Analysis Results

Intersection	Lane Type	Approach	Warranted in AM Peak?	Warranted in PM Peak?
US 231 and Frank Martin Road	Right-Turn	Southbound	No	No
US 231 and Whiteside Road	Right-Turn	Southbound	No	No
Midland Road at Eady Road	Left-Turn	Southbound	No	No
Midland Road and Whiteside Road	Left-Turn	Southbound	No	No

Study intersections and major site accesses were also evaluated for the need to provide a two-lane approach on the minor legs based on the projected traffic volumes during the AM and PM peak hours (Table 3-4). This analysis found that a two-lane approach was warranted in both the morning and afternoon peaks at the eastbound approach of Whiteside Road and US 231, which was included in the future conditions model. Again, while a two-lane approach is warranted on Frank Martin Road at US 231 in the afternoon peak, this portion of Frank Martin Road is anticipated to be closed, and traffic will be rerouted to the intersection of Airport Business Park Road and US 231.

Table 3-4. Two-Lane Minor Approach Analysis

Intersection	Approach	Warranted in AM Peak?	Warranted in PM Peak?
Frank Martin Road and US 231	Eastbound	No	Yes
Whiteside Road and US 231	Eastbound	Yes	Yes
Whiteside Road and Midland Road	Westbound	No	No
Eady Road and Midland Road	Westbound	No	No

Additional details regarding these warrant analyses are included in Appendix D – Turn Lane and Traffic Control Warrant Analyses.

4.0 Recommended Improvements

The following recommendations are based on current and anticipated needs identified through the planning process. These recommendations include infrastructure projects to address physical improvements and non-infrastructure strategies to guide future policy, land use, and development decisions. Both types of recommendations are important for improving mobility and roadway safety in the study area. Concept plans and cost estimates for implementing the infrastructure recommendations are also detailed in this section.

4.1 Infrastructure Improvement Recommendations

The following infrastructure improvement recommendations were created through a data-driven and collaborative approach, utilizing both engineering analysis and input received through public and stakeholder participation. The purpose of these recommendations is to support corridor mobility and connectivity while addressing safety, operations, and multimodal concerns. National and state standards and guidelines for roadway design and management were used to inform proposed infrastructure improvements. Signage and striping recommendations follow guidance from the Manual on Uniform Traffic Control Devices (MUTCD), while warrants for the addition of turn lanes and traffic control devices at study intersections used several national resources, such as FHWA's *Low-Cost Safety Enhancements for Stop-Controlled and Signalized Intersections*. TDOT resources were also used to ensure recommendations along the US 231 corridor meet state standards.

The tables included in this section provide additional detail about each recommendation, including the location, timeframe, and intended benefit. Recommendation timeframes are loosely correlated with the cost and effort required for implementation, as described below.

- **Near-term:** recommendations (0 to 3 years) could be constructed or implemented immediately and require minimal design and construction. These include projects that are already in some stage of the project development process.
- **Mid-term:** recommendations (3 to 6 years) requiring additional traffic data collection and analysis, as well as survey, design, and subsurface excavation during construction. Some of the recommendations are identified based upon anticipated traffic growth and additional development.
- **Long-term:** Long-term recommendations (6 years and longer) may require right-of-way acquisition and/or more significant financial investment. Additionally, these projects incorporate considerations for planned future phases of large developments.

Infrastructure improvement recommendations are further categorized into the following improvement types:

- Roadway improvements (spot improvements and roadway upgrades); and
- Multimodal improvements (north-south multiuse path).

Roadway Improvements

The recommended roadway improvements seek to address safety, operational, and geometric issues present at each of the five study intersections and address additional issues at other locations that were identified during the existing conditions analyses and through public and stakeholder engagement. These recommendations are shown in Figure 4-1 and detailed in Table 4-1.

Figure 4-1. Roadway Spot Improvement Recommendations

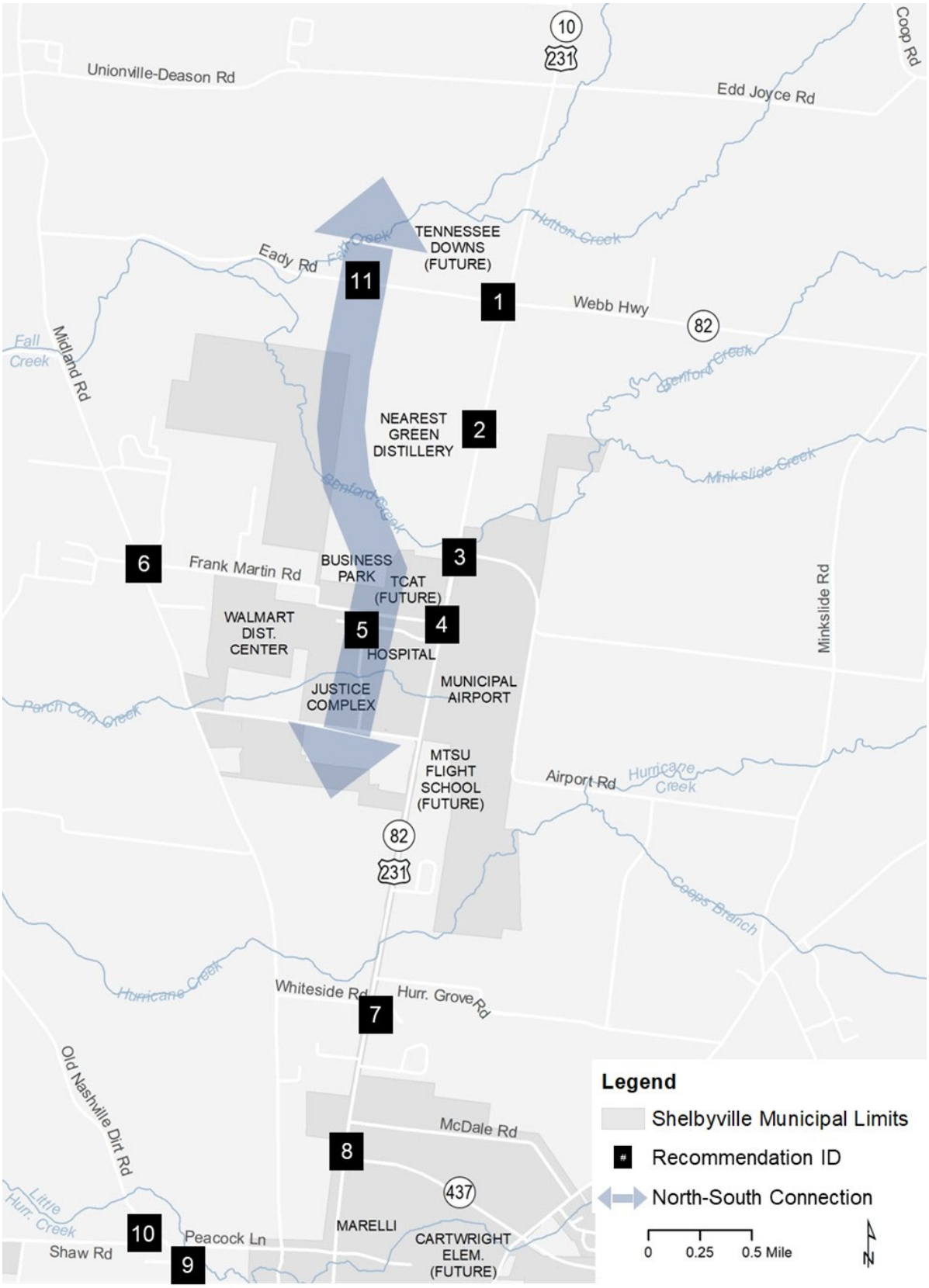


Table 4-1. Roadway Spot Improvement Recommendations

ID	Location	Recommendation	Timeframe
1	Eady Road/ Webb Highway/ SR 82 and US 231	Signalization (TDOT design and construction)	Near-Term
2a	US 231 and Nearest Green Distillery Main Driveway	Addition of signage, pavement markings, and bi-directional pavement markers	Near-Term
2b	US 231 and Nearest Green Distillery Main Driveway	Consider the installation of J-turns	Long-Term
3	Airport Road and US 231	Realignment of Airport Road with new TCAT driveway	Mid-Term
4	Frank Martin Road and US 231	Closure of Frank Martin Road to through traffic between Airport Business Park Road and US 231	Near-Term
5	North-South Roadway Connector	New parallel route west of US 231 connecting Tennessee Downs to Harts Chapel Road to be constructed in coordination with continued development	Mid-Term
6	Frank Martin Road and Midland Road	Minor shoulder widening, modify signage and pavement striping, addition of flasher	Near-Term
7	Whiteside Drive and US 231	Addition of eastbound two-lane approach at US 231; Monitor warrants for traffic signal	Long-Term
8	SR 437 and US 231	Monitor warrants for traffic signal and addition of turn lanes	Mid-Term
9	Peacock Lane and Old Nashville Dirt Road	Minor shoulder widening, modify signage and pavement striping	Near-Term
10	Shaw Road and Old Nashville Dirt Road	Modify signage and pavement striping	Near-Term
11	Planned Driveway Accesses and Eady Road	Install traffic circle at the planned Tennessee Downs and Distillery Eady Road driveways to provide traffic calming and a distinctive gateway feature between US 231 corridor development and the rural context to the west.	Long-Term

The project concepts included in Table 4-2 were identified in coordination with the steering committee as the highest priority for implementation. As such, high level concept sheets and planning level cost estimates were developed to better position these projects for future funding and implementation. Cost estimates were developed using TDOT's Planning Level Cost Estimating Tool, using 2021 Average Unit Prices with a 30% contingency applied for construction phases. Additional details regarding each priority recommendation's planning level cost estimate are included in Appendix E – Priority Concept Plans and Cost Estimates. These intersections should be monitored for potential additional safety countermeasure needs following implementation.

Table 4-2. Priority Concept Plan Cost Estimates

ID	Location	Recommendation	Cost Estimate (2021 Dollars)
2a	US 231 and Nearest Green Distillery Main Entrance	Modify signage, striping, and install bi-directional pavement markers	Construction Estimate: $5,780 Preliminary Engineering: $1,160 Total: $6,940
2b	US 231 and Nearest Green Distillery Main Entrance	Consider the installation of J-turns	Construction Estimate: $845,000 Preliminary Engineering: $169,000 Total: $1,010,000
6	Frank Martin Road and Midland Road	Minor shoulder widening, modify signage and pavement striping, addition of flasher	Construction Estimate: $37,700 Preliminary Engineering: $7,530 Total: $45,200
9/10	Shaw Road and Old Nashville Dirt Road; Peacock Lane and Old Nashville Dirt Road	Minor shoulder widening, modify signage and striping	Construction Estimate: $59,600 Preliminary Engineering: $11,900 Total: $71,500

As future residential, commercial, and industrial development continues within the study area, establishing design standards for typical roadway sections is critical for ensuring safety and operational consistency. For each of the east-west study roadways, a typical roadway classification was assigned based on existing and expected future land use and development pressure (Table 4-3). These roadway classifications, and associated general improvements, should be used as a guide when upgrading these roads to standard as new developments are approved along these roads. Coordination with the Bedford County Regional Planning Commission will be necessary during the development approval process for this to occur. Associated roadway classification typical cross-sections are further described in Chapter 4 and provided in Appendix F – Roadway Typical Sections. Recommended upgrades shown in Table 4-3 may include improvements beyond the typical cross-sections based on observed needs. It should be noted that portions of the study roadways identified in the table may be owned and maintained by the City of Shelbyville.

Table 4-3. East-West Study Roadway Classifications and Improvements

Roadway	Termini	Roadway Classification	Improvements
Unionville-Deason Road/ Edd Joyce Road	Midland Road – Coop Road	Rural Collector	• Upgrade to 12' lanes • Add 2' paved shoulder
Eady Road	Midland Road – US 231	Rural Local	• Upgrade to 11' lanes • Add 2' graded shoulder
Airport Road	US 231 – Minkslide Road	Rural Local	• Upgrade to 11' lanes • Add 2' graded shoulder
Frank Martin Road	Midland Road – US 231	Rural Local	• Upgrade to 12' lanes • Add 2' paved shoulder
Harts Chapel Road	Midland Road – US 231	Urban Local	• Upgrade to 11' lanes • Add sidewalks
Hurricane Grove Road	US 231 – Fairfield Pike	Rural Local	• Upgrade to 11' lanes • Add sidewalk
Whiteside Road	Midland Road/US 231	Urban Collector	• Upgrade to 12' lanes • Add 2' paved shoulder • Add sidewalk
Peacock Lane	Old Nashville Dirt Road/US 231	Urban Local	• Upgrade to 12' lanes • Add 2' paved shoulder • Add sidewalks

Multimodal Improvements

In addition to the roadway improvements, a multiuse path is recommended to provide local connectivity to key destinations and activity generators within the study area. These include Tennessee Downs, Nearest Green Distillery, TCAT, Vanderbilt Bedford Hospital, and the future location of Cartwright Elementary School (Figure 4-2). The multiuse path would provide a separate facility for both pedestrians and bicyclists to access where they work, play, visit, and learn without the need for a motor vehicle. This facility would also provide a safe, attractive active transportation connection between the current and planned facilities along the US 231 corridor. Additionally, the proposed multiuse path would serve the Nearest Green Distillery and future Tennessee Downs site and support ongoing economic development in the vicinity. Coordination with the City of Shelbyville would be necessary to complete portions of the proposed multiuse path located in the Shelbyville city limits.

Figure 4-2. Proposed North-South Multiuse Path

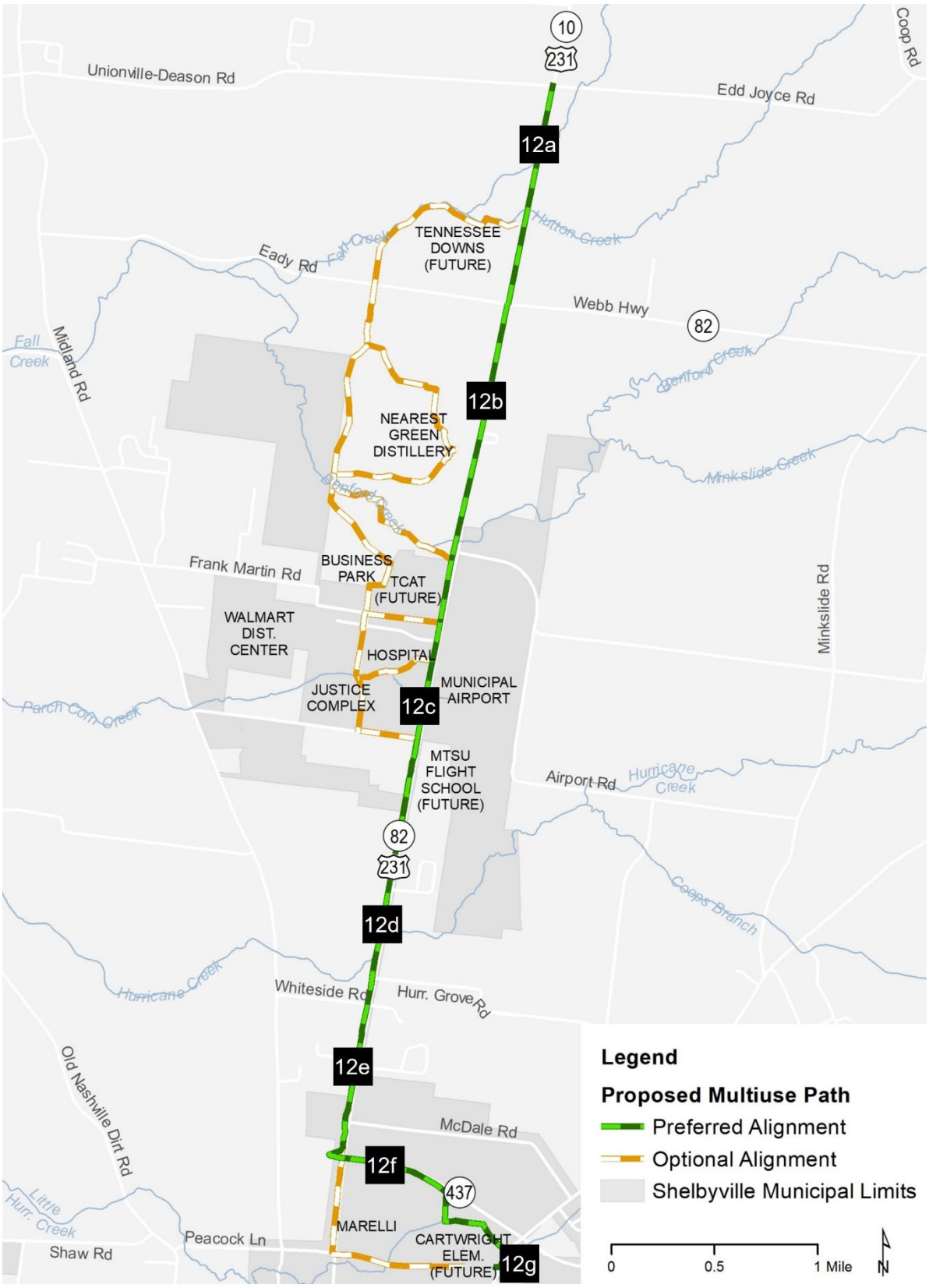


Table 4-4 details the general cost estimates for each segment of the preferred alignment based upon a planning-level cost assumption per linear foot of $150. This number does not include grading or fill costs. Detailed concept sheets associated with each segment and additional cost estimate details are provided in Appendix G – Multiuse Path Concept Plans and Cost Estimate. Design standards for the multiuse path are shown in Figure 4-3 and Figure 4-4 illustrating the pathway when located within a roadway's right-of-way and when it is within an easement. A more detailed cost estimate for the multiuse path recommendation is also included in Appendix G – Multiuse Path Concept Plans and Cost Estimate.

Table 4-4. Multiuse Path Planning Level Cost Estimates

ID	Location	Length (Miles)	Cost Estimate (2022 Dollars)
12a	Unionville-Deason Rd/Edd Joyce Rd to Eady Rd/Webb Highway/SR 82	1.1	$1,331,520
12b	Eady Rd/Webb Highway/SR 82 to New TCAT Driveway	1.3	$1,134,340
12c	New TCAT Driveway to Harts Chapel Rd	0.9	$927,140
12d	Harts Chapel Rd to Whiteside Dr	1.3	$1,484,210
12e	Whiteside Dr to SR 437 Bypass	0.7	$466,600
12f	SR 437 Bypass to Bridge Crossing	0.7	$330,090
12g	Bridge Crossing to Future Elementary School (Cartwright Elementary)	0.6	$767,300
12	Unionville-Deason Rd/Edd Joyce Rd and Future Elementary School (Cartwright Elementary)	6.6	$6,474,340

**Utilized a cost per linear foot of $150 for an asphalt pathway using TDOT 2022 average bid unit prices. See Appendix G for additional information on the elements included in this calculation.*

Figure 4-3. Design Standards - Two-Way Multiuse Path (Sidepath) in Roadway Right of Way

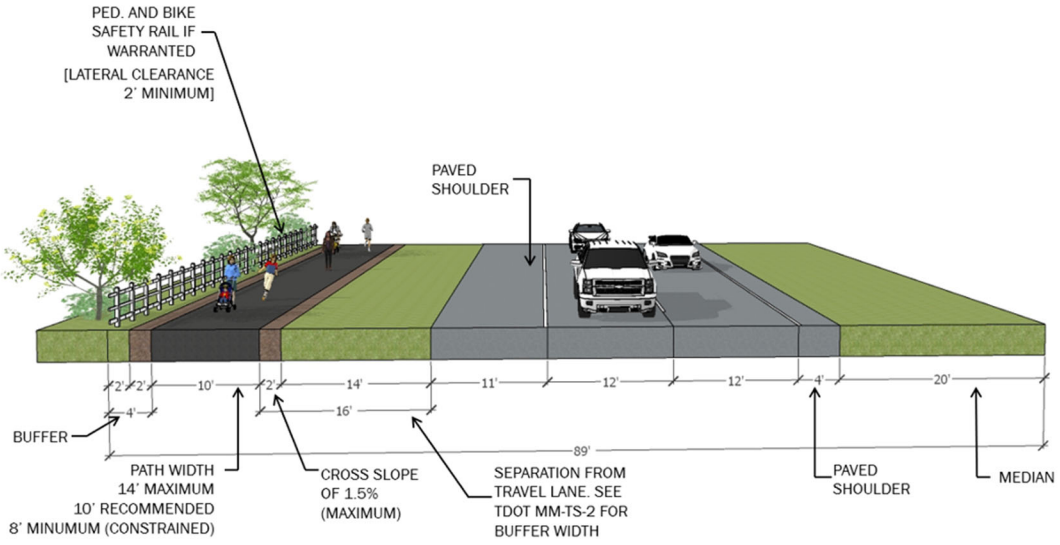
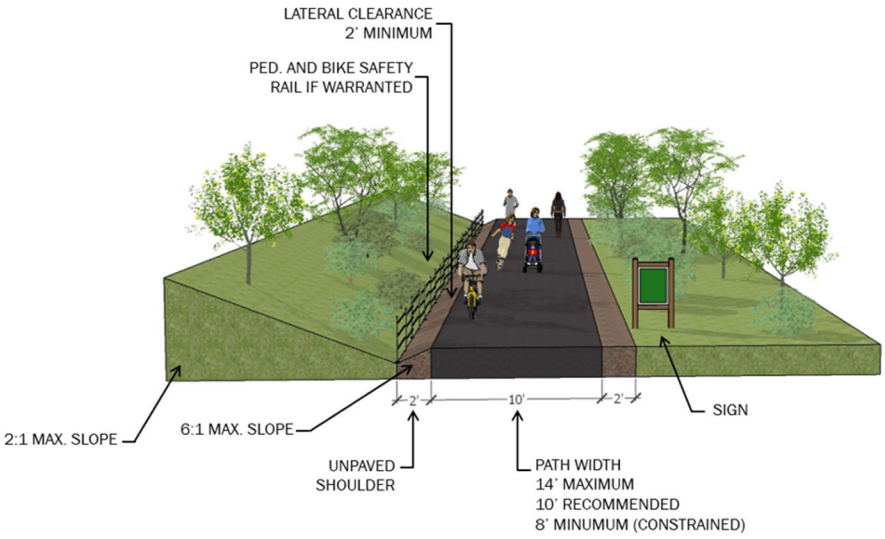


Figure 4-4. Design Standards - Two-Way Multiuse Path (Greenway) in Independent Right of Way



4.2 Non-Infrastructure Recommendations

The following non-infrastructure improvement recommendations are intended to complement the infrastructure recommendations included in this plan and were identified through public and stakeholder engagement. They involve supportive strategies, agreements, and plans that help support the goals of the study corridor. Corridor management agreements, traffic impact studies, roadway classification typical sections, traffic control planning, and land use plan consistency are individually important for successful roadway management. The type and description of each recommended non-infrastructure improvement are detailed in Table 4-5.

Table 4-5. Non-Infrastructure Recommendations

Improvement Type	Description	Next Steps
Corridor Management Agreement	Corridor management agreements (CMAs) are a collaborative tool for local communities or agencies to establish coordination between multiple entities on issues regarding transportation and land use. Access management, a type of corridor management agreement, is recommended for the US 231 corridor. As US 231 continues to develop, a coordinated approach to access management will be necessary to strategically place ingress and egress locations. This can reduce conflict points, promote the flow of traffic, and support infrastructure investment strategies.	Coordinate with TDOT, City of Shelbyville, and key stakeholders along the US 231 corridor to begin discussions of access management along this critical facility.
Traffic Impact Studies	A Traffic Impact Study (TIS) analyzes traffic impacts from both new developments and redevelopments. A TIS is used to identify needed roadway and infrastructure improvements to accommodate additional trips caused by each development. Planning commissions can require developers to contribute to these improvements as part of the entitlement process. Different types of developments will attract different modes and frequency of traffic. As development continues along the corridor, understanding how development changes will shift traffic patterns can help support safety and mobility investments.	Work with the Bedford County Regional Planning Commission to adopt policies requiring traffic impact studies for developments of a certain size. This requirement should be housed in the subdivision regulations and zoning ordinances for Bedford County.
Roadway Classification Typical Sections	As part of the plan development process, the project team developed proposed typical roadway sections, which are provided in Appendix F – Roadway Typical Sections. These typical sections should be referenced as properties develop to ensure infrastructure is improved to match demand.	Work with the Bedford County Regional Planning Commission to adopt the typical sections and utilize them when developments are approved.

Table 4-5. Non-Infrastructure Recommendations, continued

Improvement Type	Description	Next Steps
Traffic Control Plans	Traffic control plans are plans that are short-term in nature and are often used to reduce congestion and improve mobility around construction, road hazards, emergency situations, and local events. As US 231 develops, traffic control plans may be necessary to promote a steady traffic flow during local events. These plans can support roadway safety and mobility when a large influx of traffic is anticipated. Private and public partners should coordinate to allow for unified plan implementation.	Work with the Bedford County Sheriff's Office and Board of Commissioners to require traffic control plans for special events permit requests.
Land Use Consistency	Land use consistency includes the intentional review and modification of land use plans to align with the goals and objectives of the corridor, while considering the impacts of each land use type on mobility and operational efficiency. Providing additional north-south connectivity to the west of US 231 within the study area will open lands for future development allowing the County to achieve its goal of preserving the rural nature of northern Bedford County.	Work with Bedford County Planning Department as the County continues to work on the Land Use Plan Update to incorporate applicable recommendations.

5.0 Conclusion

The roadway, multimodal, and non-infrastructure recommendations included in this plan seek to address the safety, mobility, and operational concerns present along US 231 and the intersecting east-west roadways located within the broader study area. Because these roadway facilities are maintained by a combination of agencies and jurisdictions (including the City of Shelbyville, Bedford County, and TDOT), successful implementation of the recommendations included in this plan will require ongoing coordination between partners to identify mutual priorities and pursue funding sources. This coordination will be particularly important as the study area continues to develop and see additional residential, commercial, and industrial growth.

By investing in the transportation system through the recommendations included in this plan, the US 231 corridor and surrounding roadways will function as a safe, multimodal network that meets the needs of all roadway users now and into the future, whether they walk, bicycle, or drive in the area.

Eady Road at US 231 Looking North

6.0 Appendices

a. Appendix A – Public and Stakeholder Engagement Documentation
b. Appendix B – Midland Road and Frank Martin Road Collision Diagram
c. Appendix C – Operations and Development Assumptions
d. Appendix D – Turn Lane and Traffic Control Warrant Analyses
e. Appendix E – Priority Concept Plans and Cost Estimates
f. Appendix F – Roadway Typical Sections
g. Appendix G – Multiuse Path Concept Plans and Cost Estimates

Appendix A – Public and Stakeholder Engagement Documentation

Summary of Public and Stakeholder Engagement

The public and stakeholder engagement strategy for the Bedford County Community Mobility Plan included outreach to the public as well as technical coordination meetings with Bedford County staff. Feedback from the public informed the development of the vision statement, plan goals, opportunities and challenges, and project recommendations.

Virtual Public Engagement

A study webpage was developed to gather feedback from the public throughout the planning process and included background information, schedule, contact information, and an interactive map. The interactive mapping feature allowed participants to provide feedback on their priorities for the transportation system, identify preferred improvements for the study area, as well as provide general comments about opportunities and challenges within the study area. The study webpage was visited by approximately 310 unique users and the comments collected from the interactive map are included below.

ID	Comment	Up Votes	Down Votes	Latitude	Longitude
1	Put a red light up at off ramp there is going be a serious wreck at the end of the off ramp with drivers trying to merge on to 231s or 231n .	5	7	35.5184	-86.451
2	Add better sidewalks and cross/walk lights.	1	0	35.48645	-86.4391
3	Needs to be a red light put at this intersection. Too much confusion on who can and who can not causing traffic back up and close call wrecks. A younger lady was killed at this intersection many years ago and the only thing that was put up were flashing red lights and tiny bumps you go over.	6	1	35.58832	-86.4402
4	Reduce speed limits	0	11	35.60167	-86.4334
5	How about a merge lane. Red lights are good when truly needed, but they slow down traffic. Can't this intersection be finished so merge lanes could be added going either way?	0	0	35.5184	-86.451
6	Can Bedford not work with Rutherford to be proactive in managing 231 access from all the home construction happening? Murfreesboro has been an easy commute, but red lights at all of these new communities will impact travel times significantly. These contractors are making plenty of money and could work together to build some merge lanes and...even better...a bridge or two so traffic can keep flowing on 231. Please tell me there is collaboration!!!	0	0	35.7448	-86.4073

ID	Comment	Up Votes	Down Votes	Latitude	Longitude
7	A turning lane is needed for those getting on 437 from 231 so there is ample space to slow down before making a right turn onto the ramo.	7	1	35.52706	-86.4535
8	Need red light here	2	3	35.57943	-86.4397
9	A light is needed at this location.	1	1	35.60167	-86.4334
10	This area wouldn't be so bad if the left lane drivers were cited. 231 has to be the worst road for this issue. They cause the backups.	5	0	35.55122	-86.4483
11	Need a red light here so very badly. So many lives lost already. Cascade and Webb students drive this route. PLEASE put a red light here!	0	0	35.57943	-86.4397
12	Reduce Speed Limit	0	6	35.57025	-86.443
13	This is a very bad intersection. There needs to be a 3-way flashing light installed over the intersection or solar powered flashing lights installed on top of the stop signs.	0	0	35.59276	-86.4801
14	This is a very bad intersection. It needs a three way flashing light installed or solar powered flashing lights installed on top of each stop sign.	2	0	35.53939	-86.4597
15	There needs to be a red light installed here, before someone gets hurt bad or killed in an accident. Especially with more industries coming!	0	2	35.56501	-86.4452
16	This is for the Frank Martin/ Hwy. 231 intersection.	0	0	35.57025	-86.443
17	This is for the Frank Martin/ Hwy. 231 intersection.	0	0	35.57943	-86.4397
18	Desperately needs a red light. With the growth of the country, it needs to be done. Every morning I have to struggle through this intersection and I see so much confusion in who has the right away.	1	1	35.58697	-86.4391
19	Please put a light here. Too many wrecks and close calls to not have one. I've been told, in the past, that since the city limits don't come out that far that it can't be done. What's going to happen when the growth of the race track starts and more wrecks and close calls are going to happen?	0	0	35.58811	-86.4403
20	Look at the number of accidents and lives lost at this intersection. There absolutely needs to be a light here.	0	0	35.58697	-86.4391
21	Based on feedback to date, there are requests for reduced speed and the addition of at least 2 traffic lights. Additional traffic lights aren't solution to this. Traffic lights will undoubtedly create congestion, extend commuters drive time and create more rear end collisions. For the intersections in question, why not have blinking yellow lights on 231 to grab everyones attention	1	1	35.60721	-86.4348

ID	Comment	Up Votes	Down Votes	Latitude	Longitude
	and slow them down? Speed limits are also fine as is. They just need to be respected and enforced.				
22	This area also needs a beautification effort to make Bedford County/Shelbyville more inviting. As an idea, install white split rail fence from the 437 to the county line. It could be funded by the new companies coming into Bedford County such as the battery manufacturer or Tennessee Downs. The 231 corridor also needs to have a team pick up litter. This could also be accomplished by utilizing the prisoners at the local jail. Clean it up!	3	0	35.60651	-86.4383
23	For the 437 turn issues, why can't the TDOT continue the west bound lane over 231 and wrap it around to the left adjacent to the eastbound on ramp from 231? This would eliminate any left hand turns onto 231 South from the east side of 231.	1	0	35.52273	-86.4621

Figure A-1. Interactive Mapping Application and Comment Types

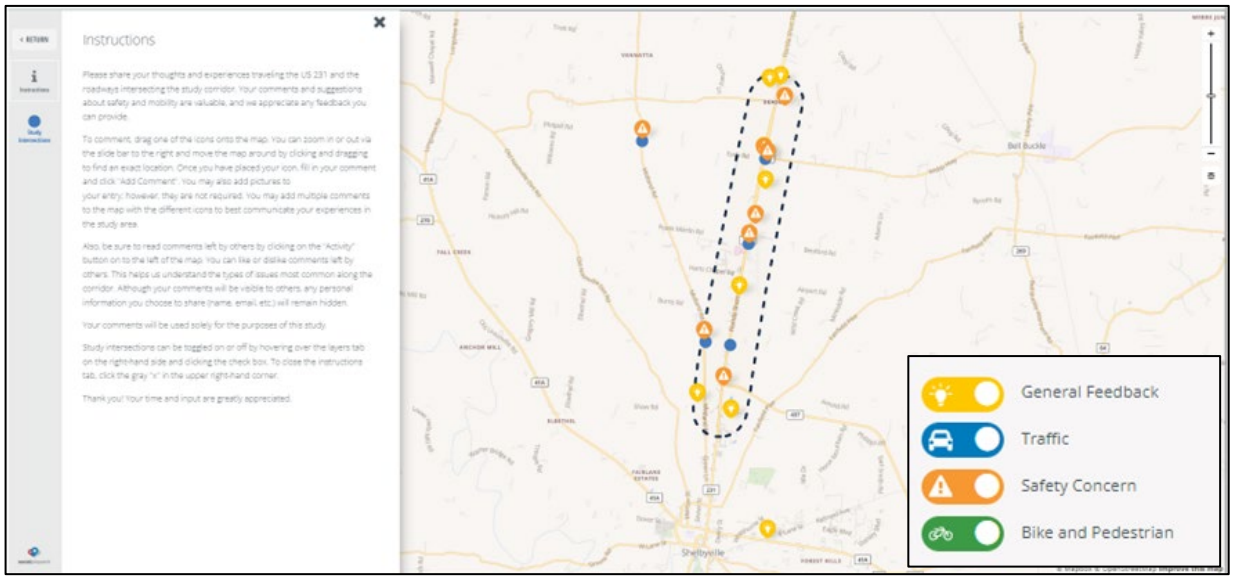


Figure A-2. Study Webpage

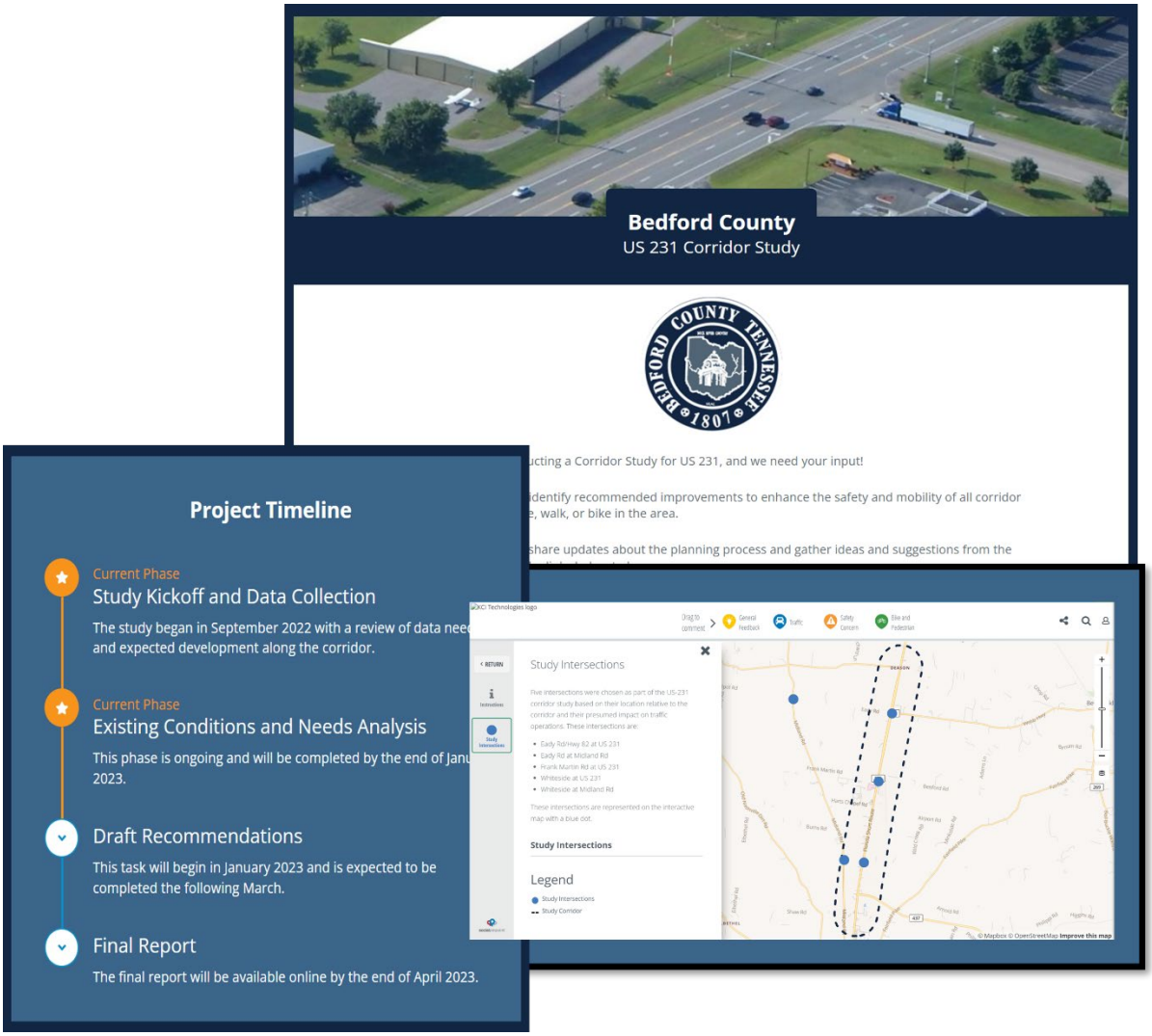
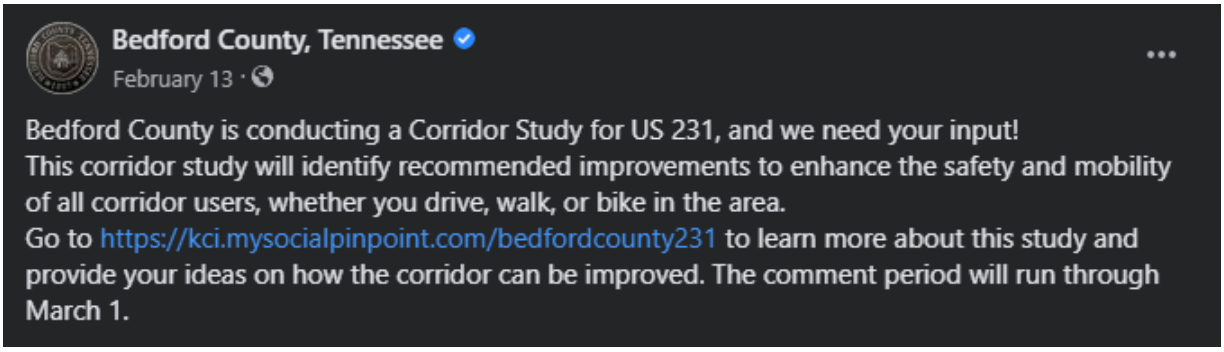


Figure A-3. Facebook Post Advertising Engagement Opportunity



Steering Committee Meeting Presentation Slides - Meeting 1

Bedford County US 231 Corridor Study

Steering Committee Meeting #1

October 6, 2022

TN TDOT Department of Transportation

KCI

1

Agenda

- Project Overview
- Existing Conditions
- Vision and Goals (Draft)
- Project Website (Draft)
- Next Steps
- Group Discussion

2

Project Overview

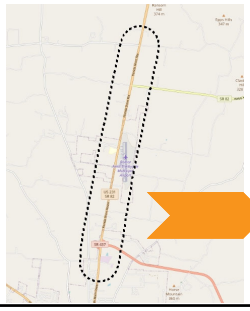
3

Project Overview

- TDOT Transportation Planning Grant (TPG)
- ~$123,000 (10% local match)
- Project team
  - County
  - TDOT
  - SCTDD
  - Consultant team

4

Project Overview



- Northern terminus: Unionville Deason Rd / Edd Joyce Rd
- Southern terminus: Bypass / Old Nashville Dirt Rd
- Intersecting County roads

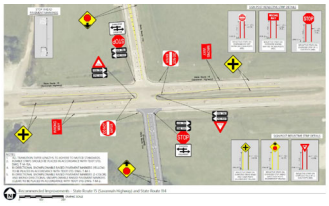
Safety and mobility improvements

5

Project Overview

OUTCOMES/DELIVERABLES:

- Future development traffic impact model
  - Counts (5 intersections)
  - Trip generation (10 parcels)
- US 231 Improvement Plan
  - Planning level design concepts (10)
  - Cost estimates

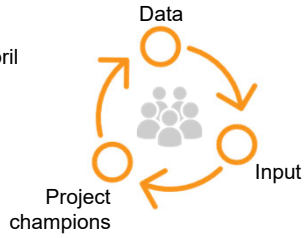


6

Project Overview

SCHEDULE:

- Project end: April 28th
- Final presentation: Early April
- Steering committee
  - 3 meetings
  - February, March



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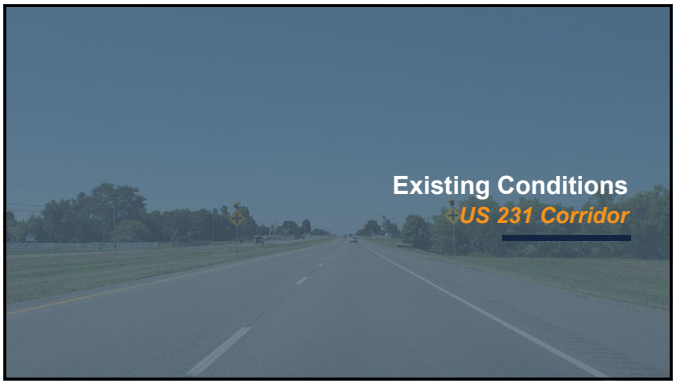

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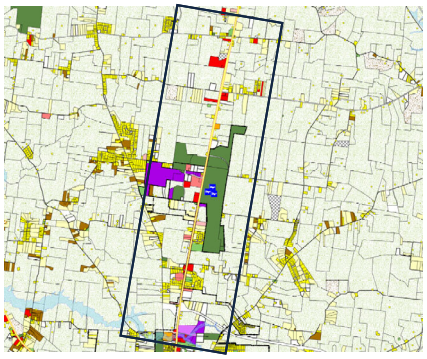


Existing Land Use Map

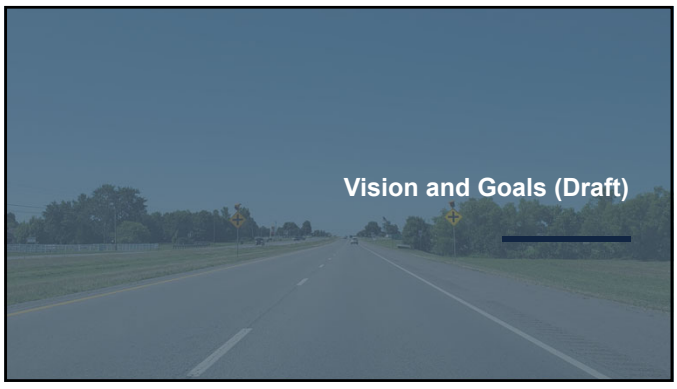
9

Existing Conditions

Persons injured in crashes (past 5 years)

Annual Average Daily Traffic (AADT)

10



11

Vision and Goals (Draft)

VISION

US 231 is a thoughtfully planned corridor that supports growth and economic development while providing safe, efficient, and reliable connectivity for residents and visitors alike.

12

Vision and Goals (Draft)

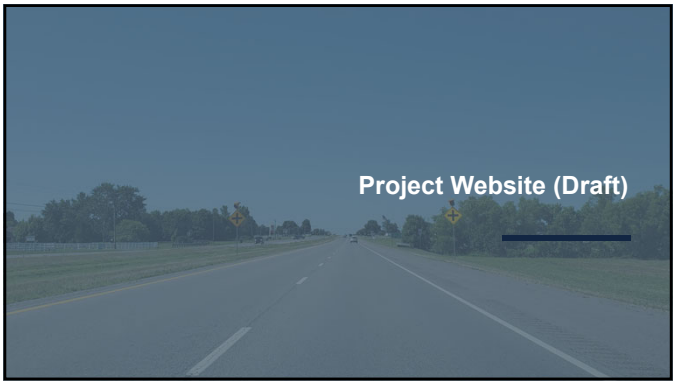
GOAL 1 Promote the safe and efficient movement of people and goods

GOAL 2 Enhance the quality of life of residents through future-focused planning

GOAL 3 Encourage a thoughtful transportation planning approach

GOAL 4 Address operational deficiencies and its impact on access, mobility, and safety

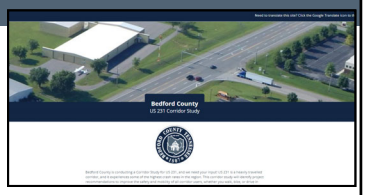
13



14

Project Website (Draft)

- Overview
- Timeline
- Interactive survey map
- Previous plans/studies, project materials
- Contact information



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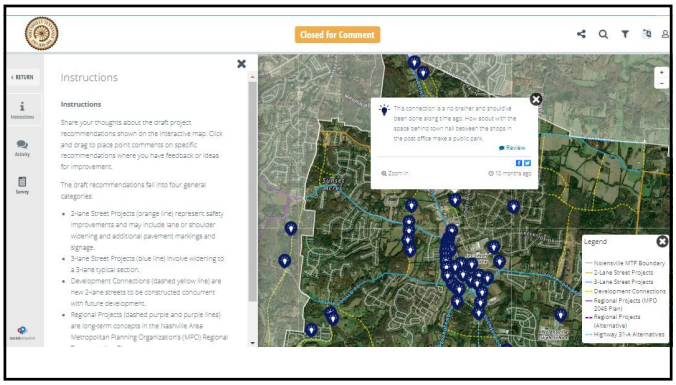

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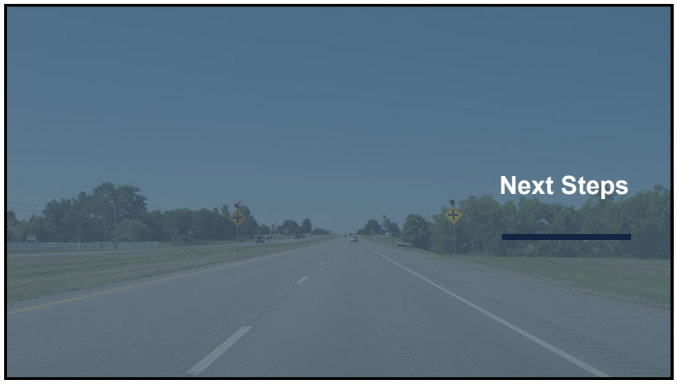
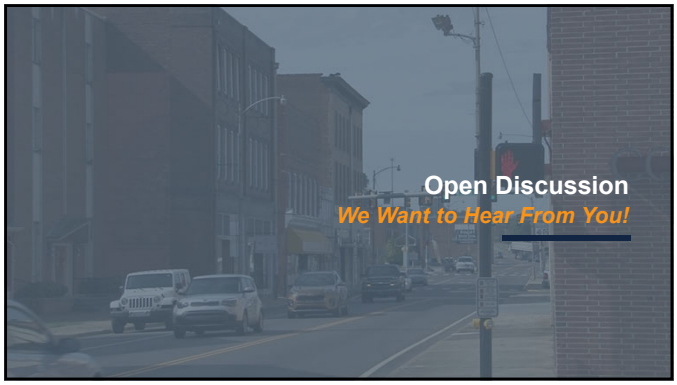


17

Next Steps

- Finalize project website
  - Mapping survey (Oct/Nov)
- Collect counts, develop model
- Continue existing conditions analysis and needs assessment
- Steering Committee meeting #2 – January 2023

18



19

Open Discussion

- Questions?
- Initial feedback?
- Input on opportunities and challenges and growth areas

20

Steering Committee Meeting Presentation Slides - Meeting 2

Bedford County US 231 Corridor Study

Steering Committee Meeting #2

February 2023

TN TDOT Department of Transportation

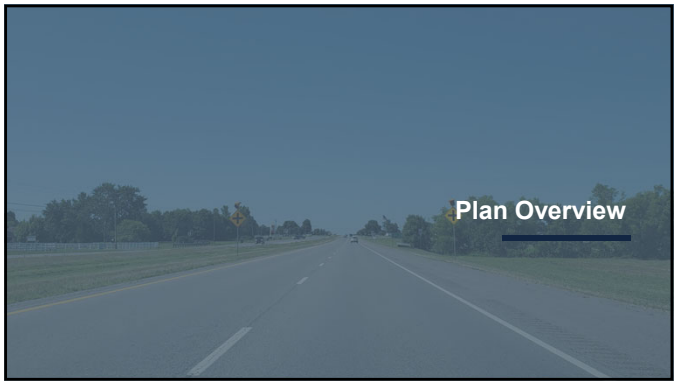
KCI

1

Agenda

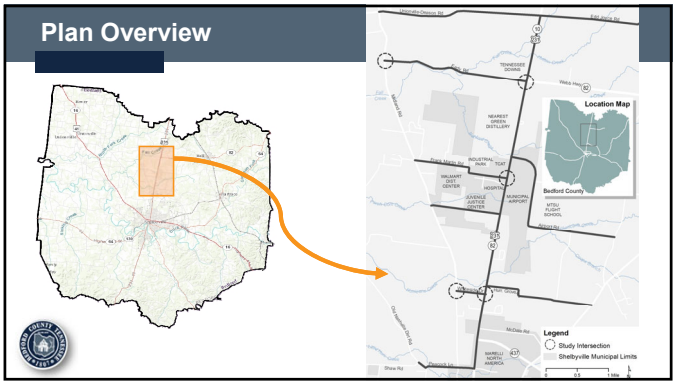
- Plan overview
- Operations model
- Draft recommendations
- Next steps
- Open discussion

2



3

Plan Overview



4

Plan Overview

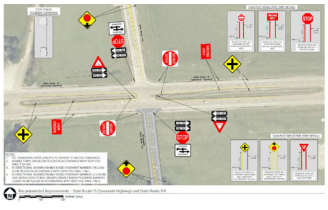
- TDOT Transportation Planning Grant (TPG)
- ~$123,000 (10% local match)
- Project team
  - County
  - TDOT
  - SCTDD
  - Consultant team

5

Plan Overview

DELIVERABLES:

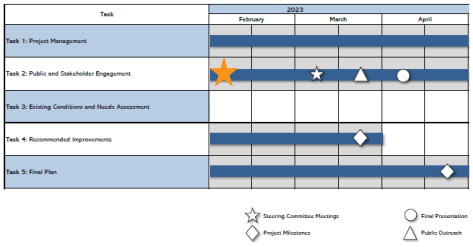
- US 231 Improvement Plan
  - Planning-level design concepts (up to 5)
  - Cost estimates
  - Connectivity and multimodal recommendations



6

Plan Overview

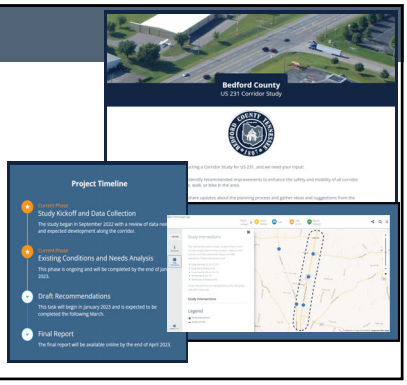
SCHEDULE:



7

Plan Overview

- Report drafting continues – background, existing conditions summaries
- Public engagement and ongoing outreach
- Traffic analyses and model development



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9

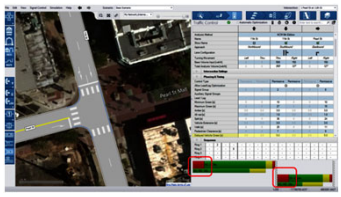
Operations Model

Traffic Operations Model

- Weekday + weekend
  - Peak hours
- Existing (2022) condition
  - Turning movement counts
- Future (2032) condition scenario
  - Background traffic growth + forecasted development

No build (do nothing) | Build (improve)

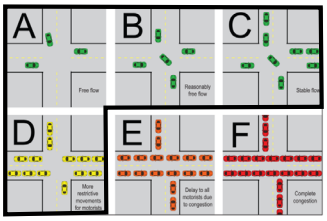
"Normal" peak conditions



10

Operations Model

- Intersection evaluation
  - One measure = Level of Service (LOS)
- LOS A – D is considered operationally acceptable



Seconds of delay

11

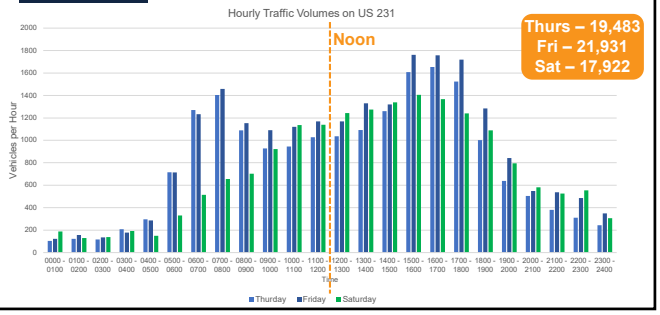
Operations Model

Future Condition (2032) Scenario

- Tennessee Downs
- TCAT
- Industrial Park
- MTSU Flight School
- Juvenile Justice Center
- New elementary school
- Scenario hotel
- Scenario subdivision

12

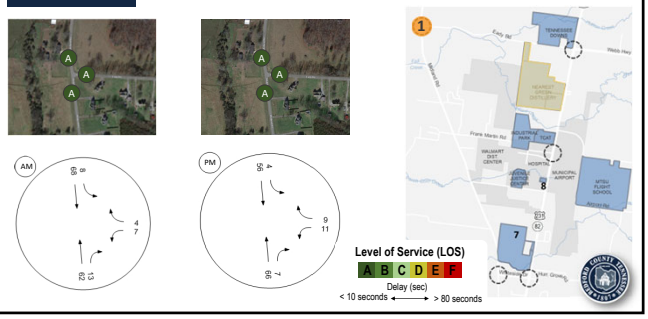
Operations Model



13

Operations Model

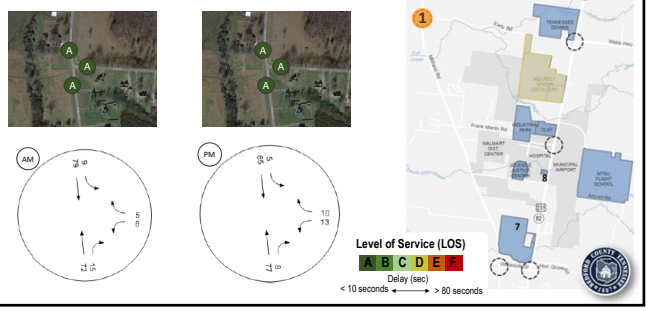
EXISTING
Eady @ Midland



14

Operations Model

FUTURE
Eady @ Midland



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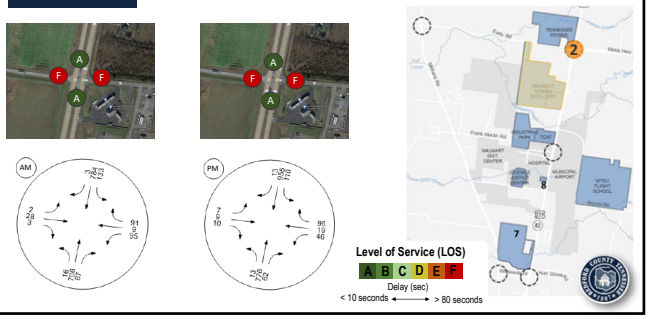
Operations Model

EXISTING
Eady @ US 231

16

Operations Model

FUTURE
Eady @ US 231

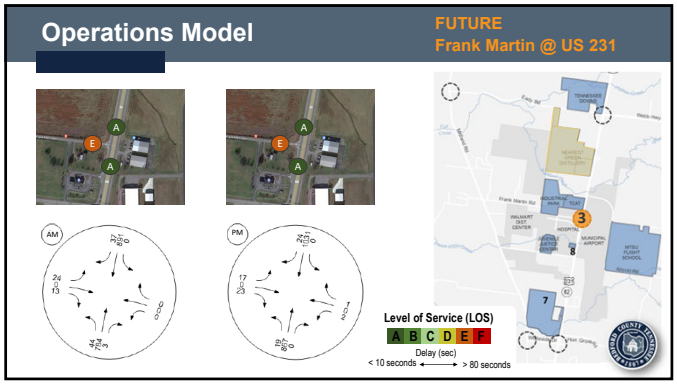


17

Operations Model

EXISTING
Frank Martin @ US 231

18



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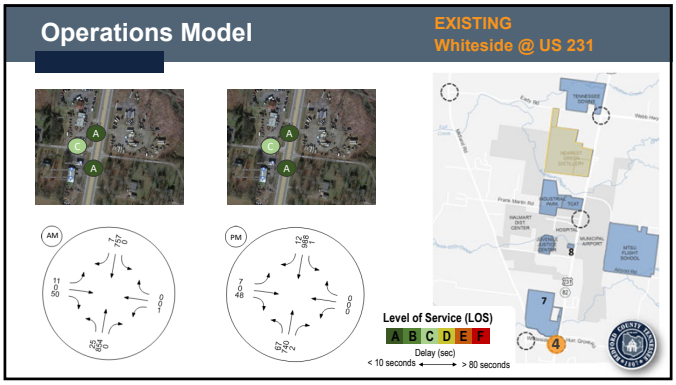

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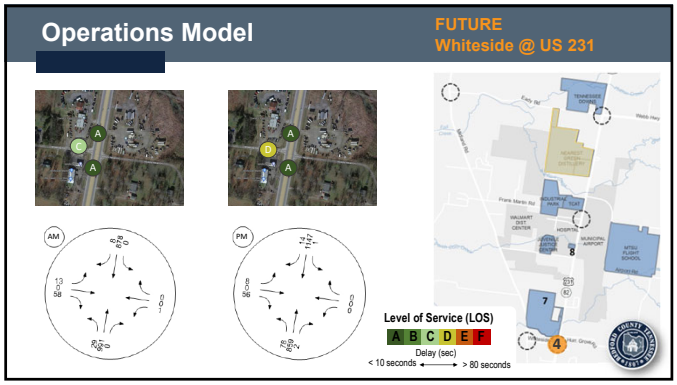

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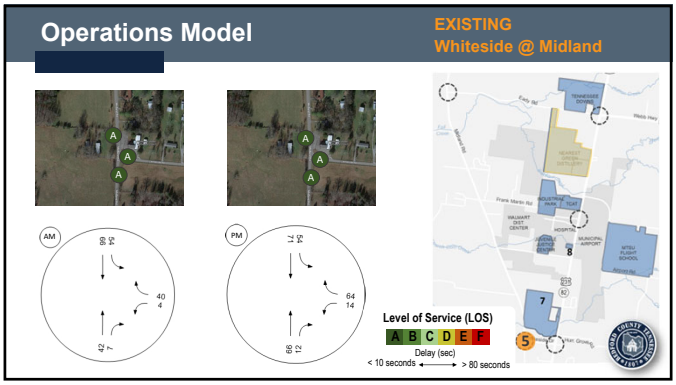

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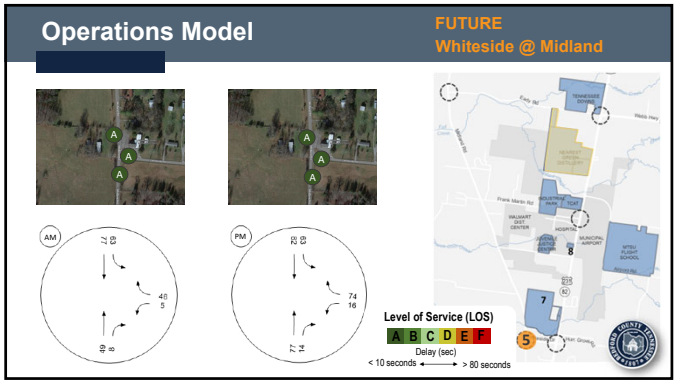

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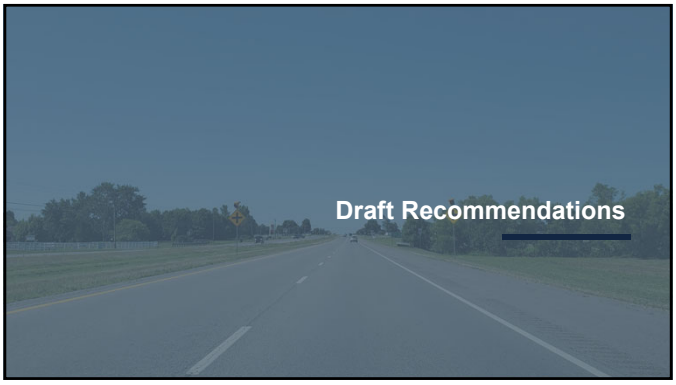
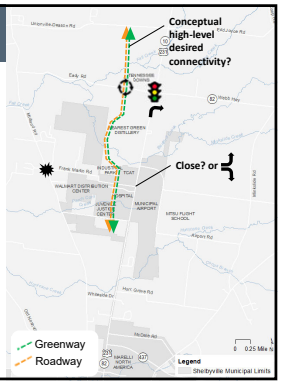


24

Draft Recommendations

- Increased roadway connectivity
- Greenway
- Corridor management agreement
- Event traffic control plans
  - Coordination with Sheriff
- Local/collector standards
  - Eady Rd, Whiteside Dr, Edd Joyce Rd
- Additional safety and mobility recommendations



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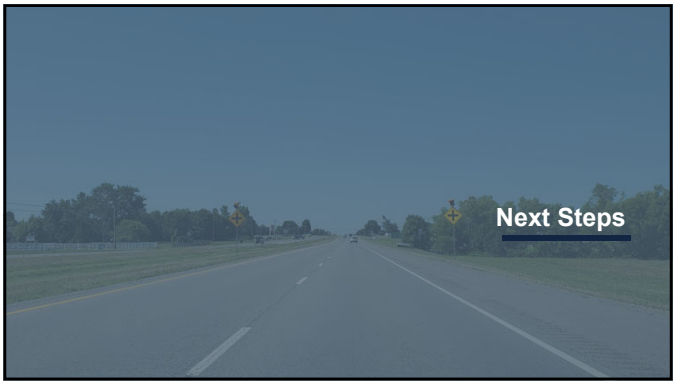
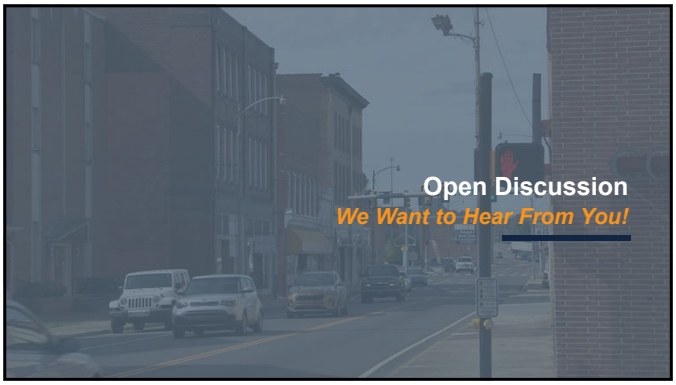


26

Next Steps

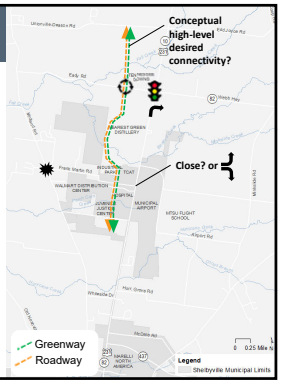
- Continue evaluations
- Coordinate with Land Use Plan effort
- Finalize project recommendations
- Develop concept plans and cost estimates
- Steering committee meeting #3
- Plan document
- Final presentation

27



28

Open Discussion



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Steering Committee Meeting Presentation Slides - Meeting 3

Bedford County US 231 Corridor Study

Steering Committee Meeting #3

March 16, 2023

TN TDOT Department of Transportation

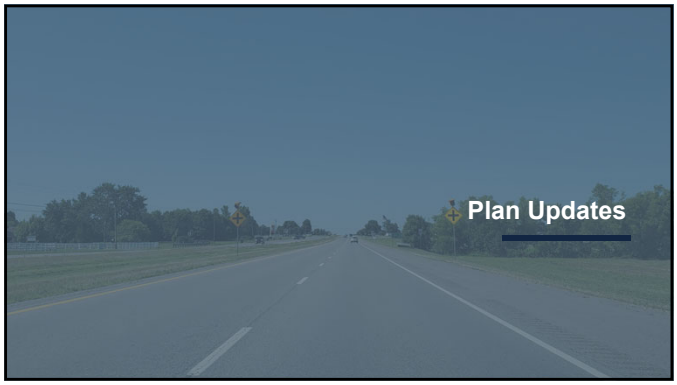
KCI

1

Agenda

- Plan updates
- Draft recommendations
- Next steps
- Open discussion

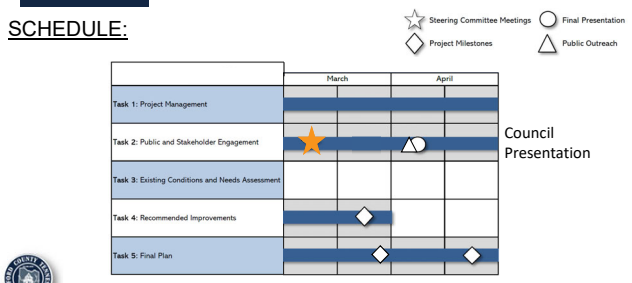
2



3

Plan Updates

SCHEDULE:



4

Plan Updates

MODEL UPDATES:

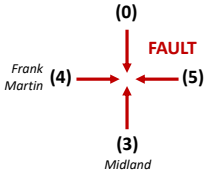
- Juvenile Justice Center → Jail and Court
- Updated: type of facility, number of beds
- No substantial impact on intersection operations

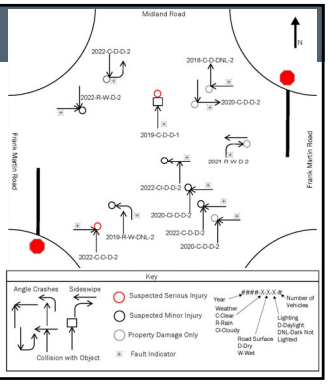
5

Plan Updates

CRASH DIAGRAM:

- Frank Martin Rd @ Midland Rd
- 12 crashes (2018 – 2022)
- 9 angles



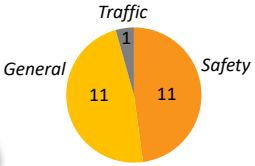


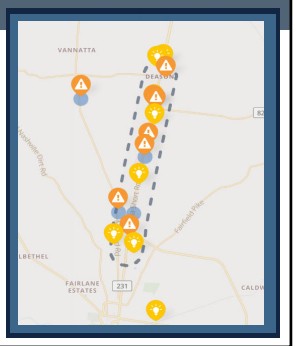
6

Plan Updates

PUBLIC ENGAGEMENT:

- 23 comments
- 69 upvotes/downvotes





7

Plan Updates

PUBLIC ENGAGEMENT:

- Traffic signals (SR 82, Frank Martin, Distillery, Bypass)
- Safety improvements (visibility)
- Be proactive → access management
- Beautification

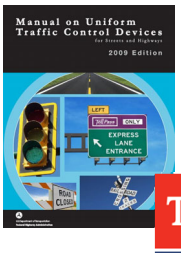
- Most upvotes (7) – turn lane at Bypass
- Most downvotes (11) – reduce speed limits along Edd Joyce Rd

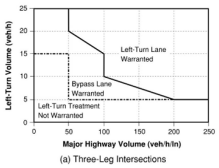
8

Draft Recommendations

9

Draft Recommendations





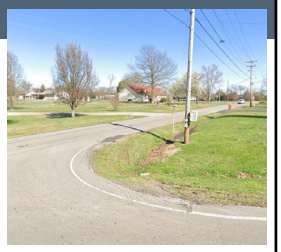
TN TDOT Department of Transportation

10

Draft Recommendations

Frank Martin Rd and Midland Rd

- Signage Improvements
  - MUTCD compliant
  - Other countermeasures (size, number)
- Pavement markings
- Widen shoulder (NB right turn)



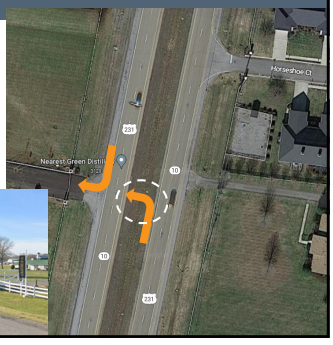
Countermeasure	Crash Reduction Factor	Typical Urban Crash Threshold	Typical Rural Crash Threshold	Additional Implementation Factors	Typical Implementation Cost Range per Intersection
Basic set of sign and marking improvements	40%	10 crashes in 5 years	4-5 crashes in 5 years	None	$5,000 to $8,000

11

Draft Recommendations

Nearest Green Distillery Main Driveway

- Median cut
- Turn lanes (NB left, SB right)
- Entrance widening, lighting
- Driveway striping



12

Draft Recommendations

Old Nashville Dirt Rd @ Shaw Rd & Peacock Ln

- Signage improvements
  - MUTCD compliant
  - Other countermeasures (size, number)
- Pavement markings
  - Extend striping
  - Stop bars

13

Draft Recommendations

Old Nashville Dirt Rd @ Shaw Rd & Peacock Ln

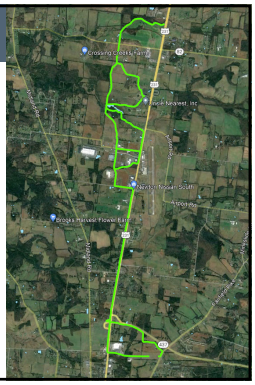
- Signage Improvements
  - MUTCD compliant
  - Other countermeasures (size, number)
- Pavement markings
  - Add centerline, edge lines
  - Stop bars

14

Draft Recommendations

Greenway/Sidepath

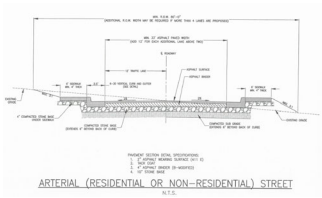
- Destinations
  - Tennessee Downs
  - Nearest Green Distillery
  - TCAT
  - Hospital
  - Elementary School

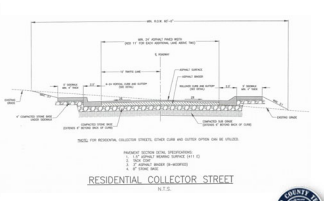


15

Draft Recommendations

Roadway Standard Drawings





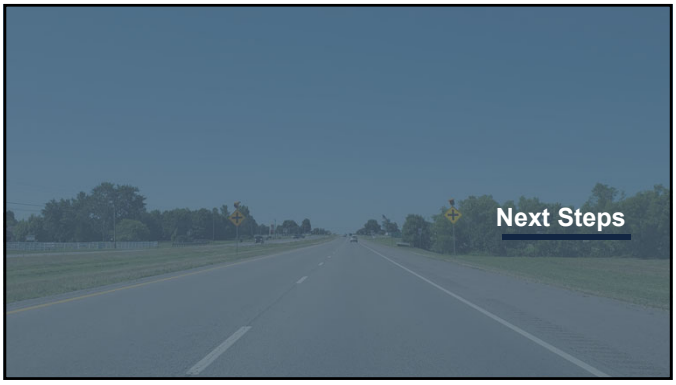
16

Draft Recommendations

Additional Recommendations

- Close Frank Martin Rd at US 231
- North-south connectivity west of US 231
- Airport Rd realignment
- SR 82 traffic signal
- Turn lane/traffic signal warrants at Bypass
- Corridor management agreement
- Event traffic control plans
- Local/collector standards → study roadways

17

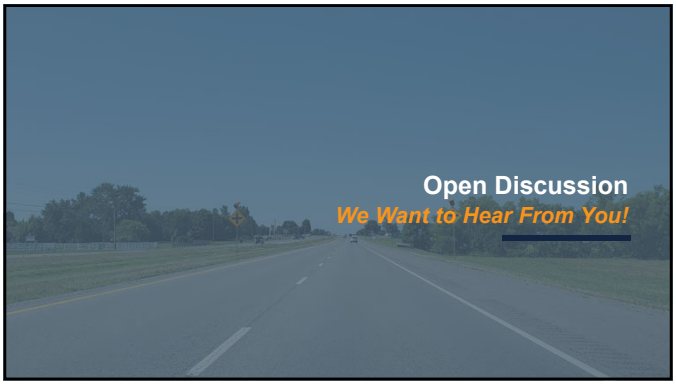


18

Next Steps

- Finalize projects
- Complete design concepts and cost estimates
- Draft and finalize plan document
- Present to Board for approval

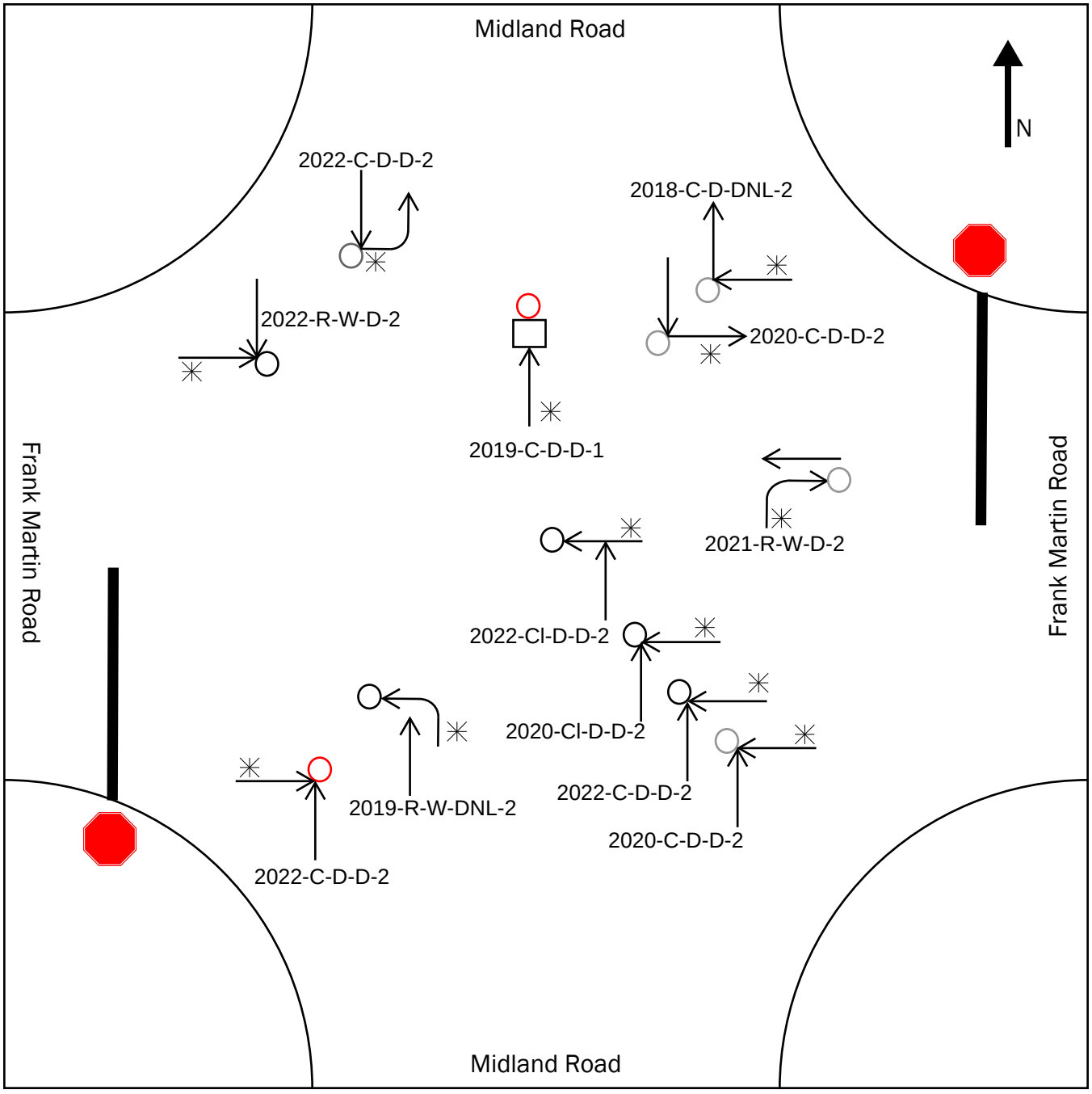
19



20

Appendix B – Midland Road and Frank Martin Road Collision Diagram

Collision Diagram



Key

Angle Crashes

Sideswipe

Collision with Object

Suspected Serious Injury

Suspected Minor Injury

Property Damage Only

Fault Indicator

####-X-X-X-#

Year

Number of Vehicles

Weather
C-Clear
R-Rain
Cl-Cloudy

Lighting
D-Daylight
DNL-Dark Not Lighted

Road Surface
D-Dry
W-Wet

Appendix C – Operations and Development Assumptions

Bedford County - TPG

Vistro File: M:\...\Bedford County TPG.vistro
Report File: M:\...\1 - Existing AM.pdf

Scenario 1 Existing Weekday AM
2/8/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	231 and Eady	Two-way stop	HCM 7th Edition	WB Left	0.962	198.9	F
6	231 and Frank Martin	Two-way stop	HCM 7th Edition	EB Left	0.156	35.8	E
9	231 and Whiteside	Two-way stop	HCM 7th Edition	WB Left	0.009	38.3	E
14	Midland and Whiteside	Two-way stop	HCM 7th Edition	WB Left	0.005	10.0	B
17	Midland and Eady	Two-way stop	HCM 7th Edition	WB Left	0.008	9.4	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: 231 and Eady

Control Type:	Two-way stop	Delay (sec / veh):	198.9
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.962

Intersection Setup

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	1
Entry Pocket Length [ft]	80.00	100.00	100.00	90.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	700.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Base Volume Input [veh/h]	14	608	58	115	676	3	2	24	3	82	8	78
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	14	608	58	115	676	3	2	24	3	82	8	78
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	152	15	29	169	1	1	6	1	21	2	20
Total Analysis Volume [veh/h]	14	608	58	115	676	3	2	24	3	82	8	78
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.01	0.00	0.13	0.01	0.00	0.02	0.27	0.00	0.96	0.09	0.12
d_M, Delay for Movement [s/veh]	9.02	0.00	0.00	9.48	0.00	0.00	58.47	59.18	24.80	198.88	194.98	11.16
Movement LOS	A	A	A	A	A	A	F	F	C	F	F	B
95th-Percentile Queue Length [veh/ln]	0.05	0.00	0.00	0.43	0.00	0.00	1.10	1.10	1.10	6.07	6.07	0.40
95th-Percentile Queue Length [ft/ln]	1.17	0.00	0.00	10.68	0.00	0.00	27.50	27.50	27.50	151.75	151.75	9.95
d_A, Approach Delay [s/veh]	0.19			1.37			55.58			111.54		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	12.91											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 6: 231 and Frank Martin

Control Type:	Two-way stop	Delay (sec / veh):	35.8
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.156

Intersection Setup

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	200.00	100.00	100.00	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Base Volume Input [veh/h]	38	676	3	0	768	32	21	0	11	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	38	676	3	0	768	32	21	0	11	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	169	1	0	192	8	5	0	3	0	0	0
Total Analysis Volume [veh/h]	38	676	3	0	768	32	21	0	11	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.01	0.00	0.00	0.01	0.00	0.16	0.00	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.61	0.00	0.00	8.96	0.00	0.00	35.83	42.06	15.10	29.58	38.65	10.48
Movement LOS	A	A	A	A	A	A	E	E	C	D	E	B
95th-Percentile Queue Length [veh/ln]	0.15	0.00	0.00	0.00	0.00	0.00	0.61	0.61	0.61	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.65	0.00	0.00	0.00	0.00	0.00	15.34	15.34	15.34	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.51			0.00			28.70			26.24		
Approach LOS	A			A			D			D		
d_I, Intersection Delay [s/veh]	0.83											
Intersection LOS	E											

Intersection Level Of Service Report
Intersection 9: 231 and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	38.3
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.009

Intersection Setup

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Base Volume Input [veh/h]	25	854	0	0	757	7	11	0	50	1	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	25	854	0	0	757	7	11	0	50	1	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	214	0	0	189	2	3	0	13	0	0	0
Total Analysis Volume [veh/h]	25	854	0	0	757	7	11	0	50	1	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.01	0.00	0.00	0.01	0.00	0.09	0.00	0.08	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	9.39	0.00	0.00	9.61	0.00	0.00	35.06	45.67	12.81	38.32	44.20	11.56
Movement LOS	A	A	A	A	A	A	E	E	B	E	E	B
95th-Percentile Queue Length [veh/ln]	0.09	0.00	0.00	0.00	0.00	0.00	0.59	0.59	0.59	0.03	0.03	0.03
95th-Percentile Queue Length [ft/ln]	2.29	0.00	0.00	0.00	0.00	0.00	14.81	14.81	14.81	0.69	0.69	0.69
d_A, Approach Delay [s/veh]	0.27			0.00			16.82			38.32		
Approach LOS	A			A			C			E		
d_I, Intersection Delay [s/veh]	0.76											
Intersection LOS	E											

Intersection Level Of Service Report
Intersection 14: Midland and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	10.0
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.005

Intersection Setup

Name	Midland Raod		Midland Road		Whiteside Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Raod		Midland Road		Whiteside Road	
Base Volume Input [veh/h]	42	7	54	66	4	40
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	42	7	54	66	4	40
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	11	2	14	17	1	10
Total Analysis Volume [veh/h]	42	7	54	66	4	40
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.03	0.00	0.01	0.04
d_M, Delay for Movement [s/veh]	0.00	0.00	7.37	0.00	10.03	8.68
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.09	0.09	0.14	0.14
95th-Percentile Queue Length [ft/ln]	0.00	0.00	2.32	2.32	3.49	3.49
d_A, Approach Delay [s/veh]	0.00		3.32		8.81	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.69					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 17: Midland and Eady

Control Type:	Two-way stop	Delay (sec / veh):	9.4
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.008

Intersection Setup

Name	Midland Road		Midland Road		Eady Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Road		Midland Road		Eady Road	
Base Volume Input [veh/h]	62	13	8	68	7	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	62	13	8	68	7	4
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	3	2	17	2	1
Total Analysis Volume [veh/h]	62	13	8	68	7	4
Pedestrian Volume [ped/h]	0		0		0	

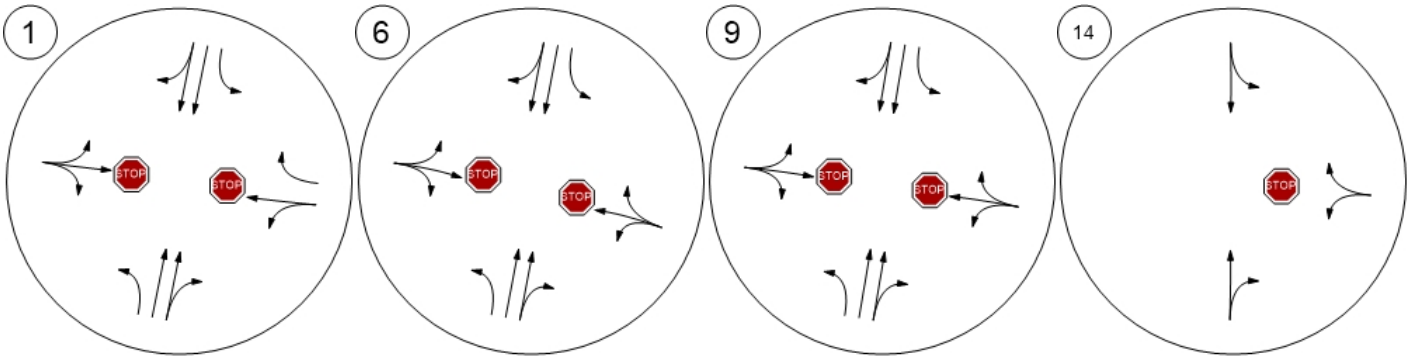
Intersection Settings

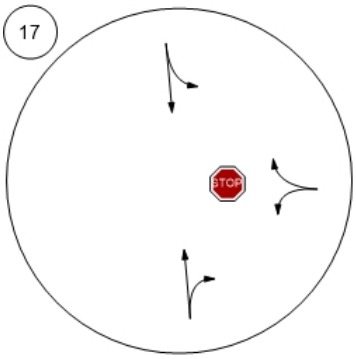
Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

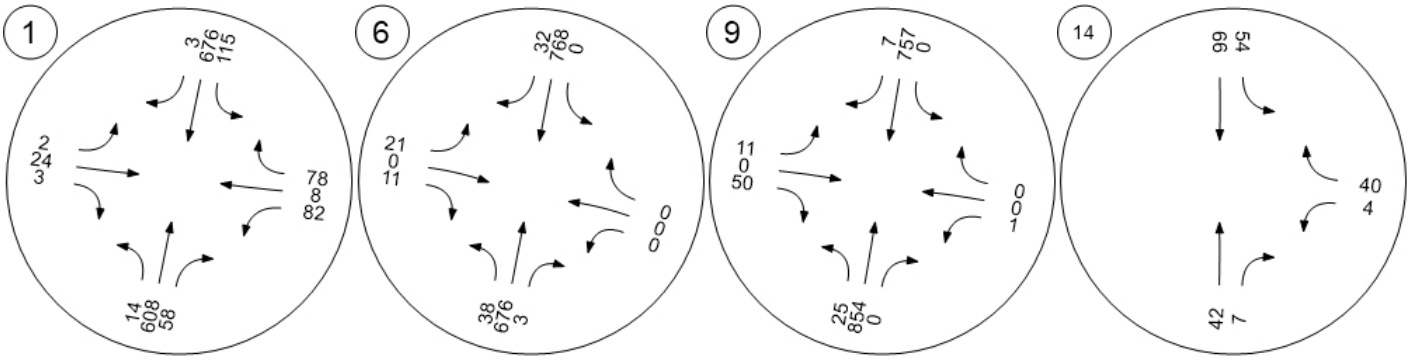
V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.37	0.00	9.36	8.67
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.01	0.01	0.04	0.04
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.33	0.33	0.94	0.94
d_A, Approach Delay [s/veh]	0.00		0.78		9.11	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.98					
Intersection LOS	A					

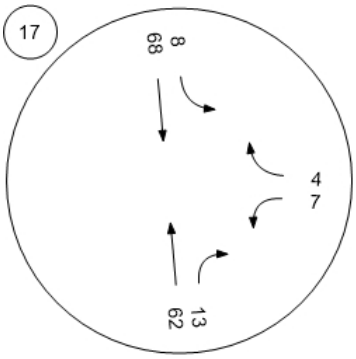
Lane Configuration and Traffic Control





Traffic Volume - Future Total Volume





Bedford County - TPG

Vistro File: M:\...\Bedford County TPG.vistro
Report File: M:\...\2 - Existing PM.pdf

Scenario 2 Existing Weekday PM
2/8/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	231 and Eady	Two-way stop	HCM 7th Edition	WB Thru	0.212	112.1	F
6	231 and Frank Martin	Two-way stop	HCM 7th Edition	EB Left	0.130	39.6	E
9	231 and Whiteside	Two-way stop	HCM 7th Edition	EB Left	0.092	55.1	F
14	Midland and Whiteside	Two-way stop	HCM 7th Edition	WB Left	0.020	10.4	B
17	Midland and Eady	Two-way stop	HCM 7th Edition	WB Left	0.013	9.3	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: 231 and Eady

Control Type:	Two-way stop	Delay (sec / veh):	112.1
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.212

Intersection Setup

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	1
Entry Pocket Length [ft]	80.00	100.00	100.00	90.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	700.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Base Volume Input [veh/h]	11	669	53	95	823	11	6	8	9	40	16	83
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	11	669	53	95	823	11	6	8	9	40	16	83
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	167	13	24	206	3	2	2	2	10	4	21
Total Analysis Volume [veh/h]	11	669	53	95	823	11	6	8	9	40	16	83
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.11	0.01	0.00	0.09	0.11	0.02	0.45	0.21	0.13
d_M, Delay for Movement [s/veh]	9.59	0.00	0.00	9.61	0.00	0.00	70.87	63.46	20.50	104.80	112.10	11.51
Movement LOS	A	A	A	A	A	A	F	F	C	F	F	B
95th-Percentile Queue Length [veh/ln]	0.04	0.00	0.00	0.36	0.00	0.00	0.78	0.78	0.78	3.12	3.12	0.45
95th-Percentile Queue Length [ft/ln]	1.05	0.00	0.00	9.09	0.00	0.00	19.52	19.52	19.52	78.08	78.08	11.19
d_A, Approach Delay [s/veh]	0.14			0.98			48.59			49.93		
Approach LOS	A			A			E			E		
d_I, Intersection Delay [s/veh]	4.98											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 6: 231 and Frank Martin

Control Type:	Two-way stop	Delay (sec / veh):	39.6
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.130

Intersection Setup

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	200.00	100.00	100.00	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Base Volume Input [veh/h]	16	747	0	0	888	21	15	0	20	2	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	747	0	0	888	21	15	0	20	2	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	187	0	0	222	5	4	0	5	1	0	0
Total Analysis Volume [veh/h]	16	747	0	0	888	21	15	0	20	2	0	1
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.01	0.00	0.00	0.01	0.00	0.13	0.00	0.04	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	9.94	0.00	0.00	9.20	0.00	0.00	39.64	47.48	14.90	33.57	45.05	11.13
Movement LOS	A	A	A	A	A	A	E	E	B	D	E	B
95th-Percentile Queue Length [veh/ln]	0.07	0.00	0.00	0.00	0.00	0.00	0.58	0.58	0.58	0.05	0.05	0.05
95th-Percentile Queue Length [ft/ln]	1.65	0.00	0.00	0.00	0.00	0.00	14.59	14.59	14.59	1.31	1.31	1.31
d_A, Approach Delay [s/veh]	0.21			0.00			25.51			26.09		
Approach LOS	A			A			D			D		
d_I, Intersection Delay [s/veh]	0.66											
Intersection LOS	E											

Intersection Level Of Service Report
Intersection 9: 231 and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	55.1
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.092

Intersection Setup

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Base Volume Input [veh/h]	67	740	2	1	988	12	7	0	48	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	67	740	2	1	988	12	7	0	48	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	185	1	0	247	3	2	0	12	0	0	0
Total Analysis Volume [veh/h]	67	740	2	1	988	12	7	0	48	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.01	0.00	0.00	0.01	0.00	0.09	0.00	0.09	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.80	0.00	0.00	9.19	0.00	0.00	55.13	63.79	14.71	46.87	61.46	10.75
Movement LOS	B	A	A	A	A	A	F	F	B	E	F	B
95th-Percentile Queue Length [veh/ln]	0.32	0.00	0.00	0.00	0.00	0.00	0.67	0.67	0.67	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	8.06	0.00	0.00	0.09	0.00	0.00	16.67	16.67	16.67	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.89			0.01			19.85			39.70		
Approach LOS	A			A			C			E		
d_I, Intersection Delay [s/veh]	0.98											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 14: Midland and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	10.4
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.020

Intersection Setup

Name	Midland Raod		Midland Road		Whiteside Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Raod		Midland Road		Whiteside Road	
Base Volume Input [veh/h]	66	12	54	71	14	64
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	66	12	54	71	14	64
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	3	14	18	4	16
Total Analysis Volume [veh/h]	66	12	54	71	14	64
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.04	0.00	0.02	0.06
d_M, Delay for Movement [s/veh]	0.00	0.00	7.43	0.00	10.43	8.99
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.09	0.09	0.28	0.28
95th-Percentile Queue Length [ft/ln]	0.00	0.00	2.32	2.32	6.89	6.89
d_A, Approach Delay [s/veh]	0.00		3.21		9.25	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	4.00					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 17: Midland and Eady

Control Type:	Two-way stop	Delay (sec / veh):	9.3
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.013

Intersection Setup

Name	Midland Road		Midland Road		Eady Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Road		Midland Road		Eady Road	
Base Volume Input [veh/h]	66	7	4	56	11	9
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	66	7	4	56	11	9
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	2	1	14	3	2
Total Analysis Volume [veh/h]	66	7	4	56	11	9
Pedestrian Volume [ped/h]	0		0		0	

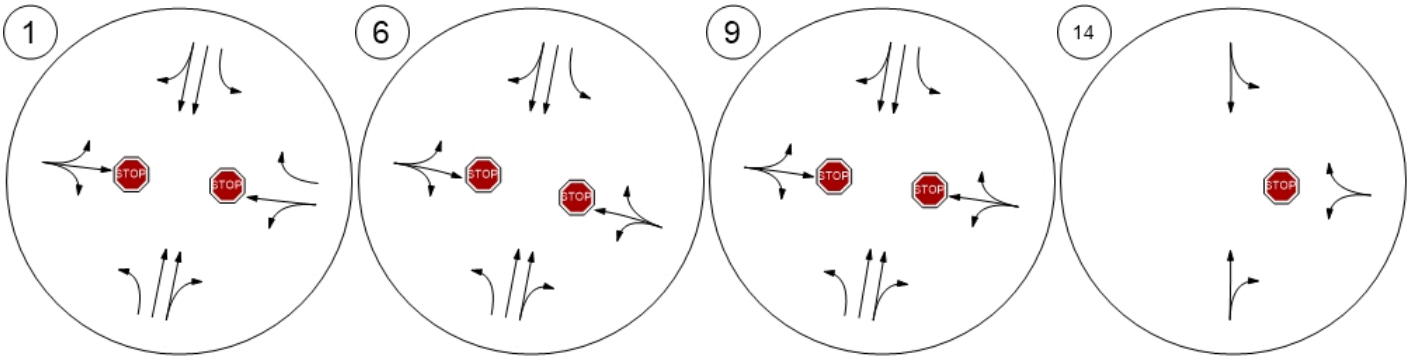
Intersection Settings

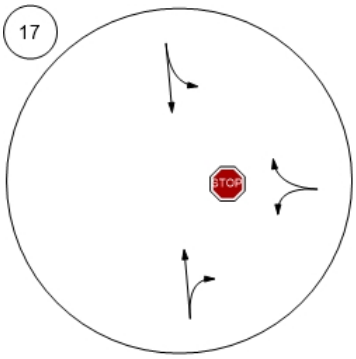
Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

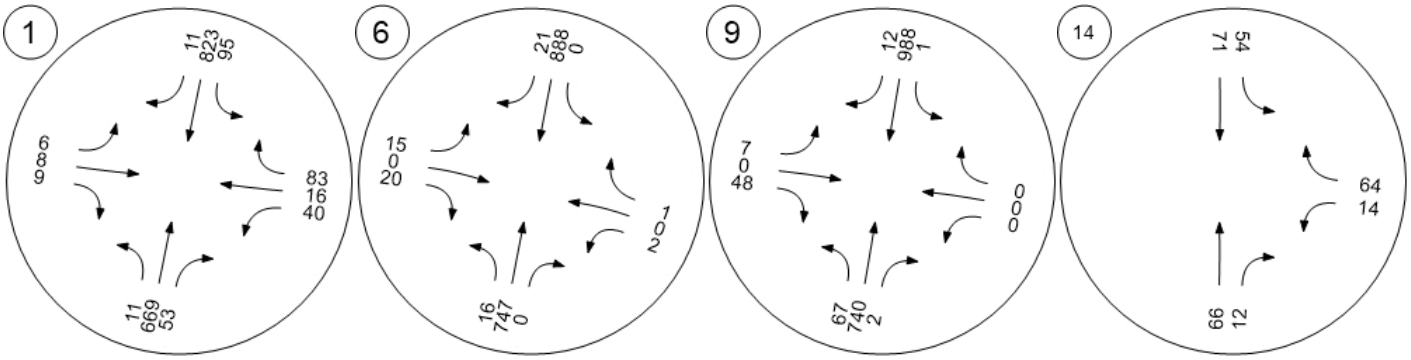
V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.01	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	7.36	0.00	9.28	8.71
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.01	0.01	0.07	0.07
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.17	0.17	1.68	1.68
d_A, Approach Delay [s/veh]	0.00		0.49		9.03	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.37					
Intersection LOS	A					

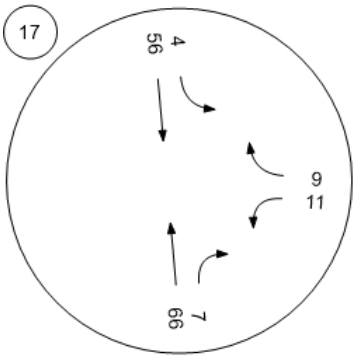
Lane Configuration and Traffic Control





Traffic Volume - Future Total Volume





Bedford County - TPG

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Report File: M:\...\3 - Existing Saturday.pdf

Scenario 3 Existing Saturday
2/8/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	231 and Eady	Two-way stop	HCM 7th Edition	WB Thru	0.067	59.9	F
6	231 and Frank Martin	Two-way stop	HCM 7th Edition	EB Left	0.159	30.4	D
9	231 and Whiteside	Two-way stop	HCM 7th Edition	WB Left	0.027	38.5	E
14	Midland and Whiteside	Two-way stop	HCM 7th Edition	WB Left	0.007	10.1	B
17	Midland and Eady	Two-way stop	HCM 7th Edition	WB Left	0.009	9.2	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: 231 and Eady

Control Type:	Two-way stop	Delay (sec / veh):	59.9
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.067

Intersection Setup

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	1
Entry Pocket Length [ft]	80.00	100.00	100.00	90.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	700.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Base Volume Input [veh/h]	15	694	53	50	594	8	6	8	13	56	8	70
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	15	694	53	50	594	8	6	8	13	56	8	70
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	174	13	13	149	2	2	2	3	14	2	18
Total Analysis Volume [veh/h]	15	694	53	50	594	8	6	8	13	56	8	70
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.01	0.00	0.06	0.01	0.00	0.04	0.07	0.02	0.43	0.07	0.11
d_M, Delay for Movement [s/veh]	8.76	0.00	0.00	9.46	0.00	0.00	34.68	38.67	12.86	57.58	59.93	11.50
Movement LOS	A	A	A	A	A	A	D	E	B	F	F	B
95th-Percentile Queue Length [veh/ln]	0.05	0.00	0.00	0.19	0.00	0.00	0.45	0.45	0.45	2.31	2.31	0.38
95th-Percentile Queue Length [ft/ln]	1.18	0.00	0.00	4.64	0.00	0.00	11.23	11.23	11.23	57.70	57.70	9.43
d_A, Approach Delay [s/veh]	0.17			0.73			25.36			33.65		
Approach LOS	A			A			D			D		
d_I, Intersection Delay [s/veh]	3.68											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 6: 231 and Frank Martin

Control Type:	Two-way stop	Delay (sec / veh):	30.4
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.159

Intersection Setup

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	200.00	100.00	100.00	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Base Volume Input [veh/h]	13	716	1	0	708	21	26	0	36	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	716	1	0	708	21	26	0	36	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	179	0	0	177	5	7	0	9	0	0	0
Total Analysis Volume [veh/h]	13	716	1	0	708	21	26	0	36	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.00	0.01	0.00	0.16	0.00	0.06	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.20	0.00	0.00	9.09	0.00	0.00	30.43	37.04	14.11	28.11	34.02	10.64
Movement LOS	A	A	A	A	A	A	D	E	B	D	D	B
95th-Percentile Queue Length [veh/ln]	0.05	0.00	0.00	0.00	0.00	0.00	0.80	0.80	0.80	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.14	0.00	0.00	0.00	0.00	0.00	20.08	20.08	20.08	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.16			0.00			20.96			24.26		
Approach LOS	A			A			C			C		
d_I, Intersection Delay [s/veh]	0.93											
Intersection LOS	D											

Intersection Level Of Service Report
Intersection 9: 231 and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	38.5
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.027

Intersection Setup

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Base Volume Input [veh/h]	44	828	0	2	718	8	6	0	35	3	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	44	828	0	2	718	8	6	0	35	3	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	11	207	0	1	180	2	2	0	9	1	0	0
Total Analysis Volume [veh/h]	44	828	0	2	718	8	6	0	35	3	0	1
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.01	0.00	0.00	0.01	0.00	0.05	0.00	0.06	0.03	0.00	0.00
d_M, Delay for Movement [s/veh]	9.34	0.00	0.00	9.52	0.00	0.00	34.40	44.43	11.71	38.47	44.39	11.91
Movement LOS	A	A	A	A	A	A	D	E	B	E	E	B
95th-Percentile Queue Length [veh/ln]	0.16	0.00	0.00	0.01	0.00	0.00	0.34	0.34	0.34	0.09	0.09	0.09
95th-Percentile Queue Length [ft/ln]	3.98	0.00	0.00	0.19	0.00	0.00	8.50	8.50	8.50	2.22	2.22	2.22
d_A, Approach Delay [s/veh]	0.47			0.03			15.03			31.83		
Approach LOS	A			A			C			D		
d_I, Intersection Delay [s/veh]	0.71											
Intersection LOS	E											

Intersection Level Of Service Report
Intersection 14: Midland and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	10.1
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.007

Intersection Setup

Name	Midland Raod		Midland Road		Whiteside Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Raod		Midland Road		Whiteside Road	
Base Volume Input [veh/h]	54	9	53	56	5	44
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	54	9	53	56	5	44
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	14	2	13	14	1	11
Total Analysis Volume [veh/h]	54	9	53	56	5	44
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.03	0.00	0.01	0.04
d_M, Delay for Movement [s/veh]	0.00	0.00	7.40	0.00	10.06	8.77
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.09	0.09	0.16	0.16
95th-Percentile Queue Length [ft/ln]	0.00	0.00	2.27	2.27	3.98	3.98
d_A, Approach Delay [s/veh]	0.00		3.60		8.90	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.75					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 17: Midland and Eady

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.009

Intersection Setup

Name	Midland Road		Midland Road		Eady Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Road		Midland Road		Eady Road	
Base Volume Input [veh/h]	67	8	3	47	8	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	67	8	3	47	8	8
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	2	1	12	2	2
Total Analysis Volume [veh/h]	67	8	3	47	8	8
Pedestrian Volume [ped/h]	0		0		0	

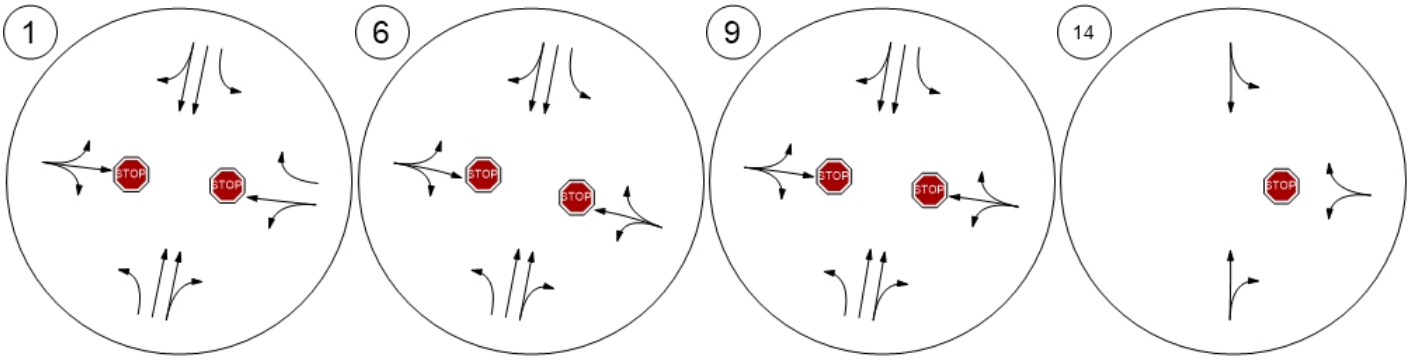
Intersection Settings

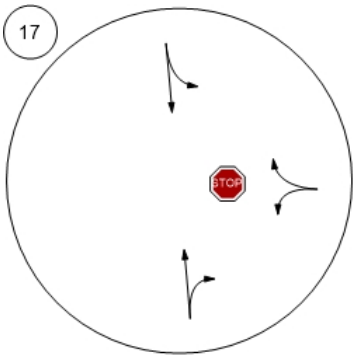
Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

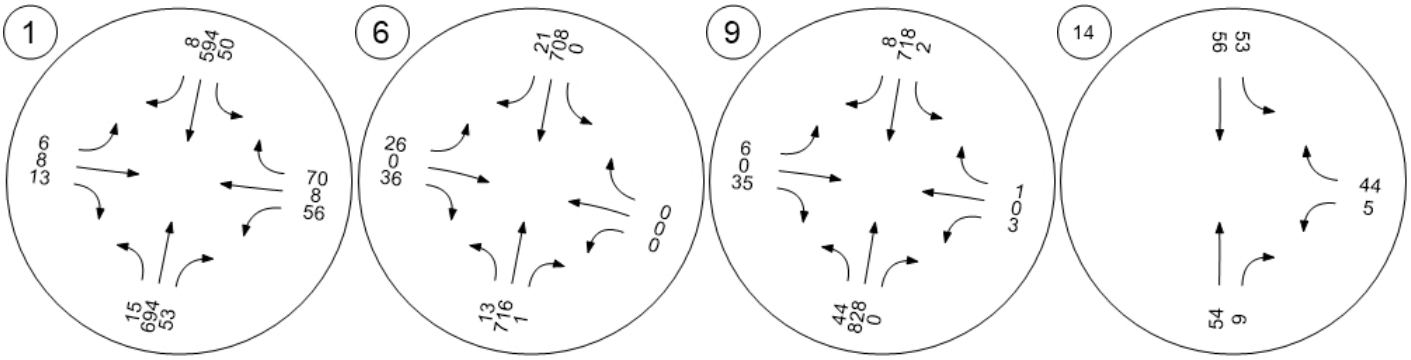
V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.01	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	7.37	0.00	9.21	8.70
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.01	0.01	0.05	0.05
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.13	0.13	1.32	1.32
d_A, Approach Delay [s/veh]	0.00		0.44		8.95	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.17					
Intersection LOS	A					

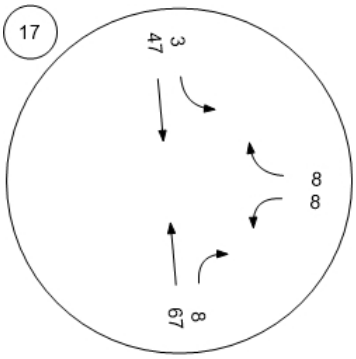
Lane Configuration and Traffic Control





Traffic Volume - Future Total Volume





Bedford County - TPG

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Report File: M:\...\4 - 2032 Background AM.pdf

Scenario 4 2032 Weekday AM
3/22/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	231 and Eady	Signalized	HCM 7th Edition	EB Thru	0.521	21.6	C
6	231 and Frank Martin	Two-way stop	HCM 7th Edition	EB Left	0.649	169.5	F
9	231 and Whiteside	Two-way stop	HCM 7th Edition	EB Left	0.885	211.1	F
14	Midland and Whiteside	Two-way stop	HCM 7th Edition	WB Left	0.029	10.9	B
17	Midland and Eady	Two-way stop	HCM 7th Edition	WB Left	0.014	10.1	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: 231 and Eady

Control Type:	Signalized	Delay (sec / veh):	21.6
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.521

Intersection Setup

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	1
Entry Pocket Length [ft]	80.00	100.00	100.00	90.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	700.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Base Volume Input [veh/h]	14	608	58	115	676	3	2	24	3	82	8	78
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	33	147	59	7	197	13	15	7	27	89	10	10
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	49	853	126	140	981	16	17	35	30	184	19	101
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	12	213	32	35	245	4	4	9	8	46	5	25
Total Analysis Volume [veh/h]	49	853	126	140	981	16	17	35	30	184	19	101
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	100
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	10	0
Maximum Green [s]	30	30	0	30	30	0	0	30	0	10	30	0
Amber [s]	4.0	4.0	0.0	4.0	4.0	0.0	0.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0
Split [s]	11	46	0	11	46	0	0	26	0	17	43	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	4.0	4.0	0.0	4.0	4.0	0.0	0.0	4.0	0.0	4.0	4.0	0.0
Minimum Recall	No	No		No	No			No		Yes	No	
Maximum Recall	No	Yes		No	Yes			No		No	No	
Pedestrian Recall	No	No		No	No			No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	L	C
C, Cycle Length [s]	100	100	100	100	100	100	100	100	100
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	4.00	4.00	0.00	4.00	4.00	4.00	0.00	4.00
g_i, Effective Green Time [s]	61	50	50	61	52	52	10	27	27
g / C, Green / Cycle	0.61	0.50	0.50	0.61	0.52	0.52	0.10	0.27	0.27
(v / s)_i Volume / Saturation Flow Rate	0.08	0.30	0.30	0.21	0.30	0.30	0.08	0.13	0.08
s, saturation flow rate [veh/h]	647	1683	1608	676	1683	1673	1016	1396	1465
c, Capacity [veh/h]	384	848	811	399	869	864	142	426	390
d1, Uniform Delay [s]	10.65	17.50	17.51	11.88	16.66	16.66	43.91	30.44	29.34
k, delay calibration	0.50	0.50	0.50	0.19	0.50	0.50	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.69	3.01	3.14	0.94	2.77	2.79	3.70	0.69	0.44
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.13	0.59	0.59	0.35	0.58	0.58	0.58	0.43	0.31
d, Delay for Lane Group [s/veh]	11.34	20.51	20.65	12.82	19.43	19.44	47.61	31.13	29.79
Lane Group LOS	B	C	C	B	B	B	D	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	0.42	7.81	7.50	1.16	7.51	7.47	2.15	3.49	2.19
50th-Percentile Queue Length [ft/ln]	10.56	195.29	187.43	29.12	187.79	186.87	53.69	87.19	54.74
95th-Percentile Queue Length [veh/ln]	0.76	12.40	11.99	2.10	12.01	11.96	3.87	6.28	3.94
95th-Percentile Queue Length [ft/ln]	19.01	309.88	299.69	52.42	300.17	298.97	96.65	156.94	98.52

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	11.34	20.57	20.65	12.82	19.44	19.44	47.61	47.61	47.61	31.13	29.79	29.79
Movement LOS	B	C	C	B	B	B	D	D	D	C	C	C
d_A, Approach Delay [s/veh]	20.14			18.62			47.61			30.60		
Approach LOS	C			B			D			C		
d_I, Intersection Delay [s/veh]	21.59											
Intersection LOS	C											
Intersection V/C	0.521											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	800	800	400	740
d_b, Bicycle Delay [s]	18.00	18.00	32.00	19.85
l_b,int, Bicycle LOS Score for Intersection	2.408	2.498	1.695	2.061
Bicycle LOS	B	B	A	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 6: 231 and Frank Martin

Control Type:	Two-way stop	Delay (sec / veh):	169.5
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.649

Intersection Setup

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	200.00	100.00	100.00	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Base Volume Input [veh/h]	38	676	3	0	768	32	21	0	11	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	22	266	0	0	258	24	3	0	6	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	66	1050	3	0	1149	61	27	0	19	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	263	1	0	287	15	7	0	5	0	0	0
Total Analysis Volume [veh/h]	66	1050	3	0	1149	61	27	0	19	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.01	0.00	0.00	0.01	0.00	0.65	0.00	0.04	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	12.11	0.00	0.00	10.48	0.00	0.00	169.46	200.19	91.09	83.87	127.41	12.26
Movement LOS	B	A	A	B	A	A	F	F	F	F	F	B
95th-Percentile Queue Length [veh/ln]	0.39	0.00	0.00	0.00	0.00	0.00	3.07	3.07	3.07	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	9.72	0.00	0.00	0.00	0.00	0.00	76.67	76.67	76.67	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.71			0.00			137.09			74.51		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	2.99											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 9: 231 and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	211.1
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.885

Intersection Setup

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Base Volume Input [veh/h]	25	854	0	0	757	7	11	0	50	1	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	283	0	0	220	14	29	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	29	1274	0	0	1098	22	42	0	58	1	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	319	0	0	275	6	11	0	15	0	0	0
Total Analysis Volume [veh/h]	29	1274	0	0	1098	22	42	0	58	1	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.01	0.00	0.00	0.01	0.00	0.89	0.00	0.12	0.03	0.00	0.00
d_M, Delay for Movement [s/veh]	11.10	0.00	0.00	11.66	0.00	0.00	211.12	257.13	142.86	106.75	131.69	16.35
Movement LOS	B	A	A	B	A	A	F	F	F	F	F	C
95th-Percentile Queue Length [veh/ln]	0.15	0.00	0.00	0.00	0.00	0.00	6.18	6.18	6.18	0.08	0.08	0.08
95th-Percentile Queue Length [ft/ln]	3.68	0.00	0.00	0.00	0.00	0.00	154.39	154.39	154.39	2.08	2.08	2.08
d_A, Approach Delay [s/veh]	0.25			0.00			171.53			106.75		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	6.97											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 14: Midland and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	10.9
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.029

Intersection Setup

Name	Midland Raod		Midland Road		Whiteside Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Raod		Midland Road		Whiteside Road	
Base Volume Input [veh/h]	42	7	54	66	4	40
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	24	29	0	22	14	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	73	37	63	99	19	46
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	9	16	25	5	12
Total Analysis Volume [veh/h]	73	37	63	99	19	46
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.04	0.00	0.03	0.05
d_M, Delay for Movement [s/veh]	0.00	0.00	7.50	0.00	10.93	9.08
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.11	0.11	0.25	0.25
95th-Percentile Queue Length [ft/ln]	0.00	0.00	2.72	2.72	6.24	6.24
d_A, Approach Delay [s/veh]	0.00		2.92		9.62	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.26					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 17: Midland and Eady

Control Type:	Two-way stop	Delay (sec / veh):	10.1
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.014

Intersection Setup

Name	Midland Road		Midland Road		Eady Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Road		Midland Road		Eady Road	
Base Volume Input [veh/h]	62	13	8	68	7	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	18	4	14	23	2	7
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	90	19	23	102	10	12
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	23	5	6	26	3	3
Total Analysis Volume [veh/h]	90	19	23	102	10	12
Pedestrian Volume [ped/h]	0		0		0	

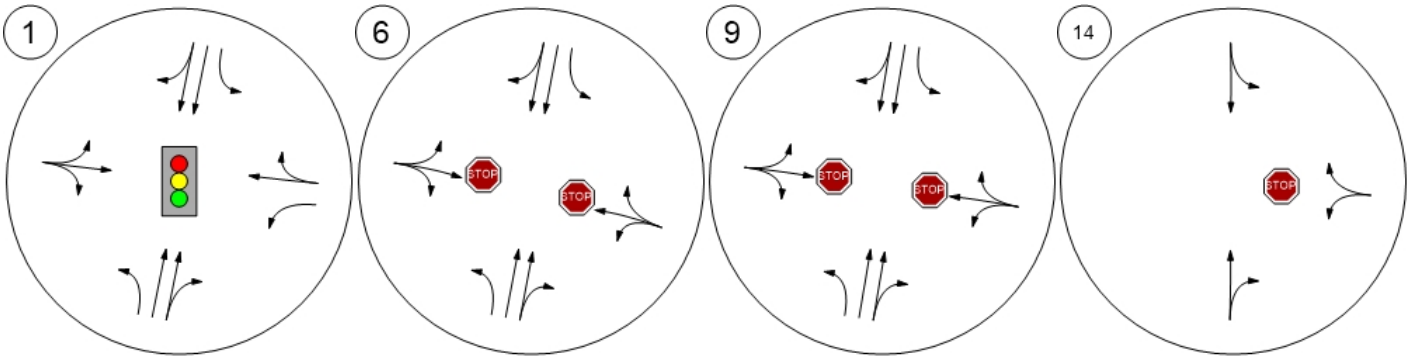
Intersection Settings

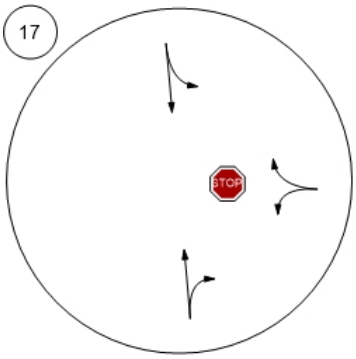
Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

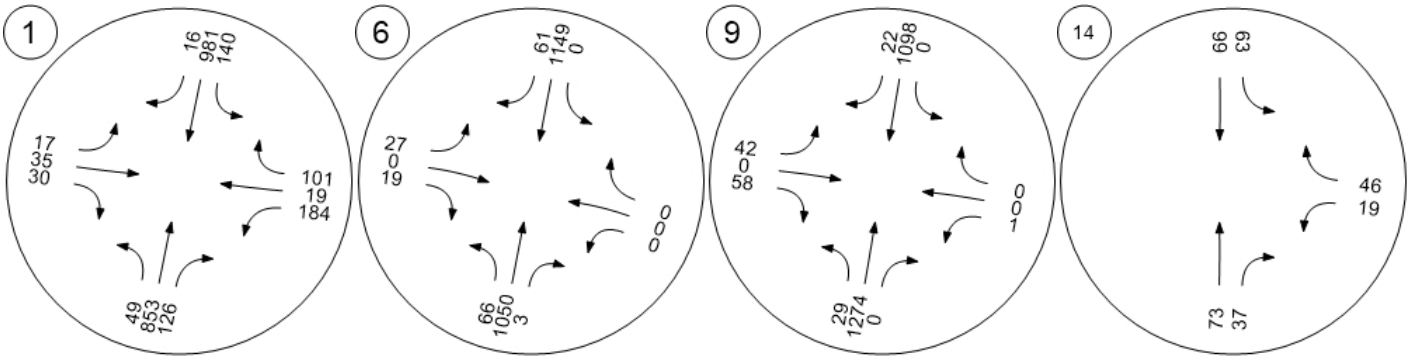
V/C, Movement V/C Ratio	0.00	0.00	0.02	0.00	0.01	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	7.46	0.00	10.06	8.88
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.04	0.04	0.08	0.08
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.97	0.97	2.02	2.02
d_A, Approach Delay [s/veh]	0.00		1.37		9.42	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.48					
Intersection LOS	B					

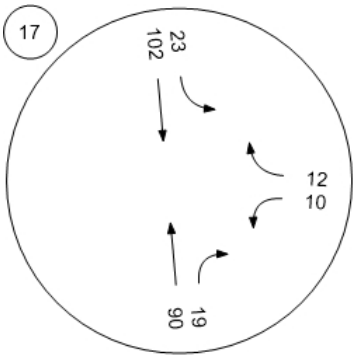
Lane Configuration and Traffic Control





Traffic Volume - Future Total Volume





Bedford County - TPG

Vistro File: M:\...\Bedford County TPG.vistro
Report File: M:\...\5 - 2032 Background PM.pdf

Scenario 5 2032 Weekday PM
3/22/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	231 and Eady	Signalized	HCM 7th Edition	EB Right	0.489	19.9	B
6	231 and Frank Martin	Two-way stop	HCM 7th Edition	EB Left	0.762	171.4	F
9	231 and Whiteside	Two-way stop	HCM 7th Edition	EB Left	1.050	333.2	F
14	Midland and Whiteside	Two-way stop	HCM 7th Edition	WB Left	0.060	11.4	B
17	Midland and Eady	Two-way stop	HCM 7th Edition	WB Left	0.022	9.8	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: 231 and Eady

Control Type:	Signalized	Delay (sec / veh):	19.9
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.489

Intersection Setup

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	1
Entry Pocket Length [ft]	80.00	100.00	100.00	90.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	700.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Base Volume Input [veh/h]	11	669	53	95	823	11	6	8	9	40	16	83
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	30	110	41	9	103	14	19	9	36	37	9	9
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	43	886	103	119	1058	27	26	18	46	83	28	105
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	11	222	26	30	265	7	7	5	12	21	7	26
Total Analysis Volume [veh/h]	43	886	103	119	1058	27	26	18	46	83	28	105
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	100
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	10	0
Maximum Green [s]	30	30	0	30	30	0	0	30	0	10	30	0
Amber [s]	4.0	4.0	0.0	4.0	4.0	0.0	0.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0
Split [s]	11	54	0	14	57	0	0	17	0	15	32	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	4.0	4.0	0.0	4.0	4.0	0.0	0.0	4.0	0.0	4.0	4.0	0.0
Minimum Recall	No	No		No	No			No		Yes	No	
Maximum Recall	No	Yes		No	Yes			No		No	No	
Pedestrian Recall	No	No		No	No			No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	L	C
C, Cycle Length [s]	100	100	100	100	100	100	100	100	100
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	4.00	4.00	0.00	4.00	4.00	4.00	0.00	4.00
g_i, Effective Green Time [s]	64	53	53	64	55	55	12	24	24
g / C, Green / Cycle	0.64	0.53	0.53	0.64	0.55	0.55	0.12	0.24	0.24
(v / s)_i Volume / Saturation Flow Rate	0.07	0.30	0.30	0.18	0.32	0.32	0.11	0.08	0.09
s, saturation flow rate [veh/h]	601	1683	1622	663	1683	1668	828	1035	1477
c, Capacity [veh/h]	385	893	861	424	916	908	149	277	355
d1, Uniform Delay [s]	9.34	15.70	15.70	9.71	15.34	15.34	42.07	30.42	31.70
k, delay calibration	0.50	0.50	0.50	0.13	0.50	0.50	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.59	2.57	2.66	0.43	2.84	2.86	3.87	0.60	0.65
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.11	0.56	0.56	0.28	0.59	0.59	0.60	0.30	0.37
d, Delay for Lane Group [s/veh]	9.93	18.27	18.37	10.14	18.18	18.21	45.95	31.02	32.36
Lane Group LOS	A	B	B	B	B	B	D	C	C
Critical Lane Group	Yes	No	No	No	No	Yes	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	0.34	7.26	7.02	0.85	7.84	7.78	2.36	1.54	2.56
50th-Percentile Queue Length [ft/ln]	8.41	181.40	175.45	21.18	196.00	194.59	58.97	38.57	64.09
95th-Percentile Queue Length [veh/ln]	0.61	11.67	11.36	1.53	12.43	12.36	4.25	2.78	4.61
95th-Percentile Queue Length [ft/ln]	15.15	291.84	284.07	38.13	310.80	308.98	106.15	69.43	115.36

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	9.93	18.31	18.37	10.14	18.19	18.21	45.95	45.95	45.95	31.02	32.36	32.36
Movement LOS	A	B	B	B	B	B	D	D	D	C	C	C
d_A, Approach Delay [s/veh]	17.97			17.40			45.95			31.84		
Approach LOS	B			B			D			C		
d_I, Intersection Delay [s/veh]	19.87											
Intersection LOS	B											
Intersection V/C	0.489											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	960	1020	220	520
d_b, Bicycle Delay [s]	13.52	12.01	39.61	27.38
l_b,int, Bicycle LOS Score for Intersection	2.411	2.553	1.708	1.916
Bicycle LOS	B	B	A	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 6: 231 and Frank Martin

Control Type:	Two-way stop	Delay (sec / veh):	171.4
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.762

Intersection Setup

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	200.00	100.00	100.00	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Base Volume Input [veh/h]	16	747	0	0	888	21	15	0	20	2	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	5	167	0	0	167	3	21	0	20	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	24	1034	0	0	1198	27	38	0	43	2	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	259	0	0	300	7	10	0	11	1	0	0
Total Analysis Volume [veh/h]	24	1034	0	0	1198	27	38	0	43	2	0	1
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.01	0.00	0.00	0.01	0.00	0.76	0.00	0.10	0.04	0.00	0.00
d_M, Delay for Movement [s/veh]	11.66	0.00	0.00	10.39	0.00	0.00	171.39	196.79	107.50	74.63	106.47	14.10
Movement LOS	B	A	A	B	A	A	F	F	F	F	F	B
95th-Percentile Queue Length [veh/ln]	0.13	0.00	0.00	0.00	0.00	0.00	4.75	4.75	4.75	0.12	0.12	0.12
95th-Percentile Queue Length [ft/ln]	3.32	0.00	0.00	0.00	0.00	0.00	118.76	118.76	118.76	3.05	3.05	3.05
d_A, Approach Delay [s/veh]	0.26			0.00			137.47			54.46		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	4.89											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 9: 231 and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	333.2
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.050

Intersection Setup

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Base Volume Input [veh/h]	67	740	2	1	988	12	7	0	48	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	150	0	0	161	22	24	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	78	1009	2	1	1308	36	32	0	56	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	20	252	1	0	327	9	8	0	14	0	0	0
Total Analysis Volume [veh/h]	78	1009	2	1	1308	36	32	0	56	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.15	0.01	0.00	0.00	0.01	0.00	1.05	0.00	0.14	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.36	0.00	0.00	10.29	0.00	0.00	333.24	364.04	224.14	107.74	157.76	12.03
Movement LOS	B	A	A	B	A	A	F	F	F	F	F	B
95th-Percentile Queue Length [veh/ln]	0.54	0.00	0.00	0.00	0.00	0.00	6.69	6.69	6.69	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	13.45	0.00	0.00	0.11	0.00	0.00	167.32	167.32	167.32	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.96			0.01			263.81			92.51		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	9.62											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 14: Midland and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	11.4
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.060

Intersection Setup

Name	Midland Raod		Midland Road		Whiteside Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Raod		Midland Road		Whiteside Road	
Base Volume Input [veh/h]	66	12	54	71	14	64
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	9	24	0	14	22	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	86	38	63	96	38	74
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	10	16	24	10	19
Total Analysis Volume [veh/h]	86	38	63	96	38	74
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.04	0.00	0.06	0.08
d_M, Delay for Movement [s/veh]	0.00	0.00	7.53	0.00	11.36	9.50
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.11	0.11	0.48	0.48
95th-Percentile Queue Length [ft/ln]	0.00	0.00	2.72	2.72	11.90	11.90
d_A, Approach Delay [s/veh]	0.00		2.98		10.13	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	4.07					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 17: Midland and Eady

Control Type:	Two-way stop	Delay (sec / veh):	9.8
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.022

Intersection Setup

Name	Midland Road		Midland Road		Eady Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Road		Midland Road		Eady Road	
Base Volume Input [veh/h]	66	7	4	56	11	9
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	8	3	13	7	4	10
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	85	11	18	72	17	20
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	3	5	18	4	5
Total Analysis Volume [veh/h]	85	11	18	72	17	20
Pedestrian Volume [ped/h]	0		0		0	

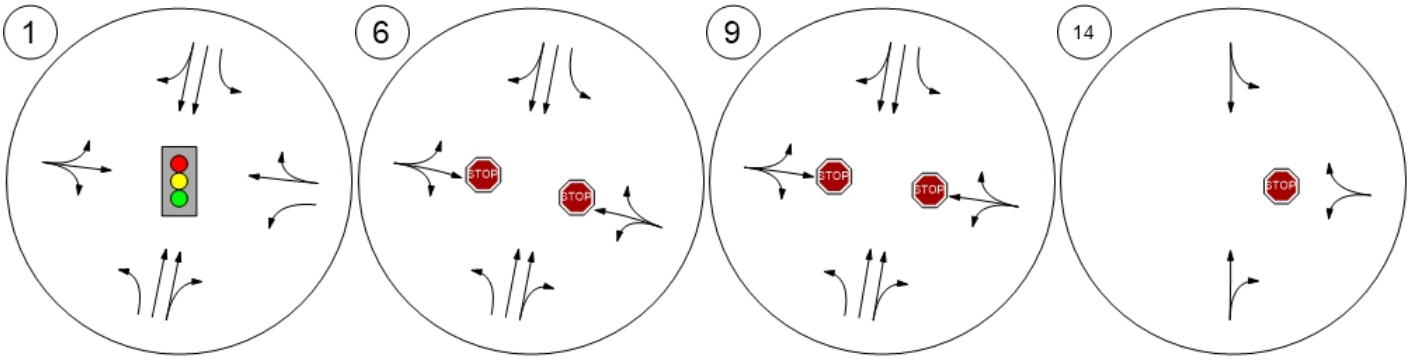
Intersection Settings

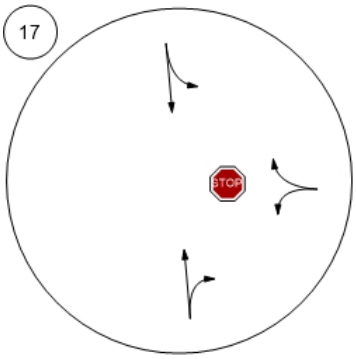
Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

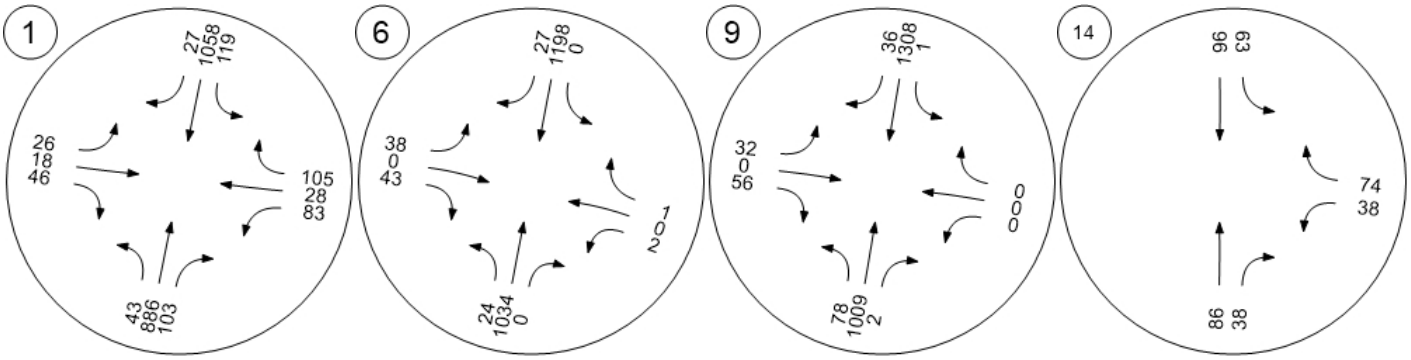
V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.02	0.02
d_M, Delay for Movement [s/veh]	0.00	0.00	7.42	0.00	9.80	8.91
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.03	0.03	0.13	0.13
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.76	0.76	3.32	3.32
d_A, Approach Delay [s/veh]	0.00		1.48		9.32	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.14					
Intersection LOS	A					

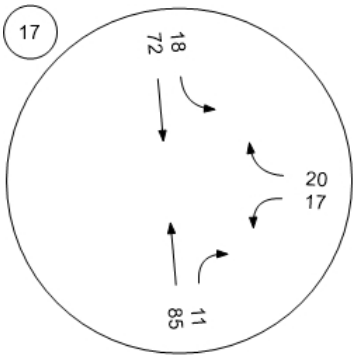
Lane Configuration and Traffic Control





Traffic Volume - Future Total Volume





Bedford County - TPG

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Report File: M:\...\6 - 2032 Saturday.pdf

Scenario 6 2032 Saturday
3/22/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	231 and Eady	Signalized	HCM 7th Edition	EB Right	0.464	18.9	B
6	231 and Frank Martin	Two-way stop	HCM 7th Edition	EB Left	0.442	77.9	F
9	231 and Whiteside	Two-way stop	HCM 7th Edition	EB Left	0.438	87.1	F
14	Midland and Whiteside	Two-way stop	HCM 7th Edition	WB Left	0.036	10.8	B
17	Midland and Eady	Two-way stop	HCM 7th Edition	WB Left	0.016	9.6	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: 231 and Eady

Control Type:	Signalized	Delay (sec / veh):	18.9
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.464

Intersection Setup

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	1
Entry Pocket Length [ft]	80.00	100.00	100.00	90.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	700.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Base Volume Input [veh/h]	15	694	53	50	594	8	6	8	13	56	8	70
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	29	72	23	9	99	14	19	9	32	35	9	9
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	46	877	85	67	788	23	26	18	47	100	18	90
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	12	219	21	17	197	6	7	5	12	25	5	23
Total Analysis Volume [veh/h]	46	877	85	67	788	23	26	18	47	100	18	90
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	100
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	10	0
Maximum Green [s]	30	30	0	30	30	0	0	30	0	30	30	0
Amber [s]	4.0	4.0	0.0	4.0	4.0	0.0	0.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0
Split [s]	11	54	0	11	54	0	0	21	0	14	35	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	4.0	4.0	0.0	4.0	4.0	0.0	0.0	4.0	0.0	4.0	4.0	0.0
Minimum Recall	No	No		No	No			No		No	No	
Maximum Recall	No	Yes		No	Yes			No		No	No	
Pedestrian Recall	No	No		No	No			Yes		No	Yes	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	L	C
C, Cycle Length [s]	100	100	100	100	100	100	100	100	100
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	4.00	4.00	0.00	4.00	4.00	4.00	0.00	4.00
g_i, Effective Green Time [s]	64	54	54	64	54	54	12	24	24
g / C, Green / Cycle	0.64	0.54	0.54	0.64	0.54	0.54	0.12	0.24	0.24
(v / s)_i Volume / Saturation Flow Rate	0.06	0.29	0.29	0.10	0.24	0.24	0.10	0.09	0.07
s, saturation flow rate [veh/h]	724	1683	1631	664	1683	1666	903	1092	1467
c, Capacity [veh/h]	478	901	874	429	911	902	151	295	355
d1, Uniform Delay [s]	7.90	15.20	15.20	8.88	13.86	13.87	43.04	30.62	30.99
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.40	2.34	2.41	0.17	1.59	1.60	3.83	0.67	0.48
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.10	0.54	0.54	0.16	0.45	0.45	0.60	0.34	0.30
d, Delay for Lane Group [s/veh]	8.30	17.54	17.61	9.05	15.45	15.47	46.88	31.29	31.47
Lane Group LOS	A	B	B	A	B	B	D	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	0.35	6.85	6.66	0.46	5.21	5.16	2.38	1.87	2.03
50th-Percentile Queue Length [ft/ln]	8.75	171.32	166.51	11.45	130.17	128.99	59.52	46.79	50.82
95th-Percentile Queue Length [veh/ln]	0.63	11.15	10.89	0.82	8.95	8.88	4.29	3.37	3.66
95th-Percentile Queue Length [ft/ln]	15.75	278.65	272.33	20.62	223.72	222.12	107.13	84.22	91.47

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	8.30	17.57	17.61	9.05	15.46	15.47	46.88	46.88	46.88	31.29	31.47	31.47
Movement LOS	A	B	B	A	B	B	D	D	D	C	C	C
d_A, Approach Delay [s/veh]	17.15			14.97			46.88			31.38		
Approach LOS	B			B			D			C		
d_I, Intersection Delay [s/veh]	18.87											
Intersection LOS	B											
Intersection V/C	0.464											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	960	960	300	580
d_b, Bicycle Delay [s]	13.52	13.52	36.13	25.21
l_b,int, Bicycle LOS Score for Intersection	2.391	2.284	1.710	1.903
Bicycle LOS	B	B	A	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 6: 231 and Frank Martin

Control Type:	Two-way stop	Delay (sec / veh):	77.9
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.442

Intersection Setup

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	200.00	100.00	100.00	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Base Volume Input [veh/h]	13	716	1	0	708	21	26	0	36	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	23	124	0	0	138	24	3	0	5	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	38	955	1	0	960	48	33	0	47	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	239	0	0	240	12	8	0	12	0	0	0
Total Analysis Volume [veh/h]	38	955	1	0	960	48	33	0	47	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.01	0.00	0.00	0.01	0.00	0.44	0.00	0.09	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.58	0.00	0.00	10.04	0.00	0.00	77.91	95.55	36.66	55.80	73.19	11.75
Movement LOS	B	A	A	B	A	A	F	F	E	F	F	B
95th-Percentile Queue Length [veh/ln]	0.18	0.00	0.00	0.00	0.00	0.00	2.64	2.64	2.64	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	4.41	0.00	0.00	0.00	0.00	0.00	65.99	65.99	65.99	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.40			0.00			53.67			46.91		
Approach LOS	A			A			F			E		
d_I, Intersection Delay [s/veh]	2.26											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 9: 231 and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	87.1
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.438

Intersection Setup

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Base Volume Input [veh/h]	44	828	0	2	718	8	6	0	35	3	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	134	0	0	114	18	21	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	51	1095	0	2	947	27	28	0	41	3	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	274	0	1	237	7	7	0	10	1	0	0
Total Analysis Volume [veh/h]	51	1095	0	2	947	27	28	0	41	3	0	1
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.01	0.00	0.00	0.01	0.00	0.44	0.00	0.08	0.06	0.00	0.00
d_M, Delay for Movement [s/veh]	10.51	0.00	0.00	10.70	0.00	0.00	87.10	113.94	37.56	76.00	93.13	15.74
Movement LOS	B	A	A	B	A	A	F	F	E	F	F	C
95th-Percentile Queue Length [veh/ln]	0.23	0.00	0.00	0.01	0.00	0.00	2.46	2.46	2.46	0.18	0.18	0.18
95th-Percentile Queue Length [ft/ln]	5.84	0.00	0.00	0.24	0.00	0.00	61.40	61.40	61.40	4.56	4.56	4.56
d_A, Approach Delay [s/veh]	0.47			0.02			57.66			60.93		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	2.18											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 14: Midland and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	10.8
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.036

Intersection Setup

Name	Midland Raod		Midland Road		Whiteside Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Raod		Midland Road		Whiteside Road	
Base Volume Input [veh/h]	54	9	53	56	5	44
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	12	21	0	10	18	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	75	31	62	75	24	51
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	8	16	19	6	13
Total Analysis Volume [veh/h]	75	31	62	75	24	51
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.04	0.00	0.04	0.05
d_M, Delay for Movement [s/veh]	0.00	0.00	7.50	0.00	10.78	9.13
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.11	0.11	0.29	0.29
95th-Percentile Queue Length [ft/ln]	0.00	0.00	2.67	2.67	7.26	7.26
d_A, Approach Delay [s/veh]	0.00		3.39		9.66	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.74					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 17: Midland and Eady

Control Type:	Two-way stop	Delay (sec / veh):	9.6
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.016

Intersection Setup

Name	Midland Road		Midland Road		Eady Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Road		Midland Road		Eady Road	
Base Volume Input [veh/h]	67	8	3	47	8	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	4	3	9	8	4	9
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	82	12	12	63	13	18
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	3	3	16	3	5
Total Analysis Volume [veh/h]	82	12	12	63	13	18
Pedestrian Volume [ped/h]	0		0		0	

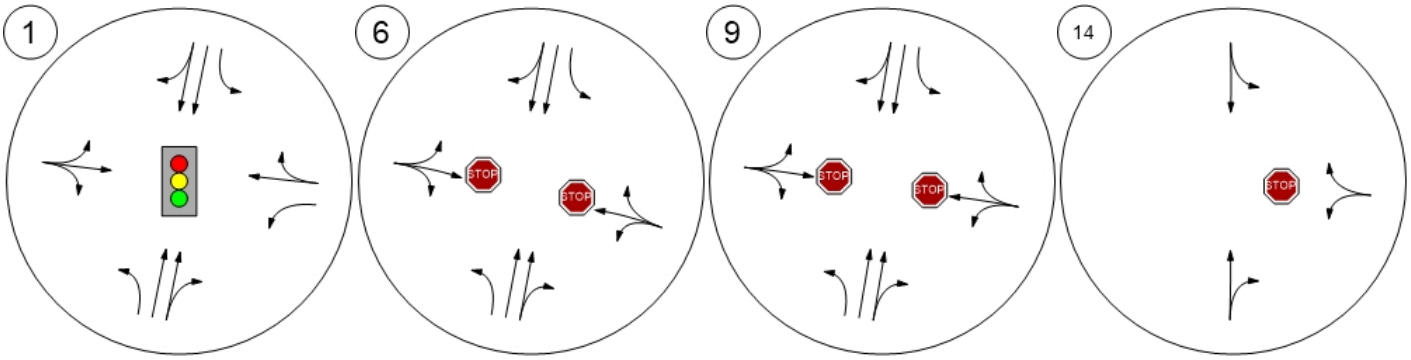
Intersection Settings

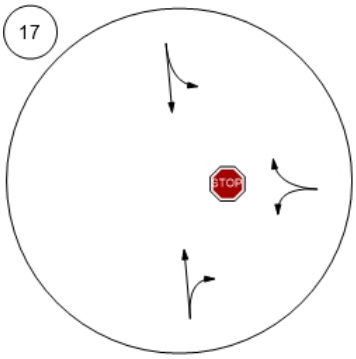
Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

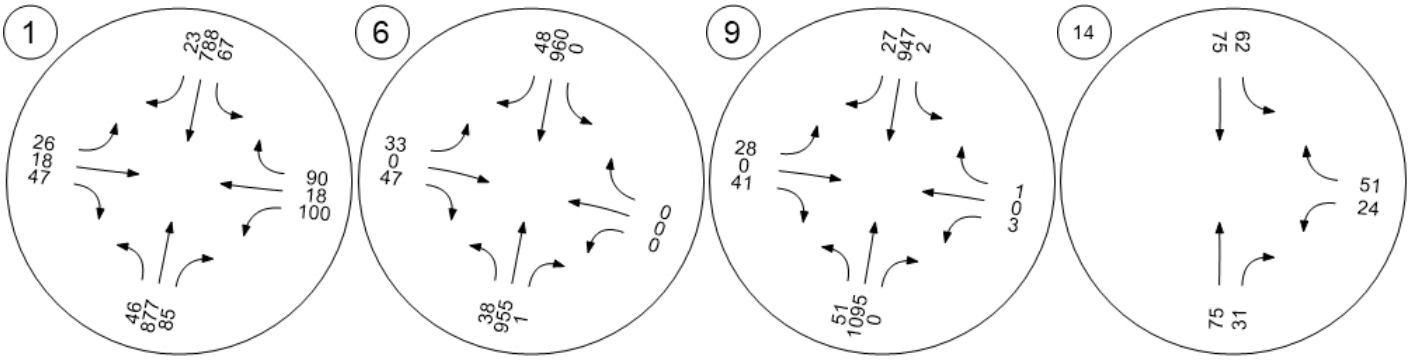
V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.02	0.02
d_M, Delay for Movement [s/veh]	0.00	0.00	7.41	0.00	9.60	8.85
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.02	0.02	0.11	0.11
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.50	0.50	2.69	2.69
d_A, Approach Delay [s/veh]	0.00		1.19		9.17	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.87					
Intersection LOS	A					

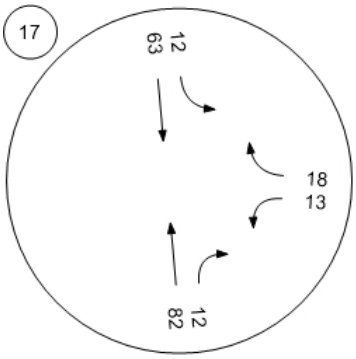
Lane Configuration and Traffic Control





Traffic Volume - Future Total Volume





Bedford County - TPG

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Report File: M:\...\7 - Improved AM.pdf

Scenario 7 Improved AM
3/22/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	231 and Eady	Signalized	HCM 7th Edition	EB Thru	0.521	21.6	C
6	231 and Frank Martin	Two-way stop	HCM 7th Edition	EB Left	0.649	190.1	F
9	231 and Whiteside	Two-way stop	HCM 7th Edition	EB Left	0.885	230.9	F
14	Midland and Whiteside	Two-way stop	HCM 7th Edition	WB Left	0.029	10.9	B
17	Midland and Eady	Two-way stop	HCM 7th Edition	WB Left	0.014	10.1	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: 231 and Eady

Control Type:	Signalized	Delay (sec / veh):	21.6
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.521

Intersection Setup

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	1
Entry Pocket Length [ft]	80.00	100.00	100.00	90.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	700.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Base Volume Input [veh/h]	14	608	58	115	676	3	2	24	3	82	8	78
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	33	147	59	7	197	13	15	7	27	89	10	10
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	49	853	126	140	981	16	17	35	30	184	19	101
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	12	213	32	35	245	4	4	9	8	46	5	25
Total Analysis Volume [veh/h]	49	853	126	140	981	16	17	35	30	184	19	101
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	100
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	10	0
Maximum Green [s]	30	30	0	30	30	0	0	30	0	10	30	0
Amber [s]	4.0	4.0	0.0	4.0	4.0	0.0	0.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0
Split [s]	11	46	0	11	46	0	0	26	0	17	43	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	4.0	4.0	0.0	4.0	4.0	0.0	0.0	4.0	0.0	4.0	4.0	0.0
Minimum Recall	No	No		No	No			No		Yes	No	
Maximum Recall	No	Yes		No	Yes			No		No	No	
Pedestrian Recall	No	No		No	No			No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	L	C
C, Cycle Length [s]	100	100	100	100	100	100	100	100	100
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	4.00	4.00	0.00	4.00	4.00	4.00	0.00	4.00
g_i, Effective Green Time [s]	61	50	50	61	52	52	10	27	27
g / C, Green / Cycle	0.61	0.50	0.50	0.61	0.52	0.52	0.10	0.27	0.27
(v / s)_i Volume / Saturation Flow Rate	0.08	0.30	0.30	0.21	0.30	0.30	0.08	0.13	0.08
s, saturation flow rate [veh/h]	647	1683	1608	676	1683	1673	1016	1396	1465
c, Capacity [veh/h]	384	848	811	399	869	864	142	426	390
d1, Uniform Delay [s]	10.65	17.50	17.51	11.88	16.66	16.66	43.91	30.44	29.34
k, delay calibration	0.50	0.50	0.50	0.19	0.50	0.50	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.69	3.01	3.14	0.94	2.77	2.79	3.70	0.69	0.44
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.13	0.59	0.59	0.35	0.58	0.58	0.58	0.43	0.31
d, Delay for Lane Group [s/veh]	11.34	20.51	20.65	12.82	19.43	19.44	47.61	31.13	29.79
Lane Group LOS	B	C	C	B	B	B	D	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	0.42	7.81	7.50	1.16	7.51	7.47	2.15	3.49	2.19
50th-Percentile Queue Length [ft/ln]	10.56	195.29	187.43	29.12	187.79	186.87	53.69	87.19	54.74
95th-Percentile Queue Length [veh/ln]	0.76	12.40	11.99	2.10	12.01	11.96	3.87	6.28	3.94
95th-Percentile Queue Length [ft/ln]	19.01	309.88	299.69	52.42	300.17	298.97	96.65	156.94	98.52

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	11.34	20.57	20.65	12.82	19.44	19.44	47.61	47.61	47.61	31.13	29.79	29.79
Movement LOS	B	C	C	B	B	B	D	D	D	C	C	C
d_A, Approach Delay [s/veh]	20.14			18.62			47.61			30.60		
Approach LOS	C			B			D			C		
d_I, Intersection Delay [s/veh]	21.59											
Intersection LOS	C											
Intersection V/C	0.521											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	800	800	400	740
d_b, Bicycle Delay [s]	18.00	18.00	32.00	19.85
l_b,int, Bicycle LOS Score for Intersection	2.408	2.498	1.695	2.061
Bicycle LOS	B	B	A	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 6: 231 and Frank Martin

Control Type:	Two-way stop	Delay (sec / veh):	190.1
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.649

Intersection Setup

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Entry Pocket Length [ft]	200.00	100.00	100.00	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Base Volume Input [veh/h]	38	676	3	0	768	32	21	0	11	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	22	266	0	0	258	24	3	0	6	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	66	1050	3	0	1149	61	27	0	19	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	263	1	0	287	15	7	0	5	0	0	0
Total Analysis Volume [veh/h]	66	1050	3	0	1149	61	27	0	19	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.01	0.00	0.00	0.01	0.00	0.65	0.00	0.04	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	12.11	0.00	0.00	10.48	0.00	0.00	190.06	220.79	13.54	83.87	127.41	12.26
Movement LOS	B	A	A	B	A	A	F	F	B	F	F	B
95th-Percentile Queue Length [veh/ln]	0.39	0.00	0.00	0.00	0.00	0.00	2.40	2.40	0.13	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	9.72	0.00	0.00	0.00	0.00	0.00	59.94	59.94	3.37	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.71			0.00			117.15			74.51		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	2.61											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 9: 231 and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	230.9
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.885

Intersection Setup

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Base Volume Input [veh/h]	25	854	0	0	757	7	11	0	50	1	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	283	0	0	220	14	29	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	29	1274	0	0	1098	22	42	0	58	1	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	319	0	0	275	6	11	0	15	0	0	0
Total Analysis Volume [veh/h]	29	1274	0	0	1098	22	42	0	58	1	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.01	0.00	0.00	0.01	0.00	0.89	0.00	0.12	0.03	0.00	0.00
d_M, Delay for Movement [s/veh]	11.10	0.00	0.00	11.66	0.00	0.00	230.88	276.90	13.70	106.75	131.69	16.35
Movement LOS	B	A	A	B	A	A	F	F	B	F	F	C
95th-Percentile Queue Length [veh/ln]	0.15	0.00	0.00	0.00	0.00	0.00	3.64	3.64	0.42	0.08	0.08	0.08
95th-Percentile Queue Length [ft/ln]	3.68	0.00	0.00	0.00	0.00	0.00	91.08	91.08	10.43	2.08	2.08	2.08
d_A, Approach Delay [s/veh]	0.25			0.00			104.92			106.75		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	4.33											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 14: Midland and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	10.9
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.029

Intersection Setup

Name	Midland Raod		Midland Road		Whiteside Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Raod		Midland Road		Whiteside Road	
Base Volume Input [veh/h]	42	7	54	66	4	40
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	24	29	0	22	14	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	73	37	63	99	19	46
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	9	16	25	5	12
Total Analysis Volume [veh/h]	73	37	63	99	19	46
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.04	0.00	0.03	0.05
d_M, Delay for Movement [s/veh]	0.00	0.00	7.50	0.00	10.93	9.08
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.11	0.11	0.25	0.25
95th-Percentile Queue Length [ft/ln]	0.00	0.00	2.72	2.72	6.24	6.24
d_A, Approach Delay [s/veh]	0.00		2.92		9.62	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.26					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 17: Midland and Eady

Control Type:	Two-way stop	Delay (sec / veh):	10.1
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.014

Intersection Setup

Name	Midland Road		Midland Road		Eady Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Road		Midland Road		Eady Road	
Base Volume Input [veh/h]	62	13	8	68	7	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	18	4	14	23	2	7
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	90	19	23	102	10	12
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	23	5	6	26	3	3
Total Analysis Volume [veh/h]	90	19	23	102	10	12
Pedestrian Volume [ped/h]	0		0		0	

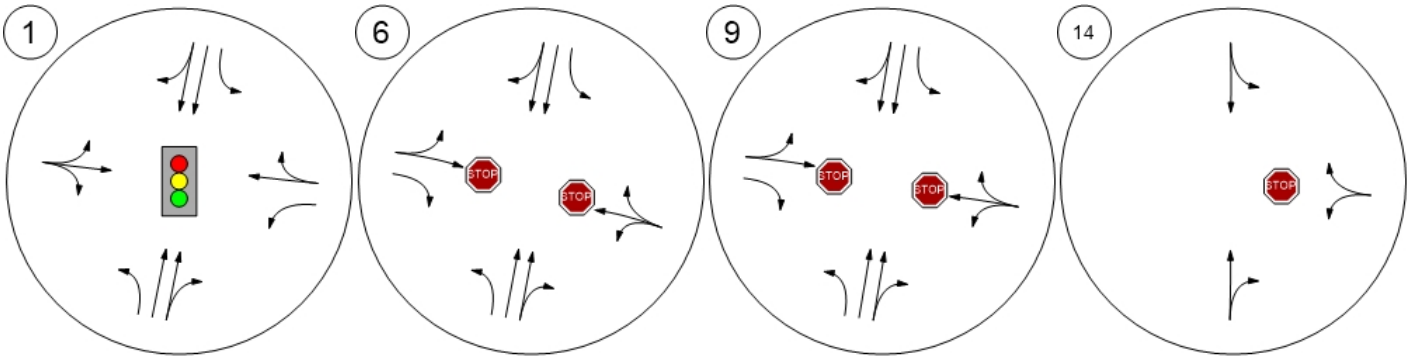
Intersection Settings

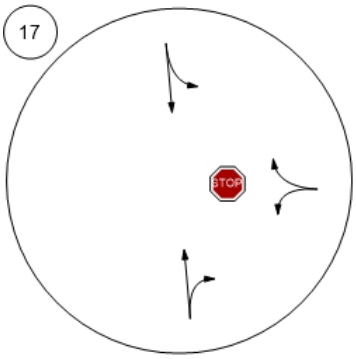
Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

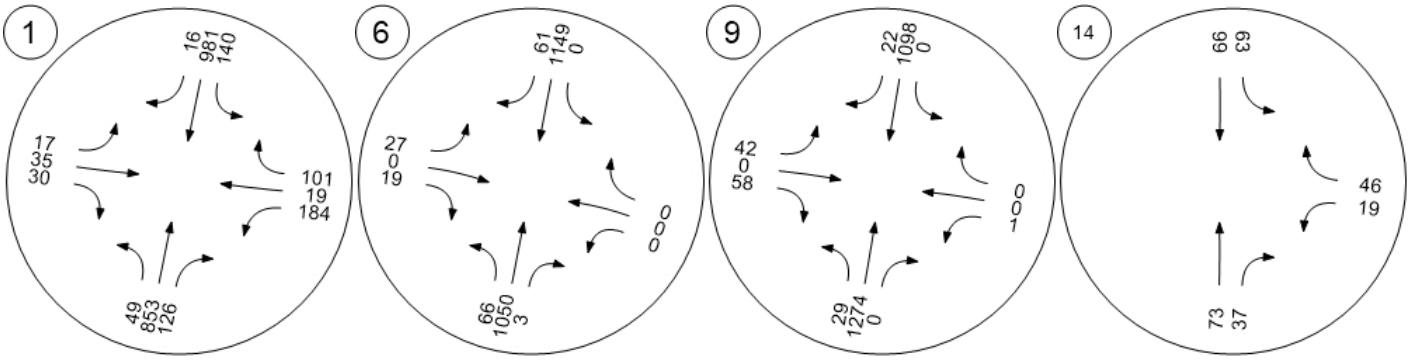
V/C, Movement V/C Ratio	0.00	0.00	0.02	0.00	0.01	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	7.46	0.00	10.06	8.88
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.04	0.04	0.08	0.08
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.97	0.97	2.02	2.02
d_A, Approach Delay [s/veh]	0.00		1.37		9.42	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.48					
Intersection LOS	B					

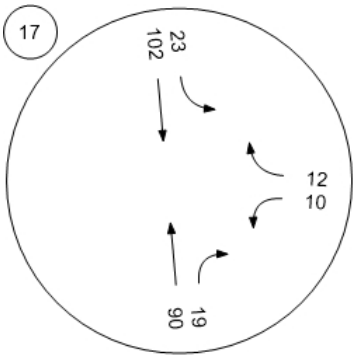
Lane Configuration and Traffic Control





Traffic Volume - Future Total Volume





Bedford County - TPG

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Report File: M:\...\7 - Improved PM.pdf

Scenario 8 Improved PM
3/22/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	231 and Eady	Signalized	HCM 7th Edition	EB Right	0.489	19.9	B
6	231 and Frank Martin	Two-way stop	HCM 7th Edition	EB Left	0.762	189.7	F
9	231 and Whiteside	Two-way stop	HCM 7th Edition	EB Left	1.050	371.0	F
14	Midland and Whiteside	Two-way stop	HCM 7th Edition	WB Left	0.060	11.4	B
17	Midland and Eady	Two-way stop	HCM 7th Edition	WB Left	0.022	9.8	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: 231 and Eady

Control Type:	Signalized	Delay (sec / veh):	19.9
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.489

Intersection Setup

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	1
Entry Pocket Length [ft]	80.00	100.00	100.00	90.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	700.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Base Volume Input [veh/h]	11	669	53	95	823	11	6	8	9	40	16	83
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	30	110	41	9	103	14	19	9	36	37	9	9
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	43	886	103	119	1058	27	26	18	46	83	28	105
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	11	222	26	30	265	7	7	5	12	21	7	26
Total Analysis Volume [veh/h]	43	886	103	119	1058	27	26	18	46	83	28	105
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	100
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	10	0
Maximum Green [s]	30	30	0	30	30	0	0	30	0	10	30	0
Amber [s]	4.0	4.0	0.0	4.0	4.0	0.0	0.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0
Split [s]	11	54	0	14	57	0	0	17	0	15	32	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	4.0	4.0	0.0	4.0	4.0	0.0	0.0	4.0	0.0	4.0	4.0	0.0
Minimum Recall	No	No		No	No			No		Yes	No	
Maximum Recall	No	Yes		No	Yes			No		No	No	
Pedestrian Recall	No	No		No	No			No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	L	C
C, Cycle Length [s]	100	100	100	100	100	100	100	100	100
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	4.00	4.00	0.00	4.00	4.00	4.00	0.00	4.00
g_i, Effective Green Time [s]	64	53	53	64	55	55	12	24	24
g / C, Green / Cycle	0.64	0.53	0.53	0.64	0.55	0.55	0.12	0.24	0.24
(v / s)_i Volume / Saturation Flow Rate	0.07	0.30	0.30	0.18	0.32	0.32	0.11	0.08	0.09
s, saturation flow rate [veh/h]	601	1683	1622	663	1683	1668	828	1035	1477
c, Capacity [veh/h]	385	893	861	424	916	908	149	277	355
d1, Uniform Delay [s]	9.34	15.70	15.70	9.71	15.34	15.34	42.07	30.42	31.70
k, delay calibration	0.50	0.50	0.50	0.13	0.50	0.50	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.59	2.57	2.66	0.43	2.84	2.86	3.87	0.60	0.65
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.11	0.56	0.56	0.28	0.59	0.59	0.60	0.30	0.37
d, Delay for Lane Group [s/veh]	9.93	18.27	18.37	10.14	18.18	18.21	45.95	31.02	32.36
Lane Group LOS	A	B	B	B	B	B	D	C	C
Critical Lane Group	Yes	No	No	No	No	Yes	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	0.34	7.26	7.02	0.85	7.84	7.78	2.36	1.54	2.56
50th-Percentile Queue Length [ft/ln]	8.41	181.40	175.45	21.18	196.00	194.59	58.97	38.57	64.09
95th-Percentile Queue Length [veh/ln]	0.61	11.67	11.36	1.53	12.43	12.36	4.25	2.78	4.61
95th-Percentile Queue Length [ft/ln]	15.15	291.84	284.07	38.13	310.80	308.98	106.15	69.43	115.36

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	9.93	18.31	18.37	10.14	18.19	18.21	45.95	45.95	45.95	31.02	32.36	32.36
Movement LOS	A	B	B	B	B	B	D	D	D	C	C	C
d_A, Approach Delay [s/veh]	17.97			17.40			45.95			31.84		
Approach LOS	B			B			D			C		
d_I, Intersection Delay [s/veh]	19.87											
Intersection LOS	B											
Intersection V/C	0.489											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	960	1020	220	520
d_b, Bicycle Delay [s]	13.52	12.01	39.61	27.38
l_b,int, Bicycle LOS Score for Intersection	2.411	2.553	1.708	1.916
Bicycle LOS	B	B	A	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 6: 231 and Frank Martin

Control Type:	Two-way stop	Delay (sec / veh):	189.7
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.762

Intersection Setup

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Entry Pocket Length [ft]	200.00	100.00	100.00	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Base Volume Input [veh/h]	16	747	0	0	888	21	15	0	20	2	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	5	167	0	0	167	3	21	0	20	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	24	1034	0	0	1198	27	38	0	43	2	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	259	0	0	300	7	10	0	11	1	0	0
Total Analysis Volume [veh/h]	24	1034	0	0	1198	27	38	0	43	2	0	1
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.01	0.00	0.00	0.01	0.00	0.76	0.00	0.10	0.04	0.00	0.00
d_M, Delay for Movement [s/veh]	11.66	0.00	0.00	10.39	0.00	0.00	189.68	215.08	14.16	74.63	106.47	14.10
Movement LOS	B	A	A	B	A	A	F	F	B	F	F	B
95th-Percentile Queue Length [veh/ln]	0.13	0.00	0.00	0.00	0.00	0.00	3.10	3.10	0.33	0.12	0.12	0.12
95th-Percentile Queue Length [ft/ln]	3.32	0.00	0.00	0.00	0.00	0.00	77.60	77.60	8.16	3.05	3.05	3.05
d_A, Approach Delay [s/veh]	0.26			0.00			96.51			54.46		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	3.49											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 9: 231 and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	371.0
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.050

Intersection Setup

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Base Volume Input [veh/h]	67	740	2	1	988	12	7	0	48	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	150	0	0	161	22	24	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	78	1009	2	1	1308	36	32	0	56	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	20	252	1	0	327	9	8	0	14	0	0	0
Total Analysis Volume [veh/h]	78	1009	2	1	1308	36	32	0	56	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.15	0.01	0.00	0.00	0.01	0.00	1.05	0.00	0.14	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.36	0.00	0.00	10.29	0.00	0.00	371.00	401.79	15.51	107.74	157.76	12.03
Movement LOS	B	A	A	B	A	A	F	F	C	F	F	B
95th-Percentile Queue Length [veh/ln]	0.54	0.00	0.00	0.00	0.00	0.00	3.56	3.56	0.49	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	13.45	0.00	0.00	0.11	0.00	0.00	89.02	89.02	12.13	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.96			0.01			144.78			92.51		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	5.47											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 14: Midland and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	11.4
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.060

Intersection Setup

Name	Midland Raod		Midland Road		Whiteside Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Raod		Midland Road		Whiteside Road	
Base Volume Input [veh/h]	66	12	54	71	14	64
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	9	24	0	14	22	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	86	38	63	96	38	74
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	10	16	24	10	19
Total Analysis Volume [veh/h]	86	38	63	96	38	74
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.04	0.00	0.06	0.08
d_M, Delay for Movement [s/veh]	0.00	0.00	7.53	0.00	11.36	9.50
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.11	0.11	0.48	0.48
95th-Percentile Queue Length [ft/ln]	0.00	0.00	2.72	2.72	11.90	11.90
d_A, Approach Delay [s/veh]	0.00		2.98		10.13	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	4.07					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 17: Midland and Eady

Control Type:	Two-way stop	Delay (sec / veh):	9.8
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.022

Intersection Setup

Name	Midland Road		Midland Road		Eady Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Road		Midland Road		Eady Road	
Base Volume Input [veh/h]	66	7	4	56	11	9
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	8	3	13	7	4	10
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	85	11	18	72	17	20
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	3	5	18	4	5
Total Analysis Volume [veh/h]	85	11	18	72	17	20
Pedestrian Volume [ped/h]	0		0		0	

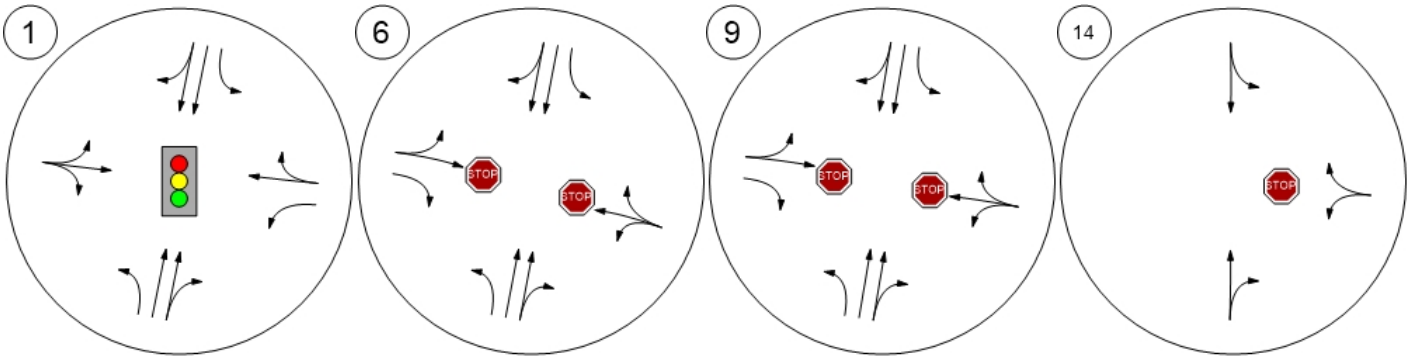
Intersection Settings

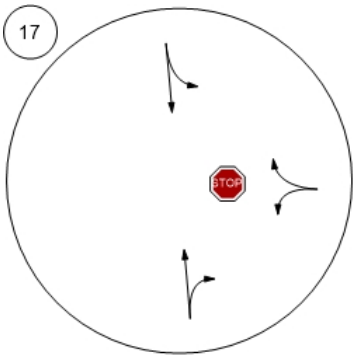
Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

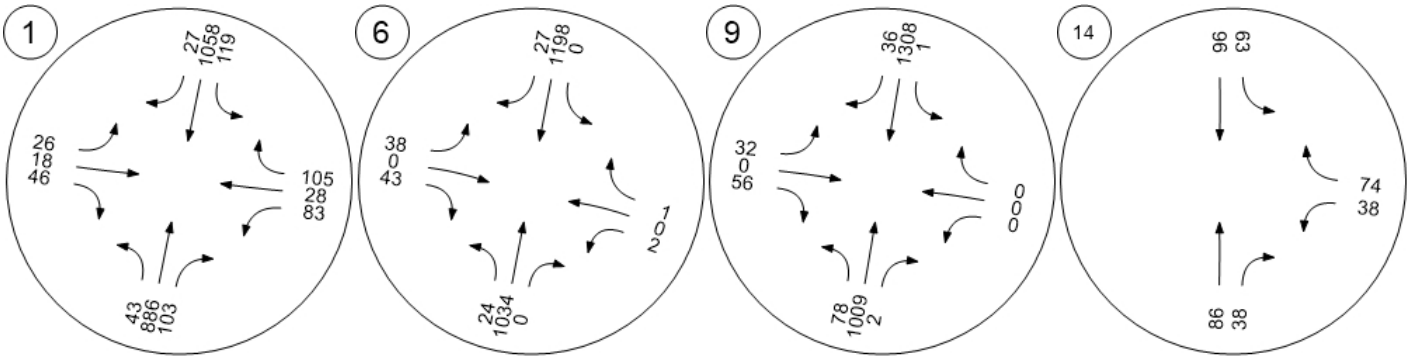
V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.02	0.02
d_M, Delay for Movement [s/veh]	0.00	0.00	7.42	0.00	9.80	8.91
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.03	0.03	0.13	0.13
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.76	0.76	3.32	3.32
d_A, Approach Delay [s/veh]	0.00		1.48		9.32	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.14					
Intersection LOS	A					

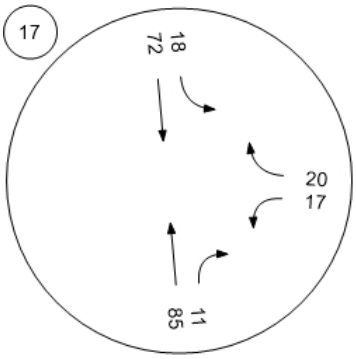
Lane Configuration and Traffic Control





Traffic Volume - Future Total Volume





Bedford County - TPG

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Report File: M:\...\7 - Improved Saturday.pdf

Scenario 9 Improved Saturday
3/22/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	231 and Eady	Signalized	HCM 7th Edition	EB Right	0.464	18.9	B
6	231 and Frank Martin	Two-way stop	HCM 7th Edition	EB Left	0.442	87.0	F
9	231 and Whiteside	Two-way stop	HCM 7th Edition	EB Left	0.438	99.6	F
14	Midland and Whiteside	Two-way stop	HCM 7th Edition	WB Left	0.036	10.8	B
17	Midland and Eady	Two-way stop	HCM 7th Edition	WB Left	0.016	9.6	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: 231 and Eady

Control Type:	Signalized	Delay (sec / veh):	18.9
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.464

Intersection Setup

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	1
Entry Pocket Length [ft]	80.00	100.00	100.00	90.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	700.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Eady Road			Highway 82		
Base Volume Input [veh/h]	15	694	53	50	594	8	6	8	13	56	8	70
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	29	72	23	9	99	14	19	9	32	35	9	9
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	46	877	85	67	788	23	26	18	47	100	18	90
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	12	219	21	17	197	6	7	5	12	25	5	23
Total Analysis Volume [veh/h]	46	877	85	67	788	23	26	18	47	100	18	90
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	100
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	Permiss	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	10	0
Maximum Green [s]	30	30	0	30	30	0	0	30	0	30	30	0
Amber [s]	4.0	4.0	0.0	4.0	4.0	0.0	0.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0
Split [s]	11	54	0	11	54	0	0	21	0	14	35	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	4.0	4.0	0.0	4.0	4.0	0.0	0.0	4.0	0.0	4.0	4.0	0.0
Minimum Recall	No	No		No	No			No		No	No	
Maximum Recall	No	Yes		No	Yes			No		No	No	
Pedestrian Recall	No	No		No	No			Yes		No	Yes	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	L	C
C, Cycle Length [s]	100	100	100	100	100	100	100	100	100
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	4.00	4.00	0.00	4.00	4.00	4.00	0.00	4.00
g_i, Effective Green Time [s]	64	54	54	64	54	54	12	24	24
g / C, Green / Cycle	0.64	0.54	0.54	0.64	0.54	0.54	0.12	0.24	0.24
(v / s)_i Volume / Saturation Flow Rate	0.06	0.29	0.29	0.10	0.24	0.24	0.10	0.09	0.07
s, saturation flow rate [veh/h]	724	1683	1631	664	1683	1666	903	1092	1467
c, Capacity [veh/h]	478	901	874	429	911	902	151	295	355
d1, Uniform Delay [s]	7.90	15.20	15.20	8.88	13.86	13.87	43.04	30.62	30.99
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.40	2.34	2.41	0.17	1.59	1.60	3.83	0.67	0.48
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.10	0.54	0.54	0.16	0.45	0.45	0.60	0.34	0.30
d, Delay for Lane Group [s/veh]	8.30	17.54	17.61	9.05	15.45	15.47	46.88	31.29	31.47
Lane Group LOS	A	B	B	A	B	B	D	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	0.35	6.85	6.66	0.46	5.21	5.16	2.38	1.87	2.03
50th-Percentile Queue Length [ft/ln]	8.75	171.32	166.51	11.45	130.17	128.99	59.52	46.79	50.82
95th-Percentile Queue Length [veh/ln]	0.63	11.15	10.89	0.82	8.95	8.88	4.29	3.37	3.66
95th-Percentile Queue Length [ft/ln]	15.75	278.65	272.33	20.62	223.72	222.12	107.13	84.22	91.47

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	8.30	17.57	17.61	9.05	15.46	15.47	46.88	46.88	46.88	31.29	31.47	31.47
Movement LOS	A	B	B	A	B	B	D	D	D	C	C	C
d_A, Approach Delay [s/veh]	17.15			14.97			46.88			31.38		
Approach LOS	B			B			D			C		
d_I, Intersection Delay [s/veh]	18.87											
Intersection LOS	B											
Intersection V/C	0.464											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	960	960	300	580
d_b, Bicycle Delay [s]	13.52	13.52	36.13	25.21
l_b,int, Bicycle LOS Score for Intersection	2.391	2.284	1.710	1.903
Bicycle LOS	B	B	A	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 6: 231 and Frank Martin

Control Type:	Two-way stop	Delay (sec / veh):	87.0
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.442

Intersection Setup

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Entry Pocket Length [ft]	200.00	100.00	100.00	150.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Frank Martin Road			Buisness Driveway		
Base Volume Input [veh/h]	13	716	1	0	708	21	26	0	36	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	23	124	0	0	138	24	3	0	5	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	38	955	1	0	960	48	33	0	47	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	239	0	0	240	12	8	0	12	0	0	0
Total Analysis Volume [veh/h]	38	955	1	0	960	48	33	0	47	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.01	0.00	0.00	0.01	0.00	0.44	0.00	0.09	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.58	0.00	0.00	10.04	0.00	0.00	87.02	104.66	12.72	55.80	73.19	11.75
Movement LOS	B	A	A	B	A	A	F	F	B	F	F	B
95th-Percentile Queue Length [veh/ln]	0.18	0.00	0.00	0.00	0.00	0.00	1.77	1.77	0.30	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	4.41	0.00	0.00	0.00	0.00	0.00	44.37	44.37	7.52	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.40			0.00			43.37			46.91		
Approach LOS	A			A			E			E		
d_I, Intersection Delay [s/veh]	1.86											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 9: 231 and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	99.6
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.438

Intersection Setup

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			50.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 231			Highway 231			Whiteside Road			Hickory Haven Lane		
Base Volume Input [veh/h]	44	828	0	2	718	8	6	0	35	3	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	134	0	0	114	18	21	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	51	1095	0	2	947	27	28	0	41	3	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	274	0	1	237	7	7	0	10	1	0	0
Total Analysis Volume [veh/h]	51	1095	0	2	947	27	28	0	41	3	0	1
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.01	0.00	0.00	0.01	0.00	0.44	0.00	0.08	0.06	0.00	0.00
d_M, Delay for Movement [s/veh]	10.51	0.00	0.00	10.70	0.00	0.00	99.61	126.45	12.42	76.00	93.13	15.74
Movement LOS	B	A	A	B	A	A	F	F	B	F	F	C
95th-Percentile Queue Length [veh/ln]	0.23	0.00	0.00	0.01	0.00	0.00	1.70	1.70	0.25	0.18	0.18	0.18
95th-Percentile Queue Length [ft/ln]	5.84	0.00	0.00	0.24	0.00	0.00	42.47	42.47	6.31	4.56	4.56	4.56
d_A, Approach Delay [s/veh]	0.47			0.02			47.80			60.93		
Approach LOS	A			A			E			F		
d_I, Intersection Delay [s/veh]	1.87											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 14: Midland and Whiteside

Control Type:	Two-way stop	Delay (sec / veh):	10.8
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.036

Intersection Setup

Name	Midland Raod		Midland Road		Whiteside Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Raod		Midland Road		Whiteside Road	
Base Volume Input [veh/h]	54	9	53	56	5	44
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	12	21	0	10	18	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	75	31	62	75	24	51
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	8	16	19	6	13
Total Analysis Volume [veh/h]	75	31	62	75	24	51
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.04	0.00	0.04	0.05
d_M, Delay for Movement [s/veh]	0.00	0.00	7.50	0.00	10.78	9.13
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.11	0.11	0.29	0.29
95th-Percentile Queue Length [ft/ln]	0.00	0.00	2.67	2.67	7.26	7.26
d_A, Approach Delay [s/veh]	0.00		3.39		9.66	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.74					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 17: Midland and Eady

Control Type:	Two-way stop	Delay (sec / veh):	9.6
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.016

Intersection Setup

Name	Midland Road		Midland Road		Eady Road	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Midland Road		Midland Road		Eady Road	
Base Volume Input [veh/h]	67	8	3	47	8	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.1605	1.1605	1.1605	1.1605	1.1605	1.1605
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	4	3	9	8	4	9
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	82	12	12	63	13	18
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	3	3	16	3	5
Total Analysis Volume [veh/h]	82	12	12	63	13	18
Pedestrian Volume [ped/h]	0		0		0	

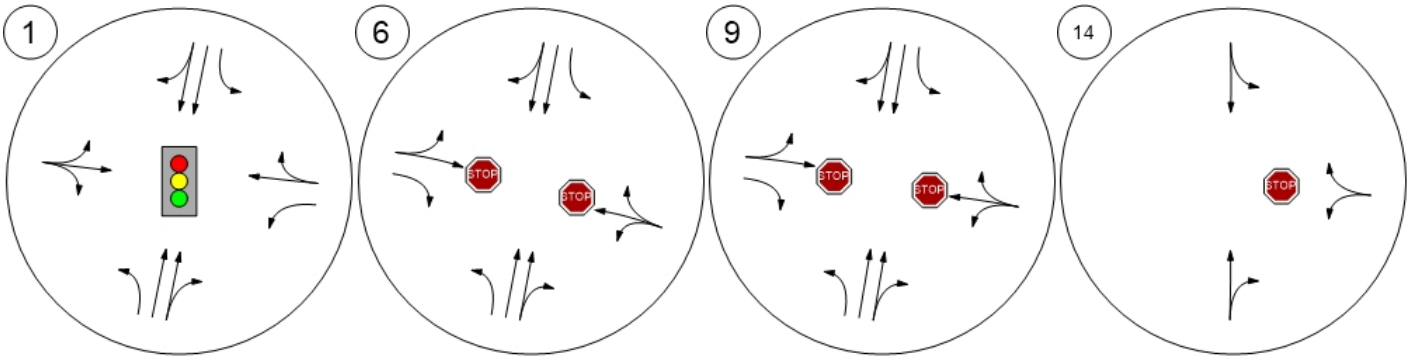
Intersection Settings

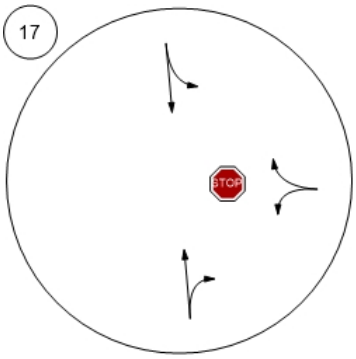
Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

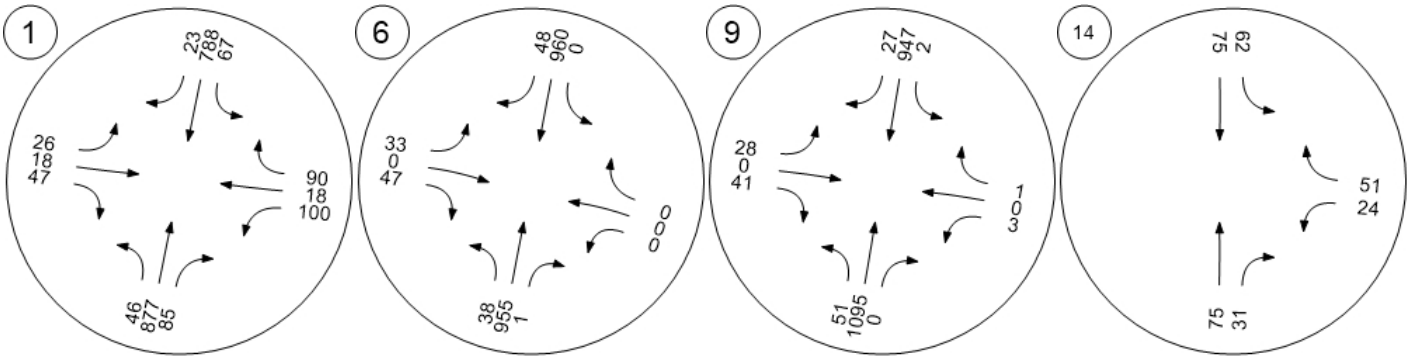
V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.02	0.02
d_M, Delay for Movement [s/veh]	0.00	0.00	7.41	0.00	9.60	8.85
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.02	0.02	0.11	0.11
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.50	0.50	2.69	2.69
d_A, Approach Delay [s/veh]	0.00		1.19		9.17	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.87					
Intersection LOS	A					

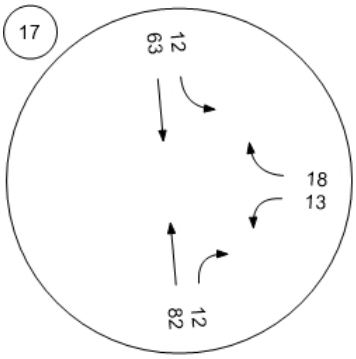
Lane Configuration and Traffic Control





Traffic Volume - Future Total Volume





TOTAL TRIP GENERATION

LU	ITE CODE	LAND USE	# UNITS	UNIT TYPE	ADT	AM			PM		
						Enter	Exit	Total	Enter	Exit	Total
1	540	Junior/Community College	900	Students	1035	80	19	99	55	44	99
2	571	Adult Detention Facility	400	Beds	392	22	18	40	4	28	32
3	540	Junior/Community College	893	Students	1027	79	19	98	55	43	98
4a	540	Warehousing	20	employees	120	11	4	15	5	8	13
4b	150	General Light Industrial	80	k.s.f.	390	52	7	59	7	45	52
5	110	Wine Tasting Room	31.9	k.s.f.	1466	46	20	66	116	117	233
6	970	TN Downs	N/A	Unit	2046	130	84	214	112	123	235
7	N/A	Single-Family Detached Housing	50	Dwelling Units	533	10	30	40	33	19	52
8	210	Hotel	100	Rooms	660	24	19	43	30	29	59
9	310	Elementary School	800	Students	1816	320	272	592	59	69	128
				SUBTOTAL	**9485**	774	492	**1266**	476	525	**1001**

LU 1 TRIP GENERATION

Junior/Community College

540 ITE Land Code

900 Students

Average Daily Traffic:

T = 1.15 * (X)

T = 1.15 * (900)

T = 1035

A.M. Peak Hour:

T = 0.11 * (X)

T = 0.11 * (900)

T = 99

Enter =	80	81%
Exit =	19	19%

P.M. Peak Hour:

T = 0.11 * (X)

T = 0.11 * (900)

T = 99

Enter =	55	56%
Exit =	44	44%

LU 2 TRIP GENERATION

Adult Detention Facility

571 ITE Land Code

400 Beds

Average Daily Traffic:

T = 0.98 * (X)

T = 0.98 * (400)

T = 392

A.M. Peak Hour:

T = 0.10 * (X)

T = 0.10 * (400)

T = 40

Enter =	22	56%
Exit =	18	44%

P.M. Peak Hour:

T = 0.08 * (X)

T = 0.08 * (400)

T = 32

Enter =	4	14%
Exit =	28	86%

LU 3 TRIP GENERATION

Junior/Community College

540 ITE Land Code

893 Students

Average Daily Traffic:

T = 1.15 * (X)

T = 1.15 * (893)

T = 1027

A.M. Peak Hour:

T = 0.11 * (X)

T = 0.11 * (893)

T = 98

Enter =	79	81%
Exit =	19	19%

P.M. Peak Hour:

T = 0.11 * (X)

T = 0.11 * (893)

T = 98

Enter =	55	56%
Exit =	43	44%

LU 4a TRIP GENERATION

Warehousing

150 ITE Land Code

20 employees

Average Daily Traffic:

Ln(T) = (0.82 * Ln(X) + 2.33)

Ln(T) = (0.82 * Ln(20) + 2.33)

T = 120

A.M. Peak Hour:

T = 0.52 * (X) + 4.93

T = 0.52 * (20) + 4.93

T = 15

Enter =	11	72%
Exit =	4	28%

P.M. Peak Hour:

T = 0.66 * (X)

T = 0.66 * (20)

T = 13

Enter =	5	36%
Exit =	8	64%

LU 4b TRIP GENERATION

General Light Industrial

110 ITE Land Code

80 k.s.f.

Average Daily Traffic:

T = 4.87 * (X)

T = 4.87 * (80)

T = 390

A.M. Peak Hour:

T = 0.74 * (X)

T = 0.74 * (80)

T = 59

Enter =	52	88%
Exit =	7	12%

P.M. Peak Hour:

T = 0.65 * (X)

T = 0.65 * (80)

T = 52

Enter =	7	14%
Exit =	45	86%

LU 5 TRIP GENERATION

Wine Tasting Room

970 ITE Land Code

31.9 k.s.f.

Average Daily Traffic:

T = 45.96 * (X)

T = 45.96 * (31.9)

T = 1466

A.M. Peak Hour:

T = 2.07 * (X)

T = 2.07 * (31.9)

T = 66

Enter =	46	70%
Exit =	20	30%

P.M. Peak Hour:

T = 7.31 * (X)

T = 7.31 * (31.9)

T = 233

Enter =	116	50%
Exit =	117	50%

LU 6 TRIP GENERATION

TN Downs

N/A ITE Land Code

N/A Unit

Average Daily Traffic:

ADT

ADT

T = 2046

A.M. Peak Hour:

AM

AM

T = 214

Enter = 130 0%

Exit = 84 0%

P.M. Peak Hour:

PM

PM

T = 235

Enter = 112 0%

Exit = 123 0%

LU 7 TRIP GENERATION

Single-Family Detached Housing

210 ITE Land Code

50 Dwelling Units

Average Daily Traffic:

Ln(T) = (0.92 * Ln(X) + 2.68)

Ln(T) = (0.92 * Ln(50) + 2.68)

T = 533

A.M. Peak Hour:

Ln(T) = (0.91 * Ln(X) + 0.12)

Ln(T) = (0.91 * Ln(50) + 0.12)

T = 40

Enter =	10	26%
Exit =	30	74%

P.M. Peak Hour:

Ln(T) = (0.94 * Ln(X) + 0.27)

Ln(T) = (0.94 * Ln(50) + 0.27)

T = 52

Enter =	33	63%
Exit =	19	37%

LU 8 TRIP GENERATION

Hotel

310 ITE Land Code

100 Rooms

Average Daily Traffic:

T = 10.84 * (X) - 423.51

T = 10.84 * (100) - 423.51

T = 660

A.M. Peak Hour:

T = 0.50 * (X) - 7.45

T = 0.50 * (100) - 7.45

T = 43

Enter =	24	56%
Exit =	19	44%

P.M. Peak Hour:

T = 0.59 * (X)

T = 0.59 * (100)

T = 59

Enter =	30	51%
Exit =	29	49%

LU 9 TRIP GENERATION

Elementary School

520 ITE Land Code

800 Students

Average Daily Traffic:

T = 2.27 * (X)

T = 2.27 * (800)

T = 1816

A.M. Peak Hour:

T = 0.74 * (X)

T = 0.74 * (800)

T = 592

Enter =	320	54%
Exit =	272	46%

P.M. Peak Hour:

T = 0.16 * (X)

T = 0.16 * (800)

T = 128

Enter =	59	46%
Exit =	69	54%

TDOT AADT Background Growth Trend Analysis

	Bell Buckle		North of Ed Joyce Road		North of Hurricane Grove Road		North of Whiteside Road		TOTAL	
	124	% Difference	12	% Difference	147	% Difference	138	% Difference		% Difference
2019	2,878	34.7%	19,378	9.3%	20,477	8.2%	2,571	14.0%	45,304	10.4%
2018	2,137	4.8%	17,725	-5.5%	18,932	-8.4%	2,255	-14.8%	41,049	-7.0%
2017	2,040	-4.9%	18,754	-2.0%	20,675	4.2%	2,647	4.1%	44,116	1.0%
2016	2,145	-17.8%	19,137	7.2%	19,834	-4.2%	2,542	2.6%	43,658	0.0%
2015	2,610	-3.7%	17,850	1.0%	20,711	15.9%	2,478	1.6%	43,649	7.2%
2014	2,710	34.8%	17,675	1.9%	17,877	4.4%	2,439	4.9%	40,701	4.9%
2013	2,011	-14.2%	17,344	8.8%	17,125	-2.4%	2,324	-1.5%	38,804	1.6%
2012	2,343	17.8%	15,947	5.2%	17,547	2.2%	2,359	5.0%	38,196	4.5%
2011	1,989	-4.6%	15,161	0.3%	17,171	-2.0%	2,247	3.8%	36,568	-0.9%
2010	2,084	-8.0%	15,122	2.6%	17,529	5.0%	2,165	2.8%	36,900	3.0%
2009	2,266	-19.0%	14,743	1.3%	16,699	0.0%	2,107	7.0%	35,815	-0.6%
2008	2,797	17.5%	14,553	3.3%	16,703	0.8%	1,970	-16.0%	36,023	1.8%
2007	2,380	--	14,094	--	16,578	--	2,344	--	35,396	--

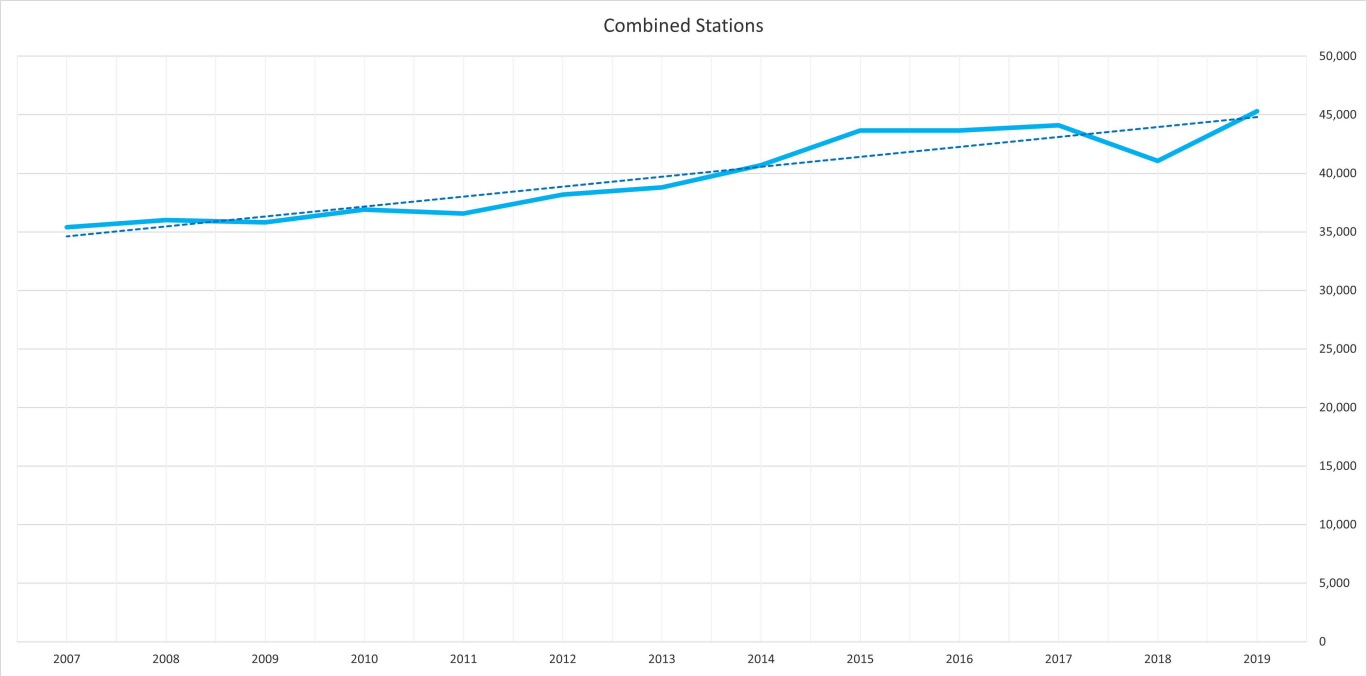
Average of Differences

NO. Years	Average
1	10.4%
2	1.7%
3	1.5%
4	1.1%
5	2.3%
6	2.8%
7	2.6%
8	2.8%
9	2.4%
10	2.5%

Exponential Rate										
	Since 2018 Annual	34.67%		9.33%		8.16%		14.01%		10.37%
	Since 2017 Annual	18.78%		1.65%		-0.48%		-1.45%		1.34%
	Since 2016 Annual	10.29%		0.42%		1.07%		0.38%		1.24%
	Since 2015 Annual	2.47%		2.07%		-0.28%		0.93%		0.93%
	Since 2014 Annual	1.21%		1.86%		2.75%		1.06%		2.17%
	Since 2013 Annual	6.16%		1.87%		3.02%		1.70%		2.61%
	Since 2012 Annual	2.98%		2.82%		2.23%		1.24%		2.47%
	Since 2011 Annual	4.73%		3.12%		2.23%		1.70%		2.71%
	Since 2010 Annual	3.65%		2.79%		1.74%		1.93%		2.31%
	Since 2009 Annual	2.42%		2.77%		2.06%		2.01%		2.38%

Average of Exponential Rates

NO. Years	Average
1	10.4%
2	5.9%
3	4.3%
4	3.5%
5	3.2%
6	3.1%
7	3.0%
8	3.0%
9	2.91%
10	2.9%



Appendix D – Turn Lane and Traffic Control Warrant Analyses

Left Turn Warrant Analysis Results

Summary Results

Approach	No.	TOD	Speed Limit	% Left-Turns	Advancing Volume	Opposing Volumes	Results
SB Midland at Eady	1	AM	45	18%	125	109	Left-turn treatment NOT warranted.
	2	PM	45	20%	90	96	Left-turn treatment NOT warranted.
SB Midland at Whiteside	3	AM	45	39%	162	110	Left-turn treatment NOT warranted.
	4	PM	45	40%	159	124	Left-turn treatment NOT warranted.

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

No 1. SB Midland at Eady, AM

2-lane roadway (English)

INPUT

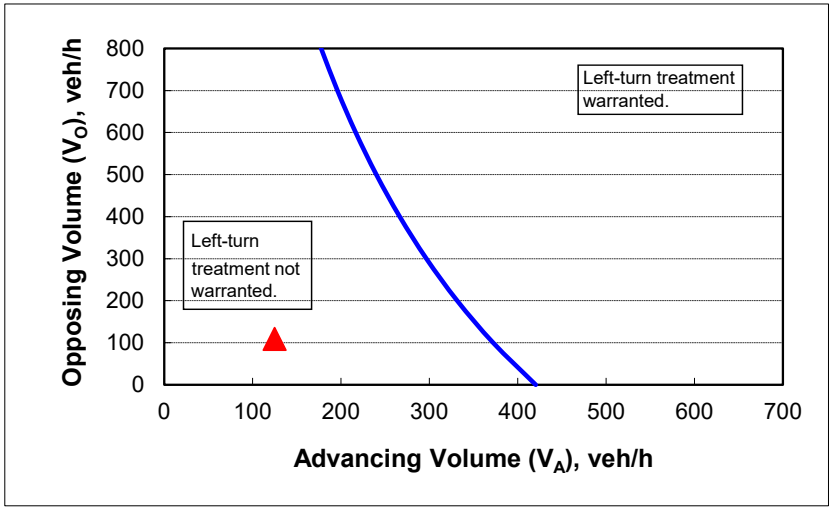
Variable	Value
85th percentile speed, mph:	45
Percent of left-turns in advancing volume (V_A), %:	18%
Advancing volume (V_A), veh/h:	125
Opposing volume (V_O), veh/h:	109

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	368
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	

CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9



Left Turn Warrant Analysis Results, continued

No 2. SB Midland at Eady, PM

2-lane roadway (English)

INPUT

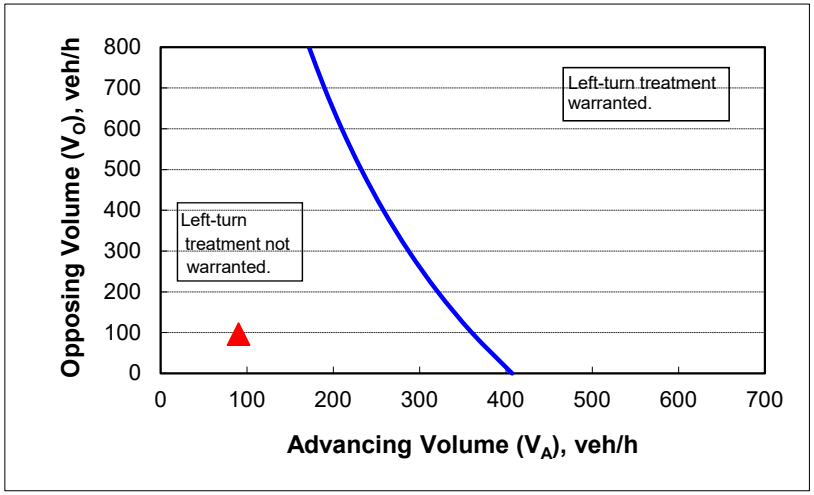
Variable	Value
85th percentile speed, mph:	45
Percent of left-turns in advancing volume (V_A), %:	20%
Advancing volume (V_A), veh/h:	90
Opposing volume (V_O), veh/h:	96

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	362
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	

CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9



No 3. SB Midland at Whiteside, AM

2-lane roadway (English)

INPUT

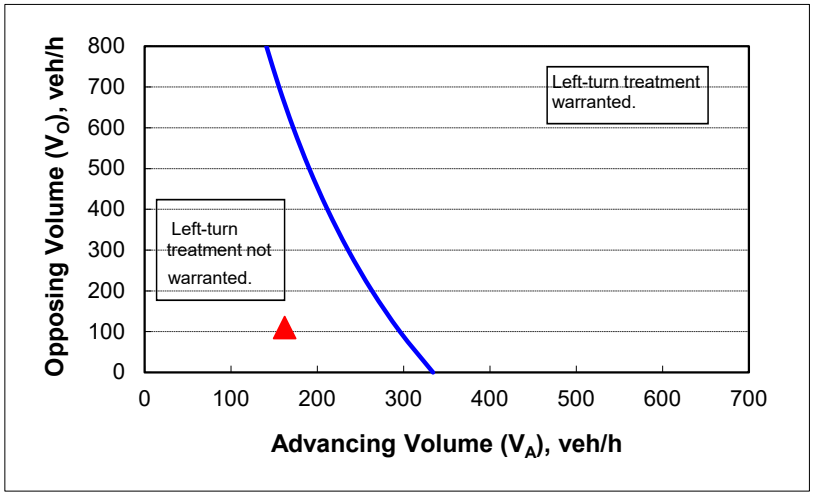
Variable	Value
85th percentile speed, mph:	45
Percent of left-turns in advancing volume (V_A), %:	39%
Advancing volume (V_A), veh/h:	162
Opposing volume (V_O), veh/h:	110

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	292
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	

CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9



Left Turn Warrant Analysis Results, continued

No 4. SB Midland at Whiteside, PM

2-lane roadway (English)

INPUT

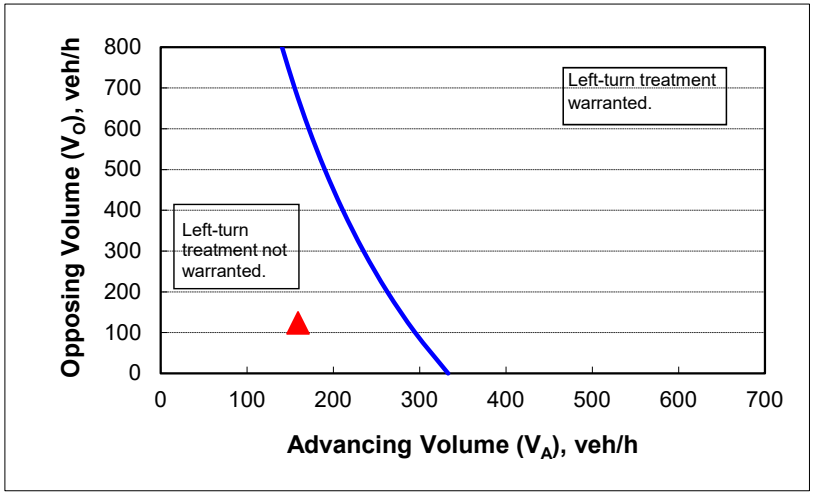
Variable	Value
85th percentile speed, mph:	45
Percent of left-turns in advancing volume (V_A), %:	40%
Advancing volume (V_A), veh/h:	159
Opposing volume (V_O), veh/h:	124

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	287
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	

CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9



Right Turn Lane Warrant Analysis Results

Inputs:

Intersection Approach		Speed Limit	AM Peak Hour		PM Peak Hour	
			V_R*	V_A*	V_R*	V_A*
2022 SB 231 onto Eady		50	3	676	11	823
2022 NB 231 onto 82		50	58	608	53	669
2022 SB 231 onto Frank Martin		50	32	768	21	888
2022 SB 231 onto Whiteside		50	7	757	12	988
2032 SB 231 onto Eady		50	3	784	13	955
2032 NB 231 onto 82		50	67	706	62	776
2032 SB 231 onto Frank Martin		50	37	891	24	1031
2032 SB 231 onto Whiteside		50	8	878	14	1147

V_R = Right Turn Volumes,
V_A = Advancing Volumes

Right Turn Lane Warrant Analysis Results, continued

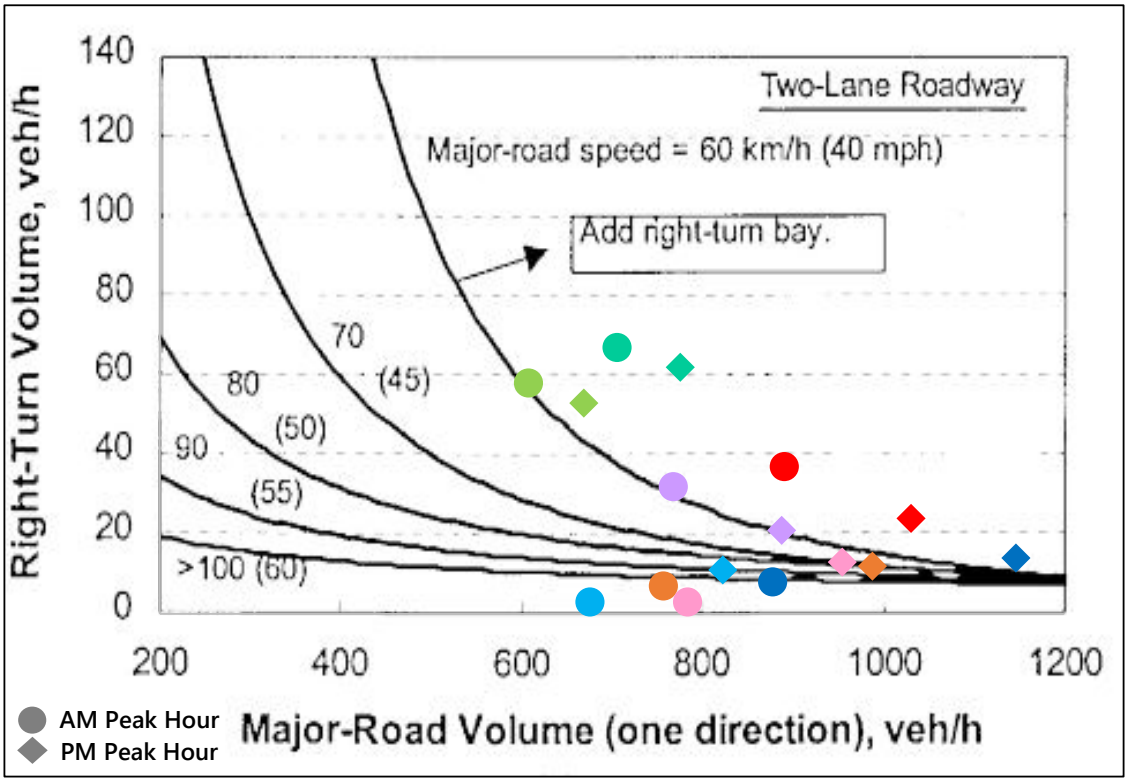
Projected Conditions (Peak Hours) - **Two-Lane Roadway**

RIGHT-TURN LANE WARRANT ANALYSIS

(Based on NCHRP 457: Evaluating Intersection Improvements)

Intersection Approach	Speed Limit	AM Peak Hour			PM Peak Hour		
		V_R*	V_A*	Warrant Met?	V_R*	V_A*	Warrant Met?
2022 SB 231 onto Eady	50	3	676		11	823	
2022 NB 231 onto 82	50	58	608		53	669	
2022 SB 231 onto Frank Martin	50	32	768		21	888	
2022 SB 231 onto Whiteside	50	7	757		12	988	
2032 SB 231 onto Eady	50	3	784		13	955	
2032 NB 231 onto 82	50	67	706		62	776	
2032 SB 231 onto Frank Martin	50	37	891		24	1031	
2032 SB 231 onto Whiteside	50	8	878		14	1147	

V_R = Right Turn Volumes, V_A = Advancing Volumes



Right Turn Lane Warrant Analysis Results, continued

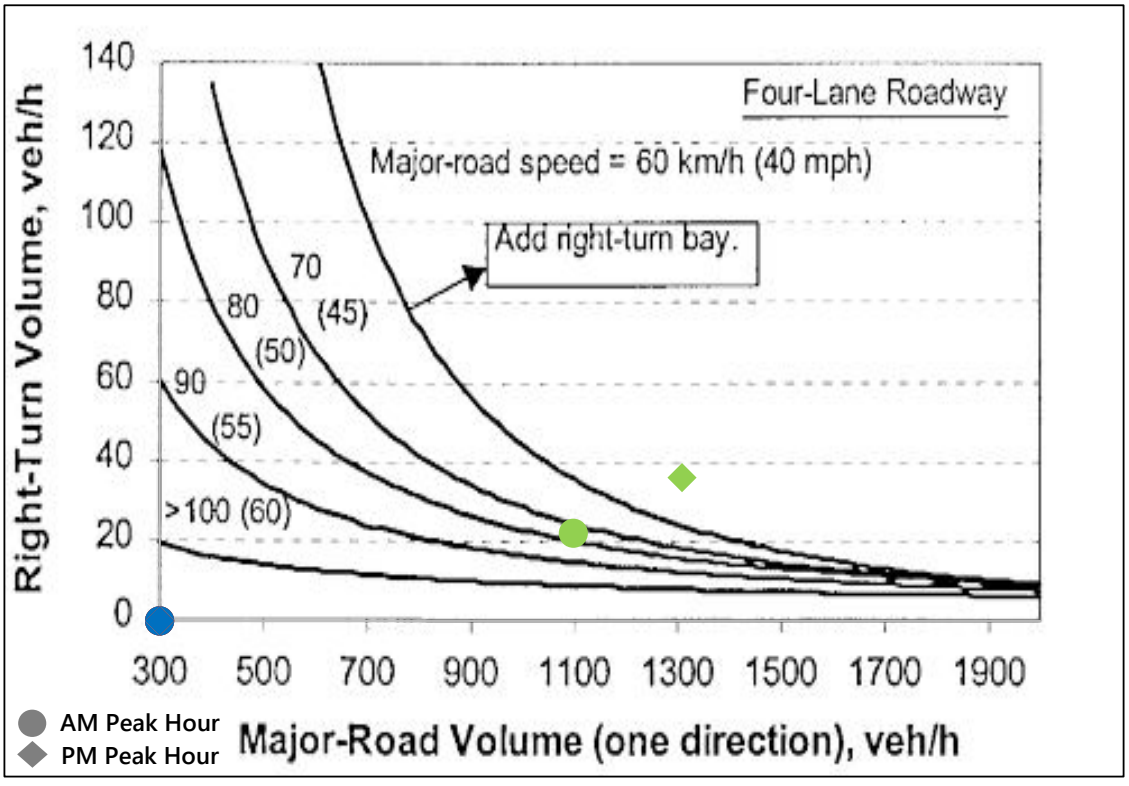
Projected Conditions (Peak Hours) - **Four-Lane Roadway**

RIGHT-TURN LANE WARRANT ANALYSIS

(Based on NCHRP 457: Evaluating Intersection Improvements)

Intersection Approach	Speed Limit	AM Peak Hour			PM Peak Hour		
		V_R*	V_A*	Warrant Met?	V_R*	V_A*	Warrant Met?
SB 231 onto Whiteside	50	22	1098	Y	36	1308	Y

V_R = Right Turn Volumes, V_A = Advancing Volumes



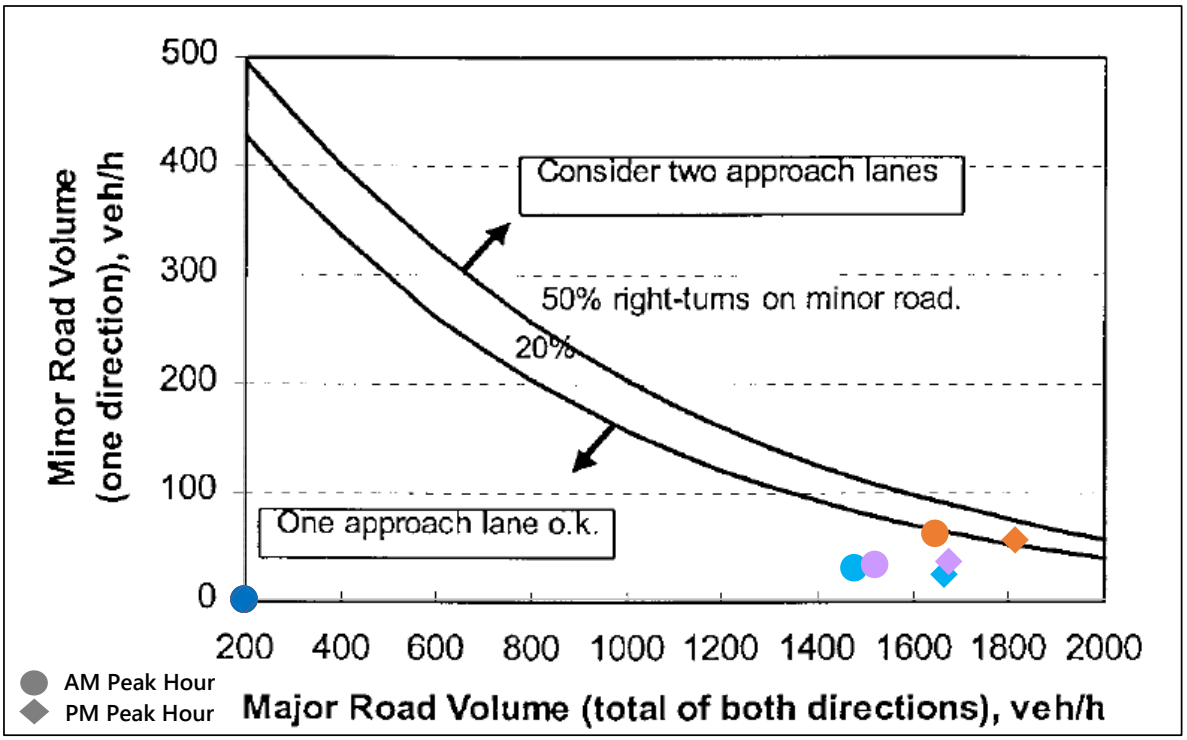
Two Lane Warrant Analysis Results

Projected Conditions (Peak Hours) - **Year 2022**

MINOR APPROACH ANALYSES

(Based on Intersection Channelization Design Guide)

Approach - Intersection		AM Peak Hour			PM Peak Hour		
		Minor Road Volume	Major Road Volume	2-Lane Approach?	Minor Road Volume	Major Road Volume	2-Lane Approach?
2022 US 231/Eady Rd		29	1474	N	23	1662	N
2022 US231/Frank Martin		32	1517	N	35	1672	N
2022 US 231/Whiteside		61	1643	N	55	1810	N
Major Street and Site Access							
Major Street and Site Access							
Major Street and Site Access							
Major Street and Site Access							



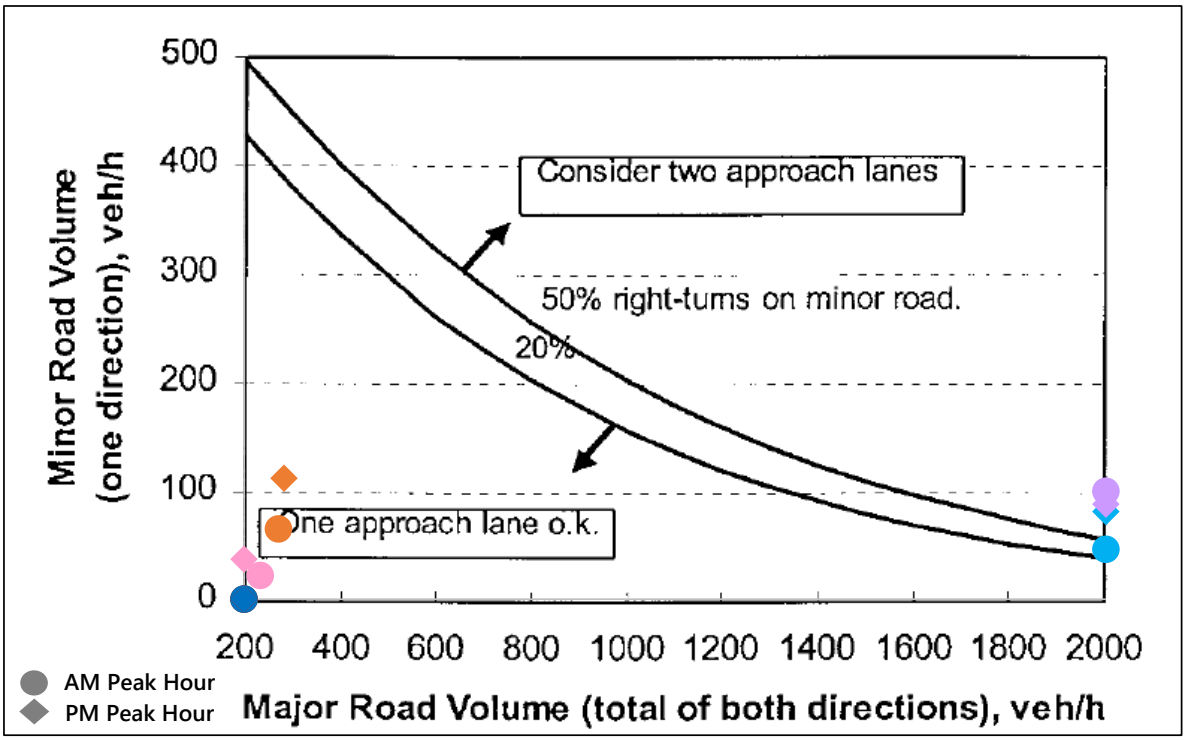
Two Lane Warrant Analysis Results

Projected Conditions (Peak Hours) - **Year 2032**

MINOR APPROACH ANALYSES

(Based on Intersection Channelization Design Guide)

Approach - Intersection	AM Peak Hour			PM Peak Hour		
	Minor Road Volume	Major Road Volume	2-Lane Approach?	Minor Road Volume	Major Road Volume	2-Lane Approach?
EB Frank Martin Road at US 231	46	2329	N	81	2283	Y
EB Whiteside at US 231	100	2423	Y	88	2434	Y
WB Whiteside at Midland	65	272	N	112	283	N
WB Eady at Midland	22	234	N	37	186	N



Appendix E – Priority Concept Plans and Cost Estimates

Near-Term Recommended Improvements - Midland Road at Frank Martin Road

GRAPHIC SCALE

0' 100' 200'

COST ESTIMATE SUMMARY

Route:	Midland Road and Frank Martin Road
Termini:	
Scope of Work:	
Project Type of Work:	Safety
County:	Bedford
Length:	0.10 Miles
Date:	May 4, 2023
Estimate Type:	Concept

DESCRIPTION		LOCAL 0%	STATE 0%	FEDERAL 0%	TOTAL
Construction Items					
Removal Items		$0	$0	$0	$0
Asphalt Paving		$0	$0	$0	$1,400
Concrete Pavement		$0	$0	$0	$0
Drainage		$0	$0	$0	$0
Appurtenances		$0	$0	$0	$0
Structures		$0	$0	$0	$0
Fencing		$0	$0	$0	$0
Signalization & Lighting		$0	$0	$0	$15,700
Railroad Crossing		$0	$0	$0	$0
Earthwork		$0	$0	$0	$300
Clearing and Grubbing		$0	$0	$0	$0
Seeding & Sodding		$0	$0	$0	$0
Rip-Rap or Slope Protection		$0	$0	$0	$0
Guardrail		$0	$0	$0	$0
Signing		$0	$0	$0	$2,800
Pavement Markings		$0	$0	$0	$1,700
Maintenance of Traffic		$0	$0	$0	$900
Mobilization	5%	$0	$0	$0	$1,140
Other Items and Annual Inflation	10%	$0	$0	$0	$2,390
Const. Contingency (Structures Not Included)	30%	$0	$0	$0	$7,900
Const. Eng. & Inspec.	10%	$0	$0	$0	$3,420
Construction Estimate		$0	$0	$0	$37,700
Interchanges & Unique Intersections					
Roundabouts		$0	$0	$0	$0
Interchanges		$0	$0	$0	$0
Right-of-Way & Utilties		**LOCAL 0%**	**STATE 0%**	**FEDERAL 0%**	**TOTAL**
Right-of-Way		$0	$0	$0	$0
Utilities		$0	$0	$0	$0
Preliminary Engineering		**LOCAL 0%**	**STATE 0%**	**FEDERAL 0%**	**TOTAL**
Prelim. Eng.	20.0%	$0	$0	$0	$7,530
Total Project Cost (2021)		$ -	$ -	$ -	$ 45,200

N

GRAPHIC SCALE

0' 150' 300'

Near-Term Recommended Improvements - Old Nashville Dirt Road at Shaw Road/Peacock Lane

COST ESTIMATE SUMMARY

Route:	Old Nashville Dirt Road at Shaw Road/Peacock Lane
Termini:	
Scope of Work:	
Project Type of Work:	Safety
County:	Bedford
Length:	0.10 Miles
Date:	May 4, 2023
Estimate Type:	Concept

DESCRIPTION		LOCAL 0%	STATE 0%	FEDERAL 0%	TOTAL
Construction Items					
Removal Items		$0	$0	$0	$0
Asphalt Paving		$0	$0	$0	$24,300
Concrete Pavement		$0	$0	$0	$0
Drainage		$0	$0	$0	$0
Appurtenances		$0	$0	$0	$0
Structures		$0	$0	$0	$0
Fencing		$0	$0	$0	$0
Signalization & Lighting		$0	$0	$0	$0
Railroad Crossing		$0	$0	$0	$0
Earthwork		$0	$0	$0	$4,000
Clearing and Grubbing		$0	$0	$0	$0
Seeding & Sodding		$0	$0	$0	$0
Rip-Rap or Slope Protection		$0	$0	$0	$0
Guardrail		$0	$0	$0	$0
Signing		$0	$0	$0	$2,900
Pavement Markings		$0	$0	$0	$3,500
Maintenance of Traffic		$0	$0	$0	$1,400
Mobilization	5%	$0	$0	$0	$1,810
Other Items and Annual Inflation	10%	$0	$0	$0	$3,790
Const. Contingency (Structures Not Included)	30%	$0	$0	$0	$12,500
Const. Eng. & Inspec.	10%	$0	$0	$0	$5,420
Construction Estimate		$0	$0	$0	$59,600
Interchanges & Unique Intersections					
Roundabouts		$0	$0	$0	$0
Interchanges		$0	$0	$0	$0
Right-of-Way & Utilties		**LOCAL 0%**	**STATE 0%**	**FEDERAL 0%**	**TOTAL**
Right-of-Way		$0	$0	$0	$0
Utilities		$0	$0	$0	$0
Preliminary Engineering		**LOCAL 0%**	**STATE 0%**	**FEDERAL 0%**	**TOTAL**
Prelim. Eng.	20.0%	$0	$0	$0	$11,900
Total Project Cost (2021)		$ -	$ -	$ -	$ 71,500

**Does not include stormwater infrastructure, cost for shoulder widening only*

Near-Term Recommended Improvements-SR 82/US 231 at Nearest Green Distillery

N

GRAPHIC SCALE

0' 70' 140'

COST ESTIMATE SUMMARY

Route:	SR 82/US 231 at Nearest Green Distillery
Termini:	
Scope of Work:	
Project Type of Work:	Safety
County:	Bedford
Length:	0.10 Miles
Date:	May 4, 2023
Estimate Type:	Concept

TN TDOT Department of Transportation

DESCRIPTION		LOCAL 0%	STATE 0%	FEDERAL 0%	TOTAL
Construction Items					
Removal Items		$0	$0	$0	$0
Asphalt Paving		$0	$0	$0	$0
Concrete Pavement		$0	$0	$0	$0
Drainage		$0	$0	$0	$0
Appurtenances		$0	$0	$0	$0
Structures		$0	$0	$0	$0
Fencing		$0	$0	$0	$0
Signalization & Lighting		$0	$0	$0	$0
Railroad Crossing		$0	$0	$0	$0
Earthwork		$0	$0	$0	$0
Clearing and Grubbing		$0	$0	$0	$0
Seeding & Sodding		$0	$0	$0	$0
Rip-Rap or Slope Protection		$0	$0	$0	$0
Guardrail		$0	$0	$0	$0
Signing		$0	$0	$0	$3,000
Pavement Markings		$0	$0	$0	$300
Maintenance of Traffic		$0	$0	$0	$200
Mobilization	5%	$0	$0	$0	$175
Other Items and Annual Inflation	10%	$0	$0	$0	$368
Const. Contingency (Structures Not Included)	30%	$0	$0	$0	$1,210
Const. Eng. & Inspec.	10%	$0	$0	$0	$525
Construction Estimate		$0	$0	$0	$5,780
Interchanges & Unique Intersections					
Roundabouts		$0	$0	$0	$0
Interchanges		$0	$0	$0	$0
Right-of-Way & Utilties		LOCAL 0%	STATE 0%	FEDERAL 0%	TOTAL
Right-of-Way		$0	$0	$0	$0
Utilities		$0	$0	$0	$0
Preliminary Engineering		LOCAL 0%	STATE 0%	FEDERAL 0%	TOTAL
Prelim. Eng.	20.0%	$0	$0	$0	$1,160
Total Project Cost (2021)		$ -	$ -	$ -	$ 6,940

N

Alternative Recommended Improvements-SR 82/US 231 at Nearest Green Distillery

GRAPHIC SCALE

0' 110' 220'

COST ESTIMATE SUMMARY

Route:	SR 82/US 231 at Nearest Green Distillery, Long-term alternative
Termini:	
Scope of Work:	
Project Type of Work:	Safety
County:	Bedford
Length:	0.04 Miles
Date:	May 4, 2023
Estimate Type:	Concept

DESCRIPTION		LOCAL 0%	STATE 0%	FEDERAL 0%	TOTAL
Construction Items					
Removal Items		$0	$0	$0	$200
Asphalt Paving		$0	$0	$0	$299,000
Concrete Pavement		$0	$0	$0	$1,500
Drainage		$0	$0	$0	$39,500
Appurtenances		$0	$0	$0	$11,100
Structures		$0	$0	$0	$0
Fencing		$0	$0	$0	$0
Signalization & Lighting		$0	$0	$0	$0
Railroad Crossing		$0	$0	$0	$0
Earthwork		$0	$0	$0	$119,000
Clearing and Grubbing		$0	$0	$0	$0
Seeding & Sodding		$0	$0	$0	$800
Rip-Rap or Slope Protection		$0	$0	$0	$0
Guardrail		$0	$0	$0	$500
Signing		$0	$0	$0	$3,900
Pavement Markings		$0	$0	$0	$16,400
Maintenance of Traffic		$0	$0	$0	$20,000
Mobilization	5%	$0	$0	$0	$25,600
Other Items and Annual Inflation	10%	$0	$0	$0	$53,800
Const. Contingency (Structures Not Included)	30%	$0	$0	$0	$177,000
Const. Eng. & Inspec.	10%	$0	$0	$0	$76,800
Construction Estimate		$0	$0	$0	$845,000
Interchanges & Unique Intersections					
Roundabouts		$0	$0	$0	$0
Interchanges		$0	$0	$0	$0
Right-of-Way & Utilties		LOCAL 0%	STATE 0%	FEDERAL 0%	TOTAL
Right-of-Way		$0	$0	$0	$0
Utilities		$0	$0	$0	$0
Preliminary Engineering		LOCAL 0%	STATE 0%	FEDERAL 0%	TOTAL
Prelim. Eng.	20.0%	$0	$0	$0	$169,000
Total Project Cost (2021)		$ -	$ -	$ -	$ 1,010,000

Midland Road at Frank Martin Road

R1-1
30" X 30"

W4-4P
24" X 12"

W2-1
30" X 30"

Old Nashville Dirt Road at Shaw Road/Peacock Lane

R1-1
30" X 30"

W2-2
30" X 30"

W1-10
36" X 36"

SR 82/US 231 at Nearest Green Distillery

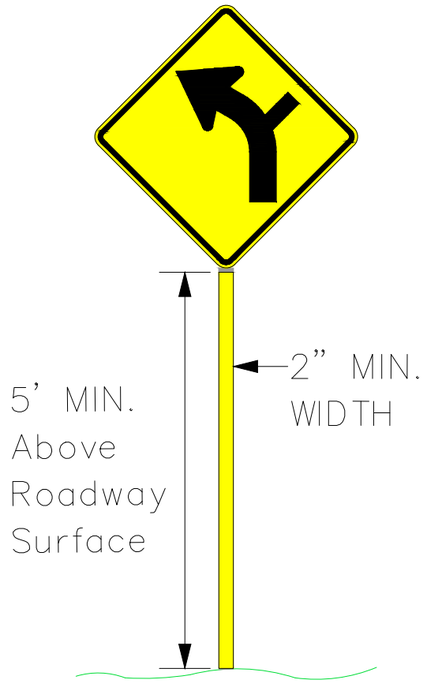
R1-1
30" X 30"

R5-1A
42" X 30"

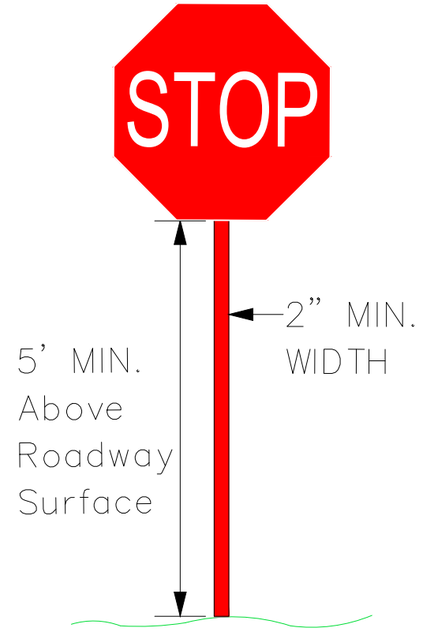
R6-1R
36" X 12"

R5-1
36" X 36"

R3-5R
30" X 36"



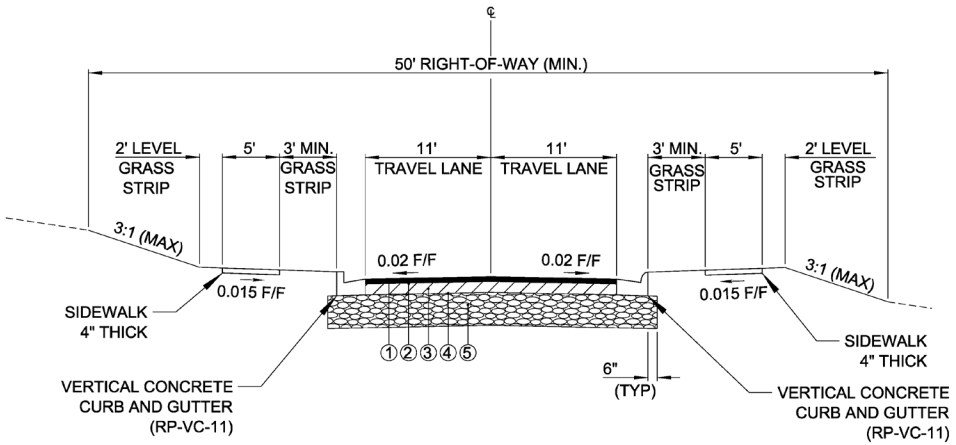
REFLECTIVE STRIP ON
INTERSECTION WARNING
(W2-1) SIGN POST
(YELLOW)



REFLECTIVE STRIP ON
STOP (R1-1) SIGN POST
(RED)

TDOT Standard Intersection Pavement Markings T-M-4
TDOT Standard Ground Mounted Roadside Sign Placement Details T-S-16
TDOT Details of Pavement Markings For Conventional Roads and Marking Abbreviations T-M-1

Appendix F – Roadway Typical Sections



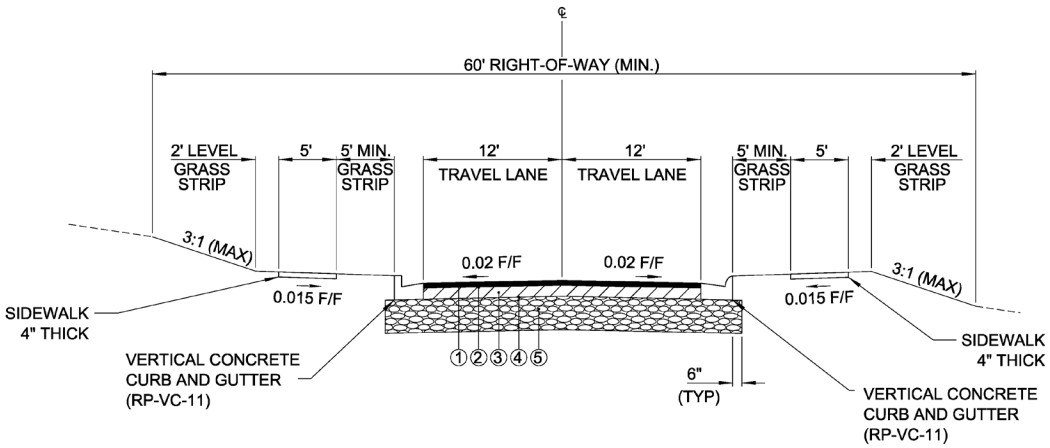
URBAN LOCAL ROADS

(DESIGN SPEED 25 - 35 MPH)

NOTES:

1. THE PAVEMENT DESIGN SHOWN IS THE MINIMUM ALLOWED. A DESIGN ANALYSIS IS REQUIRED TO DETERMINE PAVEMENT THICKNESSES. SEE THE TDOT PAVEMENT DESIGN GUIDELINES FOR ADDITIONAL INFORMATION.
2. EITHER CURB AND GUTTER OPTION MAY BE USED.
3. UNDERDRAIN TO BE USED ON BOTH SIDES OF THE ROAD. SEE DETAIL FOR ADDITIONAL INFORMATION.

MINIMUM PAVEMENT DESIGN
① **ASPHALTIC CONCRETE SURFACE (HOT MIX) PG64-22 GRADING "D" SURFACE @ 1.25" THICK (APPROX. 132.5 LB./S.Y.)** 411-01.10 ACS MIX (PG64-22) GRADING "D"
② **TACK COAT** 403-01 BITUMINOUS MATERIAL FOR TACK COAT (TC) AT 0.07 GALLONS/S.Y.
③ **BITUMINOUS PLANT MIX BASE (HOT MIX) PG64-22 GRADING "B-M" @ 3.25" THICK (APPROX. 367 LB./S.Y.)** 307-01.07 ASPHALT CONCRETE MIX (PG64-22) (BPMB-HM) GRADING "B-M"
④ **PRIME COAT** 402-01 BITUMINOUS MATERIAL FOR PRIME COAT (PC) AT 0.35 GALLONS/S.Y. 402-02 AGGREGATE FOR COVER MATERIAL (PC) AT 12 LB./S.Y.
⑤ **MINERAL AGGREGATE 6" THICK** 303-01 MINERAL AGGREGATE, TYPE "A" BASE, GRADING "D"



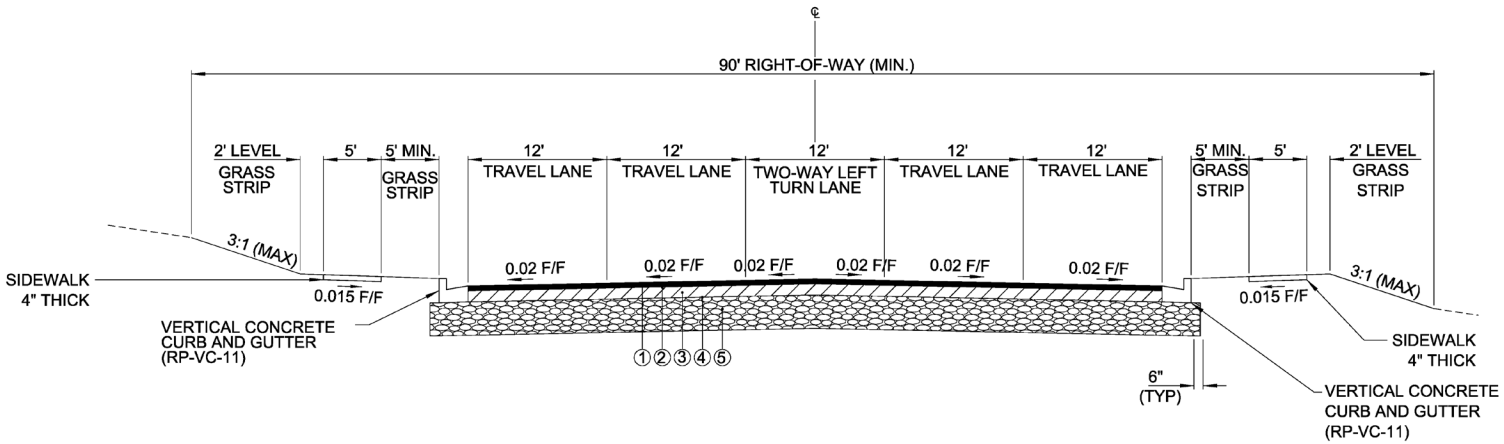
URBAN COLLECTOR ROADS

(DESIGN SPEED 30 - 45 MPH)

NOTES:

1. THE PAVEMENT DESIGN SHOWN IS THE MINIMUM ALLOWED. A DESIGN ANALYSIS IS REQUIRED TO DETERMINE PAVEMENT THICKNESSES. SEE THE TDOT PAVEMENT DESIGN GUIDELINES FOR ADDITIONAL INFORMATION.
2. THE SLOPING CONCRETE CURB AND GUTTER OPTION MAY ONLY BE USED IN RESIDENTIAL AREAS.
3. UNDERDRAIN TO BE USED ON BOTH SIDES OF THE ROAD. SEE DETAIL FOR ADDITIONAL INFORMATION.
4. ADD 12' FOR EACH ADDITIONAL LANE.
5. THE ASPHALT BASE MAY BE REDUCED TO 3" THICK IN RESIDENTIAL AREAS.

MINIMUM PAVEMENT DESIGN	
① **ASPHALTIC CONCRETE SURFACE (HOT MIX) PG64-22 GRADING "D" SURFACE @ 1.50" THICK (APPROX. 159 LB./S.Y.)**	
411-01.10	ACS MIX (PG64-22) GRADING "D"
② **TACK COAT**	
403-01	BITUMINOUS MATERIAL FOR TACK COAT (TC) AT 0.07 GALLONS/S.Y.
③ **BITUMINOUS PLANT MIX BASE (HOT MIX) PG64-22 GRADING "B-M" @ 4.00" THICK (APPROX. 452 LB./S.Y.)**	
307-01.07	ASPHALT CONCRETE MIX (PG64-22) (BPMB-HM) GRADING "B-M"
④ **PRIME COAT**	
402-01	BITUMINOUS MATERIAL FOR PRIME COAT (PC) AT 0.35 GALLONS/S.Y.
402-02	AGGREGATE FOR COVER MATERIAL (PC) AT 12 LB./S.Y.
⑤ **MINERAL AGGREGATE 8" THICK**	
303-01	MINERAL AGGREGATE, TYPE "A" BASE, GRADING "D"



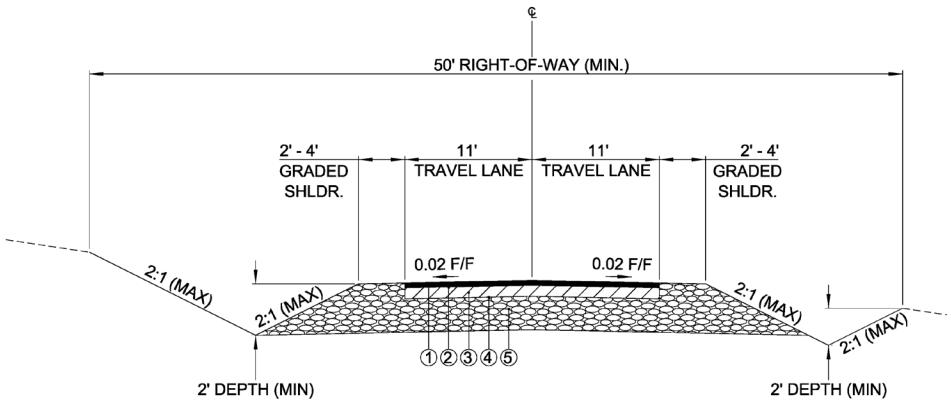
URBAN ARTERIAL ROADS

(DESIGN SPEED 40 - 45 MPH)

NOTES:

1. THE PAVEMENT DESIGN SHOWN IS THE MINIMUM ALLOWED. A DESIGN ANALYSIS IS REQUIRED TO DETERMINE PAVEMENT THICKNESSES. SEE THE TDOT PAVEMENT DESIGN GUIDELINES FOR ADDITIONAL INFORMATION. IF AADT IS ABOVE 10,000 VPD, USE A PG 70-22 BINDER.
2. UNDERDRAIN TO BE USED ON BOTH SIDES OF THE ROAD. SEE DETAIL FOR ADDITIONAL INFORMATION.
3. ADD 12' FOR EACH ADDITIONAL LANE.
4. TWO WAY LEFT TURN LANE MAY BE OMITTED WITH APPROVAL FROM THE COUNTY ENGINEER.

MINIMUM PAVEMENT DESIGN	
① **ASPHALTIC CONCRETE SURFACE (HOT MIX) PG64-22 GRADING "D" SURFACE @ 1.50" THICK (APPROX. 159 LB./S.Y.)**	
411-01.10	ACS MIX (PG64-22) GRADING "D"
② **TACK COAT**	
403-01	BITUMINOUS MATERIAL FOR TACK COAT (TC) AT 0.07 GALLONS/S.Y.
③ **BITUMINOUS PLANT MIX BASE (HOT MIX) PG64-22 GRADING "B-M" @ 4.50" THICK (APPROX. 508 LB./S.Y.)**	
307-01.07	ASPHALT CONCRETE MIX (PG64-22) (BPMB-HM) GRADING "B-M"
④ **PRIME COAT**	
402-01	BITUMINOUS MATERIAL FOR PRIME COAT (PC) AT 0.35 GALLONS/S.Y.
402-02	AGGREGATE FOR COVER MATERIAL (PC) AT 12 LB./S.Y.
⑤ **MINERAL AGGREGATE 10" THICK**	
303-01	MINERAL AGGREGATE, TYPE "A" BASE, GRADING "D"



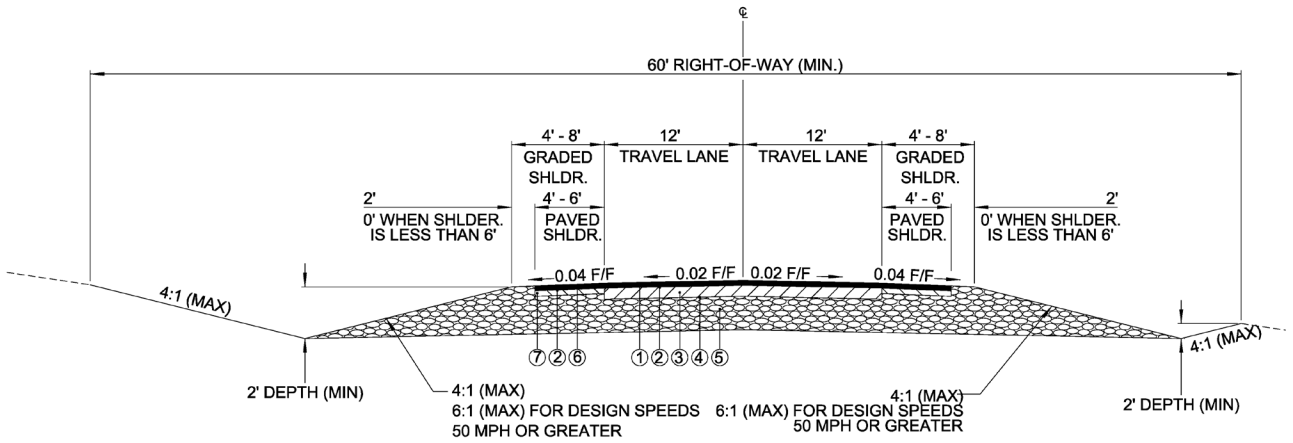
RURAL LOCAL ROADS

(DESIGN SPEED 25 - 50 MPH)

NOTES:

1. THE PAVEMENT DESIGN SHOWN IS THE MINIMUM ALLOWED. A DESIGN ANALYSIS IS REQUIRED TO DETERMINE PAVEMENT THICKNESSES. SEE THE TDOT PAVEMENT DESIGN GUIDELINES FOR ADDITIONAL INFORMATION.

MINIMUM PAVEMENT DESIGN	
① **ASPHALTIC CONCRETE SURFACE (HOT MIX) PG64-22 GRADING "D" SURFACE @ 1.25" THICK (APPROX. 132.5 LB./S.Y.)**	
411-01.10	ACS MIX (PG64-22) GRADING "D"
② **TACK COAT**	
403-01	BITUMINOUS MATERIAL FOR TACK COAT (TC) AT 0.07 GALLONS/S.Y.
③ **BITUMINOUS PLANT MIX BASE (HOT MIX) PG64-22 GRADING "B-M" @ 3.25" THICK (APPROX. 367 LB./S.Y.)**	
307-01.07	ASPHALT CONCRETE MIX (PG64-22) (BPMB-HM) GRADING "B-M"
④ **PRIME COAT**	
402-01	BITUMINOUS MATERIAL FOR PRIME COAT (PC) AT 0.35 GALLONS/S.Y.
402-02	AGGREGATE FOR COVER MATERIAL (PC) AT 12 LB./S.Y.
⑤ **MINERAL AGGREGATE 6" THICK**	
303-01	MINERAL AGGREGATE, TYPE "A" BASE, GRADING "D"



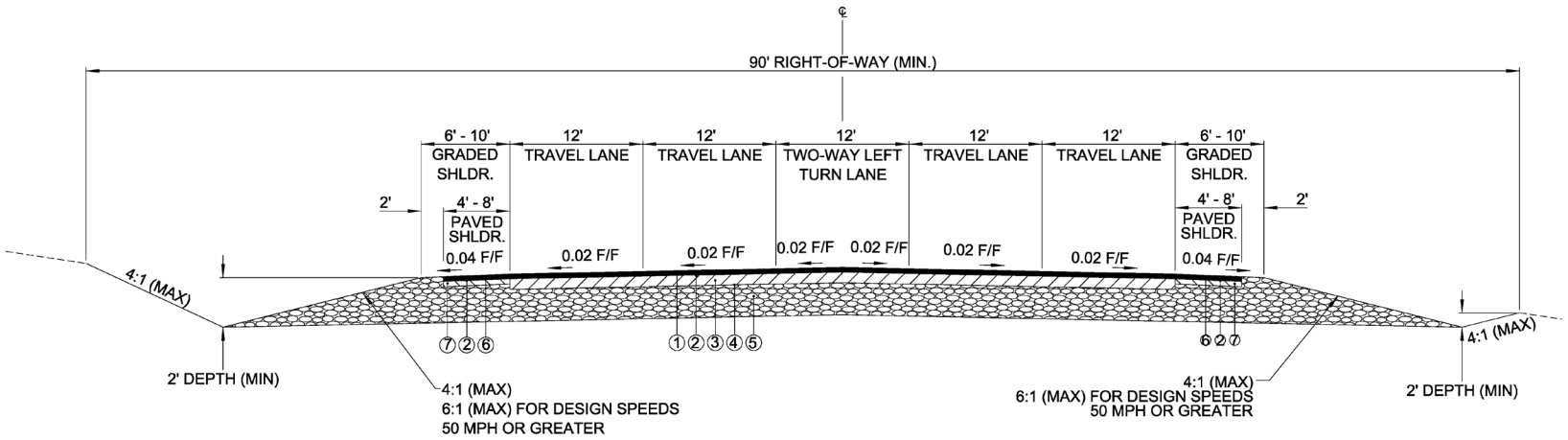
RURAL COLLECTOR ROADS

(DESIGN SPEED 30 - 60 MPH)

NOTES:

1. THE PAVEMENT DESIGN SHOWN IS THE MINIMUM ALLOWED. A DESIGN ANALYSIS IS REQUIRED TO DETERMINE PAVEMENT THICKNESSES. SEE THE TDOT PAVEMENT DESIGN GUIDELINES FOR ADDITIONAL INFORMATION.
2. ADD 12' FOR EACH ADDITIONAL LANE.
3. THE ASPHALT BASE MAY BE REDUCED TO 3" THICK IN RESIDENTIAL AREAS.

MINIMUM PAVEMENT DESIGN
① **ASPHALTIC CONCRETE SURFACE (HOT MIX) PG64-22 GRADING "D" SURFACE @ 1.50" THICK (APPROX. 159 LB./S.Y.)** 411-01.10 ACS MIX (PG64-22) GRADING "D"
② **TACK COAT** 403-01 BITUMINOUS MATERIAL FOR TACK COAT (TC) AT 0.07 GALLONS/S.Y.
③ **BITUMINOUS PLANT MIX BASE (HOT MIX) PG64-22 GRADING "B-M" @ 4.00" THICK (APPROX. 452 LB./S.Y.)** 307-01.07 ASPHALT CONCRETE MIX (PG64-22) (BPMB-HM) GRADING "B-M"
④ **PRIME COAT** 402-01 BITUMINOUS MATERIAL FOR PRIME COAT (PC) AT 0.35 GALLONS/S.Y. 402-02 AGGREGATE FOR COVER MATERIAL (PC) AT 12 LB./S.Y.
⑤ **MINERAL AGGREGATE 8" THICK** 303-01 MINERAL AGGREGATE, TYPE "A" BASE, GRADING "D"
⑥ **ASPHALTIC CONCRETE SURFACE (HOT MIX) PG64-22 GRADING "E" SHOULDERS @ 1.50" THICK (APPROX. 159 LB./S.Y.)** 411-01.07 ACS MIX (PG64-22) GRADING "E" SHOULDER
⑦ **BITUMINOUS PLANT MIX BASE (HOT MIX) PG64-22 GRADING "B-M" @ 1.50" THICK (APPROX. 170 LB./S.Y.)** 307-01.07 ASPHALT CONCRETE MIX (PG64-22) (BPMB-HM) GRADING "B-M"



RURAL ARTERIAL ROADS

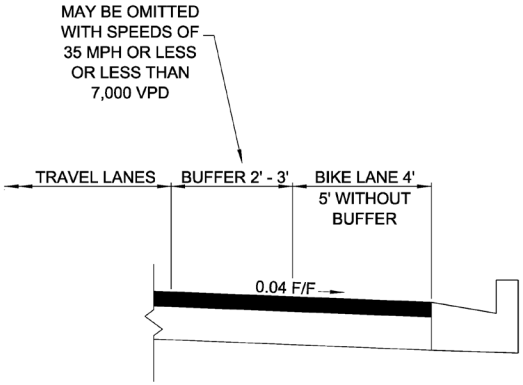
(DESIGN SPEED 40 - 70 MPH)

NOTES:

1. THE PAVEMENT DESIGN SHOWN IS THE MINIMUM ALLOWED. A DESIGN ANALYSIS IS REQUIRED TO DETERMINE PAVEMENT THICKNESSES. SEE THE TDOT PAVEMENT DESIGN GUIDELINES FOR ADDITIONAL INFORMATION. IF AADT IS ABOVE 10,000 VPD, USE A PG 70-22 BINDER.
2. ADD 12' FOR EACH ADDITIONAL LANE.
3. TWO WAY LEFT TURN LANE MAY BE OMITTED WITH APPROVAL FROM THE COUNTY ENGINEER.
4. A SINGLE LANE IN EACH DIRECTION MAY BE USED IF SUPPORTED BY TRAFFIC DEAMAND AND WITH APPROVAL OF THE COUNTY ENGINEER.

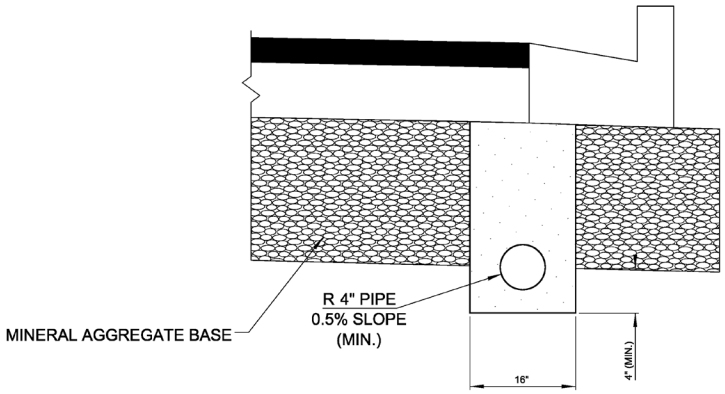
MINIMUM PAVEMENT DESIGN

①	**ASPHALTIC CONCRETE SURFACE (HOT MIX) PG64-22 GRADING "D" SURFACE @ 1.50" THICK (APPROX. 159 LB./S.Y.)** 411-01.10 ACS MIX (PG64-22) GRADING "D"
②	**TACK COAT** 403-01 BITUMINOUS MATERIAL FOR TACK COAT (TC) AT 0.07 GALLONS/S.Y.
③	**BITUMINOUS PLANT MIX BASE (HOT MIX) PG64-22 GRADING "B-M" @ 4.50" THICK (APPROX. 508 LB./S.Y.)** 307-01.07 ASPHALT CONCRETE MIX (PG64-22) (BPMB-HM) GRADING "B-M"
④	**PRIME COAT** 402-01 BITUMINOUS MATERIAL FOR PRIME COAT (PC) AT 0.35 GALLONS/S.Y. 402-02 AGGREGATE FOR COVER MATERIAL (PC) AT 12 LB./S.Y.
⑤	**MINERAL AGGREGATE 10" THICK** 303-01 MINERAL AGGREGATE, TYPE "A" BASE, GRADING "D"
⑥	**ASPHALTIC CONCRETE SURFACE (HOT MIX) PG64-22 GRADING "E" SHOULDERS @ 1.50" THICK (APPROX. 159 LB./S.Y.)** 411-01.07 ACS MIX (PG64-22) GRADING "E" SHOULDER
⑦	**BITUMINOUS PLANT MIX BASE (HOT MIX) PG64-22 GRADING "B-M" @ 1.50" THICK (APPROX. 170 LB./S.Y.)** 307-01.07 ASPHALT CONCRETE MIX (PG64-22) (BPMB-HM) GRADING "B-M"



BIKE LANE DETAIL

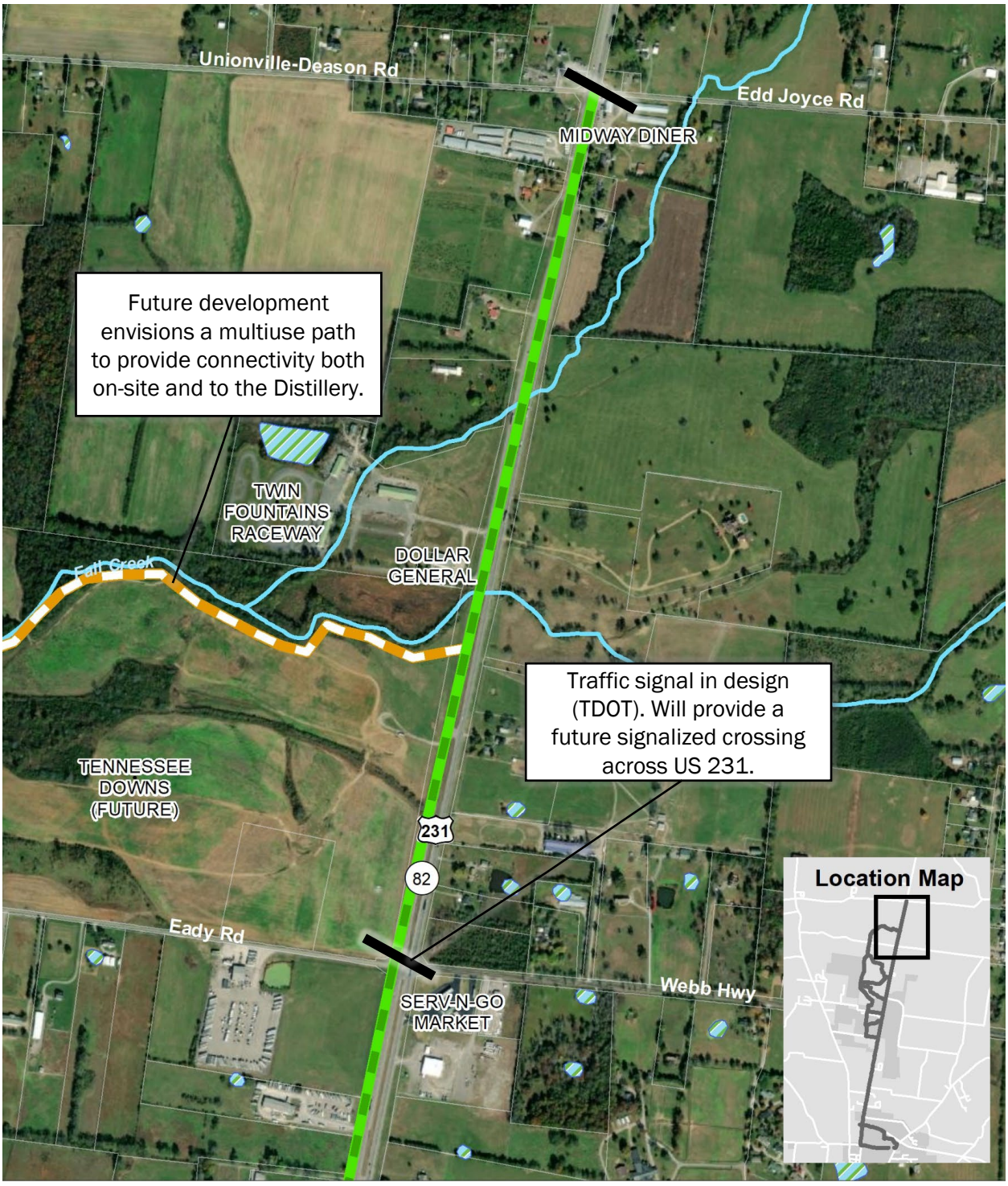
WHEN REQUESTED



UNDERDRAIN DETAIL

MAY BE OMITED WHEN MINERAL AGGREGATE IS DAYLIGHTED TO DITCH
SEE TDOT STANDARD DRAWING RD-UD SERIES FOR ADDITIONAL INFORMATION

Appendix G – Multiuse Path Concept Plans and Cost Estimate



Segment A

0 0.25 0.5 Mile

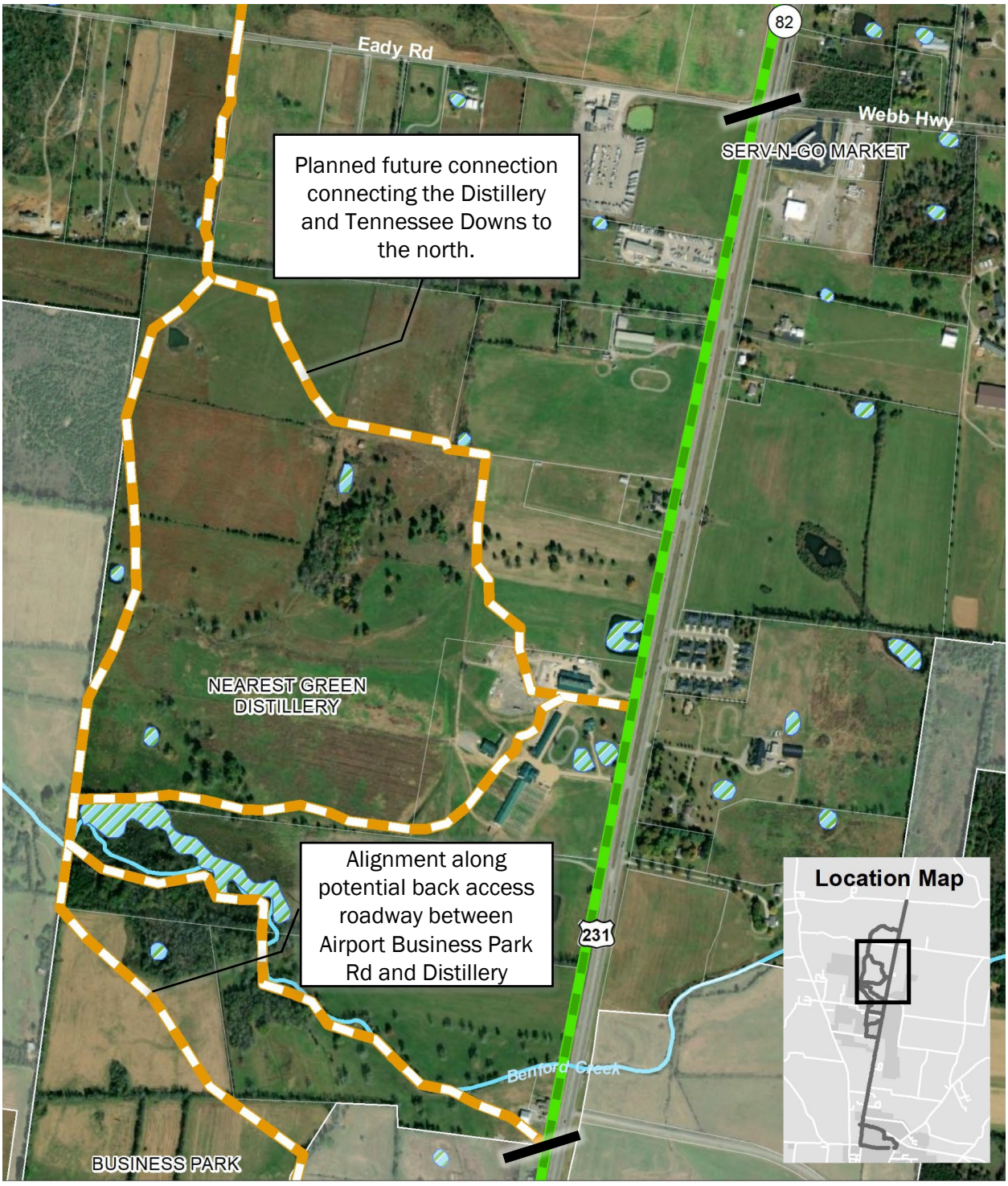
N

Legend

Preferred Alignment
Optional Alignment
Stream
Wetland
Parcel Line
Segment Termini

UNIONVILLE-DEASON ROAD TO EADY ROAD/SR 82

Project Description		Measurement Unit	Avg. Cost / Unit	Cost for Proposed Recommendations	Cost Estimate Rounded Up to Nearest Tens Place	Contingency (40%) - Construction + Construction Engineering [from TDOT 2022 Cost Tool]	Cost Estimate + Contingency [TOTAL]	Final Estimate Rounded Up to Nearest Tens Place	Avg. Cost Source [2022]	Notes/Assumptions
New Greenway (10') Construction						***0.4***				10' width; Assumes asphalt; Assumes no addition of curb and gutter; Does not include culverts, retaining walls, traffic control, etc.
	MINERAL AGGREGATE, TYPE A BASE, GRADING D	7,369	TON	$ 35.00	$ 257,911.50				TDOT AUP 2022	Assumes 6" thickness
	BITUMINOUS MATERIAL FOR PRIME COAT (PC)	9	TON	$ 280.00	$ 2,503.11				TDOT AUP 2022	Assumes 0.1" thickness
	AGGREGATE FOR COVER MATERIAL (PC)	32	TON	$ 80.00	$ 2,581.33				TDOT AUP 2022	Assumes 0.1" thickness
	ASPHALT CONCRETE MIX GRADING B-M2	729	TON	$ 115.00	$ 83,861.07				TDOT AUP 2022	Assumes 3" thickness
	BITUMINOUS MATERIAL FOR TACK COAT (TC)	2	TON	$ 830.00	$ 1,623.11				TDOT AUP 2022	Assumes 0.1" thickness
	ACS MIX (PG64-22) GRADING E SHOULDER	520	TON	$ 110.00	$ 57,233.00	***$ 405,713.12***			TDOT AUP 2022	Assumes 1.5" thickness
CONCRETE CURB RAMP		504	SF	$ 27.49	$ 13,854.96	$ 13,860.00			TDOT AUP 2022	Min size curb ramp (168 sf); 4 curb ramps
TRUNCATED DOME DETECTABLE WARNING MAT		24	SF	$ 43.68	$ 1,048.32	$ 1,050.00			TDOT AUP 2022	Assumes 3 total curb ramps (size 2' x 4')
PLASTIC PAVEMENT MARKING (CROSS-WALK)		165	LF	$ 9.86	$ 1,626.90	$ 1,630.00			TDOT AUP 2022	Assumes 2 crosswalks
SIGN		6	EACH	$ 325.00	$ 1,950.00	$ 1,950.00			TDOT AUP 2023	6 signs
DRIVEWAY SIDE DRAIN CULVERTS (24")		240	LF	$ 112.00	$ 26,880.00	$ 26,880.00			TDOT AUP 2022	40' LF for each driveway
BRIDGE CROSSING		2	EACH	$ 250,000.00	$ 500,000.00	$ 500,000.00			Engineering Estimate	Assumes 2 bridges
	SUB-TOTAL					**$ 951,083.12**	**$ 380,433.25**	**$ 1,331,516.37**	**$ 1,331,520.00**	



Segment B

Legend

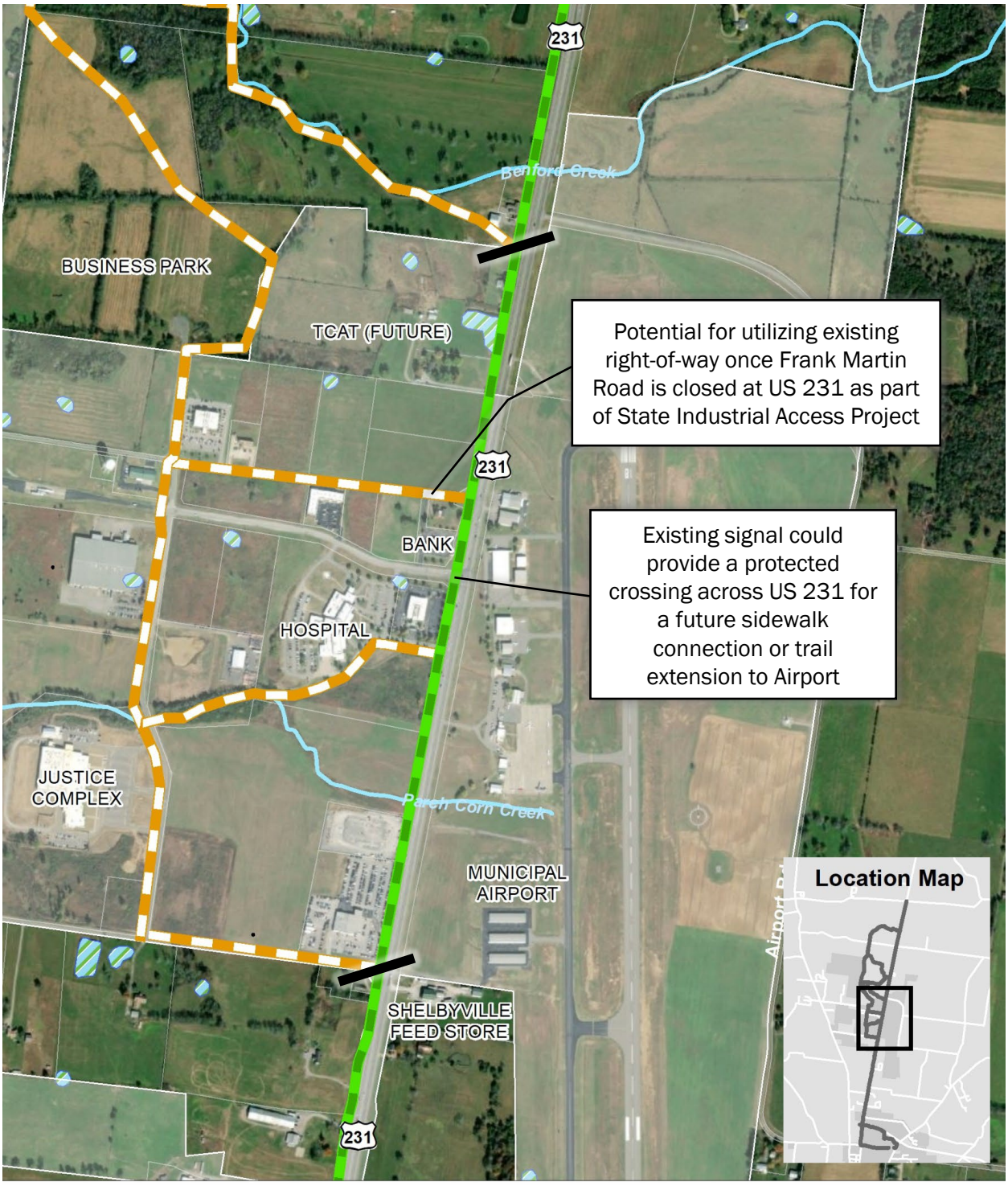
0 0.25 0.5 Mile

N

Preferred Alignment
Optional Alignment
Stream
Wetland
Parcel Line
Shelbyville Municipal Limits
Segment Termini

EADY ROAD TO TCAT DRIVEWAY

Project Description	Quantity	Measurement Unit	Avg. Cost / Unit	Cost for Proposed Recommendations	Cost Estimate Rounded Up to Nearest Tens Place	Contingency (40%) - Construction + Construction Engineering [from TDOT 2022 Cost Tool]	Cost Estimate + Contingency [TOTAL]	Final Estimate Rounded Up to Nearest Tens Place	Avg. Cost Source [2022]	Notes/Assumptions
New Greenway (10') Construction						***0.4***				10' width; Assumes asphalt; Assumes no addition of curb and gutter; Does not include culverts, retaining walls, traffic control, etc.
MINERAL AGGREGATE, TYPE A BASE, GRADING D	8,709	TON	$ 35.00	$ 304,804.50					TDOT AUP 2022	Assumes 6" thickness
BITUMINOUS MATERIAL FOR PRIME COAT (PC)	11	TON	$ 280.00	$ 2,958.22					TDOT AUP 2022	Assumes 0.1" thickness
AGGREGATE FOR COVER MATERIAL (PC)	38	TON	$ 80.00	$ 3,050.67					TDOT AUP 2022	Assumes 0.1" thickness
ASPHALT CONCRETE MIX GRADING B-M2	862	TON	$ 115.00	$ 99,108.53					TDOT AUP 2022	Assumes 3" thickness
BITUMINOUS MATERIAL FOR TACK COAT (TC)	2	TON	$ 830.00	$ 1,918.22					TDOT AUP 2022	Assumes 0.1" thickness
ACS MIX (PG64-22) GRADING E SHOULDER	615	TON	$ 110.00	$ 67,639.00	***$ 479,479.14***				TDOT AUP 2022	Assumes 1.5" thickness
CONCRETE CURB RAMP	672	SF	$ 27.49	$ 18,473.28	$ 18,480.00				TDOT AUP 2022	Min size curb ramp (168 sf); 4 curb ramps
TRUNCATED DOME DETECTABLE WARNING MAT	32	SF	$ 43.68	$ 1,397.76	$ 1,400.00				TDOT AUP 2022	Assumes 4 total curb ramps (size 2' x 4')
PLASTIC PAVEMENT MARKING (CROSS-WALK)	203	LF	$ 9.86	$ 2,001.58	$ 2,010.00				TDOT AUP 2022	Assumes 2 crosswalks
SIGN	14	EACH	$ 325.00	$ 4,550.00	$ 4,550.00				TDOT AUP 2023	14 signs
DRIVEWAY SIDE DRAIN CULVERTS (24")	360	LF	$ 112.00	$ 40,320.00	$ 40,320.00				TDOT AUP 2022	40' LF for each driveway; Assume TCAT, Distillery upgrade own
BRIDGE CROSSING	1	EACH	$ 250,000.00	$ 250,000.00	$ 250,000.00				Engineering Estimate	Assumes 1 bridge crossing
CONSTRUCTION STAKES, LINES AND GRADES	1	LS	$ 14,000.00	$ 14,000.00	$ 14,000.00				Engineering Estimate using TDOT Cost Tool	Lump sum
SUB-TOTAL					**$ 810,239.14**	**$ 324,095.66**	**$ 1,134,334.80**	**$ 1,134,340.00**		



Segment C

Legend

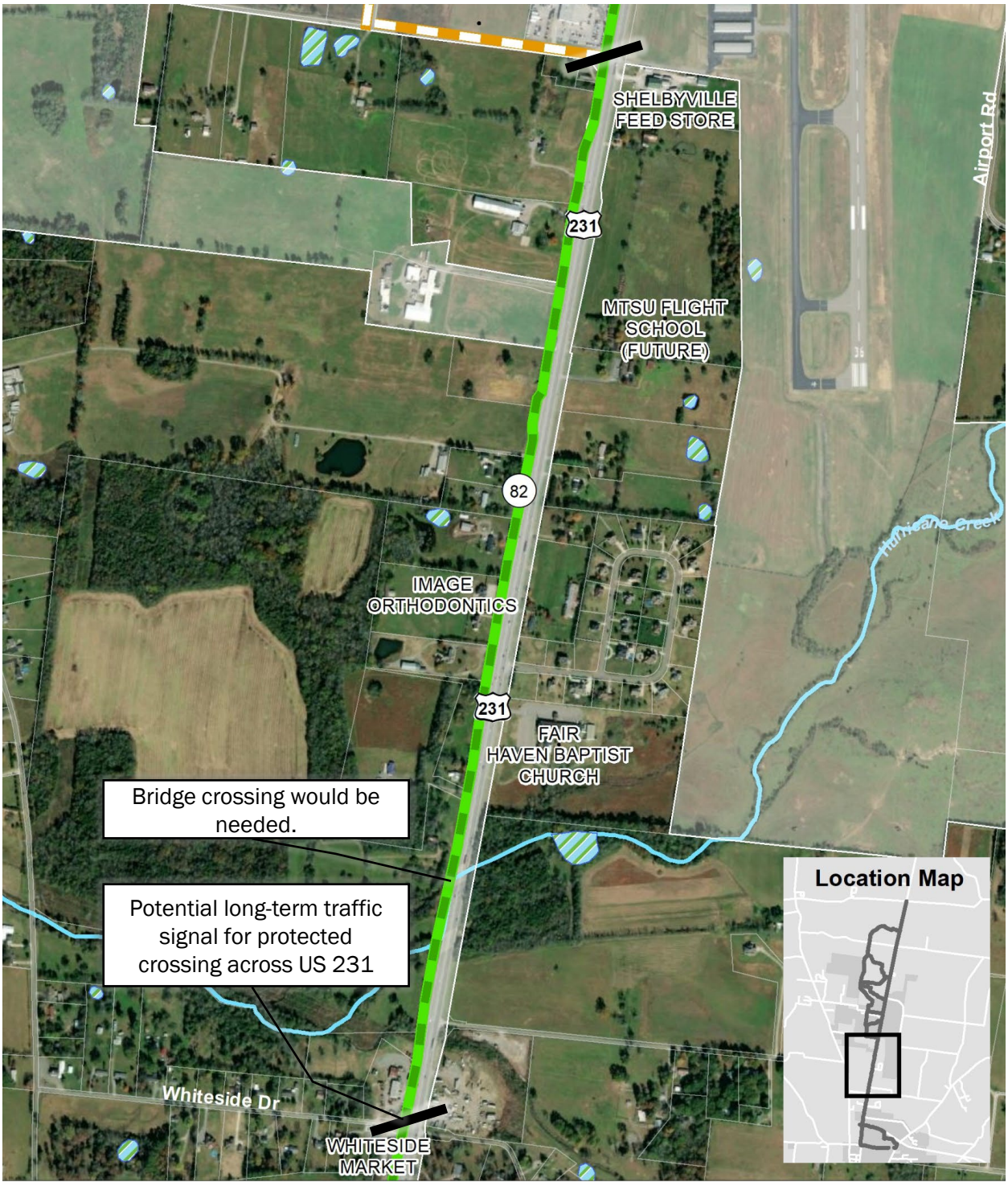
0 0.25 0.5 Mile

N

Preferred Alignment
Optional Alignment
Stream
Wetland
Parcel Line
Shelbyville Municipal Limits
Segment Termini

TCAT DRIVEWAY TO HARTS CHAPEL RD

Project Description		Measurement Unit	Avg. Cost / Unit	Cost for Proposed Recommendations	Cost Estimate Rounded Up to Nearest Tens Place	Contingency (40%) - Construction + Construction Engineering (from TDOT 2022 Cost Tool	Cost Estimate + Contingency [TOTAL]	Final Estimate Rounded Up to Nearest Tens Place	Avg. Cost Source [2022]	Notes/Assumptions
New Greenway (10') Construction						***0.4***				10' width; Assumes asphalt; Assumes no addition of curb and gutter; Does not include culverts, retaining walls, traffic control, etc.
	MINERAL AGGREGATE, TYPE A BASE, GRADING D	5,895	TON	$ 35.00	$ 206,329.20					TDOT AUP 2022	Assumes 6" thickness
	BITUMINOUS MATERIAL FOR PRIME COAT (PC)	7	TON	$ 280.00	$ 2,002.49					TDOT AUP 2022	Assumes 0.1" thickness
	AGGREGATE FOR COVER MATERIAL (PC)	26	TON	$ 80.00	$ 2,065.07					TDOT AUP 2022	Assumes 0.1" thickness
	ASPHALT CONCRETE MIX GRADING B-M2	583	TON	$ 115.00	$ 67,088.85					TDOT AUP 2022	Assumes 3" thickness
	BITUMINOUS MATERIAL FOR TACK COAT (TC)	2	TON	$ 830.00	$ 1,298.49					TDOT AUP 2022	Assumes 0.1" thickness
	ACS MIX (PG64-22) GRADING E SHOULDER	416	TON	$ 110.00	$ 45,786.40	***$ 324,570.50***				TDOT AUP 2022	Assumes 1.5" thickness
CONCRETE CURB RAMP		1,512	SF	$ 27.49	$ 41,564.88	$ 41,570.00				TDOT AUP 2022	Min size curb ramp (168 sf); 4 curb ramps
TRUNCATED DOME DETECTABLE WARNING MAT		32	SF	$ 43.68	$ 1,397.76	$ 1,400.00				TDOT AUP 2022	Assumes 4 total curb ramps (size 2' x 4')
PLASTIC PAVEMENT MARKING (CROSS-WALK)		180	LF	$ 9.86	$ 1,774.80	$ 1,780.00				TDOT AUP 2022	
SIGN		8	EACH	$ 325.00	$ 2,600.00	$ 2,600.00				TDOT AUP 2023	
DRIVEWAY SIDE DRAIN CULVERTS (24")		360	LF	$ 112.00	$ 40,320.00	$ 40,320.00				TDOT AUP 2022	40' LF for each driveway; Assume TCAT, Distillery upgrade own
BRIDGE CROSSING		1	EACH	$ 250,000.00	$ 250,000.00	$ 250,000.00				Engineering Estimate	Assumes 1 bridge crossing
CONSTRUCTION STAKES, LINES AND GRADES		-	LS	$ 14,000.00	$ -	$ -				Engineering Estimate using TDOT Cost Tool	Lump sum
SUB-TOTAL					**$ 662,240.50**	**$ 264,896.20**	**$ 927,136.70**	**$ 927,140.00**			



Segment D

Legend

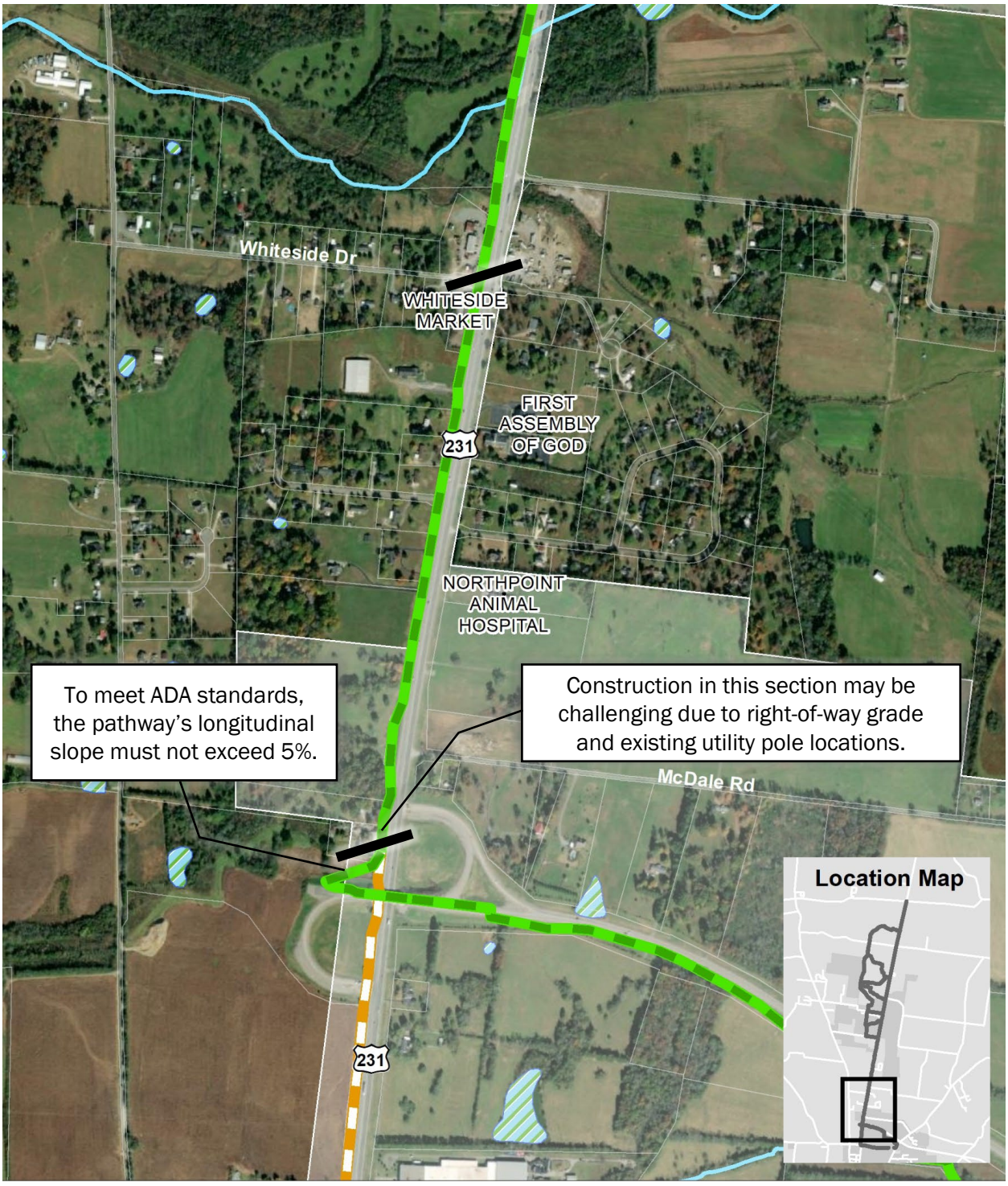
0 0.25 0.5 Mile

N

Preferred Alignment
Optional Alignment
Stream
Wetland
Parcel Line
Shelbyville Municipal Limits
Segment Termini

HARTS CHAPEL RD TO WHITESIDE RD

Project Description	Measurement Unit	Avg. Cost / Unit	Cost for Proposed Recommendations	Cost Estimate Rounded Up to Nearest Tens Place	Contingency (40%) - Construction + Construction Engineering [from TDOT 2022 Cost Tool]	Cost Estimate + Contingency [TOTAL]	Final Estimate Rounded Up to Nearest Tens Place	Avg. Cost Source [2022]	Notes/Assumptions
New Greenway (10') Construction					***0.4***				10' width; Assumes asphalt; Assumes no addition of curb and gutter; Does not include culverts, retaining walls, traffic control, etc.
MINERAL AGGREGATE, TYPE A BASE, GRADING D	8,709	TON	$ 35.00	$ 304,804.50				TDOT AUP 2022	Assumes 6" thickness
BITUMINOUS MATERIAL FOR PRIME COAT (PC)	11	TON	$ 280.00	$ 2,958.22				TDOT AUP 2022	Assumes 0.1" thickness
AGGREGATE FOR COVER MATERIAL (PC)	38	TON	$ 80.00	$ 3,050.67				TDOT AUP 2022	Assumes 0.1" thickness
ASPHALT CONCRETE MIX GRADING B-M2	862	TON	$ 115.00	$ 99,108.53				TDOT AUP 2022	Assumes 3" thickness
BITUMINOUS MATERIAL FOR TACK COAT (TC)	2	TON	$ 830.00	$ 1,918.22				TDOT AUP 2022	Assumes 0.1" thickness
ACS MIX (PG64-22) GRADING E SHOULDER	615	TON	$ 110.00	$ 67,639.00	***$ 479,479.14***			TDOT AUP 2022	Assumes 1.5" thickness
CONCRETE CURB RAMP	336	SF	$ 27.49	$ 9,236.64	$ 9,240.00			TDOT AUP 2022	Min size curb ramp (168 sf); 4 curb ramps
TRUNCATED DOME DETECTABLE WARNING MAT	16	SF	$ 43.68	$ 698.88	$ 700.00			TDOT AUP 2022	Assumes 4 total curb ramps (size 2' x 4')
PLASTIC PAVEMENT MARKING (CROSS-WALK)	160	LF	$ 9.86	$ 1,577.60	$ 1,580.00			TDOT AUP 2022	
SIGN	6	EACH	$ 325.00	$ 1,950.00	$ 1,950.00			TDOT AUP 2023	6
DRIVEWAY SIDE DRAIN CULVERTS (24")	600	LF	$ 112.00	$ 67,200.00	$ 67,200.00			TDOT AUP 2022	40' LF for each driveway; Assume TCAT, Distillery upgrade own
BRIDGE CROSSING	2	EACH	$ 250,000.00	$ 500,000.00	$ 500,000.00			Engineering Estimate	Assumes 1 bridge crossing
CONSTRUCTION STAKES, LINES AND GRADES	-	LS	$ 14,000.00	$ -	$ -			Engineering Estimate using TDOT Cost Tool	Lump sum
SUB-TOTAL					**$ 1,060,149.14**	**$ 424,059.66**	**$ 1,484,208.80**	**$ 1,484,210.00**	



Segment E

0 0.25 0.5 Mile

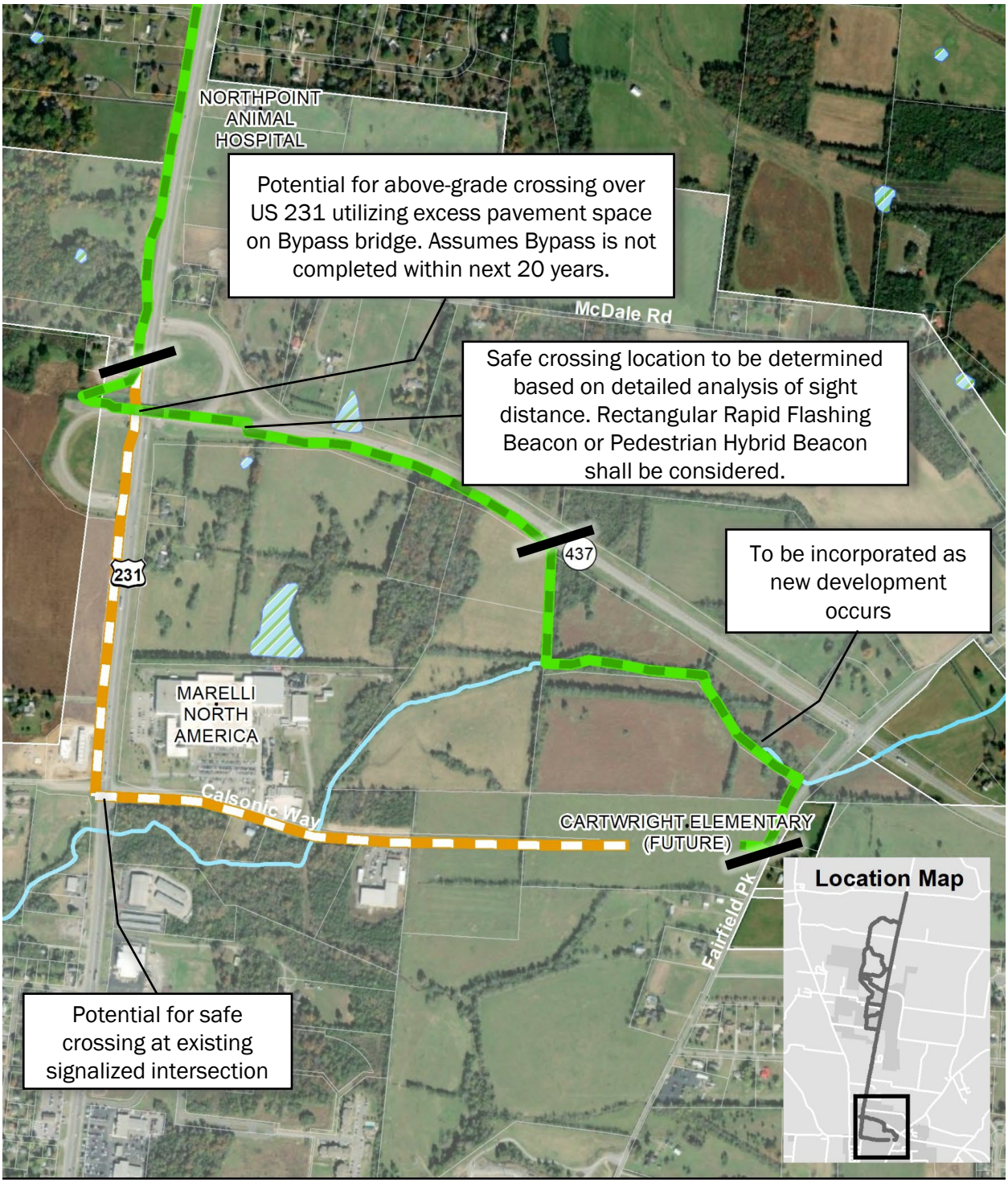
N

Legend

Preferred Alignment
Optional Alignment
Stream
Wetland
Parcel Line
Shelbyville Municipal Limits
Segment Termini

WHITESITE RD TO SR 437 BYPASS

Project Description	Measurement Unit		Avg. Cost / Unit		Cost for Proposed Recommendations		Cost Estimate Rounded Up to Nearest Tens Place		Contingency (40%) - Construction + Construction Engineering (from TDOT 2022 Cost Tool)		Cost Estimate + Contingency [TOTAL]		Final Estimate Rounded Up to Nearest Tens Place		Avg. Cost Source [2022]	Notes/Assumptions
New Greenway (10') Construction									***0.4***							10' width; Assumes asphalt; Assumes no addition of curb and gutter; Does not include culverts, retaining walls, traffic control, etc.
MINERAL AGGREGATE, TYPE A BASE, GRADING D	4,689	TON	$	35.00	$	164,125.50									TDOT AUP 2022	Assumes 6" thickness
BITUMINOUS MATERIAL FOR PRIME COAT (PC)	6	TON	$	280.00	$	1,592.89									TDOT AUP 2022	Assumes 0.1" thickness
AGGREGATE FOR COVER MATERIAL (PC)	21	TON	$	80.00	$	1,642.67									TDOT AUP 2022	Assumes 0.1" thickness
ASPHALT CONCRETE MIX GRADING B-M2	464	TON	$	115.00	$	53,366.13									TDOT AUP 2022	Assumes 3" thickness
BITUMINOUS MATERIAL FOR TACK COAT (TC)	1	TON	$	830.00	$	1,032.89									TDOT AUP 2022	Assumes 0.1" thickness
ACS MIX (PG64-22) GRADING E SHOULDER	331	TON	$	110.00	$	36,421.00	***$***	***258,181.08***							TDOT AUP 2022	Assumes 1.5" thickness
CONCRETE CURB RAMP	168	SF	$	27.49	$	4,618.32	$	4,620.00							TDOT AUP 2022	Min size curb ramp (168 sf); 4 curb ramps
TRUNCATED DOME DETECTABLE WARNING MAT	8	SF	$	43.68	$	349.44	$	350.00							TDOT AUP 2022	Assumes 4 total curb ramps (size 2' x 4')
PLASTIC PAVEMENT MARKING (CROSS-WALK)	-	LF	$	9.86	$	-	$	-							TDOT AUP 2022	
SIGN	9	EACH	$	325.00	$	2,925.00	$	2,930.00							TDOT AUP 2023	
DRIVEWAY SIDE DRAIN CULVERTS (24")	600	LF	$	112.00	$	67,200.00	$	67,200.00							TDOT AUP 2022	40' LF for each driveway
BRIDGE CROSSING	-	EACH	$	250,000.00	$	-	$	-							Engineering Estimate	Assumes 1 bridge crossing
CONSTRUCTION STAKES, LINES AND GRADES	-	LS	$	14,000.00	$	-	$	-							Engineering Estimate using TDOT Cost Tool	Lump sum
SUB-TOTAL							**$**	**333,281.08**	**$**	**133,312.43**	**$**	**466,593.51**	**$**	**466,600.00**		



Segment F/G

0 0.25 0.5 Mile

N

Legend

Preferred Alignment
Optional Alignment
Stream
Wetland
Parcel Line
Shelbyville Municipal Limits
Segment Termini

SR 437 BYPASS TO HALF MILE EAST OF US 231

Project Description		Measurement Unit	Avg. Cost / Unit	Cost for Proposed Recommendations	Cost Estimate Rounded Up to Nearest Tens Place	Contingency (40%) - Construction + Construction Engineering (from TDOT 2022 Cost Tool)	Cost Estimate + Contingency [TOTAL]	Final Estimate Rounded Up to Nearest Tens Place	Avg. Cost Source [2022]	Notes/Assumptions
New Greenway (10') Construction						***0.4***				10' width; Assumes asphalt; Assumes no addition of curb and gutter; Does not include culverts, retaining walls, traffic control, etc.
MINERAL AGGREGATE, TYPE A BASE, GRADING D	3617.46	TON	$ 35.00	$ 126,611.10					TDOT AUP 2022	Assumes 6" thickness
BITUMINOUS MATERIAL FOR PRIME COAT (PC)	4.3885714	TON	$ 280.00	$ 1,228.80					TDOT AUP 2022	Assumes 0.1" thickness
AGGREGATE FOR COVER MATERIAL (PC)	15.84	TON	$ 80.00	$ 1,267.20					TDOT AUP 2022	Assumes 0.1" thickness
ASPHALT CONCRETE MIX GRADING B-M2	357.984	TON	$ 115.00	$ 41,168.16					TDOT AUP 2022	Assumes 3" thickness
BITUMINOUS MATERIAL FOR TACK COAT (TC)	0.96	TON	$ 830.00	$ 796.80					TDOT AUP 2022	Assumes 0.1" thickness
ACS MIX (PG64-22) GRADING E SHOULDER	255.4	TON	$ 110.00	$ 28,094.00	***$ 199,166.06***				TDOT AUP 2022	Assumes 1.5" thickness
CONCRETE CURB RAMP	-	SF	$ 27.49	$ -	$ -				TDOT AUP 2022	Min size curb ramp (168 sf)
TRUNCATED DOME DETECTABLE WARNING MAT	16	SF	$ 43.68	$ 698.88	$ 700.00				TDOT AUP 2022	
PLASTIC PAVEMENT MARKING (CROSS-WALK)	20	LF	$ 9.86	$ 197.20	$ 200.00				TDOT AUP 2022	
SIGN	6	EACH	$ 325.00	$ 1,950.00	$ 1,950.00				TDOT AUP 2022	
DRIVEWAY SIDE DRAIN CULVERTS (24")	-	LF	$ 112.00	$ -	$ -				TDOT AUP 2022	40' LF for each driveway
BRIDGE CROSSING	-	EACH	$ 250,000.00	$ -	$ -				Engineering Estimate	
ENHANCED FLAT THERMO P.M. (6IN)	0.45	LM	$ 6,855.00	$ 3,115.91	$ 3,120.00				TDOT AUP 2022	
ENHANCED FLAT THERMO P.M. (4IN)	0.23	LM	$ 5,000.00	$ 1,136.36	$ 1,140.00				TDOT AUP 2022	
JERSEY BARRIER	80	EACH	$ 40.00	$ 3,200.00	$ 3,200.00				TDOT AUP 2022	
PAINTED PAVEMENT MARKING(STRAIGHT ARROW)	2	EACH	$ 190.00	$ 380.00	$ 380.00				TDOT AUP 2022	
PAINTED WORD PVMT MARK ( )	2	EACH	$ 460.00	$ 920.00	$ 920.00				(Bike Ped Only)	
RRFB	2	EACH	$ 12,500.00	$ 25,000.00	$ 25,000.00				TDOT AUP 2022	
CONSTRUCTION STAKES, LINES AND GRADES	-	LS	$ 14,000.00	$ -	$ -				Engineering Estimate using TDOT Cost Tool	Lump sum
SUB-TOTAL					**$ 235,776.06**	**$ 94,310.42**	**$ 330,086.48**	**$ 330,090.00**		

HALF MILE EAST OF US 231 TO ELEMENTARY SCHOOL

Project Description	Measurement Unit		Avg. Cost / Unit	Cost for Proposed Recommendations	Cost Estimate Rounded Up to Nearest Tens Place	Contingency (40%) - Construction + Construction Engineering [from TDOT 2022 Cost Tool]	Cost Estimate + Contingency [TOTAL]	Final Estimate Rounded Up to Nearest Tens Place	Avg. Cost Source [2022]	Notes/Assumptions
New Greenway (10') Construction						***0.4***				10' width; Assumes asphalt; Assumes no addition of curb and gutter; Does not include culverts, retaining walls, traffic control, etc.
MINERAL AGGREGATE, TYPE A BASE, GRADING D	331.1	TON	$ 35.00	$ 11,588.50					TDOT AUP 2022	Assumes 6" thickness
BITUMINOUS MATERIAL FOR PRIME COAT (PC)	1.2	TON	$ 280.00	$ 348.44					TDOT AUP 2022	Assumes 0.1" thickness
AGGREGATE FOR COVER MATERIAL (PC)	464.1	TON	$ 80.00	$ 37,124.27					TDOT AUP 2022	Assumes 0.1" thickness
ASPHALT CONCRETE MIX GRADING B-M2	5.7	TON	$ 115.00	$ 654.22					TDOT AUP 2022	Assumes 3" thickness
BITUMINOUS MATERIAL FOR TACK COAT (TC)	20.5	TON	$ 830.00	$ 17,042.67					TDOT AUP 2022	Assumes 0.1" thickness
ACS MIX (PG64-22) GRADING E SHOULDER	4689.3	TON	$ 110.00	$ 515,823.00	***$ 258,181.08***				TDOT AUP 2022	Assumes 1.5" thickness
CONCRETE CURB RAMP	672	SF	$ 27.49	$ 18,473.28	$ 18,480.00				TDOT AUP 2022	Min size curb ramp (168 sf); 4 curb ramps
TRUNCATED DOME DETECTABLE WARNING MAT	32	SF	$ 43.68	$ 1,397.76	$ 1,400.00				TDOT AUP 2022	Assumes 4 total curb ramps (size 2' x 4')
PLASTIC PAVEMENT MARKING (CROSS-WALK)	80	LF	$ 9.86	$ 788.80	$ 790.00				TDOT AUP 2022	Assumes 2 crosswalks
SIGN	4	EACH	$ 325.00	$ 1,300.00	$ 1,300.00				TDOT AUP 2023	4
DRIVEWAY SIDE DRAIN CULVERTS (24")	160	LF	$ 112.00	$ 17,920.00	$ 17,920.00				TDOT AUP 2022	40' LF for each driveway
BRIDGE CROSSING	1	EACH	$ 250,000.00	$ 250,000.00	$ 250,000.00				Engineering Estimate	Assumes 1 bridge crossing
SUB-TOTAL					**$ 548,071.08**	**$ 219,228.43**	**$ 767,299.51**	**$ 767,300.00**		