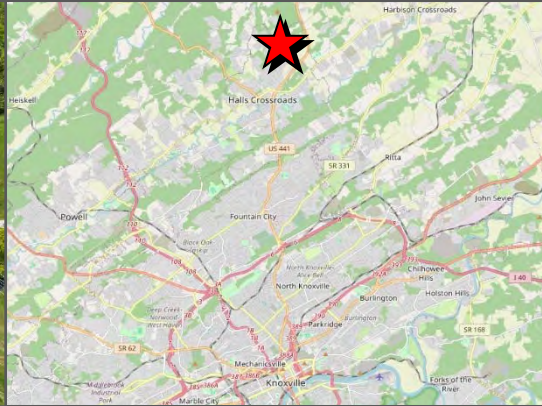


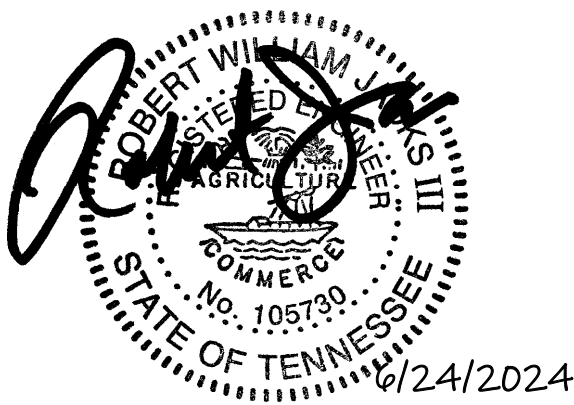


Transportation Impact Study Maynardville Pike Subdivision Knox County, Tennessee



Revised June 2024

Prepared for:
Heritage Land Development Partners, LLC
3571 Louisville Road
Louisville, TN 37777



7-SB-24-C
TIS Version 2
6/24/2024

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EXECUTIVE SUMMARY

Preface:

Heritage Land Development Partners, LLC proposes a residential development adjacent to Maynardville Pike in North Knox County, TN. The proposed development will include a maximum of 152 single-family detached houses on 58.47 +/- acres. This development is referenced as the “Maynardville Pike Subdivision” since an official name has not been chosen. The development will be built in two phases and is anticipated to be fully built and occupied by 2028. The development proposes a single entrance at Maynardville Pike, 2,335 feet south of the existing unsignalized four-way intersection with Tell Mynatt Road and Gray Road.

The primary purpose of this study is to determine and evaluate the potential impacts of the development on the adjacent transportation system. The study includes a review of the primary access road and intersection, and it is a Level 1 study established by Knoxville/Knox County Planning. Recommendations and mitigation measures are offered if transportation operations are projected to be below recognized engineering standards.

Note: The site plan is still being revised to meet Knox County’s comment regarding a future stub-out road to the southeast. The revised site plan was unavailable by the deadline to show in this revised TIS to reflect this comment. Thus, the site plan shown throughout this revised TIS does not reflect the requested stub-out road but will not affect the overall conclusions and recommendations offered in the study. While the revised site plan is not included in this revised study, this road stub-out provision is addressed in the revised TIS.

Study Results:

The significant findings of this study include the following:

- The Maynardville Pike Subdivision, with a maximum of 152 single-family detached houses, is estimated to generate 1,483 trips at full build-out and occupancy on an average weekday. Of these daily trips, 109 are estimated to occur during the AM peak hour and 147 in the PM peak hour in 2028.
- The projected 2028 peak hour level of service calculations for the intersection of Maynardville Pike at the Proposed Entrance resulted in reasonable vehicle delays. The projected 2028 vehicle queue lengths are also calculated to be reasonable and will be adequately contained in the provided vehicle lanes at the intersection.

- Based on Tennessee Department of Transportation standards, the projected 2028 volumes at the intersection of Maynardville Pike at the Proposed Entrance will not warrant an exclusive southbound right-turn lane on Maynardville Pike for motorists entering the development from the north. Entering northbound left-turn motorists from Maynardville Pike will be served by the existing center two-way left-turn lane (TWLTL).

Recommendations:

The following recommendations are offered based on the study analyses to minimize the impacts of the proposed development on the adjacent transportation system while attempting to achieve an acceptable traffic flow and improved safety. More details regarding all the recommendations are discussed at the end of the report.

Maynardville Pike at the Proposed Entrance:

- It is recommended that the center two-way left-turn lane (TWLTL) pavement markings on Maynardville Pike be removed within the extent of the new Proposed Entrance intersection to match the existing public side road breaks in the pavement markings. Any striping modifications will need to be approved by TDOT at the driveway permit stage.
- It is recommended that a Stop Sign (R1-1) be installed, and a 24" white stop bar be applied to the Proposed Entrance approach at Maynardville Pike. The stop bar should be applied a minimum of 4 feet away from the edge of Maynardville Pike and placed at the desired stopping point that maximizes the sight distance.
- Sight distances at the Proposed Entrance approach must not be impacted by future landscaping, signage, or vegetation. The site designer must ensure that the intersection sight distances are accounted for and provided in the design plans. Based on a posted speed limit of 55 mph, the required intersection sight distance is 690 feet. A visual inspection determined that these sight distances are available to the north and south on Maynardville Pike.
- The construction of the Proposed Entrance on Maynardville Pike will require a Tennessee Department of Transportation (TDOT) Highway Entrance Permit. The entrance will require widening and improving the pavement where the existing private driveway is currently located. This reconstruction will also require modifications to the existing guardrail along the highway that wraps around and terminates at the existing driveway. The developer will need to apply for this

permit and coordinate with TDOT regarding their specific requirements for this entrance.

- Even though a southbound right-turn lane on Maynardville Pike is not warranted in the projected conditions, the developer is encouraged to begin coordination with TDOT early in the permitting process. Other modifications may be necessary at TDOT's discretion, including an increased radius for southbound right turns and potentially strengthening the asphalt pavement on the shoulder to facilitate vehicles turning off the higher-speed highway.
- Knox County requires a 400-foot minimum intersection spacing distance on Arterial roads. The intersection of Maynardville Pike, an arterial road, at the Proposed Entrance will be 185 feet away to the southeast from Tell Mynatt Road/Pump House Way (centerline to centerline). The site designer must request a variance to allow the proposed intersection spacing to be less than the minimum required.

Maynardville Pike Subdivision Internal Roads:

- A 25-mph Speed Limit (R2-1) sign is recommended to be posted near the beginning of the development entrance off Maynardville Pike. It is also recommended that a "No Outlet" Sign (W14-2a) be posted at the front of the subdivision. This sign can be posted above or below the street name sign.
- Stop Signs (R1-1) with 24" white stop bars are recommended to be installed at the internal road locations, as shown in the report.
- The requested stub-out road should include a dual end-of-roadway object marker (OM4-1) installed at its end. Furthermore, an additional sign should be posted at the end of the stub-out road to follow Knoxville-Knox County Subdivision regulations. This sign is for notification of a possible future street connection. It should state, "NOTICE – This road may be extended with future development – for more info. contact Knox Co. Engineering & Public Works (865) 215-5800".
- Sight distance at the new internal intersections must not be impacted by new signage, parked cars, or future landscaping. With a speed limit of 25-mph in the development, the internal intersection sight distance is 250 feet. The required stopping sight distance is 155 feet for a level road grade. The site designer should ensure that internal sight distance lengths are met and account for different proposed road grades.
- If directed by the local post office, the site designer should include a parking area and a centralized mail delivery center within the development for the subdivision

residents.

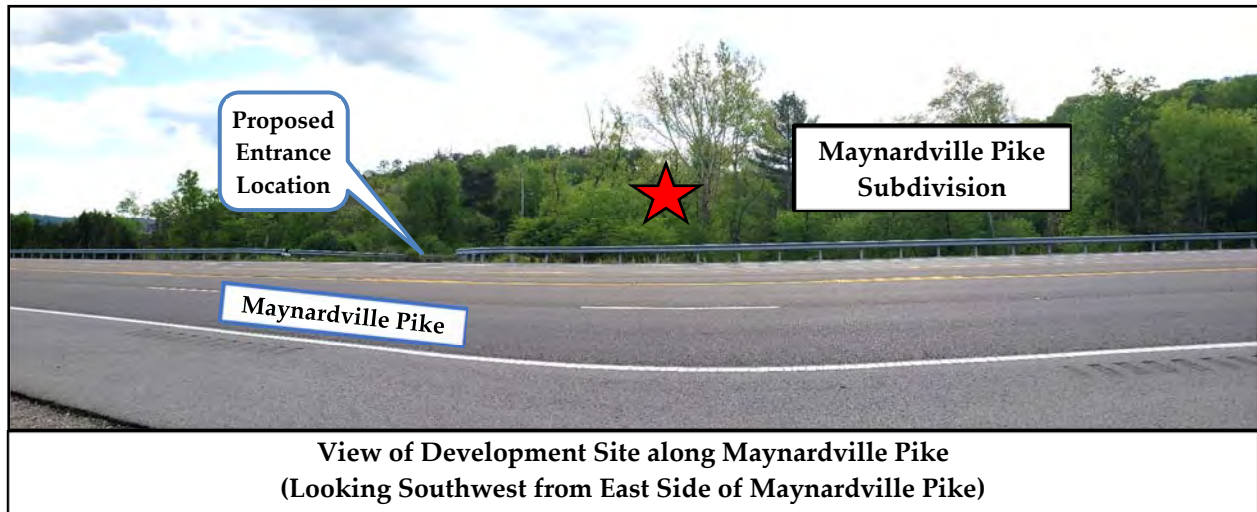
- All drainage grates and covers for the residential development must be pedestrian and bicycle safe.
- The main internal roadway will be looped and have long, straight segments. Straight road segments encourage higher vehicle speeds. It is recommended that the site designer consider including traffic calming measures on these segments, such as speed humps or tables. Specifics regarding this recommendation should be discussed in the design phase with Knox County Engineering.
- For residential subdivisions with more than 150 housing units, Knox County has a long-standing unwritten design policy requiring a boulevard road typical section at the entrance if a second access is not provided. Since the proposed layout of the Maynardville Pike Subdivision only provides one means of ingress and egress and will have 152 units, the subdivision entrance may need to be designed and constructed with a boulevard roadway section. A decision regarding this issue should be coordinated with Knox County Engineering.
- All road and intersection elements should be designed to AASHTO, TDOT, and Knox County specifications and guidelines to ensure proper transportation operations.

DESCRIPTION OF EXISTING CONDITIONS

- **STUDY AREA:**

The proposed location of this new residential development is shown on a map in Figure 1. This proposed development will be located on Maynardville Pike southeast of Tell Mynatt Road and Gray Road in the Halls Community of North Knox County, TN. The development site is two miles north of the intersection of Maynardville Pike at East Emory Road and the highly developed area in the Halls Community. The proposed development will have a single entrance to Maynardville Pike via an existing driveway previously serving a single-family house and farm property that has been abandoned. The existing driveway is built on top of a double-barrel box concrete culvert. This driveway will be reconstructed to accommodate the new development.

As Knoxville/Knox County Planning requested, transportation impacts associated with the proposed development were analyzed at the intersection where the Proposed Entrance will tie into Maynardville Pike, as shown in the image below.



The proposed development property is in a rural area, but the surrounding area has seen residential and commercial growth encroach further from the southwest. The Halls Community to the southwest has seen tremendous growth over the past few years, and this has placed increased pressure on further growth outwards and toward the development site to the north.

The development property has 700 feet of road frontage on the west side of Maynardville Pike. However, direct road access is limited due to topography and Mill Branch Creek, which runs alongside the highway. Maynardville Pike was elevated from its original alignment during its

reconstruction and widening several years ago (~2017), and this included fill slopes along the development property road frontage. Note: Tell Mynatt Road was divided into two separate sections during the highway widening. To the north, Tell Mynatt Road intersects Maynardville Pike at Gray Road. To the south, Tell Mynatt Road intersects Maynardville Pike and then transitions to Pump House Way to the east. The two sections of Tell Mynatt Road are not connected.

The proposed development site is primarily undeveloped, split between open areas previously used for farm activities and areas covered with forest. Abandoned structures currently exist on the site, including a single-family detached house, detached garage, outbuildings, and a large gambrel-roofed barn. All these structures will be removed for the construction of the subdivision. The property near the highway is low-lying and drains to Mill Branch Creek.



**Aerial View of Existing Abandoned Structures
on Proposed Development Site**

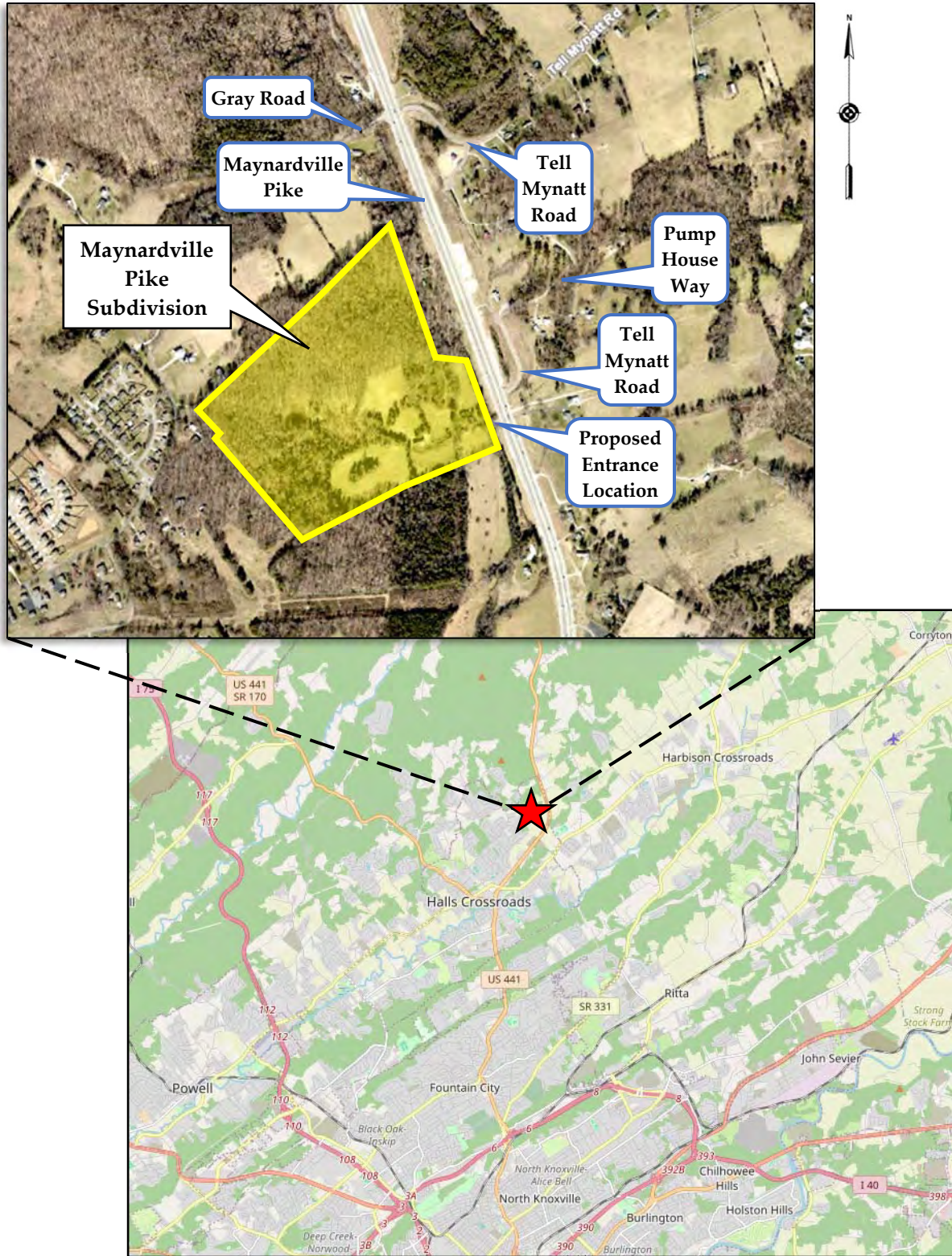


Figure 1
Location Map

▪ **EXISTING ROADWAYS:**

Table 1 lists the characteristics of the existing primary roadway adjacent to the development property and included in the study:

**TABLE 1
 STUDY CORRIDOR CHARACTERISTICS**

NAME	CLASSIFICATION ¹	SPEED LIMIT	LANES	ROAD WIDTH ²	TRANSIT ³	PEDESTRIAN FACILITIES	BICYCLE FACILITIES
Maynardville Pike (SR 33)	Major Arterial	55 mph	4 lanes with a center TWLTL	82'	None	No sidewalks	No bike lanes

¹ 2018 Major Road Plan by Knoxville/Knox County Planning

² From edges of pavement near project site

³ According to Knoxville Area Transit System Map

Maynardville Pike (SR 33) is a Major Arterial roadway and a State Route traversing generally north-south but in a northwest-southeast direction near the proposed development site. The posted speed limit on Maynardville Pike is 55 mph near the project site, and the highway has two lanes in each direction with a center two-way left-turn lane (TWLTL). In Tennessee, SR 33 has a total length of 176 miles between the Georgia and Virginia state lines and bisects East Tennessee. To the northeast of the proposed site, SR 33 provides access to Maynardville, TN, and beyond; to the southwest, the highway provides access to Knoxville, TN.

For several years, the Tennessee Department of Transportation has been widening SR 33 in three separate sections between Maynardville and Knoxville. The sections of the highway in Knox County and through the center of Maynardville to the northeast have been completed, with the last remaining highway widening section in the middle. Construction of this middle section began in 2022 and has an expected completion date of 2026. Once this middle section is complete, the highway will fully connect Knoxville and Maynardville with a highway with two lanes in each direction and a center lane.

The pavement width of Maynardville Pike near the proposed development site is 82 feet wide, with five vehicle lanes, 11-foot paved shoulders, and a 1,400-foot- section of guardrail on the west side of the highway. This long section of guardrail is interrupted at the existing driveway where the Proposed Entrance to the subdivision will be built. The guardrail is provided due to the steep fill slopes and creek running along the west side of the highway. No sidewalks or bike lanes are provided along the highway, and roadway lighting is not provided either. Along the paved

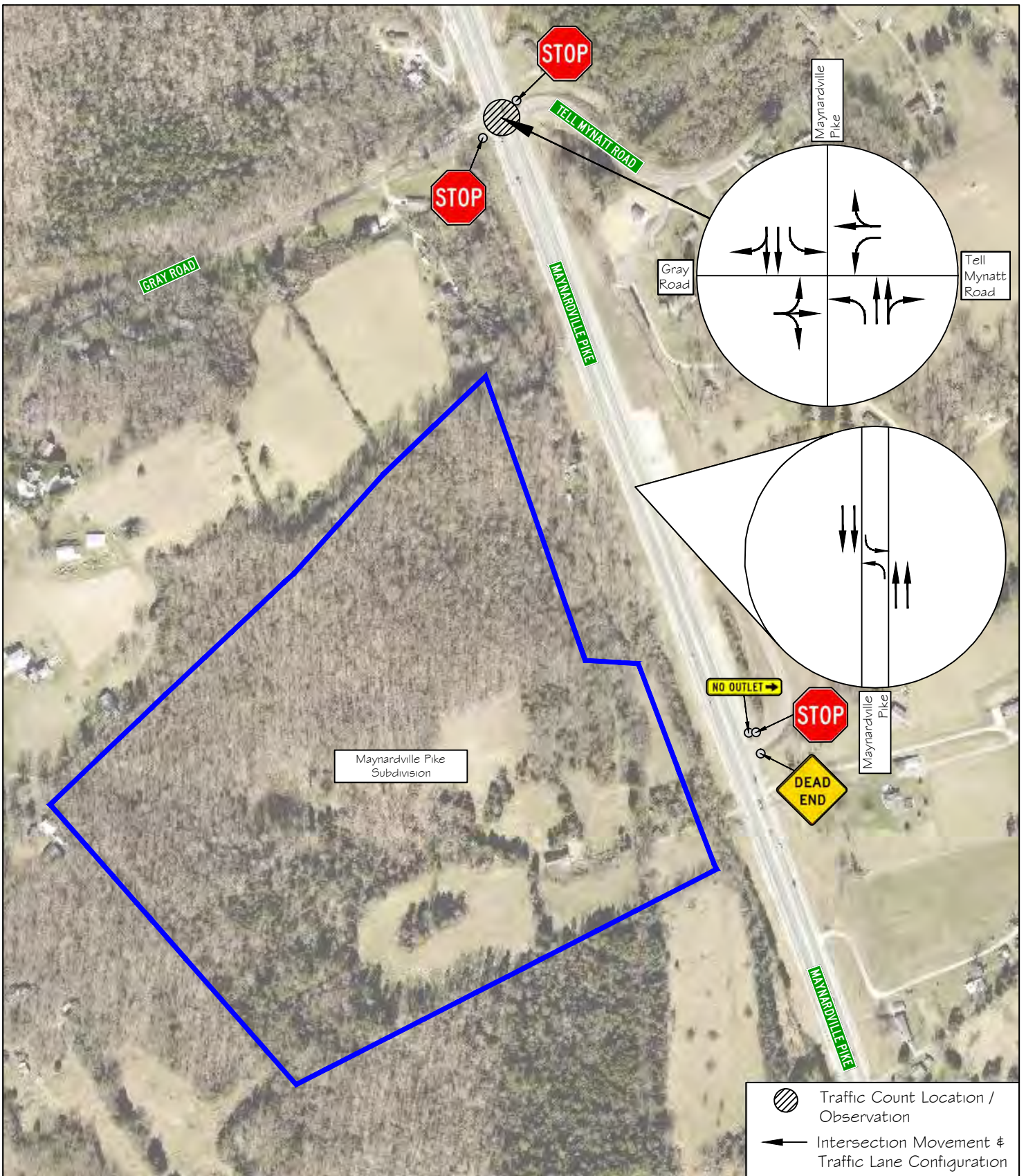
shoulder, skip-pattern edge rumble strips are milled into the pavement outside the white edge lines to warn motorists if they leave the roadway.

Maynardville Pike primarily provides access to residential houses, farm properties, and undeveloped properties near the development site. A small church is on the opposite side of the highway to the south.

Figure 2 shows the existing lane configurations in the study area, the traffic count location for the study, and the current traffic road signage near the development site. The road signage shown in Figure 2 only includes warning

and regulatory signage near the development site and adjacent to the Proposed Entrance. The pages following Figure 2 give a further overview of the site study area with photographs.





11812 Black Road
 Knoxville, TN 37932
 Phone: (865) 556-0042
 Email: ajaxengineering@gmail.com

NOT TO SCALE



FIGURE 2

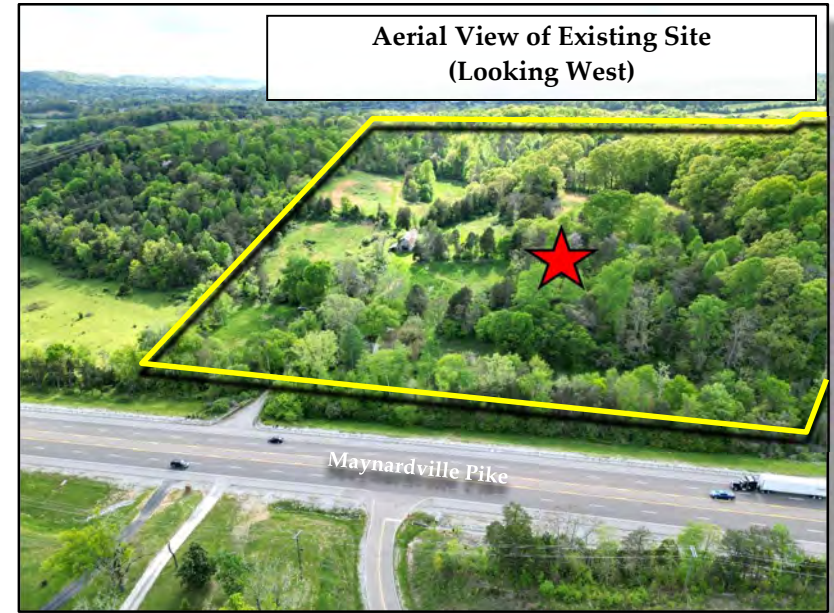
Maynardville Pike Subdivision

Traffic Count Location, Traffic Signage & Existing Lane Configurations

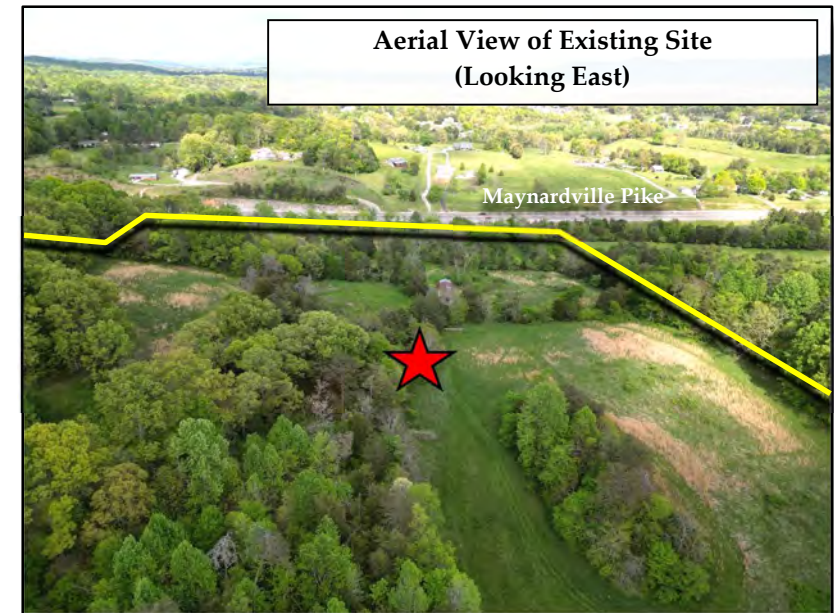
PHOTO EXHIBITS



Maynardville Pike at the Proposed Development Site

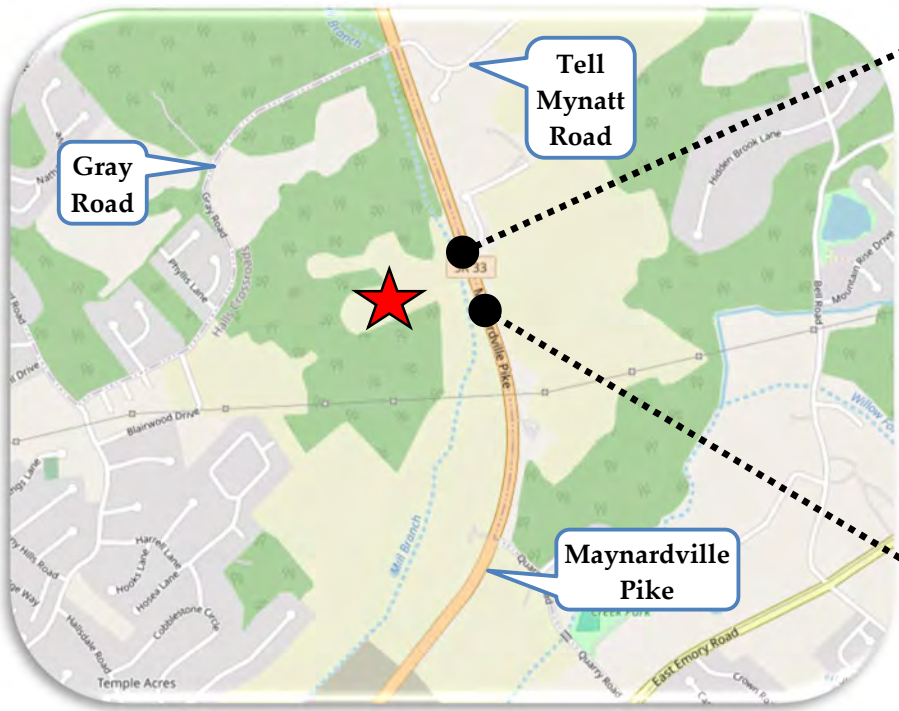


Aerial View of Existing Site (Looking West)

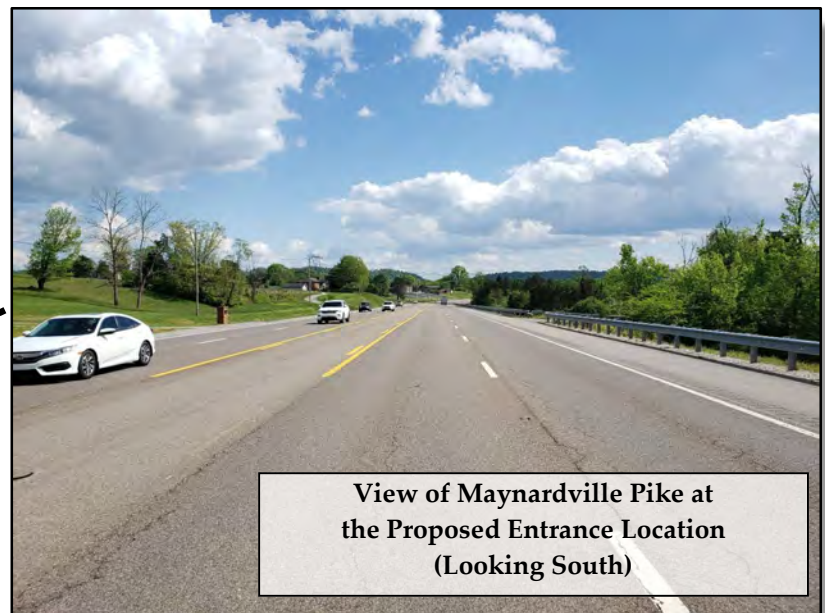


Aerial View of Existing Site (Looking East)

11



Maynardville Pike at the Proposed Development Site



View of Maynardville Pike at the Proposed Entrance Location (Looking South)



View of Maynardville Pike at the Proposed Entrance Location (Looking North)

▪ **EXISTING TRANSPORTATION VOLUMES PER MODE:**

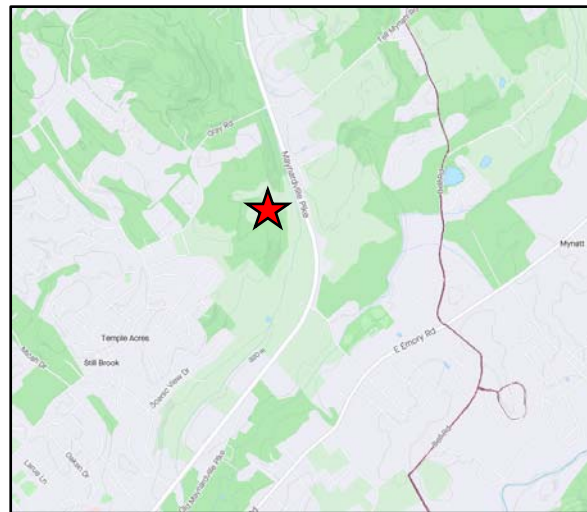
One annual vehicular traffic count location exists near the study area, and the Tennessee Department of Transportation conducts this count. The count location data is the following and can be viewed with further details in Appendix A:

- Existing vehicular roadway traffic:

The TDOT reported an Average Daily Traffic (ADT) on Maynardville Pike south of the development site at 16,701 vehicles per day in 2023. From 2013 to 2023, this count station has indicated a 1.1% average annual traffic growth rate.

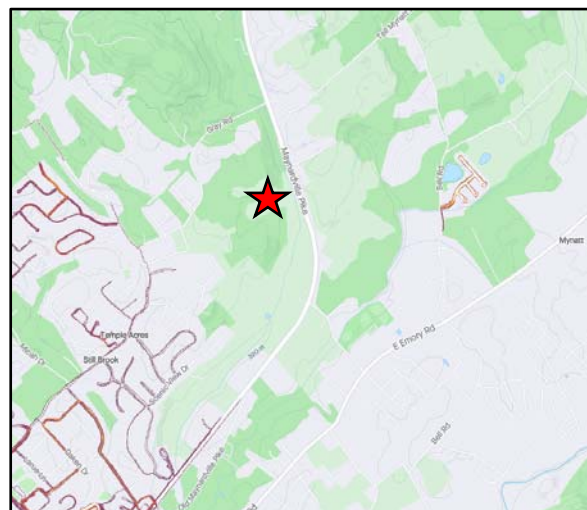
- Existing bicycle and pedestrian volumes:

The average daily pedestrian and bicycle traffic along the studied roadway is unknown. Due to the lack of facilities, it is assumed that few pedestrians and bicyclists use Maynardville Pike in the study area. No pedestrians or bicyclists were observed during the 6-hour traffic count for this project at the intersection of Maynardville Pike at Tell Mynatt Road and Gray Road.



Strava Heat Map for Bicyclists

An online website, [strava.com](https://www.strava.com), provides “heat” maps detailing routes taken by pedestrians, joggers, and bicyclists. The provided heat maps show the last two years of data, are updated monthly, and are gathered from individuals allowing their smart devices to track and compile their routes (millions of users). The activities in the maps are shown on the roads with color intensities with darker colors signifying higher activity. No

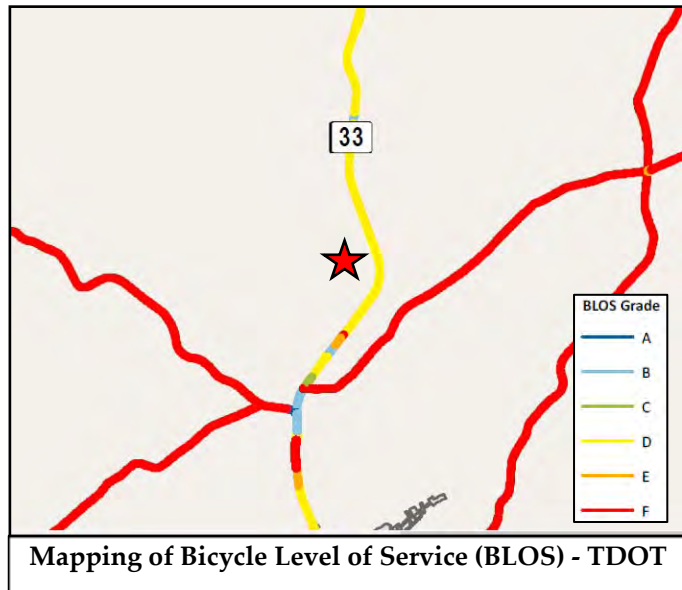


Strava Heat Map for Pedestrian and Joggers

bicycle or pedestrian activity is recorded on Maynardville Pike adjacent to the development site. The Strava heat map data shows some pedestrian activity to the east and southeast in the residential subdivisions off Gray Road and McCloud Road. Some bicyclist traffic is shown occurring east of the site and the highway along Bell Road.

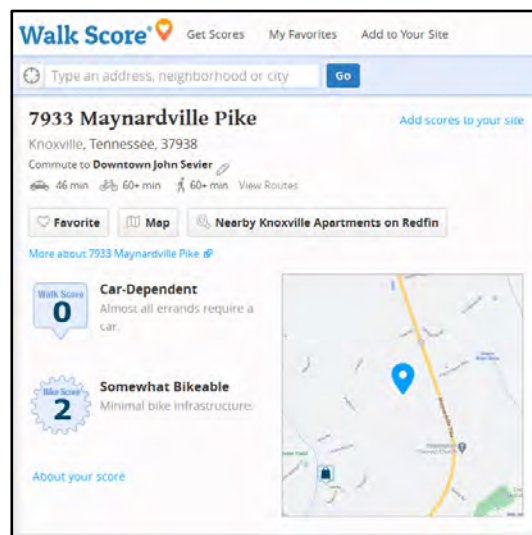
▪ **PEDESTRIAN AND BICYCLE FACILITIES:**

Even though bicycle facilities are not provided on Maynardville Pike, TDOT has published mapping illustrating the Bicycle Level of Service (BLOS) for State Routes in Knox County. BLOS is a nationally used measure of bicyclist comfort based on a roadway's geometry and traffic conditions. BLOS A designates the route as most suitable for bicyclists and BLOS F as the least suitable. The BLOS mapping for Maynardville Pike (SR 33) at the development site shows a BLOS grade of D.



▪ **WALK SCORE:**

A private company offers a website at walkscore.com that grades and gives scores to locations within the United States based on “walkability”, “bikeability”, and transit availability based on a patented system. According to the website, the numerical values assigned for the Walk Score and the Bike Score are based on the distance to the closest amenity in various relevant categories (businesses, schools, parks, etc.) and are graded from 0 to 100.



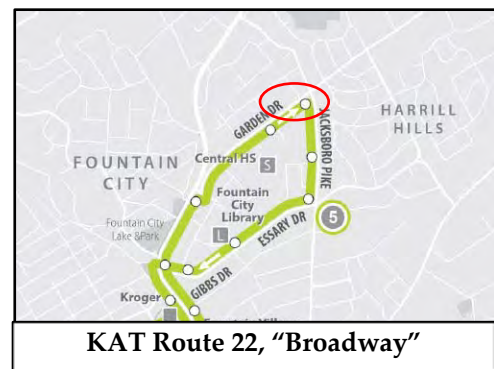
Appendix B provides maps and other information for the Walk, Bike, and Transit Score at the development property address (7933 Maynardville Pike). The project site location is graded with a Walk Score of 0. This Walk Score indicates that almost

all errands currently require a vehicle for travel at the development property. The Walk Score is graded at zero due to the lack of sidewalks and nearby amenities. The site is graded with a Bike Score of 2, which means there is minimal bike infrastructure. The site is not given a Transit Score since no public transportation locations are near the development site. Overall, for this study, no trip reductions for pedestrian or bicyclist activity were used or assumed.

▪ **TRANSIT SERVICES:**

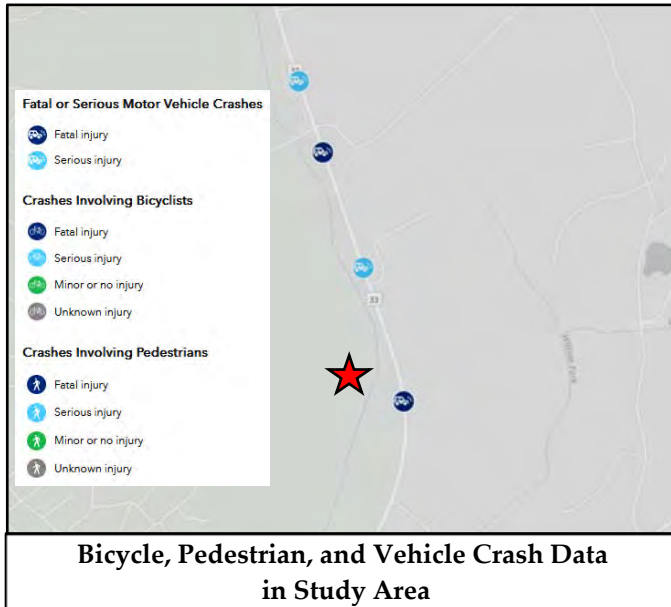
The City of Knoxville has a network of public transit opportunities offered by Knoxville Area Transit (KAT). However, bus service is not available near the development site. The overall KAT bus system map is provided in Appendix C.

The closest public transit bus stop to the development site is 5.0 miles to the south by roadway. The bus stop is at the corner of Garden Drive and Jacksboro Pike on Route 22, "Broadway". It operates on weekdays and weekends; the route map is also included in Appendix C. KAT had to reduce its service schedule due to workforce shortages during and several years after the pandemic. Within the past month, KAT has resumed services to several routes, and Route 22 was provided service additions on Sunday evenings. The new schedule for this route is included in Appendix C. Other transit services in the area include the East Tennessee Human Resource Agency (ETHRA) and the Community Action Committee (CAC), which provides transportation services when requested.



Since the distance to the nearest public bus service is several miles away, with no sidewalks or bike lanes available to access the bus stop without using a private vehicle, the proposed development is not expected to have any reduced vehicle trips due to public transit usage.

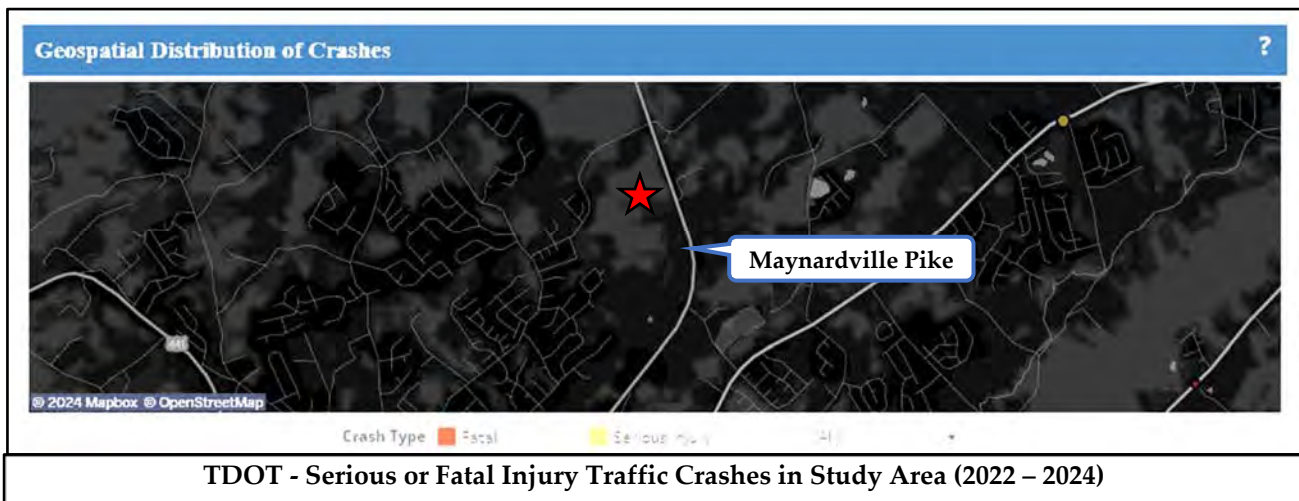
▪ **CRASH DATA:**



The Knoxville Transportation Planning Organization (TPO) provides a website that lists bicycle, pedestrian, and vehicle severe or fatal crashes from October 2016 to September 2021. The data shows several incidents near the development site along Maynardville Pike during those reported years. Two crashes involved serious injuries, and two resulted in fatal injuries. The one shown north of the intersection of Maynardville Pike at Tell Mynatt Road and Gray Road occurred on April 6th, 2018, with no listed factors as to

the cause of the crash. The crash shown just south of this intersection resulted in a fatality and occurred on July 5th, 2018. This crash involved a teen driver, and according to news reports, the teen driver was traveling north, veered across the center of the highway, and hit another vehicle head-on. Closer to the development site, a crash resulted in serious injuries on January 31st, 2020, with no factors listed as to the cause of the crash. The southernmost reported crash near the development site on Maynardville Pike was suspected to be a DUI and resulted in a fatality. This crash occurred on October 31st, 2016.

TDOT publishes and lists State crash data on its website that has involved a serious injury or a fatality over the past three calendar years. Between 2022 and 2024, the data shows no serious or fatal crashes near the proposed development site during this more recent time period.



PROJECT DESCRIPTION

▪ LOCATION AND SITE PLAN:

The proposed plan layout with a maximum of 152 single-family detached houses on 58.47 +/- acres is designed by Ardurra and is shown in Figure 3. As shown in the figure, two new streets will be constructed for the residential development. This longest internal roadway will be the entrance roadway, which will loop inside the development and end at a t-intersection. The other internal road will be a short drive that will terminate at a cul-de-sac.

The subdivision will have one entrance on Maynardville Pike, 2,335 feet south of the existing unsignalized four-way intersection with Tell Mynatt Road and Gray Road, where an existing paved driveway currently provides an entrance to the property. This driveway traverses over a double-barrel concrete box culvert over Mill Branch Creek. TDOT built this box culvert during the widening of Maynardville Pike to accommodate the driveway for the residence on the property that has since been abandoned.



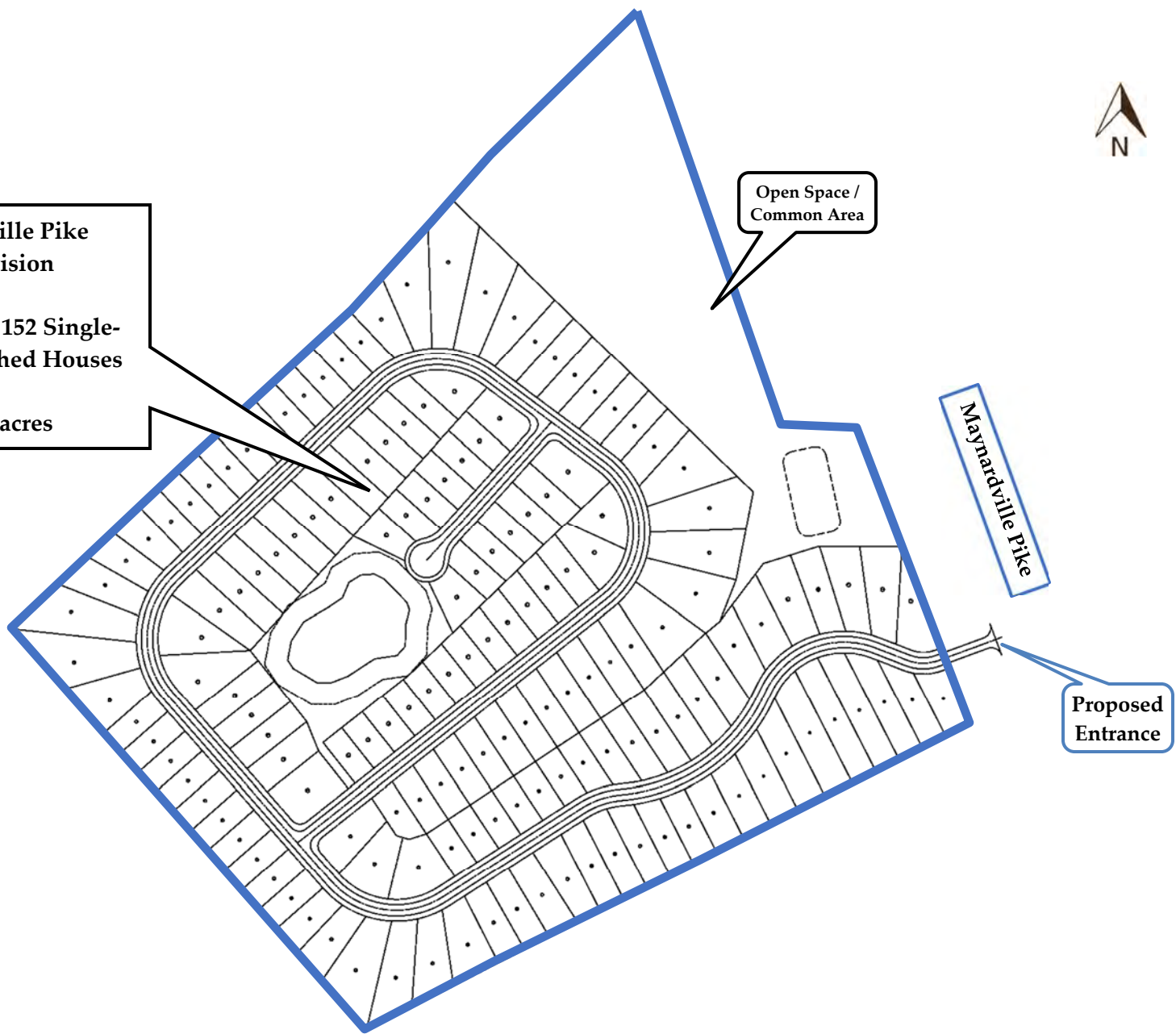
**Double-Barrel Concrete Box Culvert over
Mill Branch Creek at Proposed Entrance Location**

The 58.47-acre residential development will incorporate a large common area on the northeast side of the development. The minimum typical area of the single-family detached house lots will be 0.15 acres, with a few lots nearly a half-acre in size. Each house will have a garage and driveway. Besides a common area for future residents, no other subdivision amenities are being proposed. Sidewalks are not proposed for this development.

The schedule for the completion of this new residential development depends on economic factors and construction timelines. This project is also contingent on permitting, design, and other regulatory approvals. The area's real estate market is still experiencing large amounts of activity and growth due to population growth. This study assumed that the total construction build-out of the development and full occupancy would occur within the next four years (2028).



Maynardville Pike Subdivision
Maximum of 152 Single-Family Detached Houses
58.47 ± acres



18

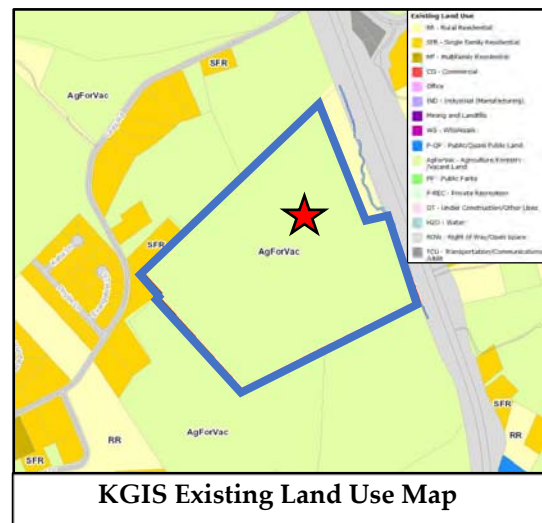
Figure 3
Proposed Plan Layout
Maynardville Pike Subdivision

Not to Scale

▪ **PROPOSED USES AND ZONING REQUIREMENTS:**

The Maynardville Pike Subdivision parcel was recently requested to be rezoned from Agricultural (A) to Planned Residential (PR). Knox County Commission gave this rezoning final approval on February 26th, 2024. The development property also includes a zoning overlay of Floodway (F). The parcel was approved with a density of up to 2.6 units per acre. The Planned Residential (PR) zone in Knox County allows for various land uses primarily within the residential realm. Uses permitted in this zone include single-family dwellings, duplexes, and multi-dwelling structures and developments. The most recent published online KGIS zoning map is provided in Appendix D. The existing adjacent surrounding zoning and land uses are the following:

- All properties around the development property are zoned as Agricultural (A), including those on the other side of Maynardville Pike.
- To the south, two parcels have single-family detached houses but mostly contain forest and farm areas. A powerline and easement bisect these two parcels. The parcel to the southeast has access to Maynardville Pike. The parcel to the southwest has access to Gray Road to the northwest.
- Single-family detached houses occupy three parcels to the north, mostly with open-maintained fields and lawns. All these properties have access to Gray Road.
- One parcel to the northeast is adjacent to the development property and sandwiched between the property and the right-of-way for Maynardville Pike. This property is forested and contains a few buildings, including a house. This house has road access to Maynardville Pike via a driveway approximately 750 feet north of the Proposed Entrance location for the Maynardville Pike Subdivision.



▪ **ON-SITE CIRCULATION:**

The total length of the two new streets within the development will be 5,615 feet (1.06 miles), designed and constructed to the Knox County, TN specifications. The development will have asphalt paved internal roadways and concrete curbs. The lane widths internally will be 13 feet each for a total 26-foot pavement width. The Proposed Entrance is shown in the design with one exiting lane and one entering lane. The street right-of-way within the development will be 50 feet. Sidewalks are not proposed along the internal roads. Knox County will maintain the streets in the development after construction, and these will be dedicated public roads.

▪ **SERVICE AND DELIVERY VEHICLE ACCESS AND CIRCULATION:**

Besides residential passenger vehicles, the internal roadways will provide access to service, delivery, maintenance, and fire protection/rescue vehicles. These vehicle types will not impact roadway operations except when they occasionally enter and exit the development. Curbside private garbage collection services are expected to be available for this residential subdivision if desired. The new public streets will be designed and constructed to Knox County specifications and are expected to be adequate for fire protection and rescue vehicles, trash collection trucks, and single-unit delivery trucks. The development's internal drives will accommodate the larger vehicle types and residents' standard passenger vehicles.

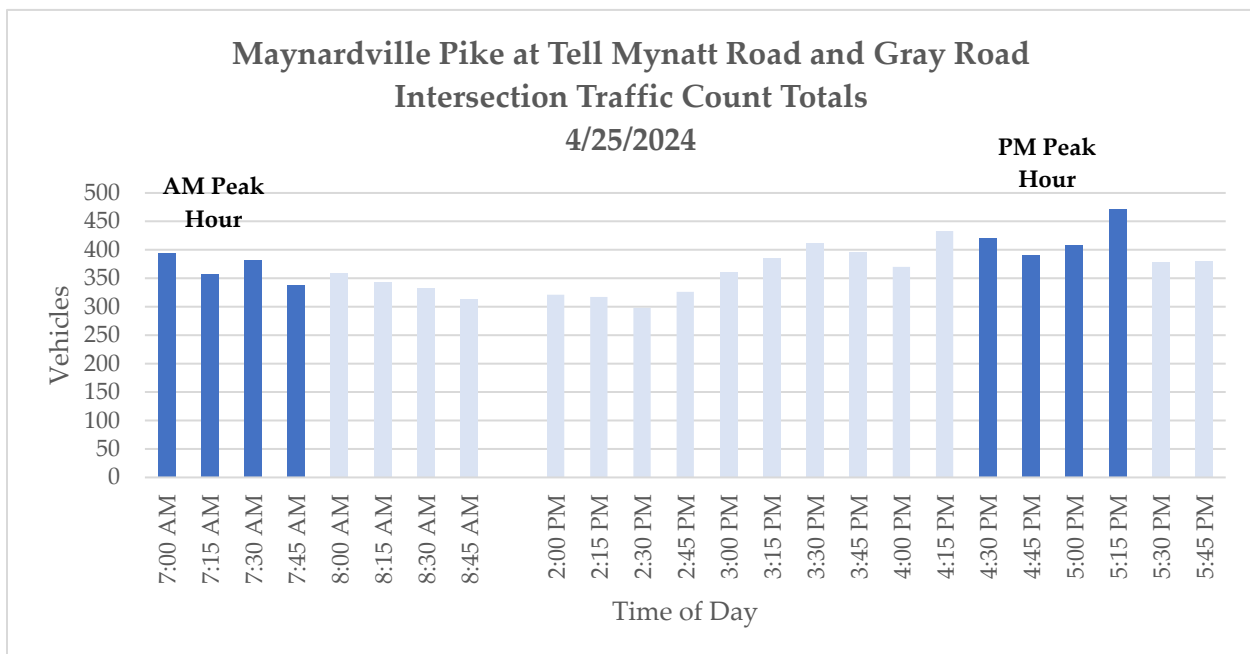
ANALYSIS OF EXISTING AND PROJECTED CONDITIONS

▪ **EXISTING TRAFFIC CONDITIONS:**

This study conducted a 6-hour traffic count at the unsignalized four-way intersection of Maynardville Pike at Tell Mynatt Road and Gray Road on Thursday, April 25th, 2024. The intersection functions with motorists on Tell Mynatt Road and Gray Road operating under stop conditions and with Maynardville Pike motorists operating freely. The manual traffic counts were conducted to tabulate the morning and afternoon peak period volumes and travel directions near the proposed development site. Based on the traffic volumes collected, the AM and PM peak hours were observed at 7:00 – 8:00 a.m. and 4:30 – 5:30 p.m. at the intersection. Local county public schools were in session when the traffic counts were conducted.

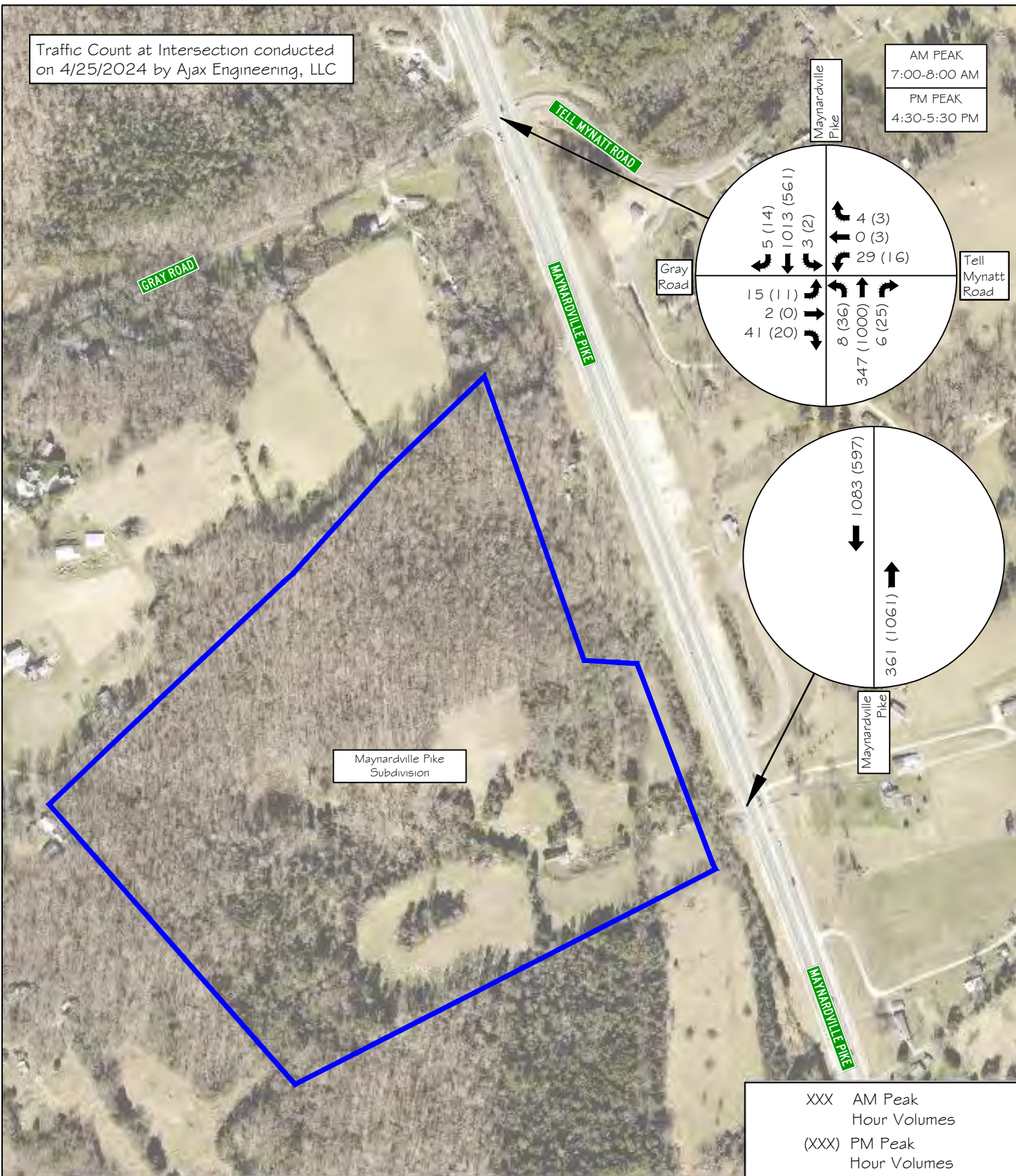
The manual tabulated traffic counts can be reviewed in Figure 4 and Appendix E; a few observations from the count are listed below. The volumes in Figure 4 shown at the proposed site were calculated based on the volumes observed at the intersection to the north.

- No bicyclists or pedestrians were observed during the traffic counts at the intersection.
- Most of the observed traffic was passenger vehicles. However, the traffic stream included a moderate number of semi-tractor-trailers. Other large and heavy vehicles included dump trucks, school buses, construction vehicles, and trash collection trucks. A few oversized loads carrying manufactured homes were also observed heading southbound.



Traffic Count at Intersection conducted on 4/25/2024 by Ajax Engineering, LLC

AM PEAK
7:00-8:00 AM
PM PEAK
4:30-5:30 PM



XXX AM Peak
Hour Volumes
(XXX) PM Peak
Hour Volumes



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FIGURE 4

Maynardville Pike Subdivision

2024 Peak Hour Traffic Volumes -
EXISTING TRAFFIC CONDITIONS

Capacity analyses were undertaken to determine the Level of Service (LOS) for the existing 2024 traffic volumes shown in Figure 4 at the observed intersection. The capacity analyses were calculated following the Highway Capacity Manual (HCM) methods and Synchro Traffic Software (Version 11). This intersection was not included in the scope of work, but the capacity analysis results are included as a courtesy in the report in the existing conditions only.

Methodology:

LOS is a qualitative measurement developed by the transportation profession to express how well an intersection or roadway performs based on a driver's perception. LOS designations include LOS A through LOS F. The designation of LOS A signifies a roadway or intersection operating at best, while LOS F signifies road operations at worst. This grading system provides a reliable, straightforward means to communicate road operations to the public. The HCM lists level of service criteria for unsignalized intersections and signalized intersections.



LOS is defined by delay per vehicle (seconds), and roadway facilities are also characterized by the volume-to-capacity ratio (v/c). LOS designations, which are based on delay, are reported differently for unsignalized and signalized intersections. For example, a delay of 20 seconds at an unsignalized intersection would indicate LOS C, representing the additional delay a motorist would experience traveling through the intersection. Also, for example, a v/c ratio of 0.75 for an approach at an unsignalized intersection would indicate that it is operating at 75% of its available capacity. This difference is primarily due to motorists' different expectations between the two road facilities. Generally, for most instances, the LOS D / LOS E boundary is considered the upper limit of acceptable delay during peak periods in urban and suburban areas.

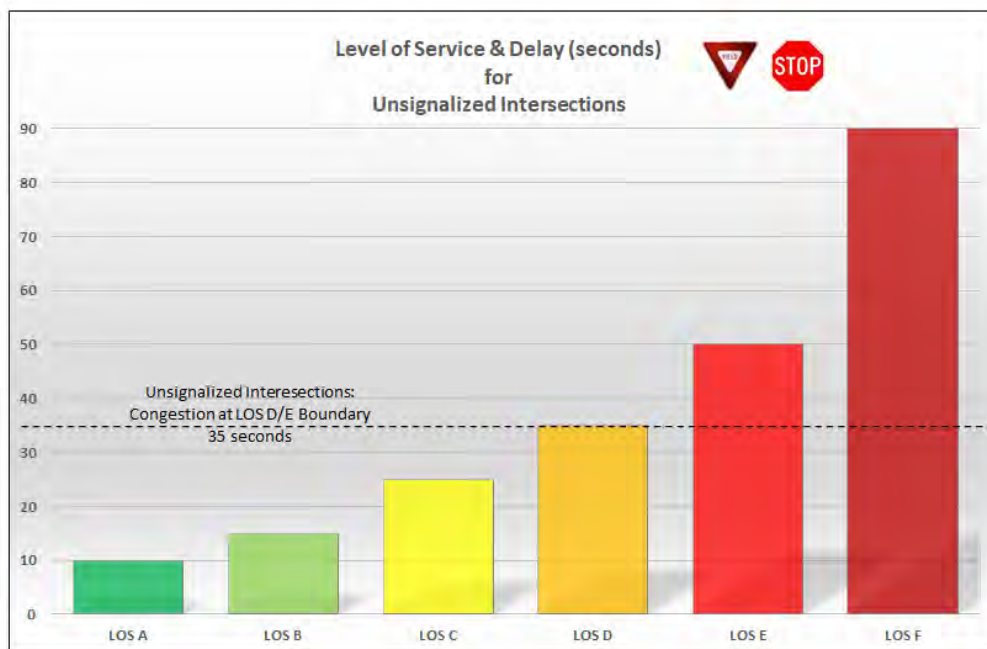
For unsignalized intersections, LOS is measured in terms of delay (in seconds). This measure is an attempt to quantify delay, including travel time, driver discomfort, and fuel consumption. For unsignalized intersections, the analysis assumes that the mainline thru and right-turn traffic does not stop and is not affected by the traffic on the minor side

streets. Thus, the LOS for a two-way stop (or yield) controlled intersection is defined by the delay for each minor approach and major street left-turn movements. Table 2 lists the level of service criteria for unsignalized intersections. The analysis results of unsignalized intersections using the HCM methodologies are conservative due to the more significant vehicle gap parameters used in the method. More often, in normal road conditions, drivers are more willing to accept smaller gaps in traffic than what is modeled using the HCM methodology. The unsignalized intersection methodology also does not account for more significant gaps sometimes produced by nearby upstream and downstream signalized intersections. For unsignalized intersections, in most instances, the upper limit of acceptable delay during peak hours is the LOS D/E boundary at 35 seconds.

TABLE 2
LEVEL OF SERVICE AND DELAY FOR UNSIGNALIZED INTERSECTIONS 

LEVEL OF SERVICE	DESCRIPTION	CONTROL DELAY (seconds/vehicle)
A	Little or no delay	0 - 10
B	Short Traffic Delays	>10 -15
C	Average Traffic Delays	>15 - 25
D	Long Traffic Delays	>25 - 35
E	Very Long Traffic Delays	>35 - 50
F	Extreme Traffic Delays	>50


Source: Highway Capacity Manual, 6th Edition



Intersection capacity results from the existing 2024 peak hour traffic are shown in Table 3. The intersection in the table is shown with a LOS designation, delay (in seconds), and v/c ratio (volume/capacity) for the AM and PM peak hours. Appendix F includes the worksheets for the existing 2024 peak hour capacity analyses.

As shown in Table 3, all the vehicle movements at the intersection are calculated to be operating with good to reasonable LOS and vehicle delays in the present 2024 AM and PM peak hours.

TABLE 3
2024 INTERSECTION CAPACITY ANALYSIS RESULTS -
EXISTING TRAFFIC CONDITIONS

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
Maynardville Pike (SB & NB) at Tell Mynatt Road (WB) and Gray Road (EB)	 Unsignalized	Northbound Left	B	11.9	0.015	A	9.4	0.061
		Eastbound Left/Thru/Right	D	25.3	0.313	C	19.0	0.167
		Westbound Left	C	20.0	0.130	D	31.6	0.129
		Westbound Thru/Right	A	9.5	0.010	C	20.6	0.064
		Southbound Left	A	8.1	0.007	B	10.6	0.006

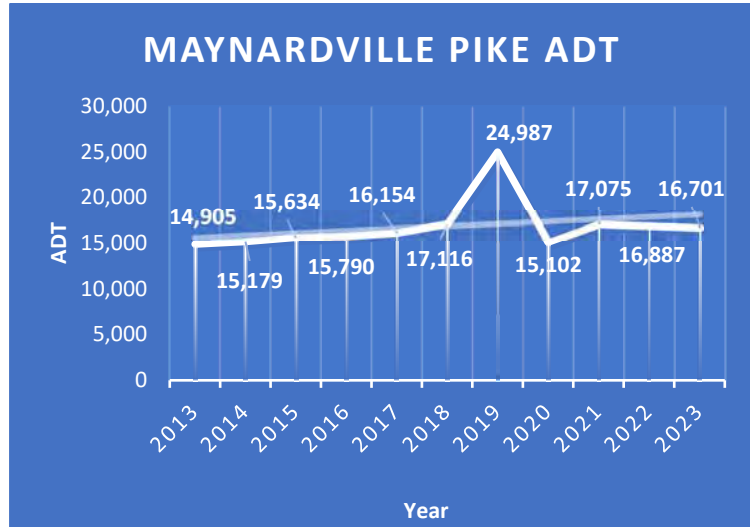
Note: All analyses were calculated in Synchro 11 software and reported using 6th Edition intersection methodology

^a Level of Service , ^b Average Delay (sec/vehicle) , ^c Volume-to-Capacity Ratio

▪ **PROJECTED TRAFFIC CONDITIONS WITHOUT THE PROJECT:**

Horizon year traffic conditions represent the projected traffic volumes in the study area without the proposed project being developed (no-build option). The build-out and full occupancy of this proposed development are assumed to occur by 2028.

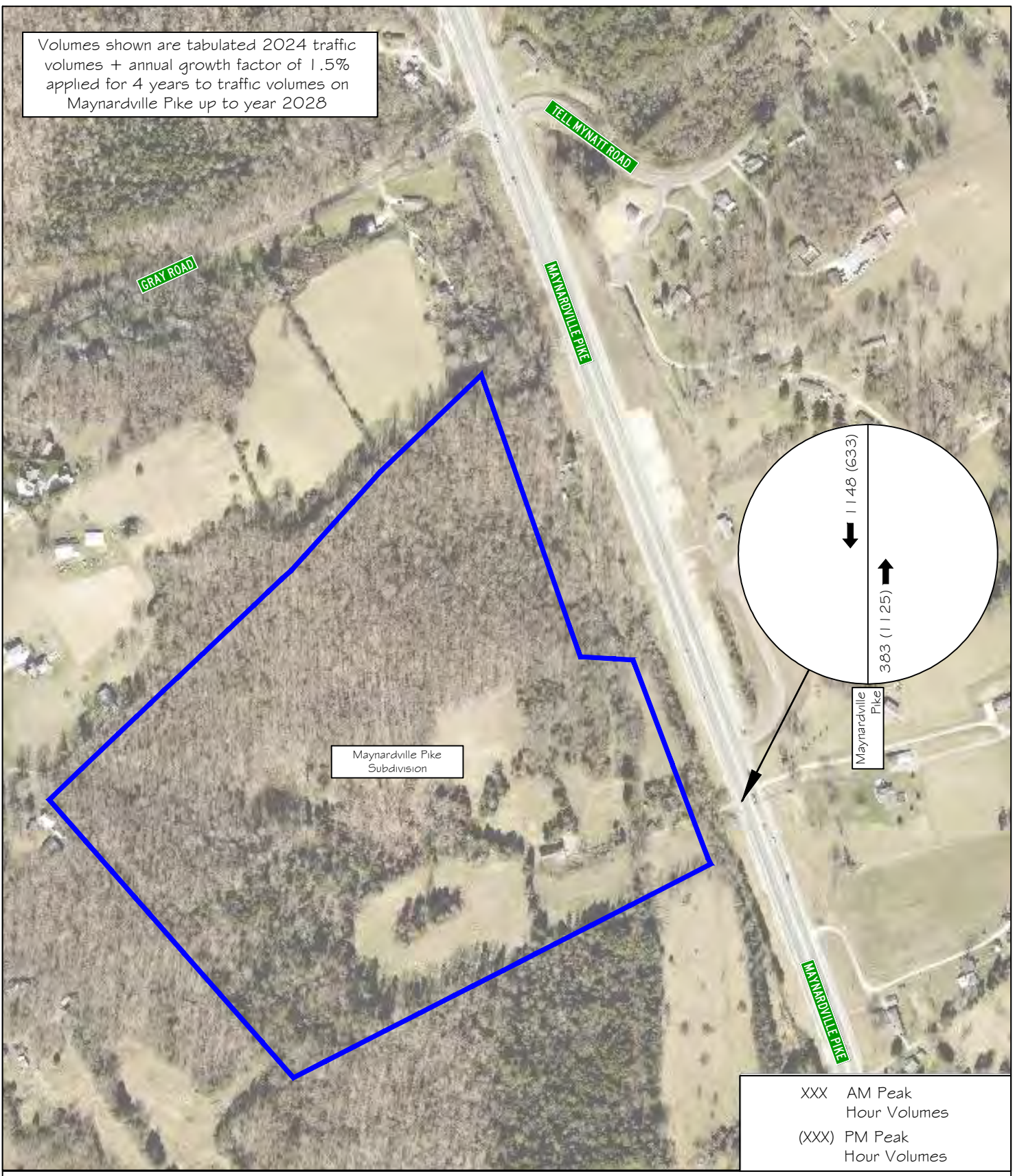
Vehicular traffic on Maynardville Pike in the study area has shown marginal annual growth over the past ten years (1.1%), according to the TDOT traffic count station and as shown in Appendix A. A significant increase was recorded in 2019, followed by a large decrease in 2020. The decrease in volumes in 2020 can be attributed to the pandemic, but the reason for the significant increase in 2019 is unknown. After 2019 and 2020, the reported traffic volumes were more in line with the expected growth based on the prior years' growth.



For this study, a slightly higher annual growth rate of 1.5% was used to calculate future growth on Maynardville Pike up to 2028 to account for potential traffic growth in the study area and provide a conservative analysis. The annual growth rate was applied to the existing 2024 volumes tabulated on Maynardville Pike to estimate the future volumes in the horizon year of 2028 without the potential development traffic.

Figure 5 shows the projected 2028 horizon year traffic volumes on Maynardville Pike at the development site without the project during the AM and PM peak hours.

Volumes shown are tabulated 2024 traffic volumes + annual growth factor of 1.5% applied for 4 years to traffic volumes on Maynardville Pike up to year 2028



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FIGURE 5

Maynardville Pike Subdivision

2028 Peak Hour Traffic Volumes -
PROJECTED TRAFFIC CONDITIONS
WITHOUT THE PROJECT

▪ **TRIP GENERATION:**

A generated trip is a single or one-direction vehicle movement entering or exiting the study site. The estimated amount of traffic the proposed 152 (maximum) single-family detached houses in the subdivision will generate was calculated based on rates and equations provided by the Trip Generation Manual, 11th Edition, an Institute of Transportation Engineers (ITE) publication. The Trip Generation Manual is the traditional and most popular resource for determining trip generation rates when transportation impact studies are produced. The data and calculations from ITE for the proposed land use are shown in Appendix G. A summary of this information is presented in the following table:



TABLE 4
TRIP GENERATION FOR MAYNARDVILLE PIKE SUBDIVISION
Maximum of 152 Single-Family Detached Houses

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	152 Houses	1,483	25%	75%		63%	37%	
				27	82	109	93	54	147
Total New Volume Site Trips			1,483	27	82	109	93	54	147

ITE Trip Generation Manual, 11th Edition
 Trips calculated by using Fitted Curve Equation

For the proposed residential development, with a maximum of 152 single-family detached houses, it is estimated that 27 vehicles will enter and 82 will exit, for a total of 109 generated trips during the AM peak hour in the year 2028. Similarly, it is estimated that 93 vehicles will enter and 54 will exit, for a total of 147 generated trips during the PM peak hour in the year 2028. The calculated trips generated for an average weekday are estimated to be 1,483 vehicles for the proposed development. No vehicle trip reductions were included in the calculations or analysis.

▪ **TRIP DISTRIBUTION AND ASSIGNMENT:**

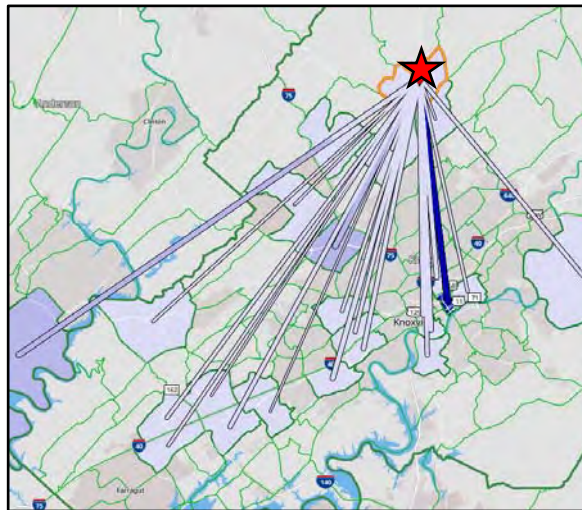
The projected trip distribution and assignment for the Maynardville Pike Subdivision are based on several sources and engineering judgment. The first source is based on the existing traffic count volumes and the observed travel directions collected at the Maynardville Pike intersection near the proposed development site.

Overall, during the traffic count, the observed direction of thru travel on Maynardville Pike had distinct splits in the morning and afternoon. In the AM peak hour, the split was roughly 75% / 25% in the AM peak hour, with 75% heading southbound and 25% heading northbound. The travel split was reversed in the PM peak hour, with 35% / 65% southbound and northbound. This observed split shows a high attractiveness towards Knoxville in the area in the morning and the opposite in the afternoon.

The turning movements at the intersection of Maynardville Pike at Tell Mynatt Road and Gray Road were used to help determine the potential distribution of traffic to and from the proposed Maynardville Pike Subdivision. Due to the current layout of the area's road system and development characteristics, it was assumed that the turning movements to and from Tell Mynatt Road would reasonably approximate the future movements for the proposed subdivision. The entering and exiting percentages during the observed AM and PM peak hours to and from Tell Mynatt Road were the following:

**Observed Entering and Exiting Vehicle Distribution
 on Tell Mynatt Road at Maynardville Pike**

AM PEAK HOUR	
ENTER FROM NORTH	33%
ENTER FROM SOUTH	67%
EXIT TO NORTH	12%
EXIT TO SOUTH	88%
PM PEAK HOUR	
ENTER FROM NORTH	7%
ENTER FROM SOUTH	93%
EXIT TO NORTH	16%
EXIT TO SOUTH	84%

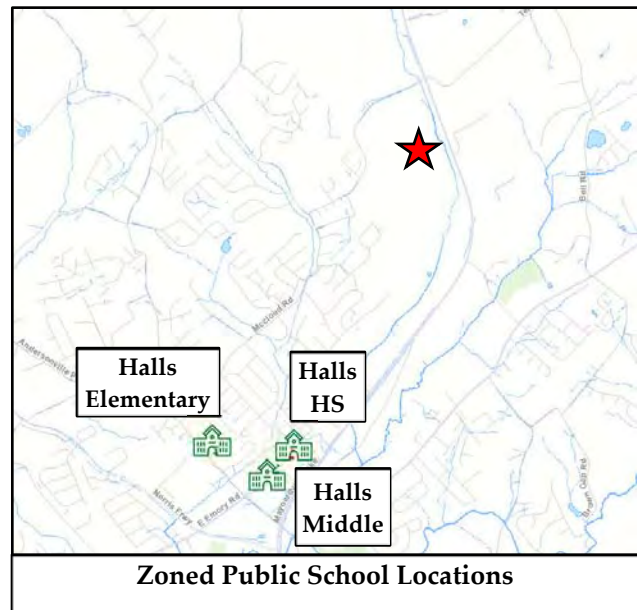


**Top 25 Locations of
2021 Census Bureau Work-Based Trips to
& from Census Tract 62.02**

The second source for determining the projected trip distribution is based on work-related trips in the local area. Work-based trips will be a significant impetus for trips generated by the development, and these trips are more likely to travel to and from the southwest and south, as observed during the traffic count. This assertion is based on data from the United States Bureau website for Census Tract 62.02, where the development property is located. Based on 2021 (latest available) census data and as presented in Appendix H, most work-based trips in the surrounding area correspond to the south, including downtown Knoxville, the University of Tennessee, West Knoxville, and Oak Ridge, TN.

In addition to employment centers, some generated traffic will travel to and from public and private schools. Schools will be another impetus for external trip-making. The development property is currently zoned for Halls Elementary, Middle, and High School.

The zoned public schools are all located south of the development site near the intersection of Maynardville Pike at East Emory Road. These schools are between 2.1 and 2.7 miles from the proposed development entrance location. All these schools will generate traffic from the subdivision to and from the south on Maynardville Pike in the morning and afternoon by private vehicle or school bus.



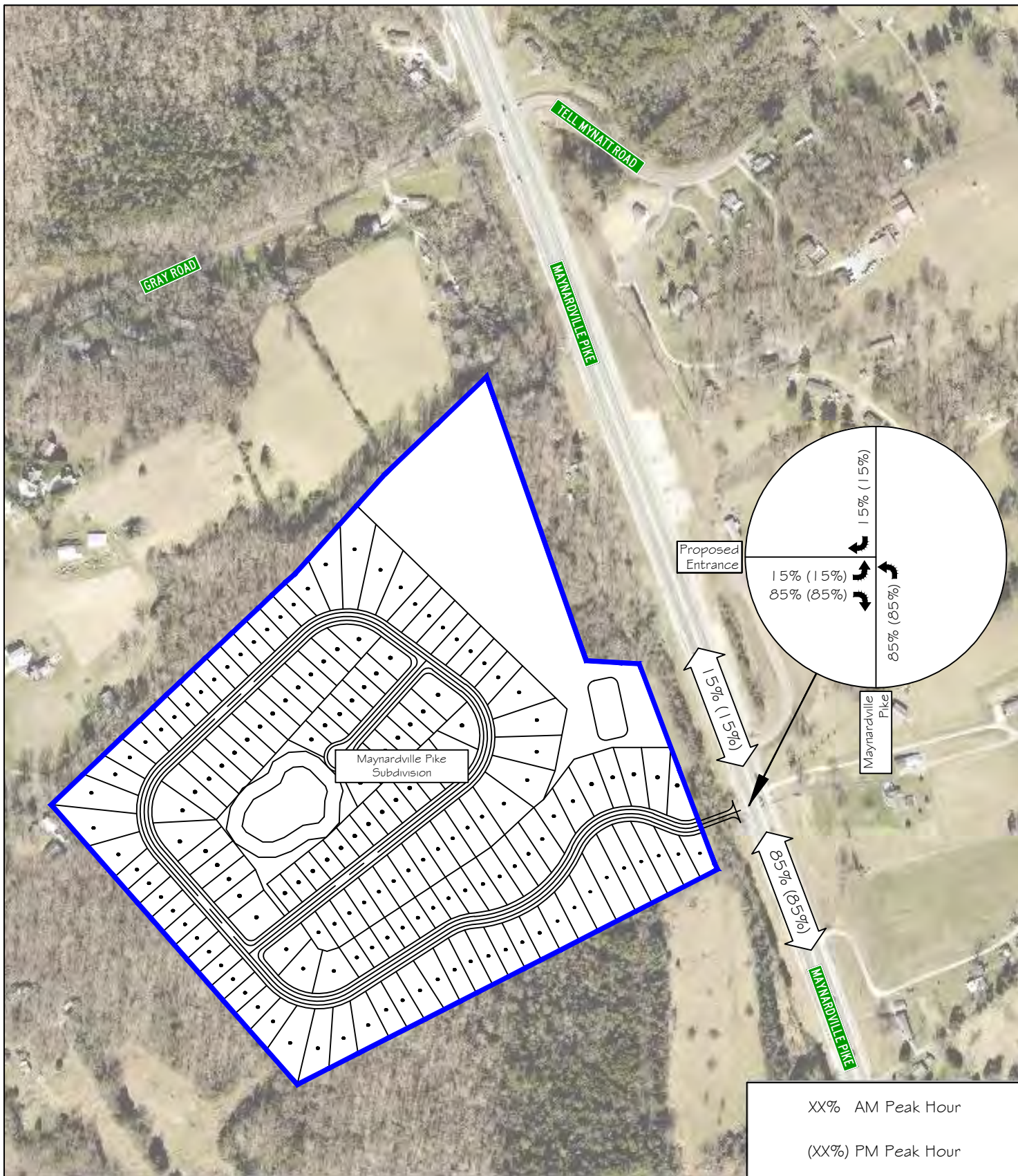
Zoned Public School Locations

The Knox County Schools Transportation Department has developed Parental Responsibility Zones (PRZ) to determine whether students are offered transportation services to and from school. The PRZ is defined as being 1.5 miles for grades 6 – 12 and 1.0 miles for grades K – 5 from where the students' parcel is accessed to the point where the buses unload at the school. This development will be outside the

PRZ for all the zoned schools, and all school-age children attending public schools in the development will be able to utilize this service if desired.

Based on these factors, Figure 6 shows the projected distribution of traffic entering and exiting the proposed development at the Proposed Entrance. The percentages shown in the figure only pertain to the trips generated by the proposed dwellings in the development calculated from the ITE trip rates. Overall, most traffic generated by future residents in the subdivision is expected to occur to and from the south.

Figure 7 shows the traffic assignment of the computed trips generated by the development and is based on the assumed distribution of trips shown in Figure 6.



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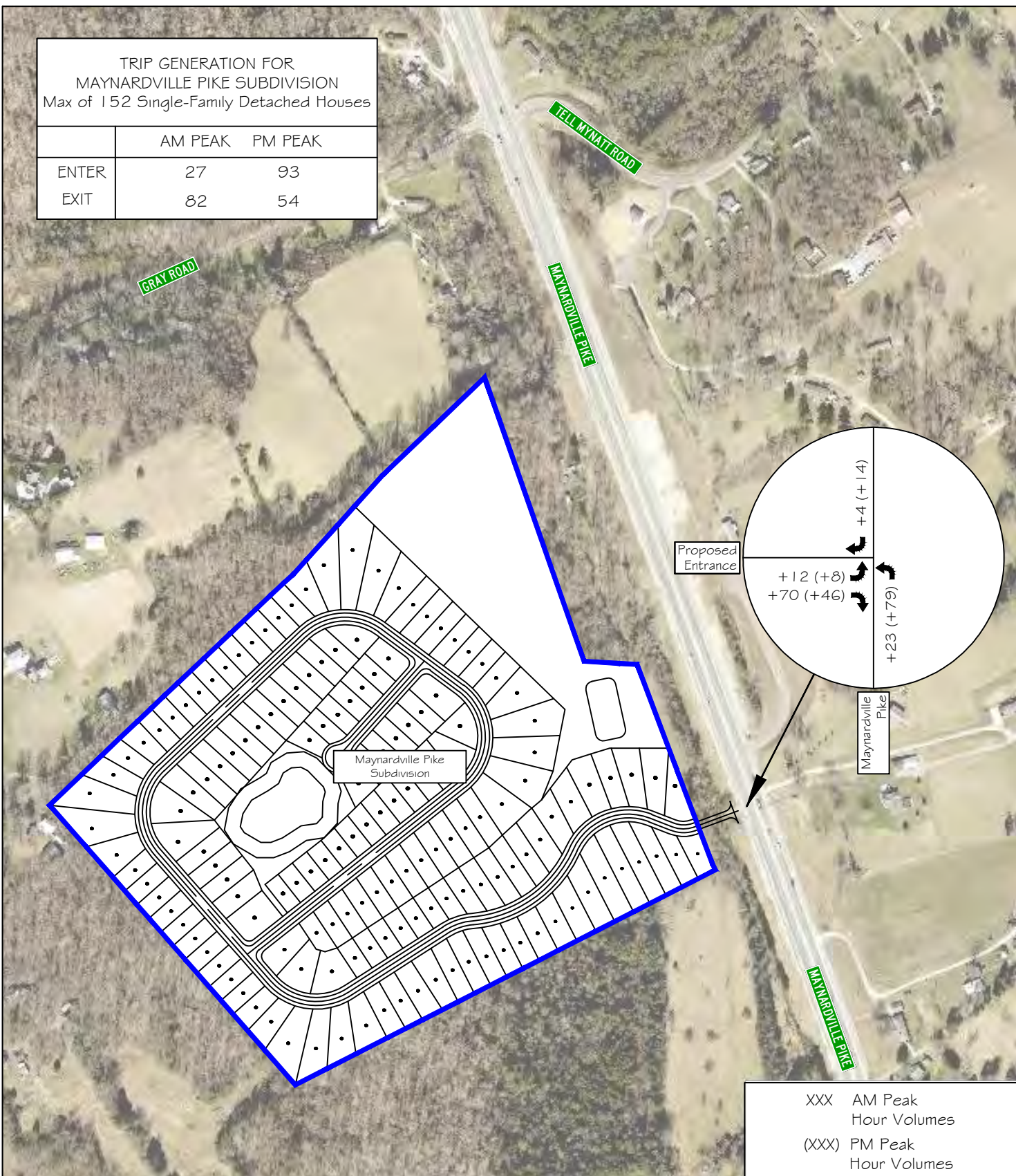
FIGURE 6

Maynardville Pike Subdivision

Directional Distribution of Generated Traffic during AM and PM Peak Hour

TRIP GENERATION FOR
MAYNARDVILLE PIKE SUBDIVISION
Max of 152 Single-Family Detached Houses

	AM PEAK	PM PEAK
ENTER	27	93
EXIT	82	54



XXX AM Peak
Hour Volumes
(XXX) PM Peak
Hour Volumes



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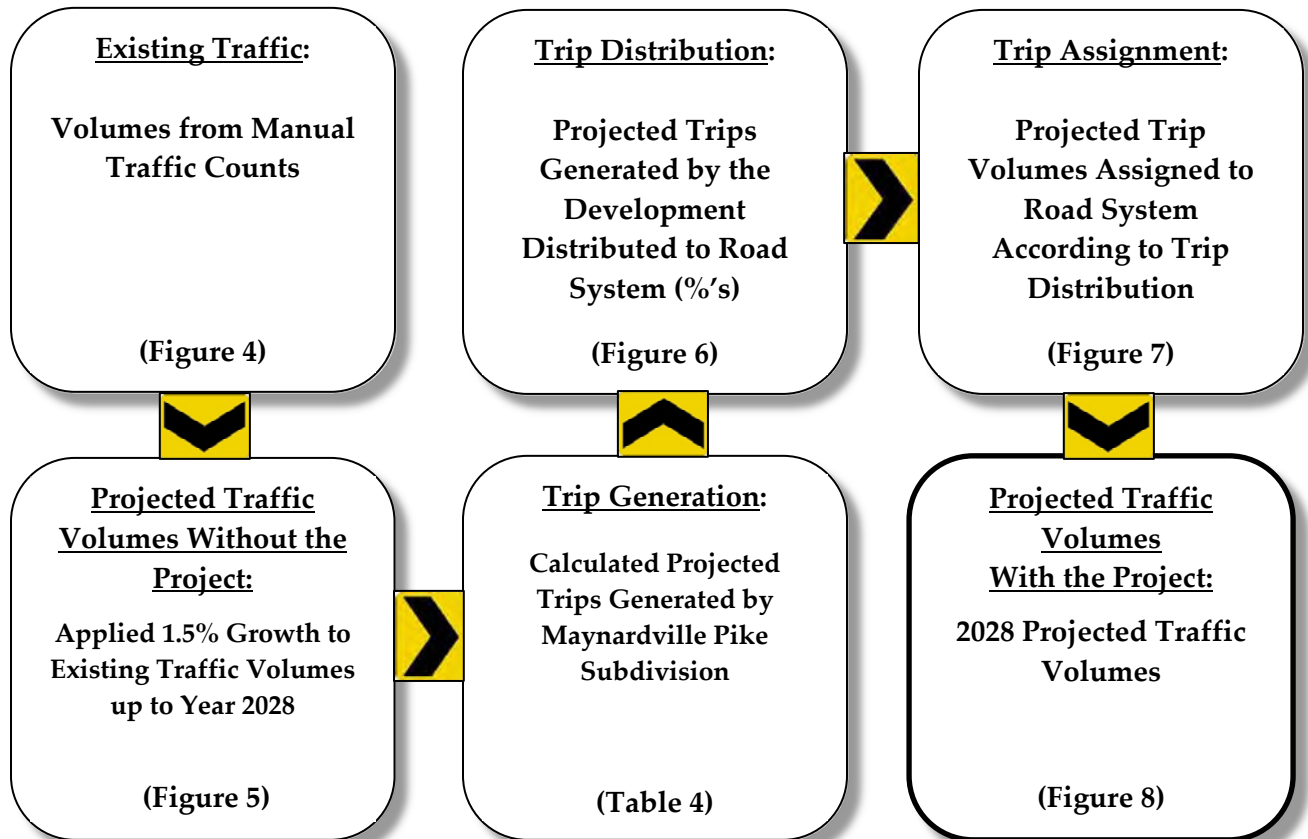
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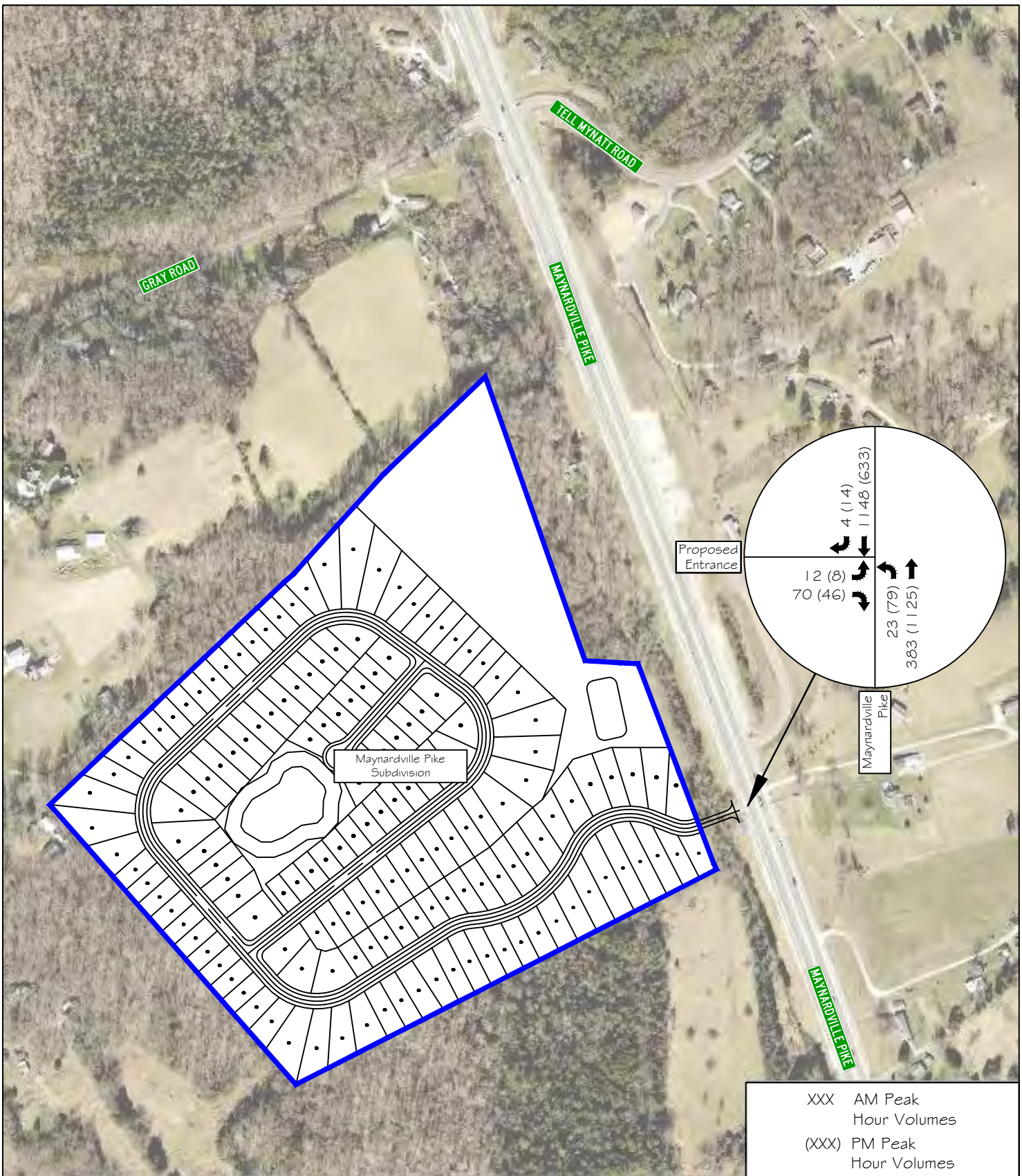
FIGURE 7
Maynardville Pike Subdivision
Traffic Assignment of Generated Traffic
during AM and PM Peak Hour

▪ **PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT:**

Overall, several additive steps were taken to estimate the total projected traffic volumes at the Proposed Entrance when the Maynardville Pike Subdivision is constructed and fully occupied in 2028. The steps are illustrated below for clarity and review:



The calculated peak hour traffic (Table 4) generated by the Maynardville Pike Subdivision was added to the 2028 horizon year traffic (Figure 5) by following the predicted trip distributions and assignments (Figures 6 and 7). This procedure was completed to obtain the total projected traffic volumes when the proposed development is fully built and occupied in 2028. Figure 8 shows the projected 2028 AM and PM peak hours with the generated development traffic at the Proposed Entrance.



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FIGURE 8

Maynardville Pike Subdivision

2028 Peak Hour Traffic Volumes -
PROJECTED TRAFFIC CONDITIONS
WITH THE PROJECT

Capacity analyses were conducted to determine the projected LOS at the Proposed Entrance with the development traffic in 2028. The Proposed Entrance intersection at Maynardville Pike is projected to operate adequately in the 2028 AM and PM peak hours with very reasonable vehicle delays. These results can be seen in Table 5, and Appendix F includes the worksheets for these capacity analyses.

TABLE 5
2028 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
Maynardville Pike (SB & NB) at Proposed Entrance (EB)	 Unsignalized	Northbound Left	B	12.3	0.049	B	10.1	0.110
		Eastbound Left/Right	C	21.1	0.290	B	14.4	0.136

Note: All analyses were calculated in Synchro 11 software and reported using 6th Edition intersection methodology
^a Level of Service , ^b Average Delay (sec/vehicle) , ^c Volume-to-Capacity Ratio

▪ **POTENTIAL TRANSPORTATION SAFETY ISSUES:**

The study area was investigated for potential existing and future safety issues when the development is constructed. These transportation features are discussed in the following pages.

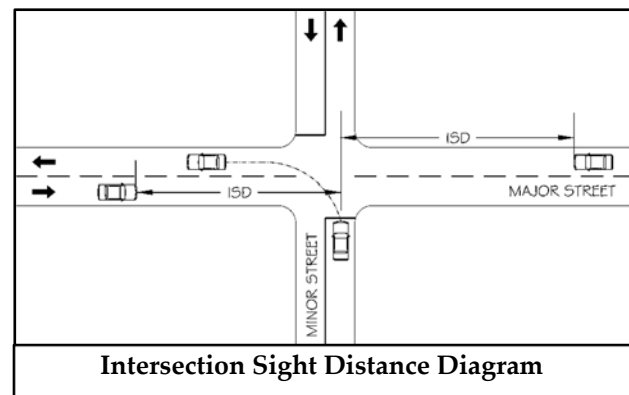
○ **EVALUATION OF SIGHT DISTANCE**

For intersections, sight distance evaluations have two categories: Stopping Sight Distance (SSD) and Intersection Sight Distance (ISD).

Methodology:

SSD is the distance required for a motorist on a major street to perceive, react, and the vehicle to come to a complete stop before colliding with an object on the road. For evaluating intersections, this object would be another vehicle entering the intersection from a minor street. SSD can be considered the minimum visibility distance standard for evaluating the safety of an intersection.

ISD is the required visibility distance standard for evaluating the safety of an intersection per section 3.04.J.5 in the Knoxville-Knox County Subdivision Regulations. ISD is based on the time required to perceive, react, and complete the desired traffic maneuver once a motorist on a minor street decides to perform a traffic maneuver.



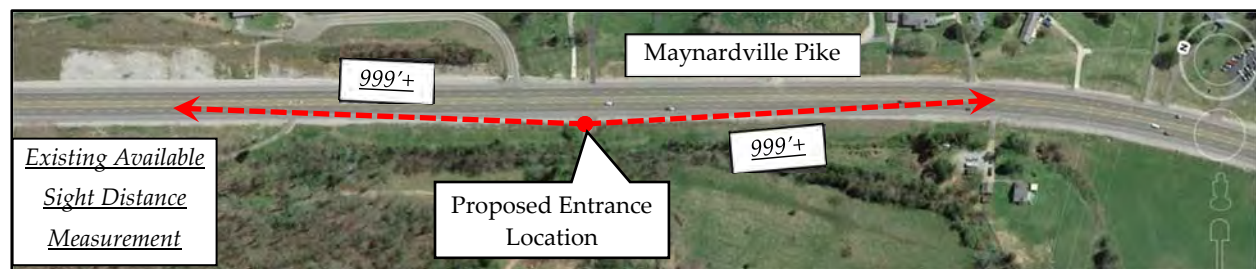
Intersection Sight Distance Diagram

Three traffic maneuvers are available for vehicles stopped on a minor street at a 4-way intersection: (1) left-turn, (2) right-turn, (3) or a crossing maneuver across the major street. For turns from the minor street, ISD is needed to allow a stopped motorist to turn onto a major street without being overtaken by an approaching vehicle. The most critical ISD is for left turns from the minor street. The ISD for this maneuver includes the time to turn left and clear half of the intersection without conflicting with the oncoming traffic from the left and accelerating to the road's operating speed without causing the approaching vehicles from the right to reduce their speed substantially.

With a posted speed limit of 55 mph on Maynardville Pike (SR 33) at the Proposed Entrance, the calculated ISD is 690 feet based on AASHTO's (American Association of State Highway Transportation Officials) and TDOT's guidance. This distance is required for a motorist to exit safely to the left at Maynardville Pike. For a motorist to safely exit to the right at Maynardville Pike, the ISD is calculated to be 530 feet.

Visual observations of the sight distances at the Proposed Entrance were undertaken. Using a Nikon Laser Rangefinder at the Proposed Entrance location, the available sight distances were visually estimated to be 999 feet (limit of rangefinder) to the north and south on Maynardville Pike. Based on visual observation, the available sight distance from the Proposed Entrance at Maynardville Pike will be more than adequate for motorists exiting the development.

Images of the existing sight distances at the Proposed Entrance location are labeled below with the ISD and visually measured sight distances.



View of Sight Distance on Maynardville Pike at the Proposed Entrance (Looking North)



View of Sight Distance on Maynardville Pike at the Proposed Entrance (Looking South)

○ **EVALUATION OF TURN LANE THRESHOLDS**

The need for a separate right-turn lane on Maynardville Pike at the Proposed Entrance was evaluated in the projected 2028 conditions. The evaluation did not include left turn-entering movements at the Proposed Entrance since an existing TWLTL is already provided in the center of the highway for left-turn movements.

The criteria used for this turn lane evaluation were based on TDOT’s “Highway System Access Manual”. This design policy relates vehicle volume thresholds based on prevailing speeds for two-lane and four-lane roadways. The projected volumes were evaluated based on the posted speed limit of 55 mph on Maynardville Pike at the Proposed Entrance.

According to TDOT’s guidelines, a separate southbound right-turn lane on Maynardville Pike is not warranted at the Proposed Entrance based on the projected 2028 PM peak hour traffic volumes. The worksheets for these evaluations are provided in Appendix I.

○ **PROJECTED VEHICLE QUEUES**

The software program also calculated the projected 2028 AM and PM peak hour vehicle queues at the Proposed Entrance. The 95th percentile vehicle queue is the recognized measurement in the traffic engineering profession as the design standard used when considering vehicle queue lengths at intersections. A 95th percentile vehicle queue length means 95% certainty that the vehicle queue will not extend beyond that point. The 95th percentile vehicle queue lengths at the Proposed Entrance for the 2028 projected conditions are shown in Table 6. The vehicle queue results are included in the capacity analysis worksheets provided in Appendix F. Table 6 shows that all the projected 2028 vehicle queues will be reasonable in length.

**TABLE 6
 TURN LANE STORAGE & VEHICLE QUEUE SUMMARY -
 2028 PROJECTED PEAK HOUR TRAFFIC WITH THE PROJECT**

INTERSECTION	APPROACH/ MOVEMENT	PROVIDED STORAGE LENGTH (ft)	SYNCHRO 95 th PERCENTILE QUEUE LENGTH (ft)	
			AM PEAK HOUR	PM PEAK HOUR
Maynardville Pike (NB & SB) at Proposed Entrance (EB)	Northbound Left	TWLTL	5	10
	Eastbound Left/Right	n/a	30	13

Note: 95th percentile queues were calculated in Synchro 11 software, with vehicle lengths assigned as 25 feet per vehicle

CONCLUSIONS & RECOMMENDATIONS

The following is an overview of recommendations to minimize the transportation impacts of the proposed Maynardville Pike Subdivision on the adjacent transportation system while attempting to achieve an acceptable traffic flow and improved safety.

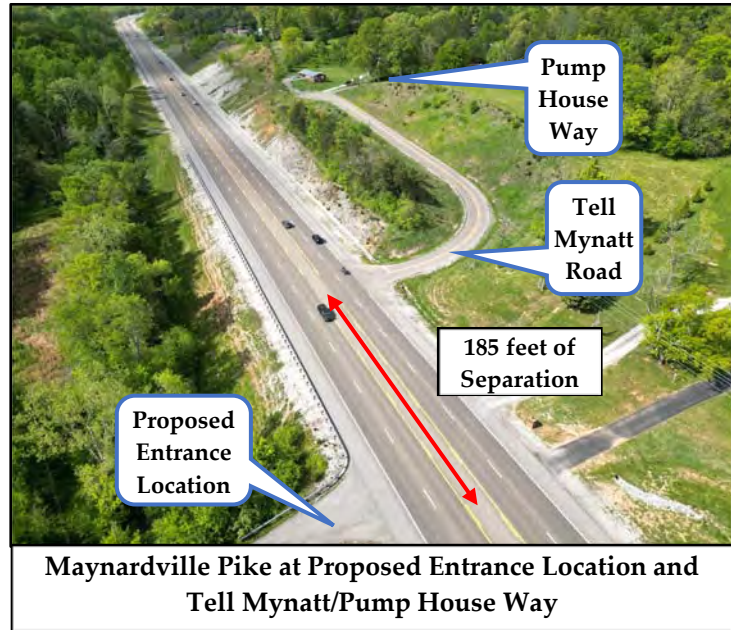


Maynardville Pike at the Proposed Entrance: The projected 2028 level of service calculations for the intersection of Maynardville Pike at the Proposed Entrance resulted in reasonable LOS and vehicle delays. Overall, the exiting left- and right-turning vehicles from the subdivision will experience minimal queue lengths, with a maximum of just over one passenger vehicle in the 2028 AM and PM peak hours.

- 1a) It is recommended that the center two-way left-turn lane (TWLTL) pavement markings on Maynardville Pike be removed within the extent of the new Proposed Entrance intersection to match the existing public side road breaks in the pavement markings. Any striping modifications will need to be approved by TDOT at the driveway permit stage.
- 1b) It is recommended that a Stop Sign (R1-1) be installed, and a 24" white stop bar be applied to the Proposed Entrance approach at Maynardville Pike. The stop bar should be applied a minimum of 4 feet away from the edge of Maynardville Pike and placed at the desired stopping point that maximizes the sight distance.
- 1c) Sight distances at the Proposed Entrance approach must not be impacted by future landscaping, signage, or vegetation. The site designer must ensure that the intersection sight distances are accounted for and provided in the design plans. Based on a posted speed limit of 55 mph, the required ISD is 690 feet. A visual inspection determined that these sight distances are available to the north and south on Maynardville Pike.
- 1d) The construction of the Proposed Entrance on Maynardville Pike will require a TDOT Highway Entrance Permit. The entrance will require widening and improving the pavement where the existing driveway is currently located. This reconstruction will also require modifications to the existing guardrail along the highway that wraps around and terminates at the existing private driveway. The developer will need to apply for this permit and coordinate with TDOT regarding their specific requirements for this entrance.

1e) Even though a southbound right-turn lane on Maynardville Pike is not warranted in the projected conditions, the developer is encouraged to begin coordination with TDOT early in the permitting process. Other modifications may be necessary at TDOT's discretion, including an increased radius for southbound right turns and potentially strengthening the asphalt pavement on the shoulder to facilitate vehicles turning off the higher-speed highway.

1f) Knox County requires a 400-foot minimum intersection spacing distance on Arterial roads. The intersection of Maynardville Pike, an arterial road, at the Proposed Entrance will be 185 feet away to the southeast from Tell Mynatt Road/Pump House Way (centerline to centerline).



The site designer must request a variance to allow the proposed intersection spacing to be less than the minimum required. This variance should be requested since the development property has limited access opportunities on Maynardville Pike due to the topography and the adjacent creek on the highway's west side.

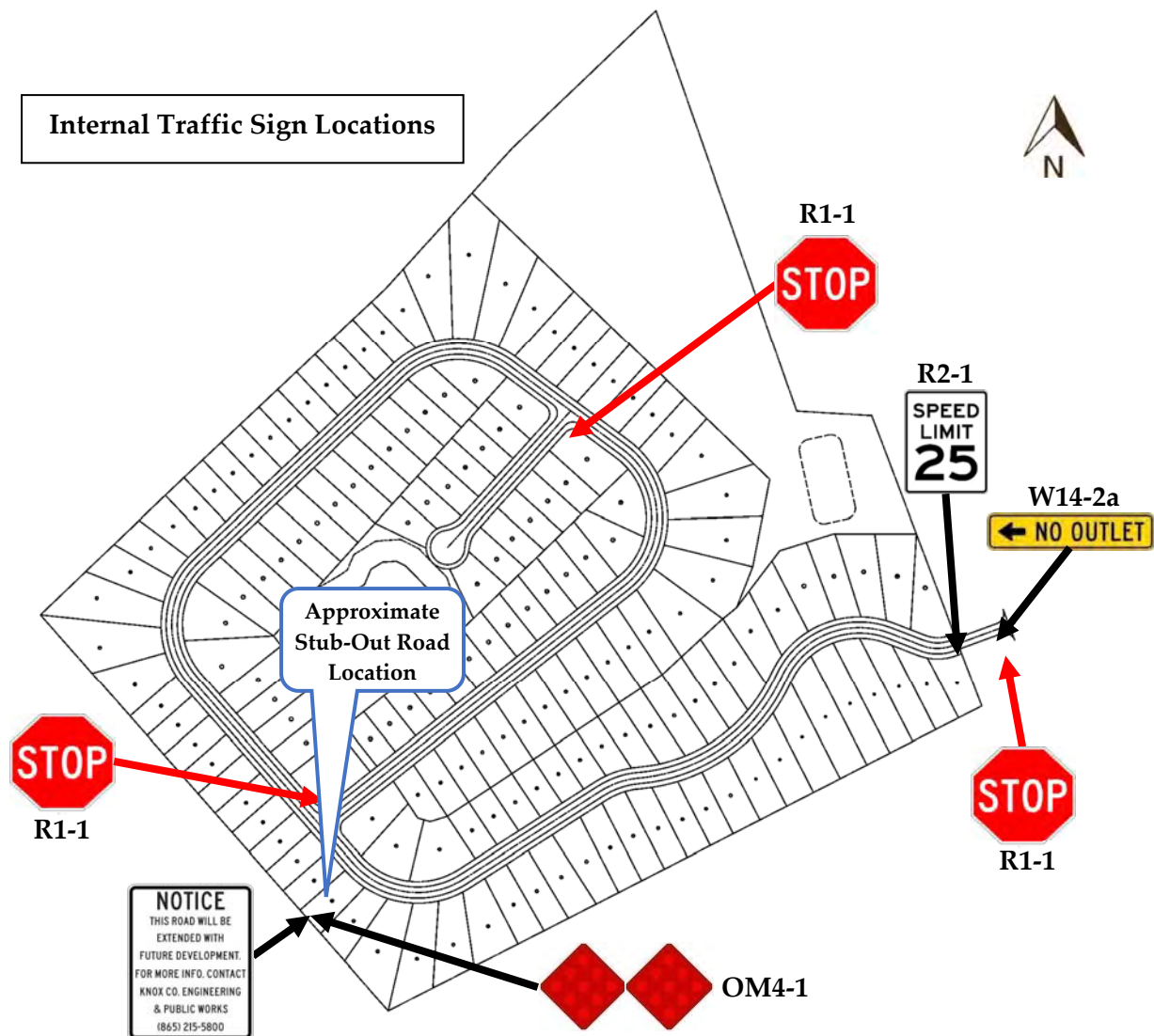
Since it is a free-flow movement, southbound right-turn movements from Maynardville Pike into the proposed subdivision will not create vehicle queues on Maynardville Pike. Thus, these movements will not interfere with turning movements on Maynardville Pike at Tell Mynatt Road/Pump House Way. These offset intersections will not have any conflicting movements, will have low turning movements from each, and vehicle queues are not expected to impact operations at either intersection.



Maynardville Pike Subdivision Internal Roads: The layout plan shows one entrance on Maynardville Pike constructed for the development, as shown in Figure 3 and below.

- 2a) A 25-mph Speed Limit (R2-1) sign is recommended to be posted near the beginning of the development entrance off Maynardville Pike. It is also recommended that a “No Outlet” Sign (W14-2a) be posted at the front of the subdivision. This sign can be posted above or below the street name sign.

- 2b) The image below shows the recommended internal road signage for the proposed subdivision. The site plan is undergoing a slight revision, including a stub-out road to the southeast, as requested by Knox County. The image below does not reflect this revision, but where the stub-out will likely occur is noted. Stop Signs (R1-1) with 24” white stop bars are recommended to be installed at the internal road locations, as shown in the image below.



The requested stub-out road should include a dual end-of-roadway object marker (OM4-1) installed at its end. Furthermore, an additional sign should be posted at the end of the stub-out road to follow Knoxville-Knox County Subdivision regulations. This sign is for notification of a possible future street connection. It should state, "NOTICE – This road may be extended with future development – for more info. contact Knox Co. Engineering & Public Works (865) 215-5800".

- 2c) Sight distance at the new internal intersections must not be impacted by new signage, parked cars, or future landscaping. With a speed limit of 25-mph in the development, the internal intersection sight distance is 250 feet. The required stopping sight distance is 155 feet for a level road grade. The site designer should ensure that internal sight distance lengths are met and account for different proposed road grades.
- 2d) If directed by the local post office, the site designer should include a parking area and a centralized mail delivery center within the development for the subdivision residents.
- 2e) All drainage grates and covers for the residential development must be pedestrian and bicycle safe.
- 2f) The main internal roadway will be looped and have long, straight segments. Straight road segments encourage higher vehicle speeds. It is recommended that the site designer consider including traffic calming measures on these segments, such as speed humps or tables. Specifics regarding this recommendation should be discussed in the design phase with Knox County Engineering.
- 2g) For residential subdivisions with more than 150 housing units, Knox County has a long-standing unwritten design policy requiring a boulevard road typical section at the entrance if a second access is not provided. This policy ensures access to the subdivision during potential emergencies. Since the proposed layout of the Maynardville Pike Subdivision only provides one



**Existing Driveway at Maynardville Pike
(Looking East)**

means of ingress and egress and will have 152 units, the subdivision entrance may need to be designed and constructed with a boulevard roadway section. Providing a boulevard section at the entrance at Maynardville Pike would likely require widening and significant alterations due to the existing width of the concrete box culvert across Mill Branch Creek. Due to this impediment and the proposal of only two additional lots over the design policy, this requirement may not be necessary. A decision regarding this issue should be coordinated with Knox County Engineering.

- 2h) All road and intersection elements should be designed to AASHTO, TDOT, and Knox County specifications and guidelines to ensure proper transportation operations.

APPENDIX A

HISTORICAL TRAFFIC COUNT DATA

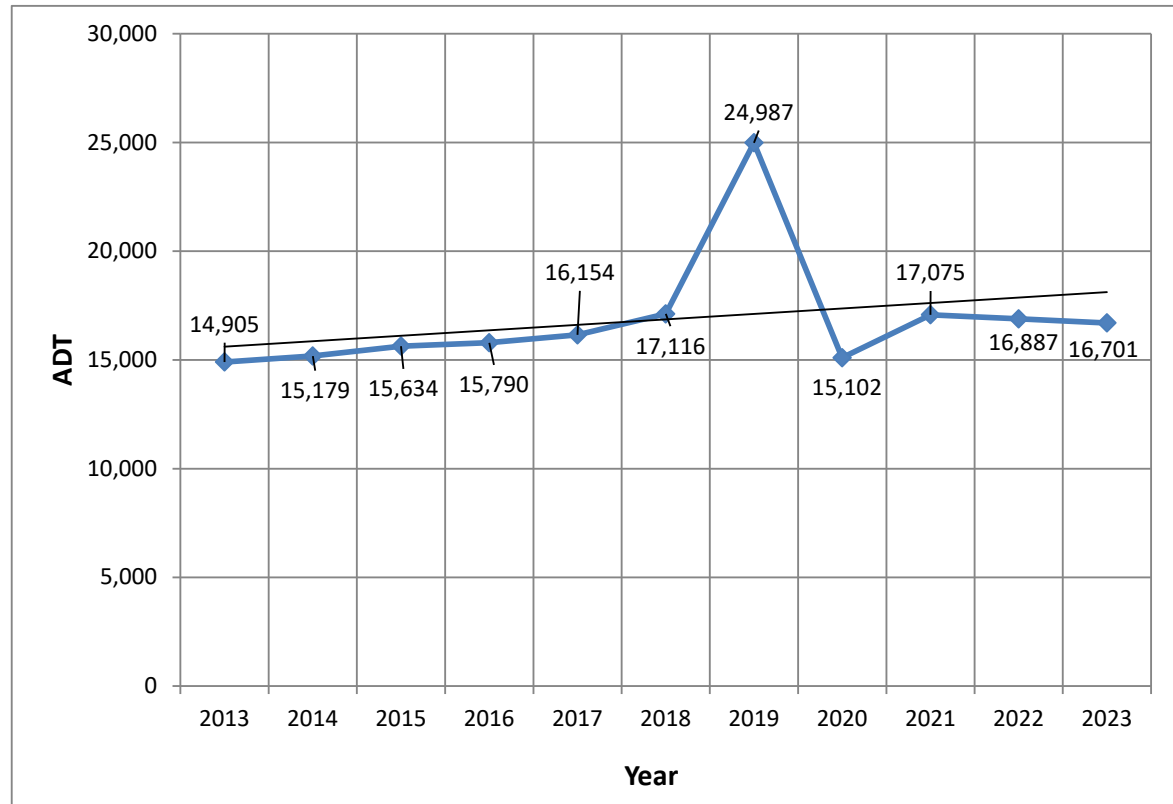
Historical Traffic Counts

Organization: TDOT

Station ID #: 47000020

Location: Maynardville Highway (SR 33), north of East Emory Road

YEAR	AADT	
2013	14,905	Trendline
2014	15,179	
2015	15,634	
2016	15,790	
2017	16,154	
2018	17,116	
2019	24,987	
2020	15,102	
2021	17,075	
2022	16,887	
2023	16,701	



2013 - 2023 Growth Rate = 12.0%

Average Annual Growth Rate = 1.1%

Home Locate Locate All Email This Auto-Locate:

List View All DTRs

Record 7226 of 15935 Goto Record go

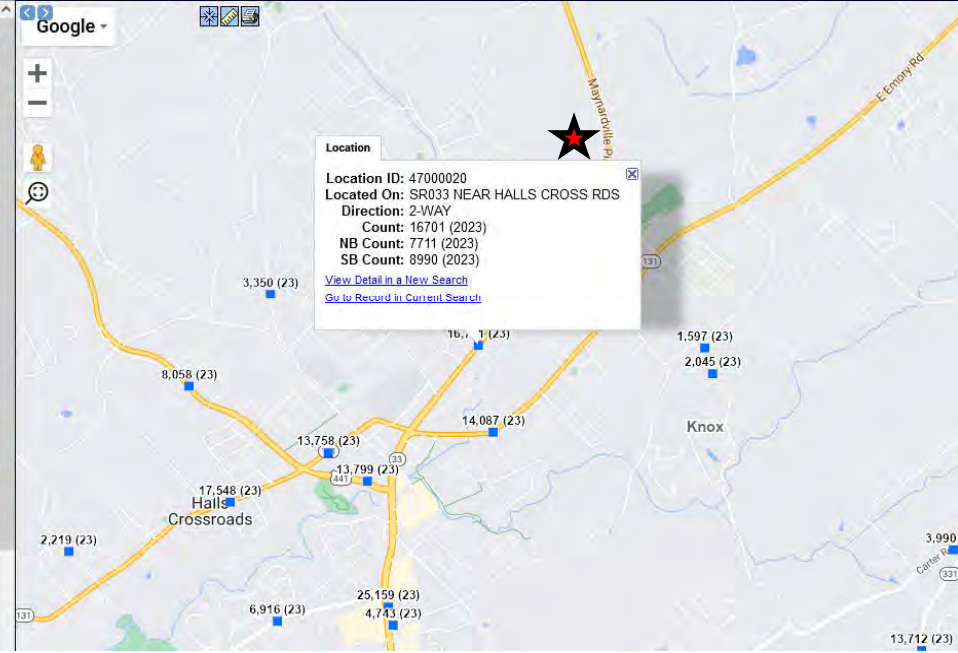
Location ID	47000020	MPO ID	
Type	SPOT	HPMS ID	
On NHS	Yes	On HPMS	
LRS ID	47SR033001	LRS Loc Pt.	15.945
SF Group	Urban Principal Arterial	Route Type	
AF Group	Region 1 Urban Other Principal Arterial	Route	
GF Group	Knox	Active	Yes
Class Dist Grp	Region 1 Urban Other Principal Arterial	Category	CC
Seas Clss Grp			
WIM Group			
QC Group	Default		
Funct'l Class	Other Principal Arterial	Milepost	
Located On	SR033		
Loc On Alias	MAYNARDVILLE PK. NEAR HALLS CROSS RDS		

More Detail

STATION DATA
Directions: 2-WAY NB SB

AADT	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2023	16,701	1,368	8	58	15,848 (95%)	853 (5%)	
	2022	16,887 ³		8	64	16,059 (95%)	828 (5%)	Grown from 2021
	2021	17,075	1,437	8	64	15,588 (91%)	1,487 (9%)	
	2020	15,102	1,529	10	64	13,773 (91%)	1,329 (9%)	
	2019	24,987		10	51			

1-5 of 39



APPENDIX B

WALK SCORE

WALKSCORE

(from walkscore.com)

Walk Score Get Scores My Favorites Add to Your Site

Type an address, neighborhood or city

7933 Maynardville Pike

Knoxville, Tennessee, 37938

Commute to **Downtown John Sevier**

46 min 60+ min 60+ min [View Routes](#)

Favorite Map [Nearby Knoxville Apartments on Redfin](#)

[More about 7933 Maynardville Pike](#)

Walk Score
0

Car-Dependent
Almost all errands require a car.

Bike Score
2

Somewhat Bikeable
Minimal bike infrastructure.

[About your score](#)

Scores for 7933 Maynardville Pike

Bike Score
2

Walk Score **Transit Score** **Bike Score**

[Score Details](#) [What is Walk Score](#)

The Walk Score for 7933 Maynardville Pike is based on the following categories.

Category	Contribution to Walk Score
Dining & Drinking	0%
Groceries	0%
Shopping	~5%
Errands	0%
Parks	0%
Schools	0%
Culture & Entertainment	0%

Scores for 7933 Maynardville Pike



Walk Score	Transit Score	Bike Score
Transit Score measures how well a location is served by public transit based on the distance and type of nearby transit lines.		
90-100	Rider's Paradise World-class public transportation	
70-89	Excellent Transit Transit is convenient for most trips	
50-69	Good Transit Many nearby public transportation options	
25-49	Some Transit A few nearby public transportation options	
0-24	Minimal Transit It is possible to get on a bus	

Scores for 7933 Maynardville Pike

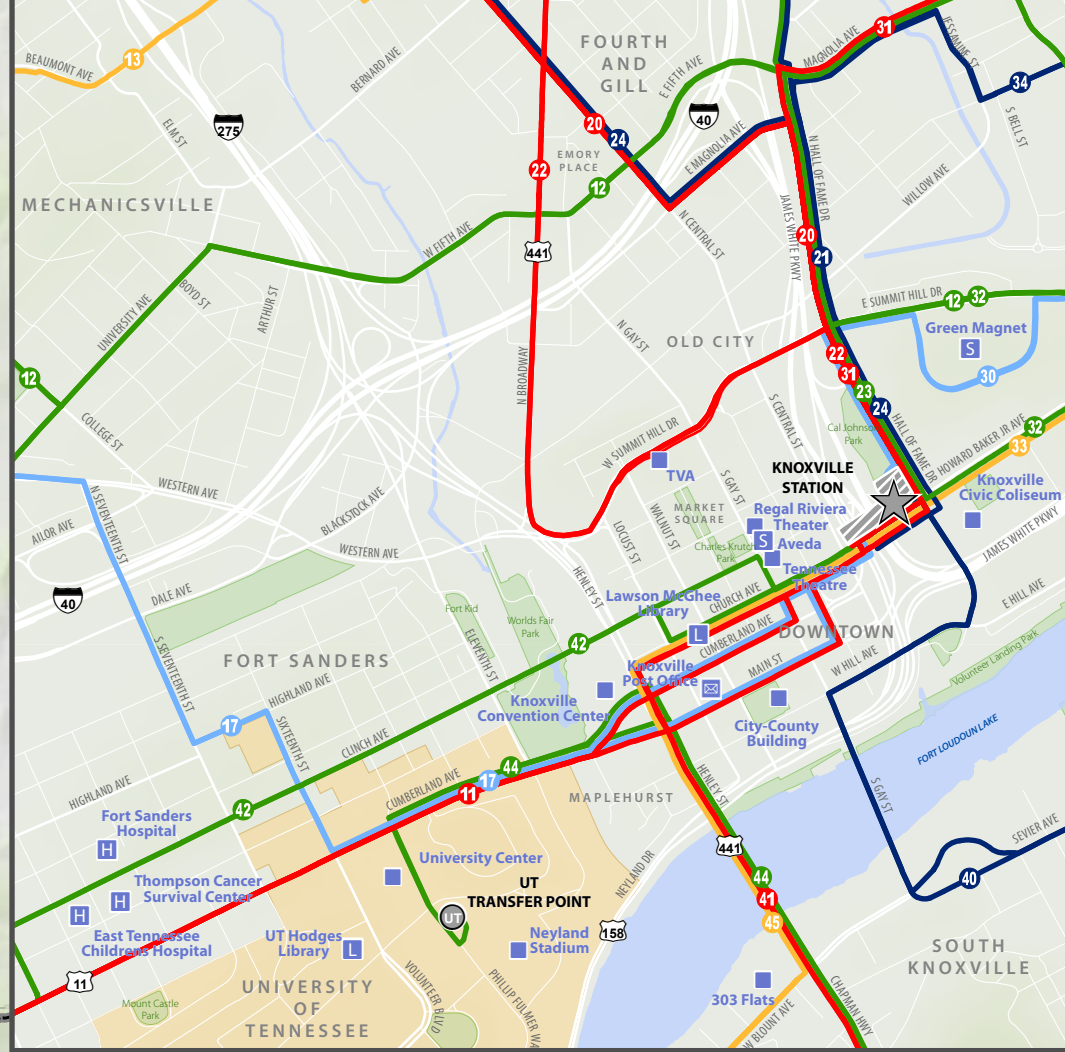


Walk Score	Transit Score	Bike Score
Bike Score measures whether an area is good for biking based on bike lanes and trails, hills, road connectivity, and destinations.		
90-100	Biker's Paradise Daily errands can be accomplished on a bike	
70-89	Very Bikeable Biking is convenient for most trips	
50-69	Bikeable Some bike infrastructure	
0-49	Somewhat Bikeable Minimal bike infrastructure	

APPENDIX C

KNOXVILLE AREA TRANSIT MAP AND INFORMATION

Knoxville City Center



Legend

- Transfer Point
- Lift Service Area Boundary

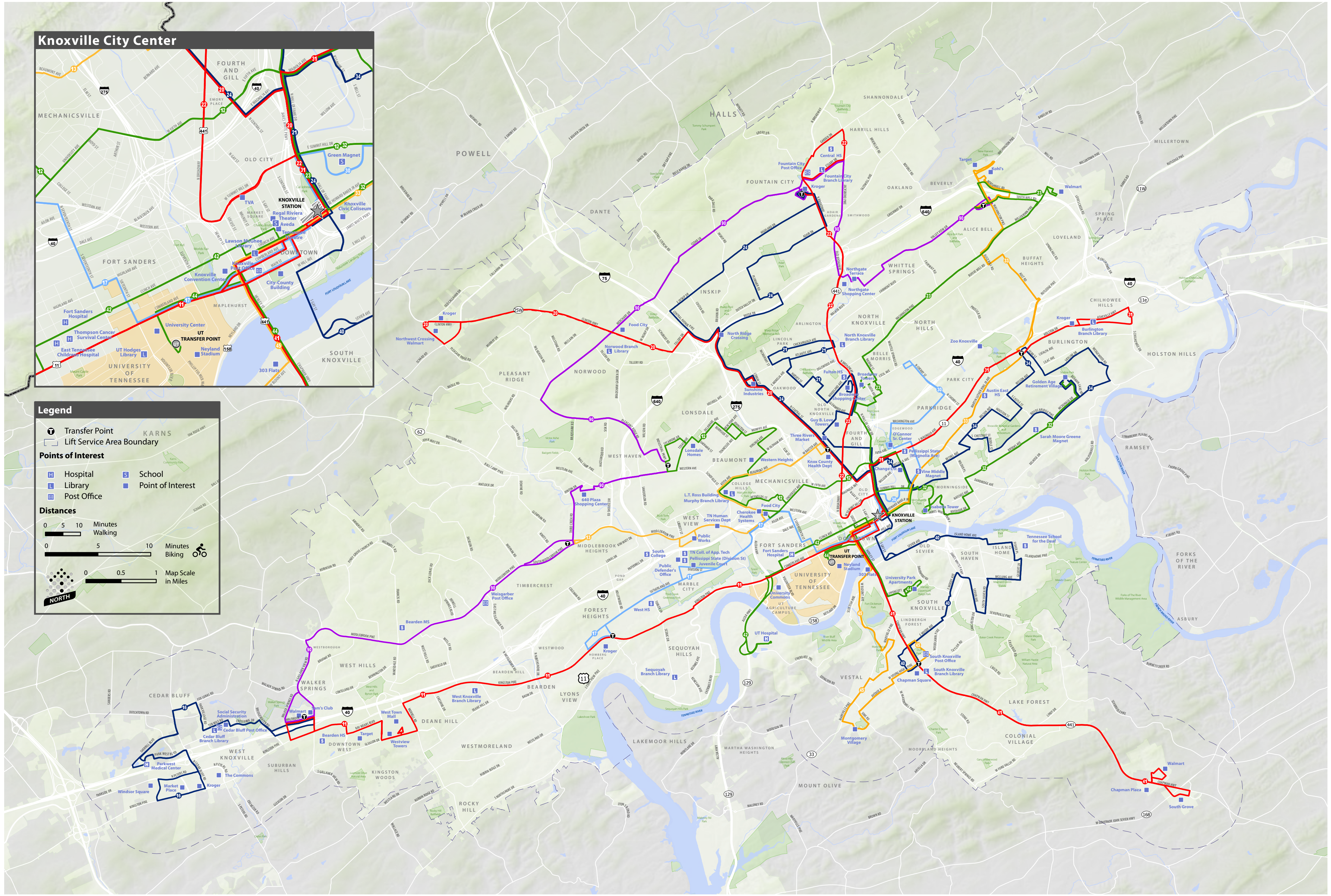
Points of Interest

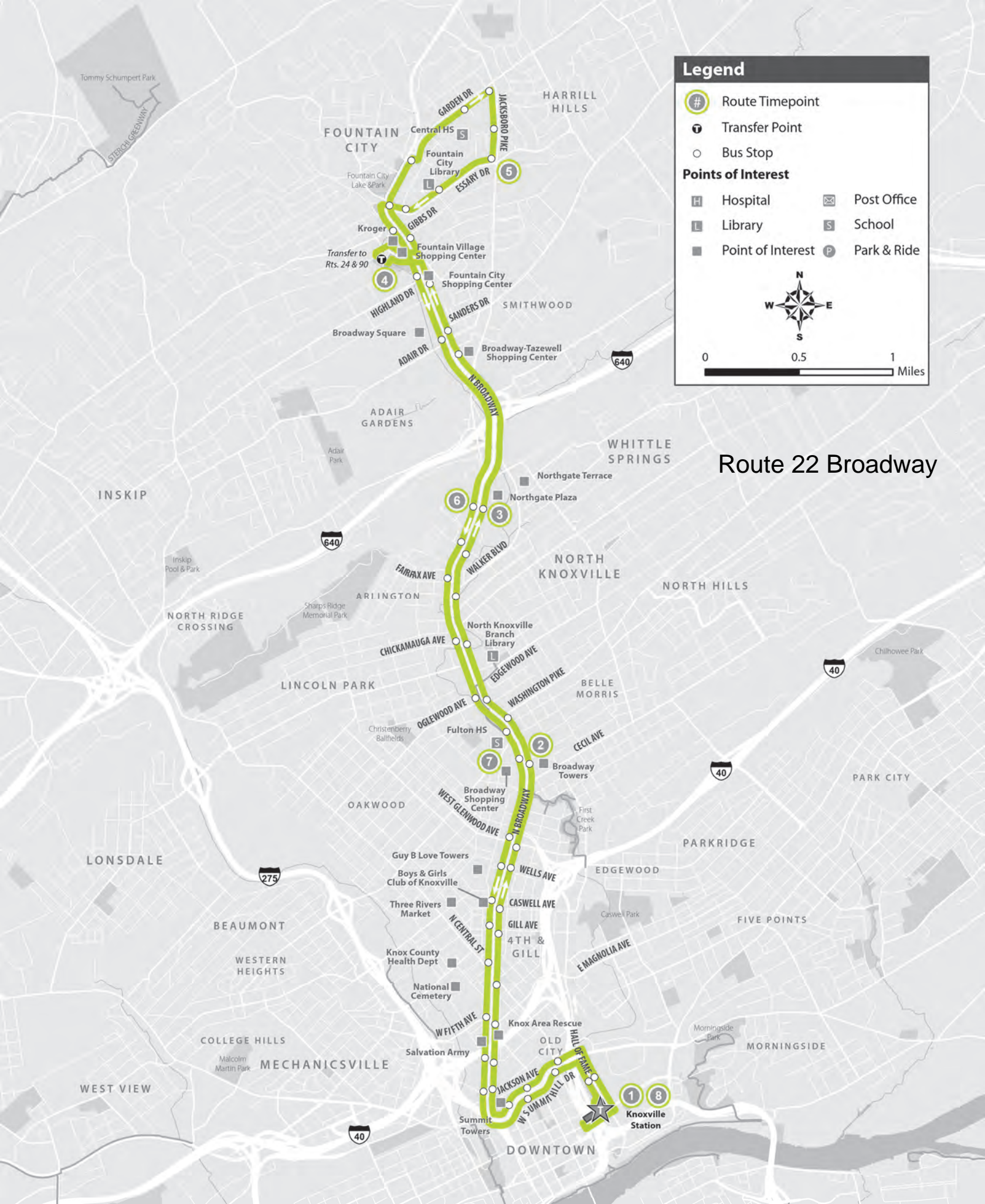
- Hospital
- School
- Library
- Post Office
- Point of Interest

Distances

- 0 5 10 Minutes Walking
- 0 5 10 Minutes Biking
- 0 0.5 1 Map Scale in Miles

NORTH





Legend

- Route Timepoint
- Transfer Point
- Bus Stop

Points of Interest

Hospital	Post Office
Library	School
Point of Interest	Park & Ride

0 0.5 1 Miles

Route 22 Broadway

Route 22 - Broadway: Weekdays

Going away from downtown				Going toward downtown			
Knoxville Station Bay H	Broadway Shopping Center	Northgate Shopping Center	Fountain City Superstop	Jacksboro @ Essary	Northgate Shopping Center	Broadway Shopping Center	Knoxville Station Bay H
1	2	3	4	5	6	7	8
				5:55 AM	6:06 AM	6:11 AM	6:25 AM
				6:25 AM	6:36 AM	6:41 AM	6:55 AM
6:00 AM	6:13 AM	6:20 AM	6:35 AM	6:40 AM	6:51 AM	6:56 AM	7:10 AM
6:30 AM	6:43 AM	6:50 AM	7:05 AM	7:10 AM	7:21 AM	7:26 AM	7:40 AM
7:00 AM	7:13 AM	7:20 AM	7:35 AM	7:40 AM	7:51 AM	7:56 AM	8:10 AM
7:15 AM	7:28 AM	7:35 AM	7:50 AM	7:55 AM	8:06 AM	8:11 AM	8:25 AM
7:45 AM	7:58 AM	8:05 AM	8:20 AM	8:25 AM	8:36 AM	8:41 AM	8:55 AM
8:15 AM	8:28 AM	8:35 AM	8:50 AM	8:55 AM	9:06 AM	9:11 AM	9:25 AM
8:30 AM	8:43 AM	8:50 AM	9:05 AM	9:10 AM	9:21 AM	9:26 AM	9:40 AM
9:00 AM	9:13 AM	9:20 AM	9:35 AM	9:40 AM	9:51 AM	9:56 AM	10:10 AM
9:30 AM	9:43 AM	9:50 AM	10:05 AM	10:10 AM	10:21 AM	10:26 AM	10:40 AM
10:00 AM	10:13 AM	10:20 AM	10:35 AM	10:40 AM	10:51 AM	10:56 AM	11:10 AM
10:30 AM	10:43 AM	10:50 AM	11:05 AM	11:10 AM	11:21 AM	11:26 AM	11:40 AM
11:00 AM	11:13 AM	11:20 AM	11:35 AM	11:40 AM	11:51 AM	11:56 AM	12:10 PM
11:30 AM	11:43 AM	11:50 AM	12:05 PM	12:10 PM	12:21 PM	12:26 PM	12:40 PM
12:00 PM	12:13 PM	12:20 PM	12:35 PM	12:40 PM	12:51 PM	12:56 PM	1:10 PM
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1:30 PM	1:43 PM	1:50 PM	2:05 PM	2:10 PM	2:21 PM	2:26 PM	2:40 PM
2:00 PM	2:13 PM	2:20 PM	2:35 PM	2:40 PM	2:51 PM	2:56 PM	3:10 PM
2:30 PM	2:43 PM	2:50 PM	3:05 PM	3:10 PM	3:21 PM	3:26 PM	3:40 PM
3:00 PM	3:13 PM	3:20 PM	3:35 PM	3:40 PM	3:51 PM	3:56 PM	4:10 PM
3:30 PM	3:43 PM	3:50 PM	4:05 PM	4:10 PM	4:21 PM	4:26 PM	4:40 PM
3:45 PM	3:58 PM	4:05 PM	4:20 PM	4:25 PM	4:36 PM	4:41 PM	4:55 PM
4:00 PM	4:13 PM	4:20 PM	4:35 PM	4:40 PM	4:51 PM	4:56 PM	5:10 PM
4:15 PM	4:28 PM	4:35 PM	4:50 PM	4:55 PM	5:06 PM	5:11 PM	5:25 PM
4:45 PM	4:58 PM	5:05 PM	5:20 PM	5:25 PM	5:36 PM	5:41 PM	5:55 PM
5:00 PM	5:13 PM	5:20 PM	5:35 PM	5:40 PM	5:51 PM	5:56 PM	6:10 PM
5:15 PM	5:28 PM	5:35 PM	5:50 PM	5:55 PM	6:06 PM	6:11 PM	6:25 PM
5:30 PM	5:43 PM	5:50 PM	6:05 PM	6:10 PM	6:21 PM	6:26 PM	6:40 PM
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6:30 PM	6:43 PM	6:50 PM	7:05 PM	7:10 PM	7:21 PM	7:26 PM	7:40 PM
6:45 PM	6:58 PM	7:05 PM	7:20 PM	7:25 PM	7:36 PM	7:41 PM	7:55 PM
7:15 PM	7:28 PM	7:35 PM	7:50 PM	7:55 PM	8:06 PM	8:11 PM	8:25 PM
7:45 PM	7:58 PM	8:05 PM	8:15 PM	8:25 PM	8:36 PM	8:41 PM	8:55 PM
8:15 PM	8:28 PM	8:35 PM	8:50 PM	8:55 PM	9:06 PM	9:11 PM	9:25 PM
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10:15 PM	10:28 PM	10:35 PM	10:50 PM	10:55 PM	11:06 PM	11:11 PM	11:25 PM
11:15 PM	11:28 PM	11:35 PM	11:40 PM				

Route 22 - Broadway: SATURDAYS

Going away from downtown				Going toward downtown			
Knoxville Station Bay H	Broadway Shopping Center	Northgate Shopping Center	Fountain City Superstop	Jacksboro @ Essary	Northgate Shopping Center	Broadway Shopping Center	Knoxville Station Bay H
1	2	3	4	5	6	7	8
7:00 AM	7:13 AM	7:20 AM	7:35 AM	7:40 AM	7:51 AM	7:56 AM	8:10 AM
7:30 AM	7:43 AM	7:50 AM	8:05 AM	8:10 AM	8:21 AM	8:26 AM	8:40 AM
8:00 AM	8:13 AM	8:20 AM	8:35 AM	8:40 AM	8:51 AM	8:56 AM	9:10 AM
8:30 AM	8:43 AM	8:50 AM	9:05 AM	9:10 AM	9:21 AM	9:26 AM	9:40 AM
9:00 AM	9:13 AM	9:20 AM	9:35 AM	9:40 AM	9:51 AM	9:56 AM	10:10 AM
9:30 AM	9:43 AM	9:50 AM	10:05 AM	10:10 AM	10:21 AM	10:26 AM	10:40 AM
10:00 AM	10:13 AM	10:20 AM	10:35 AM	10:40 AM	10:51 AM	10:56 AM	11:10 AM
10:30 AM	10:43 AM	10:50 AM	11:05 AM	11:10 AM	11:21 AM	11:26 AM	11:40 AM
11:00 AM	11:13 AM	11:20 AM	11:35 AM	11:40 AM	11:51 AM	11:56 AM	12:10 PM
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7:30 PM	7:43 PM	7:50 PM	8:05 PM	8:10 PM	8:21 PM	8:26 PM	8:40 PM
8:00 PM	8:13 PM	8:20 PM	8:35 PM	8:40 PM	8:51 PM	8:56 PM	9:10 PM
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10:30 PM	10:43 PM	10:50 PM	11:05 PM	11:10 PM	11:21 PM	11:26 PM	
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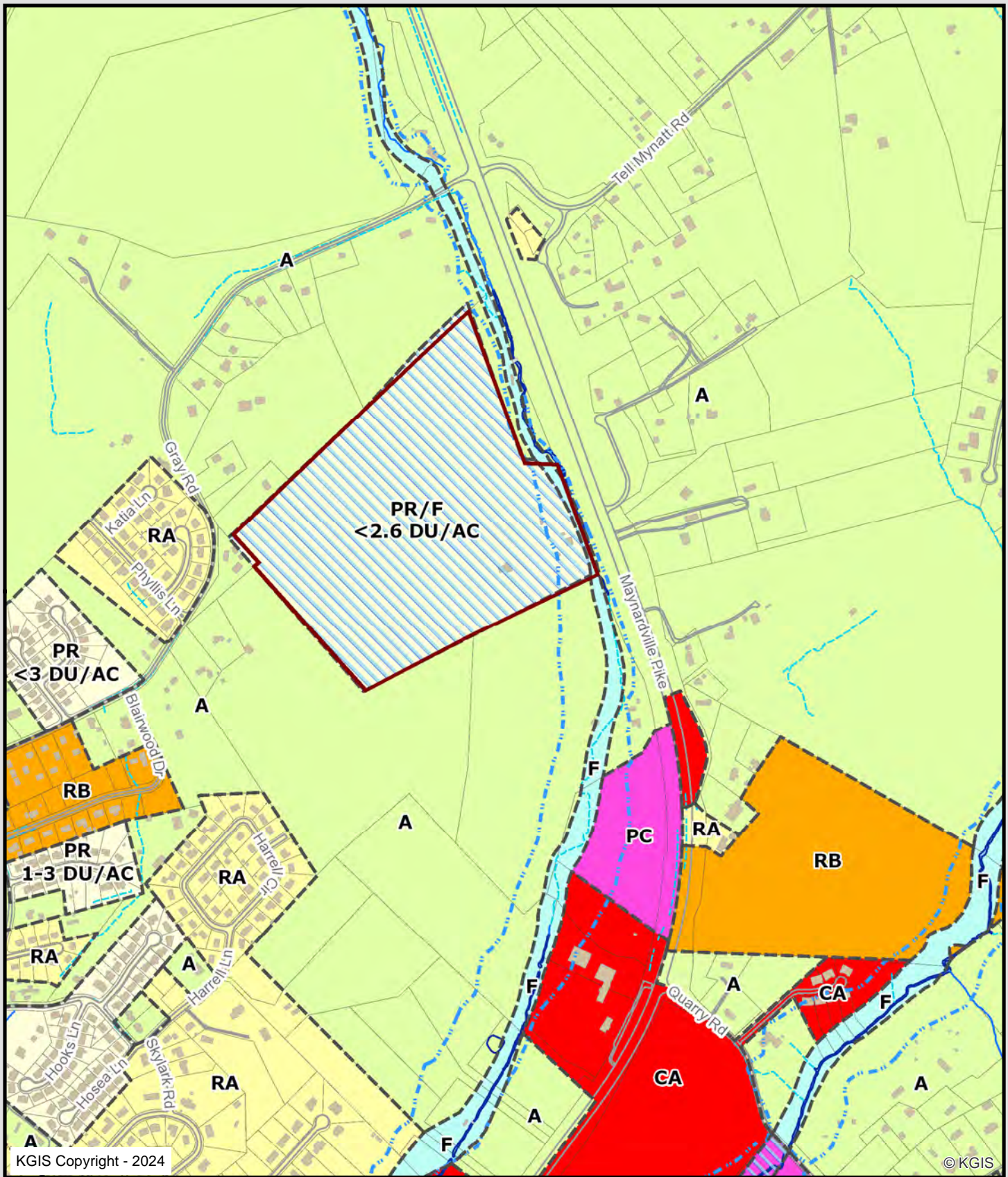
Route 22 - Broadway: SUNDAYS

Going away from downtown				Going toward downtown			
Knoxville Station Bay H	Broadway Shopping Center	Northgate Shopping Center	Fountain City Superstop	Jacksboro @ Essary	Northgate Shopping Center	Broadway Shopping Center	Knoxville Station Bay H
1	2	3	4	5	6	7	8
8:15 AM	8:28 AM	8:35 AM	8:44 AM		8:53 AM	9:00 AM	9:15 AM
9:15 AM	9:28 AM	9:35 AM	9:44 AM		9:53 AM	10:00 AM	10:15 AM
10:15 AM	10:28 AM	10:35 AM	10:44 AM		10:53 AM	11:00 AM	11:15 AM
11:15 AM	11:28 AM	11:35 AM	11:44 AM		11:53 AM	12:00 PM	12:15 PM
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6:15 PM	6:28 PM	6:35 PM	6:44 PM		6:53 PM	7:00 PM	7:15 PM
7:15 PM	7:28 PM	7:35 PM	7:44 PM		7:53 PM	8:00 PM	8:15 PM
8:15 PM	8:28 PM	8:35 PM	8:40 PM				

Highlighted times are service additions

APPENDIX D

ZONING MAP



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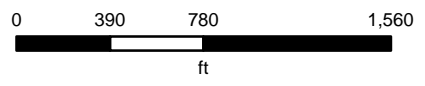
© KGIS

Zoning Map

5.6.24

Printed: 5/6/2024 at 11:35:55 AM

Knoxville - Knox County - KUB Geographic Information System



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APPENDIX E

MANUAL TRAFFIC COUNT DATA

TRAFFIC COUNT DATA

Major Street: Maynardville Pike (SB and NB)
 Minor Street: Tell Mynatt Road (WB) and Gray Road (EB)
 Traffic Control: Stop Signs on Minor Streets

4/25/2024 (Thursday)
 Mostly Sunny and Mild
 Conducted by: Ajax Engineering

TIME BEGIN	Maynardville Pike SOUTHBOUND			Tell Mynatt Road WESTBOUND			Maynardville Pike NORTHBOUND			Gray Road EASTBOUND			VEHICLE TOTAL	PEAK HOUR
	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT		
7:00 AM	0	293	2	8	0	1	2	71	1	4	0	12	394	7:00 AM - 8:00 AM
7:15 AM	0	241	0	9	0	2	2	83	1	5	1	14	358	
7:30 AM	1	267	0	5	0	1	2	93	2	2	1	8	382	
7:45 AM	2	212	3	7	0	0	2	100	2	4	0	7	339	
8:00 AM	1	234	2	6	0	0	1	97	4	0	0	14	359	
8:15 AM	3	228	0	7	0	2	3	87	3	3	0	8	344	
8:30 AM	0	198	1	1	0	1	3	115	3	3	1	7	333	
8:45 AM	2	195	0	8	0	0	2	99	0	0	1	7	314	
TOTAL	9	1868	8	51	0	7	17	745	16	21	4	77	2823	
2:00 PM	1	139	3	6	0	0	6	156	5	2	1	2	321	
2:15 PM	0	119	4	5	1	2	1	172	7	1	0	5	317	
2:30 PM	0	108	2	4	0	1	5	164	3	4	1	6	298	
2:45 PM	0	125	2	8	0	2	8	159	7	8	2	5	326	
3:00 PM	0	131	0	3	1	0	8	209	3	3	0	3	361	
3:15 PM	0	160	3	2	0	1	3	198	12	1	0	6	386	
3:30 PM	4	158	4	7	0	1	9	211	6	1	1	10	412	
3:45 PM	0	171	4	3	0	1	3	202	3	3	2	4	396	
4:00 PM	1	111	2	2	0	1	12	221	4	11	1	4	370	
4:15 PM	0	154	0	2	0	1	7	247	13	5	0	4	433	
4:30 PM	0	141	3	3	2	0	7	251	3	3	0	8	421	4:30 PM - 5:30 PM
4:45 PM	1	108	2	4	0	0	8	261	3	1	0	3	391	
5:00 PM	0	127	5	5	1	1	13	241	10	2	0	3	408	
5:15 PM	1	185	4	4	0	2	8	247	9	5	0	6	471	
5:30 PM	1	129	2	4	3	1	5	223	2	1	0	8	379	
5:45 PM	2	129	2	6	1	1	7	215	9	4	1	4	381	
TOTAL	11	2195	42	68	9	15	110	3377	99	55	9	81	6071	

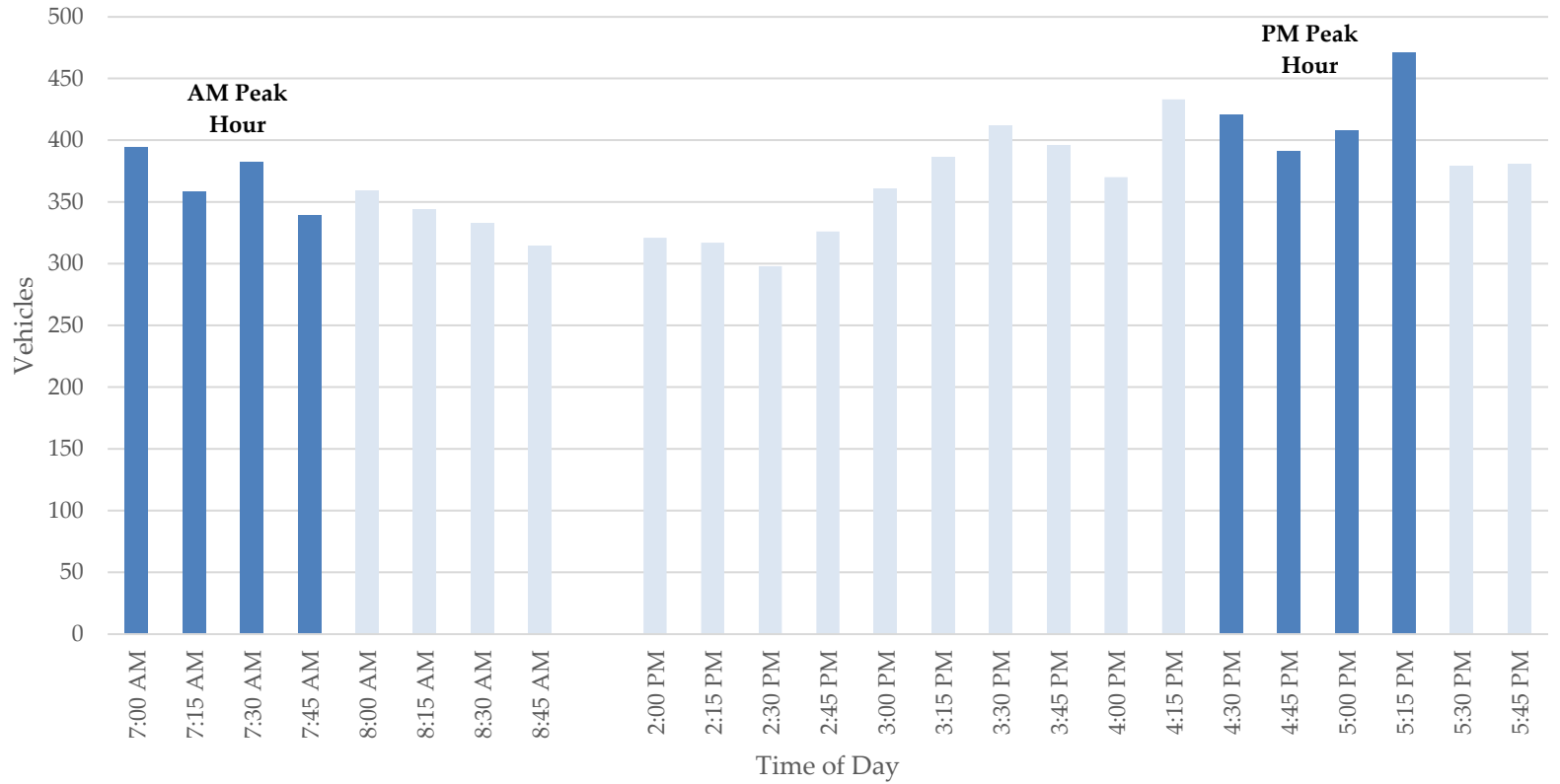
2024 AM Peak Hour 7:00 AM - 8:00 AM

TIME BEGIN	Maynardville Pike SOUTHBOUND			Tell Mynatt Road WESTBOUND			Maynardville Pike NORTHBOUND			Gray Road EASTBOUND		
	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT
7:00 AM	0	293	2	8	0	1	2	71	1	4	0	12
7:15 AM	0	241	0	9	0	2	2	83	1	5	1	14
7:30 AM	1	267	0	5	0	1	2	93	2	2	1	8
7:45 AM	2	212	3	7	0	0	2	100	2	4	0	7
TOTAL	3	1013	5	29	0	4	8	347	6	15	2	41
TRUCK %	0.0%	3.3%	0.0%	0.0%	-	0.0%	12.5%	3.7%	0.0%	0.0%	0.0%	2.4%
PHF_{mvmt}	0.38	0.86	0.42	0.81	-	0.50	1.00	0.87	0.75	0.75	0.50	0.73
PHF_{app}	0.87			0.75			0.87			0.73		
PHF_{int}	0.93											

2024 PM Peak Hour 4:30 PM - 5:30 PM

TIME BEGIN	Maynardville Pike SOUTHBOUND			Tell Mynatt Road WESTBOUND			Maynardville Pike NORTHBOUND			Gray Road EASTBOUND		
	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT
4:30 PM	0	141	3	3	2	0	7	251	3	3	0	8
4:45 PM	1	108	2	4	0	0	8	261	3	1	0	3
5:00 PM	0	127	5	5	1	1	13	241	10	2	0	3
5:15 PM	1	185	4	4	0	2	8	247	9	5	0	6
TOTAL	2	561	14	16	3	3	36	1000	25	11	0	20
TRUCK %	0.0%	2.7%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	-	0.0%
PHF_{mvmt}	0.50	0.76	0.70	0.80	0.38	0.38	0.69	0.96	0.63	0.55	-	0.63
PHF_{app}	0.76			0.79			0.98			0.70		
PHF_{int}	0.90											

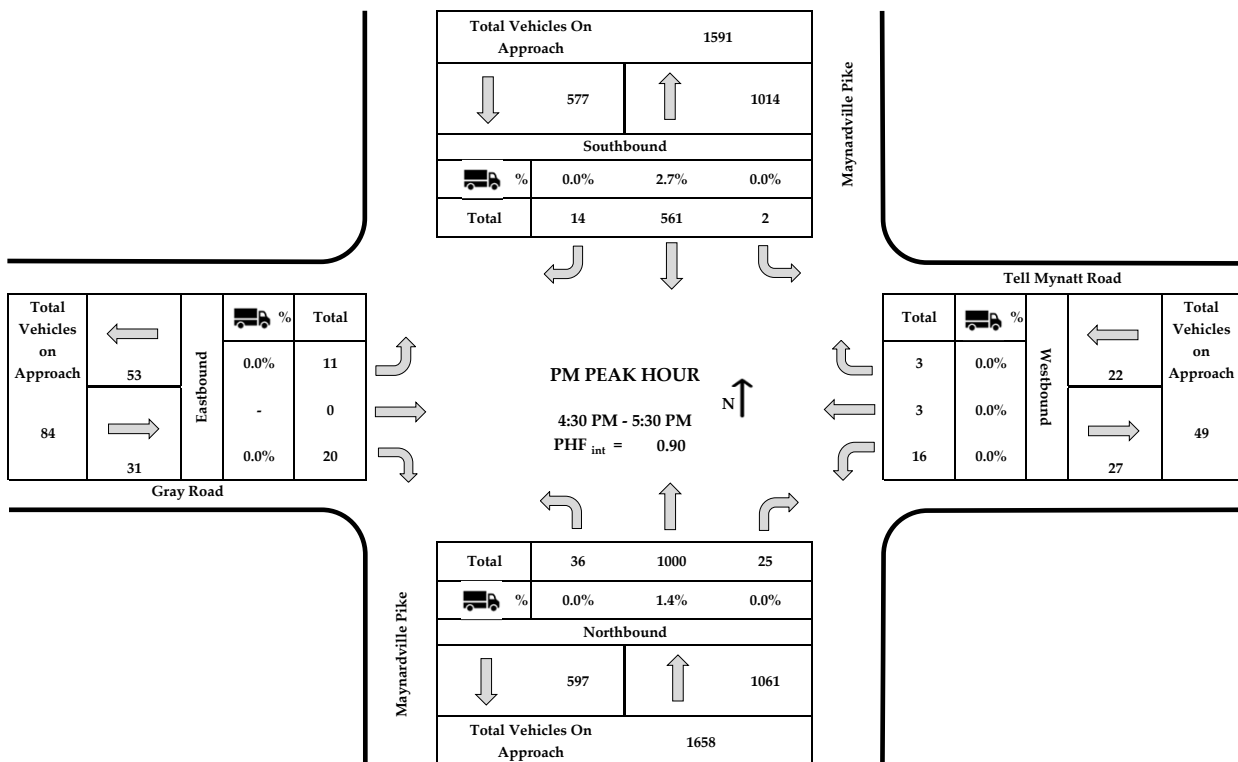
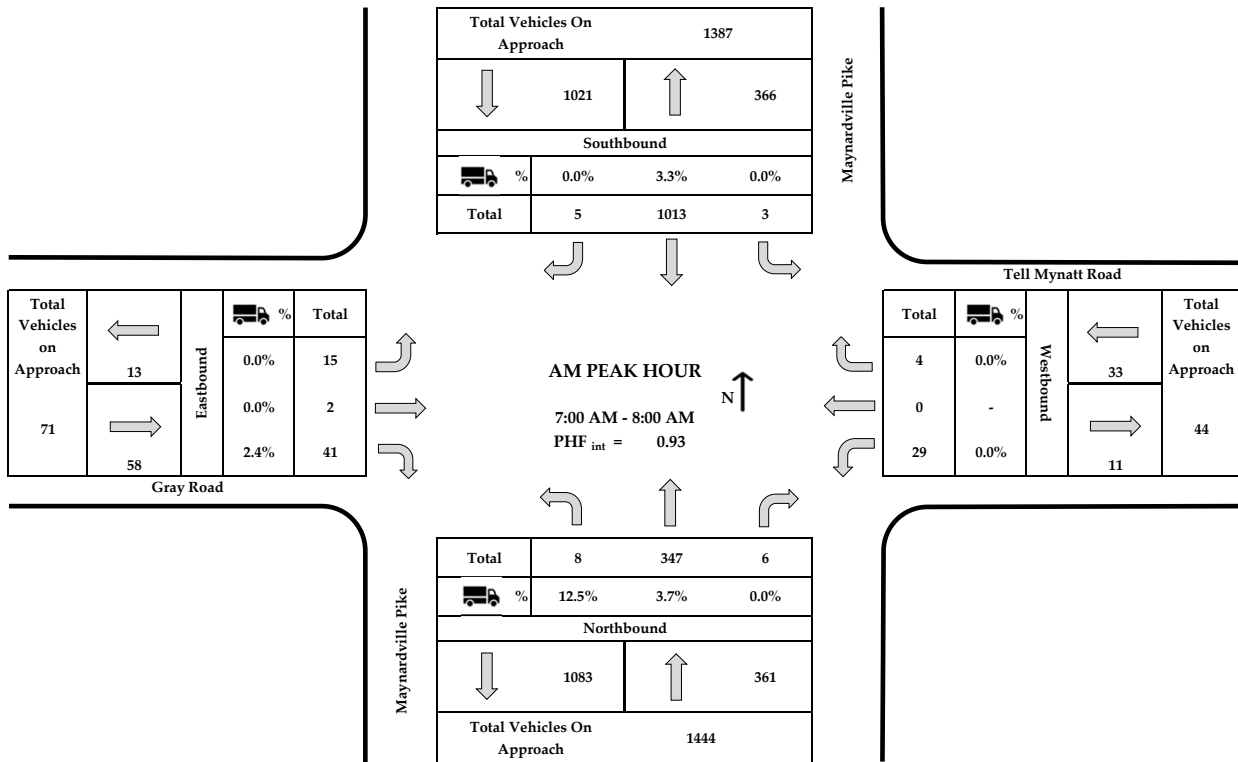
**Maynardville Pike at Tell Mynatt Road and Gray Road
Intersection Traffic Count Totals
4/25/2024**



PEAK HOUR DATA

Major Street: Maynardville Pike (SB and NB)
 Minor Street: Tell Mynatt Road (WB) and Gray Road (EB)
 Traffic Control: Stop Signs on Minor Streets

4/25/2024 (Thursday)
 Mostly Sunny and Mild
 Conducted by: Ajax Engineering



APPENDIX F

CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 11)

EXISTING CONDITIONS

HCM 6th TWSC
 3: Maynardville Pike & Gray Road/Tell Mynatt Road

05/07/2024

Intersection												
Int Delay, s/veh	1.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕		↕	↕		↕	↕	
Traffic Vol, veh/h	15	2	41	29	0	4	8	347	6	3	1013	5
Future Vol, veh/h	15	2	41	29	0	4	8	347	6	3	1013	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	50	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	4	-	-	0	-	-	3	-	-	-3	-
Peak Hour Factor	75	50	73	81	90	50	100	87	75	38	86	42
Heavy Vehicles, %	0	0	2	0	0	0	12	4	0	0	3	0
Mvmt Flow	20	4	56	36	0	8	8	399	8	8	1178	12

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1416	1623	595	1026	1625	204	1190	0	0	407	0	0
Stage 1	1200	1200	-	419	419	-	-	-	-	-	-	-
Stage 2	216	423	-	607	1206	-	-	-	-	-	-	-
Critical Hdwy	8.3	7.3	7.34	7.5	6.5	6.9	4.34	-	-	4.1	-	-
Critical Hdwy Stg 1	7.3	6.3	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	7.3	6.3	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.32	3.5	4	3.3	2.32	-	-	2.2	-	-
Pot Cap-1 Maneuver	72	72	419	192	103	809	529	-	-	1163	-	-
Stage 1	153	200	-	588	593	-	-	-	-	-	-	-
Stage 2	736	538	-	455	259	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	70	70	419	160	101	809	529	-	-	1163	-	-
Mov Cap-2 Maneuver	130	156	-	276	196	-	-	-	-	-	-	-
Stage 1	151	199	-	579	584	-	-	-	-	-	-	-
Stage 2	718	530	-	383	257	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	25.3		18.1		0.2		0.1	
HCM LOS	D		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	529	-	-	256	276	809	1163	-	-
HCM Lane V/C Ratio	0.015	-	-	0.313	0.13	0.01	0.007	-	-
HCM Control Delay (s)	11.9	-	-	25.3	20	9.5	8.1	-	-
HCM Lane LOS	B	-	-	D	C	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	1.3	0.4	0	0	-	-

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕		↕	↕		↕	↕	
Traffic Vol, veh/h	11	0	20	16	3	3	36	1000	25	2	561	14
Future Vol, veh/h	11	0	20	16	3	3	36	1000	25	2	561	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	50	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	4	-	-	0	-	-	3	-	-	-3	-
Peak Hour Factor	55	90	63	80	38	38	69	96	63	50	76	70
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	3	0
Mvmt Flow	20	0	32	20	8	8	52	1042	40	4	738	20

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1385	1942	379	1543	1932	541	758	0	0	1082	0	0
Stage 1	756	756	-	1166	1166	-	-	-	-	-	-	-
Stage 2	629	1186	-	377	766	-	-	-	-	-	-	-
Critical Hdwy	8.3	7.3	7.3	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	7.3	6.3	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	7.3	6.3	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	77	43	599	80	67	491	862	-	-	652	-	-
Stage 1	314	354	-	209	270	-	-	-	-	-	-	-
Stage 2	384	203	-	622	415	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	69	40	599	72	63	491	862	-	-	652	-	-
Mov Cap-2 Maneuver	175	128	-	155	164	-	-	-	-	-	-	-
Stage 1	295	352	-	196	254	-	-	-	-	-	-	-
Stage 2	344	191	-	585	413	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19	26.7	0.4	0.1
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	862	-	-	309	155	246	652	-	-
HCM Lane V/C Ratio	0.061	-	-	0.167	0.129	0.064	0.006	-	-
HCM Control Delay (s)	9.4	-	-	19	31.6	20.6	10.6	-	-
HCM Lane LOS	A	-	-	C	D	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.6	0.4	0.2	0	-	-

PROJECTED CONDITIONS WITH THE PROJECT

HCM 6th TWSC
6: Maynardville Pike & Proposed Entrance

05/07/2024

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y		Y	↑↑	↑↑	
Traffic Vol, veh/h	12	70	23	383	1148	4
Future Vol, veh/h	12	70	23	383	1148	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	2	-	-	3	-3	-
Peak Hour Factor	90	90	90	87	86	90
Heavy Vehicles, %	0	0	0	4	3	0
Mvmt Flow	13	78	26	440	1335	4

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1609	670	1339	0	-	0
Stage 1	1337	-	-	-	-	-
Stage 2	272	-	-	-	-	-
Critical Hdwy	7.2	7.1	4.1	-	-	-
Critical Hdwy Stg 1	6.2	-	-	-	-	-
Critical Hdwy Stg 2	6.2	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	81	389	521	-	-	-
Stage 1	184	-	-	-	-	-
Stage 2	733	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	77	389	521	-	-	-
Mov Cap-2 Maneuver	148	-	-	-	-	-
Stage 1	175	-	-	-	-	-
Stage 2	733	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21.1	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	521	-	314	-	-
HCM Lane V/C Ratio	0.049	-	0.29	-	-
HCM Control Delay (s)	12.3	-	21.1	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	1.2	-	-

HCM 6th TWSC
6: Maynardville Pike & Proposed Entrance

05/07/2024

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	46	79	1125	633	14
Future Vol, veh/h	8	46	79	1125	633	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	2	-	-	3	-3	-
Peak Hour Factor	90	90	90	96	76	90
Heavy Vehicles, %	0	0	0	1	3	0
Mvmt Flow	9	51	88	1172	833	16

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	1603	425	849	0	0
Stage 1	841	-	-	-	-
Stage 2	762	-	-	-	-
Critical Hdwy	7.2	7.1	4.1	-	-
Critical Hdwy Stg 1	6.2	-	-	-	-
Critical Hdwy Stg 2	6.2	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-
Pot Cap-1 Maneuver	82	570	798	-	-
Stage 1	354	-	-	-	-
Stage 2	392	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	73	570	798	-	-
Mov Cap-2 Maneuver	192	-	-	-	-
Stage 1	315	-	-	-	-
Stage 2	392	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.4	0.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	798	-	441	-	-
HCM Lane V/C Ratio	0.11	-	0.136	-	-
HCM Control Delay (s)	10.1	-	14.4	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.5	-	-

APPENDIX G

ITE TRIP GENERATION RATES

Land Use: 210

Single-Family Detached Housing

Description

A single-family detached housing site includes any single-family detached home on an individual lot. A typical site surveyed is a suburban subdivision.

Specialized Land Use

Data have been submitted for several single-family detached housing developments with homes that are commonly referred to as patio homes. A patio home is a detached housing unit that is located on a small lot with little (or no) front or back yard. In some subdivisions, communal maintenance of outside grounds is provided for the patio homes. The three patio home sites total 299 dwelling units with overall weighted average trip generation rates of 5.35 vehicle trips per dwelling unit for weekday, 0.26 for the AM adjacent street peak hour, and 0.47 for the PM adjacent street peak hour. These patio home rates based on a small sample of sites are lower than those for single-family detached housing (Land Use 210), lower than those for single-family attached housing (Land Use 251), and higher than those for senior adult housing -- single-family (Land Use 251). Further analysis of this housing type will be conducted in a future edition of *Trip Generation Manual*.

Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

For 30 of the study sites, data on the number of residents and number of household vehicles are available. The overall averages for the 30 sites are 3.6 residents per dwelling unit and 1.5 vehicles per dwelling unit.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Arizona, California, Connecticut, Delaware, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Minnesota, Montana, New Jersey, North Carolina, Ohio, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, Virginia, and West Virginia.

Source Numbers

100, 105, 114, 126, 157, 167, 177, 197, 207, 211, 217, 267, 275, 293, 300, 319, 320, 356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 869, 903, 925, 936, 1005, 1007, 1008, 1010, 1033, 1066, 1077, 1078, 1079

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 174

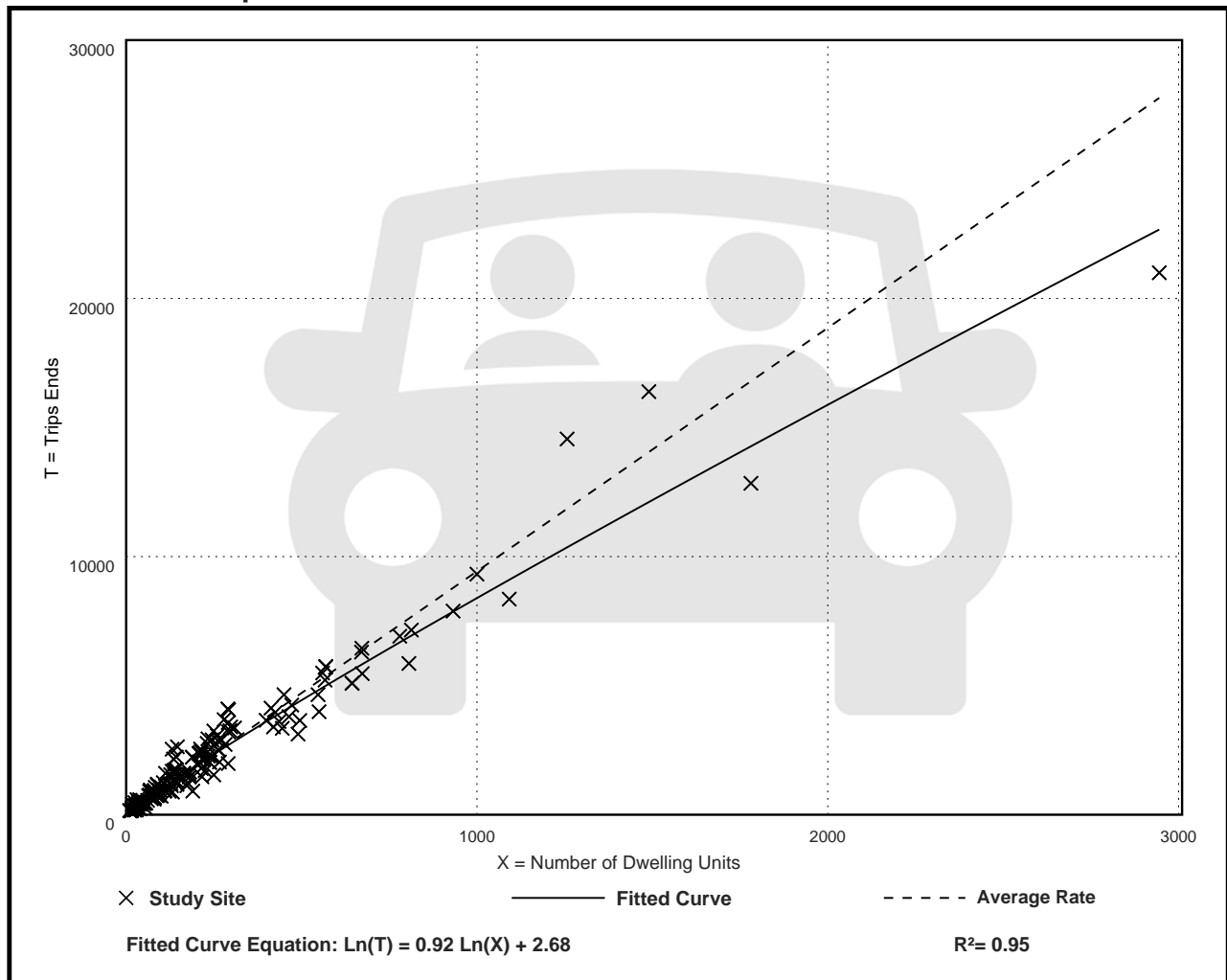
Avg. Num. of Dwelling Units: 246

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.43	4.45 - 22.61	2.13

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 192

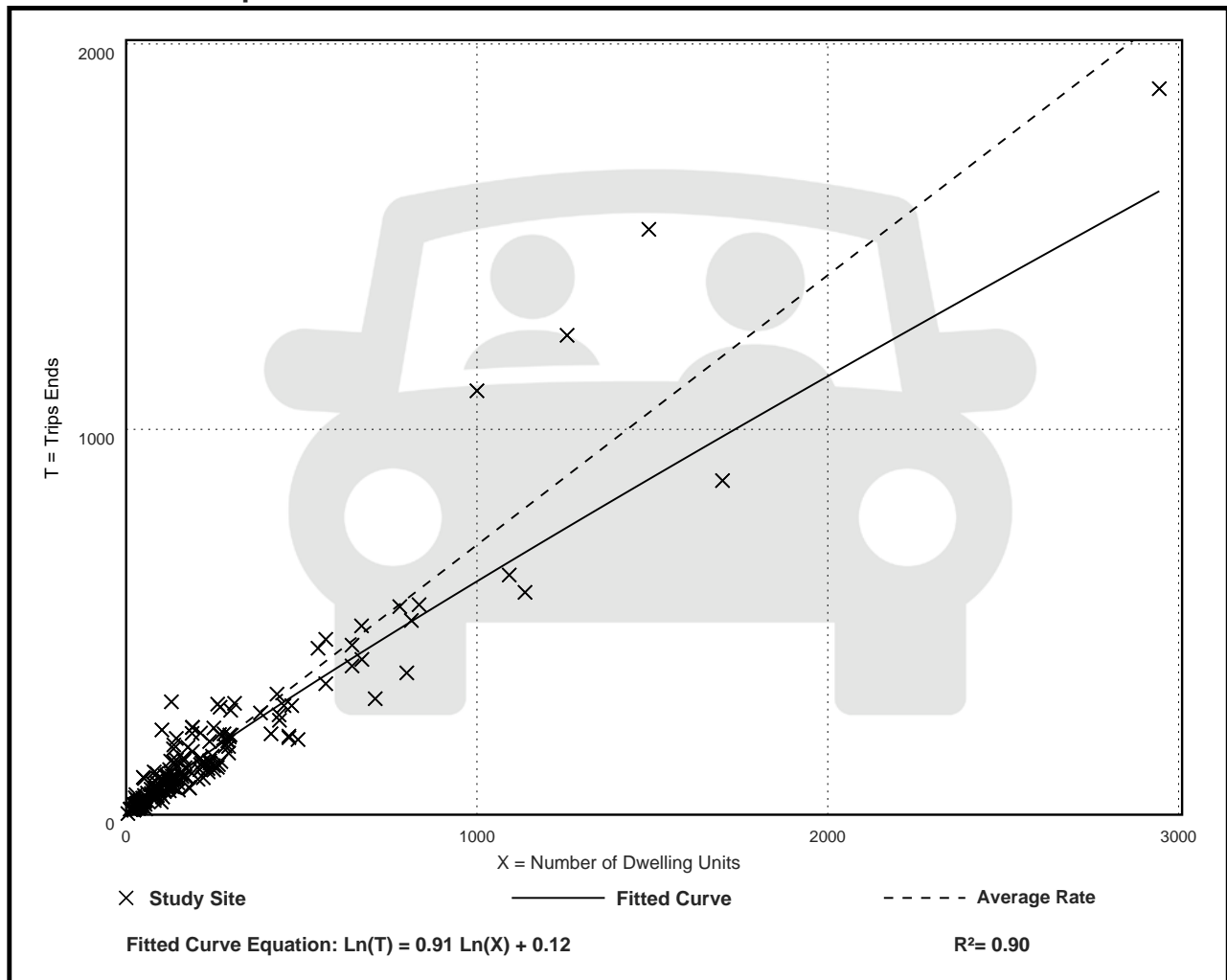
Avg. Num. of Dwelling Units: 226

Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.27 - 2.27	0.24

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 208

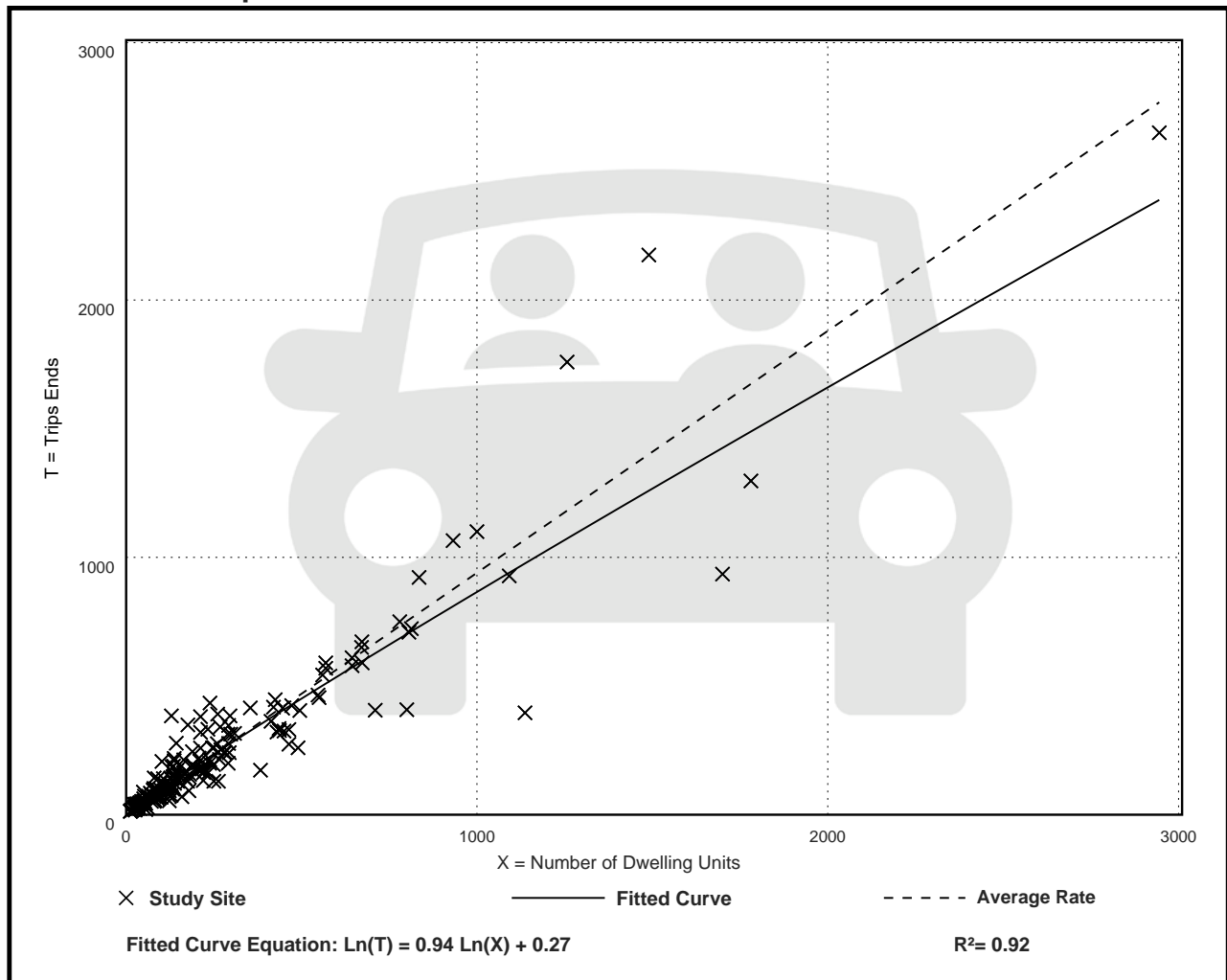
Avg. Num. of Dwelling Units: 248

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.94	0.35 - 2.98	0.31

Data Plot and Equation



TRIP GENERATION FOR MAYNARDVILLE PIKE SUBDIVISION

Maximum of 152 Single-Family Detached Houses

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	152 Houses	1,483	25%	75%		63%	37%	
				27	82	109	93	54	147
Total New Volume Site Trips			1,483	27	82	109	93	54	147

ITE Trip Generation Manual, 11th Edition

Trips calculated by using Fitted Curve Equation

TRIP GENERATION FOR MAYNARDVILLE PIKE SUBDIVISION
Maximum of 152 Single-Family Detached Houses

152 Residential Houses = X

Weekday:

Fitted Curve Equation: $\text{Ln}(T) = 0.92 \text{Ln}(X) + 2.68$

$$\text{Ln}(T) = 0.92 * 5.02 + 2.68$$

$$\text{Ln}(T) = 7.30$$

$$\underline{\underline{T = 1,483 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: $\text{Ln}(T) = 0.91 \text{Ln}(X) + 0.12$

$$T = 0.91 * 5 + 0.12$$

$$\text{Ln}(T) = 4.69$$

$$\underline{\underline{T = 109 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: $\text{Ln}(T) = 0.94 \text{Ln}(X) + 0.27$

$$\text{Ln}(T) = 0.94 * 5.02 + 0.27$$

$$\text{Ln}(T) = 4.99$$

$$\underline{\underline{T = 147 \text{ trips}}}$$

APPENDIX H

2021 CENSUS BUREAU DATA

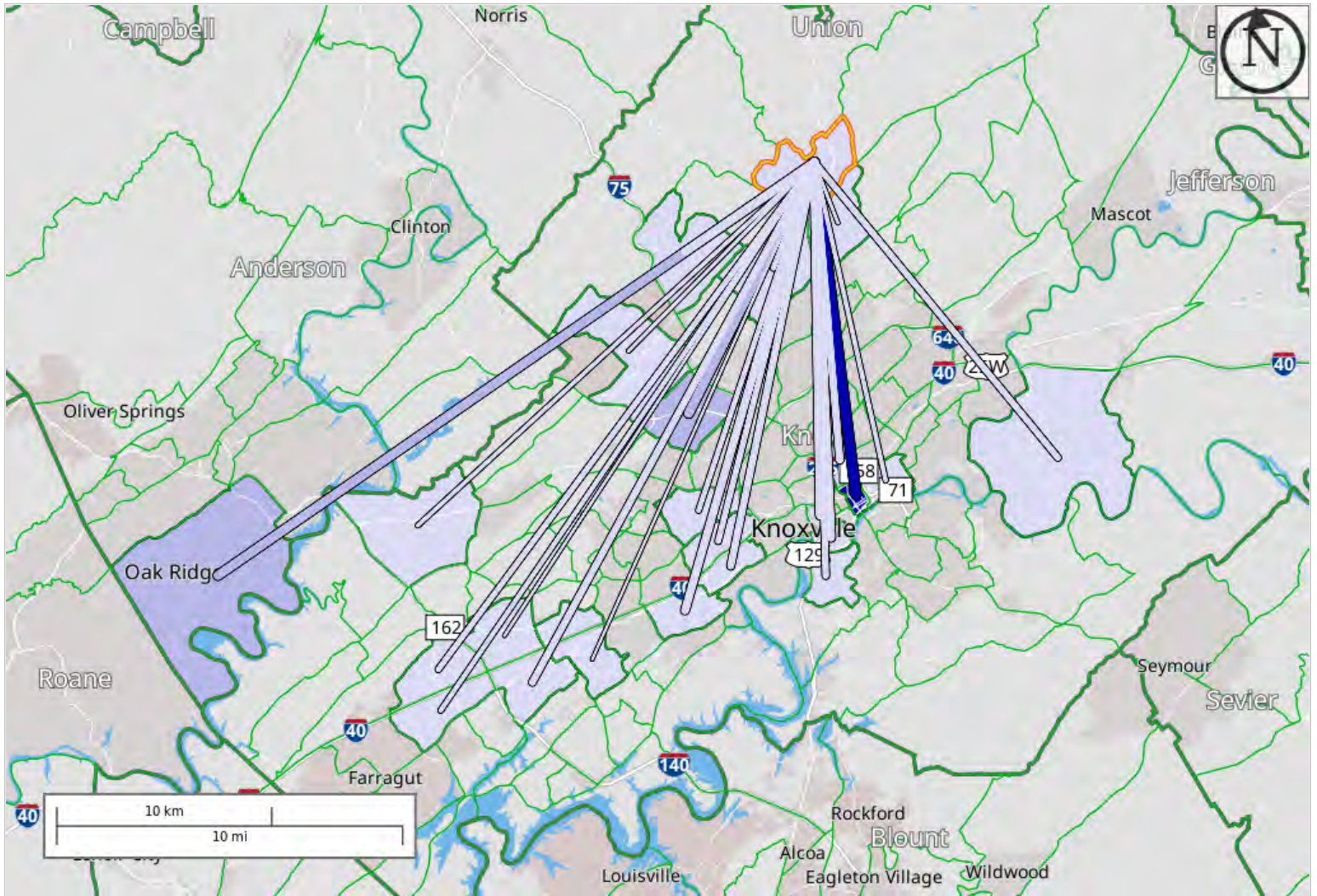
Destination Analysis

Workers: Living in 62.02 (Knox, TN)

Showing: Employment locations grouped by Census Tracts

Created by the U.S. Census Bureau's OnTheMap <https://onthemap.ces.census.gov> on 05/06/2024

Counts of All Jobs from Home Selection Area to Work Census Tracts in 2021 All Workers



Map Legend

Job Count

- 221 - 253
- 189 - 220
- 156 - 188
- 124 - 155
- 91 - 123
- 59 - 90
- 26 - 58

Selection Areas

- ▭ Home Area

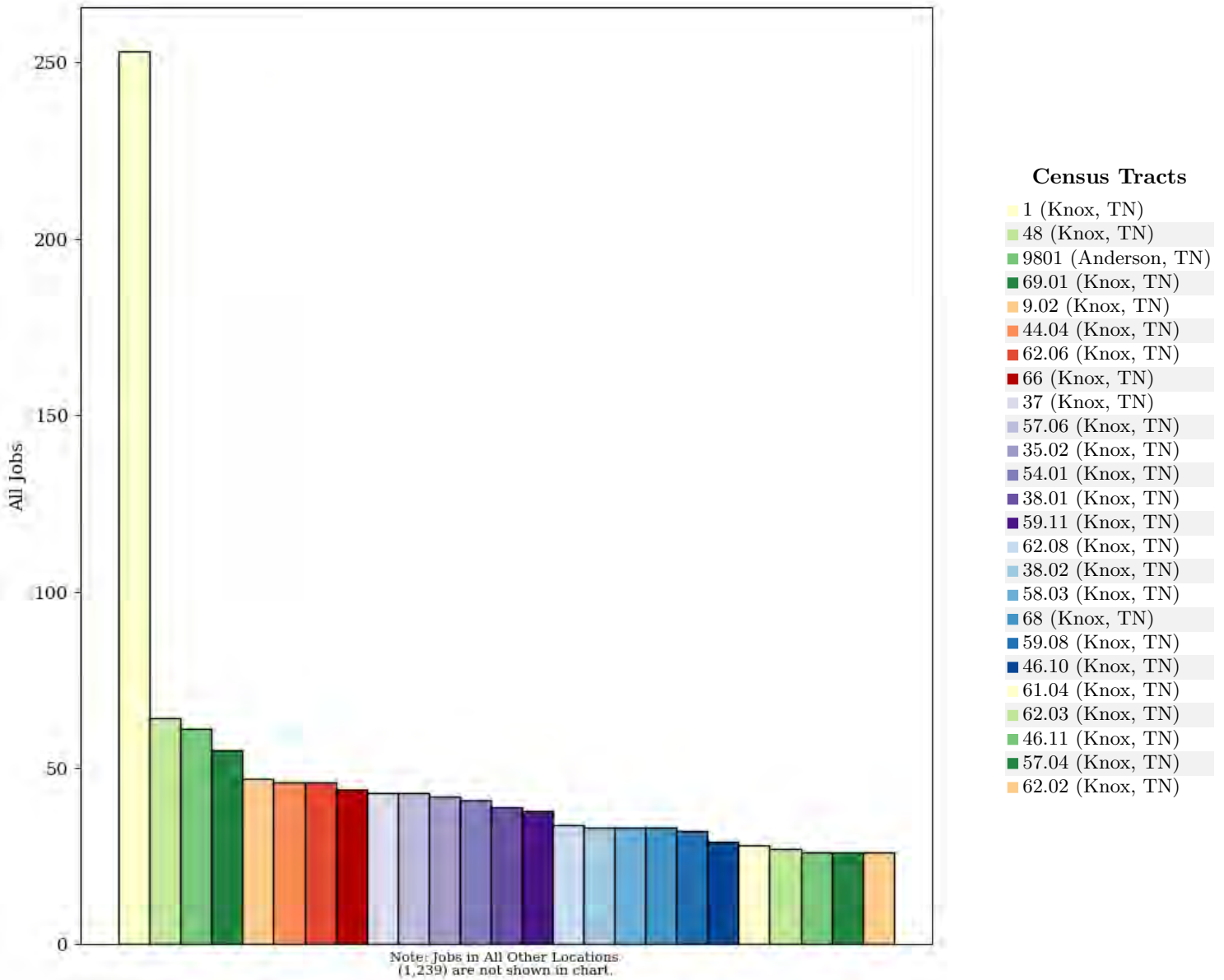
Job Count

- ▭ 221 - 253
- ▭ 189 - 220
- ▭ 156 - 188
- ▭ 124 - 155
- ▭ 91 - 123
- ▭ 59 - 90
- ▭ 26 - 58



All Jobs from Home Selection Area to Work Census Tracts in 2021

All Workers



All Jobs from Home Selection Area to Work Census Tracts in 2021

All Workers

Census Tracts as Work Destination Area	2021	
	Count	Share
All Census Tracts	2,428	100.0%
1 (Knox, TN)	253	10.4%
48 (Knox, TN)	64	2.6%
9801 (Anderson, TN)	61	2.5%
69.01 (Knox, TN)	55	2.3%
9.02 (Knox, TN)	47	1.9%
44.04 (Knox, TN)	46	1.9%
62.06 (Knox, TN)	46	1.9%
66 (Knox, TN)	44	1.8%
37 (Knox, TN)	43	1.8%
57.06 (Knox, TN)	43	1.8%

Census Tracts as Work Destination Area	2021	
	Count	Share
35.02 (Knox, TN)	42	1.7%
54.01 (Knox, TN)	41	1.7%
38.01 (Knox, TN)	39	1.6%
59.11 (Knox, TN)	38	1.6%
62.08 (Knox, TN)	34	1.4%
38.02 (Knox, TN)	33	1.4%
58.03 (Knox, TN)	33	1.4%
68 (Knox, TN)	33	1.4%
59.08 (Knox, TN)	32	1.3%
46.10 (Knox, TN)	29	1.2%
61.04 (Knox, TN)	28	1.2%
62.03 (Knox, TN)	27	1.1%
46.11 (Knox, TN)	26	1.1%
57.04 (Knox, TN)	26	1.1%
62.02 (Knox, TN)	26	1.1%
All Other Locations	1,239	51.0%

Additional Information

Analysis Settings

Analysis Type	Destination
Destination Type	Census Tracts
Selection area as	Home
Year(s)	2021
Job Type	All Jobs
Selection Area	62.02 (Knox, TN) from Census Tracts
Selected Census Blocks	45
Analysis Generation Date	05/06/2024 10:52 - OnTheMap 6.23.5
Code Revision	61ba66adb1494f11636f474452a03e1039f6f3a0
LODES Data Vintage	20231016_1512

Data Sources

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2nd Quarter of 2002-2021).

Notes

1. Race, Ethnicity, Educational Attainment, and Sex statistics are beta release results and are not available before 2009.
2. Educational Attainment is only produced for workers aged 30 and over.
3. Firm Age and Firm Size statistics are beta release results for All Private jobs and are not available before 2011.

APPENDIX I

TDOT TURN LANE VOLUME THRESHOLD WORKSHEETS

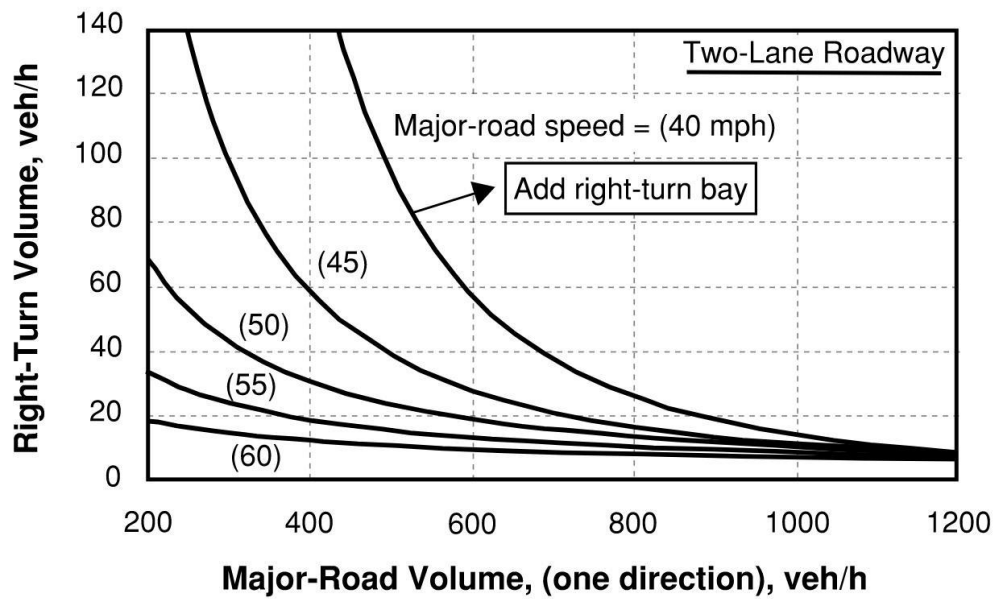


Figure 3-18: Right-Turn Lane Warrant along Two-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)²⁴

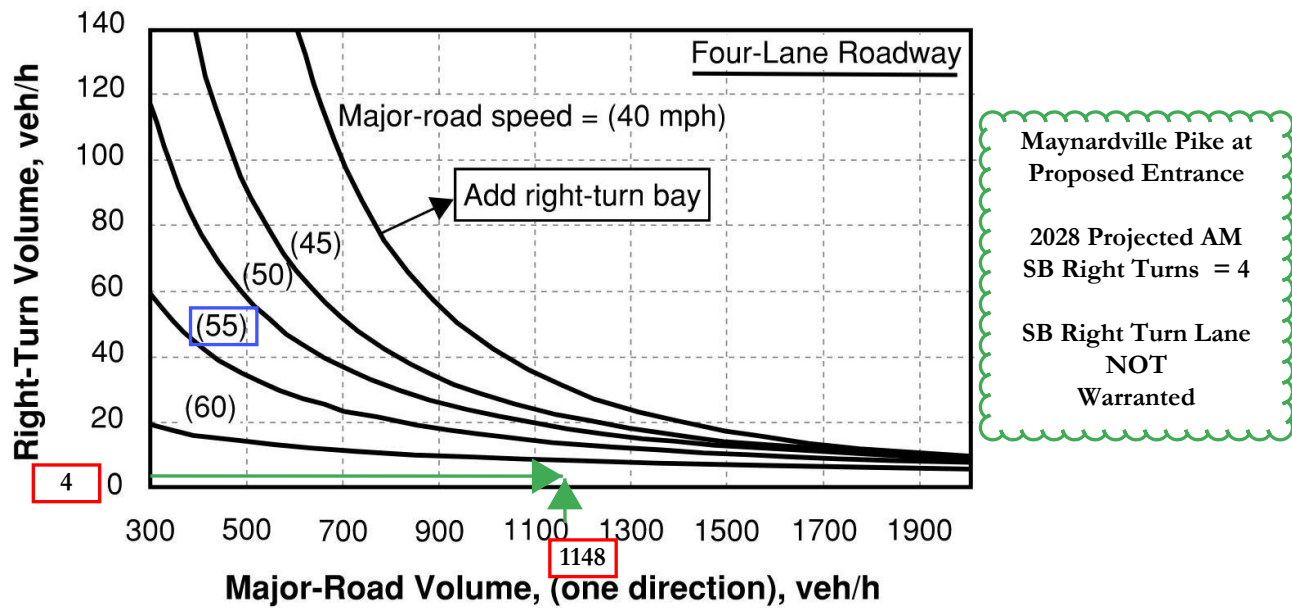


Figure 3-19: Right-Turn Lane Warrant along Four-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)²⁵

²⁴ TRB, NCHRP 457, Evaluating Intersection Improvements (2001)

²⁵ TRB, NCHRP 457, Evaluating Intersection Improvements (2001)

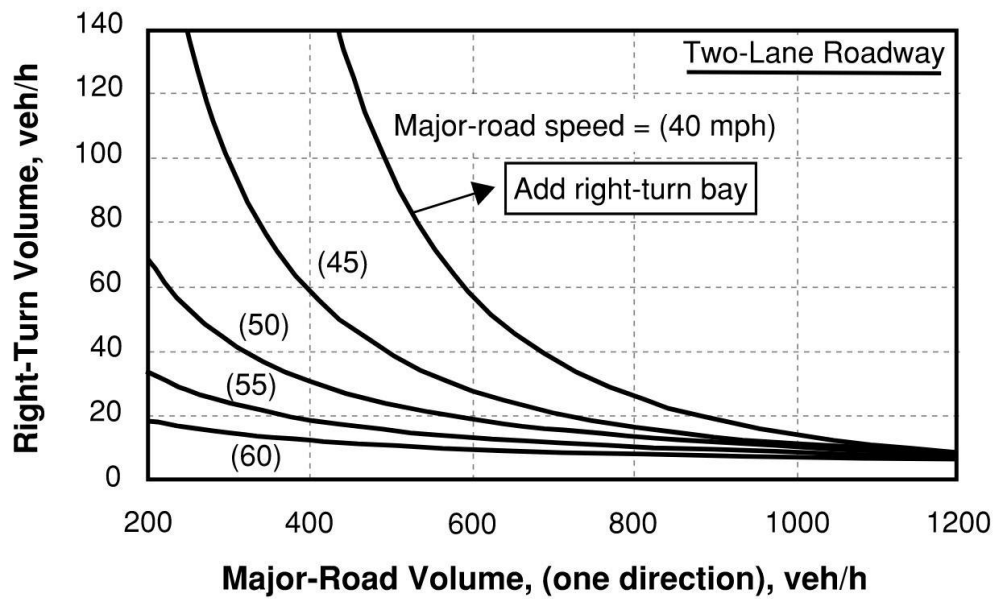


Figure 3-18: Right-Turn Lane Warrant along Two-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)²⁴

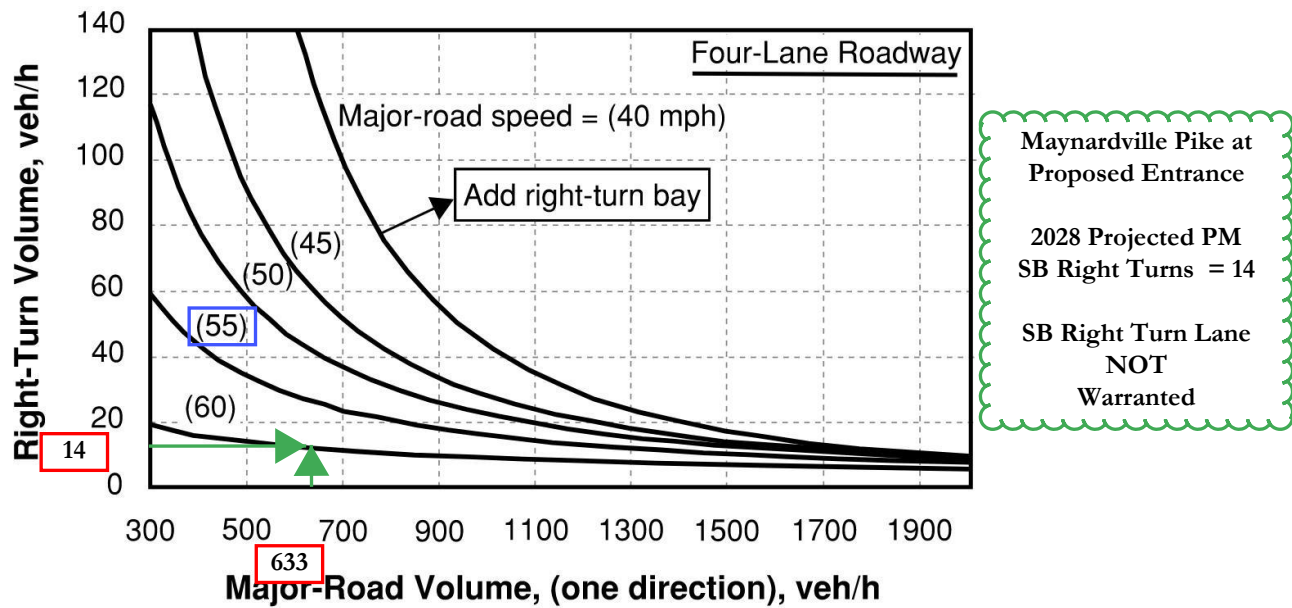


Figure 3-19: Right-Turn Lane Warrant along Four-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)²⁵

²⁴ TRB, NCHRP 457, Evaluating Intersection Improvements (2001)

²⁵ TRB, NCHRP 457, Evaluating Intersection Improvements (2001)

APPENDIX J

LETTER RESPONSE TO ADDRESS TIS COMMENTS



11812 Black Road
Knoxville, Tennessee 37932
Phone (865) 556-0042
ajaxengineering@gmail.com

June 24, 2024

PROJECT NAME: Maynardville Pike Subdivision (7-SB-24-C / 7-D-24-DP)
TO: Knoxville-Knox County Planning
SUBJECT: Response Document for Maynardville Pike Subdivision TIS Review Comments

Knoxville-Knox County Planning, Knox County Engineering, and TDOT Staff:

The following response document addresses the comments in an email from Mike Conger, PE, dated June 18, 2024. This letter is added to the end of the revised report in Appendix J.

- 1. A comment from the site plan review and provided at today's Developer Review meeting was "Provide a minimum of 1 ROW stub-out from adjacent properties, including a stub-out to parcel 028-248. If this property develops, a cross-connection to Harrell Circle can be created". Based on this potential site plan revision, please include language in the TIS regarding the typical signage required if a short section of pavement is constructed including the notice to homeowners regarding its potential future extension.**

Response: The site plan is currently under revision to meet this request and is unavailable by the deadline to show in the revised TIS to reflect this comment. This is noted on Page 1. However, the revised report addresses this request on Pages 3 and 43 by recommending the typical signage of a potential future extension.

- 2. Due to the fact that no other side roads along this section of Maynardville Pk have a dedicated left turn lane striping it is preferred to modify your recommendation for such at this subdivision's access. Ultimately any striping modifications will need to be done per TDOT's direction at the driveway permit stage so the TIS should just state the potential options for consideration including one that would match other similar existing intersections where a simple break in pavement markings is provided.**

Response: This comment has been addressed, and the revision is included on Pages 2 and 40.

- 3. There was discussion regarding the entrance road and modifications that may be needed to the existing field entrance for this development access, it is encouraged that early coordination occur with TDOT regarding their requirements for this access in terms of the existing shoulder asphalt design that may need to be strengthened and provision of an**

increased radius for the southbound right-turn movement. While the TIS stated that a decel lane was not warranted at this location, it is recognized that speeds are high in this section of Maynardville Pk and may be beneficial to provide some increased deceleration area.

Response: This comment has been addressed, and the revision is included on Pages 2 and 41.

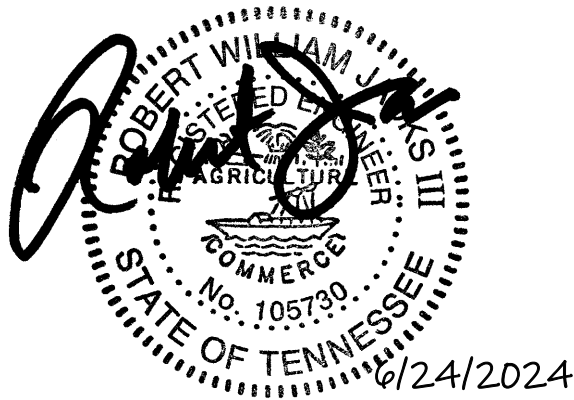
In addition to the revisions listed above, other changes in the report include the following:

- Updated Title Page
- Updated Table of Contents
- Updated Page Footers
- Added Appendix J to include this response letter

If you have any questions or further comments, don't hesitate to contact me. We look forward to your approval.

Sincerely,

Ajax Engineering, LLC
Robert W. Jacks, P.E.



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