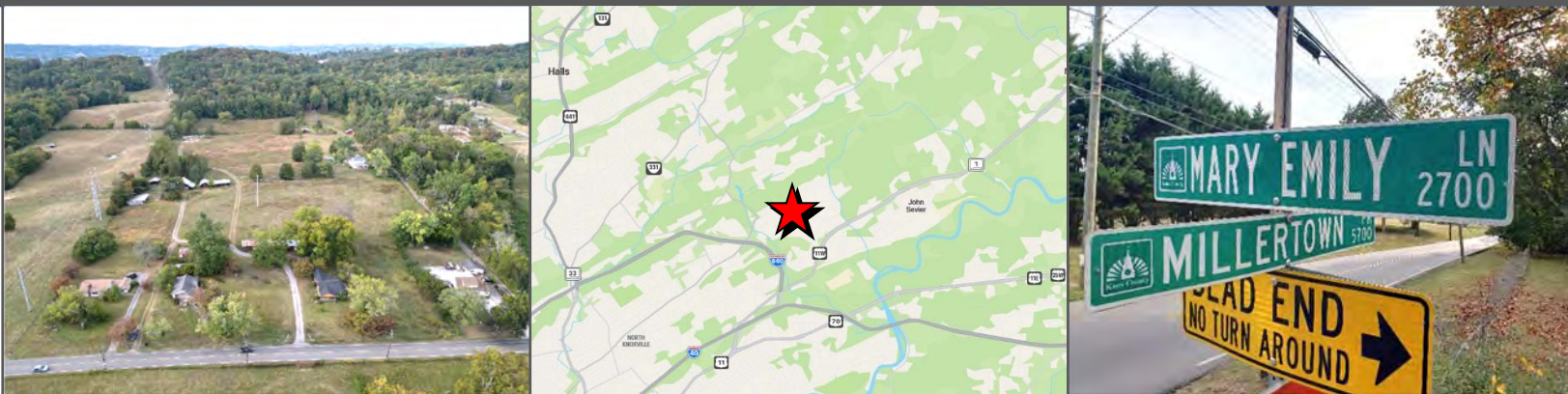


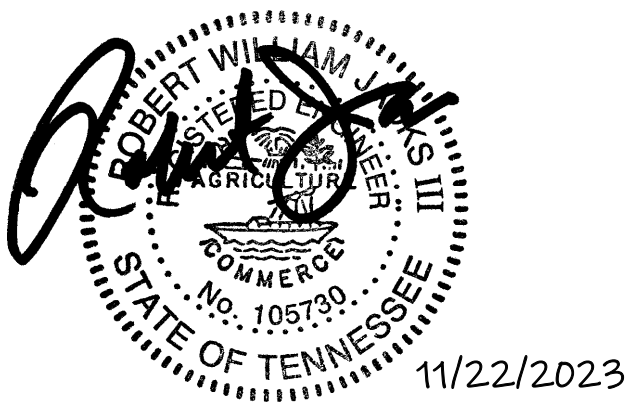


Transportation Impact Study Millertown Pike Subdivision Knox County, Tennessee



Revised November 2023

Prepared for:
Elite Construction
4317 Ball Camp Pike
Knoxville, TN 37921



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EXECUTIVE SUMMARY

Preface:

Elite Construction proposes a residential development at 5703 Millertown Pike in Northeast Knox County, TN. The proposed development will include constructing 88 new single-family detached houses and remodeling three existing detached houses on 29.7 +/- acres. The development is named and referenced in this study as “Millertown Pike Subdivision” since an official name has not been chosen yet. The development proposes a single entrance on the north side of Millertown Pike, approximately 1,010 feet southwest of the existing intersection of Millertown Pike at Sable Point Lane and Mary Emily Lane. The development is anticipated to be fully built and occupied by 2027.

This study’s primary purpose 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 entrance intersection and 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.

Study Results:

The significant findings of this study include the following:

- The Millertown Pike Subdivision, with a total of 91 single-family detached houses, is estimated to generate 925 trips at full build-out and occupancy on an average weekday. Of these daily trips, 68 are estimated to occur during the AM peak hour and 91 in the PM peak hour in 2027.
- The Proposed Entrance for the subdivision at Millertown Pike is expected to operate with reasonable vehicle delays in the projected AM and PM peak hours. The addition of the Proposed Entrance approach on Millertown Pike will operate adequately in 2027 with respect to vehicle capacity.
- The projected 2027 traffic volumes warrant the construction of a separate eastbound left-turn lane on Millertown Pike at the Proposed Entrance. A separate westbound right-turn lane on Millertown Pike is not warranted. A single exiting lane for the Proposed Entrance at Millertown Pike will be sufficient.

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.

Millertown Pike at the Proposed Entrance:

- A separate eastbound left-turn lane on Millertown Pike at the Proposed Entrance is warranted and recommended to be constructed. The calculated and recommended lengths for this proposed 11-foot wide left-turn lane include a bay taper length of 90 feet, a lane change and deceleration distance of 205 feet, and a storage length of 75 feet. Based on a posted speed limit of 40 mph, the approach taper should be 295 feet. The eastbound left-turn lane pavement should be marked with a left-turn arrow, as shown in TDOT Standard Drawing T-M-4. Assuming linear vehicular growth on Millertown Pike and construction of houses in the Millertown Pike Subdivision, it is recommended that the left-turn lane on Millertown Pike be constructed before the 47th house in the development is constructed.
- 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 Millertown Pike. The stop bar should be applied a minimum of 4 feet away from the edge of Millertown Pike and placed at the desired stopping point that maximizes the sight distance.
- Based on a posted speed limit of 40-mph on Millertown Pike, the required intersection sight distance is 400 feet for exiting turning vehicles from the Proposed Entrance. The existing sight distances at the Proposed Entrance location were estimated visually to be adequate in both directions. Intersection sight distance at the Proposed Entrance at Millertown Pike must not be impacted by future landscaping or signage. The site designer must verify that these distances will be available.
- At the Proposed Entrance, it is recommended that the entire length of the existing broken yellow centerline on Millertown Pike that allows eastbound motorists to pass other vehicles be removed to accommodate the new eastbound left-turn lane. Outside of the new left-turn lane and its approach tapers on both ends, a double yellow centerline should be applied to the center of Millertown Pike.

Millertown Pike Subdivision Internal Roads:

- A 25-mph Speed Limit Sign (R2-1) is recommended to be posted near the beginning of the development entrance off Millertown Pike. It is recommended that a “No Outlet” Sign (W14-2a) be installed at the front of the development at Millertown Pike. The “No Outlet” sign can be installed above or below the street name sign or separately posted on the Road “G” entrance road.
- End of roadway signage (OM4-1) should be installed at the ends of Roads “E” and “F” if stub roads are constructed. Stop Signs (R1-1) with 24” white stop bars are recommended to be installed at the internal intersections where shown.
- Sight distance at the new internal intersections must not be impacted by new signage, parked cars, or future landscaping in the subdivision. 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.
- All drainage grates and covers for the residential development must be pedestrian and bicycle safe.
- 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.
- The new Road “B” in the Millertown Pike Subdivision will have long, straight road segments with a portion having a steep road grade. Straight road segments with steeper grades encourage higher vehicle speeds. It is recommended that the site designer consider traffic calming measures on this internal road. Specifics regarding this recommendation should be discussed in the design phase with Knox County Engineering.
- All road grade and intersection elements should be designed to AASHTO, TDOT, and Knox County specifications and guidelines to ensure proper operation.

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 off Millertown Pike in Northeast Knox County, TN. The development will be constructed from a portion of a large existing single parcel. It will also include a couple of smaller parcels already occupied by single-family detached houses along Millertown Pike. The development will have a single entrance constructed on the north side of Millertown Pike. As requested, transportation impacts associated with the development were analyzed on Millertown Pike, where the proposed development will have road access to and from external destinations.



The proposed development property is in a quasi-rural area of Northeast Knox County, TN, being transformed to full suburban conditions. Near the development site, there are several established neighborhoods, standalone single-family homes, large undeveloped lots used for agricultural purposes, and a church. This proposed residential development will be close to Interstate 640, providing the most accessible and convenient roadway for external destinations.

The existing development site has mild sloping topography towards the front along Millertown Pike. The development property is much steeper to the north along an existing ridge. The large parent development parcel has a single-family detached house, which will be remodeled, and several outbuildings and barn structures, which will be removed for construction. Three parcels along Millertown Pike will be incorporated into the development, and two of them have existing houses that will remain and be remodeled. A good majority of the development property was recently open field and lawn areas that were maintained, with woodlands on the north side of the property along the existing ridge. These houses on Millertown Pike are currently unoccupied.

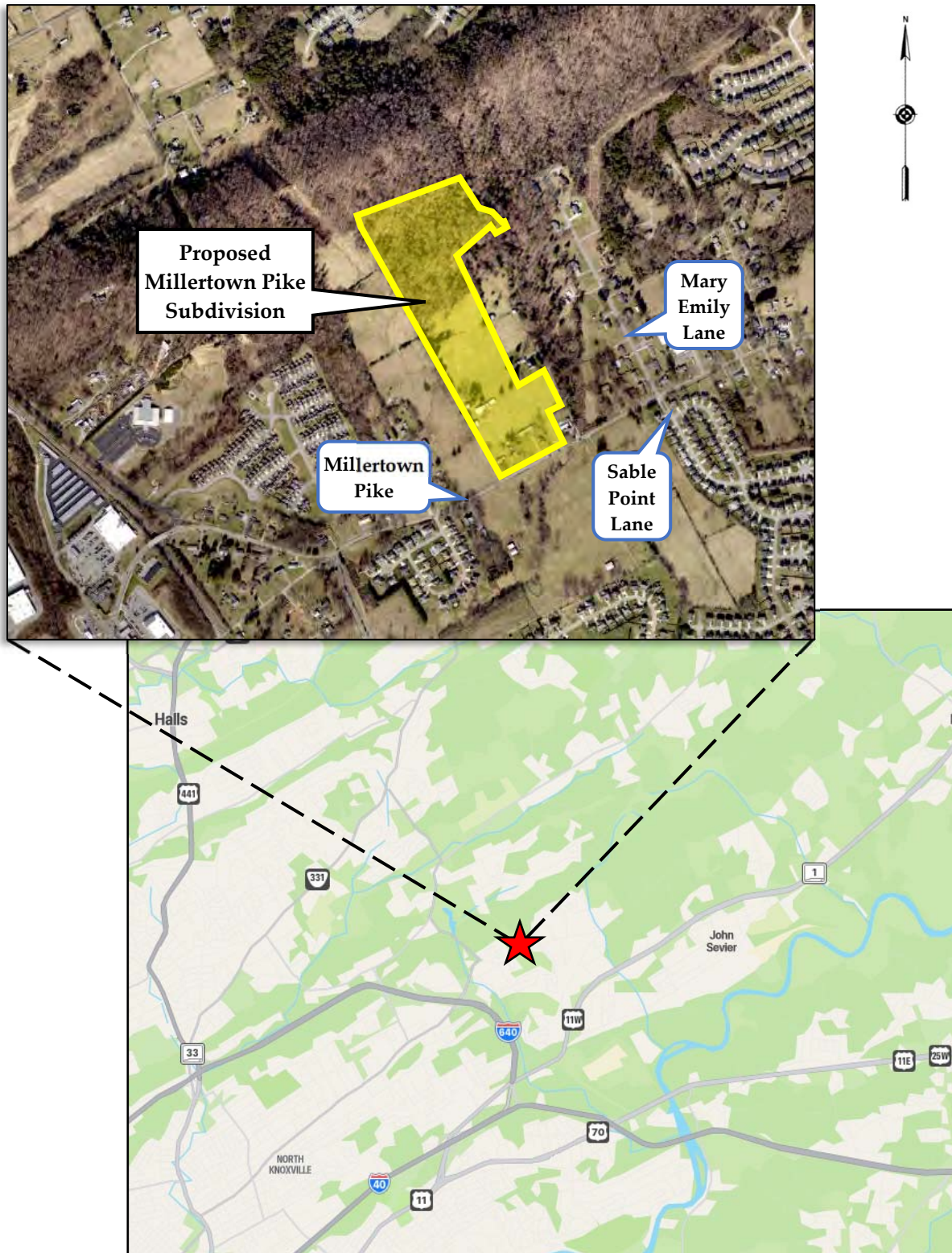


Figure 1
Location Map

▪ **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
Millertown Pike	Minor Arterial	40 mph	2	22 feet	None	None	No bike lanes

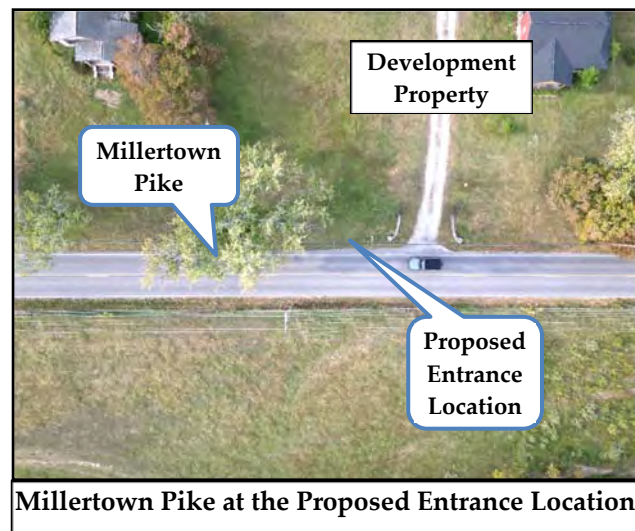
¹ 2018 Major Road Plan by Knoxville/Knox County Planning

² Edge of curb to edge of curb or edge of pavements near project site

³ According to Knoxville Area Transit System Map

Millertown Pike is a 2-lane minor arterial that traverses in a generally southwest-northeast direction. The posted speed limit on Millertown Pike is 40-mph at the project site. Millertown Pike is 8.5 miles long and runs between Washington Pike on the southwest side and ends to the northeast at Rutledge Pike (US 11W/SR 1) near East Knox County Elementary School and East Knox Park. Along its length, Millertown Pike runs roughly parallel to Rutledge Pike to the north and Washington Pike to the south. Millertown Pike provides access for travel on Interstate 640 via Exit 8 to the southwest of the development site. Near Exit 8 and Interstate 640, several significant developments provide numerous retail and commercial services, including a Walmart Supercenter, Sam's Club, Food City, Lowe's and Home Depot home improvement centers, and a yet-to-be-opened Amazon Fulfillment Center at the previous location of the Knoxville Center Mall.

The pavement of Millertown Pike is 22 feet wide, where the Proposed Entrance for the development will be constructed. Millertown Pike is delineated with white edge lines. At the location of the Proposed Entrance for the development, the center of Millertown Pike is delineated by a single yellow centerline and a broken yellow line that delineates a passing zone for eastbound traffic. This passing zone for eastbound traffic begins 500 feet to the



west of the development's Proposed Entrance location, continues for 1,150 feet to the east, and then transitions to a double yellow centerline on Millertown Pike. The pavement width outside the white edge line varies but ranges around 6 inches to over 1 foot. Millertown Pike has no curbing or sidewalks, and utility roadway lights are not provided in the adjacent study area.

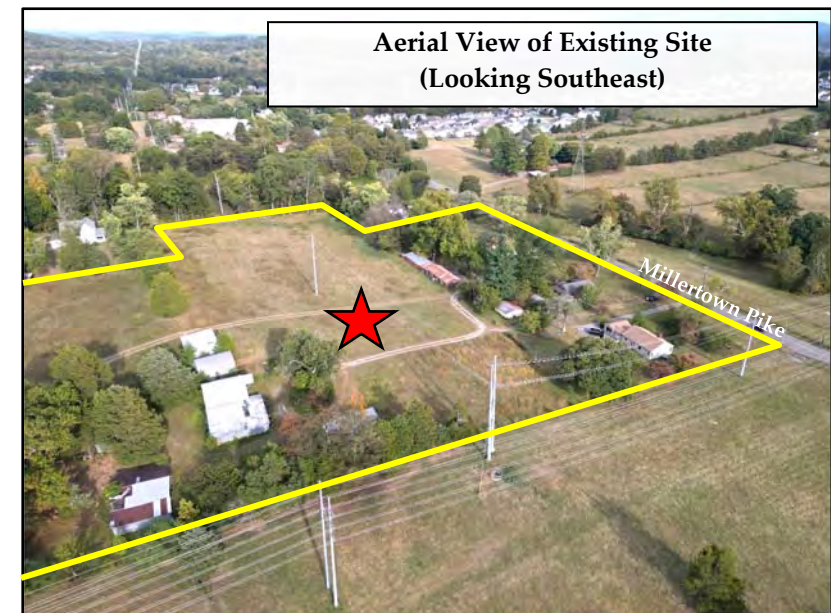
The Proposed Entrance for the development will be located on Millertown Pike, just a few feet west of the existing gravel driveway currently located at 5709 Millertown Pike.

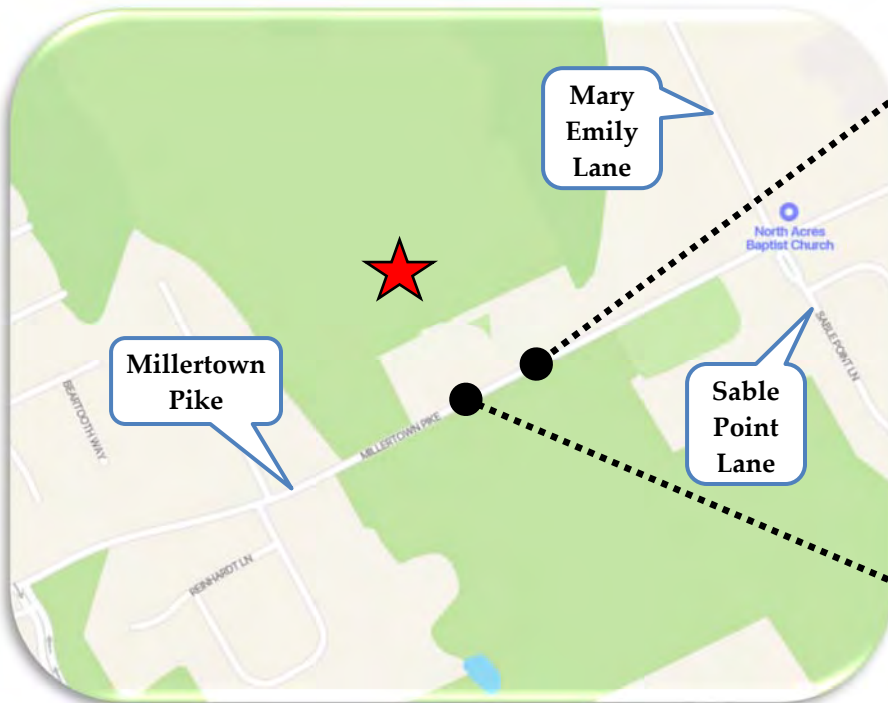
Figure 2 shows the existing lane configurations of the location where the traffic count was conducted for the study. There is only one road sign on Millertown Pike near the development property other than Stop Signs (R1-1) on the existing intersecting streets of Sable Point Lane, Mary Emily Lane, and Pendelton Drive. The pages following Figure 2 give a further overview of the site study area with photographs.

PHOTO EXHIBITS



Millertown Pike at the Proposed Development Site





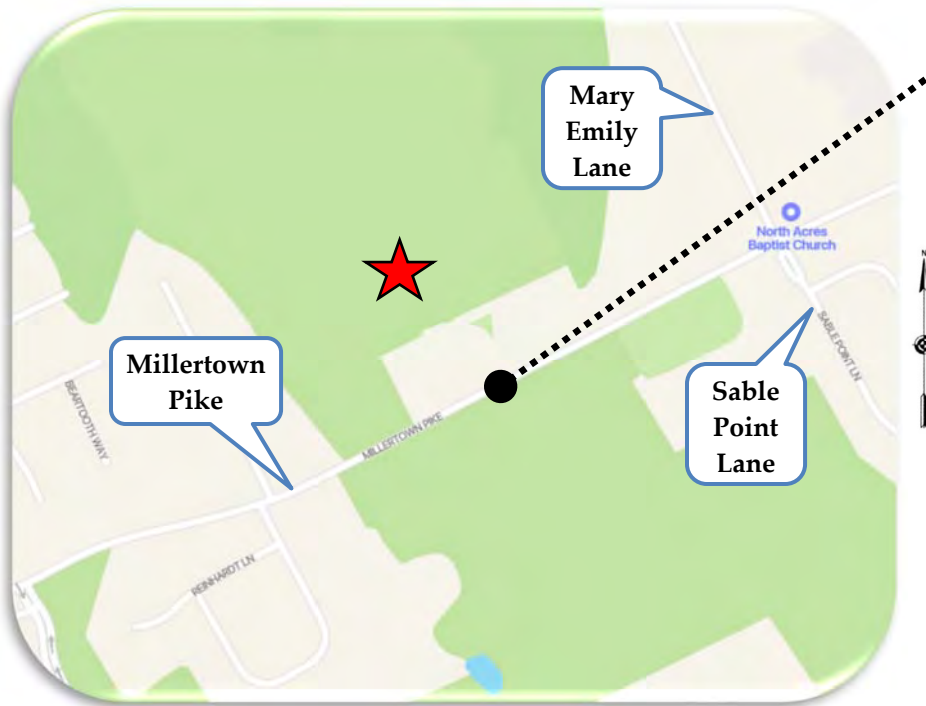
Millertown Pike at the Proposed Development Site



View of Millertown Pike at the Proposed Entrance Location (Looking Southwest)



View of Millertown Pike at the Proposed Entrance Location (Looking Northeast)



Millertown Pike at the Proposed Development Site



▪ **EXISTING TRANSPORTATION VOLUMES PER MODE:**

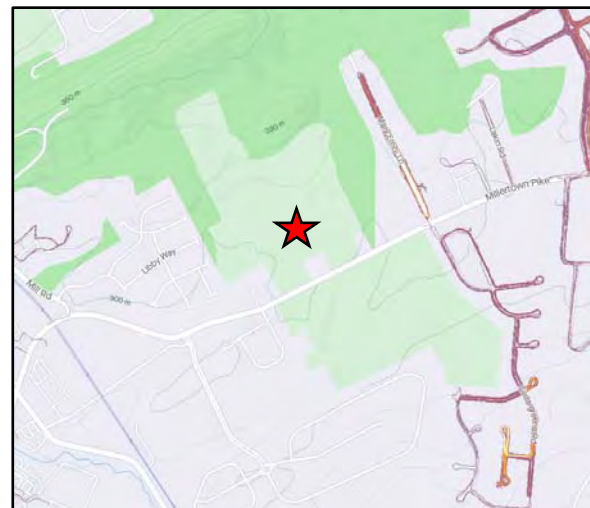
One annual vehicular traffic count location exists in the study area, and the Tennessee Department of Transportation (TDOT) conducts this count. The count location data is the following and can be viewed with further details in Appendix A:

- Existing vehicular roadway traffic:
 - TDOT reported an Average Daily Traffic (ADT) on Millertown Pike, west of Sable Point Lane and Mary Emily Lane and near the proposed development site, at 7,684 vehicles per day in 2022. From 2012 to 2022, this count station has indicated a +2.3% average annual traffic growth rate.

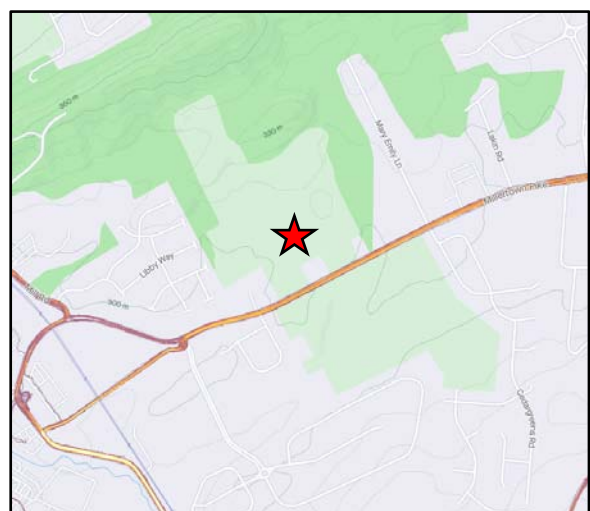
- Existing bicycle and pedestrian volumes:

The average daily pedestrian and bicycle traffic is unknown along Millertown Pike. However, with the lack of sidewalks and bike lanes, this corridor is assumed to have minimal pedestrian and bicyclist activity. During the 6-hour traffic count for this project, one bicyclist and five individuals were observed walking.

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 lighter colors signifying higher activity. The Strava heat maps show some bicycle activity and no pedestrian activity along



Strava Heat Map for Pedestrian and Joggers

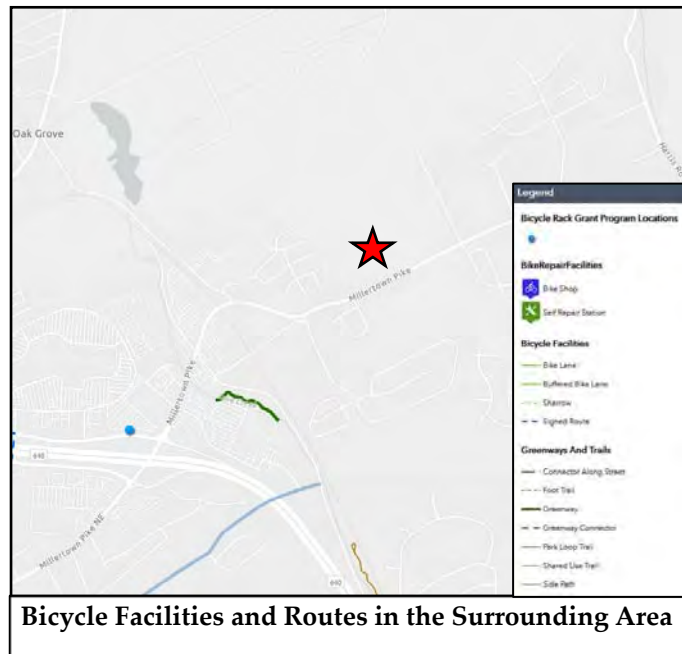


Strava Heat Map for Bicyclists

Millertown Pike adjacent to the development site. However, pedestrian activity is shown in the adjacent neighborhoods along Sable Point Lane and Mary Emily Lane.

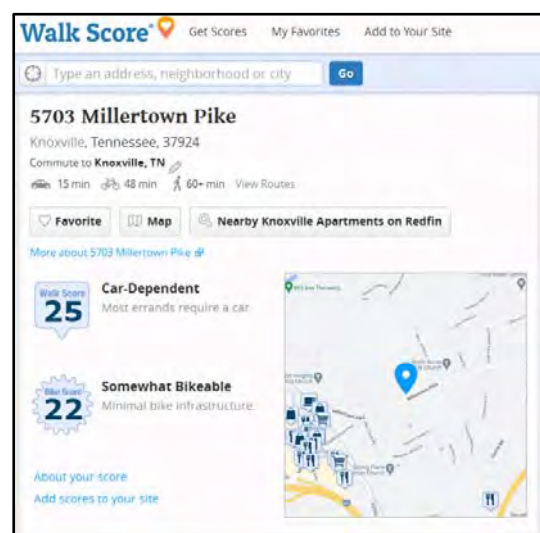
▪ **PEDESTRIAN AND BICYCLE FACILITIES:**

Sidewalks are not provided on Millertown Pike adjacent to the development property. Bike lanes are not available either. The closest designated bike facilities are located southwest at the Loves Creek Greenway and Spring Place Park. Other bike facilities in the surrounding area are on Buffat Mill Road to the southwest near Interstate 640, where Buffat Mill Road crosses over the interstate. This road is designated as a “Comfortable Route” on KGIS mapping. A “Comfortable Route” is defined as a route “based on low to medium traffic speeds and volumes along with other criteria”.



▪ **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.



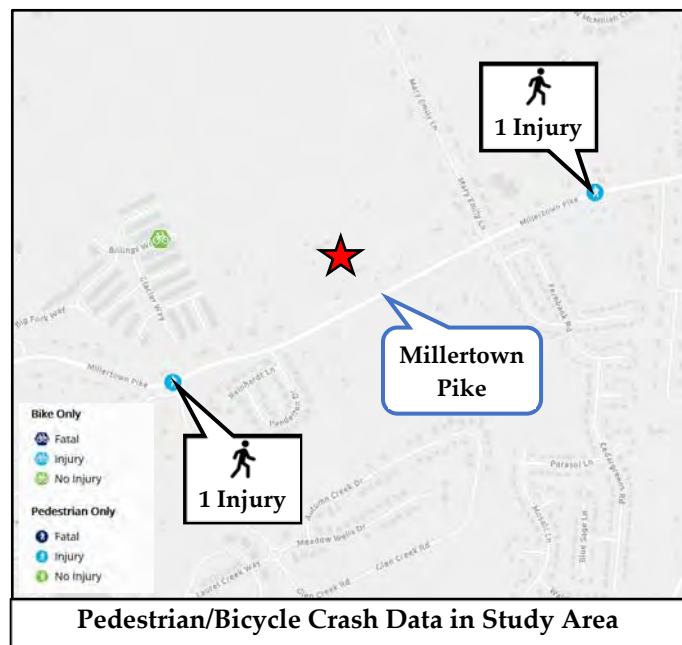
Appendix B shows maps and other information for the Walk and Bike Score at the development property address at 5703 Millertown Pike. The project site location is graded with a Walk Score of 25. This Walk Score indicates that the site is car-dependent and that almost all errands currently require

a vehicle for travel to and from the development property. The site is given a Bike Score of 22. The lack of pedestrian and bike facilities and the distance to amenities reduce the Walk and Bike Scores at the development site. The site is not given a Transit Score since public transportation is unavailable near the development site.

Due to the lack of sidewalks, bike facilities, and nearby retail and commercial developments (amenities), it is not expected that measurable bicycle or pedestrian trips will be generated that would significantly reduce vehicle trips to and from the proposed development on Millertown Pike. Thus, these potential alternative transportation modes are not used for vehicle trip reductions.

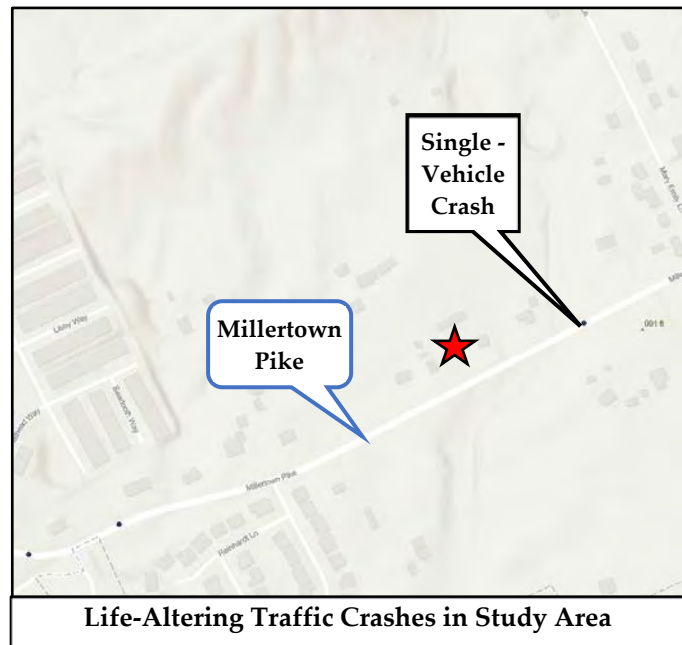
▪ **CRASH DATA:**

The Knoxville Transportation Planning Organization (TPO) published and provided a 2020 update to bicycle and pedestrian crash data for Knox County and surrounding counties. The data shows that none of these crash types occurred near the development site. However, two incidents occurred on Millertown Pike, one to the northeast and one to the southwest of the development site. The incident to the northeast occurred at Lakin Road, involved a pedestrian, and resulted in an injury. This incident occurred on May 5th, 2013, and a driver failing to yield was listed as the contributing factor. The incident to the southwest occurred on December 30th, 2015, at the intersection with Glen Creek Road. The incident included a pedestrian injury, but the cause of the crash was not listed.



The Knoxville TPO also published data related to “Life-Altering Traffic Crashes”. This data lists the location of traffic crashes in the Knoxville region that resulted in a fatality or serious injury between October 2016 and September 2021. The data shows one serious vehicular incident near

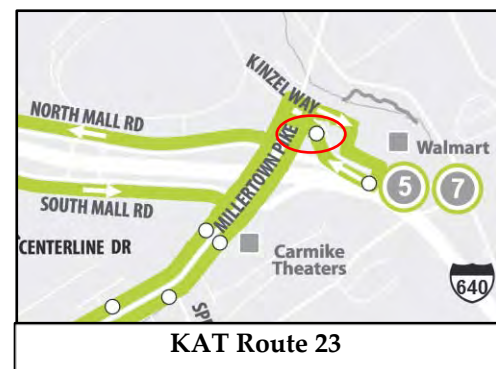
the development site in the past few years, and it occurred west of the intersection of Sable Point Lane and Mary Emily Lane. This incident was a single-vehicle crash with a serious injury on December 2nd, 2016. No crash factors were listed, but the incident did include a teen driver.



▪ TRANSIT SERVICES:

The City of Knoxville has a network of public transit opportunities offered by Knoxville Area Transit (KAT). 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 service is 0.9 miles to the southwest in front of the Walmart Supercenter on Kinzel Way off Millertown Pike and is Route 23, “Millertown”. It operates on weekdays and weekends, and this route map is included in Appendix C. KAT had to reduce its service schedule due to workforce shortages. These changes took place on August 29th, 2022, and the reduced schedule for this route is also 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 a mile away, with no sidewalks or bike lanes available on Millertown Pike to access the bus stop without the use of a private vehicle, the proposed development is not expected to have any reduced vehicle trips due to public transit usage.

PROJECT DESCRIPTION

▪ LOCATION AND SITE PLAN:

The proposed plan layout with 91 single-family detached houses on 29.7 +/- acres is designed by Batson, Himes, Norvell, and Poe and is shown in Figure 3. Eighty-eight single-family detached houses will be new, and the other three will be existing houses that will be renovated. These existing houses are adjacent to the roadway and are located at 5701, 5703, and 5709 Millertown Pike.

The design shows seven new streets constructed for the residential development. As shown in the figure, a single entrance will be constructed for the development at Millertown Pike. The two houses that will be renovated at the southwest corner will maintain their current driveway access to Millertown Pike. The other renovated house will lose its existing driveway to Millertown Pike, and the future owners of this property will be required to enter and exit at the new Proposed Entrance. The entrance road, Road "G", will be nearly 200 feet long and constructed with a boulevard-typical section with 18-foot entering and exiting lanes and a 10-foot raised center median. Except for Roads "G", "E", and "F", all other proposed internal roads in the development will end at cul-de-sacs. Roads "E" and "F" will be constructed as stub-out roads for possible future expansion to adjacent properties. However, no plans for future expansion have been made at this time.



View of Front (South Side) of Development Property – Existing Houses along Millertown Pike and Powerlines

The Millertown Pike Subdivision will be located on a portion of one large parent parcel of 43.09 acres and several small parcels adjacent to Millertown Pike. The large parcel has one single-family detached house at 5703 Millertown Pike with six outbuildings and barn structures. This existing house will be remodeled, and the other structures will be razed during construction. Approximately 15 acres of the parent parcel's rear portion will be subdivided from the development property and remain

undeveloped along the existing step ridgetop to the north.

The development will incorporate three other existing small parcels adjacent to Millertown Pike. Two of these along Millertown Pike have existing single-family detached houses, which will be remodeled as part of the subdivision development. The other parcel has a barn structure that will be removed. The total development area for the subdivision will be 29.7 +/- acres.

The total common areas designated for the subdivision will be 5.66 acres spread over five lots. These five common areas will have detention ponds designed to control stormwater for the development. On the southern portion of the property, a 150-foot KUB electric powerline and easement currently bisects the development property from the west side to the east. This area will remain undeveloped except for the largest stormwater detention pond for the development.

Most of the single-family house lots in the development will be around 0.17 acres in size (~7,500 ft²), with a handful greater than 0.25 acres. The smallest lot will be 0.11 acres (4,916 ft²), and the largest, outside the existing lots along Millertown Pike, will be 0.34 acres in size (14,758 ft²). Each house will have a garage and driveway. Internal sidewalks are not proposed for this development. The developer is not proposing on-site amenities for the future subdivision residents other than providing open common areas.

The schedule for this new residential development's completion depends on economic factors and construction timelines. This project is also contingent on permitting, design, and other regulatory approvals. The area's real estate and rental market is still experiencing large amounts of activity and growth. This study assumed that the total construction build-out of the development and full occupancy would occur within the next four years (2027).

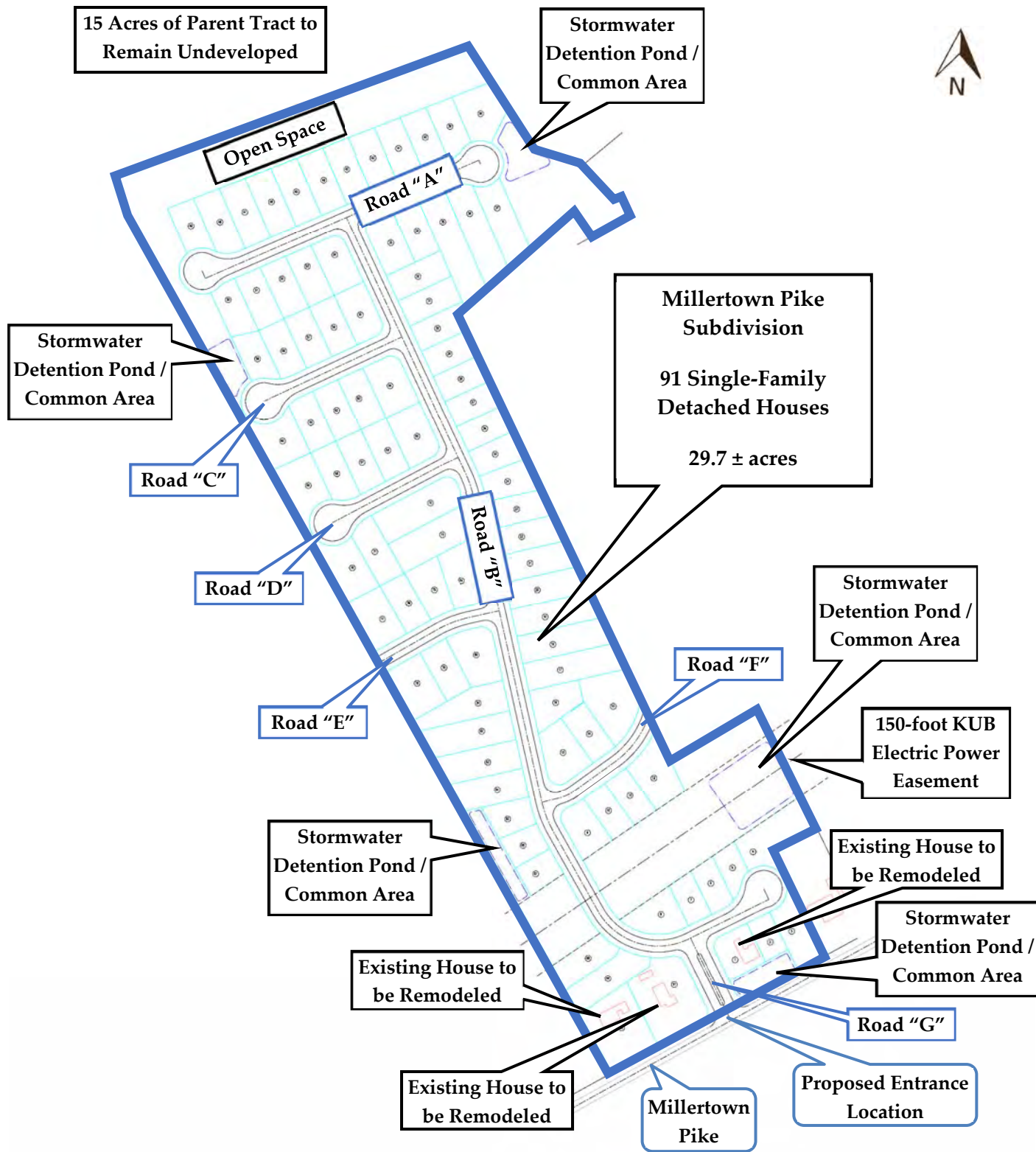


Figure 3
Proposed Plan Layout
Millertown Pike Subdivision

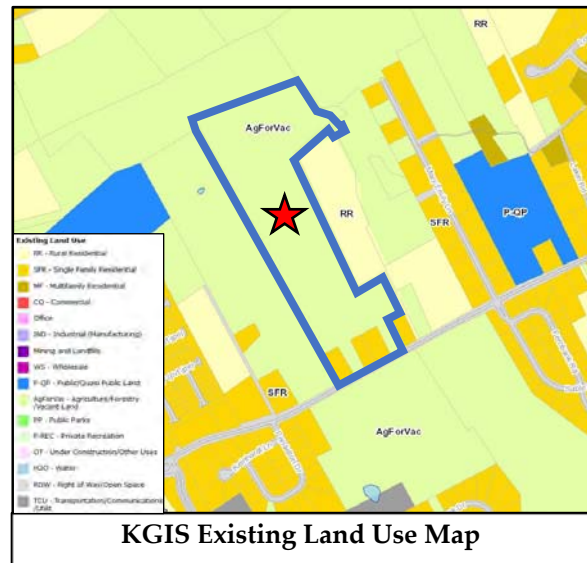
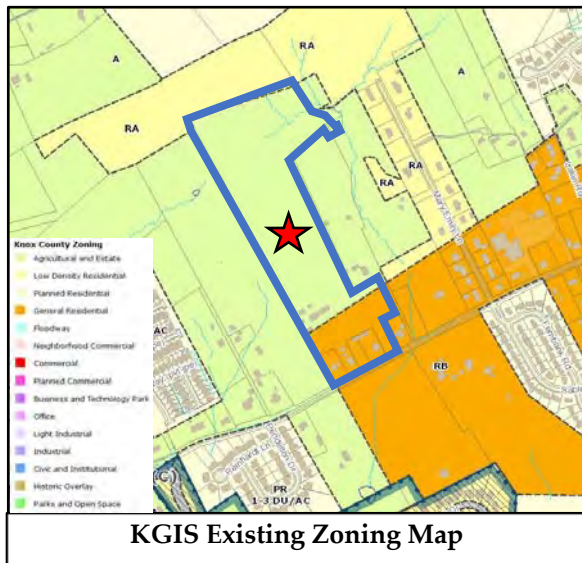
Not to Scale

▪ **PROPOSED USES AND ZONING REQUIREMENTS:**

The four existing parcels (one large parent parcel and three smaller parcels along Millertown Pike) comprising the Millertown Pike Subdivision development property are in Knox County and were recently requested to be rezoned. Knox County Commission will vote on the rezoning's first reading on October 23rd, 2023. The property's existing zoning is General Agricultural (A), General Residential (RB), and Low Density Residential (RA) and is requested to be changed to Planned Residential (PR). Knoxville/Knox County Planning approved the property with a density of up to 2.75 units per acre. Uses permitted in the Planned Residential (PR) zone include single-family dwellings, duplexes, and multi-dwelling structures and developments. The most recently published online KGIS zoning map is provided in Appendix D. The existing adjacent surrounding zoning and land uses are the following:

- Millertown Pike binds the development site to the south. To the south of the development site and across Millertown Pike, one large parcel is zoned as General Residential (RB) and Agricultural (A). This parcel is undeveloped and is used for farm activities. This property has direct access to Millertown Pike to the north via two field entrances.
- To the west of the development site, one sizeable adjacent parcel is currently used for farming activities, which includes cattle grazing. This parcel has a barn and single-family detached house on its western side with road access to Millertown Pike via a shared driveway. This parcel is zoned as Agricultural (A).
- Approximately 15 acres will be subdivided from the large parent parcel of 43.09 acres and remain undeveloped. This area is included in the requested rezoning to Planned Residential (PR). To the north of this 15-acre area, three properties are zoned as Agricultural (A) and Planned Residential (PR). These properties have access to Babelay Road to the north via Noremac Road, Apple Valley Drive, and Whelahan Farm Road in the Whelahan Farm Subdivision.
- A large parcel zoned as Low Density Residential (RA) binds the proposed subdivision property to the northeast. This property is entirely wooded and undeveloped, with road access via Mary Emily Lane.
- Two properties bind the development property to the east, and both are zoned as Agricultural (A). Both have single-family detached houses, and both have outbuildings. Most of the land on these two properties is covered with forest, with one having road access to the south to Millertown Pike via a narrow strip of land and the other to the east via Mary Emily Lane.

- Three parcels bind the development property to the southeast and are zoned as General Residential (RB) and Low Density Residential (RA). Two of the three have single-family detached houses, and all have road access to Millertown Pike.



▪ **ON-SITE CIRCULATION:**

The total length of the internal subdivision roads will be 4,095 feet (0.78 miles) and will be designed and constructed to Knox County specifications. The development will have asphalt-paved internal roadways with 8" extruded concrete curbs. The lane widths internally will be 13 feet each for a total 26-foot pavement width. The public right-of-way width within the development will be 50 feet. Concrete sidewalks are not proposed along the internal roads in this development. 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

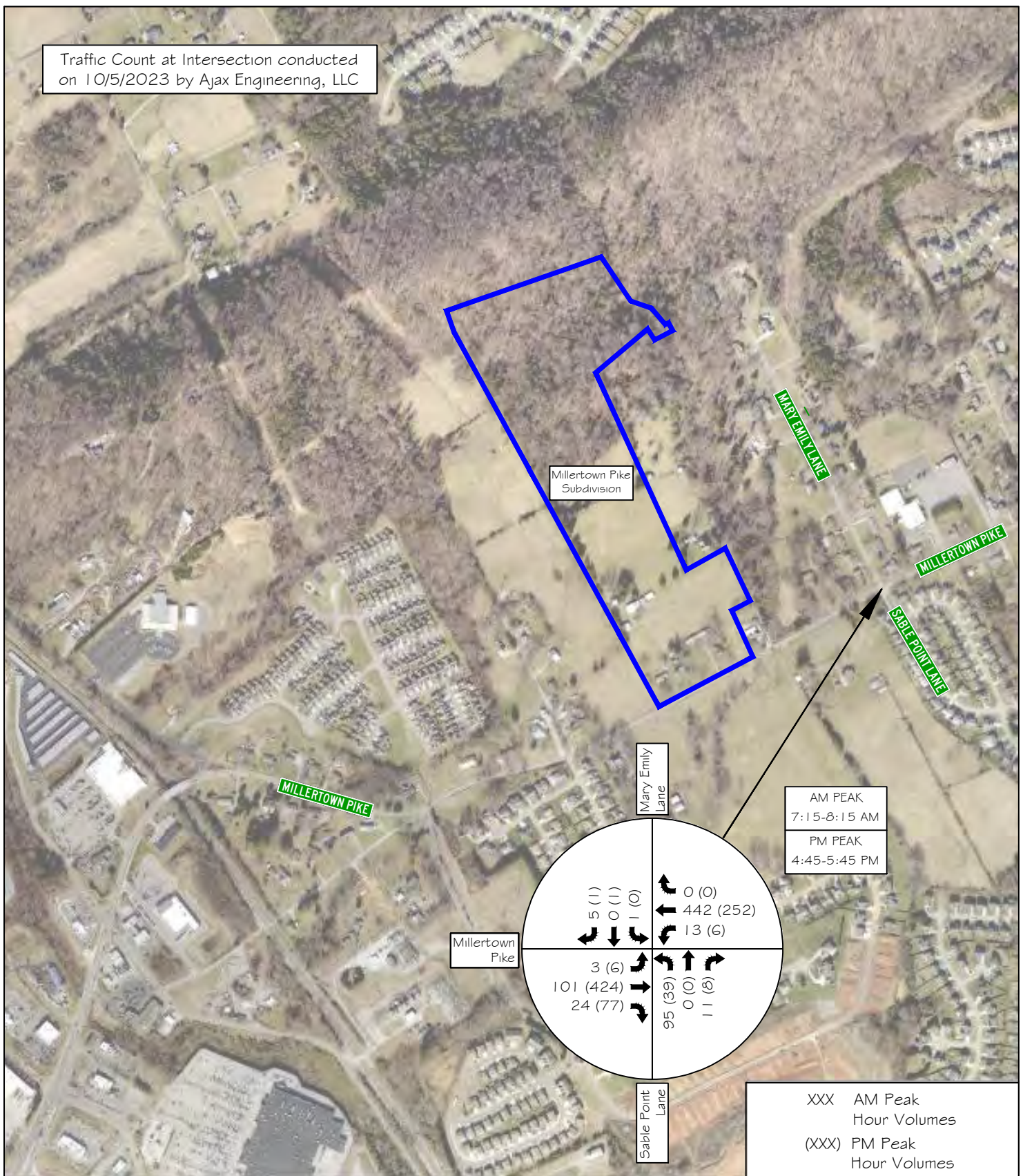
▪ EXISTING TRAFFIC CONDITIONS:

This study conducted a 6-hour traffic count at the intersection of Millertown Pike at Sable Point Lane and Mary Emily Lane, near the proposed development site, on Thursday, October 5th, 2023. Manual traffic counts were conducted to identify and tabulate the morning and afternoon peak period volumes and the travel directions near the proposed development site. Local public schools were in session when the traffic counts were conducted. Based on the traffic volumes collected at the intersection, the AM and PM peak hours were observed at 7:15 – 8:15 a.m. and 4:45 – 5:45 p.m.

The manual tabulated traffic counts can be reviewed in Figure 4 and Appendix E; some observations from the count are listed below.

- Most vehicles observed during the traffic counts were typical passenger cars, with some large trucks and heavy vehicles in the thru movements on Millertown Pike. The large and heavy vehicles included a few several semi-tractor-trailer trucks, larger construction-related trucks, and a trash collection truck. Several Knox County school buses were observed during the traffic counts traveling on Millertown Pike and entering and exiting Sable Point Lane.
- One school bus was observed stopping on Millertown Pike at Mary Emily Lane at 3:00 p.m. in the westbound direction for a few school-age children on Mary Emily Lane.
- During the traffic count, four pedestrian movements were observed along Millertown Pike. Two pedestrians were observed walking westbound along the side of Millertown Pike at 7:40 a.m., and the same pair of pedestrians were observed walking back in the opposite direction approximately 45 minutes later. In the morning, during the traffic count, one individual was observed walking on Mary Emily Lane down to Millertown Pike and back and forth several times, presumably for exercise.
- Late in the afternoon, one child from The Meadows of Millertown was observed crossing Millertown Pike from Sable Point Lane to Mary Emily Lane and then crossing right back.

Traffic Count at Intersection conducted on 10/5/2023 by Ajax Engineering, LLC



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FIGURE 4

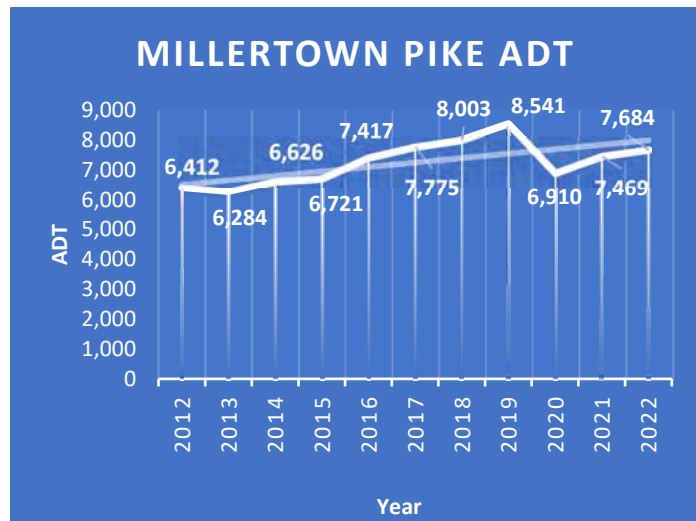
Millertown Pike Subdivision

2023 Peak Hour Traffic Volumes -
EXISTING TRAFFIC CONDITIONS

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

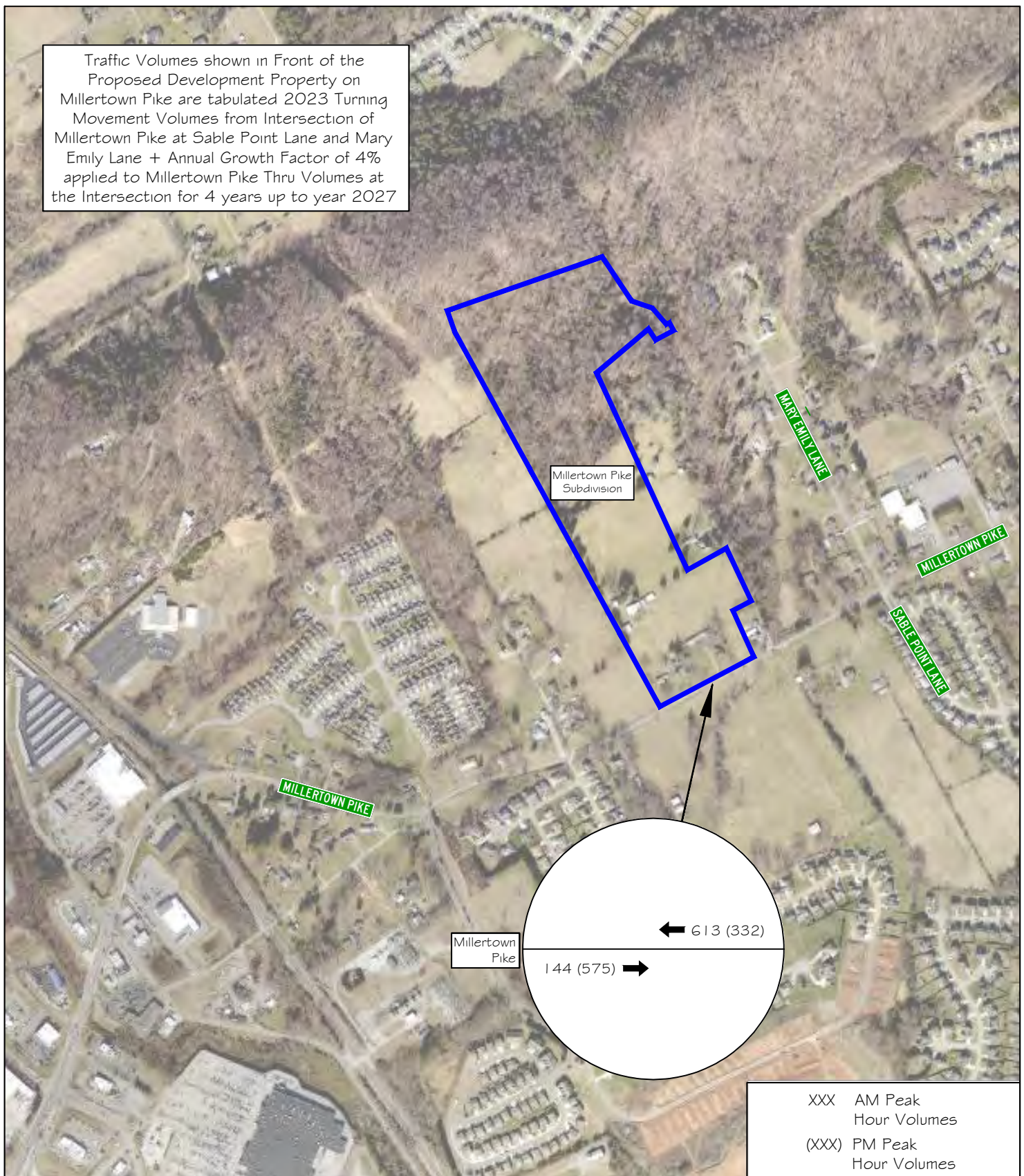
Horizon year traffic conditions represent the projected traffic volumes in the study area without the proposed project being developed (no-build option). This proposed development's build-out and full occupancy are assumed to occur by 2027.

According to the nearby TDOT count station, vehicular traffic on Millertown Pike has shown moderate growth over the past ten years. Data in Appendix A shows that Millertown Pike, west of Sable Point Lane and Mary Emily Lane, has experienced annual growth of +2.3% over the past ten years.



An annual growth rate was assumed and applied to the existing thru 2023 volumes tabulated on Millertown Pike to estimate the future volumes in the horizon year of 2027 without the potential development traffic. For this study, a slightly higher annual growth rate of +4% was used to calculate future growth on Millertown Pike up to 2027 to account for potential traffic growth in the study area to result in a conservative analysis. Figure 5 shows the projected 2027 horizon year traffic volumes on Millertown Pike at the development site without the project during the AM and PM peak hours. The volumes shown in Figure 5 include the turning movements to and from the west at the intersection during the traffic count that traveled past the proposed development site on Millertown Pike. The turning movements from Sable Point Lane and Mary Emily Lane were not increased since future vehicular growth from the existing subdivisions on these roads is not expected.

Traffic Volumes shown in Front of the Proposed Development Property on Millertown Pike are tabulated 2023 Turning Movement Volumes from Intersection of Millertown Pike at Sable Point Lane and Mary Emily Lane + Annual Growth Factor of 4% applied to Millertown Pike Thru Volumes at the Intersection for 4 years up to year 2027



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FIGURE 5

Millertown Pike Subdivision

2027 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 91 single-family detached houses 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 F. A summary of this information is presented in the following table:



TABLE 2
TRIP GENERATION FOR MILLERTOWN PIKE SUBDIVISION
91 Single-Family Detached Homes

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	91 Houses	925	25%	75%		63%	37%	
				17	51	68	57	34	91
Total New Volume Site Trips			925	17	51	68	57	34	91

ITE Trip Generation Manual, 11th Edition

Trips calculated by using Fitted Curve Equation

For the proposed residential development, it is estimated that 17 vehicles will enter and 51 will exit, for a total of 68 generated trips during the AM peak hour in the year 2027. Similarly, it is estimated that 57 vehicles will enter and 34 will exit, for a total of 91 generated trips during the PM peak hour in the year 2027. The calculated trips generated for an average weekday are estimated to be 925 vehicles for the proposed development. No vehicle trip reductions were included in the calculations or analysis.

▪ **TRIP DISTRIBUTION AND ASSIGNMENT:**

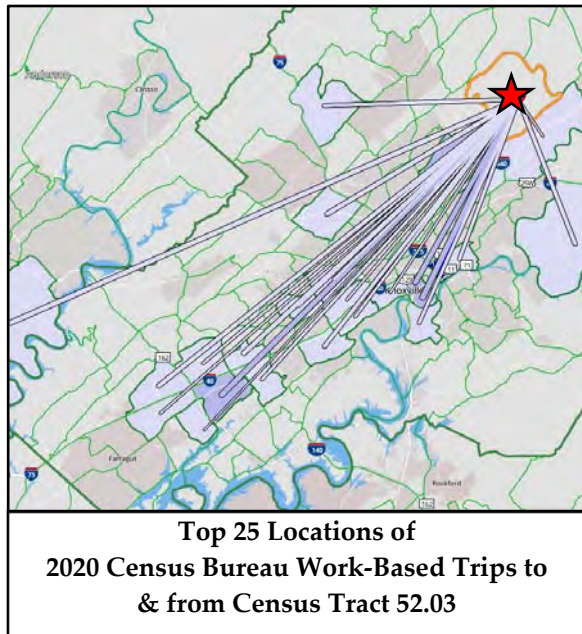
The projected trip distribution and assignment for the Millertown Pike Subdivision development are based on several sources and engineering judgment. The first source is based on the existing traffic count volumes and the observed travel directions collected at the intersection of Millertown Pike at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

During the traffic count, distinct directional splits were observed for the eastbound and westbound Millertown Pike thru volumes during the morning and afternoon peak hours. In the AM peak hour, 81% of thru traffic on Millertown Pike was observed traveling west towards Knoxville and 19% east. In the PM peak hour, the opposite flow was observed, with 37% of the traffic on Millertown Pike traveling westbound and 63% eastbound. The observed entering and exiting splits on Sable Point Lane are projected to be a good analog for the future residents of the Millertown Pike Subdivision development since this road serves a similar residential land use as proposed for the development site. Sable Point Lane provides the singular road access to the Meadows of Millertown Subdivision. This subdivision is located south of Millertown Pike and has 185 single-family detached houses. The entering and exiting percentages during the observed AM and PM peak hours to and from Sable Point Lane were the following:

**Observed Entering and Exiting Vehicle Distribution
at Sable Point Lane on Millertown Pike**

AM PEAK HOUR	
ENTER FROM WEST	65%
ENTER FROM EAST	35%
EXIT TO EAST	10%
EXIT TO WEST	90%
PM PEAK HOUR	
ENTER FROM WEST	93%
ENTER FROM EAST	7%
EXIT TO EAST	17%
EXIT TO WEST	83%

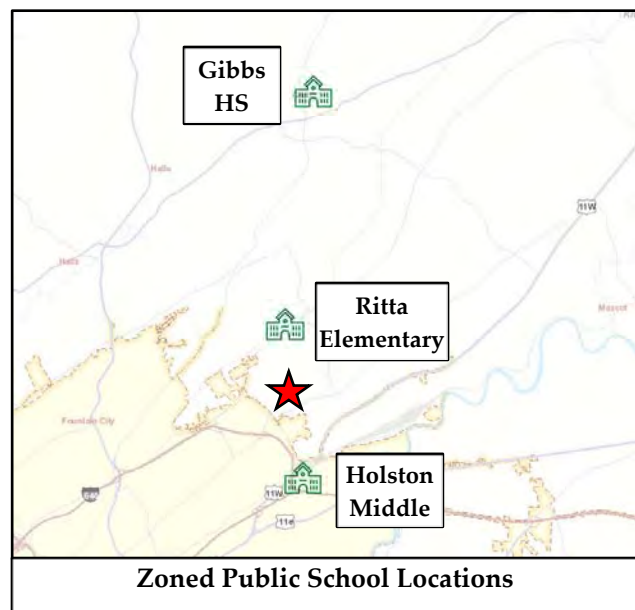
During the traffic count, most vehicles entered and exited to and from the west in the AM and PM peak hours. However, a high percentage of vehicles was observed entering from the east during the AM peak hour. This higher rate is believed to be due to some parents in The Meadows of Millertown Subdivision returning home after dropping off their younger children at Ritta Elementary School. The study did not use traffic count data for Mary Emily Lane since it had much lower volumes and only serves access to 19 single-family detached houses.



The second source in determining the projected trip distribution is based on work-related trips in the local area. Work-based trips will be a significant impetus for generated trips by the residential development, and these trips are more likely to travel to and from the southwest and south. This assertion is based on data from the United States Bureau website for Census Tract 52.03, where the development property is located. Based on 2020 (latest available) census data and as shown in Appendix G, most work-based trips in the surrounding area correspond to downtown Knoxville, the University of Tennessee area, Forks of the River Industrial Park, and areas of West

Knoxville. For future work-related travel to and from the development site, the proximity of the Interstate 640 interchange at Millertown Pike to the southwest will draw a good portion of these trips. Furthermore, future work-related travel by future residents could be drawn to and from the Amazon Fulfillment Center near Interstate 640 to the southwest when it officially begins operations. Note: An official start date has not been announced even though the facility appears complete and ready for operations to begin.

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 Ritta Elementary, Holston Middle, and Gibbs High School. These zoned public schools are located north and south of the development site. For parents and children not utilizing public school bus transportation, the most direct route to these schools would be initially traveling on Millertown Pike and then utilizing other roads to the north and south.



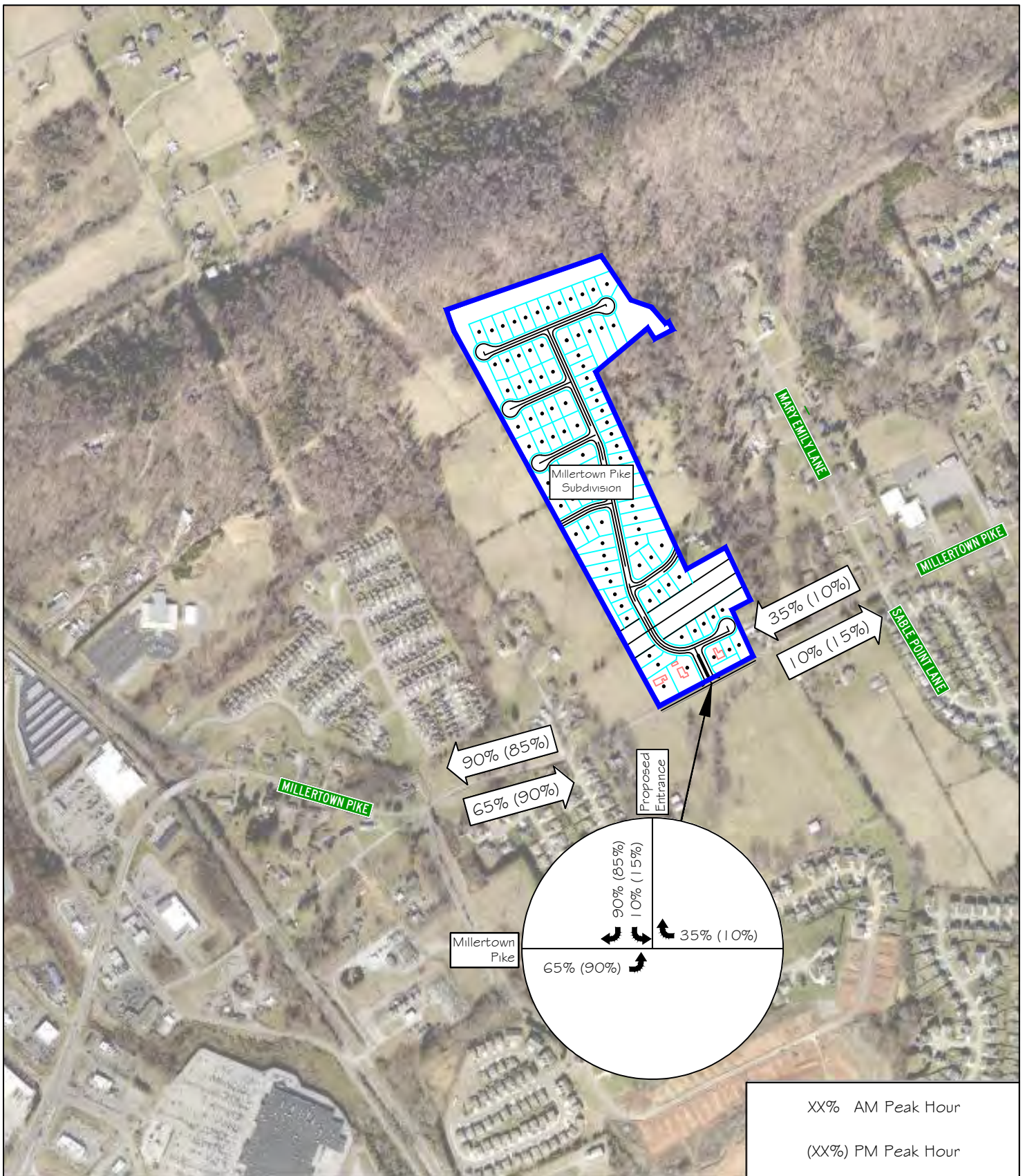
Holston Middle is the closest school to the development site at 2.4 miles, and Gibbs High School is the furthest at 8.3 miles. Ritta Elementary School is 2.9 miles away, and the shortest route to

and from this school is via Millertown Pike to the east, north on Harris Road, and then slightly west on Washington Pike to the school.

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.

Figure 6 shows the projected distribution of traffic entering and exiting the development at the Proposed Entrance at Millertown Pike. 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. Ultimately, the projected trip distribution was heavily based on the observed traffic entering and exiting Sable Point Lane at Millertown Pike.

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. It should be noted that the entering and exiting traffic shown in Figure 7 at the Proposed Entrance only includes the trips generated by 89 single-family detached houses since two of the houses in the development are existing, will be renovated, and will maintain their driveway access to Millertown Pike. The other existing house will require the homeowners to enter and exit at the Proposed Entrance since it will lose its existing driveway access due to the construction of a detention pond for the development. The trip generation calculations for 89 houses only are also included in Appendix F.



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FIGURE 6

Millertown Pike Subdivision

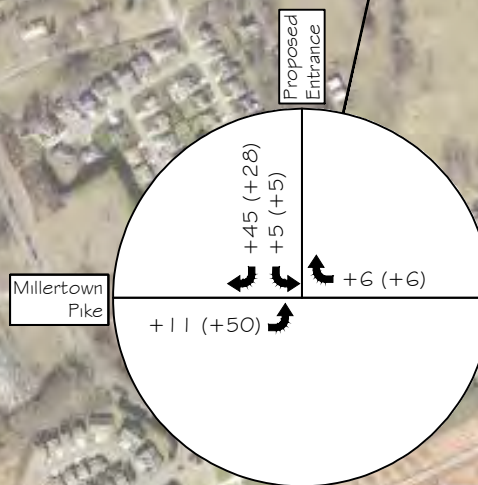
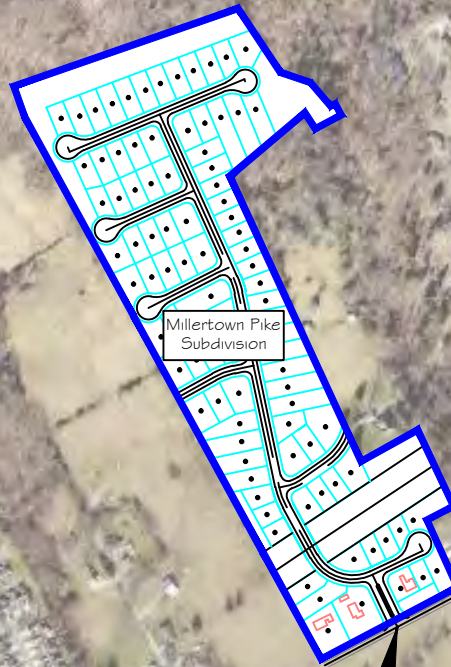
Directional Distribution of Generated Traffic during AM and PM Peak Hour

TRIP GENERATION FOR
MILLERTOWN PIKE SUBDIVISION
91 Single-Family Detached Houses

	AM PEAK	PM PEAK
ENTER	17	57
EXIT	51	34

TRIP GENERATION FOR
MILLERTOWN PIKE SUBDIVISION
89 Single-Family Detached Houses
Entering & Exiting at the Proposed Entrance

	AM PEAK	PM PEAK
ENTER	17	56
EXIT	50	33



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



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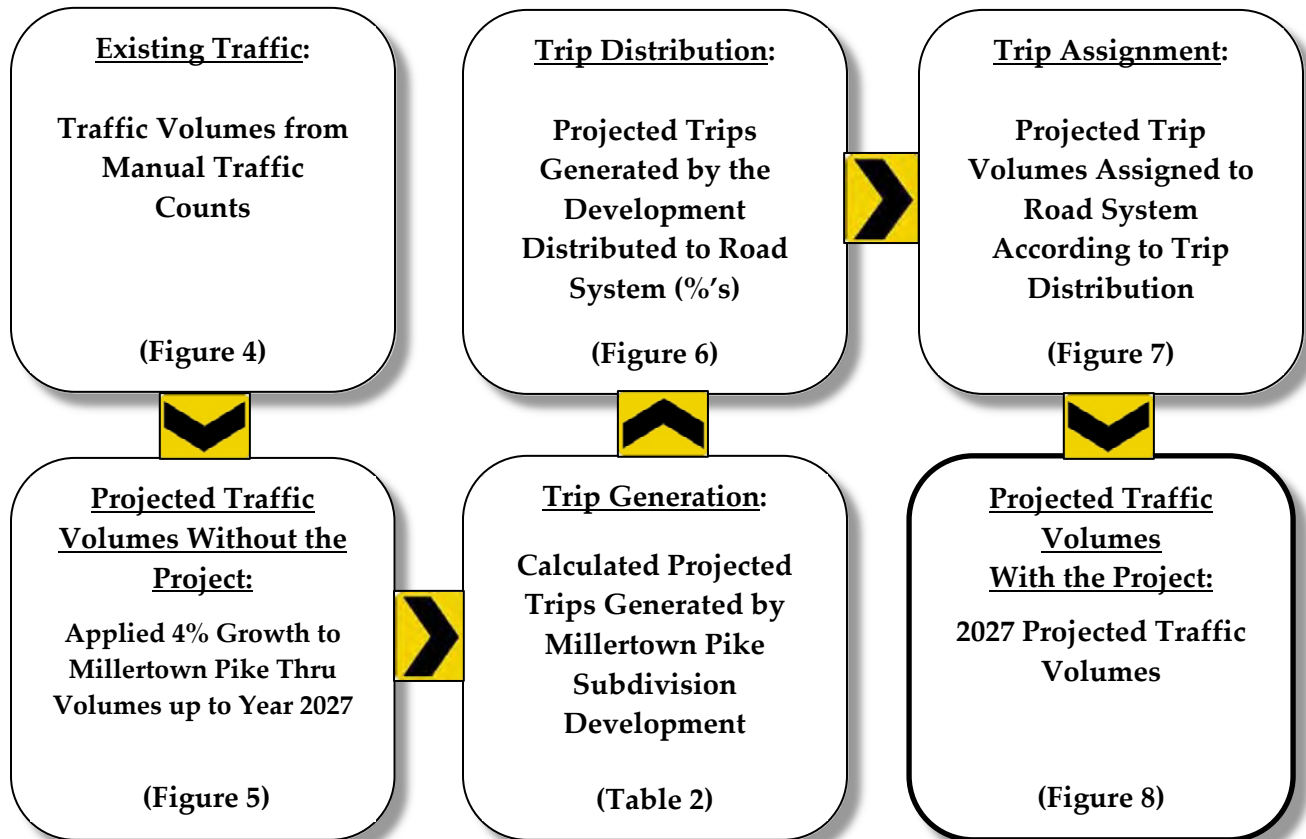
FIGURE 7

Millertown Pike Subdivision

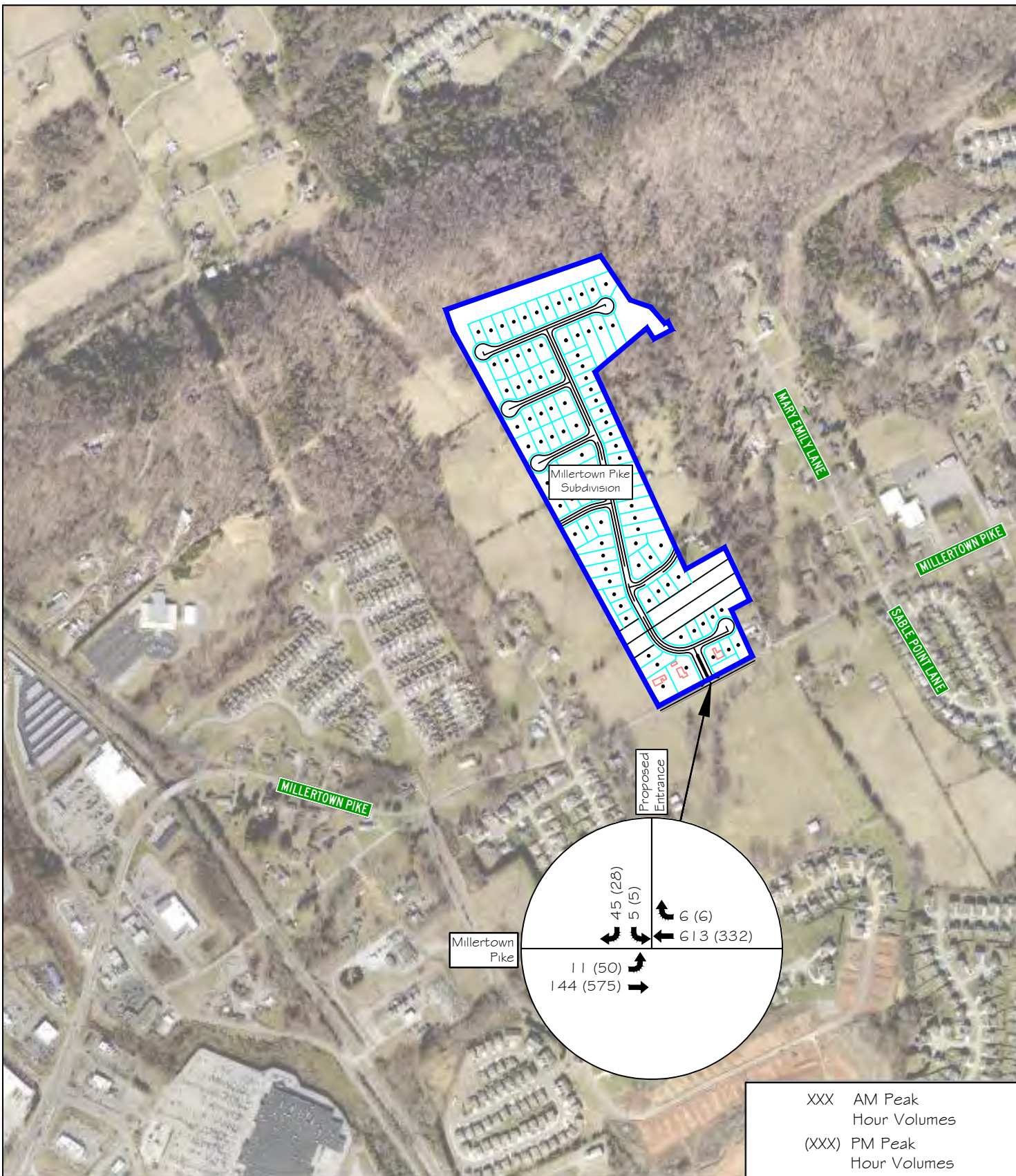
Traffic Assignment of Generated Traffic
during AM and PM Peak Hour

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

Several additive steps were taken to estimate the total projected traffic volumes at the Proposed Entrance intersection on Millertown Pike when the subdivision development is constructed and fully occupied in 2027. The steps are illustrated below for clarity and review:



The calculated peak hour traffic (Table 2) generated by the Millertown Pike Subdivision development was added to the 2027 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 at the Proposed Entrance intersection when the Millertown Pike Subdivision development is fully built and occupied in 2027. Figure 8 shows the projected 2027 AM and PM peak hour traffic volumes, which includes the generated development traffic entering and exiting the Proposed Entrance intersection and the projected thru volumes on Millertown Pike.



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FIGURE 8

Millertown Pike Subdivision

2027 Peak Hour Traffic Volumes -
PROJECTED TRAFFIC CONDITIONS
WITH THE PROJECT

Capacity analyses were conducted to determine the projected LOS at the Proposed Entrance intersection with the development traffic in 2027, shown in Figure 8. The capacity analyses were calculated following the Highway Capacity Manual (HCM) methods and Synchro Traffic Software (Version 11).

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

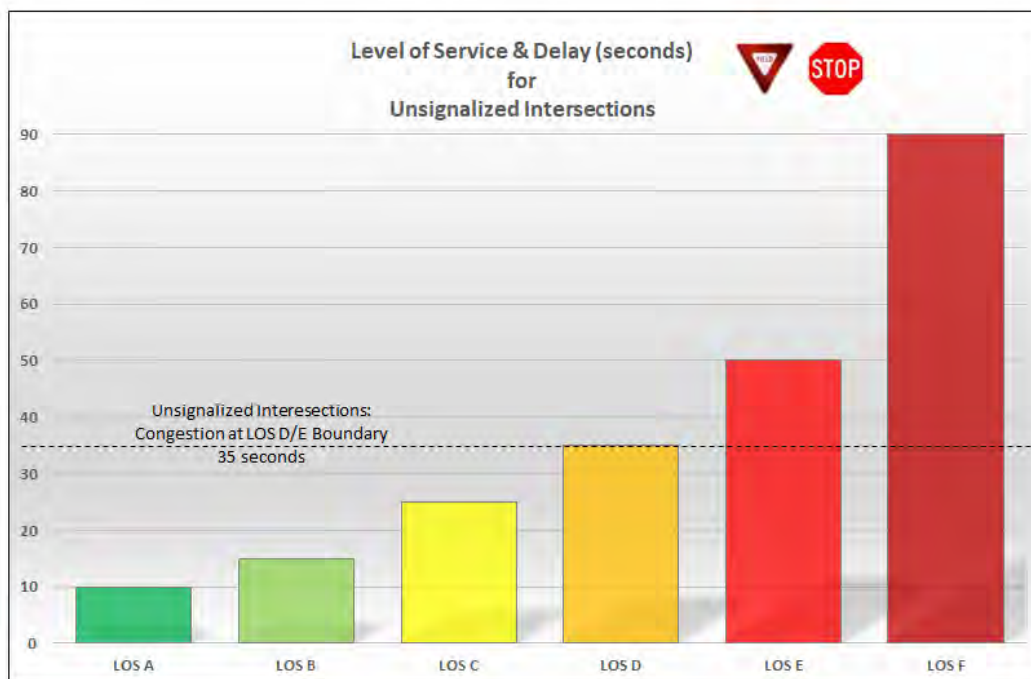
the delay for each minor approach and major street left-turn movements. Table 3 lists the level of service criteria for unsignalized intersections. The analysis results of unsignalized intersections using the HCM methodologies are conservative due to the more significant vehicle gap parameters used in 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 3
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 projected 2027 peak hour traffic are shown in Table 4. 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 H includes the worksheets for the projected 2027 peak hour capacity analyses.

As shown in Table 4, the intersection is calculated to operate with good to average LOS and reasonable vehicle delays in the projected 2027 conditions.

TABLE 4
2027 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS ^a	DELAY ^b (seconds)	v/c ^c	LOS ^a	DELAY ^b (seconds)	v/c ^c
Millertown Pike (EB & WB) at Proposed Entrance (SB)	 Unsignalized	Eastbound Left	A	9.5	0.015	A	8.1	0.046
		Southbound Left/Right	C	16.2	0.148	B	12.1	0.068

Note: All analyses were calculated in Synchro 11 software and reported using HCM 2010 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.

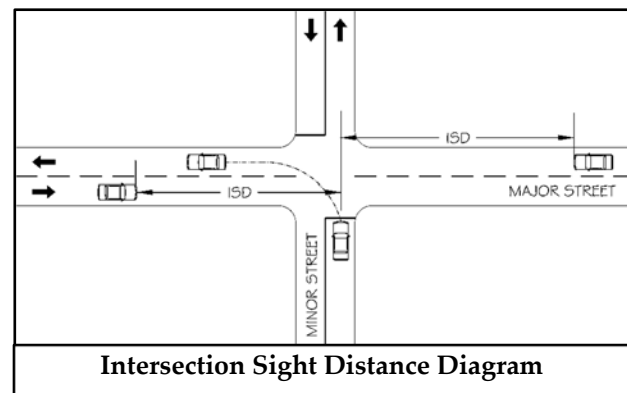
○ **EVALUATION OF SIGHT DISTANCE**

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.

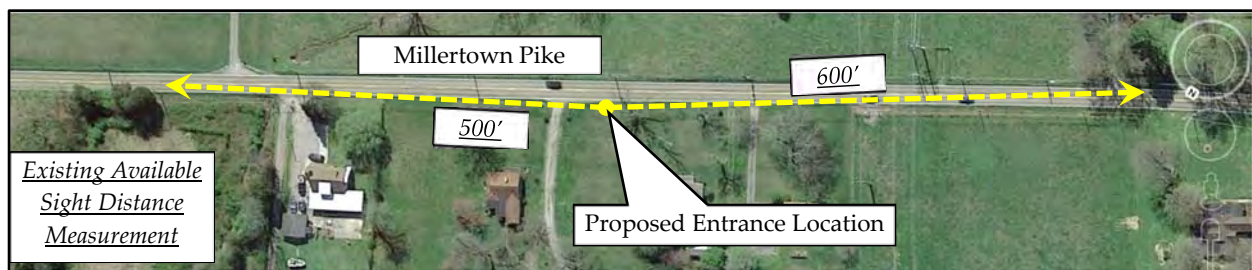


Three traffic maneuvers are available for vehicles stopped on a minor street at a 4-way intersection: (1) left-turn, (2) right-turn, (3) or a crossing maneuver across the major street. For turns from the minor street, ISD is needed to allow a stopped motorist to turn onto a major street without being 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 speed limit of 40-mph on Millertown Pike at the Proposed Entrance, the ISD is calculated to be 400 feet based on Knox County's requirement of providing 10 feet of sight distance per 1 mph of vehicle speed.

Visual observations of the sight distances at the Proposed Entrance location on Millertown Pike were undertaken. Using a Nikon Laser Rangefinder at the Proposed Entrance location, the available sight distance was visually estimated to be 500 feet to the northeast and 600 feet to the southwest. The sight distance to the northeast is smaller than the southwest due to vegetation overhanging Millertown Pike and an existing driveway entrance wall at 5709 Millertown Pike.

Thus, the available sight distances from the Proposed Entrance on Millertown Pike will be adequate based on visual observations. Images of the existing sight distances at the Proposed Entrance location are labeled below with the ISD and rangefinder-measured sight distances.



View of Sight Distance on Millertown Pike
at the Proposed Entrance Location
(Looking Northeast)



View of Sight Distance on Millertown Pike
at the Proposed Entrance Location
(Looking Southwest)

- **EVALUATION OF TURN LANE THRESHOLDS**

The need for separate entering turn lanes was evaluated in the projected 2027 conditions for the Proposed Entrance at Millertown Pike.

The criteria used for these turn lane evaluations were based on Knox County's "Access Control and Driveway Design Policy". This design policy relates vehicle volume thresholds based on prevailing speeds for two-lane and four-lane roadways. The location of the Proposed Entrance on Millertown Pike is within a 40-mph speed zone; thus, it was evaluated based on this speed.

According to Knox County's guidelines with a posted speed limit of 40-mph, a separate westbound right-turn lane on Millertown Pike at the Proposed Entrance is not warranted based on the projected AM and PM peak hour 2027 traffic volumes. However, a separate eastbound left-turn lane is warranted based on the projected 2027 PM peak hour volumes. The worksheets for these evaluations are provided in Appendix I.

- **PROJECTED VEHICLE QUEUES**

An additional software program was used to calculate the 2027 AM and PM peak hour projected vehicle queues at the studied intersection. The previously mentioned Synchro Traffic Software includes SimTraffic. The Synchro portion of the software performs the macroscopic calculations for intersections, and SimTraffic performs micro-simulation and animation of vehicular traffic. SimTraffic (Version 11) software was utilized to estimate the projected vehicle queues.

The 95th percentile vehicle queue is the recognized measurement in the traffic engineering profession as the design standard used when considering vehicle queue lengths. A 95th percentile vehicle queue length means 95% certainty that the vehicle queue will not extend beyond that point. The calculated vehicle queue results were based on averaging the outcome obtained during ten traffic simulations in the software. The 95th percentile vehicle queue lengths at the intersection are shown in Table 5 for the projected 2027 conditions with the project. The vehicle queue worksheet results from the SimTraffic software are in Appendix J.

TABLE 5
VEHICLE QUEUE SUMMARY -
2027 PROJECTED PEAK HOUR TRAFFIC WITH THE PROJECT

INTERSECTION	APPROACH/ MOVEMENT	SIMTRAFFIC 95 th PERCENTILE QUEUE LENGTH (ft)	
		AM PEAK HOUR	PM PEAK HOUR
Millertown Pike (EB & WB) at Proposed Entrance (SB)	Eastbound Left	32	73
	Southbound Left/Right	51	47

Note: 95th percentile queues were calculated in SimTraffic 11 software

Table 5 shows minimal projected queue lengths at the intersection in the 2027 peak hour conditions. The projected vehicle queues for the exiting traffic in the 2027 AM and PM peak hours at the Proposed Entrance are calculated to be reasonable. The longest queue on the eastbound approach on Millertown Pike at the Proposed Entrance was calculated to be approximately three vehicles, assuming a length of 25 feet per vehicle. Results are not reported for the westbound approach since the movements at this approach will be free-flowing and not dependent on conflicting vehicles.

CONCLUSIONS & RECOMMENDATIONS

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

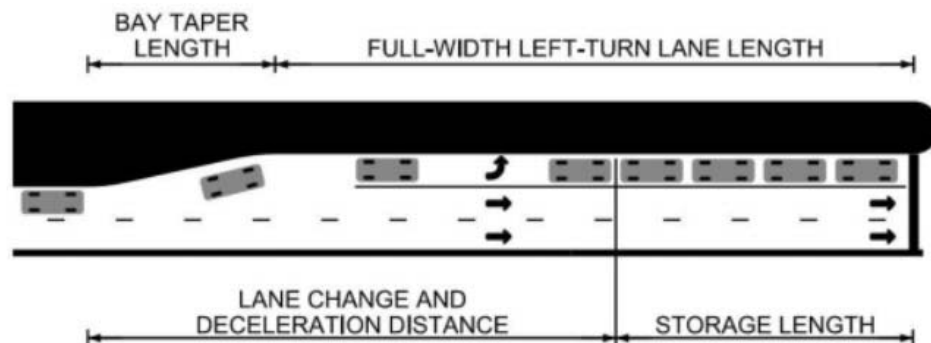


Millertown Pike at the Proposed Entrance: The 2027 projected level of service calculations for this intersection resulted in reasonable vehicle delays and LOS.

- 1a) The construction of a separate left-turn lane on Millertown Pike for entering vehicles at the Proposed Entrance is warranted and recommended based on the projected 2027 PM peak hour traffic volumes. A separate westbound right-turn lane on Millertown Pike is not warranted.

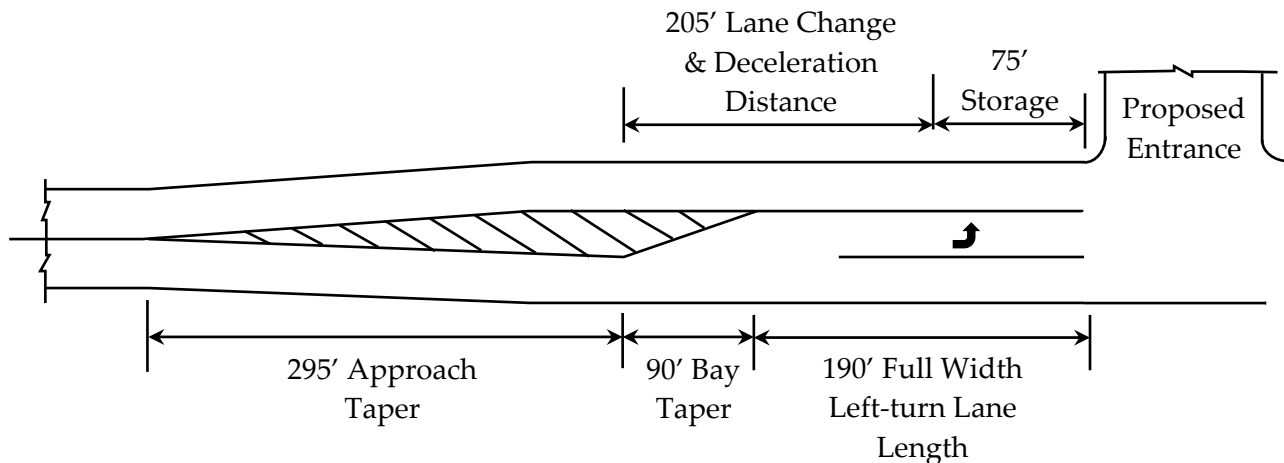
Assuming linear vehicular growth on Millertown Pike and construction of houses in the Millertown Pike Subdivision, it is recommended that the left-turn lane on Millertown Pike be constructed before the 47th house in the development is constructed. See Appendix K for calculations of this threshold.

According to TDOT's Highway System Access Manual, the functional area for an exclusive turn lane includes the "lane change and deceleration distance" and the storage length. The bay taper length is included in the lane change and deceleration distance, as shown in the following TDOT diagram:



The lane change and deceleration distance is a function of vehicle speeds, and in constrained conditions, the designer can assume some deceleration before the lane change. A speed of up to 10 mph less than the design speed can be assumed in these conditions. For this proposed eastbound left-turn lane on Millertown Pike, a vehicle

speed of 35 mph (assuming a design speed of 45 mph) was used in the calculations. Based on this assumption, the calculated and recommended lengths for a proposed 11-foot wide left-turn lane include a bay taper length of 90 feet, a lane change and deceleration distance of 205 feet, and a storage length of 75 feet. The largest 95th percentile vehicle queue length for the eastbound left-turn lane on Millertown Pike was calculated to be 73 feet in the PM peak hour in 2027 and would be contained within a storage length of 75 feet. With a 90-foot bay taper, the full-width left-turn lane will be 190 feet long. Based on a posted speed limit of 40 mph, the approach taper should be 295 feet. The following diagram shows the recommended lengths for the turn lane at the Proposed Entrance. The approach taper on Millertown Pike on the east side approaching the intersection from the opposite side must also be 295 feet.



The eastbound left-turn lane pavement should be marked with a left-turn arrow, as shown in TDOT Standard Drawing T-M-4.

- 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 Millertown Pike. The stop bar should be applied a minimum of 4 feet away from the edge of Millertown Pike and placed at the desired stopping point that maximizes the sight distance.
- 1c) A single exiting lane for the development entrance at Millertown Pike will be sufficient. The southbound exiting lane of Road "G" at Millertown Pike is proposed as a shared left/right turn lane. The longest vehicle queue in the projected 2027 conditions on this exiting approach is calculated to be 51 feet in the AM peak hour and 47 feet in the PM peak hour. These queue lengths are reasonable and translate to just two passenger cars, assuming a length of 25 feet per vehicle. The total length of the boulevard entrance road,

Road "G", will be nearly 200 feet and will fully contain the expected queue for exiting vehicles.

- 1d) Intersection sight distance at the Proposed Entrance at Millertown Pike must not be impacted by future landscaping or signage. Based on a posted speed limit of 40-mph on Millertown Pike, the required intersection sight distance is 400 feet for exiting left and right-turning vehicles. The site designer must verify that these distances will be available. The existing driveway entrance walls at 5709 Millertown Pike and the vegetation on



**Existing Driveway Entrance Walls at 5709
Millertown Pike and Vegetation along
Millertown Pike**

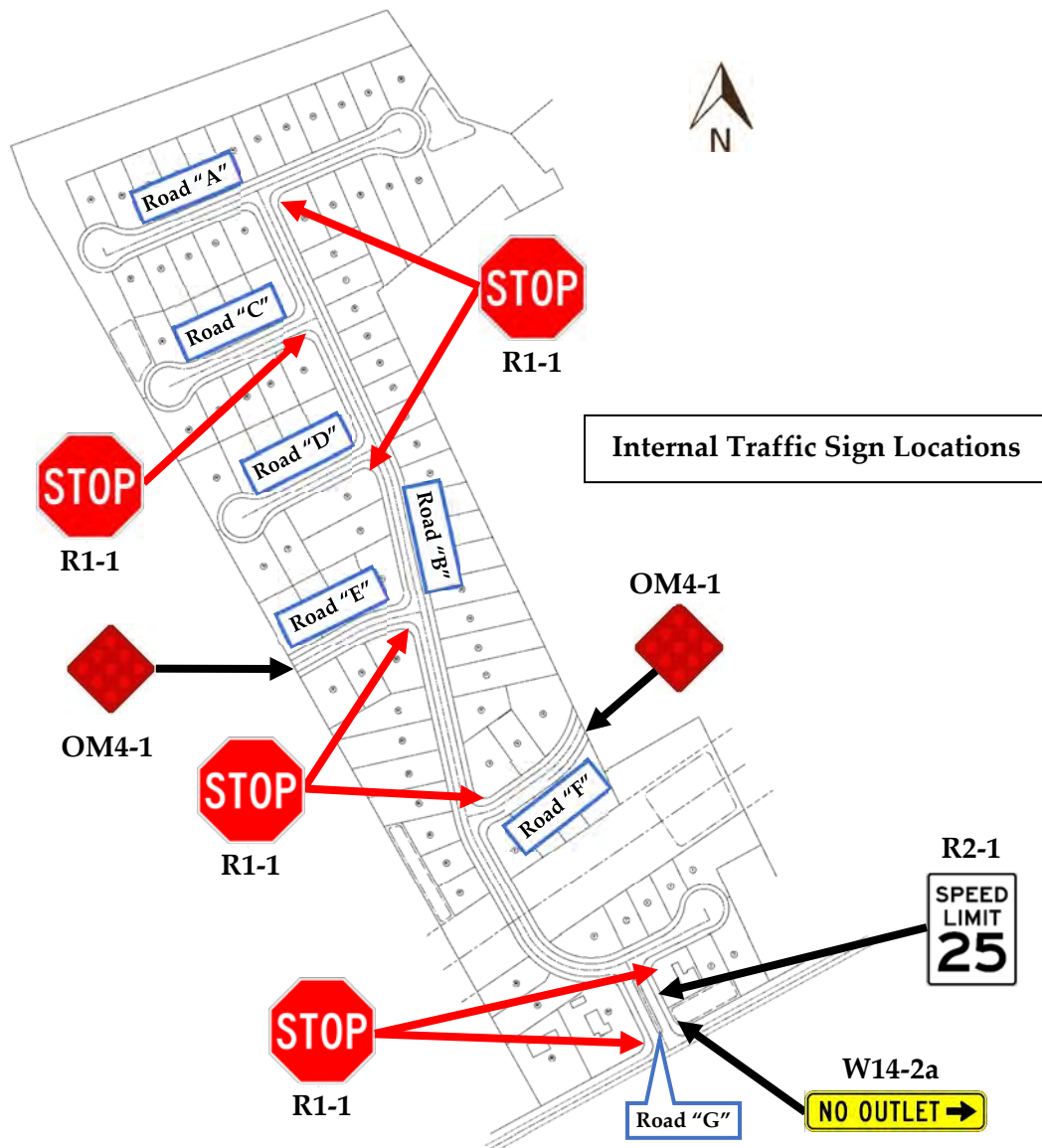
the north side of Millertown Pike along the development property's frontage will need to be removed to maximize the sight distance.

- 1e) At the Proposed Entrance, it is recommended that the entire length of the existing broken yellow centerline on Millertown Pike that allows eastbound motorists to pass other vehicles be removed to accommodate the new eastbound left-turn lane. Outside of the new left-turn lane and its approach tapers on both ends, a double yellow centerline should be applied to the center of Millertown Pike.



Millertown Pike Subdivision Internal Roads: The layout plan shows a single entrance at Millertown Pike constructed for the development, as shown in Figure 3.

- 2a) A 25-mph Speed Limit Sign (R2-1) is recommended to be posted near the beginning of the development entrance off Millertown Pike. It is recommended that a “No Outlet” Sign (W14-2a) be installed at the front of the development at Millertown Pike. The “No Outlet” sign can be installed above or below the street name sign or separately posted on the Road “G” entrance road.
- 2b) End of roadway signage (OM4-1) should be installed at the ends of Roads “E” and “F” if stub roads are constructed. Stop Signs (R1-1) with 24” white stop bars are recommended to be installed at the internal intersections, as shown below:



- 2c) Sight distance at the new internal intersections must not be impacted by new signage, parked cars, or future landscaping in the subdivision. 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.
- 2d) All drainage grates and covers for the residential development must be pedestrian and bicycle safe.
- 2e) 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.
- 2f) The new Road "B" in the Millertown Pike Subdivision will have long, straight road segments with a portion having a steep road grade. Straight road segments with steeper grades encourage higher vehicle speeds. It is recommended that the site designer consider traffic calming measures on this internal road.

Speed humps are a prevalent traffic calming measure to install in residential areas to reduce vehicle speeds due to their low cost. However, speed humps are not recommended on roads with grades greater than 8%. Road "B" has a section with a grade of 11.84%. Thus, speed humps would be inappropriate for this section of Road "B". Outside this steep grade section on Road "B", the site designer should consider speed humps on this internal road. Specifics regarding this recommendation should be discussed in the design phase with Knox County Engineering.

- 2g) All road grade and intersection elements should be designed to AASHTO, TDOT, and Knox County specifications and guidelines to ensure proper operation.

APPENDIX A

HISTORICAL TRAFFIC COUNT DATA

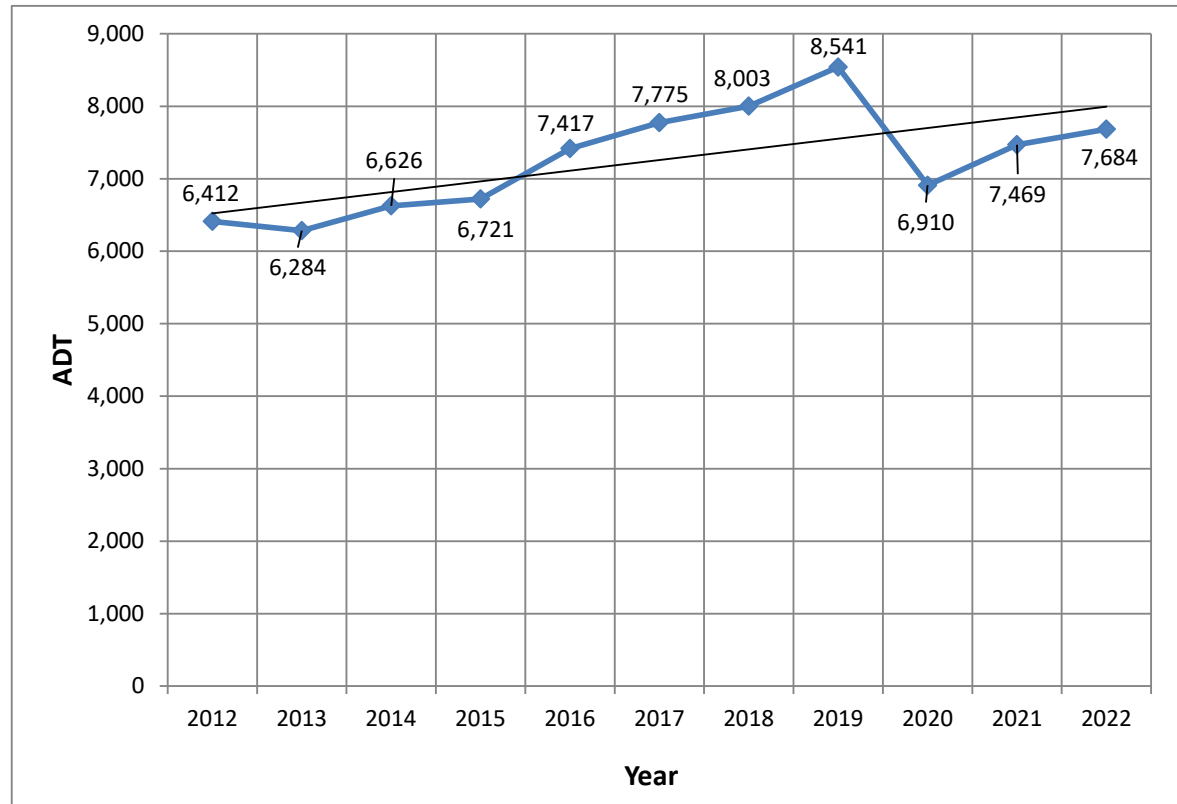
Historical Traffic Counts

Organization: TDOT

Station ID #: 47000261

Location: Millertown Pike, west of Sable Point Lane and Mary Emily Lane

YEAR	ADT	
2012	6,412	Trendline ↓
2013	6,284	
2014	6,626	
2015	6,721	
2016	7,417	
2017	7,775	
2018	8,003	
2019	8,541	
2020	6,910	
2021	7,469	
2022	7,684	



2012 - 2022 Growth Rate = 22.3%

Average Annual Growth Rate = 2.3%

TN

TDOT

Department of Transportation

MS2

Traffic Count Database System (TCDS)

Home

Login

Locate

Locate All

Email This

Auto-Locate OFF

List View

All DIRs

Record

7449

of 15697

Goto Record

go

Location ID	47000261	MPO ID	
Type	SPOT	HPMS ID	
On NHS		On HPMS	
LRS ID	4703773001	LRS Loc Pt.	6.179
SF Group	Urban	Route Type	
AF Group	Urban Minor Arterial	Route	
GF Group	Knox	Active	Yes
Class Dist Grp	Urban Minor Arterial	Category	CC
Seas Class Grp			
WIM Group			
QC Group	Default		
Funct'l Class	Minor Arterial	Milepost	
Located On	03773		
Loc On Alias	MILLERTOWN PKWY.		
	MILLERTOWN PK-NORTH OF JOHN SEVIER		

More Detail

STATION DATA

Directions: 2-WAY

AADT

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2022	7,684	717	9	65	7,468 (97%)	216 (3%)	
2021	7,469	755	10	65	7,223 (97%)	246 (3%)	
2020	6,910	744	11	65	6,648 (96%)	262 (4%)	
2019	8,541		12	65			
2018	8,003		9	65			

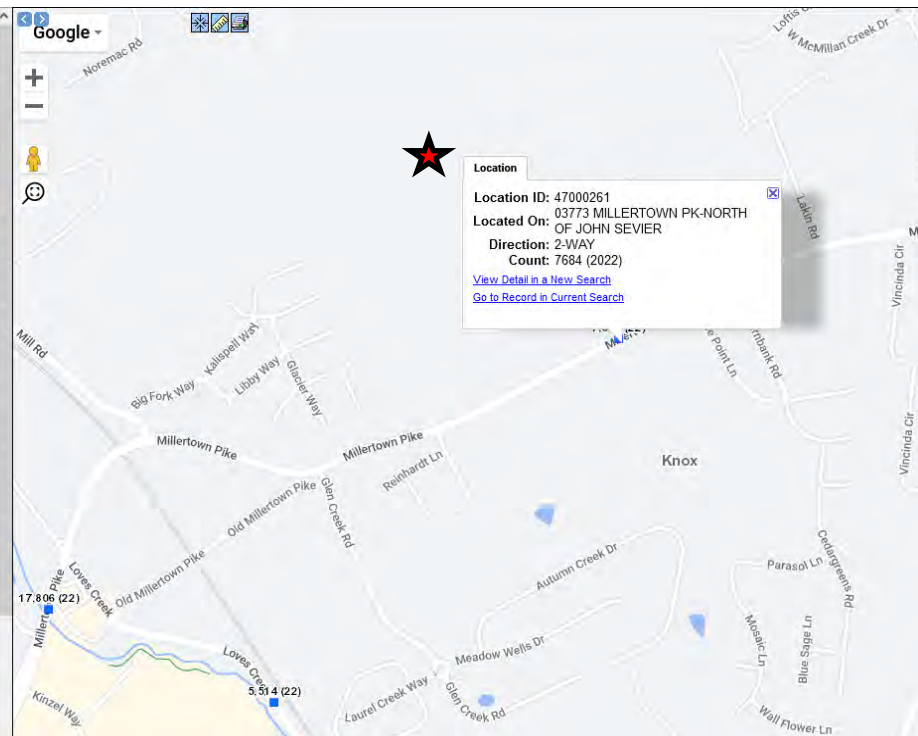
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<

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1-5 of 38




APPENDIX B

WALK SCORE


WALKSCORE




(from walkscore.com)


Walk Score  [Get Scores](#) [My Favorites](#) [Add to Your Site](#)

5703 Millertown Pike

Knoxville, Tennessee, 37924

Commute to **Knoxville, TN** 

 15 min  48 min  60+ min [View Routes](#)

[More about 5703 Millertown Pike](#) 

Walk Score

25

Car-Dependent
Most errands require a car.

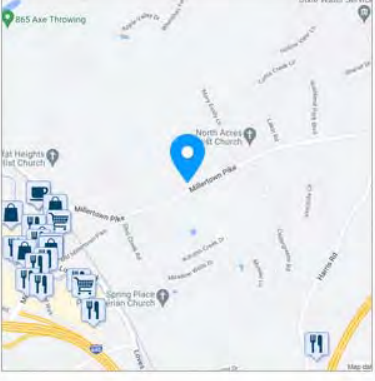
Bike Score

22

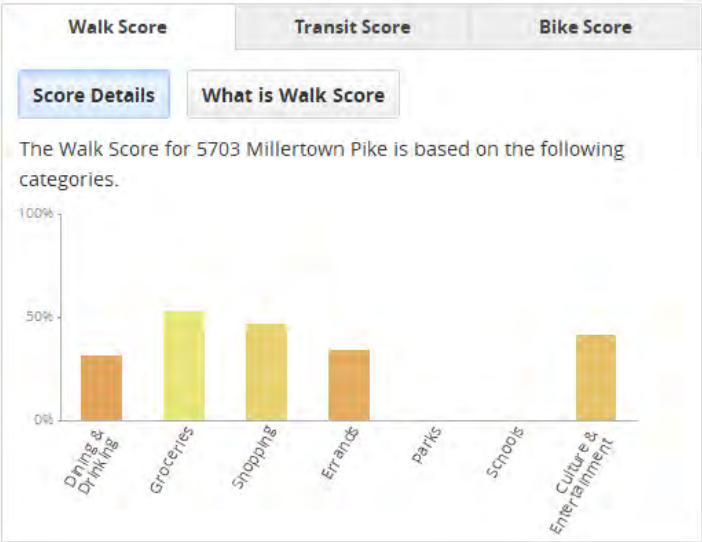
Somewhat Bikeable
Minimal bike infrastructure.

[About your score](#)

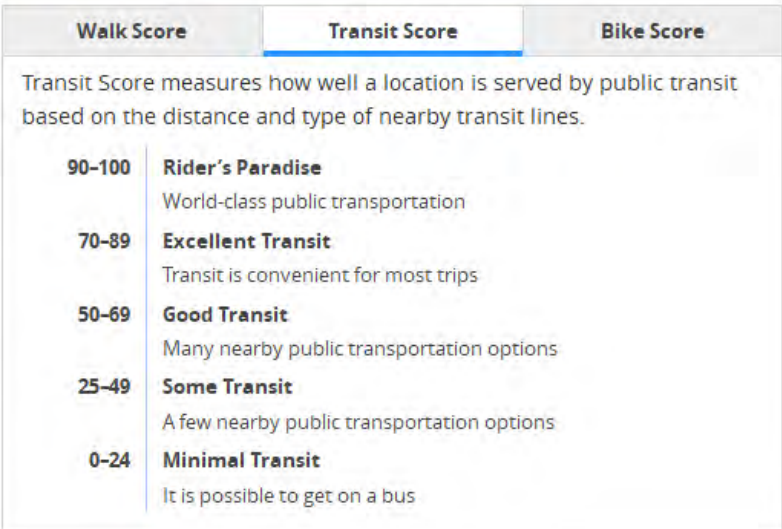
[Add scores to your site](#)



Scores for 5703 Millertown Pike



Scores for 5703 Millertown Pike



Scores for 5703 Millertown Pike

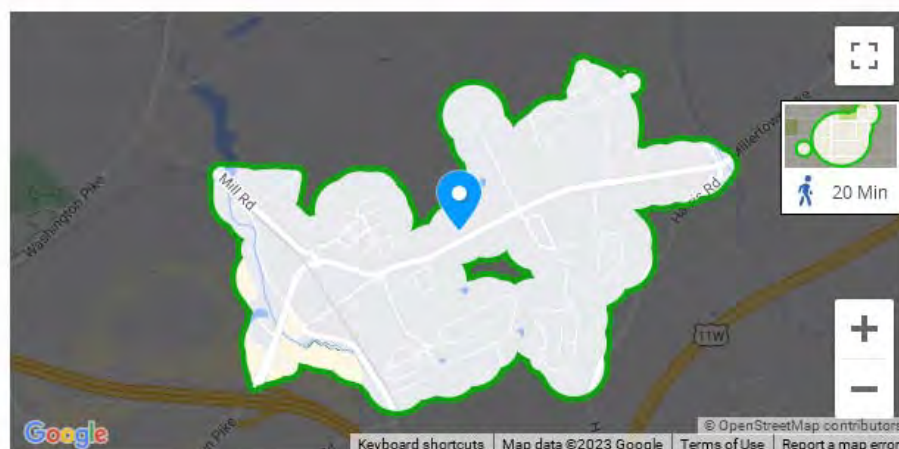


Walk Score	Transit Score	Bike Score
Bike Score measures whether an area is good for biking based on bike lanes and trails, hills, road connectivity, and destinations.		
90-100	Biker's Paradise Daily errands can be accomplished on a bike	
70-89	Very Bikeable Biking is convenient for most trips	
50-69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

Travel Time Map

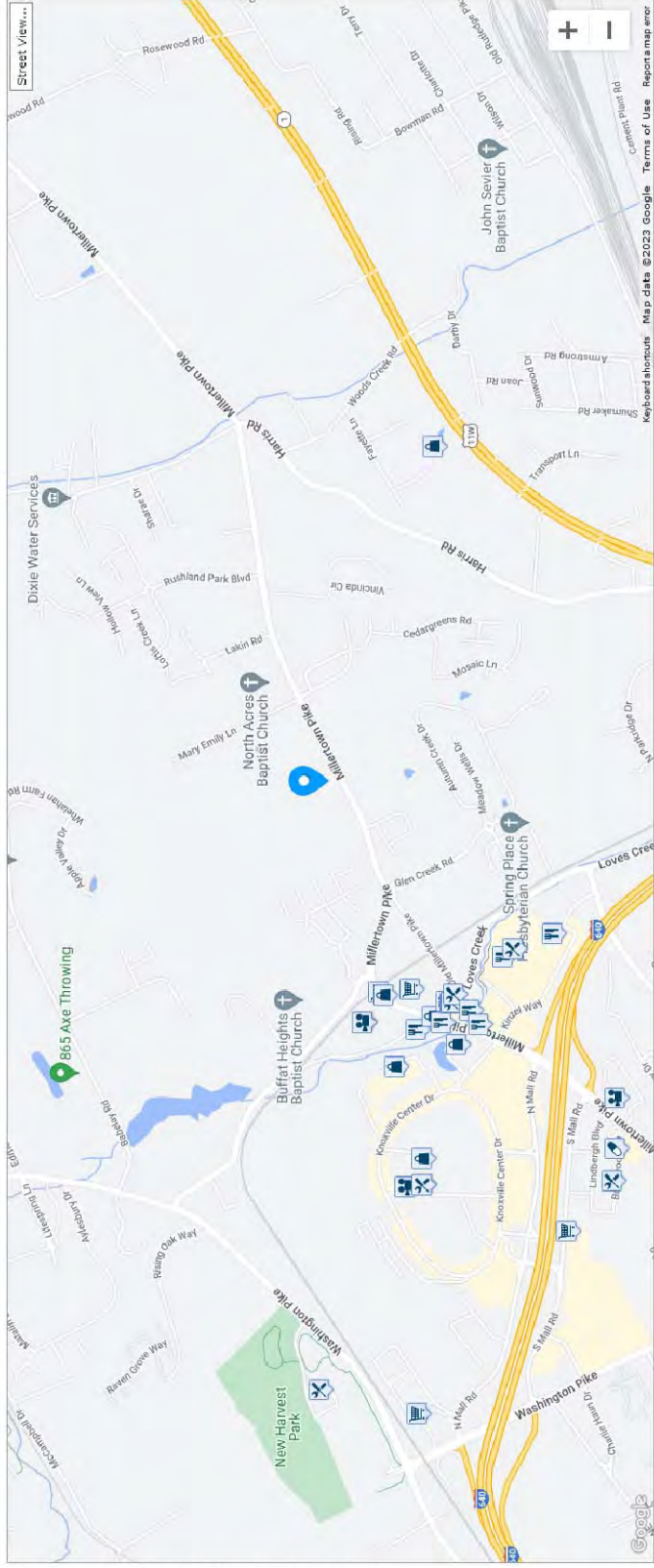
[Add to your site](#)

Explore how far you can travel by car, bus, bike and foot from 5703 Millertown Pike.



What's Nearby

- Restaurants:**
 - Walmart .6mi
- Coffee:**
 - Starbucks .5mi
- Bars:**
 - Calkey's Sports Grill 22mi
- Groceries:**
 - Nag's Wine & Spirits .5mi
- Parks:**
 - Volunteer Park 2.3mi
- Schools:**
 - Holston Middle School 1.5mi
- Shopping:**
 - US Cellular Authorized Agent .5mi
- Entertainment:**
 - Redbox .6mi
- Errands:**
 - Pure Envy Salon .5mi
- Search Nearby:**



APPENDIX C

KNOXVILLE AREA TRANSIT MAP AND INFORMATION

Knoxville City Center



Legend

Transfer Point

Lift Service Area Boundary

Points of Interest

Hospital

School

Library

Point of Interest

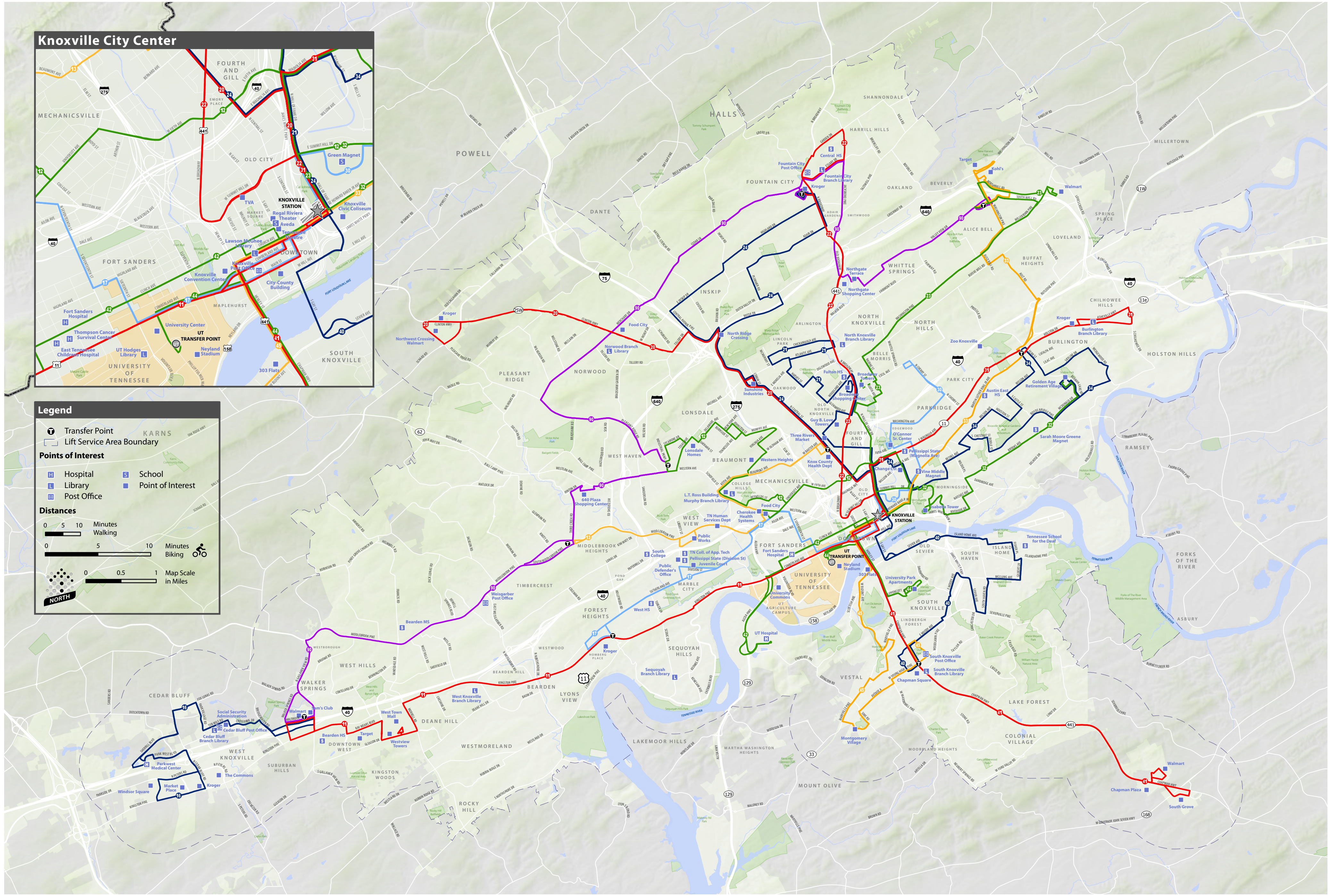
Post Office

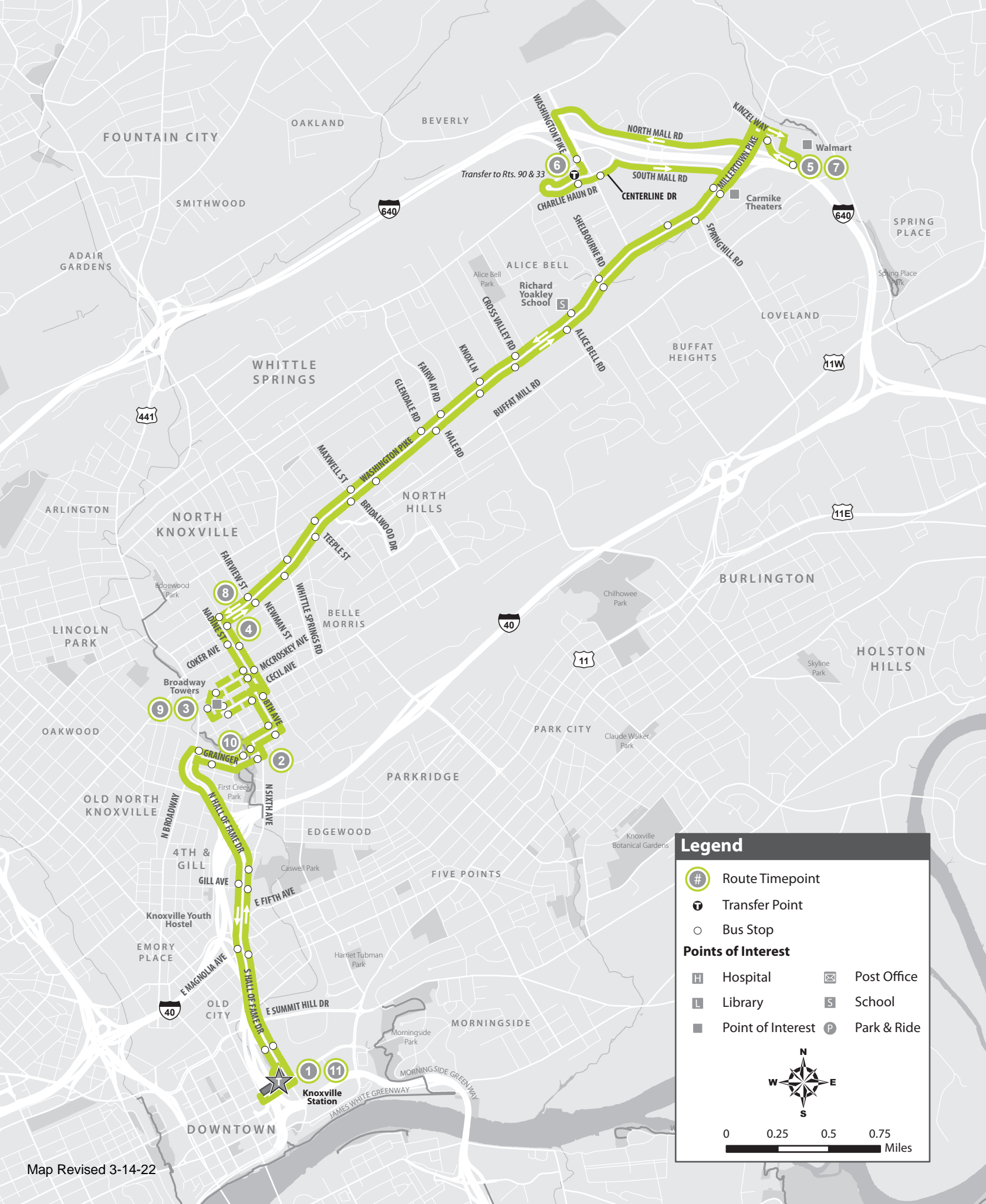
Distances

0 5 10 Minutes Walking

0 5 10 Minutes Biking

0 0.5 1 Map Scale in Miles





Route 23 - Millertown: Weekdays

Going away from downtown						Going toward downtown						
Knoxville Station Bay I	Grainger @ Sixth	Broadway Towers	Nadine @ Washington Pike	Walmart	Charlie Haun at Washingt on Pike	Goes on to serve	Charlie Haun @ Washingt on Pike	Walmart	Washington Pike @ Fairview	Broadway Towers	Sixth @ Grainger	Knoxville Station Bay
1	2	3	4	5	6		6	7	8	9	10	11
							5:30 AM	5:37 AM	5:49 AM		5:56 AM	6:10 AM
							6:30 AM	6:37 AM	6:49 AM		6:56 AM	7:10 AM
6:15 AM	6:24 AM		6:29 AM	6:45 AM	7:00 AM	Route 33	7:30 AM	7:37 AM	7:49 AM		7:56 AM	8:10 AM
7:15 AM	7:24 AM		7:29 AM	7:45 AM	8:00 AM	Route 33	8:30 AM	8:37 AM	8:49 AM	8:54 AM	8:56 AM	9:10 AM
8:15 AM	8:24 AM		8:29 AM	8:45 AM	9:00 AM	Route 33	9:30 AM	9:37 AM	9:49 AM	9:54 AM	9:56 AM	10:10 AM
9:15 AM	9:24 AM	9:27 AM	9:29 AM	9:45 AM	10:00 AM	Route 33	10:30 AM	10:37 AM	10:49 AM	10:54 AM	10:56 AM	11:10 AM
10:15 AM	10:24 AM	10:27 AM	10:29 AM	10:45 AM	11:00 AM	Route 33	11:30 AM	11:37 AM	11:49 AM	11:54 AM	11:56 AM	12:10 PM
11:15 AM	11:24 AM	11:27 AM	11:29 AM	11:45 AM	12:00 PM	Route 33	12:30 PM	12:37 PM	12:49 PM	12:54 PM	12:56 PM	1:10 PM
12:15 PM	12:24 PM	12:27 PM	12:29 PM	12:45 PM	1:00 PM	Route 33	1:30 PM	1:37 PM	1:49 PM	1:54 PM	1:56 PM	2:10 PM
1:15 PM	1:24 PM	1:27 PM	1:29 PM	1:45 PM	2:00 PM	Route 33	2:30 PM	2:37 PM	2:49 PM	2:54 PM	2:56 PM	3:10 PM
2:15 PM	2:24 PM	2:27 PM	2:29 PM	2:45 PM	3:00 PM	Route 33	3:30 PM	3:37 PM	3:49 PM	3:54 PM	3:56 PM	4:10 PM
3:15 PM	3:24 PM	3:27 PM	3:29 PM	3:45 PM	4:00 PM	Route 33	4:30 PM	4:37 PM	4:49 PM		4:56 PM	5:10 PM
4:15 PM	4:24 PM	4:27 PM	4:29 PM	4:45 PM	5:00 PM	Route 33	5:30 PM	5:37 PM	5:49 PM		5:56 PM	6:10 PM
5:15 PM	5:24 PM		5:29 PM	5:45 PM	6:00 PM	Route 33	6:30 PM	6:37 PM	6:49 PM		6:56 PM	7:10 PM
6:15 PM	6:24 PM		6:29 PM	6:45 PM	7:00 PM	Route 33	7:30 PM	7:37 PM	7:49 PM		7:56 PM	8:10 PM
7:15 PM	7:24 PM		7:29 PM	7:45 PM	8:00 PM	Route 33	8:30 PM	8:37 PM	8:49 PM		8:56 PM	9:10 PM
8:15 PM	8:24 PM		8:29 PM	8:45 PM	9:00 PM							
9:15 PM	9:24 PM		9:29 PM	9:45 PM	10:00 PM							

Route 23 - Millertown: SATURDAYS

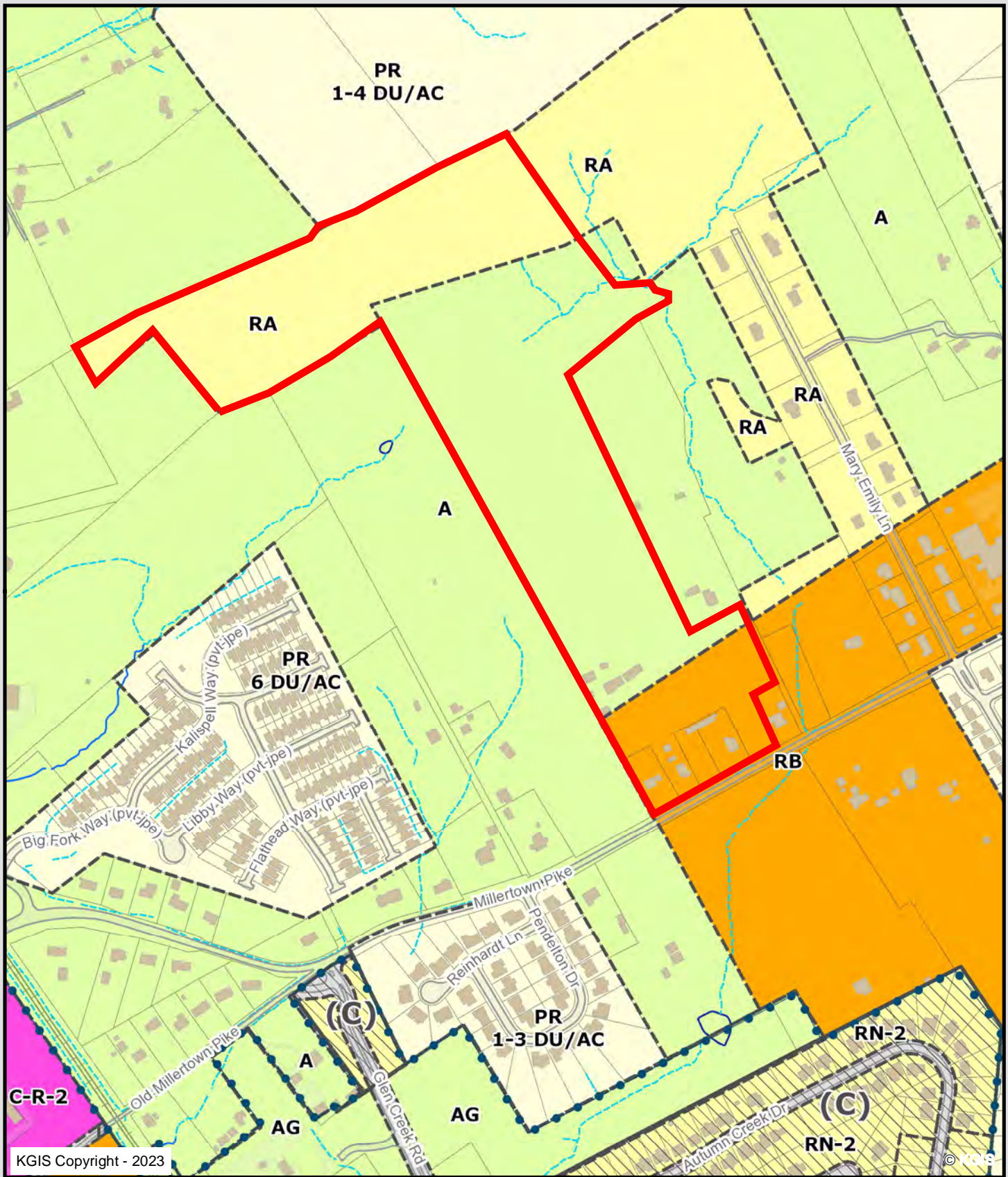
Going away from downtown						Going toward downtown						
Knoxville Station Bay I	Grainger @ Sixth	Broadway Towers	Nadine @ Washington Pike	Walmart	Charlie Haun @ Washingt on Pike	Goes on to serve	Charlie Haun @ Washingt on Pike	Walmart	Washington Pike @ Fairview	Broadway Towers	Sixth @ Grainger	Knoxville Station Bay I
1	2	3	4	5	6		6	7	8	9	10	11
							7:30 AM	7:37 AM	7:49 AM		7:56 AM	8:10 AM
7:15 AM	7:24 AM		7:29 AM	7:45 AM	8:00 AM	Route 33	8:30 AM	8:37 AM	8:49 AM		8:56 AM	9:10 AM
8:15 AM	8:24 AM		8:29 AM	8:45 AM	9:00 AM	Route 33	9:30 AM	9:37 AM	9:49 AM		9:56 AM	10:10 AM
9:15 AM	9:24 AM		9:29 AM	9:45 AM	10:00 AM	Route 33	10:30 AM	10:37 AM	10:49 AM		10:56 AM	11:10 AM
10:15 AM	10:24 AM		10:29 AM	10:45 AM	11:00 AM	Route 33	11:30 AM	11:37 AM	11:49 AM		11:56 AM	12:10 PM
11:15 AM	11:24 AM		11:29 AM	11:45 AM	12:00 PM	Route 33	12:30 PM	12:37 PM	12:49 PM		12:56 PM	1:10 PM
12:15 PM	12:24 PM		12:29 PM	12:45 PM	1:00 PM	Route 33	1:30 PM	1:37 PM	1:49 PM		1:56 PM	2:10 PM
1:15 PM	1:24 PM		1:29 PM	1:45 PM	2:00 PM	Route 33	2:30 PM	2:37 PM	2:49 PM		2:56 PM	3:10 PM
2:15 PM	2:24 PM		2:29 PM	2:45 PM	3:00 PM	Route 33	3:30 PM	3:37 PM	3:49 PM		3:56 PM	4:10 PM
3:15 PM	3:24 PM		3:29 PM	3:45 PM	4:00 PM	Route 33	4:30 PM	4:37 PM	4:49 PM		4:56 PM	5:10 PM
4:15 PM	4:24 PM		4:29 PM	4:45 PM	5:00 PM	Route 33	5:30 PM	5:37 PM	5:49 PM		5:56 PM	6:10 PM
5:15 PM	5:24 PM		5:29 PM	5:45 PM	6:00 PM	Route 33	6:30 PM	6:37 PM	6:49 PM		6:56 PM	7:10 PM
6:15 PM	6:24 PM		6:29 PM	6:45 PM	7:00 PM	Route 33	7:30 PM	7:37 PM	7:49 PM		7:56 PM	8:10 PM
7:15 PM	7:24 PM		7:29 PM	7:45 PM	8:00 PM	Route 33	8:30 PM	8:37 PM	8:49 PM		8:56 PM	9:10 PM
8:15 PM	8:24 PM		8:29 PM	8:45 PM	9:00 PM							
9:15 PM	9:24 PM		9:29 PM	9:45 PM	10:00 PM							

Route 23 - Millertown: SUNDAYS

Going away from downtown						Going toward downtown						
Knoxville Station Bay I	Grainger @ Sixth	Broadway Towers	Nadine @ Washington Pike	Walmart	Charlie Haun @ Washingt on Pike	Goes on to serve	Charlie Haun @ Washingt on Pike	Walmart	Washington Pike @ Fairview	Broadway Towers	Sixth @ Grainger	Knoxville Station Bay
1	2	3	4	5	6		6	7	8	9	10	11
							7:30 AM	7:37 AM	7:49 AM		7:56 AM	8:10 AM
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8:15 AM	8:24 AM		8:29 AM	8:45 AM	9:00 AM	Route 33	9:30 AM	9:37 AM	9:49 AM		9:56 AM	10:10 AM
9:15 AM	9:24 AM		9:29 AM	9:45 AM	10:00 AM	Route 33	10:30 AM	10:37 AM	10:49 AM		10:56 AM	11:10 AM
10:15 AM	10:24 AM		10:29 AM	10:45 AM	11:00 AM	Route 33	11:30 AM	11:37 AM	11:49 AM		11:56 AM	12:10 PM
11:15 AM	11:24 AM		11:29 AM	11:45 AM	12:00 PM	Route 33	12:30 PM	12:37 PM	12:49 PM		12:56 PM	1:10 PM
12:15 PM	12:24 PM		12:29 PM	12:45 PM	1:00 PM	Route 33	1:30 PM	1:37 PM	1:49 PM		1:56 PM	2:10 PM
1:15 PM	1:24 PM		1:29 PM	1:45 PM	2:00 PM	Route 33	2:30 PM	2:37 PM	2:49 PM		2:56 PM	3:10 PM
2:15 PM	2:24 PM		2:29 PM	2:45 PM	3:00 PM	Route 33	3:30 PM	3:37 PM	3:49 PM		3:56 PM	4:10 PM
3:15 PM	3:24 PM		3:29 PM	3:45 PM	4:00 PM	Route 33	4:30 PM	4:37 PM	4:49 PM		4:56 PM	5:10 PM
4:15 PM	4:24 PM		4:29 PM	4:45 PM	5:00 PM							
5:15 PM	5:24 PM		5:29 PM	5:45 PM	6:00 PM							

APPENDIX D

ZONING MAP



Existing Zoning Map

10.5.2023

Knoxville - Knox County - KUB Geographic Information System



Printed: 10/6/2023 at 3:16:34 PM



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APPENDIX E

MANUAL TRAFFIC COUNT DATA

TRAFFIC COUNT DATA

Major Street: Millertown Pike (EB and WB)

Minor Street: Sable Point Lane (NB) / Mary Emily Lane (SB)

Traffic Control: Stop Signs on Minor Streets

10/5/2023 (Thursday)

Mostly Cloudy and Warm

Conducted by: Ajax Engineering

	Mary Emily Lane			Millertown Pike			Sable Point Lane			Millertown Pike				
TIME BEGIN	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND			VEHICLE TOTAL	PEAK HOUR
	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT		
7:00 AM	0	0	4	3	66	0	24	0	5	1	11	2	116	7:15 AM - 8:15 AM
7:15 AM	0	0	0	3	123	0	37	0	2	0	12	4	181	
7:30 AM	0	0	4	3	150	0	19	0	3	0	30	2	211	
7:45 AM	0	0	0	5	98	0	18	0	3	1	32	10	167	
8:00 AM	1	0	1	2	71	0	21	0	3	2	27	8	136	
8:15 AM	0	0	1	0	73	1	14	0	0	1	32	8	130	
8:30 AM	0	0	1	0	52	0	12	0	1	0	40	7	113	
8:45 AM	0	0	0	0	65	1	8	0	2	0	24	6	106	
TOTAL	1	0	11	16	698	2	153	0	19	5	208	47	1160	
2:00 PM	1	0	2	1	44	1	8	0	1	1	57	4	120	
2:15 PM	0	0	0	1	38	0	15	0	2	0	73	13	142	
2:30 PM	0	0	1	2	41	0	12	0	0	0	65	6	127	
2:45 PM	0	0	0	3	36	0	6	0	1	2	55	10	113	
3:00 PM	0	0	2	5	62	0	11	0	1	0	83	9	173	
3:15 PM	0	0	0	0	49	0	5	0	0	2	92	10	158	
3:30 PM	0	0	1	1	39	0	10	0	1	2	79	18	151	
3:45 PM	0	0	0	2	46	0	9	0	1	1	91	21	171	
4:00 PM	1	0	0	2	49	0	13	1	1	1	96	20	184	
4:15 PM	1	0	3	0	64	0	8	0	1	0	76	18	171	
4:30 PM	0	0	0	1	67	1	8	0	2	3	96	16	194	
4:45 PM	0	0	1	1	63	0	10	0	1	0	104	17	197	4:45 PM - 5:45 PM
5:00 PM	0	0	0	2	59	0	2	0	3	1	92	21	180	
5:15 PM	0	0	0	2	64	0	11	0	3	3	125	20	228	
5:30 PM	0	1	0	1	66	0	16	0	1	2	103	19	209	
5:45 PM	0	0	0	1	52	1	6	0	2	2	104	24	192	
TOTAL	3	1	10	25	839	3	150	1	21	20	1391	246	2710	

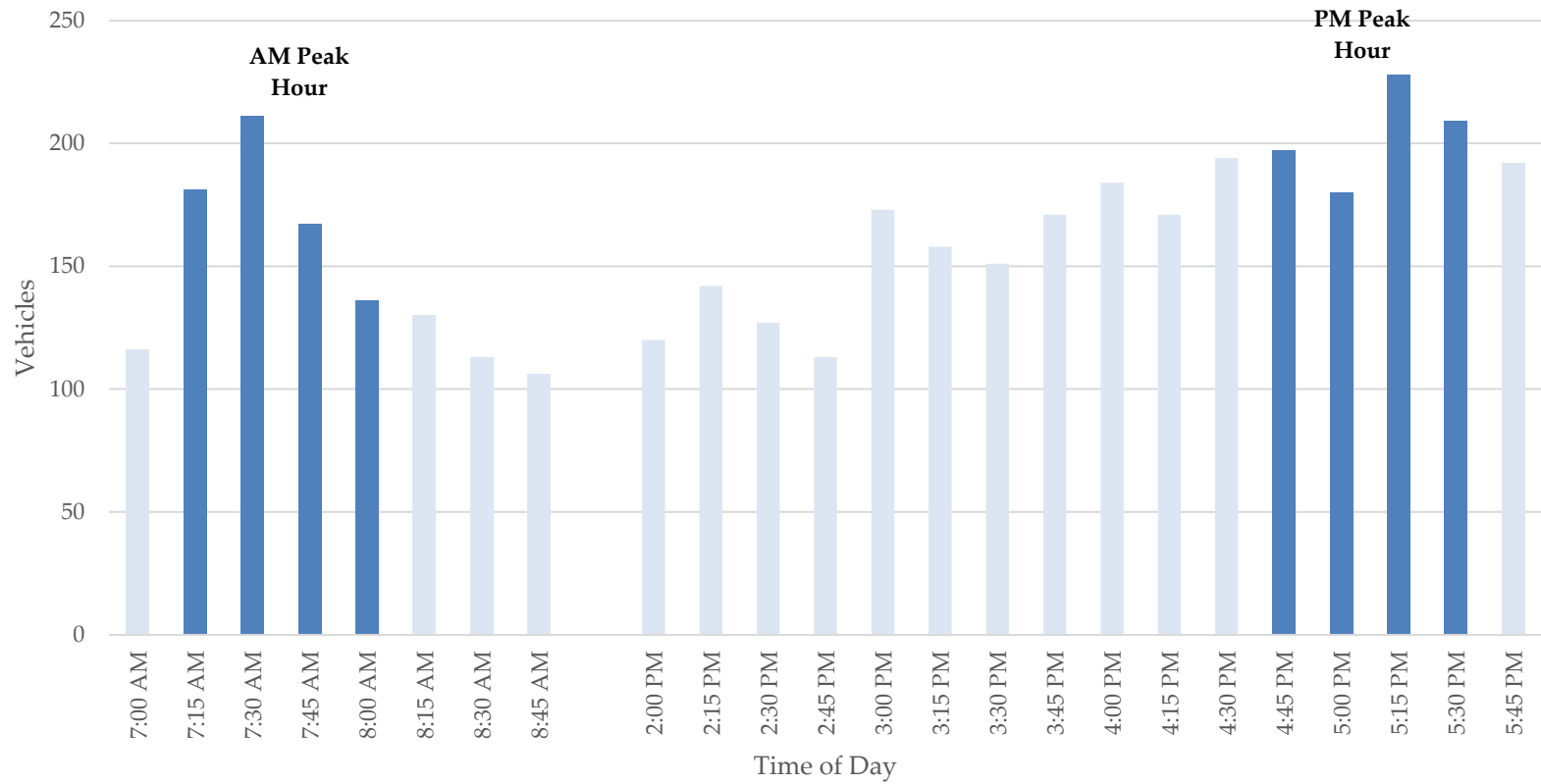
2023 AM Peak Hour	7:15 AM - 8:15 AM
-------------------	-------------------

	Mary Emily Lane			Millertown Pike			Sable Point Lane			Millertown Pike		
TIME	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND		
BEGIN	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT
7:15 AM	0	0	0	3	123	0	37	0	2	0	12	4
7:30 AM	0	0	4	3	150	0	19	0	3	0	30	2
7:45 AM	0	0	0	5	98	0	18	0	3	1	32	10
8:00 AM	1	0	1	2	71	0	21	0	3	2	27	8
TOTAL	1	0	5	13	442	0	95	0	11	3	101	24
PHF	0.25	-	0.31	0.65	0.74	-	0.64	-	0.92	0.38	0.79	0.60
TRUCK %	0.0%	0.0%	0.0%	18.2%	0.7%	0.0%	0.0%	0.0%	22.2%	0.0%	5.2%	4.3%

2023 PM Peak Hour	4:45 PM - 5:45 PM
-------------------	-------------------

[illegible]

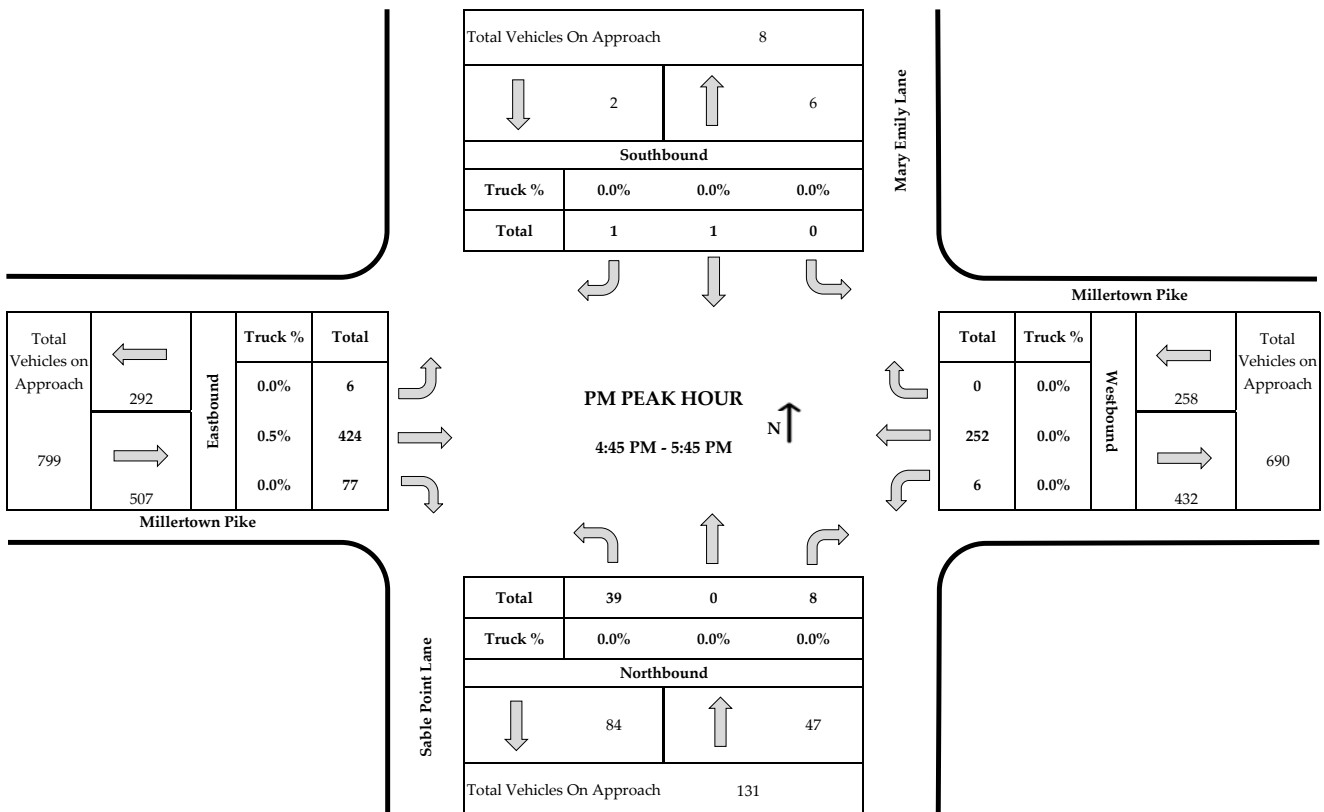
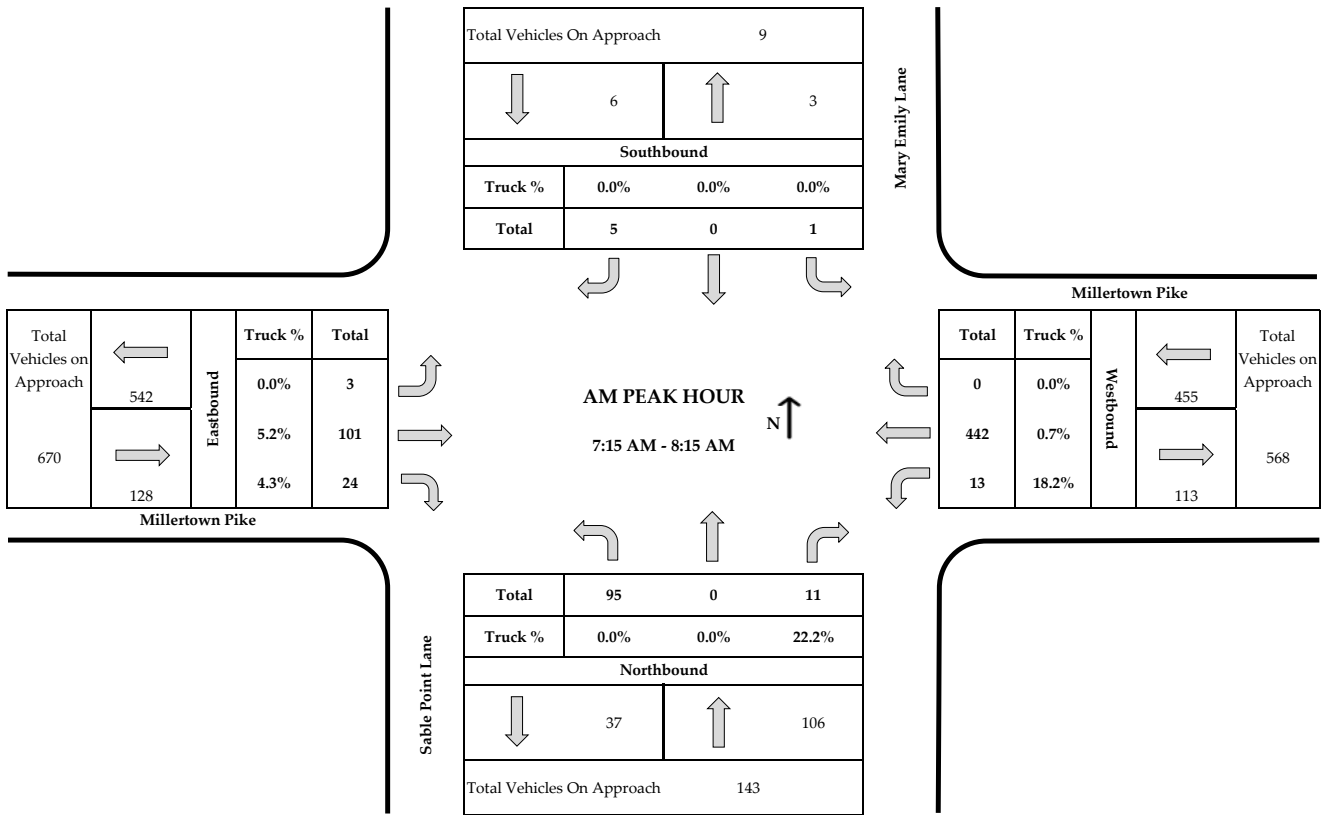
Millertown Pike at Sable Point Lane and Mary Emily Lane
Intersection Traffic Count Totals
10/5/2023



PEAK HOUR DATA

Major Street: Millertown Pike (EB and WB)
 Minor Street: Sable Point Lane (NB) / Mary Emily Lane (SB)
 Traffic Control: Stop Signs on Minor Streets

10/5/2023 (Thursday)
 Mostly Cloudy and Warm
 Conducted by: Ajax Engineering



APPENDIX F

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

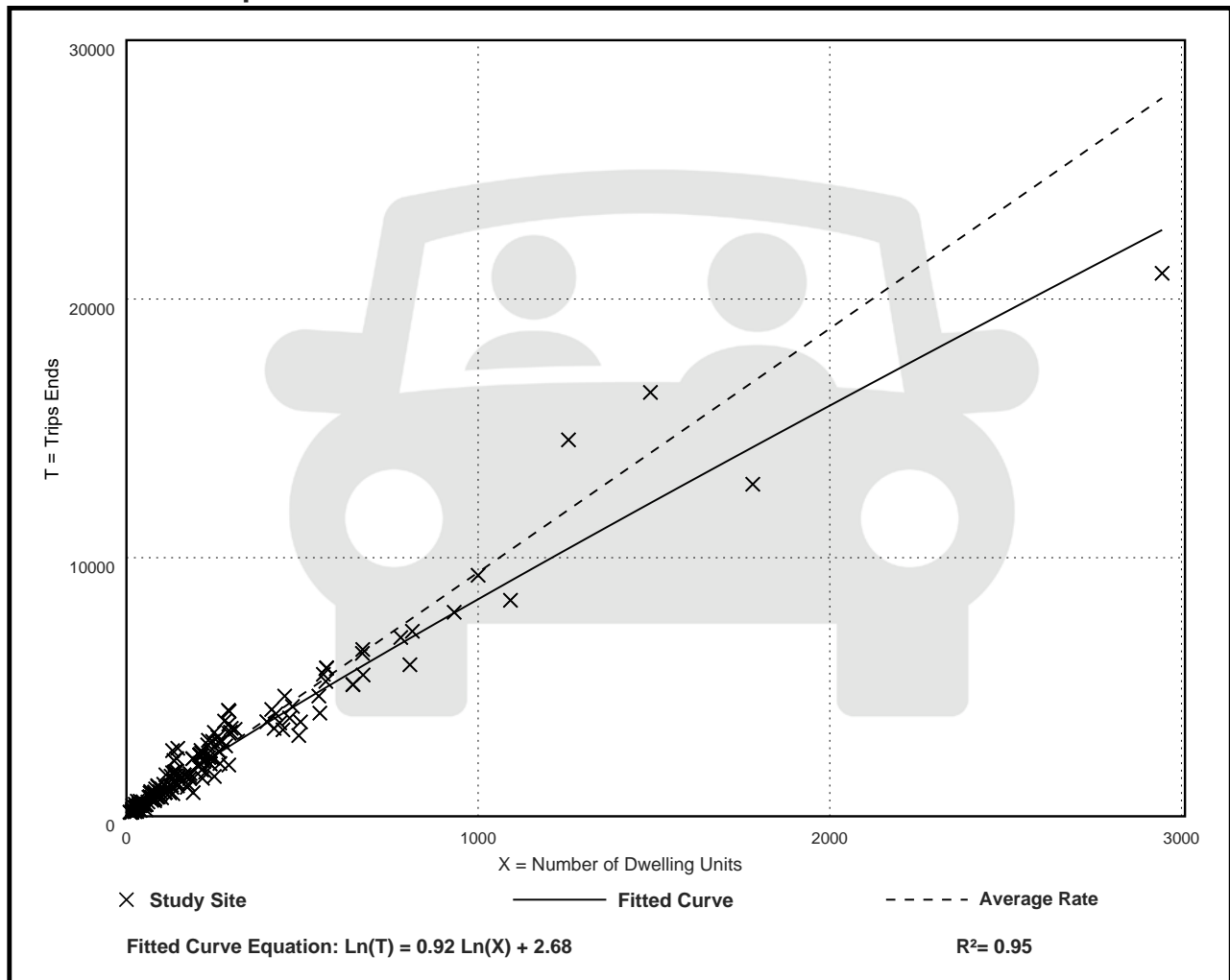
Avg. Num. of Dwelling Units: 246

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

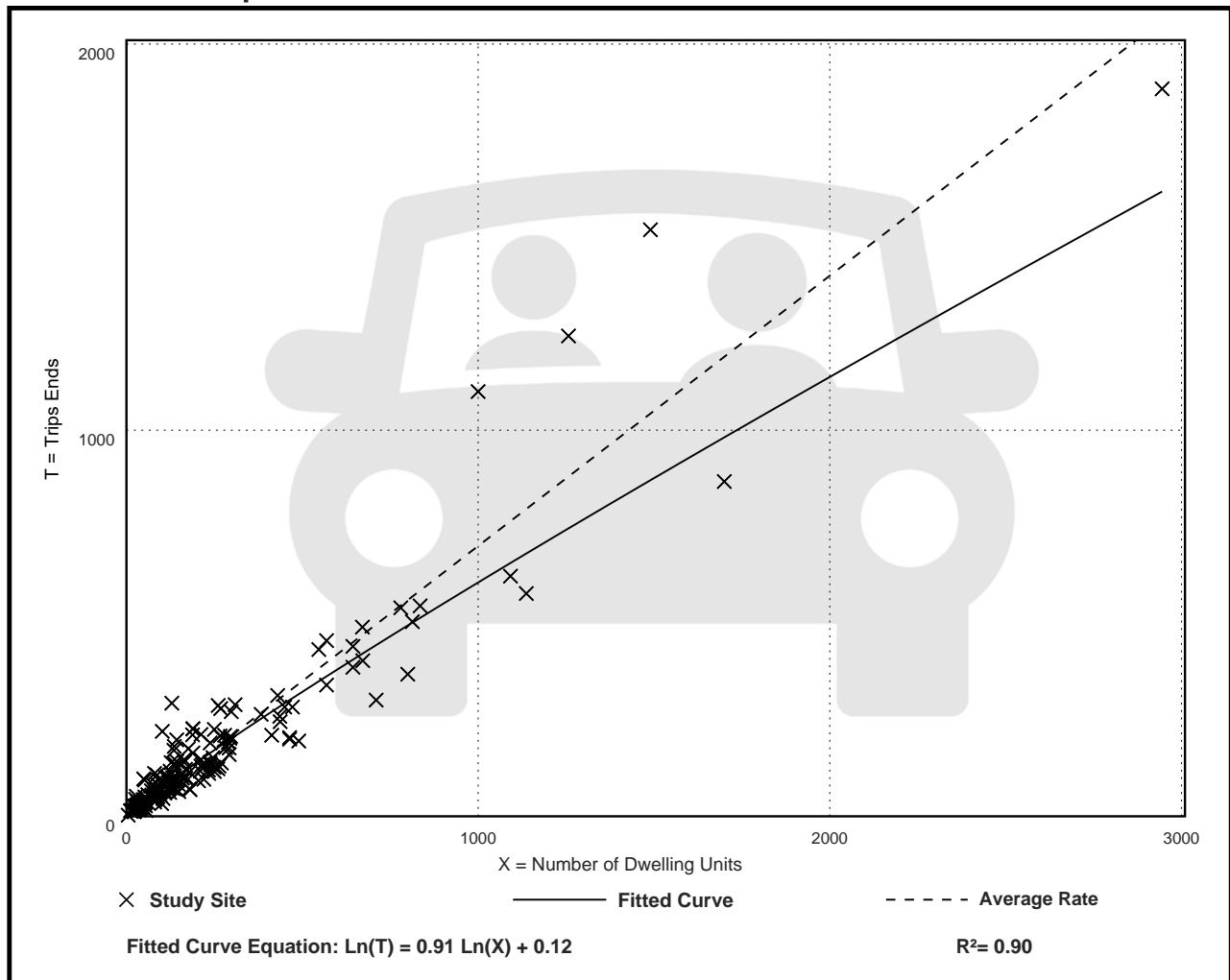
Avg. Num. of Dwelling Units: 226

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

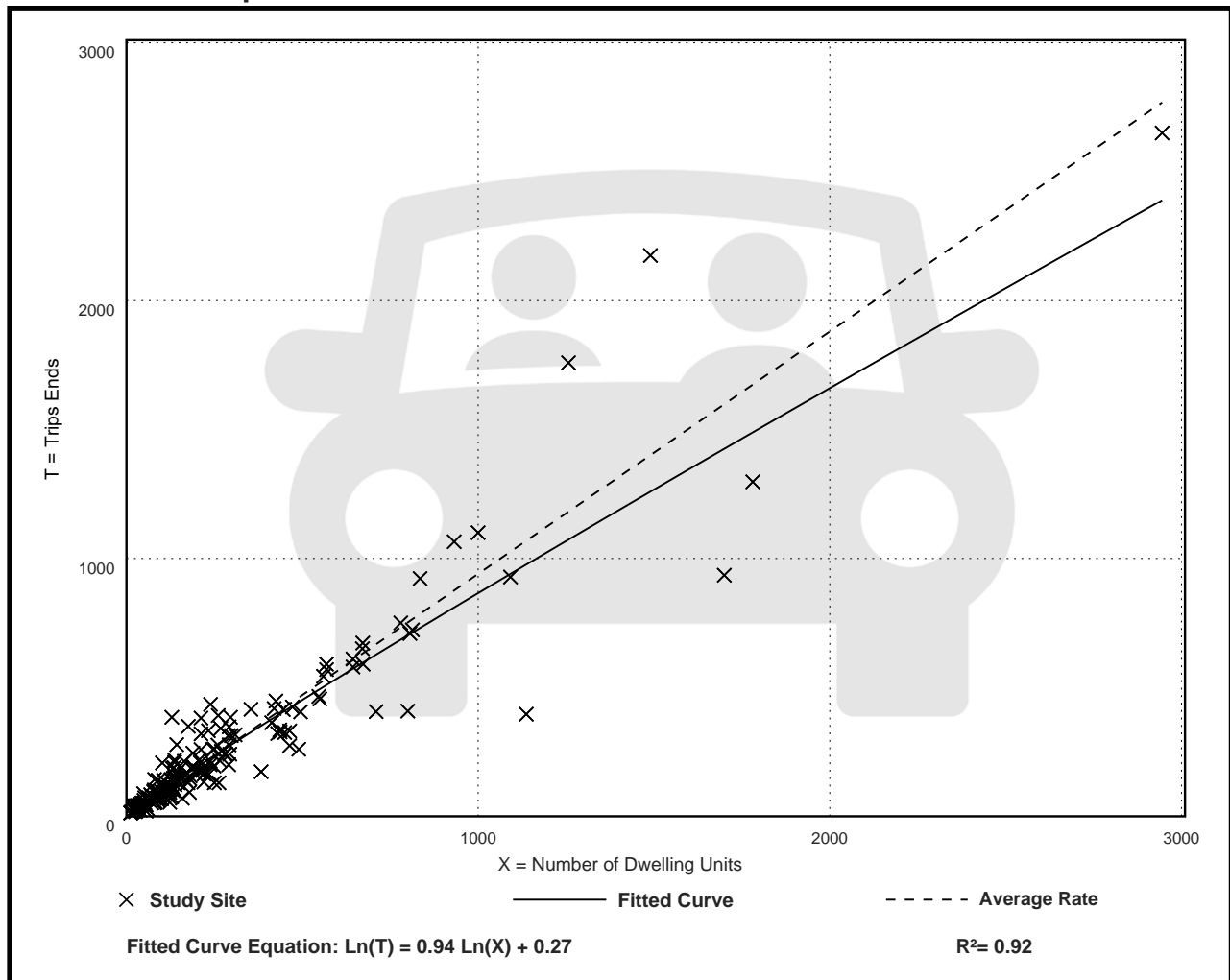
Avg. Num. of Dwelling Units: 248

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 MILLERTOWN PIKE SUBDIVISION

91 Single-Family Detached Homes

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	91 Houses	925	25%	75%		63%	37%	
				17	51	68	57	34	91
Total New Volume Site Trips			925	17	51	68	57	34	91

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

TRIP GENERATION FOR MILLERTOWN PIKE SUBDIVISION

91 Single-Family Detached Houses

91 Residential Houses = X

Weekday:

Fitted Curve Equation: $\ln(T) = 0.92 \ln(X) + 2.68$

$$\ln(T) = 0.92 * 4.51 + 2.68$$

$$\ln(T) = 6.83$$

$$T = \underline{\underline{925 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: $\ln(T) = 0.91 \ln(X) + 0.12$

$$T = 0.91 * 5 + 0.12$$

$$\ln(T) = 4.22$$

$$T = \underline{\underline{68 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: $\ln(T) = 0.94 \ln(X) + 0.27$

$$\ln(T) = 0.94 * 4.51 + 0.27$$

$$\ln(T) = 4.51$$

$$T = \underline{\underline{91 \text{ trips}}}$$

TRIP GENERATION FOR MILLERTOWN PIKE SUBDIVISION

89 Single-Family Detached Homes Entering & Exiting at the Proposed Entrance

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	89 Houses	906	25%	75%		63%	37%	
				17	50	67	56	33	89
Total New Volume Site Trips			906	17	50	67	56	33	89

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

TRIP GENERATION FOR MILLERTOWN PIKE SUBDIVISION

89 Single-Family Detached Homes Entering & Exiting at the Proposed Entrance

89 Residential Houses = X

Weekday:

Fitted Curve Equation: $\ln(T) = 0.92 \ln(X) + 2.68$

$$\ln(T) = 0.92 * 4.49 + 2.68$$

$$\ln(T) = 6.81$$

$$T = \underline{\underline{906 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: $\ln(T) = 0.91 \ln(X) + 0.12$

$$T = 0.91 * 4 + 0.12$$

$$\ln(T) = 4.20$$

$$T = \underline{\underline{67 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: $\ln(T) = 0.94 \ln(X) + 0.27$

$$\ln(T) = 0.94 * 4.49 + 0.27$$

$$\ln(T) = 4.49$$

$$T = \underline{\underline{89 \text{ trips}}}$$

APPENDIX G

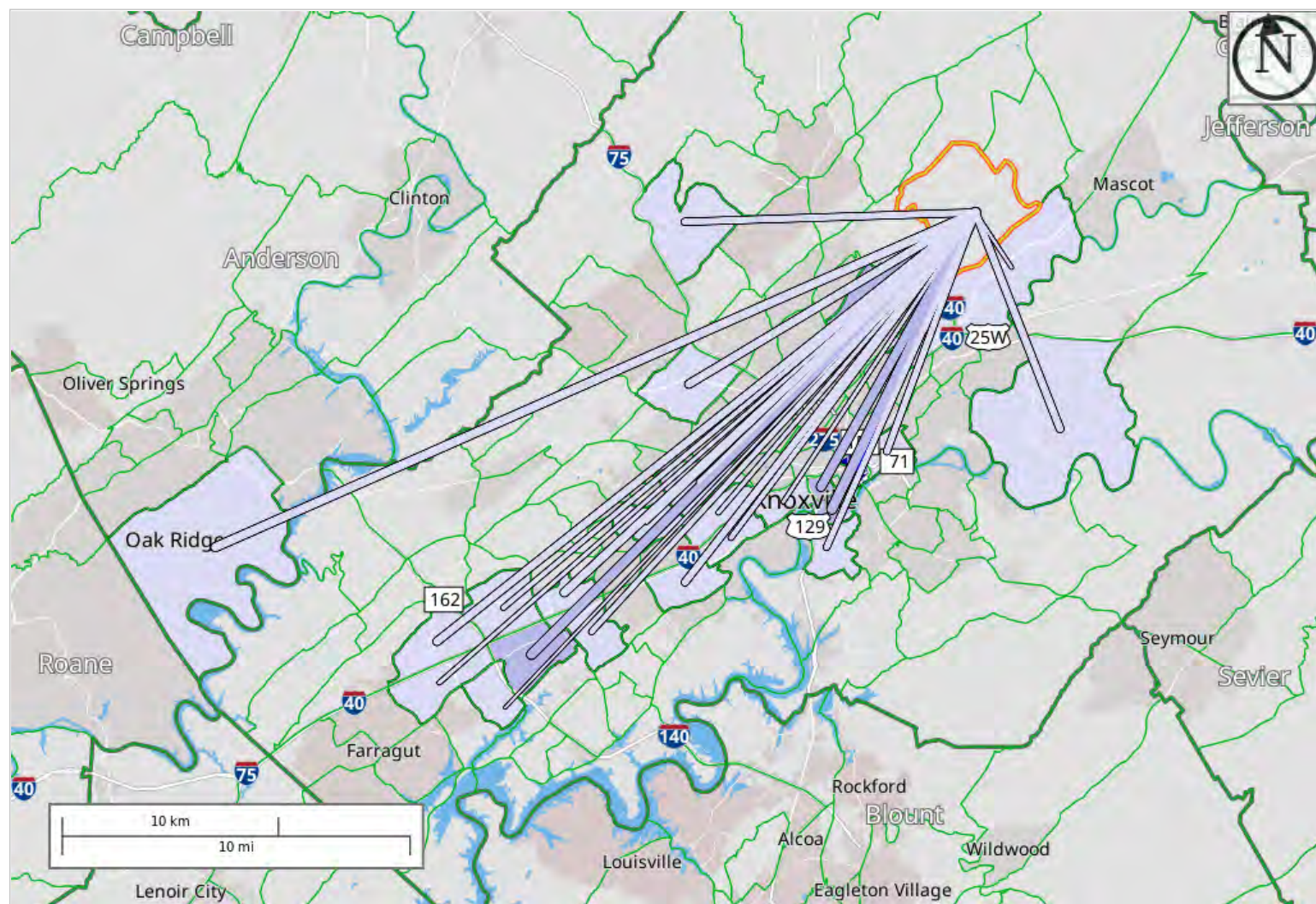
2020 CENSUS BUREAU DATA

Work Destination Report - Home Selection Area to Work Census Tracts
All Jobs for All Workers in 2020

Created by the U.S. Census Bureau's OnTheMap <https://onthemap.ces.census.gov> on 10/06/2023

Counts of All Jobs from Home Selection Area to Work Census Tracts in 2020

All Workers



Map Legend








Job Count

- 145 - 165
- 124 - 144
- 103 - 123
- 82 - 102
- 61 - 81
- 40 - 60
- 18 - 39

Selection Areas

 Home Area

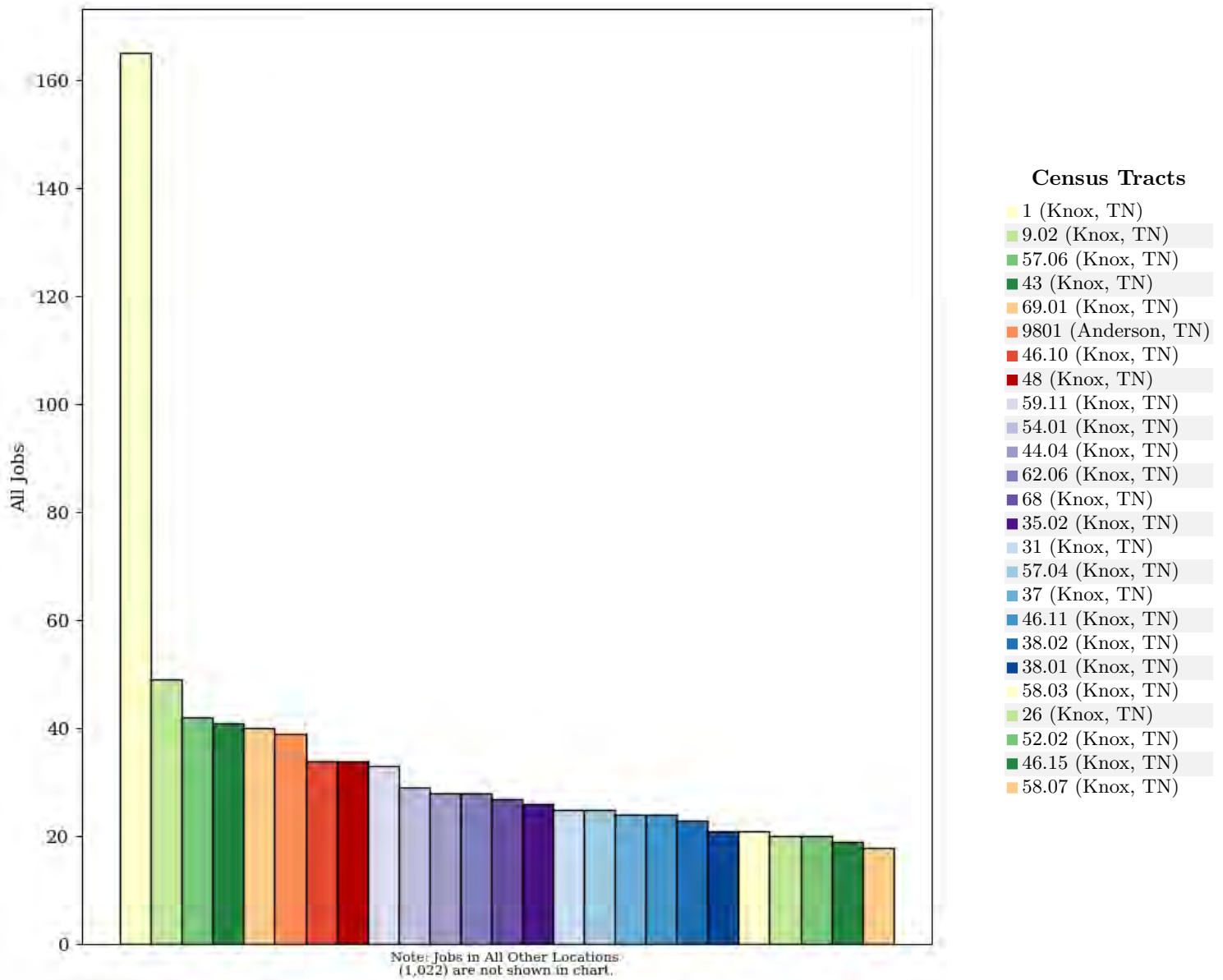
Job Count

 145 - 165
 124 - 144
 103 - 123
 82 - 102
 61 - 81
 40 - 60
 18 - 39



All Jobs from Home Selection Area to Work Census Tracts in 2020

All Workers



All Jobs from Home Selection Area to Work Census Tracts in 2020

All Workers

Census Tracts as Work Destination Area	2020	
	Count	Share
All Census Tracts	1,877	100.0
1 (Knox, TN)	165	8.8
9.02 (Knox, TN)	49	2.6
57.06 (Knox, TN)	42	2.2
43 (Knox, TN)	41	2.2
69.01 (Knox, TN)	40	2.1
9801 (Anderson, TN)	39	2.1
46.10 (Knox, TN)	34	1.8
48 (Knox, TN)	34	1.8
59.11 (Knox, TN)	33	1.8
54.01 (Knox, TN)	29	1.5

Census Tracts as Work Destination Area	2020	
	Count	Share
44.04 (Knox, TN)	28	1.5
62.06 (Knox, TN)	28	1.5
68 (Knox, TN)	27	1.4
35.02 (Knox, TN)	26	1.4
31 (Knox, TN)	25	1.3
57.04 (Knox, TN)	25	1.3
37 (Knox, TN)	24	1.3
46.11 (Knox, TN)	24	1.3
38.02 (Knox, TN)	23	1.2
38.01 (Knox, TN)	21	1.1
58.03 (Knox, TN)	21	1.1
26 (Knox, TN)	20	1.1
52.02 (Knox, TN)	20	1.1
46.15 (Knox, TN)	19	1.0
58.07 (Knox, TN)	18	1.0
All Other Locations	1,022	54.4

Additional Information

Analysis Settings

Analysis Type	Destination
Destination Type	Census Tracts
Selection area as	Home
Year(s)	2020
Job Type	All Jobs
Selection Area	52.03 (Knox, TN) from Census Tracts
Selected Census Blocks	43
Analysis Generation Date	10/06/2023 14:46 - OnTheMap 6.23.3
Code Revision	a0c6cbd8bd5ffa750ec0bd14d6c4d02f0c338544
LODES Data Vintage	20230321_1647

Data Sources

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2nd Quarter of 2002-2020).

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 H

CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 11)

PROJECTED CONDITIONS (WITH THE PROJECT)




HCM 2010 TWSC

4: Millertown Pike & Proposed Entrance

10/10/2023

Intersection

Int Delay, s/veh 0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	11	144	613	6	5	45
Future Vol, veh/h	11	144	613	6	5	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-2	-2	-	-2	-
Peak Hour Factor	90	79	74	90	90	90
Heavy Vehicles, %	0	5	1	0	0	0
Mvmt Flow	12	182	828	7	6	50

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	835	0	0 1038 832
Stage 1	-	-	- 832 -
Stage 2	-	-	- 206 -
Critical Hdwy	4.1	-	- 6 6
Critical Hdwy Stg 1	-	-	- 5 -
Critical Hdwy Stg 2	-	-	- 5 -
Follow-up Hdwy	2.2	-	- 3.5 3.3
Pot Cap-1 Maneuver	807	-	- 290 390
Stage 1	-	-	- 472 -
Stage 2	-	-	- 853 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	807	-	- 285 390
Mov Cap-2 Maneuver	-	-	- 285 -
Stage 1	-	-	- 464 -
Stage 2	-	-	- 853 -




Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	16.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	807	-	-	-	376
HCM Lane V/C Ratio	0.015	-	-	-	0.148
HCM Control Delay (s)	9.5	0	-	-	16.2
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.5

HCM 2010 TWSC

4: Millertown Pike & Proposed Entrance

10/10/2023

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	575	332	6	5	28
Future Vol, veh/h	50	575	332	6	5	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-2	-2	-	-2	-
Peak Hour Factor	90	85	95	90	90	90
Heavy Vehicles, %	0	1	0	0	0	0
Mvmt Flow	56	676	349	7	6	31
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	356	0	-	0	1141	353
Stage 1	-	-	-	-	353	-
Stage 2	-	-	-	-	788	-
Critical Hdwy	4.1	-	-	-	6	6
Critical Hdwy Stg 1	-	-	-	-	5	-
Critical Hdwy Stg 2	-	-	-	-	5	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1214	-	-	-	254	709
Stage 1	-	-	-	-	744	-
Stage 2	-	-	-	-	493	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1214	-	-	-	235	709
Mov Cap-2 Maneuver	-	-	-	-	235	-
Stage 1	-	-	-	-	689	-
Stage 2	-	-	-	-	493	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.6	0		12.1		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1214	-	-	-	543	
HCM Lane V/C Ratio	0.046	-	-	-	0.068	
HCM Control Delay (s)	8.1	0	-	-	12.1	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2	

APPENDIX I

KNOX COUNTY TURN LANE VOLUME THRESHOLD WORKSHEETS

TABLE 5A

LEFT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

(If the left-turn volume exceeds the table value a left -turn lane is needed)

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149	250	180	140	110	80	70
150 - 199	200	140	105	90	70	60
200 - 249	160	115	85	75	65	55
250 - 299	130	100	75	65	60	50
300 - 349	110	85	60	55	50	45
350 - 399	100	75	55	50	45	40
400 - 449	90	65	50	45	40	35
450 - 499	80	55	45	40	35	30
500 - 549	70	45	35	35	30	25
550 - 599	60	35	30	30	25	20
600 - 649	55	30	25	25	20	15
650 - 699	50	25	20	20	15	10
700 - 749	45	20	15	15	10	5
750 or More	40	15	10	10	5	0

Millertown Pike at the
Proposed Entrance

2027 Projected AM
EB Left Turns = 11

Left Turn Lane NOT
Warranted

$$613 + 6 = 619$$

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	=/ > 600
100 - 149	70	60	50	45	40	35
150 - 199	60	55	45	40	35	30
200 - 249	55	50	40	35	30	30
250 - 299	50	45	35	30	30	30
300 - 349	45	40	35	30	25	25
350 - 399	40	35	30	25	25	20
400 - 449	35	30	30	25	20	20
450 - 499	30	25	25	20	20	20
500 - 549	25	25	20	20	20	15
550 - 599	25	20	20	20	20	15
600 - 649	25	20	20	20	20	15
650 - 699	20	20	20	20	20	15
700 - 749	20	20	20	15	15	15
750 or More	20	20	20	15	15	15

* Or through volume only if a right-turn lane exists

TABLE 5B

**RIGHT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH**

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99						
100 - 149 150 - 199						
200 - 249 250 - 299					Yes	Yes Yes
300 - 349 350 - 399			Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499		Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
6 Fewer Than 25 25 - 49 50 - 99				Yes	Yes Yes	Yes Yes
100 - 149 150 - 199		Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

Millertown Pike at the
Proposed Entrance

2027 Projected AM
WB Right Turns = 6

Right Turn Lane NOT
Warranted

* Or through volume only if a left-turn lane exists.

TABLE 5A

**LEFT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH**

(If the left-turn volume exceeds the table value a left -turn lane is needed)

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149	250	180	140	110	80	70
150 - 199	200	140	105	90	70	60
200 - 249	160	115	85	75	65	55
250 - 299	130	100	75	65	60	50
300 - 349	110	90	70	60	55	45
350 - 399	100	80	65	55	50	40
400 - 449	90	70	60	50	45	35
450 - 499	80	65	55	45	40	30
500 - 549	70	60	45	35	35	25
550 - 599	65	55	40	35	30	25
600 - 649	60	45	35	30	25	25
650 - 699	55	35	35	30	25	20
700 - 749	50	35	30	25	20	20
750 or More	45	35	25	25	20	20

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	=/ > 600
100 - 149	70	60	50	45	40	35
150 - 199	60	55	45	40	35	30
200 - 249	55	50	40	35	30	30
250 - 299	50	45	35	30	25	30
300 - 349	45	40	35	30	25	25
350 - 399	40	35	30	25	25	20
400 - 449	35			25	20	20
450 - 499	30			20	20	20
500 - 549	25			20	20	15
550 - 599	25			20	20	15
600 - 649	25			20	20	15
650 - 699	20			20	20	15
700 - 749	20			15	15	15
750 or More	20			15	15	15

$$332 + 6 = 338$$

575

Millertown Pike at the
Proposed Entrance

2027 Projected PM
EB Left Turns = 50

Left Turn Lane
Warranted

* Or through volume only if a right-turn lane exists

TABLE 5B

**RIGHT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH**

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
6 Fewer Than 25 25 - 49 50 - 99						
100 - 149 150 - 199						
200 - 249 250 - 299					Yes	Yes Yes
300 - 349 350 - 399				Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499				Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

Millertown Pike at the
Proposed Entrance

2027 Projected PM
WB Right Turns = 6

Right Turn Lane NOT
Warranted

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25 25 - 49 50 - 99				Yes	Yes Yes	Yes Yes
100 - 149 150 - 199		Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

* Or through volume only if a left-turn lane exists.

APPENDIX J

SIMTRAFFIC VEHICLE QUEUE WORKSHEETS

Intersection: 4: Millertown Pike & Proposed Entrance

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	53	54
Average Queue (ft)	7	26
95th Queue (ft)	32	51
Link Distance (ft)	254	209
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Intersection: 4: Millertown Pike & Proposed Entrance

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	106	51
Average Queue (ft)	21	20
95th Queue (ft)	73	47
Link Distance (ft)	254	209
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

APPENDIX K

LEFT-TURN LANE TRIGGER POINT THRESHOLD CALCULATIONS

Millertown Pike Subdivision

Left-turn Lane Threshold Trigger Point Calculations

Houses to be Constructed = 89
 Horizon Year = 2027
 Average Annual Traffic Growth Rate = 4%
 Assume Linear Growth/Construction

Year	Houses Built / Year	Round Up	Eastbound Volume on Millertown Pike	Westbound Volumes on Millertown Pike
2023	-	-	507	292
2024	22.25	23	524	302
2025	22.25	23	541	312
2026	22.25	23	558	322
2027	22.25	20	575	332
	89	89		

As shown in Figure 6, in the 2027 PM Peak Hour, 90% of entering traffic is assumed to enter from west and 10% from the east

Year	Houses Built	Entering Generated Trips at Entrance	90% of Entering Trips Turning Left	10% of Entering Trips Turning Right
2023	-	-	-	-
2024	23	16	14	2
2025	46	30	27	3
2026	69	44	40	4
2027	89	56	50	6

Year	Houses Built	Eastbound Left-Turns	Eastbound Volume Thru + Right-Turn	Westbound Volume Thru + Right-Turn	* Threshold for Left-Turn Lane	Threshold Met?
2023	-	-	507	292	-	-
2024	23	14	524	304	30	No
2025	46	27	541	315	30	No
2026	69	40	558	326	25	Yes
2027	89	50	575	338	25	Yes

* From Knox County Table 5a, Left-Turn Lane Volume Thresholds for 2-Lane Roadways with a Prevailing Speed of 36 to 45 mph

Thus, by iterative process, the 47th house constructed would trigger the need for a westbound left-turn lane on Millertown Pike

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